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U.S. Nuclear Regulatory Commission
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Braidwood Station, Units 1 and 2
Facility Operating License Nos. NPF-72 and NPF-77
NRC Docket Nos. STN 50-456 and STN 50-457

Byron Station, Units 1 and 2
Facility Operating License Nos. NPF-37 and NPF-66
NRC Docket Nos. STN 50-454 and STN 50-455

LaSalle County Station, Units 1 and 2
Facility Operating License Nos. NPF-11 and NPF-18
NRC Docket Nos. 50-373 and 50-374

Subject: Submittal of Updated Site-Specific SAFSTOR Decommissioning Cost Estimates for Braidwood Station, Byron Station, and LaSalle County Station

References:
1. Letter from Patrick R. Simpson (Exelon Generation Company, LLC) to U.S. NRC, "Submittal of Braidwood Station Site-Specific SAFSTOR Decommissioning Cost Estimate," dated January 11, 2010
2. Letter from Patrick R. Simpson (Exelon Generation Company, LLC) to U.S. NRC, "Submittal of Byron Station Site-Specific SAFSTOR Decommissioning Cost Estimate," dated November 16, 2009
3. Letter from Patrick R. Simpson (Exelon Generation Company, LLC) to U.S. NRC, "Submittal of LaSalle County Station Site-Specific SAFSTOR Decommissioning Cost Estimate," dated August 27, 2009

In References 1, 2, and 3, Exelon Generation Company, LLC (EGC) submitted site-specific SAFSTOR Decommissioning Cost Estimates (DCEs) for Braidwood Station Units 1 and 2, Byron Station Units 1 and 2, and LaSalle County Station Units 1 and 2. Attached are updated DCEs that have been performed in accordance with EGC's normal practice of updating DCEs every five years.

There are no new regulatory commitments contained in this letter. If you have any questions about this letter, please contact Timothy A. Byam at (630) 657-2818.

Respectfully,

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

Attachments:
1. Braidwood Station, Units 1 and 2 Decommissioning Cost Estimate
2. Byron Station, Units 1 and 2 Decommissioning Cost Estimate
3. LaSalle County Station, Units 1 and 2 Decommissioning Cost Estimate

cc: Regional Administrator - NRC Region III
NRC Senior Resident Inspector – Braidwood Station
NRC Senior Resident Inspector – Byron Station
NRC Senior Resident Inspector – LaSalle County Station

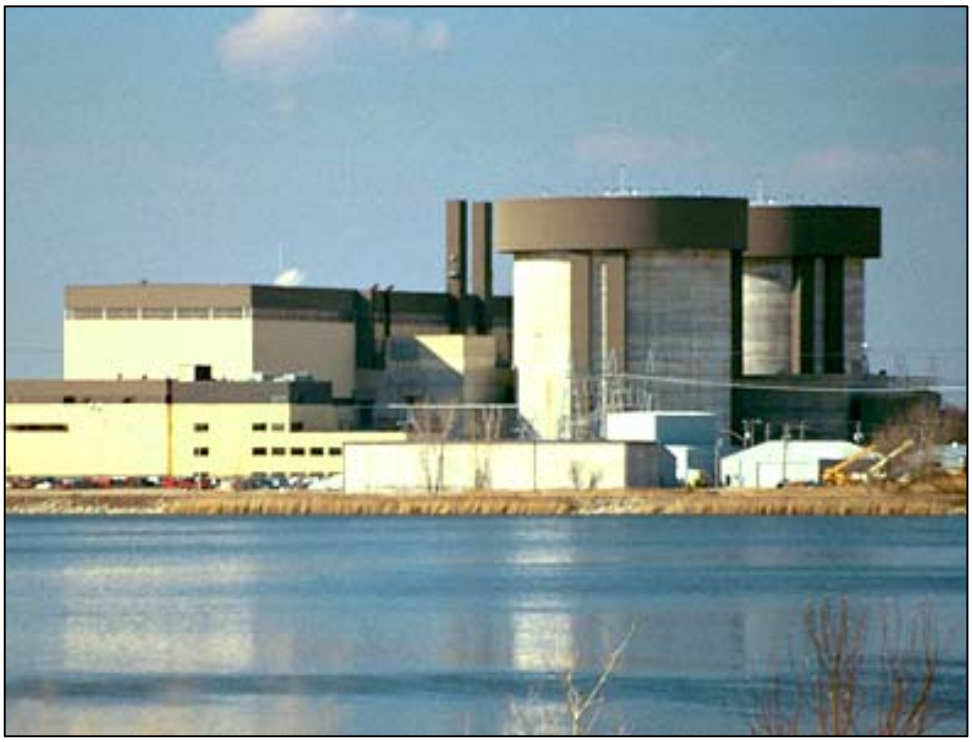
ATTACHMENT 1

Braidwood Station, Units 1 and 2
Decommissioning Cost Estimate

DECOMMISSIONING COST ANALYSIS

for the

BRAIDWOOD NUCLEAR POWER STATION



prepared for

Exelon Generation Company LLC

prepared by

TLG Services, Inc.
Bridgewater, Connecticut

September 2014

APPROVALS

Project Manager	William A. Cloutier, Jr.	12 Sept 2014
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	Francis W. Seymore	**Date**

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REVISION LOG

No.	CRA No.	Date	Item Revised	Reason for Revision
0		08-28-2014		Original Issue
1		09-12-2014	Section 6 text	Clarification to Comparison of the 2009 and 2014 Estimates; specifically on Property Taxes and Decommissioning and Demolition

EXECUTIVE SUMMARY

This report presents estimates of the cost to decommission the Braidwood Nuclear Power Station (Braidwood) for the selected decommissioning scenarios following a scheduled cessation of plant operations. The updated estimates are designed to provide Exelon Generation Company LLC (Exelon) with the information to assess its current decommissioning liability, as it relates to the nuclear station.

The analysis relies upon site-specific, technical information, developed in an evaluation in 2009,[1] and updated to reflect current assumptions pertaining to the disposition of the nuclear units and relevant industry experience in undertaking such projects. The costs are based on several key assumptions in areas of regulation, component characterization, high-level radioactive waste management, low-level radioactive waste disposal, performance uncertainties (contingency) and site restoration requirements.

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

The 2009 inventory, the basis for the decontamination and dismantling requirements and cost, and the decommissioning waste streams, was reviewed for this analysis. No substantive changes were identified to the configuration of the station or site facilities (that would impact decommissioning).

The costs to decommission Braidwood for the scenarios evaluated are tabulated at the end of this section. Costs are reported in 2014 dollars and include monies anticipated to be spent for radiological remediation and operating license termination, spent fuel management, and site restoration activities.

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

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1 "Decommissioning Cost Analysis for the Braidwood Nuclear Power Station," Document No. E16-1555-014, Rev. 0, TLG Services, Inc., October 2009

Consistent with the 2009 analysis, the current cost estimates assume that the shutdown of the nuclear station is a scheduled and pre-planned event (e.g., there is no delay in transitioning the plant and workforce from operations or in obtaining regulatory relief from operating requirements, etc.). The estimates incorporate a minimum cooling period of approximately five and one-half years for the spent fuel in the storage pool at the cessation of Unit 2 operations. In the DECON and SAFSTOR scenarios, any residual fuel remaining in the pool after the cooling period is relocated to an on-site independent spent fuel storage installation (ISFSI) to await transfer to a Department of Energy (DOE) facility (the fuel present in the spent fuel pools or reactors is assumed to remain in the storage pool for the Delayed DECON scenario and transferred directly from the pool to DOE). The estimates also include the dismantling of non-essential structures and limited restoration of the site.

Alternatives and Regulations

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

> DECON is defined as "the alternative in which the equipment, structures, and portions of a facility and site containing radioactive contaminants are removed or decontaminated to a level that permits the property to be released for unrestricted use shortly after cessation of operations."[3]
>
> SAFSTOR is defined as "the alternative in which the nuclear facility is placed and maintained in a condition that allows the nuclear facility to be safely stored and subsequently decontaminated (deferred decontamination) to levels that permit release for unrestricted use."[4] Decommissioning is to be completed within 60 years, although longer time periods will be considered when necessary to protect public health and safety.

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

3 Ibid. Page FR24022, Column 3

4 Ibid.

> ENTOMB is defined as "the alternative in which radioactive contaminants are encased in a structurally long-lived material, such as concrete; the entombed structure is appropriately maintained and continued surveillance is carried out until the radioactive material decays to a level permitting unrestricted release of the property."[5] As with the SAFSTOR alternative, decommissioning is currently required to be completed within 60 years.
>
> The 60-year restriction has limited the practicality for the ENTOMB alternative at commercial reactors that generate significant amounts of long-lived radioactive material. In 1997, the Commission directed its staff to re-evaluate this alternative and identify the technical requirements and regulatory actions that would be necessary for entombment to become a viable option. The resulting evaluation provided several recommendations, however, rulemaking has been deferred based upon several factors (e.g., no licensee has committed to pursuing the entombment option, the unresolved issues associated with the disposition of greater-than-Class C material (GTCC), and the NRC's current priorities) at least until after the additional research studies are complete. The Commission concurred with the staff's recommendation.

In 1996, the NRC amended its decommissioning regulations to clarify ambiguities and codify procedures and terminology as a means of enhancing efficiency and uniformity in the decommissioning process.[6] The amendments allow for greater public participation and better define the transition process from operations to decommissioning. Regulatory Guide 1.184, issued in July 2000, further described the methods and procedures acceptable to the NRC staff for implementing the requirements of the 1996 amendments relating to the initial activities and major phases of the decommissioning process. The costs and schedules presented in this analysis follow the general guidance and processes described in 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]

In 2011, the NRC published amended regulations to improve decommissioning planning and thereby reduce the likelihood that any current operating facility will

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5 Ibid. Page FR24023, Column 2

6 U.S. Code of Federal Regulations, Title 10, Parts 2, 50, and 51, "Decommissioning of Nuclear Power Reactors," NRC, 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

become a legacy site.[8] The amended regulations require licensees to conduct their operations to minimize the introduction of residual radioactivity into the site, which includes the site's subsurface soil and groundwater. Licensees also may be required to perform site surveys to determine whether residual radioactivity is present in subsurface areas and to keep records of these surveys with records important for decommissioning. The amended regulations require licensees to report additional details in their decommissioning cost estimate as well as requiring additional financial reporting and assurances. These additional details are included in this analysis, including the ISFSI decommissioning estimate (Appendix F).

Decommissioning Scenarios

The following scenarios were evaluated and are representative of the alternatives available to the owner. The scenarios assume that the units operate for 60 years, followed by a planned and scheduled shutdown.

1. DECON: The first scenario assumes that the two units are promptly decommissioned as an integrated activity. Spent fuel is relocated from the wet storage pool to the ISFSI so as to facilitate decontamination and dismantling activities within the fuel handling building. Spent fuel storage operations continue at the site, independent of decommissioning operations, until the transfer of the fuel to the DOE is complete, assumed for purposes of this study to be in the year 2078. At that time, the ISFSI is decommissioned and the site released for alternative use.

2. Delayed DECON: In the second scenario, the units are prepared for an abbreviated period of safe-storage. The spent fuel resident in the fuel handling building's storage pool, remains in the pool until it can be transferred to the DOE (i.e., the ISFSI is not used to off-load the pool following the cessation of operations). Spent fuel placed at the ISFSI during operations remains in storage until the pool is emptied at which time the ISFSI is also emptied. Decommissioning is scheduled to commence once the transfer of the fuel to the DOE is complete (i.e., in the year 2078).

3. SAFSTOR: The units are also placed into safe-storage in the third scenario. However, decommissioning is deferred beyond the fuel storage period to the maximum extent permitted by the current regulations. Similar to the DECON alternative, the spent fuel in the wet storage pool is relocated to the ISFSI for interim storage. The units remain in protective storage following the removal

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

of spent fuel from the site. Decommissioning operations commence such that license termination is completed within the required 60-year period. As with the first two scenarios, decommissioning activities at the two units are sequenced and integrated so as to minimize the total duration of the physical dismantling process.

Methodology

The methodology used to develop the estimates described within this document follows the basic approach originally presented in the cost estimating guidelines [9] developed by the Atomic Industrial Forum (now Nuclear Energy Institute). This reference describes a unit factor method for determining decommissioning activity costs. The unit factors used in this analysis incorporate site-specific costs and the latest available information on worker productivity in decommissioning.

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

Contingency

Consistent with standard cost estimating practice, contingencies are applied to the decontamination and dismantling costs as "specific provision for unforeseeable elements of cost within the defined project scope, particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur."[10] 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.

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

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

The use and role of contingency within decommissioning estimates is not a safety factor issue. Safety factors provide additional security and address situations that may never occur. Contingency funds, by contrast, are expected to be fully expended throughout the program. Inclusion of contingency is necessary to provide assurance that sufficient funding will be available to accomplish the intended tasks.

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,[11] and its Amendments of 1985,[12] the states became ultimately responsible for the disposition of low-level radioactive waste generated within their own borders.

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

Disposition of the various waste streams produced by the decommissioning process considered all options and services currently available to Exelon. The majority of the low-level radioactive waste designated for direct disposal (Class A[13]) can be sent to Energy*Solutions*' facility in Clive, Utah. Therefore, disposal costs for Class A waste were based upon Exelon's *Life of Plant Agreement* with Energy*Solutions*. This facility is not licensed to receive the higher activity portion (Classes B and C) of the decommissioning waste stream.

As a proxy for future disposal facilities, waste disposal costs for the higher activity waste (Class B and C) are based upon the last published rate schedule for non-compact waste for the Barnwell facility, adjusted for escalation of the Atlantic Compact rates.

Material exceeding Class C limits (limited to material closest to the reactor core and comprising a small percentage of the total waste volume) is generally not suitable for shallow-land disposal. For purposes of this analysis, GTCC radioactive waste is assumed to be packaged and disposed of in a similar manner to, and at a cost equivalent to that envisioned for the spent fuel. The GTCC is either stored on site with

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

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

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

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).

High-Level Radioactive Waste Management

Congress passed the "Nuclear Waste Policy Act" (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 DOE was to begin accepting spent fuel by January 31, 1998; however, to date no progress in the removal of spent fuel from commercial generating sites has been made.

Today, the country is at an impasse on high-level waste disposal, even with the License Application for a geologic repository submitted by the DOE to the NRC in 2008. The current administration has cut the budget for the repository program while promising to "conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle … and make recommendations for a new plan."[14] Towards this goal, the administration appointed a Blue Ribbon Commission on America's Nuclear Future (Blue Ribbon Commission) to make recommendations for a new plan for nuclear waste disposal. The Blue Ribbon Commission's charter includes a requirement that it consider "[o]ptions for safe storage of used nuclear fuel while final disposition pathways are selected and deployed."[15]

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

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

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14 Blue Ribbon Commission on America's Nuclear Future Charter, http://cybercemetery.unt.edu/archive/brc/20120620215336/http://brc.gov/index.php?q=page/charter

15 Ibid.

16 "Blue Ribbon Commission on America's Nuclear Future, Report to the Secretary of Energy," http://www.brc.gov/sites/default/files/documents/brc_finalreport_jan2012.pdf, p. 32, January 2012

17 Ibid., p.27

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

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

- Sites, designs and licenses, constructs and begins operations of a pilot interim storage facility by 2021 with an initial focus on accepting used nuclear fuel from shut-down reactor sites;
- Advances toward the siting and licensing of a larger interim storage facility to be available by 2025 that will have sufficient capacity to provide flexibility in the waste management system and allows for acceptance of enough used nuclear fuel to reduce expected government liabilities; and
- Makes demonstrable progress on the siting and characterization of repository sites to facilitate the availability of a geologic repository by 2048."[19]

The NRC's review of DOE's license application to construct a geologic repository at Yucca Mountain was suspended in 2011 when the Administration slashed the budget for completing that work. However, the US Court of Appeals for the District of Columbia Circuit recently issued a writ of mandamus (in August 2013) [20] ordering NRC to comply with federal law and restart its review of DOE's Yucca Mountain repository license application to the extent of previously appropriated funding for the review.

Completion of the decommissioning process is dependent upon the DOE's ability to remove spent fuel from the site in a timely manner. DOE's repository program had assumed that spent fuel allocations would be accepted for disposal from the nation's commercial nuclear plants, with limited exceptions, in the order (the "queue") in

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18 "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," U.S. DOE, January 11, 2013

19 Ibid., p.2

20 United States Court of Appeals for the District Of Columbia Circuit, In Re: Aiken County, et al, August 2013 http://www.cadc.uscourts.gov/internet/opinions.nsf/BAE0CF34F762EBD985257BC6004DEB18/$file/11-1271-1451347.pdf

which it was discharged from the reactor.[21] With a large fleet of reactors, Exelon may be able to re-assign allocations between its units to minimize on-site storage costs.

Assuming a 2025 start date for DOE initiating transfer of commercial spent fuel to a federal facility (based upon the proposed timeline for the availability of the larger interim storage facility), the assemblies generated from Braidwood operations are projected to be shipped from the Braidwood site in the years 2074 through 2078 (assuming the cessation of plant operations in 2046 and 2047 for Units 1 and 2, respectively). This equates to 90 multi-purpose canisters (at 32 assemblies per canister), in addition to the 59 on the pad from operations.

An ISFSI, operated under a Part 50 General License (in accordance with 10 CFR 72, Subpart K[22]), has been constructed to support continued plant operations. This analysis assumes that the facility can be expanded to support decommissioning operations (in the DECON and SAFSTOR scenarios).

The spent fuel in the wet storage pools at the cessation of plant operations is expected to be transferred to the ISFSI (DECON and SAFSTOR scenarios) within the first five and one-half years following shutdown. Once the wet storage pool is emptied, the fuel handling building can be either decontaminated and dismantled or prepared for long-term storage. The pool is kept operational in the Delayed DECON scenario until the spent fuel stored in the pools can be transferred to the DOE.

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

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21 U.S. Code of Federal Regulations, Title 10, Part 961.11, Article IV – Responsibilities of the Parties, B. DOE Responsibilities, 5.(a) … DOE shall issue an annual acceptance priority ranking for receipt of SNF and/or HLW at the DOE repository. This priority ranking shall be based on the age of SNF and/or HLW as calculated from the date of discharge of such materials from the civilian nuclear power reactor. The oldest fuel or waste will have the highest priority for acceptance …"

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

Site Restoration

The efficient removal of the contaminated materials at the site will result in damage to many of the site structures. Blasting, coring, drilling, and the other decontamination activities will substantially damage power block structures, potentially weakening the footings and structural supports. Prompt demolition once the license is terminated is clearly the most appropriate and cost-effective option. It is unreasonable to anticipate that these structures would be repaired and preserved after the radiological contamination is removed. The effort to dismantle site structures with a work force already mobilized is more efficient and less costly than if the process were deferred. Experience at shutdown generating stations has shown that plant facilities quickly degrade without maintenance, adding additional expense and creating potential hazards to the public and the demolition work force.

This estimate assumes that some site features will remain following the decommissioning project. These include the existing electrical switchyard, which is assumed to remain functional in support of the regional electrical distribution system. The existing shoreline, canals and ponds will also be left intact.

Consequently, this analysis assumes that non-essential site structures within the restricted access area are removed to a nominal depth of three feet below the local grade level wherever possible. The site is then graded and stabilized.

Summary

The costs to decommission Braidwood were evaluated for several decommissioning scenarios, incorporating the attributes of both the DECON and SAFSTOR decommissioning alternatives. Regardless of the timing of the decommissioning activities, the estimates assume the eventual removal of all the contaminated and activated plant components and structural materials, such that the facility operator may then have unrestricted use of the site with no further requirement for an operating license. Delayed decommissioning is initiated after the spent fuel has been removed from the site and is accomplished within the 60-year period required by current NRC regulations. In the interim, the spent fuel remains in storage at the site until such time that the transfer to a DOE facility can be completed. Once the transfer is complete, the storage facilities are also decommissioned.

The scenarios analyzed for the purpose of generating the estimates are described in Section 2. The assumptions are presented in Section 3, along with schedules of annual expenditures. The major cost contributors are identified in Section 6, with detailed activity costs, waste volumes, and associated manpower requirements

delineated in Appendices C, D, and E. Cost summaries for the various scenarios are provided at the end of this section for the major cost components.

The cost elements in the estimates for the DECON and SAFSTOR alternatives are assigned to one of three subcategories: NRC License Termination (radiological remediation), Spent Fuel Management, and Site Restoration. The subcategory "NRC License Termination" is used to accumulate costs that are consistent with "decommissioning" as defined by the NRC in its financial assurance regulations (i.e., 10 CFR §50.75). The cost reported for this subcategory is generally sufficient to terminate the operating license(s), recognizing that there may be some additional cost impact from spent fuel management. The License Termination cost subcategory also includes costs to decommission the ISFSI (as required by 10 CFR §72.30). Section 3.5.1 provides the basis for the ISFSI decommissioning cost.

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

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

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

As noted within this document, the estimates were developed and costs are presented in 2014 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 station or during the decommissioning period.

SUMMARY OF DECOMMISSIONING COST ELEMENTS
DECON ALTERNATIVE
(thousands of 2014 dollars)

Cost Element	Unit 1	Unit 2	Total
Decontamination	12,717	17,460	30,177
Removal	126,722	173,786	300,508
Packaging	32,108	30,962	63,070
Transportation	18,242	15,679	33,922
Waste Disposal	91,110	84,052	175,162
Off-site Waste Processing	0	0	0
Program Management [1]	261,119	297,626	558,745
Security	55,302	103,985	159,287
Spent Fuel Pool Isolation	0	12,434	12,434
Spent Fuel Management [2]	155,177	153,203	308,380
Insurance and Regulatory Fees	19,643	17,239	36,882
Energy	11,591	12,117	23,708
Characterization and Licensing Surveys	26,318	25,818	52,136
Property Taxes	44,528	43,885	88,413
Miscellaneous Equipment	6,640	6,959	13,599
Site O&M	6,122	5,900	12,022
Total [3]	867,339	1,001,105	1,868,444

Cost Element			
NRC License Termination	549,813	659,003	1,208,816
Spent Fuel Management	239,792	237,817	477,609
Site Restoration	77,734	104,284	182,019
Total [3]	867,339	1,001,105	1,868,444

[1] Includes engineering 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

SUMMARY OF DECOMMISSIONING COST ELEMENTS
DELAYED DECON ALTERNATIVE
(thousands of 2014 dollars)

Cost Element	Unit 1	Unit 2	Total
Decontamination	14,691	21,290	35,981
Removal	131,965	177,458	309,423
Packaging	27,010	26,185	53,195
Transportation	17,022	14,507	31,529
Waste Disposal	81,936	75,286	157,223
Off-site Waste Processing	0	0	0
Program Management [1]	386,503	401,996	788,499
Security	131,571	142,840	274,412
Spent Fuel Pool Isolation	0	12,434	12,434
Spent Fuel Management [2]	102,353	99,315	201,668
Insurance and Regulatory Fees	40,457	37,268	77,725
Energy	25,141	25,805	50,947
Characterization and Licensing Surveys	27,403	26,554	53,957
Property Taxes	49,716	49,071	98,787
Miscellaneous Equipment	13,317	15,871	29,189
Site O&M	8,012	7,790	15,802
Total [3]	1,057,100	1,133,671	2,190,771

Cost Element			
NRC License Termination	599,809	711,318	1,311,127
Spent Fuel Management	379,532	317,892	697,424
Site Restoration	77,759	104,462	182,220
Total [3]	1,057,100	1,133,671	2,190,771

[1] Includes engineering 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

SUMMARY OF DECOMMISSIONING COST ELEMENTS
SAFSTOR ALTERNATIVE
(thousands of 2014 dollars)

Cost Element	Unit 1	Unit 2	Total
Decontamination	14,681	21,267	35,949
Removal	131,998	177,399	309,396
Packaging	26,988	26,163	53,151
Transportation	17,082	14,558	31,640
Waste Disposal	80,752	74,112	154,865
Off-site Waste Processing	0	0	0
Program Management [1]	339,117	373,478	712,596
Security	93,212	140,655	233,867
Spent Fuel Pool Isolation	0	12,434	12,434
Spent Fuel Management [2]	151,935	148,896	300,832
Insurance and Regulatory Fees	57,046	53,759	110,805
Energy	24,420	24,897	49,317
Characterization and Licensing Surveys	27,403	26,554	53,957
Property Taxes	60,856	60,211	121,067
Miscellaneous Equipment	16,976	21,052	38,028
Site O&M	11,861	11,639	23,499
Total [3]	1,054,326	1,187,075	2,241,402

Cost Element			
NRC License Termination	775,904	844,618	1,620,522
Spent Fuel Management	200,054	237,391	437,445
Site Restoration	78,368	105,067	183,435
Total [3]	1,054,326	1,187,075	2,241,402

[1] Includes engineering 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

1. INTRODUCTION

This report presents estimates of the cost to decommission the Braidwood Nuclear Power Station (Braidwood) for the selected decommissioning scenarios following a scheduled cessation of plant operations. The updated estimates are designed to provide Exelon Generation Company LLC (Exelon) with the information to assess its current decommissioning liability, as it relates to the nuclear station.

The analysis relies upon site-specific, technical information, developed in an evaluation in 2009,[1] * and updated to reflect current assumptions pertaining to the disposition of the nuclear units and relevant industry experience in undertaking such projects. The costs are based on several key assumptions in areas of regulation, component characterization, high-level radioactive waste management, low-level radioactive waste disposal, performance uncertainties (contingency) and site restoration requirements.

The analysis is not a comprehensive engineering evaluation, but presents estimates prepared in advance of the detailed planning required to execute the decommissioning of the nuclear unit. It may also not reflect the actual plan to decommission Braidwood; the plan may differ from the assumptions made in this analysis based on facts that exist at the time of decommissioning.

1.1 OBJECTIVES OF STUDY

The objectives of this study are to prepare comprehensive estimates of the cost to decommission Braidwood, to provide a sequence or schedule for the associated activities, and to develop waste stream projections from the decontamination and dismantling activities. Operating licenses were issued on October 17, 1986, for Unit 1 and December 18, 1987, for Unit 2. A sixty year operating lifetime has been assumed for the purpose of this study. As such, the cessation of operations would then be October 17, 2046, for Unit 1 and December 18, 2047, for Units 1 and 2, respectively. These dates were used to schedule the decommissioning activities.

1.2 SITE DESCRIPTION

Braidwood is located near the Kankakee River, approximately 6 line miles southwest of Wilmington, Illinois. The station is comprised of two essentially identical pressurized water reactors with supporting facilities.

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

The primary coolant system for each unit consists of a pressurized water reactor system designed by the Westinghouse Corporation. The reactor coolant system is comprised of the reactor vessel and four heat transfer loops. Each loop contains a reactor coolant pump, steam generator, and associated piping and valves. In addition, the system includes a pressurizer, a pressurizer relief tank, interconnected piping, and the instrumentation necessary for operational control. All components of the reactor coolant system are located in the containment building. The design reactor thermal power level is 3,645 Megawatts thermal (MWth). The corresponding electrical outputs are approximately 1,295 Megawatts electric (MWe) and 1,265 MWe for Units 1 and 2, respectively.

The containment structure at Braidwood Station is a prestressed concrete shell structure made up of a cylinder with a shallow dome roof and a flat foundation slab. The entire structure is lined on the inside with steel plate, which acts as a leaktight membrane. The containment completely encloses the entire primary coolant system, including portions of the auxiliary and engineered safety features systems.

Heat produced in the reactor is converted to electrical energy by the power conversion system. A turbine-generator system converts the thermal energy of steam produced in the reactor into mechanical shaft power and then into electrical energy. The main turbine consists of one double-flow, high-pressure turbine and three double-flow, low-pressure turbines. The generator is driven at 1800 rpm and is rated at 1300 MVA. The exhaust steam from the turbine is condensed and deaerated in the main condenser. The heat rejected to the main condenser is removed by the circulating water system.

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

1.3 REGULATORY GUIDANCE

The Nuclear Regulatory Commission (NRC or Commission) provided initial decommissioning requirements in its rule "General Requirements for Decommissioning Nuclear Facilities," issued in June 1988.[2] This rule set forth financial criteria for decommissioning licensed nuclear power facilities. The regulation addressed decommissioning planning needs, timing, funding

methods, and environmental review requirements. The intent of the rule was to ensure that decommissioning would be accomplished in a safe and timely manner and that adequate funds would be available for this purpose. Subsequent to the rule, the NRC issued Regulatory Guide 1.159, "Assuring the Availability of Funds for Decommissioning Nuclear Reactors,"[3] which provided additional guidance to the licensees of nuclear facilities on the financial methods acceptable to the NRC staff for complying with the requirements of the rule. The regulatory guide addressed the funding requirements and provided guidance on the content and form of the financial assurance mechanisms indicated in the rule.

The rule defined three decommissioning alternatives as being acceptable to the NRC: DECON, SAFSTOR, and ENTOMB. The DECON alternative assumes that any contaminated or activated portion of the plant's systems, structures, and facilities are removed or decontaminated to levels that permit the site to be released for unrestricted use shortly after the cessation of plant operations. The rule also placed limits on the time allowed to complete the decommissioning process. For SAFSTOR, the process is restricted in overall duration to 60 years, unless it can be shown that a longer duration is necessary to protect public health and safety. The guidelines for ENTOMB are similar, providing the NRC with both sufficient leverage and flexibility to ensure that these deferred options are only used in situations where it is reasonable and consistent with the definition of decommissioning. At the conclusion of a 60-year dormancy period (or longer for ENTOMB if the NRC approves such a case), the site would still require significant remediation to meet the unrestricted release limits for license termination.

The ENTOMB alternative has not been viewed as a viable option for power reactors due to the significant time required to isolate the long-lived radionuclides for decay to permissible levels. However, with recent rulemaking permitting the controlled release of a site, the NRC has re-evaluated this alternative.[4] The resulting feasibility study, based upon an assessment by Pacific Northwest National Laboratory, concluded that the method did have conditional merit for some, if not most, reactors. However, the staff also found that additional rulemaking would be needed before this option could be treated as a generic alternative. The NRC had considered rulemaking to alter the 60-year time for completing decommissioning and to clarify the use of engineered barriers for reactor entombments.[5] However, the NRC's staff has recommended that rulemaking be deferred, based upon several factors, e.g., no licensee has committed to pursuing the entombment option, the unresolved issues associated with the disposition of greater-than-Class C material (GTCC), and the NRC's current priorities, at least until after the additional

research studies are complete. The Commission concurred with the staff's recommendation.

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

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

In 2011, the NRC published amended regulations to improve decommissioning planning and thereby reduce the likelihood that any current operating facility will become a legacy site.[7] The amended regulations require licensees to conduct their operations to minimize the introduction of residual radioactivity into the site, which includes the site's subsurface soil and groundwater. Licensees also may be required to perform site surveys to determine whether residual radioactivity is present in subsurface areas and to keep records of these surveys with records important for decommissioning. The amended regulations require licensees to report additional details in their decommissioning cost estimate as well as requiring additional financial reporting and assurances. These additional details, including an ISFSI decommissioning estimate, are included in this analysis.

1.3.1 High-Level Radioactive Waste Management

Congress passed the "Nuclear Waste Policy Act" (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 DOE was to begin accepting spent fuel by January 31, 1998; however, to date no progress in the removal of spent fuel from commercial generating sites has been made.

Today, the country is at an impasse on high-level waste disposal, even with the License Application for a geologic repository submitted by the DOE to the NRC in 2008. The current administration has cut the budget for the repository program while promising to "conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle … and make recommendations for a new plan."[8] Towards this goal, the administration appointed a Blue Ribbon Commission on America's Nuclear Future (Blue Ribbon Commission) to make recommendations for a new plan for nuclear waste disposal. The Blue Ribbon Commission's charter includes a requirement that it consider "[o]ptions for safe storage of used nuclear fuel while final disposition pathways are selected and deployed."[9]

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

- "[T]he United States [should] establish a program that leads to the timely development of one or more consolidated storage facilities"
- "[T]he United States should undertake an integrated nuclear waste management program that leads to the timely development of one or more permanent deep geological facilities for the safe disposal of spent fuel and high-level nuclear waste."[10]

In January 2013, the DOE issued the "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," in response to the recommendations made by the Blue Ribbon Commission and as "a framework for moving toward a sustainable program to deploy an integrated system capable of transporting, storing, and disposing of used nuclear fuel..."[11]

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

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

The NRC's review of DOE's license application to construct a geologic repository at Yucca Mountain was suspended in 2011 when the Administration slashed the budget for completing that work. However, the US Court of Appeals for the District of Columbia Circuit recently issued a writ of mandamus (in August 2013)[12] ordering NRC to comply with federal law and restart its review of DOE's Yucca Mountain repository license application to the extent of previously appropriated funding for the review.

Completion of the decommissioning process is dependent upon the DOE's ability to remove spent fuel from the site in a timely manner. DOE's repository program had assumed that spent fuel allocations would be accepted for disposal from the nation's commercial nuclear plants, with limited exceptions, in the order (the "queue") in which it was discharged from the reactor.[13] With a large fleet of reactors, Exelon may be able to re-assign allocations between its units to minimize on-site storage costs.

Assuming a 2025 start date for DOE initiating transfer of commercial spent fuel to a federal facility (based upon the proposed timeline for the availability of the larger interim storage facility), the assemblies generated from Braidwood operations are projected to be shipped from the Braidwood site in the years 2074 through 2078 (assuming the cessation of plant operations in 2046 and 2047 for Units 1 and 2, respectively). This equates to 90 multi-purpose canisters (at 32

assemblies per canister), in addition to the 59 on the pad from operations.

An ISFSI, operated under a Part 50 General License (in accordance with 10 CFR 72, Subpart K[14]), has been constructed to support continued plant operations. This analysis assumes that the facility can be expanded to support decommissioning operations (in the DECON and SAFSTOR scenarios).

The spent fuel in the wet storage pools at the cessation of plant operations is expected to be transferred to the ISFSI (DECON and SAFSTOR scenarios) within the first five and one-half years following shutdown. Once the wet storage pool is emptied, the fuel handling building can be either decontaminated and dismantled or prepared for long-term storage. The spent fuel pool is kept operational in the Delayed DECON scenario until the transfer of spent fuel from the pool to the DOE can be completed.

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

1.3.2 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,[15] and its Amendments of 1985,[16] the states became ultimately responsible for the disposition of low-level radioactive waste generated within their own borders. It was expected that groups of states would combine together to jointly deal with their radioactive wastes; these organizations are referred to as waste disposal compacts.

With the exception of Texas, no new compact facilities have been successfully sited, licensed, and constructed. The Texas Compact disposal

facility is now operational and waste is being accepted from generators within the Compact by the operator, Waste Control Specialists (WCS). The facility is also able to accept limited quantities of non-Compact waste.

All options and services currently available to Exelon for disposition of the various waste streams produced by the decommissioning process were considered. The majority of the low-level radioactive waste designated for direct disposal (Class A[17]) can be sent to Energy*Solutions*' facility in Clive, Utah. Therefore, disposal costs for Class A waste were based upon Exelon's *Life of Plant Agreement* with Energy*Solutions*. This facility is not licensed to receive the higher activity portion (Classes B and C) of the decommissioning waste stream.

As a proxy for future disposal facilities, waste disposal costs for the higher activity waste (Class B and C) are based upon the last published rate schedule for non-compact waste for the Barnwell facility, adjusted for escalation of the Atlantic Compact rates.

Material exceeding Class C limits (limited to material closest to the reactor core and comprising a small percentage of the total waste volume) is generally not suitable for shallow-land disposal. For purposes of this analysis, GTCC radioactive waste is assumed to be packaged and disposed of in a similar manner to, and at a cost equivalent to that envisioned for the spent fuel. The GTCC is either stored on site 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).

1.3.3 Radiological Criteria for License Termination

In 1997, the NRC published Subpart E, "Radiological Criteria for License Termination,"[18] amending 10 CFR §20. This subpart provides radiological criteria for releasing a facility for unrestricted use. The regulation states that the site can be released for unrestricted use if radioactivity levels are such that the average member of a critical group would not receive a Total Effective Dose Equivalent (TEDE) in excess of 25 millirem per year, and provided that residual radioactivity has been reduced to levels that are As Low As Reasonably Achievable (ALARA). The decommissioning estimates for Braidwood assume that the site will be remediated to a residual level consistent with the NRC-prescribed level.

It should be noted that the NRC and the Environmental Protection Agency (EPA) differ on the amount of residual radioactivity considered acceptable in site remediation. The EPA has two limits that apply to radioactive materials. An EPA limit of 15 millirem per year is derived from criteria established by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund).[19] An additional limit of 4 millirem per year, as defined in 40 CFR §141.16, is applied to drinking water.[20]

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)[21] 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 Braidwood for three variations of the approved decommissioning alternatives: DECON and SAFSTOR. Although the scenarios differ with respect to technique, process, cost, and schedule, they attain the same result: the ultimate release of the site for unrestricted use.

The following scenarios were evaluated and are representative of the alternatives available to the owner. The scenarios assume that the units operate for 60 years, followed by a planned and scheduled shutdown.

1. DECON: The first scenario assumes that the two units are promptly decommissioned as an integrated activity. Spent fuel in the wet storage pool is relocated to the ISFSI so as to facilitate decontamination and dismantling activities within the fuel handling building. Spent fuel storage operations continue at the site, independent of decommissioning operations, until the transfer of the fuel to the DOE is complete, assumed for purposes of this study to be in the year 2078. At that time, the ISFSI is decommissioned and the site released for alternative use.

2. Delayed DECON: In the second scenario, the units are prepared for an abbreviated period of safe-storage. The spent fuel resident in the fuel handling building's storage pool, remains in the pool until it can be transferred to the DOE (i.e., the ISFSI is not used to off-load the pool following the cessation of operations). Spent fuel placed at the ISFSI during operations remains in storage until the pool is emptied at which time the ISFSI is also emptied. Decommissioning is scheduled to commence once the transfer of the fuel to the DOE is complete (i.e., in the year 2078).

3. SAFSTOR: The units are also placed into safe-storage in the third scenario. However, decommissioning is deferred beyond the fuel storage period to the maximum extent permitted by the current regulations. Similar to the DECON alternative, the spent fuel in the wet storage pool is relocated to the ISFSI for interim storage. The units remain in protective storage following the removal of spent fuel from the site. Decommissioning operations commence such that license termination is completed within the required 60-year period. As with the first two scenarios, decommissioning activities at the two units are sequenced and integrated so as to minimize the total duration of the physical dismantling process.

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

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

The second phase encompasses activities during the storage period or during major decommissioning activities, or a combination of the two. The third phase pertains to the activities involved in license termination. The decommissioning estimates developed for Braidwood 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 of cessation of operations, provides a description of the licensee's planned decommissioning activities, a timetable, and the associated financial requirements of the intended decommissioning program. Upon receipt of the PSDAR, the NRC will make the document available to the public for comment in a local meeting to be held in the vicinity of the reactor site. Ninety days following submittal and NRC receipt of the PSDAR, the licensee may begin to perform major decommissioning activities under a modified 10 CFR §50.59 procedure (10 CFR §50.59 establishes the conditions under which licensees may make changes to the facility or procedures and conduct test or experiments, i.e., without prior 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, and work packages and procedures, would be assembled to support the proposed decontamination and dismantling activities.

Site Preparations

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

- Characterization of the site and surrounding environs. This includes radiation surveys of work areas, major components (including the reactor vessel and its internals), internal piping, and biological shield cores.
- Isolation of the spent fuel storage pool and fuel handling systems, such that decommissioning operations can commence on the balance of the plant. Decommissioning operations are scheduled around the fuel handling areas to optimize the overall project schedule. The fuel is transferred to the ISFSI as it decays to the point that it meets the heat load criteria of the containers. Consequently, it is assumed that the fuel pool remains operational for approximately five and one-half years following the cessation of Unit 2 operations.
- Specification of transport and disposal requirements for activated materials and/or hazardous materials, including shielding and waste stabilization.
- Development of procedures for occupational exposure control, control and release of liquid and gaseous effluent, processing of radwaste (including dry-active waste, resins, filter media, metallic and non-metallic components generated in decommissioning), site security and emergency programs, and industrial safety.

2.1.2 Period 2 - Decommissioning Operations

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

10 CFR §50 operating license. Significant decommissioning activities in this phase include:

- Construction of temporary facilities and/or modification of existing facilities to support dismantling activities. This may include a centralized processing area to facilitate equipment removal and component preparations for off-site disposal.
- Reconfiguration and modification of site structures and facilities as needed to support decommissioning operations. This may include the upgrading of roads (on- and off-site) to facilitate hauling and transport. Modifications may be required to the containment structure to facilitate access of large/heavy equipment. Modifications may also be required to the refueling area of the 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.
- 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 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 former 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 steam generator cubicles necessary for access and component extraction are removed.
- Removal of the steam generators and pressurizer for material recovery and controlled 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 lightweight grout). Steel shielding is added, as necessary, to those external areas of the package to meet transportation limits and regulations.
- Transfer of the spent fuel from the storage pool to the ISFSI pad for interim storage.
- Expansion of the ISFSI and transfer of the spent fuel from the storage pool to the ISFSI pad for interim storage. Spent fuel storage operations continue throughout the active decommissioning period. Fuel transfer is expected to begin in 2074 and to be completed by the end of the year 2078.

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

- Removal of remaining plant systems and associated components as they become nonessential to the decommissioning program or worker health and safety (e.g., waste collection and treatment systems, electrical power and ventilation systems).
- Removal of the steel liners from the 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 structures.
- Removal of the contaminated equipment and material from the auxiliary and fuel buildings, and any other contaminated facility. Use radiation and contamination control techniques until radiation surveys 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 will facilitate surface decontamination and subsequent verification surveys required prior to obtaining release for demolition.
- Removal of the remaining components, equipment, and plant services in support of the area release survey(s).
- Routing of material removed during 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 for 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)."[22] This document incorporates the statistical approaches to survey design and data interpretation used by the EPA. It also identifies commercially available instrumentation and procedures for conducting radiological surveys. Use of this guidance ensures that the surveys are conducted in a manner that provides a high degree of confidence that applicable NRC criteria are satisfied. Once the survey is complete, the results are provided to the NRC in a format that can be

verified. The NRC then reviews and evaluates the information, performs an independent confirmation of radiological site conditions, and makes a determination on final termination of the license.

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

2.1.3 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 may result in substantial damage to many of the structures. Although performed in a controlled, safe manner, blasting, coring, drilling, scarification (surface removal), and the other decontamination activities will substantially degrade power block structures including the reactor 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 effort to dismantle site structures with a work force already mobilized on site is more efficient than if the process were deferred. Site facilities quickly degrade without maintenance, adding additional expense and creating potential hazards to the public as well as to future workers. Abandonment creates a breeding ground for vermin infestation as well as other biological hazards.

This cost study presumes that non-essential structures and site facilities are dismantled as a continuation of the decommissioning activity.

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

Concrete rubble produced by demolition activities is processed to remove rebar and miscellaneous embedments. The processed material is then used on site to backfill voids. Excess materials are trucked to an off-site area for disposal as construction debris.

2.1.4 ISFSI Operations and Decommissioning

The ISFSI will continue to operate under the general license provisions of 10 CFR §72 following the amendment of the §50 operating license to release the adjacent (power block) property. Assuming the DOE starts accepting fuel in 2025, transfer of spent fuel from Braidwood is anticipated to begin in 2074 and continue through the year 2078.

At the conclusion of the spent fuel transfer process, the ISFSI will be decommissioned. The Commission will terminate the Part 50 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, and the license for the facility terminated, the modules can be dismantled using conventional techniques for the demolition of reinforced concrete. The concrete storage pad will then be removed, and the area graded and landscaped to conform to the surrounding environment.

2.2 SAFSTOR and DELAYED DECON

The NRC defines SAFSTOR as "the alternative in which the nuclear facility is placed and maintained in a condition that allows the nuclear facility to be safely stored and subsequently decontaminated (deferred decontamination) to levels that permit release for unrestricted use." The facility is left intact (during the dormancy period), with structures maintained in a sound condition. Systems not required to operate in support of the spent fuel pool or site surveillance and security are drained, de-energized, and secured. Minimal cleaning/removal of loose contamination and/or fixation and sealing of remaining contamination are 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. Site preparations are also similar to those for the DECON alternative. However, with the exception of the required radiation surveys and site characterizations, the mobilization and preparation of site facilities is less extensive.

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

2.2.1 Period 1 - Preparations

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

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

- Isolation of the spent fuel storage services and fuel handling systems located in the fuel handling building so that safe-storage operations may commence on the balance of the plant. This activity may be

carried out by plant personnel in accordance with existing operating technical specifications.

- 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 systems, decontaminating them 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 phase 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 their own actions. The security fence, sensors, alarms, and other surveillance equipment provide security. Fire and radiation alarms are also monitored and maintained. While remote surveillance is an option, it does not offer the immediate response time of a physical presence.

The transfer of the spent fuel to a DOE facility continues during this period until complete. Fuel is shipped exclusively from the ISFSI in the SAFSTOR scenario and from both the pool and the ISFSI in the Delayed DECON scenario.

After an optional period of storage (such that license terminations are accomplished within 60 years of final shutdown of Unit 1), it is required that the licensee submit applications to terminate the license, along with an LTP (described in Section 2.1.2), thereby initiating the third phase.

2.2.3 Periods 3 and 4 - Delayed Decommissioning

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

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

the availability of the fuel storage facilities located within the fuel handling building 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 estimates for the delayed scenarios incorporate reduced ALARA controls for the lower occupational exposure potential.

Although the initial radiation levels due to ^{60}Co will decrease during the dormancy period, the internal components of the reactor vessel will still exhibit sufficiently high radiation dose rates to require remote sectioning under water due to the presence of long-lived radionuclides such as ^{94}Nb, ^{59}Ni, and ^{63}Ni. Therefore, the dismantling procedures described for the DECON alternative would still be employed during deferred scenarios. Portions of the 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. If the site structures are to be dismantled, dismantling as a continuation of the decommissioning process is clearly the most appropriate and cost-effective option, as described in Section 2.1.3. The basis for the dismantling cost in the deferred scenarios is consistent with that described for DECON, removal of structures and

site facilities to a nominal depth of three feet below grade and limited restoration of the site.

3. COST ESTIMATE

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

3.1 BASIS OF ESTIMATE

The estimates were developed with site-specific, technical information developed in an evaluation prepared for Exelon in 2009. The information was reviewed for the current analysis and updated as deemed appropriate. The site-specific considerations and assumptions used in the previous evaluation were also revisited. Modifications were incorporated where new information was available or experience from ongoing decommissioning programs provided viable alternatives or improved processes.

3.2 METHODOLOGY

The methodology used to develop the estimates follows the basic approach originally presented in the AIF/NESP-036 study report, "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates,"[23] and the DOE "Decommissioning Handbook."[24] These documents present a unit factor method for estimating decommissioning activity costs, which simplifies the estimating calculations. Unit factors for concrete removal ($/cubic yard), steel removal ($/ton), and cutting costs ($/inch) were developed using local labor rates. The activity-dependent costs were estimated with the item quantities (cubic yards and tons), developed from plant drawings and inventory documents. Removal rates and material costs for the conventional disposition of components and structures relied upon information available in the industry publication, "Building Construction Cost Data," published by R.S. Means.[25]

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, San

Onofre-1, Crystal River and Vermont Yankee nuclear units have provided additional insight into the process, the regulatory aspects, and the technical challenges of decommissioning commercial nuclear units.

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

Work Difficulty Factors

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

- Access Factor 10% to 20%
- Respiratory Protection Factor 10% to 50%
- Radiation/ALARA Factor 10% to 40%
- Protective Clothing Factor 10% to 30%
- Work Break Factor 8.33%

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

Scheduling Program Durations

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

An activity duration critical path is used to determine the total decommissioning program schedule. The schedule is relied upon in calculating the carrying costs, which include program management, administration, field

engineering, equipment rental, and support services such as quality control and security. This systematic approach for assembling decommissioning estimates ensures a high degree of confidence in the reliability of the resulting cost estimate.

3.3 IMPACT OF DECOMMISSIONING MULTIPLE REACTOR UNITS

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

- The sequence of work generally follows the principal that the work is done at Unit 1 first, followed by similar work at Unit 2. This permits the experience gained at Unit 1 to be applied by the workforce at the second unit. It should be noted however, that the estimates do not consider productivity improvements at the second unit, since there is little documented experience with decommissioning two units simultaneously The work associated with developing activity specifications and procedures can be considered essentially identical between the two units, therefore the second unit costs are assumed to be a fraction of the first unit (~ 43%).
- Segmenting the reactor vessel and internals will require the use of special equipment. The decommissioning project will be scheduled such that Unit 2's reactor internals and vessel are segmented immediately after the activities at Unit 1 have been completed. This permits sharing of the segmentation equipment between the two units.
- 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. Trying to complete the final status survey of Unit 1, while Unit 2 still has ongoing radiological remediation work and waste handling in process is considered impractical. As such, the transfer of

the spent fuel from the storage pool and subsequent decontamination of the fuel handling building 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 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.

3.4.1 Contingency

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.

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[26] as "specific provision for unforeseeable elements of cost within the defined project scope; particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur." The cost elements in this

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

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

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

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

operation of highly specialized tooling, field conditions, and water clarity.

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

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

Operations and Maintenance Expenses	15%
ISFSI Decommissioning	25%

The contingency values are applied to the appropriate components of the estimates on a line item basis. A composite value is then reported at the end of each estimate. For example, the composite contingency values reported for the DECON alternative are 17.3% and 17.3% for Units 1 and 2, respectively. Values for the other alternatives are delineated within the detailed cost tables in Appendices D and E.

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 (e.g., affecting worker health and safety, site release criteria, waste transportation, and disposal).

- Policy decisions altering national commitments (e.g., in the ability to accommodate certain waste forms for disposition or in the timetable for such, for example, in the start and rate of acceptance of spent fuel by the DOE).
- Pricing changes for basic inputs, such as labor, energy, materials, and burial.

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

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 impacts of the considerations identified below are included in this cost study.

3.5.1 Spent Fuel Management

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

The total inventory of assemblies that will require handling during decommissioning is based upon several assumptions. The pickup of commercial fuel is assumed to begin in the year 2025. The maximum rate at which the fuel is removed from the commercial sites is based upon an annual capacity at the geologic repository of 3,000 metric tons of uranium (MTU). Any delay in the startup of the repository or decrease in the rate of acceptance will correspondingly prolong the transfer process and result in the fuel remaining at the site longer.

In all three scenarios, the ISFSI will continue to operate until such time that the transfer of spent fuel to the DOE can be completed. Assuming that the DOE commences repository operation in 2025, fuel is projected to be removed from the Braidwood site by the year 2078. In the Delayed DECON scenario, the ISFSI is only used to store fuel placed during plant operations. Spent fuel off-loaded from the reactors after operations cease, remains in the pool during the transfer period. The inventory of fuel assemblies located in the spent fuel pool is preferentially off-loaded as the allocations permit.

Operation and maintenance costs for the storage facilities (the ISFSI and the pool for the Delayed DECON scenario) are included within the estimates and address the cost for staffing the facilities, as well as security, insurance, and licensing fees. The estimates include the costs to purchase (DECON and SAFSTOR scenarios), load, and transfer the fuel storage canisters. Costs are also provided for the final disposition of the facilities once the transfer is complete.

Repository Startup

Operation of the DOE's yet-to-be constructed geologic repository is contingent upon the review and approval of the facility's license application by the NRC, the successful resolution of pending litigation, and the development of a national transportation system. With the appropriate authorizations from Congress, the Administration currently plans to implement a program over the next 10 years that could result in an interim storage facility being available by 2025.

Spent Fuel Management Model

The Exelon nuclear fleet consists of 26 units at 14 sites in Illinois, Pennsylvania, New Jersey, New York and Maryland, including the inactive units at Dresden, Peach Bottom and Zion (Zion is still included in the spent fuel analysis model since the fuel transfer to DOE will be done as part of the Exelon allocation). The ability to complete the decommissioning of these units, particularly for the DECON and Delayed DECON alternatives, is highly dependent upon when the DOE is assumed to remove spent fuel from the sites.

The DOE's repository program assumes that spent fuel will be accepted for disposal from the nation's commercial nuclear plants in the order (the "queue") in which it was removed from service ("oldest fuel first"). A

computer model developed by Exelon Nuclear was used to determine when the DOE would provide allocations in the queue for removal of spent fuel from the individual sites. Repository operations were based upon annual industry-wide receipt of 400 Metric Tons Heavy Metal (MTHM) in the first year of operation, a total of 3,800 MTHM in years 2 through 4 and 3,000 MTHM for year 5 and beyond.[27]

ISFSIs are constructed as necessary to maintain full-core discharge capability at the individual sites. Once the DOE begins repository operations, spent fuel shipments are managed across the fleet to optimize spent fuel storage.

Canister Design

The design and capacity of the ISFSI is based upon a Holtec HI-STORM vertical cask system, with a 32-fuel assembly capacity. This is also the basis for future cask acquisitions. The DOE is assumed to provide the MPC for fuel transferred directly from the pool to the DOE at no cost to the owner.

Canister Loading and Transfer

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

Operations and Maintenance

Annual costs (excluding labor) of approximately $792,000 and $96,000 are used for operation and maintenance of each spent fuel pool and the ISFSI, respectively.

ISFSI Decommissioning

A multi-purpose (storage and transport) dry shielded storage canister with a vertical, reinforced concrete storage module is used as a basis for the cost analysis. The final core off load from each unit, equivalent to 14 total casks, 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 is included in the estimate. Appendix F details the costs

necessary to survey, decontaminate, and terminate the NRC license on the ISFSI facility. The estimates in Appendices C through E also include the costs for the demolition of the ISFSI facility following NRC license termination (as a Site Restoration expense).

3.5.2 Reactor Vessel and Internal Components

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

The reactor pressure vessel and internal components are segmented for disposal in shielded, reusable transportation casks. Segmentation is performed in the 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 will dictate segmentation and packaging methodology.

The dismantling of the reactor internals will generate radioactive waste considered unsuitable for shallow land disposal (i.e., GTCC). Although the material is not classified as high-level waste, federal regulations under the LLRW Policy Amendments Act specifies the GTCC LLWR is designated a federal responsibility under Section 3(b)(1)(D). However, the DOE has not been forthcoming with an acceptance criteria or disposition schedule for this material, and numerous questions remain as to the ultimate disposal cost and waste form requirements. As such, for purposes of this study, the GTCC has been packaged and disposed of in the same manner as high-level waste, at a cost equivalent to that envisioned for the spent fuel. This is consistent with the concept that the generator of GTCC waste will bear all reasonable costs of disposing of such wastes. [28]

It is not anticipated that the DOE would accept this waste prior to completing the transfer of spent fuel. Therefore, until such time the DOE is ready to accept GTCC waste, it is reasonable to assume that this material would remain in storage at the Braidwood site.

Intact disposal of the reactor vessel and internal components can provide savings in cost and worker exposure by eliminating the complex

segmentation requirements, isolation of the GTCC material, and transport/storage of the resulting waste packages. Portland General Electric (PGE) was able to dispose of the Trojan reactor as an intact package. However, its location on the Columbia River simplified the transportation analysis since:

- the reactor package could be secured to the transport vehicle for the entire journey, i.e., the package was not lifted during transport,
- there were no man-made or natural terrain features between the plant site and the disposal location that could produce a large drop, and
- transport speeds were very low, limited by the overland transport vehicle and the river barge.

As a member of the Northwest Compact, PGE had a site available for disposal of the package - the US Ecology facility in Washington State. The characteristics of this arid site proved favorable in demonstrating compliance with land disposal regulations.

It is not known whether this option will be available when Braidwood 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.

3.5.3 Primary System Components

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 will be 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, will be removed to create sufficient laydown space for processing these large components.

The generators will be rigged for removal, disconnected from the surrounding piping and supports, and maneuvered into the open area where they will be lowered onto a dolly. Once each steam generator has been placed in the horizontal position, nozzles and other openings will be welded closed. The lower shell will have a carbon steel membrane welded to its outside surface for shielding, if required, during transport. The interior volume will be filled with low-density cellular concrete for stabilization of the internal contamination and to satisfy burial ground packaging requirements. When this stage has been completed, each generator will be moved out of containment and lowered onto a multi-wheeled transporter to be staged at an on-site storage area and await transport to the disposal facility. The pressurizer will be removed using the same technique. Each component will then be loaded onto a railcar 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 disposal.

Braidwood Unit 1 has replaced its original set of steam generators; this original set is still on site, stored within a concrete protective structure. The cost for transportation and disposal of this original set of Unit 1 steam generators has been included in this analysis.

3.5.4 Main Turbine and Condenser

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

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

3.5.5 Transportation Methods

Contaminated piping, components, and structural material other than the highly activated reactor vessel and internal components will qualify as LSA-I, II or III or Surface Contaminated Object, SCO-I or II, as described in Title 49.[29] The contaminated material will be packaged in Industrial Packages (IP 1, IP-2, or IP-3, as defined in subpart 173.411) for transport unless demonstrated to qualify as their own shipping containers. The reactor vessel and internal components are expected to be transported in accordance with §71, as Type B. It is conceivable that the reactor, due to its limited specific activity, could qualify as LSA II or III. However, the high radiation levels on the outer surface would require that additional shielding be incorporated within the packaging so as to attenuate the dose to levels acceptable for transport.

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

The transport of large intact components (e.g., large heat exchangers and other oversized components) will be by a combination of truck, rail, and/or multi-wheeled transporter. Truck transport costs were estimated using published tariffs from Tri-State Motor Transit.[30]

3.5.6 Low-Level Radioactive Waste Disposal

The mass of radioactive waste generated during the various decommissioning activities is reported by line-item in Appendices C, D and E, and summarized in Section 5. The Section 5 waste summaries are consistent with 10 CFR §61 classifications. Commercially available steel containers are used for the disposal of piping, small components, and concrete. Larger components can serve as their own containers, with proper closure of all openings, access ways, and penetrations. The waste volumes are calculated on the exterior package dimensions for

containerized material or a dimensional calculation for components serving as their own waste containers.

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

Disposal fees are calculated using current disposal agreements, with surcharges added for the highly activated components, such as those generated in the segmentation of the reactor vessel. The cost to dispose of the majority of the material generated from the decontamination and dismantling activities is based upon Exelon's current disposal agreement with Energy*Solutions* for its facility in Clive, Utah.

EnergySolutions is not able to accept the higher activity waste (Class B and C) generated in the decontamination of the reactor vessel and segmentation of the components closest to the core. As a proxy for future disposal facilities, waste disposal costs for the higher activity waste (Class B and C) are based upon the last published rate schedule for non-compact waste for the Barnwell facility, adjusted for escalation of the Atlantic Compact rates.

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

3.5.7 Site Conditions Following Decommissioning

The NRC will terminate (or amend) the site license when it determines that site remediation has been performed in accordance with the license termination plan, and that the terminal radiation survey and associated documentation demonstrate that the facility is suitable for release. The NRC's involvement in the decommissioning process will end at this point. Building codes and environmental regulations will dictate the

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

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

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

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

Exelon, as the operator, will continue to provide site operations support, including decommissioning program management, licensing, radiological protection, and site security. A Decommissioning Operations Contractor (DOC) will provide the supervisory staff needed to oversee the labor subcontractors, consultants, and specialty contractors needed to perform the work required for the decontamination and dismantling effort. The DOC will also provide the engineering services needed to develop

activity specifications, detailed procedures, detailed activation analyses, and support field activities such as structural modifications.

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

The craft labor required to decontaminate and dismantle the Braidwood units will be acquired through standard site contracting practices. Craft labor costs were based upon information from Exelon. Craft labor costs include applicable overheads and profit.

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

Staffing levels are assigned for each unit by sub-period and functional area. Economies of a multi-unit decommissioning are recognized by establishing a primary and a secondary staff level. The unit assigned the primary staff will include common supervisory positions and positions that may be shared across both units. The types of positions and staffing levels are adjusted based upon the type of activity occurring in each sub-period.

A profile of the staffing level for the two-unit decommissioning, including contractors and craft, is provided in Figures 3.1 through 3.3 for the DECON, Delayed DECON, and SAFSTOR scenarios, respectively. Utility staffing levels will gradually decrease after completing the removal of physical systems at each of the units.

Staffing levels and management support will vary based upon the amount and type of decommissioning work. Craft manpower levels decrease after systems removal and structures decontamination and drop substantially during the delay period and the license termination survey period. However, craft staff levels increase again during the site restoration period due to the work associated with structures demolition.

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.[31] Actual estimates are derived from the curie/gram values contained therein and adjusted for the different mass of the Braidwood components, projected operating life, and different periods of decay. Additional short-lived isotopes were derived from CR-0130[32] and CR-0672,[33] and benchmarked to the long-lived values from CR-3474.

It is anticipated that there will be control element assemblies (CEAs) in the spent fuel pool at the cessation of operations, including those CEAs from the final core. This analysis assumes that the CEAs can be disposed of along with the spent fuel at no additional cost (in accordance with Appendix E of the Standard Contract)

Activation of the reactor building structures is confined to the biological shield.

3.6.4 General

Transition Activities

Existing warehouses will be cleared of non-essential material and remain for use by Exelon and its subcontractors. The plant's operating staff will perform the following activities at no additional cost or credit to the project during the transition period:

- Drain and collect fuel oils, lubricating oils, and transformer oils for recycle and/or sale.
- Drain and collect acids, caustics, and other chemical stores for recycle and/or sale.
- Processes operating waste inventories, i.e., the estimates do not address the disposition of any legacy wastes; the disposal of

operating wastes during this initial period is not considered a decommissioning expense.

Scrap and Salvage

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

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

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

The concrete debris resulting from building demolition activities is crushed on site to reduce the size of the debris. The resulting crushed concrete is used to backfill below grade voids, with the excess assumed to be removed from the site as recycled material at no cost or credit to

the decommissioning program. The rebar removed from the concrete crushing process is disposed of as scrap steel in a similar fashion as other scrap metal as discussed previously.

Energy

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

Insurance

Costs for continuing coverage (nuclear liability and property insurance) following cessation of plant operations and during decommissioning are included and based upon current operating premiums. Reductions in premiums throughout the decommissioning process are based upon guidance provided by Exelon.

Taxes

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

Site Modifications

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

3.7 COST ESTIMATE SUMMARY

A schedule of expenditures for each scenario is provided in Tables 3.1 through 3.3. Decommissioning costs are reported in the year of projected expenditure; however, the values are provided in thousands of 2014 dollars. Costs are not inflated, escalated, or discounted over the period of expenditure. The annual expenditures are based upon the detailed activity costs reported in Appendices C through E, along with the schedules discussed in Section 4.

TABLE 3.1a
BRAIDWOOD NUCLEAR POWER STATION, UNIT 1
DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2046	11,744	2,127	420	10	2,484	16,785
2047	60,523	13,605	2,436	2,144	13,591	92,300
2048	69,420	30,859	2,542	28,849	24,054	155,723
2049	64,750	31,308	1,887	34,217	24,525	156,687
2050	43,854	15,188	1,512	4,736	9,562	74,852
2051	43,854	15,188	1,512	4,736	9,562	74,852
2052	13,937	4,538	443	1,394	5,443	25,755
2053	1,524	121	0	8	3,720	5,373
2054	24,987	1,749	323	28	3,975	31,061
2055	19,450	8,028	202	0	3,302	30,982
2056	19,503	8,050	202	0	3,311	31,067
2057	9,055	3,079	77	0	3,318	15,530
2058	2,587	0	0	0	3,329	5,916
2059	2,587	0	0	0	3,329	5,916
2060	2,594	0	0	0	3,338	5,932
2061	2,587	0	0	0	3,329	5,916
2062	2,587	0	0	0	3,329	5,916
2063	2,587	0	0	0	3,329	5,916
2064	2,594	0	0	0	3,338	5,932
2065	2,587	0	0	0	3,329	5,916
2066	2,587	0	0	0	3,329	5,916
2067	2,587	0	0	0	3,329	5,916
2068	2,594	0	0	0	3,338	5,932
2069	2,587	0	0	0	3,329	5,916
2070	2,587	0	0	0	3,329	5,916
2071	2,587	0	0	0	3,329	5,916
2072	2,594	0	0	0	3,338	5,932
2073	2,587	0	0	0	3,329	5,916
2074	2,677	270	0	0	3,329	6,275
2075	3,234	1,941	0	0	3,329	8,503

TABLE 3.1a (continued)
BRAIDWOOD NUCLEAR POWER STATION, UNIT 1
DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2076	3,241	1,941	0	0	3,338	8,520
2077	3,234	1,941	0	0	3,329	8,503
2078	3,234	1,941	0	0	3,329	8,503
2079	1,799	1,601	35	1,117	16,795	21,347
Total	441,447	143,473	11,591	77,238	193,590	867,339

TABLE 3.1b
BRAIDWOOD NUCLEAR POWER STATION, UNIT 2
DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2047	2,297	392	77	2	442	3,210
2048	60,594	10,724	2,099	400	12,821	86,637
2049	75,149	27,440	2,896	19,400	32,917	157,802
2050	75,967	31,470	1,916	28,202	22,993	160,548
2051	68,152	17,736	1,553	8,434	11,182	107,058
2052	67,455	16,232	1,516	6,221	9,876	101,301
2053	56,557	11,528	1,131	5,598	8,461	83,275
2054	35,759	3,315	446	806	4,352	44,680
2055	25,820	11,216	202	0	3,303	40,541
2056	25,891	11,246	202	0	3,312	40,652
2057	11,499	4,302	77	0	3,319	19,197
2058	2,587	0	0	0	3,329	5,916
2059	2,587	0	0	0	3,329	5,916
2060	2,594	0	0	0	3,338	5,932
2061	2,587	0	0	0	3,329	5,916
2062	2,587	0	0	0	3,329	5,916
2063	2,587	0	0	0	3,329	5,916
2064	2,594	0	0	0	3,338	5,932
2065	2,587	0	0	0	3,329	5,916
2066	2,587	0	0	0	3,329	5,916
2067	2,587	0	0	0	3,329	5,916
2068	2,594	0	0	0	3,338	5,932
2069	2,587	0	0	0	3,329	5,916
2070	2,587	0	0	0	3,329	5,916
2071	2,587	0	0	0	3,329	5,916
2072	2,594	0	0	0	3,338	5,932
2073	2,587	0	0	0	3,329	5,916
2074	2,677	270	0	0	3,329	6,275
2075	3,234	1,941	0	0	3,329	8,503
2076	3,241	1,941	0	0	3,338	8,520

TABLE 3.1b (continued)
BRAIDWOOD NUCLEAR POWER STATION, UNIT 2
DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2077	3,234	1,941	0	0	3,329	8,503
2078	3,234	1,941	0	0	3,329	8,503
2079	1,799	1,467	0	1,117	16,795	21,178
Total	563,985	155,101	12,117	70,181	199,722	1,001,105

TABLE 3.2a
BRAIDWOOD NUCLEAR POWER STATION, UNIT 1
DELAYED DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2046	9,007	301	420	10	1,335	11,073
2047	47,301	3,844	2,016	491	9,320	62,972
2048	19,015	1,989	873	507	9,365	31,748
2049	8,091	427	403	17	4,953	13,892
2050	8,091	427	403	17	4,953	13,892
2051	8,091	427	403	17	4,953	13,892
2052	8,113	428	404	17	4,967	13,930
2053	8,091	427	403	17	4,953	13,892
2054	8,091	427	403	17	4,953	13,892
2055	8,091	427	403	17	4,953	13,892
2056	8,113	428	404	17	4,967	13,930
2057	8,091	427	403	17	4,953	13,892
2058	8,091	427	403	17	4,953	13,892
2059	8,091	427	403	17	4,953	13,892
2060	8,113	428	404	17	4,967	13,930
2061	8,091	427	403	17	4,953	13,892
2062	8,091	427	403	17	4,953	13,892
2063	8,091	427	403	17	4,953	13,892
2064	8,113	428	404	17	4,967	13,930
2065	8,091	427	403	17	4,953	13,892
2066	8,091	427	403	17	4,953	13,892
2067	8,091	427	403	17	4,953	13,892
2068	8,113	428	404	17	4,967	13,930
2069	8,091	427	403	17	4,953	13,892
2070	8,091	427	403	17	4,953	13,892
2071	8,091	427	403	17	4,953	13,892
2072	8,113	428	404	17	4,967	13,930
2073	8,091	427	403	17	4,953	13,892
2074	8,450	1,505	403	17	4,953	15,329
2075	10,679	8,189	403	17	4,953	24,242

TABLE 3.2a (continued)
BRAIDWOOD NUCLEAR POWER STATION, UNIT 1
DELAYED DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2076	8,401	1,291	404	17	4,967	15,080
2077	6,337	1,603	303	13	4,351	12,606
2078	4,391	2,240	202	8	3,745	10,585
2079	42,790	1,846	2,016	41	1,718	48,411
2080	61,619	18,080	1,971	18,493	12,305	112,470
2081	61,571	23,584	1,909	36,320	22,547	145,932
2082	36,640	7,054	1,512	5,304	5,986	56,497
2083	36,640	7,054	1,512	5,304	5,986	56,497
2084	8,235	1,508	302	1,067	2,462	13,575
2085	7,616	399	95	14	1,668	9,793
2086	23,294	4,597	306	18	1,382	29,597
2087	17,532	8,136	202	0	754	26,624
2088	17,484	8,114	201	0	752	26,551
Total	629,412	112,013	25,141	68,065	222,468	1,057,099

TABLE 3.2b
BRAIDWOOD NUCLEAR POWER STATION, UNIT 2
DELAYED DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2047	1,912	55	77	2	231	2,277
2048	50,892	1,960	2,022	139	6,569	61,582
2049	32,930	4,708	1,146	1,186	24,322	64,292
2050	8,141	443	403	17	4,976	13,981
2051	8,141	443	403	17	4,976	13,981
2052	8,163	445	404	17	4,990	14,019
2053	8,141	443	403	17	4,976	13,981
2054	8,141	443	403	17	4,976	13,981
2055	8,141	443	403	17	4,976	13,981
2056	8,163	445	404	17	4,990	14,019
2057	8,141	443	403	17	4,976	13,981
2058	8,141	443	403	17	4,976	13,981
2059	8,141	443	403	17	4,976	13,981
2060	8,163	445	404	17	4,990	14,019
2061	8,141	443	403	17	4,976	13,981
2062	8,141	443	403	17	4,976	13,981
2063	8,141	443	403	17	4,976	13,981
2064	8,163	445	404	17	4,990	14,019
2065	8,141	443	403	17	4,976	13,981
2066	8,141	443	403	17	4,976	13,981
2067	8,141	443	403	17	4,976	13,981
2068	8,163	445	404	17	4,990	14,019
2069	8,141	443	403	17	4,976	13,981
2070	8,141	443	403	17	4,976	13,981
2071	8,141	443	403	17	4,976	13,981
2072	8,163	445	404	17	4,990	14,019
2073	8,141	443	403	17	4,976	13,981
2074	8,141	443	403	17	4,976	13,981
2075	8,141	443	403	17	4,976	13,981
2076	10,463	7,345	404	17	4,990	23,219

TABLE 3.2b (continued)
BRAIDWOOD NUCLEAR POWER STATION, UNIT 2
DELAYED DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2077	7,321	4,423	303	13	4,356	16,415
2078	4,440	2,256	202	8	3,733	10,639
2079	1,268	342	241	8	1,581	3,440
2080	26,603	1,826	2,022	39	1,672	32,162
2081	47,871	15,240	1,966	13,165	10,328	88,569
2082	60,205	21,915	1,916	26,359	19,034	129,429
2083	56,445	9,054	1,538	8,020	6,751	81,808
2084	56,347	8,212	1,516	6,805	5,941	78,821
2085	50,686	6,607	1,251	5,196	4,939	68,680
2086	28,522	6,223	306	18	1,267	36,336
2087	23,902	11,324	202	0	755	36,183
2088	23,837	11,293	201	0	753	36,084
Total	695,440	124,320	25,805	61,415	226,692	1,133,671

TABLE 3.3a
BRAIDWOOD NUCLEAR POWER STATION, UNIT 1
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2046	9,482	1,724	420	10	2,484	14,120
2047	48,229	10,677	2,016	491	13,691	75,104
2048	17,476	8,829	873	505	11,805	39,487
2049	5,376	7,243	403	15	8,378	21,416
2050	5,376	7,243	403	15	8,378	21,416
2051	5,376	7,243	403	15	8,378	21,416
2052	5,391	7,263	404	15	8,401	21,474
2053	4,495	3,495	294	12	5,877	14,173
2054	3,744	299	202	8	3,745	7,997
2055	3,744	299	202	8	3,745	7,997
2056	3,754	300	202	8	3,755	8,019
2057	3,744	299	202	8	3,745	7,997
2058	3,744	299	202	8	3,745	7,997
2059	3,744	299	202	8	3,745	7,997
2060	3,754	300	202	8	3,755	8,019
2061	3,744	299	202	8	3,745	7,997
2062	3,744	299	202	8	3,745	7,997
2063	3,744	299	202	8	3,745	7,997
2064	3,754	300	202	8	3,755	8,019
2065	3,744	299	202	8	3,745	7,997
2066	3,744	299	202	8	3,745	7,997
2067	3,744	299	202	8	3,745	7,997
2068	3,754	300	202	8	3,755	8,019
2069	3,744	299	202	8	3,745	7,997
2070	3,744	299	202	8	3,745	7,997
2071	3,744	299	202	8	3,745	7,997
2072	3,754	300	202	8	3,755	8,019
2073	3,744	299	202	8	3,745	7,997
2074	3,833	569	202	8	3,745	8,357
2075	4,391	2,240	202	8	3,745	10,585

TABLE 3.3a (continued)
BRAIDWOOD NUCLEAR POWER STATION, UNIT 1
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2076	4,401	2,240	202	8	3,755	10,607
2077	4,391	2,240	202	8	3,745	10,585
2078	4,391	2,240	202	8	3,745	10,585
2079	2,256	295	202	8	1,577	4,337
2080	2,262	296	202	8	1,581	4,349
2081	2,256	295	202	8	1,577	4,337
2082	2,256	295	202	8	1,577	4,337
2083	2,256	295	202	8	1,577	4,337
2084	2,262	296	202	8	1,581	4,349
2085	2,256	295	202	8	1,577	4,337
2086	2,256	295	202	8	1,577	4,337
2087	2,256	295	202	8	1,577	4,337
2088	2,262	296	202	8	1,581	4,349
2089	2,256	295	202	8	1,577	4,337
2090	2,256	295	202	8	1,577	4,337
2091	2,256	295	202	8	1,577	4,337
2092	2,262	296	202	8	1,581	4,349
2093	2,256	295	202	8	1,577	4,337
2094	2,256	295	202	8	1,577	4,337
2095	2,256	295	202	8	1,577	4,337
2096	2,262	296	202	8	1,581	4,349
2097	2,256	295	202	8	1,577	4,337
2098	2,256	295	202	8	1,577	4,337
2099	29,241	1,327	1,410	30	1,671	33,680
2100	55,001	10,625	2,000	5,914	5,160	78,700
2101	61,793	23,667	1,916	35,754	22,650	145,780
2102	45,057	12,623	1,647	15,479	11,771	86,578
2103	36,655	7,078	1,512	5,300	6,309	56,855
2104	20,696	3,952	833	2,922	4,187	32,591
2105	1,130	121	0	8	1,576	2,835

TABLE 3.3a (continued)
BRAIDWOOD NUCLEAR POWER STATION, UNIT 1
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2106	25,328	2,689	346	27	1,699	30,089
2107	17,732	8,182	202	0	754	26,869
2108	17,780	8,204	202	0	756	26,943
2109	4,761	2,197	54	0	202	7,214
Total	557,855	155,801	24,420	66,881	249,371	1,054,326

TABLE 3.3b
BRAIDWOOD NUCLEAR POWER STATION, UNIT 2
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2047	2,018	373	77	2	442	2,912
2048	53,661	10,268	2,022	139	11,878	77,968
2049	39,388	13,003	1,146	1,186	26,839	81,562
2050	17,750	8,746	403	18	9,639	36,558
2051	17,750	8,746	403	18	9,639	36,558
2052	17,799	8,770	404	18	9,666	36,658
2053	10,217	4,196	294	13	6,451	21,172
2054	3,793	316	202	8	3,733	8,051
2055	3,793	316	202	8	3,733	8,051
2056	3,804	316	202	8	3,743	8,074
2057	3,793	316	202	8	3,733	8,051
2058	3,793	316	202	8	3,733	8,051
2059	3,793	316	202	8	3,733	8,051
2060	3,804	316	202	8	3,743	8,074
2061	3,793	316	202	8	3,733	8,051
2062	3,793	316	202	8	3,733	8,051
2063	3,793	316	202	8	3,733	8,051
2064	3,804	316	202	8	3,743	8,074
2065	3,793	316	202	8	3,733	8,051
2066	3,793	316	202	8	3,733	8,051
2067	3,793	316	202	8	3,733	8,051
2068	3,804	316	202	8	3,743	8,074
2069	3,793	316	202	8	3,733	8,051
2070	3,793	316	202	8	3,733	8,051
2071	3,793	316	202	8	3,733	8,051
2072	3,804	316	202	8	3,743	8,074
2073	3,793	316	202	8	3,733	8,051
2074	3,883	585	202	8	3,733	8,411
2075	4,440	2,256	202	8	3,733	10,639

TABLE 3.3b (continued)
BRAIDWOOD NUCLEAR POWER STATION, UNIT 2
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2076	4,451	2,257	202	8	3,743	10,661
2077	4,440	2,256	202	8	3,733	10,639
2078	4,440	2,256	202	8	3,733	10,639
2079	2,306	312	202	8	1,579	4,406
2080	2,312	313	202	8	1,583	4,418
2081	2,306	312	202	8	1,579	4,406
2082	2,306	312	202	8	1,579	4,406
2083	2,306	312	202	8	1,579	4,406
2084	2,312	313	202	8	1,583	4,418
2085	2,306	312	202	8	1,579	4,406
2086	2,306	312	202	8	1,579	4,406
2087	2,306	312	202	8	1,579	4,406
2088	2,312	313	202	8	1,583	4,418
2089	2,306	312	202	8	1,579	4,406
2090	2,306	312	202	8	1,579	4,406
2091	2,306	312	202	8	1,579	4,406
2092	2,312	313	202	8	1,583	4,418
2093	2,306	312	202	8	1,579	4,406
2094	2,306	312	202	8	1,579	4,406
2095	2,306	312	202	8	1,579	4,406
2096	2,312	313	202	8	1,583	4,418
2097	2,306	312	202	8	1,579	4,406
2098	2,306	312	202	8	1,579	4,406
2099	2,306	312	202	8	1,579	4,406
2100	18,558	1,313	1,410	28	1,638	22,947
2101	36,955	8,612	2,000	4,354	4,591	56,513
2102	62,335	22,701	1,916	26,726	19,753	133,431
2103	58,271	13,090	1,648	13,501	10,758	97,268
2104	56,359	8,228	1,516	6,797	6,203	79,103
2105	56,205	8,205	1,512	6,779	6,186	78,887

TABLE 3.3b (continued)
BRAIDWOOD NUCLEAR POWER STATION, UNIT 2
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2106	31,904	3,792	404	287	1,708	38,095
2107	24,102	11,370	202	0	755	36,428
2108	24,168	11,401	202	0	757	36,528
2109	6,471	3,053	54	0	203	9,781
Total	679,937	168,344	24,897	60,241	253,657	1,187,075

FIGURE 3.1
DECON SCENARIO
BRAIDWOOD NUCLEAR POWER STATION
MANPOWER LEVELS

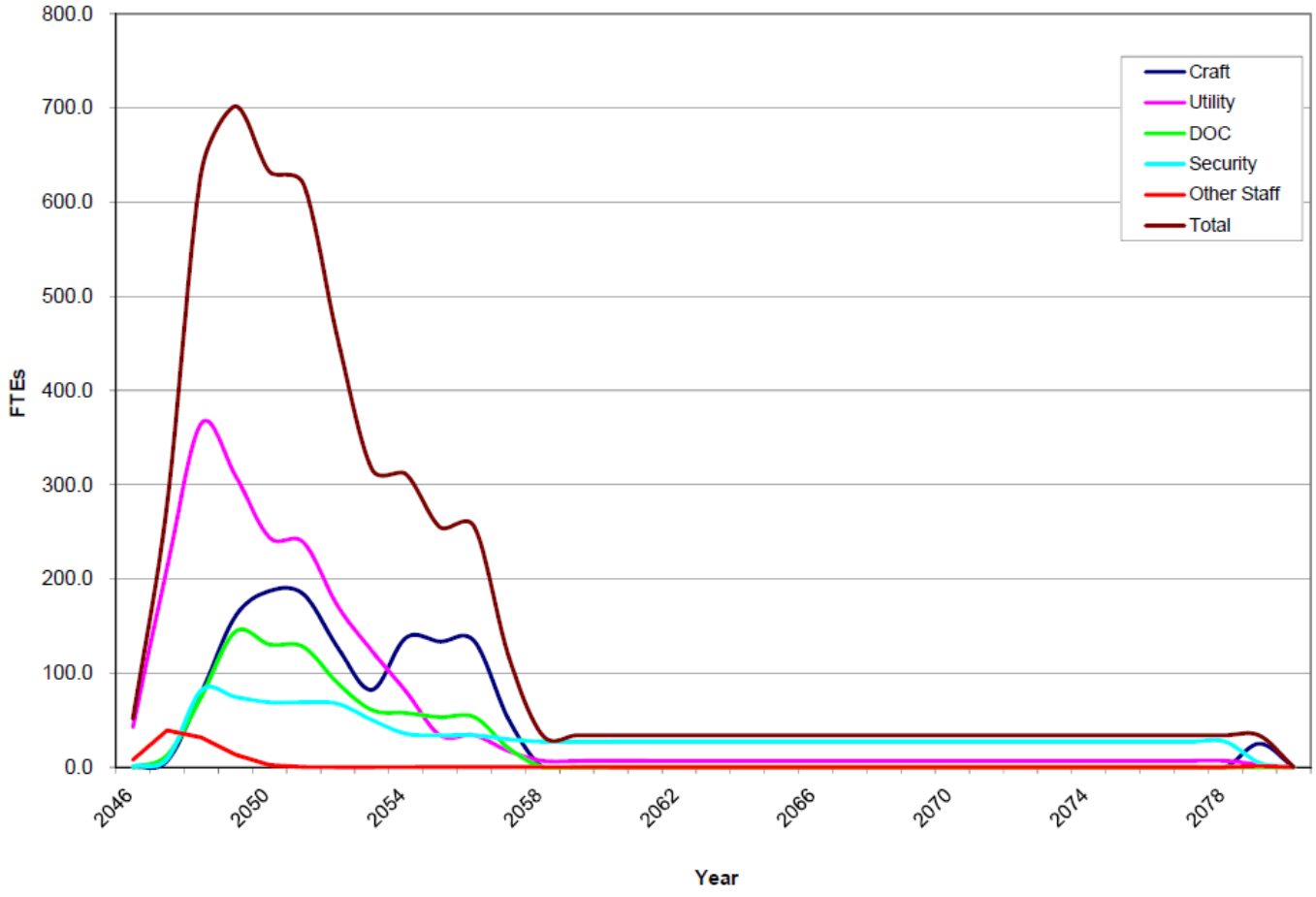


FIGURE 3.2
DELAYED DECON SCENARIO
BRAIDWOOD NUCLEAR POWER STATION
MANPOWER LEVELS

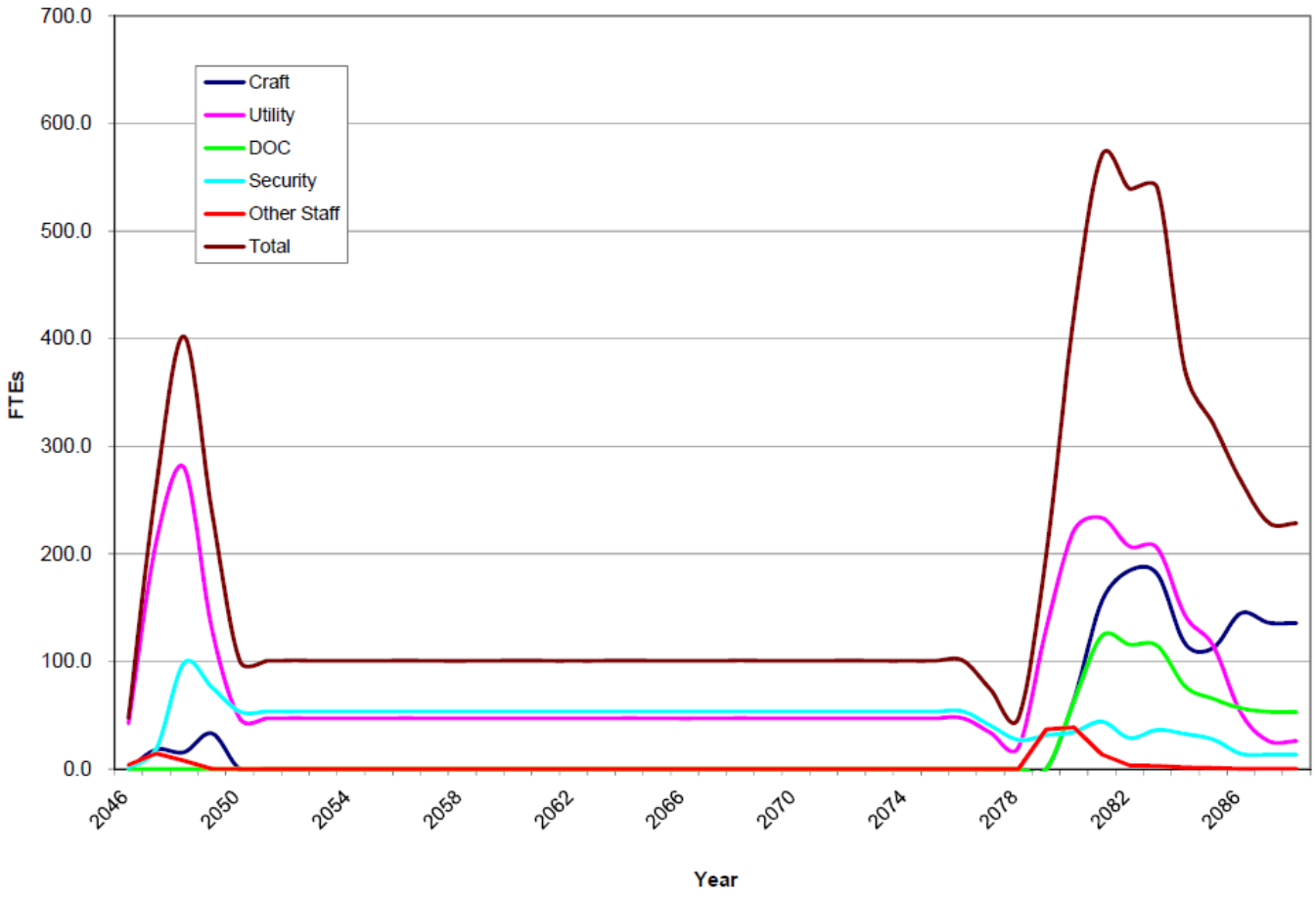
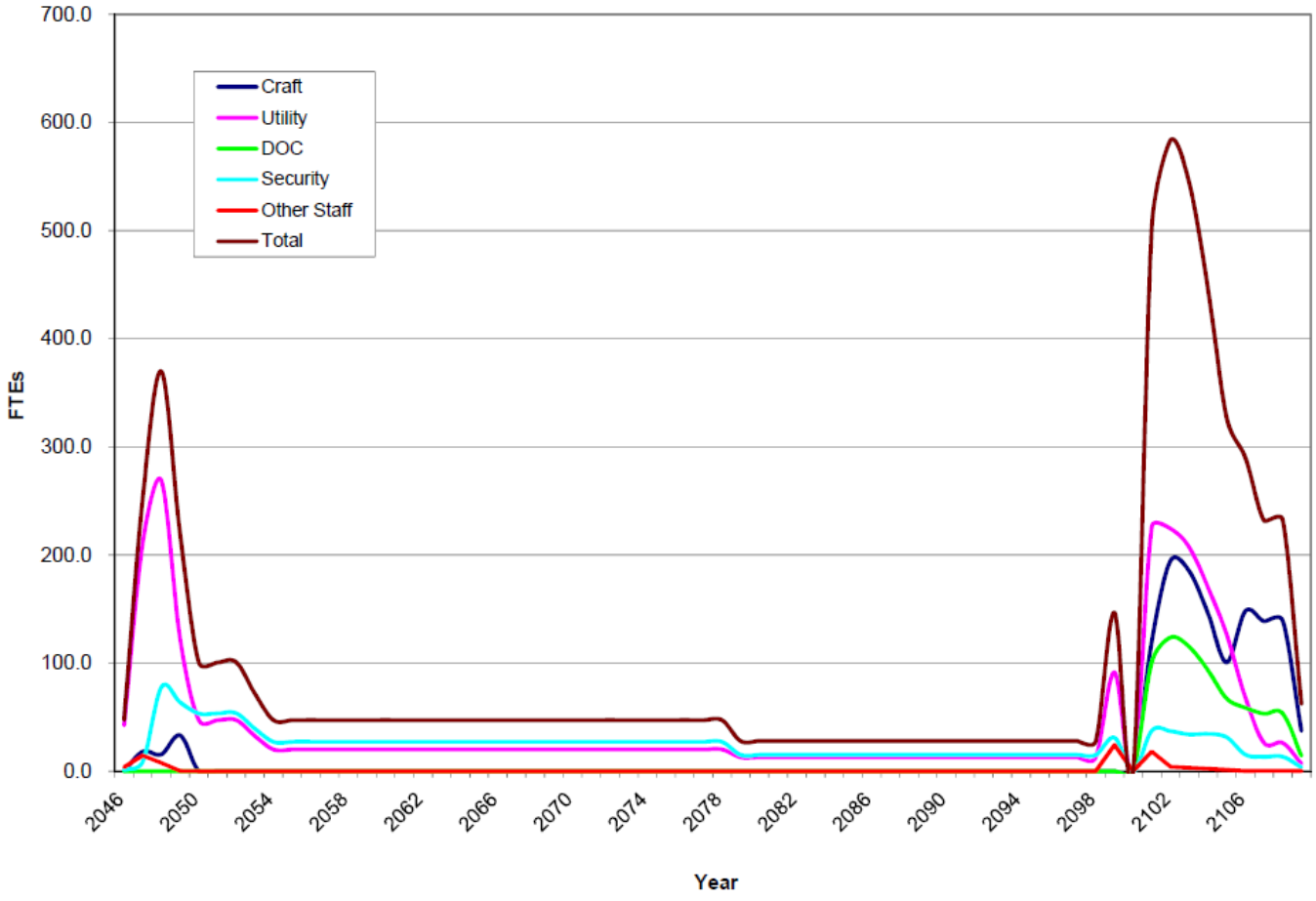


FIGURE 3.3
SAFSTOR SCENARIO
BRAIDWOOD NUCLEAR POWER STATION
MANPOWER LEVELS



4. SCHEDULE ESTIMATE

The schedules for the decommissioning scenarios considered in this study follow the sequence presented in the AIF/NESP-036 study, with minor changes to reflect recent experience and site-specific constraints. In addition, the scheduling has been revised to reflect the spent fuel management plans described in Section 3.5.1.

A schedule or sequence of activities is presented in Figure 4.1 for the DECON decommissioning alternative. The schedule is also representative of the work activities identified in the delayed dismantling scenarios, absent any spent fuel constraints. The scheduling sequence assumes that fuel is removed from the spent fuel pool within the first five and one-half years after operations cease at Unit 2. 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 2010" computer software.[34]

4.1 SCHEDULE ESTIMATE ASSUMPTIONS

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

- The fuel handling building is isolated until such time that all spent fuel has been discharged to the ISFSI (DECON and SAFSTOR) or to the DOE (Delayed DECON). Decontamination and dismantling of the storage pool are initiated once the transfer of spent fuel to the ISFSI or DOE is complete.
- All work (except vessel and internals removal) is performed during an 8-hour workday, 5 days per week, with no overtime. There are eleven paid holidays per year.
- Reactor and internals removal activities are performed by using separate crews for different activities working on different shifts, with a corresponding backshift charge for the second shift.
- Multiple crews work parallel activities to the maximum extent possible, consistent with optimum efficiency, adequate access for cutting, removal

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

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

4.2 PROJECT SCHEDULE

The period-dependent costs presented in the detailed cost tables are based upon the durations developed in the schedule for decommissioning Braidwood. Durations are established between several milestones in each project period; these durations are used to establish a critical path for the entire project. In turn, the critical path duration for each period is used as the basis for determining the period-dependent costs. A second critical path is also shown for the spent fuel cooling period, which determines the release of the fuel handling building for final decontamination.

Project timelines are provided in Figures 4.2 through 4.4; the milestone dates are based on this same shutdown date. The start of decommissioning activities in the Delayed Decommissioning scenario is concurrent with the end of the fuel transfer activity (i.e. to an off-site DOE facility).

FIGURE 4.1
DECON ACTIVITY SCHEDULE

ID	Task Name
1	Braidwood Unit 1 & 2 schedule
2	Shutdown Unit 1
3	Period 1a Unit 1 - Shutdown through transition
4	Certificate of permanent cessation of operations submitted
5	Fuel storage pool operations
6	Dry fuel storage operations
7	Reconfigure plant
8	Prepare activity specifications
9	Perform site characterization
10	PSDAR submitted
11	Written certificate of permanent removal of fuel submitted
12	Site specific decommissioning cost estimate submitted
13	DOC staff mobilized
14	Period 1b Unit 1 - Decommissioning preparations
15	Fuel storage pool operations
16	Reconfigure plant (continued)
17	Dry fuel storage operations
18	Prepare detailed work procedures
19	Decon NSSS
20	Isolate spent fuel pool
21	Period 2a Unit 1 - Large component removal
22	Fuel storage pool operations
23	Dry fuel storage operations

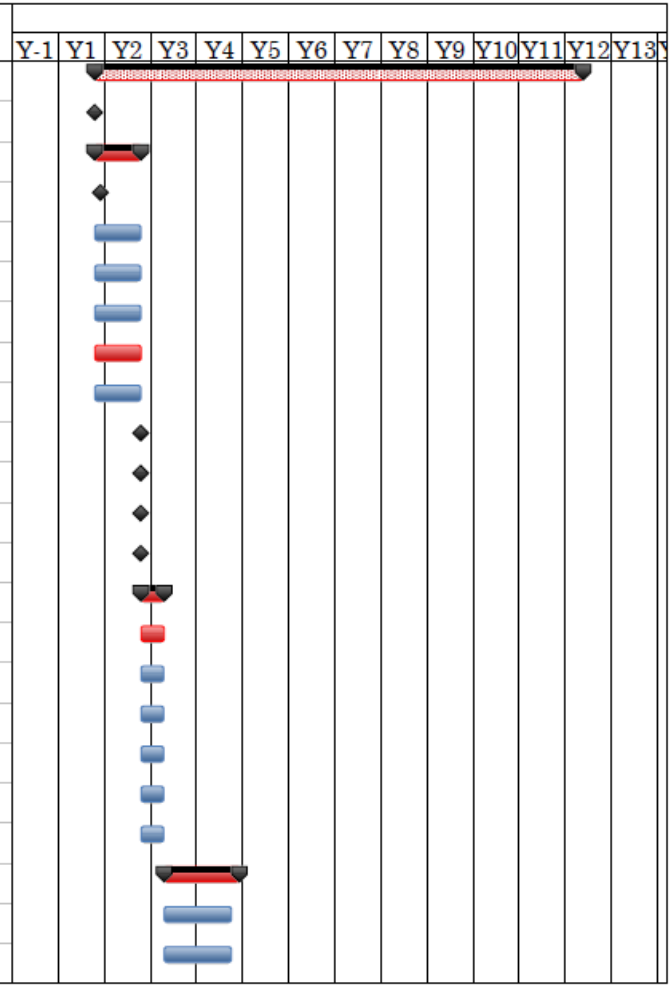


FIGURE 4.1 (continued)
DECON ACTIVITY SCHEDULE

ID	Task Name
24	Preparation for reactor vessel removal
25	Reactor vessel & internals
26	Remaining large NSSS components disposition
27	Move vessel cutter to Unit 2
28	Non-essential systems
29	Main turbine/generator
30	Main condenser
31	License termination plan submitted
32	Period 2b Unit 1 - Decontamination (wet fuel)
33	Fuel storage pool operations
34	Dry fuel storage operations
35	Remove systems not supporting wet fuel storage
36	Decon buildings not supporting wet fuel storage
37	License termination plan approved
38	
39	Unit 2 Operations
40	Shutdown Unit 2
41	Period 1a Unit 2 - Shutdown through transition
42	Certificate of permanent cessation of operations submitted
43	Fuel storage pool operations
44	Dry fuel storage operations
45	Reconfigure plant
46	Prepare activity specifications

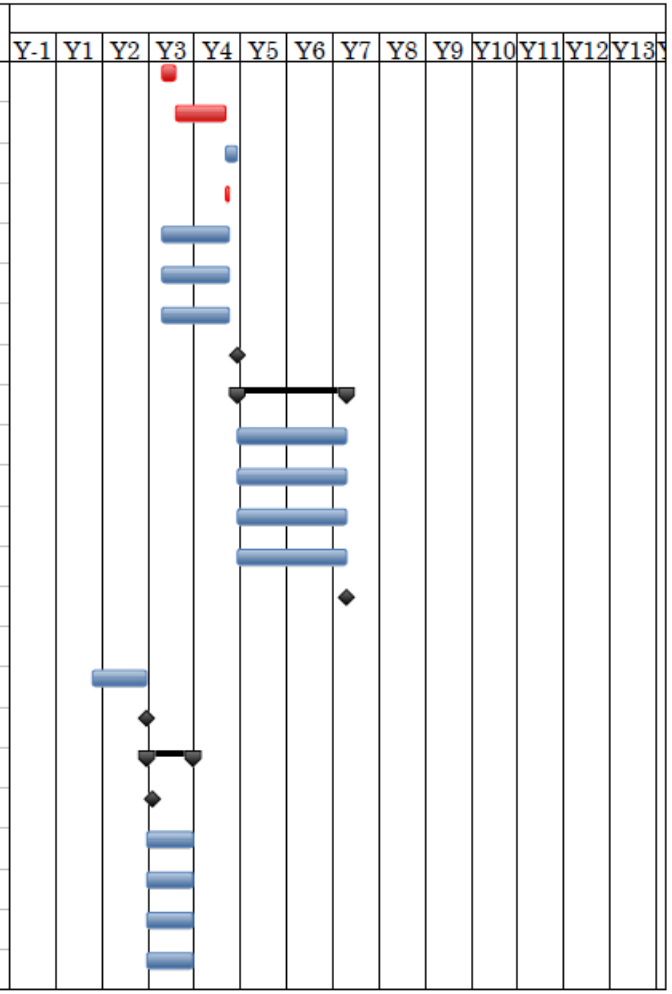


FIGURE 4.1 (continued)
DECON ACTIVITY SCHEDULE

ID	Task Name
47	Perform site characterization
48	PSDAR submitted
49	Written certificate of permanent removal of fuel submitted
50	Site specific decommissioning cost estimate submitted
51	DOC staff mobilized
52	Period 1b Unit 2 - Decommissioning preparations
53	Fuel storage pool operations
54	Reconfigure plant (continued)
55	Dry fuel storage operations
56	Prepare detailed work procedures
57	Decon NSSS
58	Isolate spent fuel pool
59	Period 2a Unit 2 - Large component removal
60	Fuel storage pool operations
61	Dry fuel storage operations
62	Preparation for reactor vessel removal
63	Reactor vessel & internals
64	Remaining large NSSS components disposition
65	Non-essential systems
66	Main turbine/generator
67	Main condenser
68	License termination plan submitted
69	Period 2b Unit 2 - Decontamination (wet fuel)

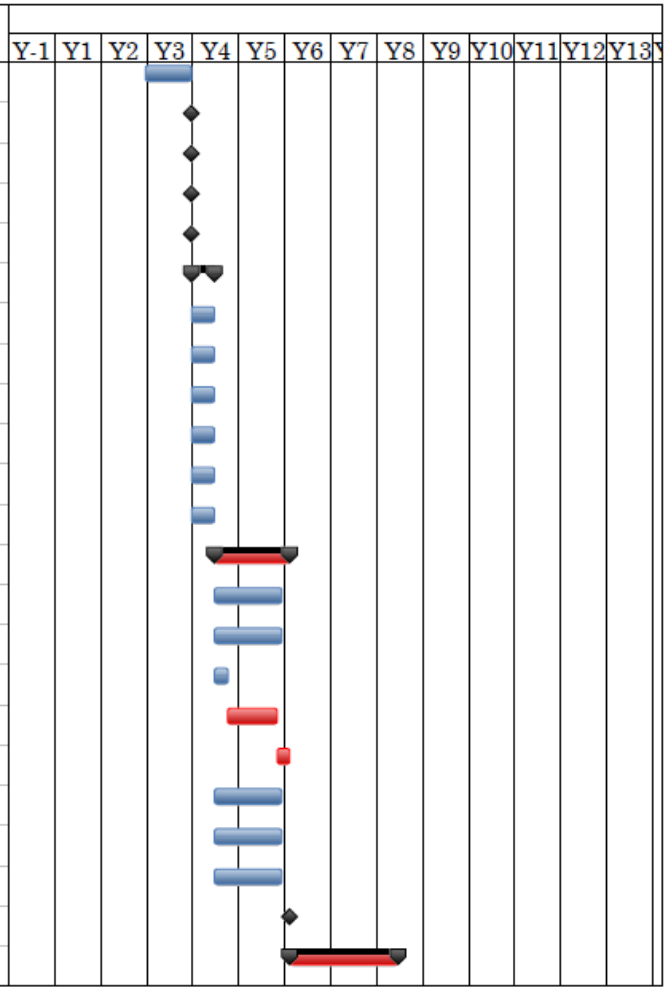


FIGURE 4.1 (continued)
DECON ACTIVITY SCHEDULE

ID	Task Name
70	Fuel storage pool operations
71	Dry fuel storage operations
72	Remove systems not supporting wet fuel storage
73	Decon buildings not supporting wet fuel storage
74	License termination plan approved
75	Fuel storage pool available for decommissioning
76	Period 2d Unit 2 - Decontamination following wet fuel storage
77	Dry fuel storage operations
78	Remove remaining systems
79	Decon wet fuel storage area
80	
81	Period 2f Unit 1 & 2 - Plant license termination
82	Dry fuel storage operations
83	Final Site Survey
84	NRC review & approval
85	Part 50 license terminated
86	Period 3b Unit 1 & 2 - Site restoration
87	Dry fuel storage operations
88	Building demolitions, backfill and landscaping
89	Building demolition
90	Landscape Site

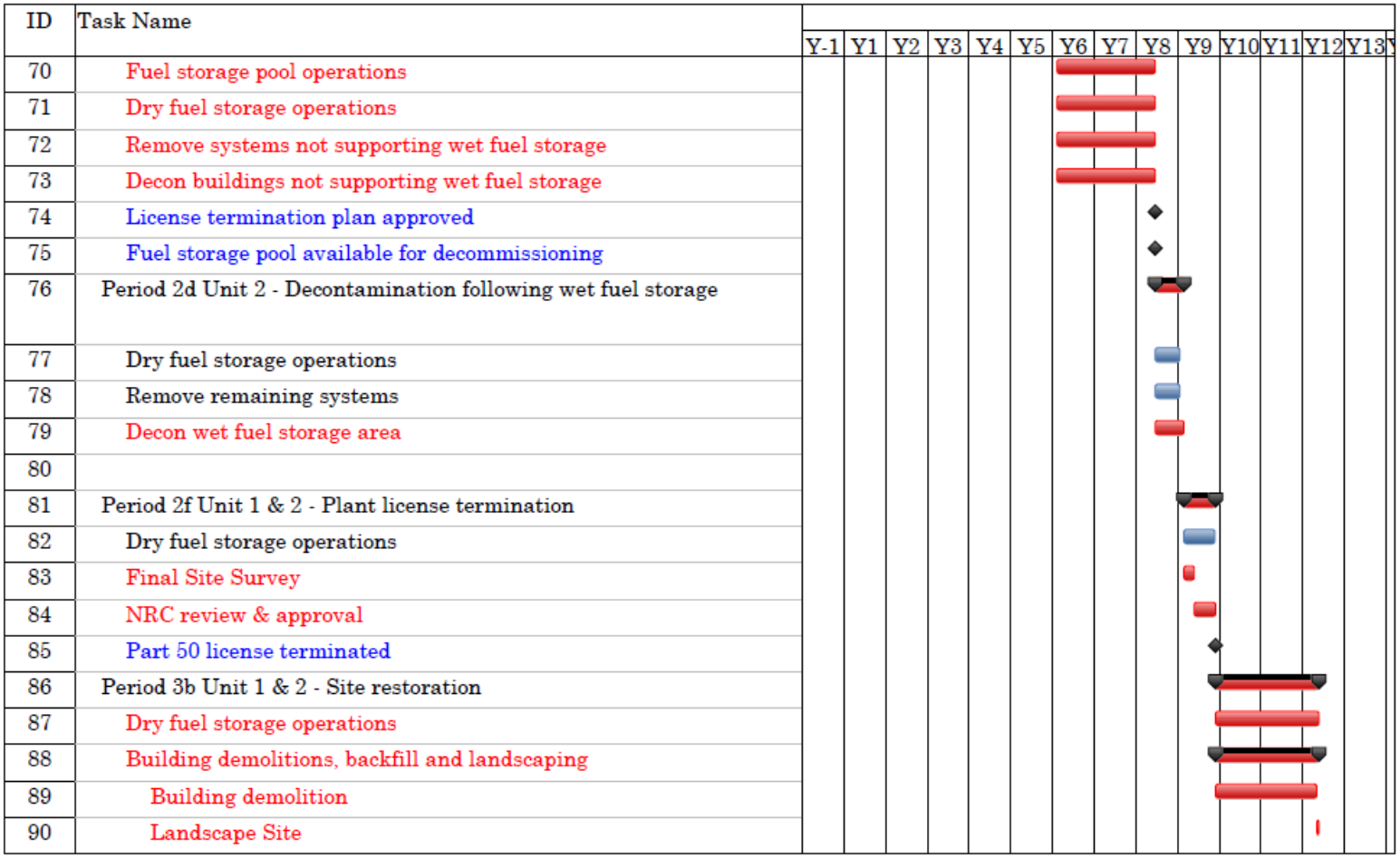


FIGURE 4.2
DECOMMISSIONING TIMELINE
DECON
(not to scale)

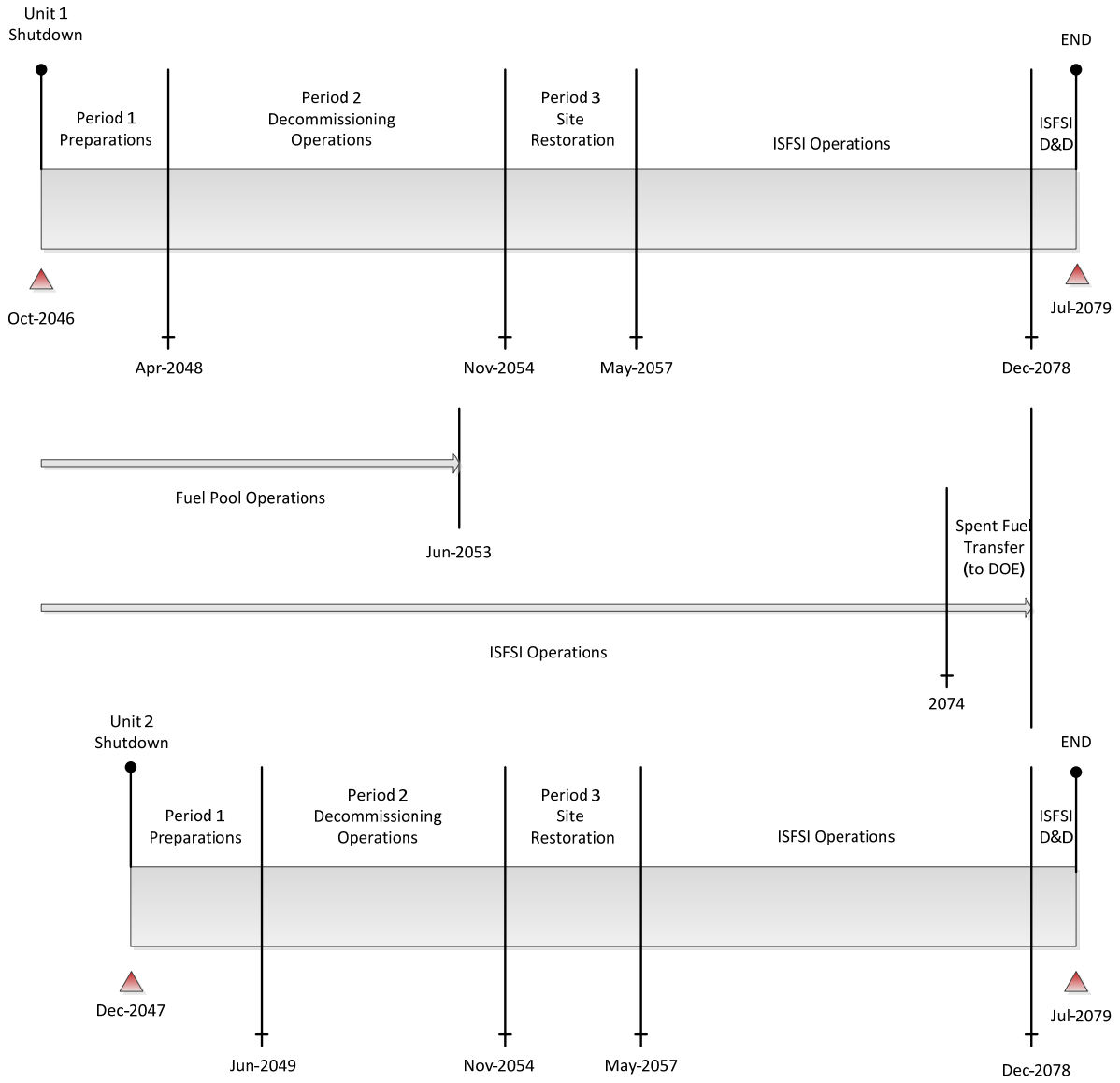


FIGURE 4.3
DECOMMISSIONING TIMELINE
DELAYED DECON
(not to scale)

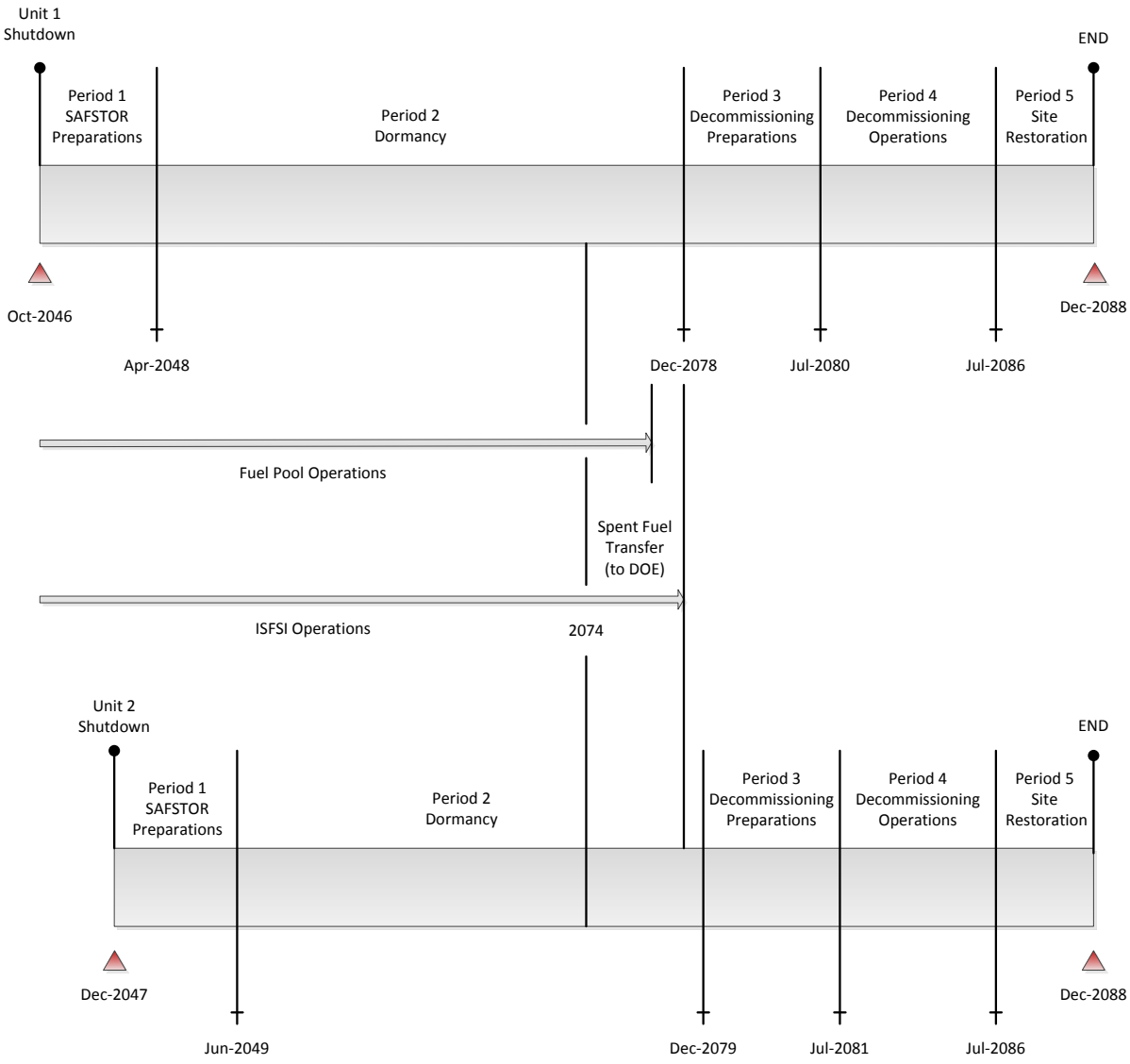
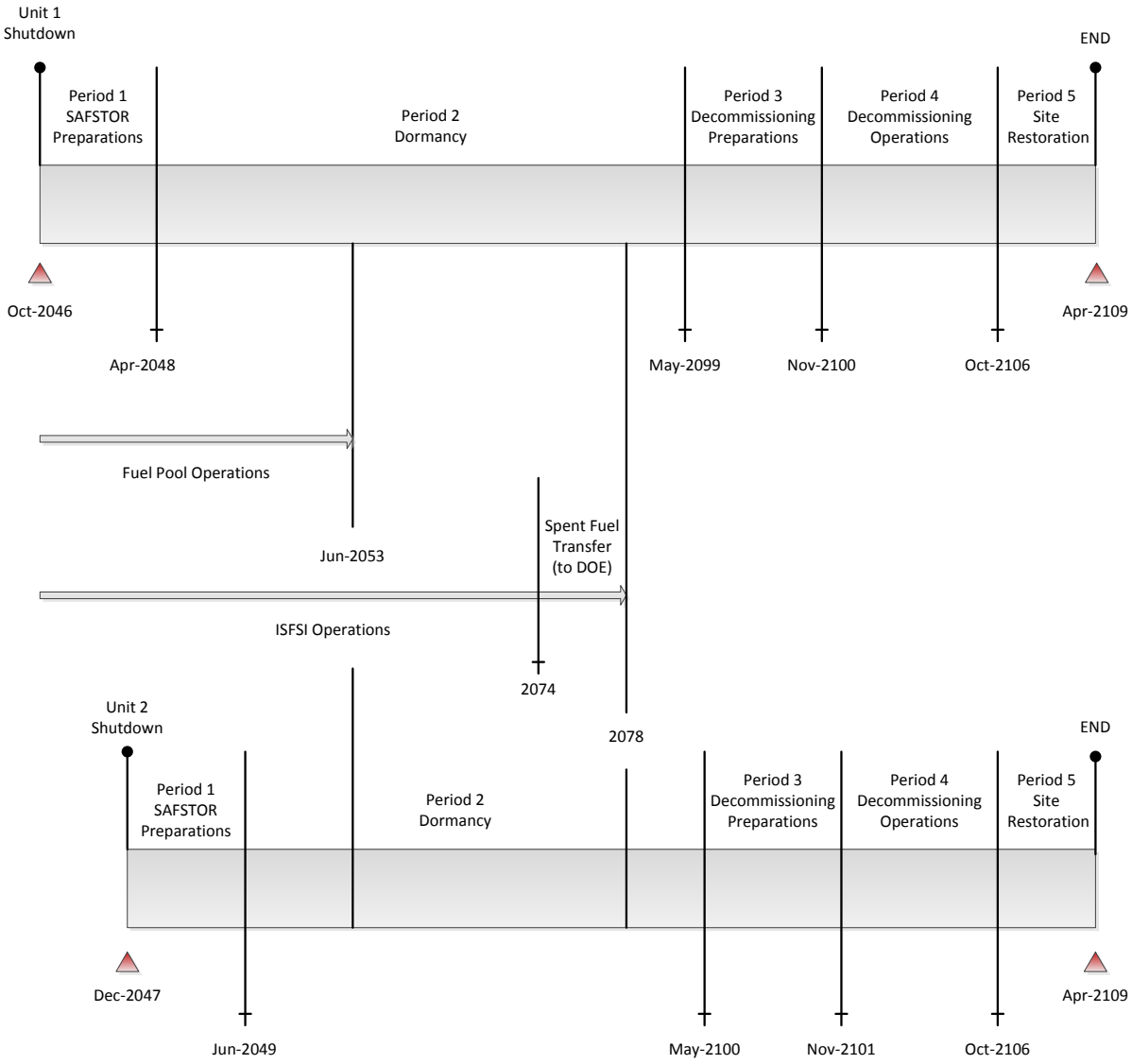


FIGURE 4.4
DECOMMISSIONING TIMELINE
SAFSTOR
(not to scale)



5. RADIOACTIVE WASTES

The objectives of the decommissioning process are the removal of all radioactive material from the site that would restrict its future use and the termination of the NRC license(s). This currently requires the remediation of all radioactive material at the site in excess of applicable legal limits. Under the Atomic Energy Act,[35] the NRC is responsible for protecting the public from sources of ionizing radiation. Title 10 of the Code of Federal Regulations delineates the production, utilization, and disposal of radioactive materials and processes. In particular, §71 defines radioactive material as it pertains to packaging and transportation and §61 specifies its disposition.

Most of the materials being transported for controlled burial are categorized as Low Specific Activity (LSA) or Surface Contaminated Object (SCO) materials containing Type A quantities, as defined in 49 CFR §173-178. Shipping containers are required to be Industrial Packages (IP-1, IP-2 or IP-3, as defined in subpart 173.411). For this study, commercially available steel containers are presumed to be used for the disposal of piping, small components, and concrete. Larger components can serve as their own containers, with proper closure of all openings, access ways, and penetrations.

The destinations for the various waste streams from decommissioning are identified in Figures 5.1 and 5.2. The volumes of radioactive waste generated during the various decommissioning activities at the site is shown on a line-item basis in Appendices C, D, and E and summarized in Tables 5.1 through 5.3. The quantified waste volume summaries shown in these tables are consistent with §61 classifications. The volumes are calculated based on the exterior dimensions for containerized material and on the displaced volume of components serving as their own waste containers.

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

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

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

The waste material generated in the decontamination and dismantling of Braidwood is primarily generated during Period 2 of the DECON alternative and Period 4 of the deferred alternatives. All radioactive waste is sent offsite for controlled disposal.

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

Energy*Solutions* is not able to accept the higher activity waste (Class B and C) generated in the decontamination of the reactor vessel and segmentation of the components closest to the core. As a proxy for future disposal facilities, waste disposal costs for the higher activity waste (Class B and C) are based upon the last published rate schedule for non-compact waste for the Barnwell facility, adjusted for escalation of the Atlantic Compact rates.

FIGURE 5.1
RADIOACTIVE WASTE DISPOSITION

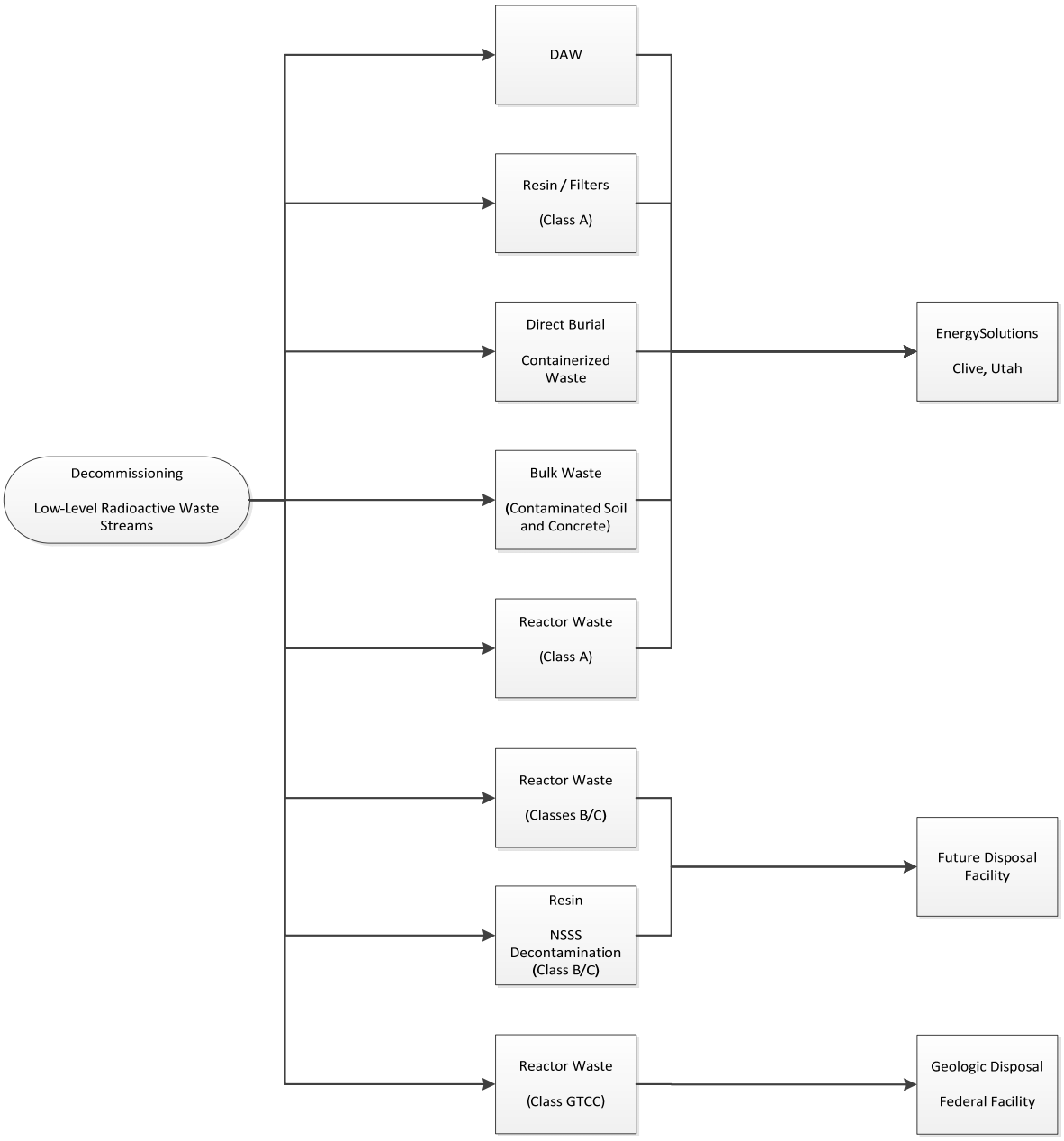
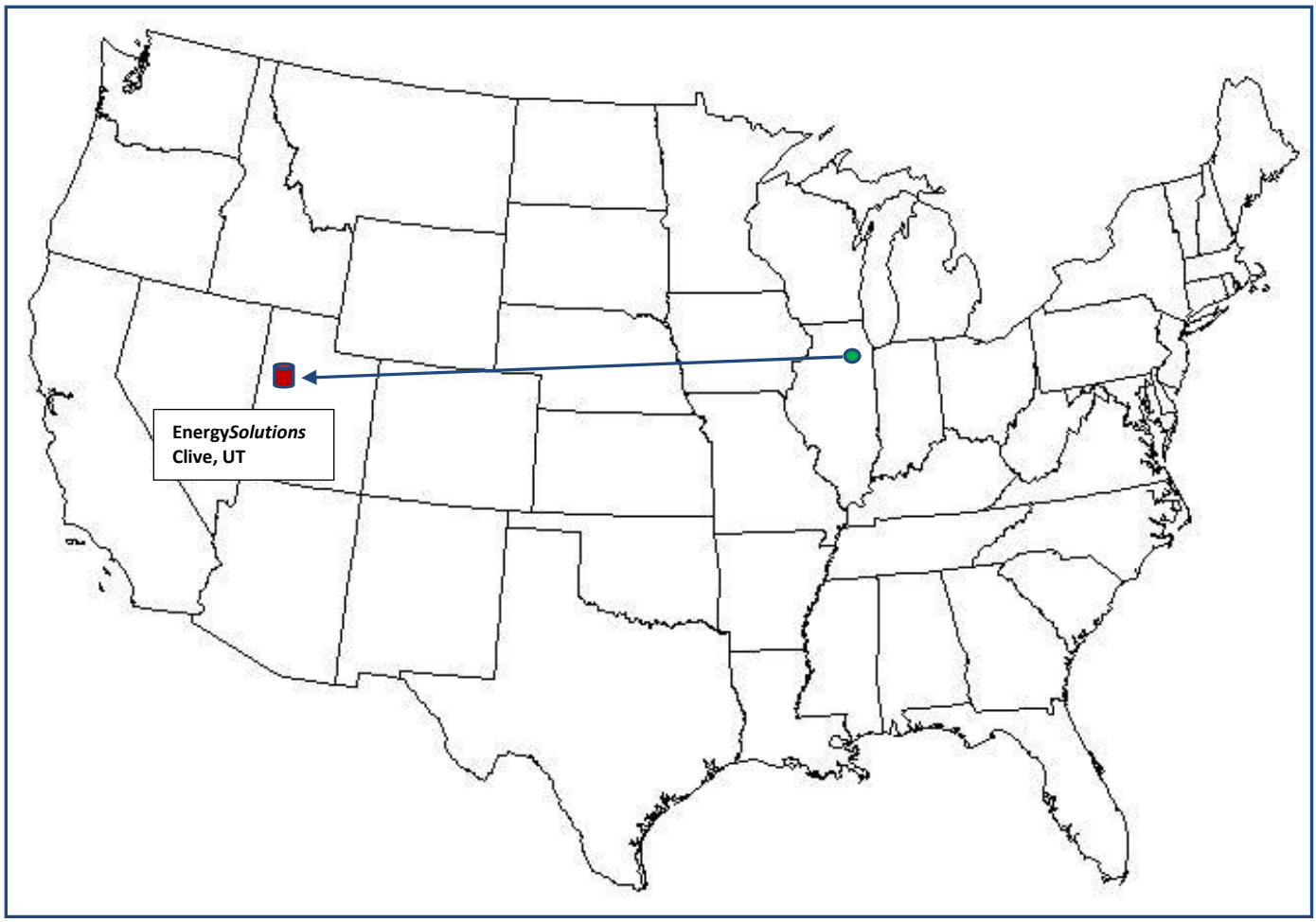


FIGURE 5.2
DECOMMISSIONING WASTE DESTINATIONS
RADIOLOGICAL



The figure indicates the destinations for the low-level radioactive waste designated for direct disposal (Class A at Energy*Solutions*).

Disposition of the Class B and C low-level radioactive waste will be at a future disposal facility (to be determined). For estimating purposes, the facility is located (for capturing transportation costs) at a distance equivalent to the Energy*Solutions* facility and the disposal cost is based upon the currently operating Barnwell Low-Level Radioactive Waste Disposal Facility in South Carolina.

Disposal options (and destinations) for GTCC are still being evaluated.

TABLE 5.1
DECOMMISSIONING WASTE SUMMARY
DECON

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Mass (pounds)
Low-Level Radioactive Waste (near-surface disposal)	Energy*Solutions* Containerized	A	897,671	49,116,590
	Energy*Solutions* Bulk	A	55,012	3,174,540
	Future LLRW Disposal Facility (Proxy)	B	3,691	403,221
	Future LLRW Disposal Facility (Proxy)	C	785	94,822
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC	4,433	866,361
Total [2]			961,592	53,655,534
Scrap Metal				257,968,000

[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
DECOMMISSIONING WASTE SUMMARY
DELAYED DECON

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Mass (pounds)
Low-Level Radioactive Waste (near-surface disposal)	Energy*Solutions* Containerized	A	897,707	48,712,280
	Energy*Solutions* Bulk	A	64,003	3,166,325
	Future LLRW Disposal Facility (Proxy)	B	2,254	213,522
	Future LLRW Disposal Facility (Proxy)	C	785	94,822
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC	4,433	866,361
Total [2]			969,182	53,053,310
Scrap Metal				257,968,000

[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
DECOMMISSIONING WASTE SUMMARY
SAFSTOR

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Mass (pounds)
Low-Level Radioactive Waste (near-surface disposal)	Energy*Solutions* Containerized	A	898,846	48,818,540
	Energy*Solutions* Bulk	A	62,812	3,142,502
	Future LLRW Disposal Facility (Proxy)	B	1,002	100,508
	Future LLRW Disposal Facility (Proxy)	C	785	94,822
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC	4,433	866,361
Total [2]			967,879	53,022,733
Scrap Metal				257,968,000

[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 Braidwood relied upon the site-specific, technical information developed for a previous analysis prepared in 2009. While not an engineering study, the estimates provide Exelon with sufficient information to assess its financial obligations, as they pertain to the eventual decommissioning of the nuclear station.

The estimates described in this report are based on numerous fundamental assumptions, including regulatory requirements, project contingencies, low-level radioactive waste disposal practices, high-level radioactive waste management options, and site restoration requirements. The decommissioning scenarios assume continued operation of the plant's spent fuel pool for a minimum of five and one-half years following the cessation of operations for continued cooling of the assemblies. For the DECON and SAFSTOR scenarios, the ISFSI is expanded to accommodate the spent fuel, once sufficiently cooled, until such time that the DOE can complete the transfer of the assemblies to its repository. The spent fuel in the storage pools and reactors at the cessation of operations remains in the storage pools in the Delayed-DECON alternative.

The cost projected to promptly decommission (DECON) Braidwood is estimated to be $1,868.4 million. The majority of this cost (approximately 64.7%) is associated with the physical decontamination and dismantling of the nuclear units so that the licenses can be terminated. Another 25.6% is associated with the management, interim storage, and eventual transfer of the spent fuel. The remaining 9.7% is for the demolition of the designated structures and limited restoration of the site.

The primary cost contributors, identified in Tables 6.1 through 6.3, are either labor-related or associated with the management and disposition of the radioactive waste. Program management is the largest single contributor to the overall cost. The magnitude of the expense is a function of both the size of the organization required to manage the decommissioning, as well as the duration of the program. This analysis assumes that Exelon will oversee the decommissioning program, using a DOC to manage the decommissioning labor force and the associated subcontractors. The size and composition of the management organization varies with the decommissioning phase and associated site activities. However, once the operating license is terminated, the staff is substantially reduced for the conventional demolition and restoration of the site, and the long-term care of the spent fuel (for the DECON alternative).

As described in this report, the spent fuel pool will remain operational for a minimum of five and one-half years following the cessation of operations. The pool will be isolated and an independent spent fuel island created. This will allow decommissioning operations to proceed in and around the pool areas. Over the five and one-half year period, the spent fuel will be packaged into transportable steel canisters for future loading into a DOE-provided transport cask (DECON and SAFSTOR alternatives). The canisters will be stored in concrete overpacks at the ISFSI until the DOE is able to receive them. Dry storage of the fuel provides additional flexibility in the event the DOE is not able to meet the current timetable for completing the transfer of assemblies to an off-site facility and minimizes the associated caretaking expenses.

The cost for waste disposal includes only those costs associated with the controlled disposition of the low-level radioactive waste generated from decontamination and dismantling activities, including plant equipment and components, structural material, filters, resins and dry-active waste. As described in Section 5, disposal of the majority of the radioactive material is at EnergySolutions facility in Clive, Utah or some alternative facility. Highly activated components, requiring additional isolation from the environment, are packaged for geologic disposal. Disposal of these components is based upon a cost equivalent for spent fuel.

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. 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.

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.

Comparison of the 2009 and 2014 Estimates

For illustrative purposes, the estimates for the 2009 and 2014 DECON scenarios are compared, with the cost difference for the major cost elements shown in Table 6.4. The 2009 cost elements are inflated using the CPI, Services index to 2014 dollars to remove the effect of financial escalation from the comparison. The cost difference between the escalated 2009 estimate (increased approximately 8.6%) and the 2014 estimate is approximately $381 million. Unless otherwise noted, all cost values and percentages reflect 2009 estimate costs adjusted for inflation.

Spent Fuel Management

Approximately $154 million, or 40% of the total cost difference, is directly attributable to the additional 13 years of post-dismantling ISFSI operation reflected in the 2014 estimate. The cost of ISFSI operations (including plant staff, security, insurance, property taxes, fees, and other operating costs) during this timeframe is approximately $5.92 million per year per unit (2014 estimate $s). The increased residence time was based upon Exelon's revised projections for fleet-wide DOE spent fuel acceptance, and with consideration of an additional delay in DOE startup (first acceptance of commercial spent fuel) from 2018 to 2025.

Spent Fuel Management (Direct Costs)

This cost category increased approximately $130 million. It includes the costs for the dry storage casks and loading campaign costs, as well as emergency planning fees while fuel is on site. The principal contributor to the increase was from emergency planning fees, which represents approximately $128 million or 98% of the increase. In 2009, a nominal emergency planning fee allowance was used. The 2014 estimate incorporates an annual state fee of $3.8 million (for the station) while spent fuel was on site. An increase (14%) in the capital cost of the dry storage system was responsible for the remainder of the increase in this cost category from years 2009 to 2014.

These increases were partially offset by a reduced number of dry storage overpacks and canisters required (93 in 2009 to 90 in 2014) and a reduction in the costs to expand the ISFSI (from a nominal cost of $200 thousand per cask in 2009 dollars to a nominal cost of $100 thousand per slot in 2014 dollars).

Security

The majority of the increase in security costs (68%) was due to the longer spent fuel site residence time as described previously. Contributing to the increase was a 30% increase in average personnel costs.

Property Taxes

Property taxes for the 1st four years following unit shut down changed substantially. This was due to the method by which the Exelon schedule of property taxes was applied in the two estimates. Property taxes are assumed to be paid in arrears; therefore the tax payment in the year following shutdown is actually for the final year of operations, and therefore is not included in either the 2009 or 2014 estimates. In 2009 the cost model assumed that this first year (which as not included) was part of the reduction in tax payments; the 2014 estimate does not make this assumption. The 2009 estimate also assumed that the second year of payment was already reduced to 67% of the operations level; the 2014 estimate begins property tax payments at the operations level for the second year. The total impact of the change was that the 2009 estimate paid the equivalent of one year of operations-level taxes before beginning the $1 million per year level payments; the 2014 estimate paid the equivalent of approximately two years of operations-level taxes prior to the $1 million per year level payments. The increase in the spent fuel site residence time (13 years) also contributed to the increased in costs.

Decommissioning and Demolition

Plant system and structural commodity "Removal" costs increased as a result of an 8% increase in craft labor over the five year period (used to perform physical plant dismantling) and a 14% increase in health physics personnel (used to support work crew activities, perform interim radiological assessments, and license termination surveys). The 2014 "Removal" cost also includes the perimeter excavation of the power blocks for removing underground services. This was added in 2014 based upon industry experience.

In the 2009 cost estimate, a significant portion of the contaminated waste stream was designated for off-site processing, volume reduction and recovery. This included the secondary side of the steam generators. In the 2014 estimate, he LLRW

strategy changed such that metal material was sent directly to the LLRW burial facility, where is can be separated for burial or processing by the waste vendor consistent with recent industry practice. This results in a single rate for burial or processing of waste metals. With the low direct disposal rate, third-party off-site processing was not utilized in the 2014 estimate. As a result of the change:

1) The packaging cost increased, since direct disposal of contaminated metals incorporates the mass and volume of the waste package, as well as the cost of the one-time use waste package. Off-site processing typically uses reusable containers that do not contribute substantially to the packaging cost. "Packaging" costs also increased with the addition (in 2014) of four spent fuel multi-purpose canisters and storage overpacks for GTCC waste (2 per unit at a nominal cost of $1.2 million for each canister and transfer costs). The additional packages resulted from a payload constraint being applied on the storage canisters, as a result of industry experience.

2) Shipping costs increased for three reasons, the greater distance to the waste disposal site v. the off-site waste processing site, the increased number of waste packages weight, and a 2014 price for diesel fuel being 46% higher than in 2009.

3) In 2014 low-level waste disposal costs increased relative to the combination of waste disposal and processing cost in 2009 principally because the 2014 cost of waste disposal for system components (using a single waste stream) is substantially larger than 2009 cost for disposal (which used separate waste streams for direct burial and off-site waste processing). Also contributing to the change was a 10% increase in the large component disposal rate (applied to large primary system components such as steam generators and the reactor vessel. This cost increase was offset to a limited extent by a decrease in the on-site decontamination of systems.

Characterization and Licensing Surveys

Characterization and surveys increased by $16.0 million (44%). The majority of the increase in this cost category (93%) is associated with the addition (in 2014) of remedial action survey personnel during the active decontamination and dismantling periods. These teams are used to assess, process, and identify areas of concerns, and confirm that the desired remediation results have been achieved. This activity has been added based on industry experience.

Other

Additional costs were realized in the 2014 cost model from an updated "Insurance" model and "Site O&M" charges provided by Exelon (combined with the longer spent fuel site residence time). "Energy" costs increased 23% percent since the 2009 estimate. This is commensurate with the 21.2% increase in the price of electricity used in the 2014 estimate and the model that adjusts energy consumption based on reactor thermal rating (Braidwood had a power uprate between the 2009 and 2014 studies).

TABLE 6.1
SUMMARY OF DECOMMISSIONING COST ELEMENTS
DECON ALTERNATIVE
(thousands of 2014 dollars)

Cost Element	Total	Percentage
Decontamination	30,177	1.6
Removal	300,508	16.1
Packaging	63,070	3.4
Transportation	33,922	1.8
Waste Disposal	175,162	9.4
Off-site Waste Processing	0	0.0
Program Management [1]	558,745	29.9
Security	159,287	8.5
Spent Fuel Pool Isolation	12,434	0.7
Spent Fuel Management [2]	308,380	16.5
Insurance and Regulatory Fees	36,882	2.0
Energy	23,708	1.3
Characterization and Licensing Surveys	52,136	2.8
Property Taxes	88,413	4.7
Miscellaneous Equipment	13,599	0.7
Site O&M	12,022	0.6
Total [3]	1,868,444	100.0

Cost Element	Total	Percentage
NRC License Termination	1,208,816	64.7
Spent Fuel Management	477,609	25.6
Site Restoration	182,019	9.7
Total [3]	1,868,444	100.0

[1] Includes engineering 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

TABLE 6.2
SUMMARY OF DECOMMISSIONING COST ELEMENTS
DELAYED DECON ALTERNATIVE
(thousands of 2014 dollars)

Cost Element	Total	Percentage
Decontamination	35,981	1.6
Removal	309,423	14.1
Packaging	53,195	2.4
Transportation	31,529	1.4
Waste Disposal	157,223	7.2
Off-site Waste Processing	0	0.0
Program Management [1]	788,499	36.0
Security	274,412	12.5
Spent Fuel Pool Isolation	12,434	0.6
Spent Fuel Management [2]	201,668	9.2
Insurance and Regulatory Fees	77,725	3.5
Energy	50,947	2.3
Characterization and Licensing Surveys	53,957	2.5
Property Taxes	98,787	4.5
Miscellaneous Equipment	29,189	1.3
Site O&M	15,802	0.7
Total [3]	2,190,771	100.0

Cost Element	Total	Percentage
NRC License Termination	1,311,127	59.8
Spent Fuel Management	697,424	31.8
Site Restoration	182,220	8.3
Total [3]	2,190,771	100.0

[1] Includes engineering 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

TABLE 6.3
SUMMARY OF DECOMMISSIONING COST ELEMENTS
SAFSTOR ALTERNATIVE
(thousands of 2014 dollars)

Cost Element	Total	Percentage
Decontamination	35,949	1.6
Removal	309,396	13.8
Packaging	53,151	2.4
Transportation	31,640	1.4
Waste Disposal	154,865	6.9
Off-site Waste Processing	0	0.0
Program Management [1]	712,596	31.8
Security	233,867	10.4
Spent Fuel Pool Isolation	12,434	0.6
Spent Fuel Management [2]	300,832	13.4
Insurance and Regulatory Fees	110,805	4.9
Energy	49,317	2.2
Characterization and Licensing Surveys	53,957	2.4
Property Taxes	121,067	5.4
Miscellaneous Equipment	38,028	1.7
Site O&M	23,499	1.0
Total [3]	2,241,402	100.0

Cost Element	Total	Percentage
NRC License Termination	1,620,522	72.3
Spent Fuel Management	437,445	19.5
Site Restoration	183,435	8.2
Total [3]	2,241,402	100.0

[1] Includes engineering 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

TABLE 6.4
SUMMARY COMPARISON
DECON ALTERNATIVE
(thousands of dollars)

Cost Element	2009 Estimate (dollars)	2009 Escalated to 2014 [1] (dollars)	2014 Estimate (dollars)	Delta [2]
Decontamination	36,446	39,562	30,177	-9,386
Removal	249,366	270,688	300,508	29,819
Packaging	29,993	32,558	63,070	30,512
Transportation	20,786	22,563	33,922	11,358
Waste Disposal	119,684	129,918	175,162	45,244
Off-site Waste Processing	8,110	8,803	0	-8,803
Program Management	513,377	557,274	558,745	1,471
Security	77,874	84,533	159,287	74,754
Spent Fuel Pool Isolation	11,143	12,096	12,434	339
Spent Fuel Management (Direct Costs)	164,291	178,339	308,380	130,041
Insurance and Regulatory Fees	23,532	25,544	36,882	11,338
Energy	17,702	19,216	23,708	4,493
Characterization/Licensing Surveys	33,288	36,134	52,136	16,001
Property Taxes	39,113	42,457	88,413	45,956
Miscellaneous Equipment	12,921	14,026	13,599	-427
Site O&M	5,508	5,979	12,022	6,043
Total	1,363,134	1,479,691	1,868,444	388,753

NRC License Termination	971,127	1,054,165	1,208,816	154,651
Spent Fuel Management	238,232	258,602	323,688	65,086
Additional 13 Years of ISFSI Ops [3]			153,921	153,921
Site Restoration	153,775	166,924	182,019	15,095
Total	1,363,134	1,479,691	1,868,444	388,753

[1] Escalated by CPI, Services for comparative purposes
[2] "2014 Estimate" value minus "2009 Escalated to 2014" value
[3] Based upon average annual cost of $5.92 million per unit for 13 years

7. REFERENCES

1. "Decommissioning Cost Analysis for the Braidwood Nuclear Power Station," Document No. E16-1555-014, Rev. 0, TLG Services, Inc., October 2009

2. U.S. Code of Federal Regulations, Title 10, Parts 30, 40, 50, 51, 70 and 72, "General Requirements for Decommissioning Nuclear Facilities," Nuclear Regulatory Commission, 53 Fed. Reg., 24018-, June 27, 1988

3. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.159, "Assuring the Availability of Funds for Decommissioning Nuclear Reactors," Rev. 2, October 2011

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, 66 Fed. Reg. 52551, 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, 61 Fed. Reg. 39278, July 29, 1996.

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

8. "Nuclear Waste Policy Act of 1982," 42 U.S. Code 10101, et seq. http://pbadupws.nrc.gov/docs/ML1327/ML13274A489.pdf#page=419

9. Blue Ribbon Commission on America's Nuclear Future Charter, http://cybercemetery.unt.edu/archive/brc/20120620215336/http://brc.gov/index.php?q=page/charter

10. "Blue Ribbon Commission on America's Nuclear Future, Report to the Secretary of Energy," http://www.brc.gov/, January 2012.

11. "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," U.S. DOE, January 11, 2013.

7. REFERENCES
(continued)

12. United States Court of Appeals for the District Of Columbia Circuit, In Re: Aiken County, Et Al., August 2013, http://www.cadc.uscourts.gov/internet/opinions.nsf/BAE0CF34F762EBD985257BC6004DEB18/$file/11-1271-1451347.pdf

13. U.S. Code of Federal Regulations, Title 10, Part 961.11, Article IV – Responsibilities of the Parties, B. DOE Responsibilities, 5.(a) "… DOE shall issue an annual acceptance priority ranking for receipt of SNF and/or HLW at the DOE repository. This priority ranking shall be based on the age of SNF and/or HLW as calculated from the date of discharge of such materials from the civilian nuclear power reactor. The oldest fuel or waste will have the highest priority for acceptance …"

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

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

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

17. U.S. Code of Federal Regulations, Title 10, Part 61.55 "Waste Classification"

18. U.S. Code of Federal Regulations, Title 10, Part 20, Subpart E, "Final Rule, Radiological Criteria for License Termination," 62 Fed. Reg. 39058, July 21, 1997

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

20. 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."

21. "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

7. REFERENCES
(continued)

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

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

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

25. "Building Construction Cost Data 2014," Robert Snow Means Company, Inc., Kingston, Massachusetts

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

27. Civilian Radioactive Waste Management System Waste Acceptance System Requirements Document," Revision 5, ICN01 (DOE/RW-0351) effective March 10, 2008

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

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

30. Tri-State Motor Transit Company Radioactive Materials Tariff

31. 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.

32. 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.

7. REFERENCES
(continued)

33. 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

34. "Microsoft Project 2010," Microsoft Corporation, Redmond, WA, 2003

35. “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	66.26	2,229.72
Craftsmen	2.00	11.217	79.04	1,773.18
Foreman	1.00	11.217	81.75	916.99
General Foreman	0.25	11.217	85.24	239.03
Fire Watch	0.05	11.217	66.26	37.16
Health Physics Technician	1.00	11.217	63.44	711.61
Total labor cost				$5,907.69

4. EQUIPMENT & CONSUMABLES COSTS

Equipment Costs	none
Consumables/Materials Costs	
• Blotting paper 50 @ $0.63/sq ft {1}	$31.50
• Plastic sheets/bags 50 @ $0.28/sq ft {2}	$14.00
• Gas torch consumables 1 @ $19.99 x 1 /hr {3}	$19.99
Subtotal cost of equipment and materials	$65.49
Overhead & profit on equipment and materials @ 16.25 %	$10.64
Total costs, equipment & material	$76.13

TOTAL COST:

Removal of contaminated heat exchanger <3000 pounds:	$5,983.82
Total labor cost:	$5,907.69
Total equipment/material costs:	$76.13
Total craft labor man-hours required per unit:	81.88

5. NOTES AND REFERENCES

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

- References for equipment & consumables costs:

    1. www.mcmaster.com online catalog, McMaster Carr Spill Control (7193T88)
    2. R.S. Means (2014) Division 01 56, Section 13.60-0600, page 23
    3. R.S. Means (2014) Division 01 54 33, Section 40-6360, page 698

- Material and consumable costs were adjusted using the regional indices for Joliet, Illinois.

APPENDIX B

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

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
Removal of clean instrument and sampling tubing, $/linear foot	0.71
Removal of clean pipe 0.25 to 2 inches diameter, $/linear foot	7.62
Removal of clean pipe >2 to 4 inches diameter, $/linear foot	10.74
Removal of clean pipe >4 to 8 inches diameter, $/linear foot	20.59
Removal of clean pipe >8 to 14 inches diameter, $/linear foot	40.11
Removal of clean pipe >14 to 20 inches diameter, $/linear foot	52.15
Removal of clean pipe >20 to 36 inches diameter, $/linear foot	76.72
Removal of clean pipe >36 inches diameter, $/linear foot	91.16
Removal of clean valve >2 to 4 inches	136.61
Removal of clean valve >4 to 8 inches	205.88
Removal of clean valve >8 to 14 inches	401.14
Removal of clean valve >14 to 20 inches	521.45
Removal of clean valve >20 to 36 inches	767.21
Removal of clean valve >36 inches	911.59
Removal of clean pipe hanger for small bore piping	47.09
Removal of clean pipe hanger for large bore piping	170.47
Removal of clean pump, <300 pound	347.23
Removal of clean pump, 300-1000 pound	954.07
Removal of clean pump, 1000-10,000 pound	3,785.79
Removal of clean pump, >10,000 pound	7,321.60
Removal of clean pump motor, 300-1000 pound	399.26
Removal of clean pump motor, 1000-10,000 pound	1,573.57
Removal of clean pump motor, >10,000 pound	3,540.53
Removal of clean heat exchanger <3000 pound	2,030.43
Removal of clean heat exchanger >3000 pound	5,111.15
Removal of clean feedwater heater/deaerator	14,425.58
Removal of clean moisture separator/reheater	29,678.35
Removal of clean tank, <300 gallons	446.65
Removal of clean tank, 300-3000 gallon	1,408.54
Removal of clean tank, >3000 gallons, $/square foot surface area	11.70

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
Removal of clean electrical equipment, <300 pound	188.64
Removal of clean electrical equipment, 300-1000 pound	650.04
Removal of clean electrical equipment, 1000-10,000 pound	1,300.09
Removal of clean electrical equipment, >10,000 pound	3,070.55
Removal of clean electrical transformer < 30 tons	2,132.46
Removal of clean electrical transformer > 30 tons	6,141.10
Removal of clean standby diesel generator, <100 kW	2,178.12
Removal of clean standby diesel generator, 100 kW to 1 MW	4,861.70
Removal of clean standby diesel generator, >1 MW	10,064.70
Removal of clean electrical cable tray, $/linear foot	17.70
Removal of clean electrical conduit, $/linear foot	7.73
Removal of clean mechanical equipment, <300 pound	188.64
Removal of clean mechanical equipment, 300-1000 pound	650.04
Removal of clean mechanical equipment, 1000-10,000 pound	1,300.09
Removal of clean mechanical equipment, >10,000 pound	3,070.55
Removal of clean HVAC equipment, <300 pound	228.10
Removal of clean HVAC equipment, 300-1000 pound	781.09
Removal of clean HVAC equipment, 1000-10,000 pound	1,556.69
Removal of clean HVAC equipment, >10,000 pound	3,070.55
Removal of clean HVAC ductwork, $/pound	0.75
Removal of contaminated instrument and sampling tubing, $/linear foot	2.12
Removal of contaminated pipe 0.25 to 2 inches diameter, $/linear foot	28.56
Removal of contaminated pipe >2 to 4 inches diameter, $/linear foot	49.95
Removal of contaminated pipe >4 to 8 inches diameter, $/linear foot	78.26
Removal of contaminated pipe >8 to 14 inches diameter, $/linear foot	156.02
Removal of contaminated pipe >14 to 20 inches diameter, $/linear foot	188.10
Removal of contaminated pipe >20 to 36 inches diameter, $/linear foot	261.57
Removal of contaminated pipe >36 inches diameter, $/linear foot	309.74
Removal of contaminated valve >2 to 4 inches	602.04
Removal of contaminated valve >4 to 8 inches	726.27

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
Removal of contaminated valve >8 to 14 inches	1,507.33
Removal of contaminated valve >14 to 20 inches	1,920.40
Removal of contaminated valve >20 to 36 inches	2,562.83
Removal of contaminated valve >36 inches	3,044.48
Removal of contaminated pipe hanger for small bore piping	197.41
Removal of contaminated pipe hanger for large bore piping	653.12
Removal of contaminated pump, <300 pound	1,293.91
Removal of contaminated pump, 300-1000 pound	2,990.42
Removal of contaminated pump, 1000-10,000 pound	9,917.66
Removal of contaminated pump, >10,000 pound	24,162.77
Removal of contaminated pump motor, 300-1000 pound	1,254.78
Removal of contaminated pump motor, 1000-10,000 pound	4,017.44
Removal of contaminated pump motor, >10,000 pound	9,019.53
Removal of contaminated heat exchanger <3000 pound	5,983.82
Removal of contaminated heat exchanger >3000 pound	17,299.15
Removal of contaminated tank, <300 gallons	2,145.94
Removal of contaminated tank, >300 gallons, $/square foot	42.24
Removal of contaminated electrical equipment, <300 pound	1,009.61
Removal of contaminated electrical equipment, 300-1000 pound	2,438.80
Removal of contaminated electrical equipment, 1000-10,000 pound	4,695.49
Removal of contaminated electrical equipment, >10,000 pound	9,152.53
Removal of contaminated electrical cable tray, $/linear foot	48.87
Removal of contaminated electrical conduit, $/linear foot	22.70
Removal of contaminated mechanical equipment, <300 pound	1,123.89
Removal of contaminated mechanical equipment, 300-1000 pound	2,695.93
Removal of contaminated mechanical equipment, 1000-10,000 pound	5,182.17
Removal of contaminated mechanical equipment, >10,000 pound	9,152.53
Removal of contaminated HVAC equipment, <300 pound	1,123.89
Removal of contaminated HVAC equipment, 300-1000 pound	2,695.93
Removal of contaminated HVAC equipment, 1000-10,000 pound	5,182.17

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
Removal of contaminated HVAC equipment, >10,000 pound	9,152.53
Removal of contaminated HVAC ductwork, $/pound	2.88
Removal/plasma arc cut of contaminated thin metal components, $/linear in.	5.39
Additional decontamination of surface by washing, $/square foot	11.27
Additional decontamination of surfaces by hydrolasing, $/square foot	47.03
Decontamination rig hook up and flush, $/ 250 foot length	9,529.12
Chemical flush of components/systems, $/gallon	20.28
Removal of clean standard reinforced concrete, $/cubic yard	185.92
Removal of grade slab concrete, $/cubic yard	252.17
Removal of clean concrete floors, $/cubic yard	480.40
Removal of sections of clean concrete floors, $/cubic yard	1,447.14
Removal of clean heavily rein concrete w/#9 rebar, $/cubic yard	307.62
Removal of contaminated heavily rein concrete w/#9 rebar, $/cubic yard	2,849.80
Removal of clean heavily rein concrete w/#18 rebar, $/cubic yard	388.88
Removal of contaminated heavily rein concrete w/#18 rebar, $/cubic yard	3,772.75
Removal heavily rein concrete w/#18 rebar & steel embedments, $/cubic yard	598.89
Removal of below-grade suspended floors, $/cubic yard	480.40
Removal of clean monolithic concrete structures, $/cubic yard	1,217.15
Removal of contaminated monolithic concrete structures, $/cubic yard	2,845.80
Removal of clean foundation concrete, $/cubic yard	955.80
Removal of contaminated foundation concrete, $/cubic yard	2,651.26
Explosive demolition of bulk concrete, $/cubic yard	40.89
Removal of clean hollow masonry block wall, $/cubic yard	138.07
Removal of contaminated hollow masonry block wall, $/cubic yard	446.65
Removal of clean solid masonry block wall, $/cubic yard	138.07
Removal of contaminated solid masonry block wall, $/cubic yard	446.65
Backfill of below-grade voids, $/cubic yard	36.47
Removal of subterranean tunnels/voids, $/linear foot	157.20
Placement of concrete for below-grade voids, $/cubic yard	140.71
Excavation of clean material, $/cubic yard	3.88

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
Excavation of contaminated material, $/cubic yard	53.12
Removal of clean concrete rubble (tipping fee included), $/cubic yard	29.50
Removal of contaminated concrete rubble, $/cubic yard	34.40
Removal of building by volume, $/cubic foot	0.40
Removal of clean building metal siding, $/square foot	1.86
Removal of contaminated building metal siding, $/square foot	6.06
Removal of standard asphalt roofing, $/square foot	3.31
Removal of transite panels, $/square foot	2.90
Scarifying contaminated concrete surfaces (drill & spall), $/square foot	16.41
Scabbling contaminated concrete floors, $/square foot	10.52
Scabbling contaminated concrete walls, $/square foot	28.21
Scabbling contaminated ceilings, $/square foot	97.23
Scabbling structural steel, $/square foot	8.40
Removal of clean overhead crane/monorail < 10 ton capacity	896.58
Removal of contaminated overhead crane/monorail < 10 ton capacity	2,476.96
Removal of clean overhead crane/monorail >10-50 ton capacity	2,151.79
Removal of contaminated overhead crane/monorail >10-50 ton capacity	5,943.70
Removal of polar crane > 50 ton capacity	8,938.01
Removal of gantry crane > 50 ton capacity	38,381.84
Removal of structural steel, $/pound	0.27
Removal of clean steel floor grating, $/square foot	6.32
Removal of contaminated steel floor grating, $/square foot	18.05
Removal of clean free standing steel liner, $/square foot	17.55
Removal of contaminated free standing steel liner, $/square foot	49.49
Removal of clean concrete-anchored steel liner, $/square foot	8.78
Removal of contaminated concrete-anchored steel liner, $/square foot	57.69
Placement of scaffolding in clean areas, $/square foot	18.27
Placement of scaffolding in contaminated areas, $/square foot	32.46
Landscaping with topsoil, $/acre	27,031.38
Cost of CPC B-88 LSA box & preparation for use	2,224.75

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	2,038.85
Cost of CPC B-12V 12 gauge LSA box & preparation for use	1,670.38
Cost of CPC B-144 LSA box & preparation for use	11,162.35
Cost of LSA drum & preparation for use	239.59
Cost of cask liner for CNSI 8 120A cask (resins)	13,419.39
Cost of cask liner for CNSI 8 120A cask (filters)	9,766.44
Decontamination of surfaces with vacuuming, $/square foot	1.10

APPENDIX C

DETAILED COST ANALYSIS

DECON

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Braidwood Nuclear Power Station, Unit 2 ..... C-10

Table C-1
Braidwood Nuclear Power Station Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	161	24	185	185	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	248	37	285	285	-	-	-	-	-	-	-	-	-	2,000
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	570	85	655	655	-	-	-	-	-	-	-	-	-	4,600
1a.1.8	Perform detailed rad survey									a											
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	124	19	142	142	-	-	-	-	-	-	-	-	-	1,000
1a.1.10	End product description	-	-	-	-	-	-	124	19	142	142	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	161	24	185	185	-	-	-	-	-	-	-	-	-	1,300
1a.1.12	Define major work sequence	-	-	-	-	-	-	929	139	1,069	1,069	-	-	-	-	-	-	-	-	-	7,500
1a.1.13	Perform SER and EA	-	-	-	-	-	-	384	58	442	442	-	-	-	-	-	-	-	-	-	3,100
1a.1.14	Perform Site-Specific Cost Study	-	-	-	-	-	-	619	93	712	712	-	-	-	-	-	-	-	-	-	5,000
1a.1.15	Prepare/submit License Termination Plan	-	-	-	-	-	-	507	76	584	584	-	-	-	-	-	-	-	-	-	4,096
1a.1.16	Receive NRC approval of termination plan									a											
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	610	91	701	631	-	70	-	-	-	-	-	-	-	4,920
1a.1.17.2	Plant systems	-	-	-	-	-	-	516	77	594	534	-	59	-	-	-	-	-	-	-	4,167
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	62	9	71	71	-	-	-	-	-	-	-	-	-	500
1a.1.17.4	Reactor internals	-	-	-	-	-	-	880	132	1,012	1,012	-	-	-	-	-	-	-	-	-	7,100
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	805	121	926	926	-	-	-	-	-	-	-	-	-	6,500
1a.1.17.6	Biological shield	-	-	-	-	-	-	62	9	71	71	-	-	-	-	-	-	-	-	-	500
1a.1.17.7	Steam generators	-	-	-	-	-	-	387	58	445	445	-	-	-	-	-	-	-	-	-	3,120
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	198	30	228	114	-	114	-	-	-	-	-	-	-	1,600
1a.1.17.9	Main Turbine	-	-	-	-	-	-	50	7	57	-	-	57	-	-	-	-	-	-	-	400
1a.1.17.10	Main Condensers	-	-	-	-	-	-	50	7	57	-	-	57	-	-	-	-	-	-	-	400
1a.1.17.11	Plant structures & buildings	-	-	-	-	-	-	387	58	445	222	-	222	-	-	-	-	-	-	-	3,120
1a.1.17.12	Waste management	-	-	-	-	-	-	570	85	655	655	-	-	-	-	-	-	-	-	-	4,600
1a.1.17.13	Facility & site closeout	-	-	-	-	-	-	112	17	128	64	-	64	-	-	-	-	-	-	-	900
1a.1.17	Total	-	-	-	-	-	-	4,686	703	5,389	4,746	-	644	-	-	-	-	-	-	-	37,827
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	297	45	342	342	-	-	-	-	-	-	-	-	-	2,400
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	3,000	450	3,450	3,450	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	1,400
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,300	345	2,645	2,645	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	152	23	175	175	-	-	-	-	-	-	-	-	-	1,230
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	14,437	2,166	16,603	15,959	-	644	-	-	-	-	-	-	-	73,753
Period 1a Additional Costs																					
1a.2.1	ISFSI Expansion	-	-	-	-	-	-	4,800	720	5,520	-	5,520	-	-	-	-	-	-	-	-	-
1a.2	Subtotal Period 1a Additional Costs	-	-	-	-	-	-	4,800	720	5,520	-	5,520	-	-	-	-	-	-	-	-	-
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	9,606	1,441	11,047	-	11,047	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	9,606	1,441	11,047	-	11,047	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,815	181	1,996	1,996	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	527	-	-	-	-	-	132	658	658	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	565	-	-	-	-	-	85	649	649	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	14	7	-	39	-	12	72	72	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,753	263	2,016	2,016	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	1,181	118	1,299	1,299	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	2,188	219	2,407	-	2,407	-	-	-	-	-	-	-	-	-
1a.4.9	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	396	59	455	-	455	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	48	7	55	-	55	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	672	101	772	772	-	-	-	-	-	-	-	-	-	12,264
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	32,063	4,809	36,873	36,873	-	-	-	-	-	-	-	-	-	423,400
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,091	14	7	-	39	40,280	6,011	47,443	44,526	2,917	-	-	610	-	-	-	12,190	20	435,664

Table C-1
Braidwood Nuclear Power Station Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
1a.0	TOTAL PERIOD 1a COST	-	1,091	14	7	-	39	69,124	10,338	80,613	60,485	19,484	644	-	610	-	-	-	12,190	20	509,417
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems	-	-	-	-	-	-	586	88	674	607	-	67	-	-	-	-	-	-	-	4,733
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	124	19	142	142	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.3	Reactor internals	-	-	-	-	-	-	310	46	356	356	-	-	-	-	-	-	-	-	-	2,500
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	167	25	192	48	-	144	-	-	-	-	-	-	-	1,350
1b.1.1.5	CRD cooling assembly	-	-	-	-	-	-	124	19	142	142	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.6	CRD housings & ICI tubes	-	-	-	-	-	-	124	19	142	142	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.7	Incore instrumentation	-	-	-	-	-	-	124	19	142	142	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	450	67	517	517	-	-	-	-	-	-	-	-	-	3,630
1b.1.1.9	Facility closeout	-	-	-	-	-	-	149	22	171	85	-	85	-	-	-	-	-	-	-	1,200
1b.1.1.10	Missile shields	-	-	-	-	-	-	56	8	64	64	-	-	-	-	-	-	-	-	-	450
1b.1.1.11	Biological shield	-	-	-	-	-	-	149	22	171	171	-	-	-	-	-	-	-	-	-	1,200
1b.1.1.12	Steam generators	-	-	-	-	-	-	570	85	655	655	-	-	-	-	-	-	-	-	-	4,600
1b.1.1.13	Reinforced concrete	-	-	-	-	-	-	124	19	142	71	-	71	-	-	-	-	-	-	-	1,000
1b.1.1.14	Main Turbine	-	-	-	-	-	-	193	29	222	-	-	222	-	-	-	-	-	-	-	1,560
1b.1.1.15	Main Condensers	-	-	-	-	-	-	193	29	222	-	-	222	-	-	-	-	-	-	-	1,560
1b.1.1.16	Auxiliary building	-	-	-	-	-	-	338	51	389	350	-	39	-	-	-	-	-	-	-	2,730
1b.1.1.17	Reactor building	-	-	-	-	-	-	338	51	389	350	-	39	-	-	-	-	-	-	-	2,730
1b.1.1	Total	-	-	-	-	-	-	4,118	618	4,736	3,846	-	891	-	-	-	-	-	-	-	33,243
1b.1.2	Decon primary loop	794	-	-	-	-	-	-	397	1,190	1,190	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	794	-	-	-	-	-	4,118	1,015	5,927	5,036	-	891	-	-	-	-	-	-	1,067	33,243
Period 1b Additional Costs																					
1b.2.1	Site Characterization	-	-	-	-	-	-	6,480	1,944	8,424	8,424	-	-	-	-	-	-	-	-	30,500	10,852
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	6,480	1,944	8,424	8,424	-	-	-	-	-	-	-	-	30,500	10,852
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	947	-	-	-	-	-	-	142	1,089	1,089	-	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning water waste	52	-	37	92	-	115	-	72	368	368	-	-	-	328	-	-	-	19,686	64	-
1b.3.4	Process decommissioning chemical flush waste	2	-	99	353	-	3,918	-	1,044	5,416	5,416	-	-	-	-	926	-	-	98,699	173	-
1b.3.5	Small tool allowance	-	2	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-
1b.3.6	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-
1b.3.7	Decon rig	1,500	-	-	-	-	-	-	225	1,725	1,725	-	-	-	-	-	-	-	-	-	-
1b.3.8	Spent Fuel Capital and Transfer	-	-	-	-	-	-	4,816	722	5,539	-	5,539	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	2,501	1,102	136	445	-	4,034	5,980	2,545	16,742	11,203	5,539	-	-	328	926	-	-	118,386	237	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	29	-	-	-	-	-	-	7	36	36	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	688	69	757	757	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	6,155	616	6,771	6,771	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	296	-	-	-	-	-	74	371	371	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	283	-	-	-	-	-	42	326	326	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	8	4	-	23	-	7	42	42	-	-	-	358	-	-	-	7,159	12	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	1,758	264	2,022	2,022	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	346	35	381	381	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	1,097	110	1,207	-	1,207	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Cost	-	-	-	-	-	-	83	12	95	95	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	198	30	228	-	228	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	24	4	28	-	28	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	337	51	387	387	-	-	-	-	-	-	-	-	-	6,149
1b.4.14	DOC Staff Cost	-	-	-	-	-	-	5,438	816	6,254	6,254	-	-	-	-	-	-	-	-	-	63,789
1b.4.15	Utility Staff Cost	-	-	-	-	-	-	16,140	2,421	18,561	18,561	-	-	-	-	-	-	-	-	-	213,326
1b.4	Subtotal Period 1b Period-Dependent Costs	29	580	8	4	-	23	32,265	4,556	37,465	36,003	1,462	-	-	358	-	-	-	7,159	12	283,263
1b.0	TOTAL PERIOD 1b COST	3,323	1,682	144	449	-	4,056	48,844	10,060	68,558	60,666	7,001	891	-	686	926	-	-	125,545	31,816	327,358
PERIOD 1 TOTALS		3,323	2,773	158	456	-	4,095	117,967	20,398	149,171	121,152	26,485	1,535	-	1,296	926	-	-	137,735	31,836	836,775

Table C-1
Braidwood Nuclear Power Station Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes: Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 2a - Large Component Removal																					
Period 2a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
2a.1.1.1	Reactor Coolant Piping	248	207	39	53	-	271	-	256	1,075	1,075	-	-	-	1,838	-	-	-	210,083	6,092	-
2a.1.1.2	Pressurizer Relief Tank	42	38	7	10	-	47	-	45	189	189	-	-	-	329	-	-	-	36,553	1,072	-
2a.1.1.3	Reactor Coolant Pumps & Motors	134	138	158	212	-	1,390	-	497	2,530	2,530	-	-	-	4,796	-	-	-	780,540	4,291	100
2a.1.1.4	Pressurizer	65	79	536	115	-	879	-	343	2,017	2,017	-	-	-	3,033	-	-	-	284,696	2,505	938
2a.1.1.5	Steam Generators	502	4,584	3,980	3,785	-	11,272	-	5,181	29,305	29,305	-	-	-	68,143	-	-	-	4,044,803	23,233	5,750
2a.1.1.6	Retired Steam Generator Units	-	-	1,737	2,955	-	10,309	-	3,194	18,195	18,195	-	-	-	62,044	-	-	-	3,098,576	10,800	2,250
2a.1.1.7	CRDMs/ICIs/Service Structure Removal	119	358	219	56	-	141	-	214	1,107	1,107	-	-	-	2,843	-	-	-	109,650	6,533	-
2a.1.1.8	Reactor Vessel Internals	188	3,194	8,540	1,772	-	8,240	330	9,237	31,500	31,500	-	-	-	1,878	963	393	-	329,968	31,267	1,383
2a.1.1.9	Reactor Vessel	150	5,369	2,487	1,195	-	2,847	330	6,496	18,874	18,874	-	-	-	9,361	-	-	-	960,884	31,267	1,383
2a.1.1	Totals	1,449	13,967	17,703	10,155	-	35,397	659	25,462	104,792	104,792	-	-	-	154,264	963	393	-	9,855,751	117,060	11,803
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	787	3,385	1,093	-	3,399	-	1,549	10,213	10,213	-	-	-	58,555	-	-	-	3,040,215	10,564	-
2a.1.3	Main Condensers	-	1,528	1,965	1,020	-	5,039	-	1,991	11,544	11,544	-	-	-	75,240	-	-	-	3,906,532	20,428	-
Cascading Costs from Clean Building Demolition																					
2a.1.4.1	Reactor	-	1,397	-	-	-	-	-	210	1,607	1,607	-	-	-	-	-	-	-	-	12,130	-
2a.1.4.2	Auxiliary Building	-	771	-	-	-	-	-	116	887	887	-	-	-	-	-	-	-	-	6,782	-
2a.1.4.3	Refueling Water Storage Tank	-	137	-	-	-	-	-	21	158	158	-	-	-	-	-	-	-	-	1,299	-
2a.1.4.4	Steam Generator Storage Facility	-	57	-	-	-	-	-	9	66	66	-	-	-	-	-	-	-	-	507	-
2a.1.4	Totals	-	2,363	-	-	-	-	-	354	2,717	2,717	-	-	-	-	-	-	-	-	20,718	-
Disposal of Plant Systems																					
2a.1.5.1	Auxiliary Feedwater	-	92	-	-	-	-	-	14	106	-	-	106	-	-	-	-	-	-	1,244	-
2a.1.5.2	Auxiliary Steam	-	82	-	-	-	-	-	12	95	-	-	95	-	-	-	-	-	-	1,126	-
2a.1.5.3	Auxiliary Steam RCA	-	153	24	11	-	54	-	56	298	298	-	-	-	805	-	-	-	42,068	1,984	-
2a.1.5.4	Boric Acid Processing	-	641	137	79	-	392	-	284	1,533	1,533	-	-	-	6,102	-	-	-	303,638	8,912	-
2a.1.5.5	CO2 & H2	-	31	-	-	-	-	-	5	35	-	-	35	-	-	-	-	-	-	419	-
2a.1.5.6	CO2 & H2 RCA	-	44	5	2	-	11	-	15	77	77	-	-	-	159	-	-	-	8,312	583	-
2a.1.5.7	Chemical Feed	-	68	-	-	-	-	-	10	78	-	-	78	-	-	-	-	-	-	934	-
2a.1.5.8	Chilled Water	-	85	-	-	-	-	-	13	98	-	-	98	-	-	-	-	-	-	1,142	-
2a.1.5.9	Circulating Water	-	375	-	-	-	-	-	56	432	-	-	432	-	-	-	-	-	-	5,174	-
2a.1.5.10	Condensate	-	443	-	-	-	-	-	66	509	-	-	509	-	-	-	-	-	-	6,023	-
2a.1.5.11	Condensate Booster	-	399	-	-	-	-	-	60	459	-	-	459	-	-	-	-	-	-	5,428	-
2a.1.5.12	Condensate Cleanup	-	78	-	-	-	-	-	12	90	-	-	90	-	-	-	-	-	-	1,060	-
2a.1.5.13	Containment Spray	-	294	88	47	-	233	-	148	810	810	-	-	-	3,481	-	-	-	180,655	3,897	-
2a.1.5.14	Diesel Fuel Oil	-	120	-	-	-	-	-	18	138	-	-	138	-	-	-	-	-	-	1,615	-
2a.1.5.15	Essential Service Water	-	280	-	-	-	-	-	42	322	-	-	322	-	-	-	-	-	-	3,837	-
2a.1.5.16	Extraction Steam	-	223	-	-	-	-	-	33	257	-	-	257	-	-	-	-	-	-	3,089	-
2a.1.5.17	Feedwater	-	372	-	-	-	-	-	56	428	-	-	428	-	-	-	-	-	-	5,142	-
2a.1.5.18	Feedwater Drains	-	891	-	-	-	-	-	134	1,025	-	-	1,025	-	-	-	-	-	-	12,366	-
2a.1.5.19	Gland Steam	-	67	-	-	-	-	-	10	77	-	-	77	-	-	-	-	-	-	932	-
2a.1.5.20	Gland Water	-	59	-	-	-	-	-	9	68	-	-	68	-	-	-	-	-	-	828	-
2a.1.5.21	Main Steam	-	380	-	-	-	-	-	57	437	-	-	437	-	-	-	-	-	-	5,216	-
2a.1.5.22	Main Steam RCA	-	59	17	10	-	49	-	30	164	164	-	-	-	726	-	-	-	37,727	769	-
2a.1.5.23	Nitrogen	-	4	1	1	-	3	-	2	10	10	-	-	-	49	-	-	-	2,447	50	-
2a.1.5.24	Non-Essential Service Water	-	210	-	-	-	-	-	32	242	-	-	242	-	-	-	-	-	-	2,916	-
2a.1.5.25	Non-Essential Service Water RCA	-	107	34	19	-	94	-	56	310	310	-	-	-	1,400	-	-	-	72,790	1,358	-
2a.1.5.26	Off Gas	-	720	135	73	-	360	-	294	1,581	1,581	-	-	-	5,352	-	-	-	278,775	9,696	-
2a.1.5.27	Process Radiation Monitoring	-	53	3	1	-	7	-	16	81	81	-	-	-	109	-	-	-	5,726	753	-
2a.1.5.28	Process Sampling	-	156	14	8	-	40	-	51	269	269	-	-	-	590	-	-	-	30,697	2,183	-
2a.1.5.29	Screen Wash	-	59	-	-	-	-	-	9	68	-	-	68	-	-	-	-	-	-	821	-
2a.1.5.30	Station Air	-	36	-	-	-	-	-	5	42	-	-	42	-	-	-	-	-	-	498	-
2a.1.5.31	Station Heating	-	130	-	-	-	-	-	19	149	-	-	149	-	-	-	-	-	-	1,771	-
2a.1.5.32	Switchgear Heat Removal	-	10	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	139	-
2a.1.5.33	Turbine Bldg Equip Drains	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	17	-
2a.1.5.34	Turbine Generator	-	67	-	-	-	-	-	10	77	-	-	77	-	-	-	-	-	-	901	-
2a.1.5.35	Turbine Oil	-	103	-	-	-	-	-	15	118	-	-	118	-	-	-	-	-	-	1,399	-
2a.1.5.36	Waste Oil Sumps	-	35	-	-	-	-	-	5	41	-	-	41	-	-	-	-	-	-	483	-
2a.1.5	Totals	-	6,927	457	251	-	1,242	-	1,656	10,534	5,133	-	5,401	-	18,774	-	-	-	962,836	94,702	-
2a.1.6	Scaffolding in support of decommissioning	-	1,293	9	5	-	24	-	331	1,662	1,662	-	-	-	359	-	-	-	18,654	18,871	-

Table C-1
Braidwood Nuclear Power Station Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
2a.1	Subtotal Period 2a Activity Costs	1,449	26,865	23,520	12,524	-	45,101	659	31,344	141,463	136,062	-	5,401	-	307,192	963	393	-	17,783,990	282,344	11,803
Period 2a Additional Costs																					
2a.2.1	Remedial Action Surveys	-	-	-	-	-	-	2,161	648	2,809	2,809	-	-	-	-	-	-	-	-	34,055	-
2a.2.2	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
2a.2	Subtotal Period 2a Additional Costs	-	-	-	-	-	-	2,211	656	2,866	2,866	-	-	-	-	-	-	-	-	34,055	-
Period 2a Collateral Costs																					
2a.3.1	Process decommissioning water waste	96	-	69	173	-	216	-	135	688	688	-	-	-	615	-	-	-	36,878	120	-
2a.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.3.3	Small tool allowance	-	362	-	-	-	-	-	54	416	374	-	42	-	-	-	-	-	-	-	-
2a.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	15,739	2,361	18,100	-	18,100	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	96	362	69	173	-	216	15,739	2,550	19,203	1,062	18,100	42	-	615	-	-	-	36,878	120	-
Period 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	95	-	-	-	-	-	-	24	118	118	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	1,696	170	1,865	1,865	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	15,160	1,516	16,676	15,009	-	1,668	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	2,427	-	-	-	-	-	607	3,034	3,034	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	3,556	-	-	-	-	-	533	4,089	4,089	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	98	50	-	277	-	86	511	511	-	-	-	4,324	-	-	-	86,474	141	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	2,729	409	3,138	3,138	-	-	-	-	-	-	-	-	-	-
2a.4.8	NRC Fees	-	-	-	-	-	-	1,026	103	1,128	1,128	-	-	-	-	-	-	-	-	-	-
2a.4.9	Emergency Planning Fees	-	-	-	-	-	-	3,111	311	3,422	-	3,422	-	-	-	-	-	-	-	-	-
2a.4.10	Site O&M Cost	-	-	-	-	-	-	270	41	311	311	-	-	-	-	-	-	-	-	-	-
2a.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	648	97	745	-	745	-	-	-	-	-	-	-	-	-
2a.4.12	ISFSI Operating Costs	-	-	-	-	-	-	78	12	90	-	90	-	-	-	-	-	-	-	-	-
2a.4.13	Security Staff Cost	-	-	-	-	-	-	1,030	155	1,185	1,185	-	-	-	-	-	-	-	-	-	18,794
2a.4.14	DOC Staff Cost	-	-	-	-	-	-	21,496	3,224	24,720	24,720	-	-	-	-	-	-	-	-	-	259,703
2a.4.15	Utility Staff Cost	-	-	-	-	-	-	36,892	5,534	42,426	42,426	-	-	-	-	-	-	-	-	-	483,526
2a.4	Subtotal Period 2a Period-Dependent Costs	95	5,983	98	50	-	277	84,137	12,821	103,460	97,535	4,257	1,668	-	4,324	-	-	-	86,474	141	762,023
2a.0	TOTAL PERIOD 2a COST	1,639	33,209	23,687	12,748	-	45,594	102,745	47,370	266,992	237,525	22,357	7,110	-	312,130	963	393	-	17,907,340	316,660	773,826
PERIOD 2b - Site Decontamination																					
Disposal of Plant Systems																					
2b.1.2.1	Chemical & Volume Control	-	1,399	171	85	-	419	-	484	2,558	2,558	-	-	-	6,236	-	-	-	324,551	18,408	-
2b.1.2.2	Chilled Water RCA	-	360	116	62	-	304	-	187	1,028	1,028	-	-	-	4,527	-	-	-	235,699	4,956	-
2b.1.2.3	Component Cooling RCA	-	760	209	112	-	553	-	366	1,999	1,999	-	-	-	8,239	-	-	-	428,586	10,074	-
2b.1.2.4	Electrical	-	3,573	-	-	-	-	-	536	4,109	-	-	4,109	-	-	-	-	-	-	48,490	-
2b.1.2.5	Electrical - Contaminated	-	1,432	137	87	-	430	-	492	2,578	2,578	-	-	-	6,418	-	-	-	333,233	19,322	-
2b.1.2.6	Electrical - RCA	-	2,162	372	227	-	1,123	-	892	4,776	4,776	-	-	-	16,763	-	-	-	870,329	29,753	-
2b.1.2.7	Emergency Diesel Generator	-	152	-	-	-	-	-	23	175	-	-	175	-	-	-	-	-	-	2,066	-
2b.1.2.8	Essential Service Water RCA	-	342	120	67	-	333	-	191	1,053	1,053	-	-	-	4,958	-	-	-	257,885	4,643	-
2b.1.2.9	Fire Protection	-	146	-	-	-	-	-	22	168	-	-	168	-	-	-	-	-	-	1,984	-
2b.1.2.10	Fire Protection RCA	-	206	30	14	-	68	-	74	391	391	-	-	-	1,002	-	-	-	52,396	2,641	-
2b.1.2.11	HVAC-Auxiliary Building	-	637	104	65	-	323	-	260	1,390	1,390	-	-	-	4,827	-	-	-	250,668	8,352	-
2b.1.2.12	HVAC-Diesel Generator Room	-	50	-	-	-	-	-	8	58	-	-	58	-	-	-	-	-	-	682	-
2b.1.2.13	HVAC-Miscellaneous	-	48	-	-	-	-	-	7	56	-	-	56	-	-	-	-	-	-	656	-
2b.1.2.14	HVAC-Primary Containment	-	771	218	138	-	683	-	406	2,216	2,216	-	-	-	10,197	-	-	-	529,451	10,184	-
2b.1.2.15	HVAC-Turbine Building	-	219	-	-	-	-	-	33	252	-	-	252	-	-	-	-	-	-	3,177	-
2b.1.2.16	Instrument Air Supply	-	54	-	-	-	-	-	8	62	-	-	62	-	-	-	-	-	-	760	-
2b.1.2.17	Instrument Air Supply RCA	-	84	11	5	-	24	-	29	153	153	-	-	-	354	-	-	-	18,493	1,096	-
2b.1.2.18	Miscellaneous Drains	-	49	7	4	-	20	-	19	99	99	-	-	-	299	-	-	-	15,562	663	-
2b.1.2.19	Primary Containment Purge	-	355	138	76	-	377	-	208	1,154	1,154	-	-	-	5,614	-	-	-	292,306	5,019	-
2b.1.2.20	Primary Water	-	76	7	3	-	15	-	24	125	125	-	-	-	218	-	-	-	11,425	1,032	-
2b.1.2.21	Radioactive Waste Disposal	-	1,168	171	90	-	446	-	434	2,309	2,309	-	-	-	6,808	-	-	-	345,754	16,011	-
2b.1.2.22	Reactor Building Equipment Drains	-	123	18	9	-	47	-	46	243	243	-	-	-	695	-	-	-	36,107	1,619	-
2b.1.2.23	Reactor Building Floor Drains	-	58	7	4	-	18	-	20	107	107	-	-	-	265	-	-	-	13,801	770	-
2b.1.2.24	Reactor Coolant	-	216	23	11	-	55	-	72	377	377	-	-	-	812	-	-	-	42,440	2,826	-
2b.1.2.25	Residual Heat Removal	-	244	52	30	-	147	-	107	580	580	-	-	-	2,184	-	-	-	113,636	3,334	-
2b.1.2.26	Safety Injection	-	1,118	247	140	-	694	-	499	2,697	2,697	-	-	-	10,622	-	-	-	537,761	15,372	-
2b.1.2.27	Station Air RCA	-	41	5	2	-	11	-	14	74	74	-	-	-	169	-	-	-	8,811	531	-
2b.1.2.28	Station Heating RCA	-	138	33	16	-	81	-	61	330	330	-	-	-	1,209	-	-	-	63,061	1,826	-
2b.1.2.29	Waste Oil Sumps RCA	-	8	1	1	-	3	-	3	17	17	-	-	-	50	-	-	-	2,602	95	-
2b.1.2	Totals	-	15,988	2,199	1,249	-	6,172	-	5,523	31,132	26,252	-	4,879	-	92,465	-	-	-	4,784,556	216,344	-
2b.1.3	Scaffolding in support of decommissioning	-	1,940	14	7	-	36	-	496	2,494	2,494	-	-	-	539	-	-	-	27,981	28,306	-

Table C-1
Braidwood Nuclear Power Station Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Decontamination of Site Buildings																					
2b.1.4.1	Reactor	2,526	1,941	235	365	-	1,399	-	2,176	8,642	8,642	-	-	-	25,576	-	-	-	1,334,799	57,982	-
2b.1.4.2	Auxiliary Building	254	161	22	23	-	82	-	193	735	735	-	-	-	1,329	-	-	-	83,033	5,419	-
2b.1.4.3	Refueling Water Storage Tank	463	554	42	19	-	87	-	399	1,564	1,564	-	-	-	1,304	-	-	-	72,866	13,642	-
2b.1.4.4	Steam Generator Storage Facility	74	0	0	0	-	0	-	37	111	111	-	-	-	1	-	-	-	46	993	-
2b.1.4	Totals	3,317	2,656	299	407	-	1,568	-	2,805	11,052	11,052	-	-	-	28,210	-	-	-	1,490,745	78,037	-
2b.1	Subtotal Period 2b Activity Costs	3,317	20,583	2,512	1,664	-	7,776	-	8,825	44,677	39,798	-	4,879	-	121,214	-	-	-	6,303,281	322,688	-
Period 2b Additional Costs																					
2b.2.1	License Termination Survey Planning	-	-	-	-	-	-	983	295	1,278	1,278	-	-	-	-	-	-	-	-	-	6,240
2b.2.2	Remedial Action Surveys	-	-	-	-	-	-	3,118	935	4,053	4,053	-	-	-	-	-	-	-	-	49,147	-
2b.2.3	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
2b.2.4	Underground Services Excavation	-	554	-	-	-	-	-	83	637	637	-	-	-	-	-	-	-	-	2,755	-
2b.2.5	Operational Tools and Equipment	-	-	9	52	-	189	-	56	306	306	-	-	-	5,855	-	-	-	146,375	16	-
2b.2	Subtotal Period 2b Additional Costs	-	554	9	52	-	189	4,151	1,377	6,333	6,333	-	-	-	5,855	-	-	-	146,375	51,918	6,240
Period 2b Collateral Costs																					
2b.3.1	Process decommissioning water waste	92	-	68	171	-	214	-	132	677	677	-	-	-	609	-	-	-	36,517	119	-
2b.3.3	Small tool allowance	-	418	-	-	-	-	-	63	480	480	-	-	-	-	-	-	-	-	-	-
2b.3.4	Decommissioning Equipment Disposition	-	-	184	96	-	472	-	151	903	903	-	-	-	7,054	-	-	-	366,237	88	-
2b.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	22,713	3,407	26,120	-	26,120	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	92	418	252	267	-	686	22,713	3,753	28,181	2,061	26,120	-	-	7,662	-	-	-	402,755	207	-
Period 2b Period-Dependent Costs																					
2b.4.1	Decon supplies	838	-	-	-	-	-	-	209	1,047	1,047	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	1,197	120	1,316	1,316	-	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	5,520	552	6,072	6,072	-	-	-	-	-	-	-	-	-	-
2b.4.4	Health physics supplies	-	2,977	-	-	-	-	-	744	3,722	3,722	-	-	-	-	-	-	-	-	-	-
2b.4.5	Heavy equipment rental	-	5,080	-	-	-	-	-	762	5,842	5,842	-	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	108	56	-	307	-	96	566	566	-	-	-	4,790	-	-	-	95,798	156	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	3,109	466	3,576	3,576	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	1,481	148	1,629	1,629	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	4,489	449	4,938	-	4,938	-	-	-	-	-	-	-	-	-
2b.4.10	Site O&M Cost	-	-	-	-	-	-	390	59	449	449	-	-	-	-	-	-	-	-	-	-
2b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	935	140	1,075	-	1,075	-	-	-	-	-	-	-	-	-
2b.4.12	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	474	71	545	545	-	-	-	-	-	-	-	-	-	-
2b.4.13	ISFSI Operating Costs	-	-	-	-	-	-	113	17	130	-	130	-	-	-	-	-	-	-	-	-
2b.4.14	Security Staff Cost	-	-	-	-	-	-	1,487	223	1,710	1,710	-	-	-	-	-	-	-	-	-	27,123
2b.4.15	DOC Staff Cost	-	-	-	-	-	-	20,595	3,089	23,684	23,684	-	-	-	-	-	-	-	-	-	266,297
2b.4.16	Utility Staff Cost	-	-	-	-	-	-	36,076	5,411	41,487	41,487	-	-	-	-	-	-	-	-	-	495,609
2b.4	Subtotal Period 2b Period-Dependent Costs	838	8,058	108	56	-	307	75,865	12,557	97,788	91,644	6,143	-	-	4,790	-	-	-	95,798	156	789,029
2b.0	TOTAL PERIOD 2b COST	4,247	29,613	2,882	2,039	-	8,957	102,730	26,511	176,979	139,836	32,264	4,879	-	139,522	-	-	-	6,948,210	374,969	795,269
PERIOD 2e - Delay before License Termination																					
Period 2e Period-Dependent Costs																					
2e.4.1	Insurance	-	-	-	-	-	-	942	94	1,037	1,037	-	-	-	-	-	-	-	-	-	-
2e.4.2	Property taxes	-	-	-	-	-	-	931	93	1,024	1,024	-	-	-	-	-	-	-	-	-	-
2e.4.3	Health physics supplies	-	177	-	-	-	-	-	44	221	221	-	-	-	-	-	-	-	-	-	-
2e.4.4	Disposal of DAW generated	-	-	4	2	-	12	-	4	22	22	-	-	-	186	-	-	-	3,714	6	-
2e.4.5	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2e.4.6	NRC Fees	-	-	-	-	-	-	473	47	520	520	-	-	-	-	-	-	-	-	-	-
2e.4.7	Emergency Planning Fees	-	-	-	-	-	-	3,537	354	3,891	-	3,891	-	-	-	-	-	-	-	-	-
2e.4.8	Site O&M Cost	-	-	-	-	-	-	307	46	353	353	-	-	-	-	-	-	-	-	-	-
2e.4.9	ISFSI Operating Costs	-	-	-	-	-	-	89	13	102	-	102	-	-	-	-	-	-	-	-	-
2e.4.10	Security Staff Cost	-	-	-	-	-	-	639	96	735	735	-	-	-	-	-	-	-	-	-	11,657
2e.4.11	Utility Staff Cost	-	-	-	-	-	-	1,830	274	2,104	2,104	-	-	-	-	-	-	-	-	-	27,200
2e.4	Subtotal Period 2e Period-Dependent Costs	-	177	4	2	-	12	8,748	1,066	10,009	6,016	3,993	-	-	186	-	-	-	3,714	6	38,857
2e.0	TOTAL PERIOD 2e COST	-	177	4	2	-	12	8,748	1,066	10,009	6,016	3,993	-	-	186	-	-	-	3,714	6	38,857
PERIOD 2f - License Termination																					
Period 2f Direct Decommissioning Activities																					
2f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
2f.1.2	Terminate license									a											
2f.1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-

Table C-1
Braidwood Nuclear Power Station Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 2f Additional Costs																					
2f.2.1	License Termination Survey	-	-	-	-	-	-	7,331	2,199	9,530	9,530	-	-	-	-	-	-	-	-	97,452	3,120
2f.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	7,331	2,199	9,530	9,530	-	-	-	-	-	-	-	-	97,452	3,120
Period 2f Collateral Costs																					
2f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
2f.3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
Period 2f Period-Dependent Costs																					
2f.4.1	Insurance	-	-	-	-	-	-	381	38	419	419	-	-	-	-	-	-	-	-	-	-
2f.4.2	Property taxes	-	-	-	-	-	-	376	38	414	414	-	-	-	-	-	-	-	-	-	-
2f.4.3	Health physics supplies	-	601	-	-	-	-	-	150	752	752	-	-	-	-	-	-	-	-	-	-
2f.4.4	Disposal of DAW generated	-	-	8	4	-	22	-	7	40	40	-	-	-	337	-	-	-	6,734	11	-
2f.4.5	Plant energy budget	-	-	-	-	-	-	264	40	304	304	-	-	-	-	-	-	-	-	-	-
2f.4.6	NRC Fees	-	-	-	-	-	-	455	46	501	501	-	-	-	-	-	-	-	-	-	-
2f.4.7	Emergency Planning Fees	-	-	-	-	-	-	1,431	143	1,574	-	1,574	-	-	-	-	-	-	-	-	-
2f.4.8	Site O&M Cost	-	-	-	-	-	-	124	19	143	143	-	-	-	-	-	-	-	-	-	-
2f.4.9	ISFSI Operating Costs	-	-	-	-	-	-	36	5	41	-	41	-	-	-	-	-	-	-	-	-
2f.4.10	Security Staff Cost	-	-	-	-	-	-	1,648	247	1,895	1,895	-	-	-	-	-	-	-	-	-	27,893
2f.4.11	DOC Staff Cost	-	-	-	-	-	-	3,870	580	4,450	4,450	-	-	-	-	-	-	-	-	-	46,750
2f.4.12	Utility Staff Cost	-	-	-	-	-	-	4,980	747	5,727	5,727	-	-	-	-	-	-	-	-	-	60,107
2f.4	Subtotal Period 2f Period-Dependent Costs	-	601	8	4	-	22	13,565	2,060	16,259	14,645	1,615	-	-	337	-	-	-	6,734	11	134,750
2f.0	TOTAL PERIOD 2f COST	-	601	8	4	-	22	22,231	4,485	27,351	25,736	1,615	-	-	337	-	-	-	6,734	97,463	137,870
PERIOD 2 TOTALS		5,886	63,600	26,581	14,792	-	54,584	236,455	79,432	481,331	409,113	60,229	11,989	-	452,174	963	393	-	24,866,000	789,097	1,745,822
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	Reactor	-	8,057	-	-	-	-	-	1,209	9,266	-	-	9,266	-	-	-	-	-	-	69,546	-
3b.1.1.2	Auxiliary Building	-	6,941	-	-	-	-	-	1,041	7,982	-	-	7,982	-	-	-	-	-	-	61,038	-
3b.1.1.3	Refueling Water Storage Tank	-	1,234	-	-	-	-	-	185	1,419	-	-	1,419	-	-	-	-	-	-	11,692	-
3b.1.1.4	Steam Generator Storage Facility	-	516	-	-	-	-	-	77	593	-	-	593	-	-	-	-	-	-	4,559	-
3b.1.1.5	Turbine Building	-	6,833	-	-	-	-	-	1,025	7,858	-	-	7,858	-	-	-	-	-	-	70,342	-
3b.1.1.6	Turbine Pedestal	-	1,627	-	-	-	-	-	244	1,872	-	-	1,872	-	-	-	-	-	-	12,628	-
3b.1.1	Totals	-	25,209	-	-	-	-	-	3,781	28,990	-	-	28,990	-	-	-	-	-	-	229,806	-
Site Closeout Activities																					
3b.1.2	Grade & landscape site	-	986	-	-	-	-	-	148	1,134	-	-	1,134	-	-	-	-	-	-	1,942	-
3b.1.3	Final report to NRC	-	-	-	-	-	-	193	29	222	222	-	-	-	-	-	-	-	-	-	1,560
3b.1	Subtotal Period 3b Activity Costs	-	26,195	-	-	-	-	193	3,958	30,346	222	-	30,124	-	-	-	-	-	-	231,748	1,560
Period 3b Additional Costs																					
3b.2.1	Concrete Crushing	-	662	-	-	-	-	4	100	766	-	-	766	-	-	-	-	-	-	2,798	-
3b.2	Subtotal Period 3b Additional Costs	-	662	-	-	-	-	4	100	766	-	-	766	-	-	-	-	-	-	2,798	-
Period 3b Collateral Costs																					
3b.3.1	Small tool allowance	-	320	-	-	-	-	-	48	368	-	-	368	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	320	-	-	-	-	-	48	368	-	-	368	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Insurance	-	-	-	-	-	-	627	63	690	-	690	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	1,239	124	1,363	-	1,363	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	7,568	-	-	-	-	-	1,135	8,704	-	-	8,704	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	435	65	500	-	-	500	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	314	31	346	-	346	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	4,708	471	5,179	-	5,179	-	-	-	-	-	-	-	-	-
3b.4.7	ISFSI Operating Costs	-	-	-	-	-	-	118	18	136	-	136	-	-	-	-	-	-	-	-	-
3b.4.8	Site O&M Cost	-	-	-	-	-	-	409	61	470	-	-	470	-	-	-	-	-	-	-	-
3b.4.9	Security Staff Cost	-	-	-	-	-	-	5,175	776	5,951	0	4,880	1,071	-	-	-	-	-	-	-	87,294
3b.4.10	DOC Staff Cost	-	-	-	-	-	-	11,846	1,777	13,623	-	-	13,623	-	-	-	-	-	-	-	137,043
3b.4.11	Utility Staff Cost	-	-	-	-	-	-	7,283	1,093	8,376	-	1,591	6,785	-	-	-	-	-	-	-	87,294
3b.4	Subtotal Period 3b Period-Dependent Costs	-	7,568	-	-	-	-	32,155	5,614	45,338	0	14,184	31,153	-	-	-	-	-	-	-	311,630
3b.0	TOTAL PERIOD 3b COST	-	34,745	-	-	-	-	32,352	9,720	76,817	222	14,184	62,411	-	-	-	-	-	-	234,546	313,190

Table C-1
Braidwood Nuclear Power Station Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Collateral Costs																					
3c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	9,313	1,397	10,709	-	10,709	-	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	9,313	1,397	10,709	-	10,709	-	-	-	-	-	-	-	-	-
Period 3c Period-Dependent Costs																					
3c.4.1	Insurance	-	-	-	-	-	-	5,470	547	6,017	-	6,017	-	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	10,808	1,081	11,888	-	11,888	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	3,297	330	3,626	-	3,626	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	41,069	4,107	45,176	-	45,176	-	-	-	-	-	-	-	-	-
3c.4.6	Site O&M Cost	-	-	-	-	-	-	3,568	535	4,104	-	4,104	-	-	-	-	-	-	-	-	-
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	1,033	155	1,188	-	1,188	-	-	-	-	-	-	-	-	-
3c.4.8	Security Staff Cost	-	-	-	-	-	-	36,799	5,520	42,319	-	42,319	-	-	-	-	-	-	-	-	609,043
3c.4.9	Utility Staff Cost	-	-	-	-	-	-	11,866	1,780	13,646	-	13,646	-	-	-	-	-	-	-	-	152,486
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	113,910	14,054	127,964	-	127,964	-	-	-	-	-	-	-	-	761,529
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	123,222	15,451	138,673	-	138,673	-	-	-	-	-	-	-	-	761,529
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	625	-	-	12,062	-	1,966	14,653	14,653	-	-	-	-	-	-	2,217	433,180	-	-
3d.1.1	Totals	-	-	625	-	-	12,062	-	1,966	14,653	14,653	-	-	-	-	-	-	2,217	433,180	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	625	-	-	12,062	-	1,966	14,653	14,653	-	-	-	-	-	-	2,217	433,180	-	-
Period 3d Period-Dependent Costs																					
3d.4.1	Insurance	-	-	-	-	-	-	10	1	11	-	11	-	-	-	-	-	-	-	-	-
3d.4.2	Property taxes	-	-	-	-	-	-	19	2	21	-	21	-	-	-	-	-	-	-	-	-
3d.4.4	Emergency Planning Fees	-	-	-	-	-	-	73	7	80	-	80	-	-	-	-	-	-	-	-	-
3d.4.5	Site O&M Cost	-	-	-	-	-	-	6	1	7	-	7	-	-	-	-	-	-	-	-	-
3d.4.6	ISFSI Operating Costs	-	-	-	-	-	-	2	0	2	-	2	-	-	-	-	-	-	-	-	-
3d.4.7	Security Staff Cost	-	-	-	-	-	-	65	10	75	-	75	-	-	-	-	-	-	-	-	1,080
3d.4.8	Utility Staff Cost	-	-	-	-	-	-	21	3	24	-	24	-	-	-	-	-	-	-	-	270
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	196	24	220	-	220	-	-	-	-	-	-	-	-	1,350
3d.0	TOTAL PERIOD 3d COST	-	-	625	-	-	12,062	196	1,990	14,873	14,653	220	-	-	-	-	-	2,217	433,180	-	1,350
PERIOD 3e - ISFSI Decontamination																					
Period 3e Direct Decommissioning Activities																					
Period 3e Additional Costs																					
3e.2.1	License Termination ISFSI	-	200	207	324	-	893	1,592	804	4,022	4,022	-	-	-	14,549	-	-	-	1,178,830	11,786	1,032
3e.2	Subtotal Period 3e Additional Costs	-	200	207	324	-	893	1,592	804	4,022	4,022	-	-	-	14,549	-	-	-	1,178,830	11,786	1,032
Period 3e Period-Dependent Costs																					
3e.4.1	Insurance	-	-	-	-	-	-	62	15	77	77	-	-	-	-	-	-	-	-	-	-
3e.4.2	Property taxes	-	-	-	-	-	-	163	41	204	204	-	-	-	-	-	-	-	-	-	-
3e.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3e.4.4	Security Staff Cost	-	-	-	-	-	-	148	37	184	184	-	-	-	-	-	-	-	-	-	2,468
3e.4.5	Utility Staff Cost	-	-	-	-	-	-	150	37	187	187	-	-	-	-	-	-	-	-	-	1,870
3e.4	Subtotal Period 3e Period-Dependent Costs	-	-	-	-	-	-	522	130	652	652	-	-	-	-	-	-	-	-	-	4,338
3e.0	TOTAL PERIOD 3e COST	-	200	207	324	-	893	2,114	935	4,674	4,674	-	-	-	14,549	-	-	-	1,178,830	11,786	5,370
PERIOD 3f - ISFSI Site Restoration																					
Period 3f Direct Decommissioning Activities																					
Period 3f Additional Costs																					
3f.2.1	Site Restoration ISFSI	-	1,147	-	-	-	-	28	176	1,351	-	-	1,351	-	-	-	-	-	-	13,036	80
3f.2	Subtotal Period 3f Additional Costs	-	1,147	-	-	-	-	28	176	1,351	-	-	1,351	-	-	-	-	-	-	13,036	80

Table C-1
Braidwood Nuclear Power Station Unit 1
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 3f Collateral Costs																					
3f.3.1	Small tool allowance	-	18	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	18	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																					
3f.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.2	Property taxes	-	-	-	-	-	-	86	9	95	-	-	95	-	-	-	-	-	-	-	-
3f.4.3	Heavy equipment rental	-	116	-	-	-	-	-	17	134	-	-	134	-	-	-	-	-	-	-	-
3f.4.4	Plant energy budget	-	-	-	-	-	-	30	5	35	-	-	35	-	-	-	-	-	-	-	-
3f.4.5	Security Staff Cost	-	-	-	-	-	-	78	12	90	-	-	90	-	-	-	-	-	-	-	1,307
3f.4.6	Utility Staff Cost	-	-	-	-	-	-	65	10	75	-	-	75	-	-	-	-	-	-	-	810
3f.4	Subtotal Period 3f Period-Dependent Costs	-	116	-	-	-	-	260	52	428	-	-	428	-	-	-	-	-	-	-	2,117
3f.0	TOTAL PERIOD 3f COST	-	1,281	-	-	-	-	288	231	1,799	-	-	1,799	-	-	-	-	-	-	13,036	2,197
PERIOD 3 TOTALS		-	36,227	832	324	-	12,956	158,171	28,327	236,837	19,549	153,078	64,210	-	14,549	-	-	2,217	1,612,010	259,367	1,083,637
TOTAL COST TO DECOMMISSION		**9,209**	**102,600**	**27,572**	**15,573**	**-**	**71,635**	**512,593**	**128,157**	**867,339**	**549,813**	**239,792**	**77,734**	**-**	**468,019**	**1,889**	**393**	**2,217**	**26,615,740**	**1,080,300**	**3,666,233**

TOTAL COST TO DECOMMISSION WITH 17.34% CONTINGENCY:	**$867,339**	**thousands of 2014 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 63.39% OR:	**$549,813**	**thousands of 2014 dollars**
SPENT FUEL MANAGEMENT COST IS 27.65% OR:	**$239,792**	**thousands of 2014 dollars**
NON-NUCLEAR DEMOLITION COST IS 8.96% OR:	**$77,734**	**thousands of 2014 dollars**
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	**470,300**	**cubic feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**2,217**	**Cubic Feet**
TOTAL SCRAP METAL REMOVED:	**54,939**	**Tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,080,300**	**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
Braidwood Nuclear Power Station Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	69	10	79	79	-	-	-	-	-	-	-	-	-	556
1a.1.2	Notification of Cessation of Operations									a											
1a.1.3	Remove fuel & source material									n/a											
1a.1.4	Notification of Permanent Defueling									a											
1a.1.5	Deactivate plant systems & process waste									a											
1a.1.6	Prepare and submit PSDAR	-	-	-	-	-	-	106	16	122	122	-	-	-	-	-	-	-	-	-	856
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	244	37	281	281	-	-	-	-	-	-	-	-	-	1,969
1a.1.8	Perform detailed rad survey									a											
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	428
1a.1.10	End product description	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	428
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	69	10	79	79	-	-	-	-	-	-	-	-	-	556
1a.1.12	Define major work sequence	-	-	-	-	-	-	398	60	457	457	-	-	-	-	-	-	-	-	-	3,210
1a.1.13	Perform SER and EA	-	-	-	-	-	-	164	25	189	189	-	-	-	-	-	-	-	-	-	1,327
1a.1.14	Perform Site-Specific Cost Study	-	-	-	-	-	-	265	40	305	305	-	-	-	-	-	-	-	-	-	2,140
1a.1.15	Prepare/submit License Termination Plan	-	-	-	-	-	-	217	33	250	250	-	-	-	-	-	-	-	-	-	1,753
1a.1.16	Receive NRC approval of termination plan									a											
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	261	39	300	270	-	30	-	-	-	-	-	-	-	2,106
1a.1.17.2	Plant systems	-	-	-	-	-	-	221	33	254	229	-	25	-	-	-	-	-	-	-	1,783
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	27	4	30	30	-	-	-	-	-	-	-	-	-	214
1a.1.17.4	Reactor internals	-	-	-	-	-	-	376	56	433	433	-	-	-	-	-	-	-	-	-	3,039
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	345	52	396	396	-	-	-	-	-	-	-	-	-	2,782
1a.1.17.6	Biological shield	-	-	-	-	-	-	27	4	30	30	-	-	-	-	-	-	-	-	-	214
1a.1.17.7	Steam generators	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	1,335
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	85	13	98	49	-	49	-	-	-	-	-	-	-	685
1a.1.17.9	Main Turbine	-	-	-	-	-	-	21	3	24	-	-	24	-	-	-	-	-	-	-	171
1a.1.17.10	Main Condensers	-	-	-	-	-	-	21	3	24	-	-	24	-	-	-	-	-	-	-	171
1a.1.17.11	Plant structures & buildings	-	-	-	-	-	-	165	25	190	95	-	95	-	-	-	-	-	-	-	1,335
1a.1.17.12	Waste management	-	-	-	-	-	-	244	37	281	281	-	-	-	-	-	-	-	-	-	1,969
1a.1.17.13	Facility & site closeout	-	-	-	-	-	-	48	7	55	27	-	27	-	-	-	-	-	-	-	385
1a.1.17	Total	-	-	-	-	-	-	2,006	301	2,307	2,031	-	276	-	-	-	-	-	-	-	16,190
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,027
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	3,000	450	3,450	3,450	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	74	11	85	85	-	-	-	-	-	-	-	-	-	599
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,300	345	2,645	2,645	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	65	10	75	75	-	-	-	-	-	-	-	-	-	526
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	9,211	1,382	10,592	10,317	-	276	-	-	-	-	-	-	-	31,566
Period 1a Additional Costs																					
1a.2.1	ISFSI Expansion	-	-	-	-	-	-	4,800	720	5,520	-	5,520	-	-	-	-	-	-	-	-	-
1a.2	Subtotal Period 1a Additional Costs	-	-	-	-	-	-	4,800	720	5,520	-	5,520	-	-	-	-	-	-	-	-	-
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	9,633	1,445	11,078	-	11,078	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	9,633	1,445	11,078	-	11,078	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,815	181	1,996	1,996	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	528	-	-	-	-	-	132	660	660	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	566	-	-	-	-	-	85	651	651	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	14	7	-	39	-	12	72	72	-	-	-	611	-	-	-	12,224	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,758	264	2,022	2,022	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	836	84	920	920	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	2,194	219	2,413	-	2,413	-	-	-	-	-	-	-	-	-
1a.4.9	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	397	59	456	-	456	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	48	7	55	-	55	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	8,971	1,346	10,317	10,317	-	-	-	-	-	-	-	-	-	157,903
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	32,151	4,823	36,974	36,974	-	-	-	-	-	-	-	-	-	424,560
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,094	14	7	-	39	48,335	7,237	56,727	53,802	2,925	-	-	611	-	-	-	12,224	20	582,463

Table C-2
Braidwood Nuclear Power Station Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
1a.0	TOTAL PERIOD 1a COST	-	1,094	14	7	-	39	71,979	10,784	83,917	64,119	19,522	276	-	611	-	-	-	12,224	20	614,029
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems	-	-	-	-	-	-	251	38	289	260	-	29	-	-	-	-	-	-	-	2,026
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	428
1b.1.1.3	Reactor internals	-	-	-	-	-	-	133	20	152	152	-	-	-	-	-	-	-	-	-	1,070
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	72	11	82	21	-	62	-	-	-	-	-	-	-	578
1b.1.1.5	CRD cooling assembly	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	428
1b.1.1.6	CRD housings & ICI tubes	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	428
1b.1.1.7	Incore instrumentation	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	428
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	192	29	221	221	-	-	-	-	-	-	-	-	-	1,554
1b.1.1.9	Facility closeout	-	-	-	-	-	-	64	10	73	37	-	37	-	-	-	-	-	-	-	514
1b.1.1.10	Missile shields	-	-	-	-	-	-	24	4	27	27	-	-	-	-	-	-	-	-	-	193
1b.1.1.11	Biological shield	-	-	-	-	-	-	64	10	73	73	-	-	-	-	-	-	-	-	-	514
1b.1.1.12	Steam generators	-	-	-	-	-	-	244	37	281	281	-	-	-	-	-	-	-	-	-	1,969
1b.1.1.13	Reinforced concrete	-	-	-	-	-	-	53	8	61	30	-	30	-	-	-	-	-	-	-	428
1b.1.1.14	Main Turbine	-	-	-	-	-	-	83	12	95	-	-	95	-	-	-	-	-	-	-	668
1b.1.1.15	Main Condensers	-	-	-	-	-	-	83	12	95	-	-	95	-	-	-	-	-	-	-	668
1b.1.1.16	Auxiliary building	-	-	-	-	-	-	145	22	166	150	-	17	-	-	-	-	-	-	-	1,168
1b.1.1.17	Reactor building	-	-	-	-	-	-	145	22	166	150	-	17	-	-	-	-	-	-	-	1,168
1b.1.1	Total	-	-	-	-	-	-	1,763	264	2,027	1,646	-	381	-	-	-	-	-	-	-	14,228
1b.1.2	Decon primary loop	730	-	-	-	-	-	-	365	1,095	1,095	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	730	-	-	-	-	-	1,763	629	3,122	2,741	-	381	-	-	-	-	-	-	1,067	14,228
Period 1b Additional Costs																					
1b.2.1	Site Characterization	-	-	-	-	-	-	2,771	831	3,602	3,602	-	-	-	-	-	-	-	-	13,042	4,640
1b.2.2	Spent Fuel Pool Isolation	-	-	-	-	-	-	10,813	1,622	12,434	12,434	-	-	-	-	-	-	-	-	-	-
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	13,583	2,453	16,037	16,037	-	-	-	-	-	-	-	-	13,042	4,640
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	947	-	-	-	-	-	-	142	1,089	1,089	-	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning water waste	51	-	36	91	-	114	-	72	365	365	-	-	-	325	-	-	-	19,489	63	-
1b.3.4	Process decommissioning chemical flush waste	2	-	90	319	-	3,550	-	945	4,907	4,907	-	-	-	-	839	-	-	89,417	157	-
1b.3.5	Small tool allowance	-	2	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-
1b.3.6	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-
1b.3.7	Decon rig	1,500	-	-	-	-	-	-	225	1,725	1,725	-	-	-	-	-	-	-	-	-	-
1b.3.8	Spent Fuel Capital and Transfer	-	-	-	-	-	-	4,816	722	5,539	-	5,539	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	2,500	1,102	126	411	-	3,664	5,980	2,446	16,229	10,690	5,539	-	-	325	839	-	-	108,906	220	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	29	-	-	-	-	-	-	7	36	36	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	690	69	759	759	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	6,172	617	6,789	6,789	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	296	-	-	-	-	-	74	370	370	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	283	-	-	-	-	-	42	326	326	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	8	4	-	23	-	7	42	42	-	-	-	358	-	-	-	7,159	12	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	1,758	264	2,022	2,022	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	234	23	257	257	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	1,097	110	1,207	-	1,207	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Cost	-	-	-	-	-	-	83	12	95	95	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	198	30	228	-	228	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	24	4	28	-	28	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	4,486	673	5,158	5,158	-	-	-	-	-	-	-	-	-	78,951
1b.4.14	DOC Staff Cost	-	-	-	-	-	-	5,438	816	6,254	6,254	-	-	-	-	-	-	-	-	-	63,789
1b.4.15	Utility Staff Cost	-	-	-	-	-	-	16,140	2,421	18,561	18,561	-	-	-	-	-	-	-	-	-	213,326
1b.4	Subtotal Period 1b Period-Dependent Costs	29	580	8	4	-	23	36,320	5,169	42,133	40,671	1,462	-	-	358	-	-	-	7,159	12	356,066
1b.0	TOTAL PERIOD 1b COST	3,259	1,682	135	415	-	3,687	57,646	10,698	77,521	70,139	7,001	381	-	683	839	-	-	116,066	14,341	374,934
PERIOD 1 TOTALS		3,259	2,776	148	422	-	3,726	129,625	21,482	161,438	134,258	26,523	657	-	1,294	839	-	-	128,289	14,361	988,963

Table C-2
Braidwood Nuclear Power Station Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 2a - Large Component Removal																					
Period 2a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
2a.1.1.1	Reactor Coolant Piping	248	207	39	53	-	271	-	256	1,075	1,075	-	-	-	1,838	-	-	-	210,083	6,092	-
2a.1.1.2	Pressurizer Relief Tank	42	38	7	10	-	47	-	45	189	189	-	-	-	329	-	-	-	36,553	1,072	-
2a.1.1.3	Reactor Coolant Pumps & Motors	134	138	158	212	-	1,390	-	497	2,530	2,530	-	-	-	4,796	-	-	-	780,540	4,291	100
2a.1.1.4	Pressurizer	65	79	536	115	-	879	-	343	2,017	2,017	-	-	-	3,033	-	-	-	284,696	2,505	938
2a.1.1.5	Steam Generators	500	4,584	2,543	2,997	-	10,502	-	4,725	25,852	25,852	-	-	-	62,711	-	-	-	3,280,862	23,233	3,500
2a.1.1.6	CRDMs/ICIs/Service Structure Removal	119	358	219	56	-	141	-	214	1,107	1,107	-	-	-	2,843	-	-	-	109,650	6,533	-
2a.1.1.7	Reactor Vessel Internals	188	3,194	8,540	1,772	-	8,243	330	9,238	31,504	31,504	-	-	-	1,878	963	393	-	329,968	31,267	1,383
2a.1.1.8	Reactor Vessel	150	5,369	2,487	1,195	-	2,847	330	6,496	18,874	18,874	-	-	-	9,361	-	-	-	960,884	31,267	1,383
2a.1.1	Totals	1,446	13,967	14,530	6,412	-	24,321	659	21,814	83,149	83,149	-	-	-	86,788	963	393	-	5,993,236	106,260	7,303
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	773	3,324	1,256	-	3,337	-	1,548	10,237	10,237	-	-	-	57,484	-	-	-	2,984,647	10,371	-
2a.1.3	Main Condensers	-	1,528	1,965	1,022	-	5,039	-	1,992	11,546	11,546	-	-	-	75,240	-	-	-	3,906,532	20,428	-
Cascading Costs from Clean Building Demolition																					
2a.1.4.1	Reactor	-	1,397	-	-	-	-	-	210	1,607	1,607	-	-	-	-	-	-	-	-	12,130	-
2a.1.4.2	Auxiliary Building	-	785	-	-	-	-	-	118	902	902	-	-	-	-	-	-	-	-	6,896	-
2a.1.4.3	Radwaste/Service Building	-	513	-	-	-	-	-	77	590	590	-	-	-	-	-	-	-	-	5,059	-
2a.1.4.4	Refueling Water Storage Tank	-	137	-	-	-	-	-	21	158	158	-	-	-	-	-	-	-	-	1,299	-
2a.1.4.5	Fuel Handling Building	-	403	-	-	-	-	-	60	463	463	-	-	-	-	-	-	-	-	3,690	-
2a.1.4	Totals	-	3,235	-	-	-	-	-	485	3,720	3,720	-	-	-	-	-	-	-	-	29,075	-
Disposal of Plant Systems																					
2a.1.5.1	Auxiliary Feedwater	-	85	-	-	-	-	-	13	97	-	-	97	-	-	-	-	-	-	1,143	-
2a.1.5.2	Auxiliary Steam	-	153	-	-	-	-	-	23	176	-	-	176	-	-	-	-	-	-	2,107	-
2a.1.5.3	Auxiliary Steam RCA	-	410	74	37	-	183	-	161	864	864	-	-	-	2,714	-	-	-	141,487	5,387	-
2a.1.5.4	Boric Acid Processing	-	593	88	48	-	238	-	224	1,190	1,190	-	-	-	3,611	-	-	-	184,114	7,871	-
2a.1.5.5	CO2 & H2	-	21	-	-	-	-	-	3	24	-	-	24	-	-	-	-	-	-	289	-
2a.1.5.6	CO2 & H2 RCA	-	39	7	4	-	18	-	16	84	84	-	-	-	276	-	-	-	14,104	492	-
2a.1.5.7	Chemical Feed	-	194	-	-	-	-	-	29	223	-	-	223	-	-	-	-	-	-	2,663	-
2a.1.5.8	Chemical Feed at Intake	-	27	-	-	-	-	-	4	30	-	-	30	-	-	-	-	-	-	364	-
2a.1.5.9	Chilled Water	-	107	-	-	-	-	-	16	124	-	-	124	-	-	-	-	-	-	1,454	-
2a.1.5.10	Circulating Water	-	641	-	-	-	-	-	96	737	-	-	737	-	-	-	-	-	-	8,814	-
2a.1.5.11	Condensate	-	392	-	-	-	-	-	59	450	-	-	450	-	-	-	-	-	-	5,317	-
2a.1.5.12	Condensate Booster	-	391	-	-	-	-	-	59	449	-	-	449	-	-	-	-	-	-	5,314	-
2a.1.5.13	Condensate Cleanup	-	214	-	-	-	-	-	32	246	-	-	246	-	-	-	-	-	-	3,000	-
2a.1.5.14	Containment Spray	-	289	87	47	-	231	-	146	800	800	-	-	-	3,455	-	-	-	179,291	3,839	-
2a.1.5.15	Diesel Fuel Oil	-	212	-	-	-	-	-	32	244	-	-	244	-	-	-	-	-	-	2,848	-
2a.1.5.16	Essential Service Water	-	368	-	-	-	-	-	55	423	-	-	423	-	-	-	-	-	-	5,049	-
2a.1.5.17	Extraction Steam	-	263	-	-	-	-	-	39	302	-	-	302	-	-	-	-	-	-	3,637	-
2a.1.5.18	Feedwater	-	357	-	-	-	-	-	53	410	-	-	410	-	-	-	-	-	-	4,925	-
2a.1.5.19	Feedwater Drains	-	845	-	-	-	-	-	127	972	-	-	972	-	-	-	-	-	-	11,719	-
2a.1.5.20	Gland Steam	-	44	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	616	-
2a.1.5.21	Gland Water	-	33	-	-	-	-	-	5	37	-	-	37	-	-	-	-	-	-	458	-
2a.1.5.22	Main Steam	-	363	-	-	-	-	-	54	417	-	-	417	-	-	-	-	-	-	4,979	-
2a.1.5.23	Main Steam RCA	-	96	23	13	-	64	-	44	240	240	-	-	-	947	-	-	-	49,262	1,292	-
2a.1.5.24	Make-up Demineralizer	-	183	-	-	-	-	-	27	210	-	-	210	-	-	-	-	-	-	2,595	-
2a.1.5.25	Nitrogen	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	18	-
2a.1.5.26	Non-Essential Service Water	-	426	-	-	-	-	-	64	490	-	-	490	-	-	-	-	-	-	5,903	-
2a.1.5.27	Non-Essential Service Water RCA	-	205	87	51	-	251	-	130	724	724	-	-	-	3,738	-	-	-	194,273	2,692	-
2a.1.5.28	Off Gas	-	850	176	97	-	478	-	364	1,965	1,965	-	-	-	7,112	-	-	-	370,343	11,479	-
2a.1.5.29	Potable Water	-	6	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	75	-
2a.1.5.30	Process Radiation Monitoring	-	85	4	2	-	9	-	24	125	125	-	-	-	134	-	-	-	7,021	1,219	-
2a.1.5.31	Process Sampling	-	188	15	8	-	41	-	60	312	312	-	-	-	615	-	-	-	31,992	2,649	-
2a.1.5.32	Screen Wash	-	53	-	-	-	-	-	8	61	-	-	61	-	-	-	-	-	-	740	-
2a.1.5.33	Station Air	-	51	-	-	-	-	-	8	59	-	-	59	-	-	-	-	-	-	705	-
2a.1.5.34	Station Heating	-	174	-	-	-	-	-	26	200	-	-	200	-	-	-	-	-	-	2,391	-
2a.1.5.35	Steam Humidification	-	8	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	115	-
2a.1.5.36	Switchgear Heat Removal	-	38	-	-	-	-	-	6	44	-	-	44	-	-	-	-	-	-	519	-
2a.1.5.37	Turbine Bldg Equip Drains	-	91	-	-	-	-	-	14	104	-	-	104	-	-	-	-	-	-	1,235	-
2a.1.5.38	Turbine Bldg Floor Drains	-	155	-	-	-	-	-	23	179	-	-	179	-	-	-	-	-	-	2,117	-
2a.1.5.39	Turbine Oil	-	98	-	-	-	-	-	15	112	-	-	112	-	-	-	-	-	-	1,359	-
2a.1.5.40	Turbine-Generator Auxilaries	-	65	-	-	-	-	-	10	75	-	-	75	-	-	-	-	-	-	884	-

Table C-2
Braidwood Nuclear Power Station Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
2a.1.5.41	Waste Oil Sumps	-	38	-	-	-	-	-	6	43	-	-	43	-	-	-	-	-	-	517	-
2a.1.5.42	Well Water	-	92	-	-	-	-	-	14	106	-	-	106	-	-	-	-	-	-	1,247	-
2a.1.5	Totals	-	8,943	560	307	-	1,512	-	2,097	13,419	6,302	-	7,116	-	22,603	-	-	-	1,171,887	122,034	-
2a.1.6	Scaffolding in support of decommissioning	-	1,908	15	8	-	37	-	489	2,456	2,456	-	-	-	556	-	-	-	28,884	27,854	-
2a.1	Subtotal Period 2a Activity Costs	1,446	30,353	20,394	9,004	-	34,246	659	28,424	124,527	117,411	-	7,116	-	242,672	963	393	-	14,085,190	316,021	7,303
Period 2a Additional Costs																					
2a.2.1	Remedial Action Surveys	-	-	-	-	-	-	2,161	648	2,809	2,809	-	-	-	-	-	-	-	-	34,055	-
2a.2.2	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
2a.2	Subtotal Period 2a Additional Costs	-	-	-	-	-	-	2,211	656	2,866	2,866	-	-	-	-	-	-	-	-	34,055	-
Period 2a Collateral Costs																					
2a.3.1	Process decommissioning water waste	97	-	70	176	-	219	-	137	699	699	-	-	-	625	-	-	-	37,506	122	-
2a.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2a.3.3	Small tool allowance	-	419	-	-	-	-	-	63	482	433	-	48	-	-	-	-	-	-	-	-
2a.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	15,739	2,361	18,100	-	18,100	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	97	419	70	176	-	219	15,739	2,560	19,281	1,133	18,100	48	-	625	-	-	-	37,506	122	-
Period 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	95	-	-	-	-	-	-	24	118	118	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	1,695	170	1,865	1,865	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	15,159	1,516	16,675	15,007	-	1,667	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	2,591	-	-	-	-	-	648	3,239	3,239	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	3,556	-	-	-	-	-	533	4,089	4,089	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	99	51	-	281	-	88	519	519	-	-	-	4,389	-	-	-	87,787	143	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	2,729	409	3,138	3,138	-	-	-	-	-	-	-	-	-	-
2a.4.8	NRC Fees	-	-	-	-	-	-	714	71	785	785	-	-	-	-	-	-	-	-	-	-
2a.4.9	Emergency Planning Fees	-	-	-	-	-	-	3,111	311	3,422	-	3,422	-	-	-	-	-	-	-	-	-
2a.4.10	Site O&M Cost	-	-	-	-	-	-	270	41	311	311	-	-	-	-	-	-	-	-	-	-
2a.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	648	97	745	-	745	-	-	-	-	-	-	-	-	-
2a.4.12	ISFSI Operating Costs	-	-	-	-	-	-	78	12	90	-	90	-	-	-	-	-	-	-	-	-
2a.4.13	Security Staff Cost	-	-	-	-	-	-	12,364	1,855	14,218	14,218	-	-	-	-	-	-	-	-	-	216,134
2a.4.14	DOC Staff Cost	-	-	-	-	-	-	21,496	3,224	24,720	24,720	-	-	-	-	-	-	-	-	-	259,703
2a.4.15	Utility Staff Cost	-	-	-	-	-	-	36,892	5,534	42,426	42,426	-	-	-	-	-	-	-	-	-	483,526
2a.4	Subtotal Period 2a Period-Dependent Costs	95	6,147	99	51	-	281	95,156	14,532	116,361	110,437	4,257	1,667	-	4,389	-	-	-	87,787	143	959,363
2a.0	TOTAL PERIOD 2a COST	1,638	36,919	20,563	9,231	-	34,747	113,765	46,173	263,035	231,846	22,357	8,832	-	247,686	963	393	-	14,210,480	350,342	966,666
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b.1.1.1	Chemical & Volume Control	-	1,338	164	82	-	407	-	465	2,456	2,456	-	-	-	6,063	-	-	-	315,292	17,657	-
2b.1.1.2	Chilled Water RCA	-	742	180	95	-	470	-	335	1,823	1,823	-	-	-	7,000	-	-	-	364,517	9,521	-
2b.1.1.3	Component Cooling	-	790	224	122	-	600	-	388	2,123	2,123	-	-	-	8,936	-	-	-	464,778	10,502	-
2b.1.1.4	Electrical	-	4,890	-	-	-	-	-	734	5,624	-	-	5,624	-	-	-	-	-	-	66,259	-
2b.1.1.5	Electrical - Contaminated	-	2,166	194	123	-	608	-	732	3,824	3,824	-	-	-	9,079	-	-	-	471,393	29,048	-
2b.1.1.6	Electrical - RCA	-	2,815	454	278	-	1,372	-	1,134	6,054	6,054	-	-	-	20,491	-	-	-	1,063,899	38,351	-
2b.1.1.7	Emergency Diesel Generator	-	111	-	-	-	-	-	17	127	-	-	127	-	-	-	-	-	-	1,514	-
2b.1.1.8	Essential Service Water RCA	-	385	209	122	-	601	-	286	1,603	1,603	-	-	-	8,972	-	-	-	466,273	5,336	-
2b.1.1.9	Fire Protection	-	362	-	-	-	-	-	54	416	-	-	416	-	-	-	-	-	-	4,983	-
2b.1.1.10	Fire Protection RCA	-	597	153	85	-	419	-	282	1,537	1,537	-	-	-	6,243	-	-	-	324,808	7,672	-
2b.1.1.11	HVAC-Auxiliary Building	-	694	116	73	-	361	-	286	1,531	1,531	-	-	-	5,390	-	-	-	279,889	9,167	-
2b.1.1.12	HVAC-Control Room HVAC	-	9	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	127	-
2b.1.1.13	HVAC-Diesel Generator Room	-	51	-	-	-	-	-	8	58	-	-	58	-	-	-	-	-	-	686	-
2b.1.1.14	HVAC-Laboratory	-	23	-	-	-	-	-	3	27	-	-	27	-	-	-	-	-	-	315	-
2b.1.1.15	HVAC-Machine Shop	-	21	-	-	-	-	-	3	24	-	-	24	-	-	-	-	-	-	297	-
2b.1.1.16	HVAC-Primary Containment	-	771	218	139	-	683	-	406	2,217	2,217	-	-	-	10,197	-	-	-	529,451	10,184	-
2b.1.1.17	HVAC-Pumphouse	-	20	-	-	-	-	-	3	23	-	-	23	-	-	-	-	-	-	275	-
2b.1.1.18	HVAC-Radwaste	-	398	68	43	-	213	-	166	888	888	-	-	-	3,177	-	-	-	164,931	5,099	-
2b.1.1.19	HVAC-Turbine Building	-	218	-	-	-	-	-	33	250	-	-	250	-	-	-	-	-	-	3,158	-
2b.1.1.20	Instrument Air Supply	-	85	-	-	-	-	-	13	97	-	-	97	-	-	-	-	-	-	1,197	-
2b.1.1.21	Instrument Air Supply RCA	-	276	31	14	-	68	-	91	480	480	-	-	-	1,002	-	-	-	52,414	3,630	-
2b.1.1.22	Miscellaneous Drains	-	94	15	8	-	40	-	36	192	192	-	-	-	592	-	-	-	30,841	1,259	-
2b.1.1.23	Primary Containment Purge	-	374	138	76	-	375	-	212	1,175	1,175	-	-	-	5,582	-	-	-	290,664	5,256	-

Table C-2
Braidwood Nuclear Power Station Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
2b.1.1.24	Primary Water	-	1,040	234	136	-	670	-	471	2,551	2,551	-	-	-	10,451	-	-	-	519,324	14,343	-
2b.1.1.25	Radioactive Waste Disposal	-	3,439	523	282	-	1,391	-	1,302	6,937	6,937	-	-	-	21,101	-	-	-	1,078,202	45,313	-
2b.1.1.26	Reactor Bldg Equipment Drains	-	135	25	14	-	67	-	55	295	295	-	-	-	997	-	-	-	51,818	1,790	-
2b.1.1.27	Reactor Building Floor Drains	-	51	6	3	-	16	-	18	95	95	-	-	-	245	-	-	-	12,768	678	-
2b.1.1.28	Reactor Coolant	-	205	22	10	-	51	-	68	357	357	-	-	-	763	-	-	-	39,871	2,697	-
2b.1.1.29	Residual Heat Removal	-	236	51	29	-	143	-	104	564	564	-	-	-	2,129	-	-	-	110,771	3,232	-
2b.1.1.30	Safety Injection	-	1,086	241	137	-	676	-	485	2,625	2,625	-	-	-	10,357	-	-	-	523,998	14,960	-
2b.1.1.31	Station Air RCA	-	65	8	4	-	19	-	22	118	118	-	-	-	283	-	-	-	14,808	833	-
2b.1.1.32	Station Heating RCA	-	281	60	32	-	156	-	120	648	648	-	-	-	2,315	-	-	-	120,573	3,664	-
2b.1.1.33	Waste Oil Sumps RCA	-	29	4	2	-	10	-	10	56	56	-	-	-	149	-	-	-	7,762	370	-
2b.1.1.34	Waste Water Treatment	-	105	-	-	-	-	-	16	120	-	-	120	-	-	-	-	-	-	1,464	-
2b.1.1	Totals	-	23,901	3,340	1,910	-	9,416	-	8,360	46,926	40,148	-	6,778	-	141,515	-	-	-	7,299,044	320,838	-
2b.1.2	Scaffolding in support of decommissioning	-	2,385	18	9	-	47	-	611	3,070	3,070	-	-	-	695	-	-	-	36,104	34,817	-
Decontamination of Site Buildings																					
2b.1.3.1	Reactor	2,526	1,941	235	366	-	1,399	-	2,176	8,643	8,643	-	-	-	25,576	-	-	-	1,334,799	57,982	-
2b.1.3.2	Auxiliary Building	299	196	22	28	-	94	-	229	869	869	-	-	-	1,545	-	-	-	101,706	6,427	-
2b.1.3.3	Radwaste/Service Building	197	90	10	20	-	55	-	138	509	509	-	-	-	988	-	-	-	68,345	3,692	-
2b.1.3.4	Refueling Water Storage Tank	463	554	42	19	-	87	-	399	1,564	1,564	-	-	-	1,304	-	-	-	72,866	13,642	-
2b.1.3	Totals	3,484	2,781	309	433	-	1,634	-	2,942	11,584	11,584	-	-	-	29,412	-	-	-	1,577,717	81,743	-
2b.1	Subtotal Period 2b Activity Costs	3,484	29,067	3,667	2,352	-	11,097	-	11,913	61,581	54,803	-	6,778	-	171,623	-	-	-	8,912,865	437,399	-
Period 2b Additional Costs																					
2b.2.1	Remedial Action Surveys	-	-	-	-	-	-	3,111	933	4,044	4,044	-	-	-	-	-	-	-	-	49,033	-
2b.2.2	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
2b.2	Subtotal Period 2b Additional Costs	-	-	-	-	-	-	3,161	941	4,102	4,102	-	-	-	-	-	-	-	-	49,033	-
Period 2b Collateral Costs																					
2b.3.1	Process decommissioning water waste	97	-	72	181	-	225	-	139	715	715	-	-	-	642	-	-	-	38,539	125	-
2b.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2b.3.3	Small tool allowance	-	559	-	-	-	-	-	84	643	643	-	-	-	-	-	-	-	-	-	-
2b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	22,687	3,403	26,090	-	26,090	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	97	559	72	181	-	225	22,687	3,626	27,448	1,358	26,090	-	-	642	-	-	-	38,539	125	-
Period 2b Period-Dependent Costs																					
2b.4.1	Decon supplies	898	-	-	-	-	-	-	224	1,122	1,122	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	1,195	120	1,315	1,315	-	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	5,505	550	6,055	6,055	-	-	-	-	-	-	-	-	-	-
2b.4.4	Health physics supplies	-	3,628	-	-	-	-	-	907	4,535	4,535	-	-	-	-	-	-	-	-	-	-
2b.4.5	Heavy equipment rental	-	5,074	-	-	-	-	-	761	5,835	5,835	-	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	141	73	-	400	-	125	738	738	-	-	-	6,244	-	-	-	124,887	204	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	3,106	466	3,572	3,572	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	1,029	103	1,132	1,132	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	4,484	448	4,932	-	4,932	-	-	-	-	-	-	-	-	-
2b.4.10	Site O&M Cost	-	-	-	-	-	-	390	58	448	448	-	-	-	-	-	-	-	-	-	-
2b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	1,397	210	1,606	-	1,606	-	-	-	-	-	-	-	-	-
2b.4.12	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	473	71	544	544	-	-	-	-	-	-	-	-	-	-
2b.4.13	ISFSI Operating Costs	-	-	-	-	-	-	113	17	130	-	130	-	-	-	-	-	-	-	-	-
2b.4.14	Security Staff Cost	-	-	-	-	-	-	17,822	2,673	20,495	20,495	-	-	-	-	-	-	-	-	-	311,551
2b.4.15	DOC Staff Cost	-	-	-	-	-	-	29,773	4,466	34,240	34,240	-	-	-	-	-	-	-	-	-	359,577
2b.4.16	Utility Staff Cost	-	-	-	-	-	-	51,088	7,663	58,751	58,751	-	-	-	-	-	-	-	-	-	667,434
2b.4	Subtotal Period 2b Period-Dependent Costs	898	8,703	141	73	-	400	116,375	18,863	145,452	138,783	6,668	-	-	6,244	-	-	-	124,887	204	1,338,563
2b.0	TOTAL PERIOD 2b COST	4,479	38,329	3,880	2,606	-	11,722	142,223	35,343	238,583	199,046	32,759	6,778	-	178,509	-	-	-	9,076,291	486,760	1,338,563
PERIOD 2d - Decontamination Following Wet Fuel Storage																					
Period 2d Direct Decommissioning Activities																					
2d.1.1	Remove spent fuel racks	1,412	139	369	143	-	705	-	975	3,744	3,744	-	-	-	10,524	-	-	-	546,426	2,174	-
Disposal of Plant Systems																					
2d.1.2.1	Fuel Handling Bldg Equip Drains	-	206	34	18	-	91	-	80	429	429	-	-	-	1,386	-	-	-	70,185	2,721	-
2d.1.2.2	Fuel Handling Bldg Equip Drains (Unit 1)	-	37	4	2	-	9	-	12	63	63	-	-	-	129	-	-	-	6,739	479	-
2d.1.2.3	Fuel Handling Bldg Floor Drains	-	210	33	17	-	82	-	79	420	420	-	-	-	1,241	-	-	-	63,725	2,768	-
2d.1.2.4	Fuel Handling Bldg Floor Drains (Unit 1)	-	147	23	12	-	58	-	55	295	295	-	-	-	874	-	-	-	44,626	1,978	-
2d.1.2.5	Fuel Pool Cooling & Cleanup	-	279	49	27	-	133	-	112	601	601	-	-	-	1,989	-	-	-	103,404	3,712	-

Table C-2
Braidwood Nuclear Power Station Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 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)																					
2d.1.2.6	Fuel Pool Cooling & Cleanup (Unit 1)	-	259	46	25	-	124	-	104	559	559	-	-	-	1,857	-	-	-	96,476	3,463	-
2d.1.2.7	HVAC-Miscellaneous	-	128	-	-	-	-	-	19	148	-	-	148	-	-	-	-	-	-	1,769	-
2d.1.2.8	Tritium ALPS	-	472	110	64	-	316	-	218	1,180	1,180	-	-	-	4,948	-	-	-	245,163	6,507	-
2d.1.2	Totals	-	1,737	299	165	-	813	-	679	3,694	3,546	-	148	-	12,424	-	-	-	630,319	23,396	-
Decontamination of Site Buildings																					
2d.1.3.1	Fuel Handling Building	1,322	1,539	111	63	-	257	-	1,131	4,423	4,423	-	-	-	3,927	-	-	-	231,370	38,265	-
2d.1.3	Totals	1,322	1,539	111	63	-	257	-	1,131	4,423	4,423	-	-	-	3,927	-	-	-	231,370	38,265	-
2d.1.4	Scaffolding in support of decommissioning	-	477	4	2	-	9	-	122	614	614	-	-	-	139	-	-	-	7,221	6,963	-
2d.1	Subtotal Period 2d Activity Costs	2,735	3,893	783	372	-	1,784	-	2,908	12,474	12,327	-	148	-	27,014	-	-	-	1,415,337	70,799	-
Period 2d Additional Costs																					
2d.2.1	License Termination Survey Planning	-	-	-	-	-	-	983	295	1,278	1,278	-	-	-	-	-	-	-	-	-	6,240
2d.2.2	Remedial Action Surveys	-	-	-	-	-	-	918	275	1,193	1,193	-	-	-	-	-	-	-	-	14,465	-
2d.2.3	Underground Services Excavation	-	554	-	-	-	-	-	83	637	637	-	-	-	-	-	-	-	-	2,755	-
2d.2.4	Operational Tools and Equipment	-	-	9	52	-	189	-	56	306	306	-	-	-	5,855	-	-	-	146,375	16	-
2d.2	Subtotal Period 2d Additional Costs	-	554	9	52	-	189	1,901	709	3,415	3,415	-	-	-	5,855	-	-	-	146,375	17,236	6,240
Period 2d Collateral Costs																					
2d.3.1	Process decommissioning water waste	115	-	86	216	-	270	-	166	853	853	-	-	-	768	-	-	-	46,097	150	-
2d.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2d.3.3	Small tool allowance	-	120	-	-	-	-	-	18	138	138	-	-	-	-	-	-	-	-	-	-
2d.3.4	Decommissioning Equipment Disposition	-	-	184	96	-	472	-	151	903	903	-	-	-	7,054	-	-	-	366,237	88	-
2d.3	Subtotal Period 2d Collateral Costs	115	120	270	312	-	742	-	335	1,895	1,895	-	-	-	7,822	-	-	-	412,335	238	-
Period 2d Period-Dependent Costs																					
2d.4.1	Decon supplies	185	-	-	-	-	-	-	46	232	232	-	-	-	-	-	-	-	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	351	35	386	386	-	-	-	-	-	-	-	-	-	-
2d.4.3	Property taxes	-	-	-	-	-	-	346	35	381	381	-	-	-	-	-	-	-	-	-	-
2d.4.4	Health physics supplies	-	762	-	-	-	-	-	191	953	953	-	-	-	-	-	-	-	-	-	-
2d.4.5	Heavy equipment rental	-	1,489	-	-	-	-	-	223	1,713	1,713	-	-	-	-	-	-	-	-	-	-
2d.4.6	Disposal of DAW generated	-	-	36	19	-	102	-	32	189	189	-	-	-	1,597	-	-	-	31,949	52	-
2d.4.7	Plant energy budget	-	-	-	-	-	-	486	73	559	559	-	-	-	-	-	-	-	-	-	-
2d.4.8	NRC Fees	-	-	-	-	-	-	253	25	279	279	-	-	-	-	-	-	-	-	-	-
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	1,316	132	1,448	-	1,448	-	-	-	-	-	-	-	-	-
2d.4.10	Site O&M Cost	-	-	-	-	-	-	114	17	132	132	-	-	-	-	-	-	-	-	-	-
2d.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	278	42	320	320	-	-	-	-	-	-	-	-	-	-
2d.4.12	ISFSI Operating Costs	-	-	-	-	-	-	33	5	38	-	38	-	-	-	-	-	-	-	-	-
2d.4.13	Security Staff Cost	-	-	-	-	-	-	2,854	428	3,282	3,282	-	-	-	-	-	-	-	-	-	48,070
2d.4.14	DOC Staff Cost	-	-	-	-	-	-	6,020	903	6,923	6,923	-	-	-	-	-	-	-	-	-	72,286
2d.4.15	Utility Staff Cost	-	-	-	-	-	-	10,969	1,645	12,614	12,614	-	-	-	-	-	-	-	-	-	138,066
2d.4	Subtotal Period 2d Period-Dependent Costs	185	2,252	36	19	-	102	23,020	3,832	29,446	27,960	1,486	-	-	1,597	-	-	-	31,949	52	258,421
2d.0	TOTAL PERIOD 2d COST	3,035	6,819	1,098	755	-	2,817	24,921	7,784	47,231	45,597	1,486	148	-	42,289	-	-	-	2,005,995	88,325	264,661
PERIOD 2f - License Termination																					
Period 2f Direct Decommissioning Activities																					
2f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
2f.1.2	Terminate license									a											
2f.1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2f.2.1	License Termination Survey	-	-	-	-	-	-	9,744	2,923	12,667	12,667	-	-	-	-	-	-	-	-	132,123	3,120
2f.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	9,744	2,923	12,667	12,667	-	-	-	-	-	-	-	-	132,123	3,120
Period 2f Collateral Costs																					
2f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
2f.3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
Period 2f Period-Dependent Costs																					
2f.4.1	Insurance	-	-	-	-	-	-	381	38	419	419	-	-	-	-	-	-	-	-	-	-
2f.4.2	Property taxes	-	-	-	-	-	-	376	38	414	414	-	-	-	-	-	-	-	-	-	-
2f.4.3	Health physics supplies	-	705	-	-	-	-	-	176	881	881	-	-	-	-	-	-	-	-	-	-
2f.4.4	Disposal of DAW generated	-	-	8	4	-	22	-	7	40	40	-	-	-	337	-	-	-	6,734	11	-
2f.4.5	Plant energy budget	-	-	-	-	-	-	264	40	304	304	-	-	-	-	-	-	-	-	-	-

Table C-2
Braidwood Nuclear Power Station Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 2f Period-Dependent Costs (continued)																					
2f.4.6	NRC Fees	-	-	-	-	-	-	302	30	333	333	-	-	-	-	-	-	-	-	-	-
2f.4.7	Emergency Planning Fees	-	-	-	-	-	-	1,431	143	1,574	-	1,574	-	-	-	-	-	-	-	-	-
2f.4.8	Site O&M Cost	-	-	-	-	-	-	124	19	143	143	-	-	-	-	-	-	-	-	-	-
2f.4.9	ISFSI Operating Costs	-	-	-	-	-	-	36	5	41	-	41	-	-	-	-	-	-	-	-	-
2f.4.10	Security Staff Cost	-	-	-	-	-	-	1,648	247	1,895	1,895	-	-	-	-	-	-	-	-	-	27,893
2f.4.11	DOC Staff Cost	-	-	-	-	-	-	3,870	580	4,450	4,450	-	-	-	-	-	-	-	-	-	46,750
2f.4.12	Utility Staff Cost	-	-	-	-	-	-	4,980	747	5,727	5,727	-	-	-	-	-	-	-	-	-	60,107
2f.4	Subtotal Period 2f Period-Dependent Costs	-	705	8	4	-	22	13,412	2,070	16,220	14,605	1,615	-	-	337	-	-	-	6,734	11	134,750
2f.0	TOTAL PERIOD 2f COST	-	705	8	4	-	22	24,492	5,220	30,449	28,834	1,615	-	-	337	-	-	-	6,734	132,134	137,870
PERIOD 2 TOTALS		9,153	82,771	25,549	12,596	-	49,307	305,401	94,520	579,297	505,324	58,216	15,758	-	468,821	963	393	-	25,299,500	1,057,561	2,707,761
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	Reactor	-	8,057	-	-	-	-	-	1,209	9,266	-	-	9,266	-	-	-	-	-	-	69,546	-
3b.1.1.2	Aux Feedwater-Steam Tunnel/Penetr. Area	-	795	-	-	-	-	-	119	914	-	-	914	-	-	-	-	-	-	5,187	-
3b.1.1.3	Auxiliary Building	-	7,062	-	-	-	-	-	1,059	8,121	-	-	8,121	-	-	-	-	-	-	62,064	-
3b.1.1.4	Blowdown Outfall Structure	-	35	-	-	-	-	-	5	40	-	-	40	-	-	-	-	-	-	295	-
3b.1.1.5	Bottled Gas Storage	-	31	-	-	-	-	-	5	36	-	-	36	-	-	-	-	-	-	340	-
3b.1.1.6	Circulating Water Discharge	-	265	-	-	-	-	-	40	305	-	-	305	-	-	-	-	-	-	2,887	-
3b.1.1.7	Gatehouse and Extension	-	397	-	-	-	-	-	60	457	-	-	457	-	-	-	-	-	-	4,193	-
3b.1.1.8	Instrument Maintenance Building	-	112	-	-	-	-	-	17	129	-	-	129	-	-	-	-	-	-	1,190	-
3b.1.1.9	Lake Screen House	-	1,788	-	-	-	-	-	268	2,056	-	-	2,056	-	-	-	-	-	-	15,283	-
3b.1.1.10	Make-up Demineralizer Area	-	764	-	-	-	-	-	115	878	-	-	878	-	-	-	-	-	-	8,158	-
3b.1.1.11	Miscellaneous Warehouses	-	2,333	-	-	-	-	-	350	2,683	-	-	2,683	-	-	-	-	-	-	26,794	-
3b.1.1.12	Miscellaneous Yard Structures	-	1,517	-	-	-	-	-	228	1,744	-	-	1,744	-	-	-	-	-	-	14,701	-
3b.1.1.13	Radwaste/Service Building	-	4,681	-	-	-	-	-	702	5,383	-	-	5,383	-	-	-	-	-	-	45,685	-
3b.1.1.14	Receiving Building	-	218	-	-	-	-	-	33	250	-	-	250	-	-	-	-	-	-	2,293	-
3b.1.1.15	Refueling Water Storage Tank	-	1,234	-	-	-	-	-	185	1,419	-	-	1,419	-	-	-	-	-	-	11,692	-
3b.1.1.16	River Screen House	-	726	-	-	-	-	-	109	835	-	-	835	-	-	-	-	-	-	6,844	-
3b.1.1.17	Security Modifications	-	1,084	-	-	-	-	-	163	1,246	-	-	1,246	-	-	-	-	-	-	6,939	-
3b.1.1.18	Sewage Treatment Plant	-	124	-	-	-	-	-	19	143	-	-	143	-	-	-	-	-	-	1,330	-
3b.1.1.19	Tech Support Center & Cond Cleanup Bldg	-	594	-	-	-	-	-	89	683	-	-	683	-	-	-	-	-	-	6,095	-
3b.1.1.20	Turbine Building	-	6,833	-	-	-	-	-	1,025	7,858	-	-	7,858	-	-	-	-	-	-	70,342	-
3b.1.1.21	Turbine Pedestal	-	1,627	-	-	-	-	-	244	1,872	-	-	1,872	-	-	-	-	-	-	12,628	-
3b.1.1.22	Waste Treatment Building	-	122	-	-	-	-	-	18	141	-	-	141	-	-	-	-	-	-	1,265	-
3b.1.1.23	Fuel Handling Building	-	3,632	-	-	-	-	-	545	4,177	-	-	4,177	-	-	-	-	-	-	33,245	-
3b.1.1	Totals	-	44,032	-	-	-	-	-	6,605	50,637	-	-	50,637	-	-	-	-	-	-	408,996	-
Site Closeout Activities																					
3b.1.2	Remove Rubble	-	294	-	-	-	-	-	44	339	-	-	339	-	-	-	-	-	-	1,367	-
3b.1.3	Grade & landscape site	-	986	-	-	-	-	-	148	1,134	-	-	1,134	-	-	-	-	-	-	1,942	-
3b.1.4	Final report to NRC	-	-	-	-	-	-	83	12	95	95	-	-	-	-	-	-	-	-	-	668
3b.1	Subtotal Period 3b Activity Costs	-	45,312	-	-	-	-	83	6,809	52,204	95	-	52,109	-	-	-	-	-	-	412,305	668
Period 3b Additional Costs																					
3b.2.1	Concrete Crushing	-	1,120	-	-	-	-	6	169	1,295	-	-	1,295	-	-	-	-	-	-	4,730	-
3b.2.2	Cofferdam Construction and Teardown	-	889	-	-	-	-	-	133	1,023	-	-	1,023	-	-	-	-	-	-	7,391	-
3b.2	Subtotal Period 3b Additional Costs	-	2,009	-	-	-	-	6	302	2,317	-	-	2,317	-	-	-	-	-	-	12,121	-
Period 3b Collateral Costs																					
3b.3.1	Small tool allowance	-	574	-	-	-	-	-	86	660	-	-	660	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	574	-	-	-	-	-	86	660	-	-	660	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Insurance	-	-	-	-	-	-	627	63	690	-	690	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	1,239	124	1,363	-	1,363	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	7,568	-	-	-	-	-	1,135	8,704	-	-	8,704	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	435	65	500	-	-	500	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	314	31	346	-	346	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	4,708	471	5,179	-	5,179	-	-	-	-	-	-	-	-	-
3b.4.7	ISFSI Operating Costs	-	-	-	-	-	-	118	18	136	-	136	-	-	-	-	-	-	-	-	-
3b.4.8	Site O&M Cost	-	-	-	-	-	-	409	61	470	-	-	470	-	-	-	-	-	-	-	-

Table C-2
Braidwood Nuclear Power Station Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 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 (continued)																					
3b.4.9	Security Staff Cost	-	-	-	-	-	-	5,175	776	5,951	0	4,880	1,071	-	-	-	-	-	-	-	87,294
3b.4.10	DOC Staff Cost	-	-	-	-	-	-	11,846	1,777	13,623	-	-	13,623	-	-	-	-	-	-	-	137,043
3b.4.11	Utility Staff Cost	-	-	-	-	-	-	7,283	1,093	8,376	-	1,591	6,785	-	-	-	-	-	-	-	87,294
3b.4	Subtotal Period 3b Period-Dependent Costs	-	7,568	-	-	-	-	32,155	5,614	45,338	0	14,184	31,153	-	-	-	-	-	-	-	311,630
3b.0	TOTAL PERIOD 3b COST	-	55,463	-	-	-	-	32,244	12,812	100,519	95	14,184	86,239	-	-	-	-	-	-	424,426	312,298
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Collateral Costs																					
3c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	9,313	1,397	10,709	-	10,709	-	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	9,313	1,397	10,709	-	10,709	-	-	-	-	-	-	-	-	-
Period 3c Period-Dependent Costs																					
3c.4.1	Insurance	-	-	-	-	-	-	5,470	547	6,017	-	6,017	-	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	10,808	1,081	11,888	-	11,888	-	-	-	-	-	-	-	-	-
3c.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	3,297	330	3,626	-	3,626	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	41,069	4,107	45,176	-	45,176	-	-	-	-	-	-	-	-	-
3c.4.6	Site O&M Cost	-	-	-	-	-	-	3,568	535	4,104	-	4,104	-	-	-	-	-	-	-	-	-
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	1,033	155	1,188	-	1,188	-	-	-	-	-	-	-	-	-
3c.4.8	Security Staff Cost	-	-	-	-	-	-	36,799	5,520	42,319	-	42,319	-	-	-	-	-	-	-	-	609,043
3c.4.9	Utility Staff Cost	-	-	-	-	-	-	11,866	1,780	13,646	-	13,646	-	-	-	-	-	-	-	-	152,486
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	113,910	14,054	127,964	-	127,964	-	-	-	-	-	-	-	-	761,529
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	123,222	15,451	138,673	-	138,673	-	-	-	-	-	-	-	-	761,529
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	625	-	-	12,062	-	1,966	14,653	14,653	-	-	-	-	-	-	2,217	433,180	-	-
3d.1.1	Totals	-	-	625	-	-	12,062	-	1,966	14,653	14,653	-	-	-	-	-	-	2,217	433,180	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	625	-	-	12,062	-	1,966	14,653	14,653	-	-	-	-	-	-	2,217	433,180	-	-
Period 3d Period-Dependent Costs																					
3d.4.1	Insurance	-	-	-	-	-	-	10	1	11	-	11	-	-	-	-	-	-	-	-	-
3d.4.2	Property taxes	-	-	-	-	-	-	19	2	21	-	21	-	-	-	-	-	-	-	-	-
3d.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3d.4.4	Emergency Planning Fees	-	-	-	-	-	-	73	7	80	-	80	-	-	-	-	-	-	-	-	-
3d.4.5	Site O&M Cost	-	-	-	-	-	-	6	1	7	-	7	-	-	-	-	-	-	-	-	-
3d.4.6	ISFSI Operating Costs	-	-	-	-	-	-	2	0	2	-	2	-	-	-	-	-	-	-	-	-
3d.4.7	Security Staff Cost	-	-	-	-	-	-	65	10	75	-	75	-	-	-	-	-	-	-	-	1,080
3d.4.8	Utility Staff Cost	-	-	-	-	-	-	21	3	24	-	24	-	-	-	-	-	-	-	-	270
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	196	24	220	-	220	-	-	-	-	-	-	-	-	1,350
3d.0	TOTAL PERIOD 3d COST	-	-	625	-	-	12,062	196	1,990	14,873	14,653	220	-	-	-	-	-	2,217	433,180	-	1,350
PERIOD 3e - ISFSI Decontamination																					
Period 3e Direct Decommissioning Activities																					
Period 3e Additional Costs																					
3e.2.1	License Termination ISFSI	-	200	207	324	-	893	1,592	804	4,022	4,022	-	-	-	14,549	-	-	-	1,178,830	11,786	1,032
3e.2	Subtotal Period 3e Additional Costs	-	200	207	324	-	893	1,592	804	4,022	4,022	-	-	-	14,549	-	-	-	1,178,830	11,786	1,032
Period 3e Period-Dependent Costs																					
3e.4.1	Insurance	-	-	-	-	-	-	62	15	77	77	-	-	-	-	-	-	-	-	-	-
3e.4.2	Property taxes	-	-	-	-	-	-	163	41	204	204	-	-	-	-	-	-	-	-	-	-
3e.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3e.4.4	Security Staff Cost	-	-	-	-	-	-	148	37	184	184	-	-	-	-	-	-	-	-	-	2,468
3e.4.5	Utility Staff Cost	-	-	-	-	-	-	150	37	187	187	-	-	-	-	-	-	-	-	-	1,870
3e.4	Subtotal Period 3e Period-Dependent Costs	-	-	-	-	-	-	522	130	652	652	-	-	-	-	-	-	-	-	-	4,338
3e.0	TOTAL PERIOD 3e COST	-	200	207	324	-	893	2,114	935	4,674	4,674	-	-	-	14,549	-	-	-	1,178,830	11,786	5,370

Table C-2
Braidwood Nuclear Power Station Unit 2
DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 3f - ISFSI Site Restoration																					
Period 3f Direct Decommissioning Activities																					
Period 3f Additional Costs																					
3f.2.1	Site Restoration ISFSI	-	1,147	-	-	-	-	28	176	1,351	-	-	1,351	-	-	-	-	-	-	13,036	80
3f.2	Subtotal Period 3f Additional Costs	-	1,147	-	-	-	-	28	176	1,351	-	-	1,351	-	-	-	-	-	-	13,036	80
Period 3f Collateral Costs																					
3f.3.1	Small tool allowance	-	18	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	18	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																					
3f.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.2	Property taxes	-	-	-	-	-	-	86	9	95	-	-	95	-	-	-	-	-	-	-	-
3f.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.4	Security Staff Cost	-	-	-	-	-	-	78	12	90	-	-	90	-	-	-	-	-	-	-	1,307
3f.4.5	Utility Staff Cost	-	-	-	-	-	-	65	10	75	-	-	75	-	-	-	-	-	-	-	810
3f.4	Subtotal Period 3f Period-Dependent Costs	-	-	-	-	-	-	229	30	260	-	-	260	-	-	-	-	-	-	-	2,117
3f.0	TOTAL PERIOD 3f COST	-	1,165	-	-	-	-	257	209	1,631	-	-	1,631	-	-	-	-	-	-	13,036	2,197
PERIOD 3 TOTALS		-	56,828	832	324	-	12,956	158,033	31,396	260,370	19,422	153,078	87,870	-	14,549	-	-	2,217	1,612,010	449,247	1,082,745
TOTAL COST TO DECOMMISSION		**12,412**	**142,375**	**26,530**	**13,342**	**-**	**65,989**	**593,059**	**147,398**	**1,001,105**	**659,003**	**237,817**	**104,284**	**-**	**484,664**	**1,802**	**393**	**2,217**	**27,039,800**	**1,521,169**	**4,779,468**

TOTAL COST TO DECOMMISSION WITH 17.27% CONTINGENCY:	**$1,001,105**	**thousands of 2014 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 65.83% OR:	**$659,003**	**thousands of 2014 dollars**
SPENT FUEL MANAGEMENT COST IS 23.76% OR:	**$237,817**	**thousands of 2014 dollars**
NON-NUCLEAR DEMOLITION COST IS 10.42% OR:	**$104,284**	**thousands of 2014 dollars**
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	**486,859**	**cubic feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**2,217**	**Cubic Feet**
TOTAL SCRAP METAL REMOVED:	**74,045**	**Tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,521,169**	**Man-hours**

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

APPENDIX D

DETAILED COST ANALYSIS

DELAYED DECON

Page

Braidwood Nuclear Power Station, Unit 1 .....D-2

Braidwood Nuclear Power Station, Unit 2 .....D-11

Table D-1
Braidwood Nuclear Power Station Unit 1
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	481	144	625	625	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	161	24	185	185	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	248	37	285	285	-	-	-	-	-	-	-	-	-	2,000
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	161	24	185	185	-	-	-	-	-	-	-	-	-	1,300
1a.1.9	Perform detailed rad survey									a											
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	124	19	142	142	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	End product description	-	-	-	-	-	-	124	19	142	142	-	-	-	-	-	-	-	-	-	1,000
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	186	28	214	214	-	-	-	-	-	-	-	-	-	1,500
1a.1.13	Define major work sequence	-	-	-	-	-	-	124	19	142	142	-	-	-	-	-	-	-	-	-	1,000
1a.1.14	Perform SER and EA	-	-	-	-	-	-	384	58	442	442	-	-	-	-	-	-	-	-	-	3,100
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	619	93	712	712	-	-	-	-	-	-	-	-	-	5,000
Activity Specifications																					
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	610	91	701	701	-	-	-	-	-	-	-	-	-	4,920
1a.1.16.2	Plant systems	-	-	-	-	-	-	516	77	594	594	-	-	-	-	-	-	-	-	-	4,167
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	387	58	445	445	-	-	-	-	-	-	-	-	-	3,120
1a.1.16.4	Waste management	-	-	-	-	-	-	248	37	285	285	-	-	-	-	-	-	-	-	-	2,000
1a.1.16.5	Facility and site dormancy	-	-	-	-	-	-	248	37	285	285	-	-	-	-	-	-	-	-	-	2,000
1a.1.16	Total	-	-	-	-	-	-	2,008	301	2,309	2,309	-	-	-	-	-	-	-	-	-	16,207
Detailed Work Procedures																					
1a.1.17.1	Plant systems	-	-	-	-	-	-	147	22	169	169	-	-	-	-	-	-	-	-	-	1,183
1a.1.17.2	Facility closeout & dormancy	-	-	-	-	-	-	149	22	171	171	-	-	-	-	-	-	-	-	-	1,200
1a.1.17	Total	-	-	-	-	-	-	295	44	340	340	-	-	-	-	-	-	-	-	-	2,383
1a.1.18	Procure vacuum drying system	-	-	-	-	-	-	12	2	14	14	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	4,927	811	5,738	5,738	-	-	-	-	-	-	-	-	-	35,890
Period 1a Collateral Costs																					
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,815	181	1,996	1,996	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	527	-	-	-	-	-	132	658	658	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	565	-	-	-	-	-	85	649	649	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	14	7	-	39	-	12	72	72	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,753	263	2,016	2,016	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	1,181	118	1,299	1,299	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	2,188	219	2,407	-	2,407	-	-	-	-	-	-	-	-	-
1a.4.9	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	396	59	455	-	455	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	48	7	55	-	55	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	672	101	772	772	-	-	-	-	-	-	-	-	-	12,264
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	32,063	4,809	36,873	36,873	-	-	-	-	-	-	-	-	-	423,400
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,091	14	7	-	39	40,280	6,011	47,443	44,526	2,917	-	-	610	-	-	-	12,190	20	435,664
1a.0	TOTAL PERIOD 1a COST	-	1,091	14	7	-	39	45,207	6,823	53,181	50,264	2,917	-	-	610	-	-	-	12,190	20	471,554
PERIOD 1b - SAFSTOR Limited DECON Activities																					
Period 1b Direct Decommissioning Activities																					
Decontamination of Site Buildings																					
1b.1.1.1	Reactor	2,496	-	-	-	-	-	-	1,248	3,744	3,744	-	-	-	-	-	-	-	-	33,093	-
1b.1.1.2	Auxiliary Building	247	-	-	-	-	-	-	124	371	371	-	-	-	-	-	-	-	-	3,289	-

Table D-1
Braidwood Nuclear Power Station Unit 1
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Decontamination of Site Buildings (continued)																					
1b.1.1.3	Refueling Water Storage Tank	411	-	-	-	-	-	-	205	616	616	-	-	-	-	-	-	-	-	5,322	-
1b.1.1.4	Steam Generator Storage Facility	67	-	-	-	-	-	-	33	100	100	-	-	-	-	-	-	-	-	887	-
1b.1.1	Totals	3,221	-	-	-	-	-	-	1,610	4,831	4,831	-	-	-	-	-	-	-	-	42,591	-
1b.1	Subtotal Period 1b Activity Costs	3,221	-	-	-	-	-	-	1,610	4,831	4,831	-	-	-	-	-	-	-	-	42,591	-
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	947	-	-	-	-	-	-	142	1,089	1,089	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process decommissioning water waste	180	-	127	321	-	400	-	251	1,279	1,279	-	-	-	1,139	-	-	-	68,312	222	-
1b.3.3	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1b.3.4	Small tool allowance	-	56	-	-	-	-	-	8	65	65	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	1,127	56	127	321	-	400	-	401	2,432	2,432	-	-	-	1,139	-	-	-	68,312	222	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	687	-	-	-	-	-	-	172	859	859	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	342	34	376	376	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	3,061	306	3,367	3,367	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	340	-	-	-	-	-	85	425	425	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	141	-	-	-	-	-	21	162	162	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	12	6	-	34	-	11	63	63	-	-	-	529	-	-	-	10,586	17	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	437	66	503	503	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	172	17	189	189	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	546	55	600	-	600	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Cost	-	-	-	-	-	-	41	6	47	47	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	99	15	113	-	113	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	12	2	14	-	14	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	1,573	236	1,809	1,809	-	-	-	-	-	-	-	-	-	27,721
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	7,994	1,199	9,193	9,193	-	-	-	-	-	-	-	-	-	105,560
1b.4	Subtotal Period 1b Period-Dependent Costs	687	481	12	6	-	34	14,276	2,224	17,720	16,993	727	-	-	529	-	-	-	10,586	17	133,281
1b.0	TOTAL PERIOD 1b COST	5,034	537	139	327	-	434	14,276	4,235	24,983	24,256	727	-	-	1,668	-	-	-	78,898	42,830	133,281
PERIOD 1c - Preparations for SAFSTOR Dormancy																					
Period 1c Direct Decommissioning Activities																					
1c.1.1	Prepare support equipment for storage	-	517	-	-	-	-	-	78	595	595	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	55	-	-	-	-	-	8	64	64	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	10,874	-
1c.1.4	Secure building accesses									a											
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	72	11	83	83	-	-	-	-	-	-	-	-	-	583
1c.1	Subtotal Period 1c Activity Costs	-	572	-	-	-	-	805	317	1,694	1,694	-	-	-	-	-	-	-	-	14,574	583
Period 1c Collateral Costs																					
1c.3.1	Process decommissioning water waste	142	-	100	252	-	314	-	197	1,006	1,006	-	-	-	896	-	-	-	53,749	175	-
1c.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1c.3.3	Small tool allowance	-	5	-	-	-	-	-	1	6	6	-	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	142	5	100	252	-	314	-	198	1,012	1,012	-	-	-	896	-	-	-	53,749	175	-
Period 1c Period-Dependent Costs																					
1c.4.1	Insurance	-	-	-	-	-	-	342	34	376	376	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	3,061	306	3,367	3,367	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	203	-	-	-	-	-	51	254	254	-	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	141	-	-	-	-	-	21	162	162	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	3	2	-	10	-	3	18	18	-	-	-	152	-	-	-	3,039	5	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	437	66	503	503	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	172	17	189	189	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	546	55	600	-	600	-	-	-	-	-	-	-	-	-
1c.4.9	Site O&M Cost	-	-	-	-	-	-	41	6	47	47	-	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	99	15	113	-	113	-	-	-	-	-	-	-	-	-
1c.4.11	ISFSI Operating Costs	-	-	-	-	-	-	12	2	14	-	14	-	-	-	-	-	-	-	-	-
1c.4.12	Security Staff Cost	-	-	-	-	-	-	167	25	193	193	-	-	-	-	-	-	-	-	-	3,058
1c.4.13	Utility Staff Cost	-	-	-	-	-	-	7,994	1,199	9,193	9,193	-	-	-	-	-	-	-	-	-	105,560
1c.4	Subtotal Period 1c Period-Dependent Costs	-	344	3	2	-	10	12,871	1,800	15,029	14,302	727	-	-	152	-	-	-	3,039	5	108,618
1c.0	TOTAL PERIOD 1c COST	142	922	104	254	-	324	13,676	2,314	17,735	17,008	727	-	-	1,048	-	-	-	56,788	14,753	109,201

Table D-1
Braidwood Nuclear Power Station Unit 1
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2014 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 1 TOTALS		5,176	2,550	257	588	-	797	73,159	13,372	95,899	91,528	4,371	-	-	3,325	-	-	-	147,877	57,603	714,036
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	-	-	-	-	-	-	149	22	171	171	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	4,061	1,015	5,076	5,076	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	4,210	1,037	5,247	5,247	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																					
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	11,250	1,688	12,938	-	12,938	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	11,250	1,688	12,938	-	12,938	-	-	-	-	-	-	-	-	-
Period 2a Period-Dependent Costs																					
2a.4.1	Insurance	-	-	-	-	-	-	15,665	1,566	17,231	-	17,231	-	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	33,328	3,333	36,660	36,660	-	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	5,782	-	-	-	-	-	1,446	7,228	7,228	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	139	71	-	394	-	123	729	729	-	-	-	6,162	-	-	-	123,249	201	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	10,252	1,538	11,789	-	11,789	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	8,459	846	9,305	9,305	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	55,504	5,550	61,055	-	61,055	-	-	-	-	-	-	-	-	-
2a.4.8	Site O&M Cost	-	-	-	-	-	-	4,823	723	5,546	-	5,546	-	-	-	-	-	-	-	-	-
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	11,563	1,734	13,297	-	13,297	-	-	-	-	-	-	-	-	-
2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	1,396	209	1,605	-	1,605	-	-	-	-	-	-	-	-	-
2a.4.11	Security Staff Cost	-	-	-	-	-	-	93,593	14,039	107,632	-	107,632	-	-	-	-	-	-	-	-	1,623,669
2a.4.12	Utility Staff Cost	-	-	-	-	-	-	111,971	16,796	128,767	-	128,767	-	-	-	-	-	-	-	-	1,432,829
2a.4	Subtotal Period 2a Period-Dependent Costs	-	5,782	139	71	-	394	346,553	47,904	400,844	53,922	346,922	-	-	6,162	-	-	-	123,249	201	3,056,498
2a.0	TOTAL PERIOD 2a COST	-	5,782	139	71	-	394	362,012	50,629	419,029	59,169	359,860	-	-	6,162	-	-	-	123,249	201	3,056,498
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	-	-	-	-	-	-	8	1	9	9	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	208	52	260	260	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	216	53	269	269	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	3,688	553	4,241	-	4,241	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	3,688	553	4,241	-	4,241	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	758	76	834	-	834	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	749	75	824	-	824	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	146	-	-	-	-	-	37	183	183	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	4	2	-	10	-	3	18	18	-	-	-	155	-	-	-	3,096	5	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	263	39	302	-	302	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	414	41	455	455	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	2,845	285	3,130	-	3,130	-	-	-	-	-	-	-	-	-
2b.4.8	Site O&M Cost	-	-	-	-	-	-	247	37	284	-	284	-	-	-	-	-	-	-	-	-
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	72	11	82	-	82	-	-	-	-	-	-	-	-	-
2b.4.10	Security Staff Cost	-	-	-	-	-	-	2,550	382	2,932	-	2,932	-	-	-	-	-	-	-	-	42,197
2b.4.11	Utility Staff Cost	-	-	-	-	-	-	2,324	349	2,672	-	2,672	-	-	-	-	-	-	-	-	31,257
2b.4	Subtotal Period 2b Period-Dependent Costs	-	146	4	2	-	10	10,221	1,334	11,716	656	11,060	-	-	155	-	-	-	3,096	5	73,454
2b.0	TOTAL PERIOD 2b COST	-	146	4	2	-	10	14,124	1,941	16,226	925	15,301	-	-	155	-	-	-	3,096	5	73,454
PERIOD 2 TOTALS		-	5,928	143	73	-	404	376,136	52,570	435,254	60,094	375,161	-	-	6,317	-	-	-	126,345	206	3,129,952

Table D-1
Braidwood Nuclear Power Station Unit 1
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	161	24	185	185	-	-	-	-	-	-	-	-	-	1,300
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	570	85	655	655	-	-	-	-	-	-	-	-	-	4,600
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	124	19	142	142	-	-	-	-	-	-	-	-	-	1,000
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	161	24	185	185	-	-	-	-	-	-	-	-	-	1,300
3a.1.6	Define major work sequence	-	-	-	-	-	-	929	139	1,069	1,069	-	-	-	-	-	-	-	-	-	7,500
3a.1.7	Perform SER and EA	-	-	-	-	-	-	384	58	442	442	-	-	-	-	-	-	-	-	-	3,100
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	619	93	712	712	-	-	-	-	-	-	-	-	-	5,000
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	507	76	584	584	-	-	-	-	-	-	-	-	-	4,096
3a.1.10	Receive NRC approval of termination plan									a											
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	913	137	1,050	945	-	105	-	-	-	-	-	-	-	7,370
3a.1.11.2	Plant systems	-	-	-	-	-	-	516	77	594	534	-	59	-	-	-	-	-	-	-	4,167
3a.1.11.3	Reactor internals	-	-	-	-	-	-	880	132	1,012	1,012	-	-	-	-	-	-	-	-	-	7,100
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	805	121	926	926	-	-	-	-	-	-	-	-	-	6,500
3a.1.11.5	Biological shield	-	-	-	-	-	-	62	9	71	71	-	-	-	-	-	-	-	-	-	500
3a.1.11.6	Steam generators	-	-	-	-	-	-	387	58	445	445	-	-	-	-	-	-	-	-	-	3,120
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	198	30	228	114	-	114	-	-	-	-	-	-	-	1,600
3a.1.11.8	Main Turbine	-	-	-	-	-	-	50	7	57	-	-	57	-	-	-	-	-	-	-	400
3a.1.11.9	Main Condensers	-	-	-	-	-	-	50	7	57	-	-	57	-	-	-	-	-	-	-	400
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	387	58	445	222	-	222	-	-	-	-	-	-	-	3,120
3a.1.11.11	Waste management	-	-	-	-	-	-	570	85	655	655	-	-	-	-	-	-	-	-	-	4,600
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-	112	17	128	64	-	64	-	-	-	-	-	-	-	900
3a.1.11	Total	-	-	-	-	-	-	4,928	739	5,667	4,988	-	679	-	-	-	-	-	-	-	39,777
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	297	45	342	342	-	-	-	-	-	-	-	-	-	2,400
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	3,000	450	3,450	3,450	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	1,400
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,300	345	2,645	2,645	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	152	23	175	175	-	-	-	-	-	-	-	-	-	1,230
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	14,307	2,146	16,453	15,775	-	679	-	-	-	-	-	-	-	72,703
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	506	51	556	556	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	500	50	550	550	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	460	-	-	-	-	-	115	575	575	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	565	-	-	-	-	-	85	649	649	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	12	6	-	33	-	10	61	61	-	-	-	514	-	-	-	10,287	17	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	1,753	263	2,016	2,016	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	378	38	416	416	-	-	-	-	-	-	-	-	-	-
3a.4.8	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
3a.4.9	Security Staff Cost	-	-	-	-	-	-	3,888	583	4,472	4,472	-	-	-	-	-	-	-	-	-	65,179
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	19,542	2,931	22,473	22,473	-	-	-	-	-	-	-	-	-	258,629
3a.4	Subtotal Period 3a Period-Dependent Costs	-	1,025	12	6	-	33	26,732	4,151	31,958	31,958	-	-	-	514	-	-	-	10,287	17	323,807
3a.0	TOTAL PERIOD 3a COST	-	1,025	12	6	-	33	41,039	6,297	48,411	47,733	-	679	-	514	-	-	-	10,287	17	396,510
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	586	88	674	607	-	67	-	-	-	-	-	-	-	4,733
3b.1.1.2	Reactor internals	-	-	-	-	-	-	310	46	356	356	-	-	-	-	-	-	-	-	-	2,500
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	167	25	192	48	-	144	-	-	-	-	-	-	-	1,350
3b.1.1.4	CRD cooling assembly	-	-	-	-	-	-	124	19	142	142	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.5	CRD housings & ICI tubes	-	-	-	-	-	-	124	19	142	142	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.6	Incore instrumentation	-	-	-	-	-	-	124	19	142	142	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	450	67	517	517	-	-	-	-	-	-	-	-	-	3,630
3b.1.1.8	Facility closeout	-	-	-	-	-	-	149	22	171	85	-	85	-	-	-	-	-	-	-	1,200

Table D-1
Braidwood Nuclear Power Station Unit 1
Delayed DECON Decommissioning Cost Estimate
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Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Detailed Work Procedures (continued)																					
3b.1.1.9	Missile shields	-	-	-	-	-	-	56	8	64	64	-	-	-	-	-	-	-	-	-	450
3b.1.1.10	Biological shield	-	-	-	-	-	-	149	22	171	171	-	-	-	-	-	-	-	-	-	1,200
3b.1.1.11	Steam generators	-	-	-	-	-	-	570	85	655	655	-	-	-	-	-	-	-	-	-	4,600
3b.1.1.12	Reinforced concrete	-	-	-	-	-	-	124	19	142	71	-	71	-	-	-	-	-	-	-	1,000
3b.1.1.13	Main Turbine	-	-	-	-	-	-	193	29	222	-	-	222	-	-	-	-	-	-	-	1,560
3b.1.1.14	Main Condensers	-	-	-	-	-	-	193	29	222	-	-	222	-	-	-	-	-	-	-	1,560
3b.1.1.15	Auxiliary building	-	-	-	-	-	-	338	51	389	350	-	39	-	-	-	-	-	-	-	2,730
3b.1.1.16	Reactor building	-	-	-	-	-	-	338	51	389	350	-	39	-	-	-	-	-	-	-	2,730
3b.1.1	Total	-	-	-	-	-	-	3,995	599	4,594	3,703	-	891	-	-	-	-	-	-	-	32,243
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	3,995	599	4,594	3,703	-	891	-	-	-	-	-	-	-	32,243
Period 3b Additional Costs																					
3b.2.1	Site Characterization	-	-	-	-	-	-	6,480	1,944	8,424	8,424	-	-	-	-	-	-	-	-	30,500	10,852
3b.2	Subtotal Period 3b Additional Costs	-	-	-	-	-	-	6,480	1,944	8,424	8,424	-	-	-	-	-	-	-	-	30,500	10,852
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	947	-	-	-	-	-	-	142	1,089	1,089	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
3b.3.3	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	947	1,100	-	-	-	-	1,163	482	3,692	3,692	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	29	-	-	-	-	-	-	7	36	36	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	254	25	279	279	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	251	25	276	276	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	254	-	-	-	-	-	64	318	318	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	283	-	-	-	-	-	42	326	326	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	7	3	-	19	-	6	34	34	-	-	-	292	-	-	-	5,834	10	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	879	132	1,011	1,011	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	190	19	208	208	-	-	-	-	-	-	-	-	-	-
3b.4.9	Site O&M Cost	-	-	-	-	-	-	83	12	95	95	-	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	1,950	292	2,242	2,242	-	-	-	-	-	-	-	-	-	32,679
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	5,002	750	5,752	5,752	-	-	-	-	-	-	-	-	-	58,560
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	9,798	1,470	11,267	11,267	-	-	-	-	-	-	-	-	-	129,669
3b.4	Subtotal Period 3b Period-Dependent Costs	29	537	7	3	-	19	18,405	2,845	21,845	21,845	-	-	-	292	-	-	-	5,834	10	220,907
3b.0	TOTAL PERIOD 3b COST	976	1,637	7	3	-	19	30,043	5,870	38,554	37,664	-	891	-	292	-	-	-	5,834	30,510	264,002
PERIOD 3 TOTALS		976	2,662	18	9	-	52	71,082	12,167	86,966	85,396	-	1,569	-	806	-	-	-	16,121	30,526	660,512
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Reactor Coolant Piping	54	186	39	40	-	271	-	151	742	742	-	-	-	1,838	-	-	-	210,083	3,290	-
4a.1.1.2	Pressurizer Relief Tank	9	34	7	8	-	47	-	27	132	132	-	-	-	329	-	-	-	36,553	596	-
4a.1.1.3	Reactor Coolant Pumps & Motors	32	121	85	198	-	1,390	-	432	2,259	2,259	-	-	-	4,796	-	-	-	780,540	2,726	80
4a.1.1.4	Pressurizer	14	79	370	105	-	879	-	299	1,746	1,746	-	-	-	3,033	-	-	-	240,915	1,532	750
4a.1.1.5	Steam Generators	109	4,584	2,883	3,734	-	11,075	-	4,818	27,202	27,202	-	-	-	67,463	-	-	-	3,820,664	20,508	4,500
4a.1.1.6	Retired Steam Generator Units	-	-	1,659	2,955	-	10,309	-	3,187	18,110	18,110	-	-	-	62,044	-	-	-	3,098,576	10,800	2,250
4a.1.1.7	CRDMs/ICIs/Service Structure Removal	26	315	219	43	-	141	-	155	899	899	-	-	-	2,843	-	-	-	109,650	4,745	-
4a.1.1.8	Reactor Vessel Internals	104	2,920	6,538	1,071	-	5,071	292	6,723	22,719	22,719	-	-	-	1,835	1,127	393	-	328,507	27,350	1,226
4a.1.1.9	Vessel & Internals GTCC Disposal	-	-	-	-	-	12,062	-	1,809	13,872	13,872	-	-	-	-	-	-	2,217	433,180	-	-
4a.1.1.10	Reactor Vessel	129	5,095	2,175	1,159	-	2,832	292	6,179	17,862	17,862	-	-	-	9,331	-	-	-	960,579	27,350	1,226
4a.1.1	Totals	477	13,334	13,975	9,312	-	44,079	585	23,781	105,542	105,542	-	-	-	153,512	1,127	393	2,217	10,019,250	98,898	10,032
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	695	3,385	1,093	-	3,399	-	1,526	10,098	10,098	-	-	-	58,555	-	-	-	3,040,215	9,317	-
4a.1.3	Main Condensers	-	1,368	1,965	1,020	-	5,039	-	1,951	11,344	11,344	-	-	-	75,240	-	-	-	3,906,532	18,250	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor	-	1,397	-	-	-	-	-	210	1,607	1,607	-	-	-	-	-	-	-	-	12,130	-
4a.1.4.2	Auxiliary Building	-	771	-	-	-	-	-	116	887	887	-	-	-	-	-	-	-	-	6,782	-
4a.1.4.3	Refueling Water Storage Tank	-	137	-	-	-	-	-	21	158	158	-	-	-	-	-	-	-	-	1,299	-
4a.1.4.4	Steam Generator Storage Facility	-	57	-	-	-	-	-	9	66	66	-	-	-	-	-	-	-	-	507	-
4a.1.4	Totals	-	2,363	-	-	-	-	-	354	2,717	2,717	-	-	-	-	-	-	-	-	20,718	-

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															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems																					
4a.1.5.1	Auxiliary Feedwater	-	92	-	-	-	-	-	14	106	-	-	106	-	-	-	-	-	-	1,244	-
4a.1.5.2	Auxiliary Steam	-	82	-	-	-	-	-	12	95	-	-	95	-	-	-	-	-	-	1,126	-
4a.1.5.3	Auxiliary Steam RCA	-	153	24	11	-	54	-	56	298	298	-	-	-	805	-	-	-	42,068	1,984	-
4a.1.5.4	Boric Acid Processing	-	578	137	79	-	392	-	268	1,454	1,454	-	-	-	6,102	-	-	-	303,638	8,026	-
4a.1.5.5	CO2 & H2	-	31	-	-	-	-	-	5	35	-	-	35	-	-	-	-	-	-	419	-
4a.1.5.6	CO2 & H2 RCA	-	44	5	2	-	11	-	15	77	77	-	-	-	159	-	-	-	8,312	583	-
4a.1.5.7	Chemical Feed	-	68	-	-	-	-	-	10	78	-	-	78	-	-	-	-	-	-	934	-
4a.1.5.8	Chilled Water	-	85	-	-	-	-	-	13	98	-	-	98	-	-	-	-	-	-	1,142	-
4a.1.5.9	Circulating Water	-	375	-	-	-	-	-	56	432	-	-	432	-	-	-	-	-	-	5,174	-
4a.1.5.10	Condensate	-	443	-	-	-	-	-	66	509	-	-	509	-	-	-	-	-	-	6,023	-
4a.1.5.11	Condensate Booster	-	399	-	-	-	-	-	60	459	-	-	459	-	-	-	-	-	-	5,428	-
4a.1.5.12	Condensate Cleanup	-	78	-	-	-	-	-	12	90	-	-	90	-	-	-	-	-	-	1,060	-
4a.1.5.13	Containment Spray	-	294	88	47	-	233	-	148	810	810	-	-	-	3,481	-	-	-	180,655	3,897	-
4a.1.5.14	Diesel Fuel Oil	-	120	-	-	-	-	-	18	138	-	-	138	-	-	-	-	-	-	1,615	-
4a.1.5.15	Essential Service Water	-	280	-	-	-	-	-	42	322	-	-	322	-	-	-	-	-	-	3,837	-
4a.1.5.16	Extraction Steam	-	223	-	-	-	-	-	33	257	-	-	257	-	-	-	-	-	-	3,089	-
4a.1.5.17	Feedwater	-	372	-	-	-	-	-	56	428	-	-	428	-	-	-	-	-	-	5,142	-
4a.1.5.18	Feedwater Drains	-	891	-	-	-	-	-	134	1,025	-	-	1,025	-	-	-	-	-	-	12,366	-
4a.1.5.19	Gland Steam	-	67	-	-	-	-	-	10	77	-	-	77	-	-	-	-	-	-	932	-
4a.1.5.20	Gland Water	-	59	-	-	-	-	-	9	68	-	-	68	-	-	-	-	-	-	828	-
4a.1.5.21	Main Steam	-	380	-	-	-	-	-	57	437	-	-	437	-	-	-	-	-	-	5,216	-
4a.1.5.22	Main Steam RCA	-	59	17	10	-	49	-	30	164	164	-	-	-	726	-	-	-	37,727	769	-
4a.1.5.23	Nitrogen	-	4	1	1	-	3	-	2	10	10	-	-	-	49	-	-	-	2,447	50	-
4a.1.5.24	Non-Essential Service Water	-	210	-	-	-	-	-	32	242	-	-	242	-	-	-	-	-	-	2,916	-
4a.1.5.25	Non-Essential Service Water RCA	-	107	34	19	-	94	-	56	310	310	-	-	-	1,400	-	-	-	72,790	1,358	-
4a.1.5.26	Off Gas	-	650	135	73	-	360	-	277	1,494	1,494	-	-	-	5,352	-	-	-	278,775	8,689	-
4a.1.5.27	Process Radiation Monitoring	-	48	3	1	-	7	-	14	74	74	-	-	-	109	-	-	-	5,726	671	-
4a.1.5.28	Process Sampling	-	139	14	8	-	40	-	47	248	248	-	-	-	590	-	-	-	30,697	1,947	-
4a.1.5.29	Screen Wash	-	59	-	-	-	-	-	9	68	-	-	68	-	-	-	-	-	-	821	-
4a.1.5.30	Station Air	-	36	-	-	-	-	-	5	42	-	-	42	-	-	-	-	-	-	498	-
4a.1.5.31	Station Heating	-	130	-	-	-	-	-	19	149	-	-	149	-	-	-	-	-	-	1,771	-
4a.1.5.32	Switchgear Heat Removal	-	10	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	139	-
4a.1.5.33	Turbine Bldg Equip Drains	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	17	-
4a.1.5.34	Turbine Generator	-	67	-	-	-	-	-	10	77	-	-	77	-	-	-	-	-	-	901	-
4a.1.5.35	Turbine Oil	-	103	-	-	-	-	-	15	118	-	-	118	-	-	-	-	-	-	1,399	-
4a.1.5.36	Waste Oil Sumps	-	35	-	-	-	-	-	5	41	-	-	41	-	-	-	-	-	-	483	-
4a.1.5	Totals	-	6,772	457	251	-	1,242	-	1,617	10,340	4,939	-	5,401	-	18,774	-	-	-	962,836	92,492	-
4a.1.6	Scaffolding in support of decommissioning	-	1,242	9	5	-	24	-	318	1,598	1,598	-	-	-	359	-	-	-	18,654	18,101	-
4a.1	Subtotal Period 4a Activity Costs	477	25,774	19,792	11,682	-	53,784	585	29,548	141,640	136,239	-	5,401	-	306,440	1,127	393	2,217	17,947,480	257,777	10,032
Period 4a Additional Costs																					
4a.2.1	Remedial Action Surveys	-	-	-	-	-	-	1,976	593	2,569	2,569	-	-	-	-	-	-	-	-	31,151	-
4a.2.2	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
4a.2.3	Operational Tools and Equipment	-	-	9	52	-	189	-	56	306	306	-	-	-	5,855	-	-	-	146,375	16	-
4a.2	Subtotal Period 4a Additional Costs	-	-	9	52	-	189	2,026	656	2,933	2,933	-	-	-	5,855	-	-	-	146,375	31,167	-
Period 4a Collateral Costs																					
4a.3.1	Process decommissioning water waste	9	-	12	29	-	37	-	19	105	105	-	-	-	104	-	-	-	6,256	20	-
4a.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4a.3.3	Small tool allowance	-	323	-	-	-	-	-	49	372	335	-	37	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	9	323	12	29	-	37	-	68	477	440	-	37	-	104	-	-	-	6,256	20	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	86	-	-	-	-	-	-	21	107	107	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	751	75	826	826	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	742	74	816	735	-	82	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	2,180	-	-	-	-	-	545	2,726	2,726	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	3,223	-	-	-	-	-	483	3,706	3,706	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	83	43	-	235	-	73	434	434	-	-	-	3,672	-	-	-	73,441	120	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	2,474	371	2,845	2,845	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	896	90	986	986	-	-	-	-	-	-	-	-	-	-
4a.4.9	Site O&M Cost	-	-	-	-	-	-	245	37	282	282	-	-	-	-	-	-	-	-	-	-
4a.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	595	89	685	685	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	5,774	866	6,640	6,640	-	-	-	-	-	-	-	-	-	96,786
4a.4.12	DOC Staff Cost	-	-	-	-	-	-	17,539	2,631	20,169	20,169	-	-	-	-	-	-	-	-	-	213,703

Table D-1
Braidwood Nuclear Power Station Unit 1
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 4a Period-Dependent Costs (continued)																					
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	29,258	4,389	33,647	33,647	-	-	-	-	-	-	-	-	-	387,143
4a.4	Subtotal Period 4a Period-Dependent Costs	86	5,403	83	43	-	235	58,274	9,745	73,869	73,787	-	82	-	3,672	-	-	-	73,441	120	697,631
4a.0	TOTAL PERIOD 4a COST	571	31,501	19,896	11,806	-	54,244	60,885	40,017	218,919	213,399	-	5,520	-	316,071	1,127	393	2,217	18,173,550	289,084	707,663
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
4b.1.1	Remove spent fuel racks	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Disposal of Plant Systems																					
4b.1.2.1	Chemical & Volume Control	-	1,265	171	85	-	419	-	451	2,391	2,391	-	-	-	6,236	-	-	-	324,551	16,476	-
4b.1.2.2	Chilled Water RCA	-	360	116	62	-	304	-	187	1,028	1,028	-	-	-	4,527	-	-	-	235,699	4,956	-
4b.1.2.3	Component Cooling RCA	-	760	209	112	-	553	-	366	1,999	1,999	-	-	-	8,239	-	-	-	428,586	10,074	-
4b.1.2.4	Electrical	-	3,573	-	-	-	-	-	536	4,109	-	-	4,109	-	-	-	-	-	-	48,490	-
4b.1.2.5	Electrical - Contaminated	-	1,289	137	87	-	430	-	457	2,400	2,400	-	-	-	6,418	-	-	-	333,233	17,294	-
4b.1.2.6	Electrical - RCA	-	2,162	372	227	-	1,123	-	892	4,776	4,776	-	-	-	16,763	-	-	-	870,329	29,753	-
4b.1.2.7	Emergency Diesel Generator	-	152	-	-	-	-	-	23	175	-	-	175	-	-	-	-	-	-	2,066	-
4b.1.2.8	Essential Service Water RCA	-	342	120	67	-	333	-	191	1,053	1,053	-	-	-	4,958	-	-	-	257,885	4,643	-
4b.1.2.9	Fire Protection	-	146	-	-	-	-	-	22	168	-	-	168	-	-	-	-	-	-	1,984	-
4b.1.2.10	Fire Protection RCA	-	206	30	14	-	68	-	74	391	391	-	-	-	1,002	-	-	-	52,396	2,641	-
4b.1.2.11	HVAC-Auxiliary Building	-	572	104	65	-	323	-	244	1,309	1,309	-	-	-	4,827	-	-	-	250,668	7,298	-
4b.1.2.12	HVAC-Diesel Generator Room	-	50	-	-	-	-	-	8	58	-	-	58	-	-	-	-	-	-	682	-
4b.1.2.13	HVAC-Miscellaneous	-	48	-	-	-	-	-	7	56	-	-	56	-	-	-	-	-	-	656	-
4b.1.2.14	HVAC-Primary Containment	-	692	218	138	-	683	-	386	2,118	2,118	-	-	-	10,197	-	-	-	529,451	8,908	-
4b.1.2.15	HVAC-Turbine Building	-	219	-	-	-	-	-	33	252	-	-	252	-	-	-	-	-	-	3,177	-
4b.1.2.16	Instrument Air Supply	-	54	-	-	-	-	-	8	62	-	-	62	-	-	-	-	-	-	760	-
4b.1.2.17	Instrument Air Supply RCA	-	84	11	5	-	24	-	29	153	153	-	-	-	354	-	-	-	18,493	1,096	-
4b.1.2.18	Miscellaneous Drains	-	44	7	4	-	20	-	17	93	93	-	-	-	299	-	-	-	15,562	594	-
4b.1.2.19	Primary Containment Purge	-	318	138	76	-	377	-	199	1,109	1,109	-	-	-	5,614	-	-	-	292,306	4,509	-
4b.1.2.20	Primary Water	-	69	7	3	-	15	-	22	116	116	-	-	-	218	-	-	-	11,425	924	-
4b.1.2.21	Radioactive Waste Disposal	-	1,052	171	90	-	446	-	405	2,164	2,164	-	-	-	6,808	-	-	-	345,754	14,349	-
4b.1.2.22	Reactor Building Equipment Drains	-	112	18	9	-	47	-	43	229	229	-	-	-	695	-	-	-	36,107	1,451	-
4b.1.2.23	Reactor Building Floor Drains	-	52	7	4	-	18	-	19	99	99	-	-	-	265	-	-	-	13,801	686	-
4b.1.2.24	Reactor Coolant	-	195	23	11	-	55	-	67	351	351	-	-	-	812	-	-	-	42,440	2,529	-
4b.1.2.25	Residual Heat Removal	-	220	52	30	-	147	-	101	550	550	-	-	-	2,184	-	-	-	113,636	2,985	-
4b.1.2.26	Safety Injection	-	1,008	247	140	-	694	-	471	2,561	2,561	-	-	-	10,622	-	-	-	537,761	13,820	-
4b.1.2.27	Station Air RCA	-	41	5	2	-	11	-	14	74	74	-	-	-	169	-	-	-	8,811	531	-
4b.1.2.28	Station Heating RCA	-	138	33	16	-	81	-	61	330	330	-	-	-	1,209	-	-	-	63,061	1,826	-
4b.1.2.29	Waste Oil Sumps RCA	-	8	1	1	-	3	-	3	17	17	-	-	-	50	-	-	-	2,602	95	-
4b.1.2	Totals	-	15,233	2,199	1,249	-	6,172	-	5,334	30,188	25,309	-	4,879	-	92,465	-	-	-	4,784,556	205,253	-
4b.1.3	Scaffolding in support of decommissioning	-	1,863	14	7	-	36	-	477	2,398	2,398	-	-	-	539	-	-	-	27,981	27,151	-
Decontamination of Site Buildings																					
4b.1.4.1	Reactor	2,264	1,625	233	346	-	1,358	-	1,953	7,781	7,781	-	-	-	24,850	-	-	-	1,271,843	50,420	-
4b.1.4.2	Auxiliary Building	226	123	21	17	-	69	-	166	622	622	-	-	-	1,101	-	-	-	63,292	4,575	-
4b.1.4.3	Refueling Water Storage Tank	412	480	41	18	-	83	-	354	1,388	1,388	-	-	-	1,240	-	-	-	67,350	11,972	-
4b.1.4.4	Steam Generator Storage Facility	67	0	0	0	-	0	-	34	101	101	-	-	-	1	-	-	-	46	888	-
4b.1.4	Totals	2,969	2,228	296	381	-	1,510	-	2,506	9,892	9,892	-	-	-	27,192	-	-	-	1,402,531	67,855	-
4b.1	Subtotal Period 4b Activity Costs	2,969	19,324	2,509	1,638	-	7,719	-	8,318	42,478	37,599	-	4,879	-	120,196	-	-	-	6,215,068	300,260	-
Period 4b Additional Costs																					
4b.2.1	License Termination Survey Planning	-	-	-	-	-	-	983	295	1,278	1,278	-	-	-	-	-	-	-	-	-	6,240
4b.2.2	Remedial Action Surveys	-	-	-	-	-	-	2,923	877	3,800	3,800	-	-	-	-	-	-	-	-	46,072	-
4b.2.3	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
4b.2.4	License Termination ISFSI	-	443	207	278	-	893	1,283	776	3,880	3,880	-	-	-	14,543	-	-	-	1,178,709	7,632	5,262
4b.2.5	Underground Services Excavation	-	554	-	-	-	-	-	83	637	637	-	-	-	-	-	-	-	-	2,755	-
4b.2	Subtotal Period 4b Additional Costs	-	997	207	278	-	893	5,239	2,039	9,653	9,653	-	-	-	14,543	-	-	-	1,178,709	56,459	11,502
Period 4b Collateral Costs																					
4b.3.1	Process decommissioning water waste	10	-	14	36	-	45	-	23	129	129	-	-	-	128	-	-	-	7,705	25	-
4b.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4b.3.3	Small tool allowance	-	397	-	-	-	-	-	60	456	456	-	-	-	-	-	-	-	-	-	-
4b.3.4	Decommissioning Equipment Disposition	-	-	184	96	-	472	-	151	903	903	-	-	-	7,054	-	-	-	366,237	88	-
4b.3	Subtotal Period 4b Collateral Costs	10	397	199	132	-	518	-	234	1,488	1,488	-	-	-	7,182	-	-	-	373,943	113	-

Table D-1
Braidwood Nuclear Power Station Unit 1
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	801	-	-	-	-	-	-	200	1,001	1,001	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	1,121	112	1,233	1,233	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	1,107	111	1,218	1,218	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	2,774	-	-	-	-	-	693	3,467	3,467	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	4,762	-	-	-	-	-	714	5,477	5,477	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	98	50	-	277	-	86	511	511	-	-	-	4,321	-	-	-	86,419	141	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	2,915	437	3,352	3,352	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	1,338	134	1,472	1,472	-	-	-	-	-	-	-	-	-	-
4b.4.9	Site O&M Cost	-	-	-	-	-	-	366	55	420	420	-	-	-	-	-	-	-	-	-	-
4b.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	889	133	1,022	1,022	-	-	-	-	-	-	-	-	-	-
4b.4.11	Security Staff Cost	-	-	-	-	-	-	1,394	209	1,603	1,603	-	-	-	-	-	-	-	-	-	25,426
4b.4.12	DOC Staff Cost	-	-	-	-	-	-	16,403	2,460	18,864	18,864	-	-	-	-	-	-	-	-	-	217,274
4b.4.13	Utility Staff Cost	-	-	-	-	-	-	27,793	4,169	31,962	31,962	-	-	-	-	-	-	-	-	-	388,320
4b.4	Subtotal Period 4b Period-Dependent Costs	801	7,536	98	50	-	277	53,325	9,515	71,602	71,602	-	-	-	4,321	-	-	-	86,419	141	631,020
4b.0	TOTAL PERIOD 4b COST	3,780	28,255	3,013	2,098	-	9,406	58,564	20,105	125,221	120,342	-	4,879	-	146,242	-	-	-	7,854,137	356,973	642,522
PERIOD 4e - Delay before License Termination																					
Period 4e Direct Decommissioning Activities																					
Period 4e Collateral Costs																					
4e.3	Subtotal Period 4e Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 4e Period-Dependent Costs																					
4e.4.1	Insurance	-	-	-	-	-	-	793	79	872	872	-	-	-	-	-	-	-	-	-	-
4e.4.2	Property taxes	-	-	-	-	-	-	783	78	861	861	-	-	-	-	-	-	-	-	-	-
4e.4.3	Health physics supplies	-	149	-	-	-	-	-	37	186	186	-	-	-	-	-	-	-	-	-	-
4e.4.4	Disposal of DAW generated	-	-	4	2	-	10	-	3	18	18	-	-	-	156	-	-	-	3,124	5	-
4e.4.5	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4e.4.6	NRC Fees	-	-	-	-	-	-	398	40	437	437	-	-	-	-	-	-	-	-	-	-
4e.4.7	Site O&M Cost	-	-	-	-	-	-	259	39	297	297	-	-	-	-	-	-	-	-	-	-
4e.4.8	Utility Staff Cost	-	-	-	-	-	-	1,539	231	1,770	1,770	-	-	-	-	-	-	-	-	-	22,880
4e.4	Subtotal Period 4e Period-Dependent Costs	-	149	4	2	-	10	3,771	507	4,442	4,442	-	-	-	156	-	-	-	3,124	5	22,880
4e.0	TOTAL PERIOD 4e COST	-	149	4	2	-	10	3,771	507	4,442	4,442	-	-	-	156	-	-	-	3,124	5	22,880
PERIOD 4f - License Termination																					
Period 4f Direct Decommissioning Activities																					
4f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
4f.1.2	Terminate license									a											
4f.1	Subtotal Period 4f Activity Costs	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
Period 4f Additional Costs																					
4f.2.1	License Termination Survey	-	-	-	-	-	-	7,331	2,199	9,530	9,530	-	-	-	-	-	-	-	-	97,452	3,120
4f.2	Subtotal Period 4f Additional Costs	-	-	-	-	-	-	7,331	2,199	9,530	9,530	-	-	-	-	-	-	-	-	97,452	3,120
Period 4f Collateral Costs																					
4f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
4f.3	Subtotal Period 4f Collateral Costs	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
Period 4f Period-Dependent Costs																					
4f.4.1	Insurance	-	-	-	-	-	-	381	38	419	419	-	-	-	-	-	-	-	-	-	-
4f.4.2	Property taxes	-	-	-	-	-	-	376	38	414	414	-	-	-	-	-	-	-	-	-	-
4f.4.3	Health physics supplies	-	600	-	-	-	-	-	150	750	750	-	-	-	-	-	-	-	-	-	-
4f.4.4	Disposal of DAW generated	-	-	8	4	-	21	-	7	40	40	-	-	-	335	-	-	-	6,698	11	-
4f.4.5	Plant energy budget	-	-	-	-	-	-	264	40	304	304	-	-	-	-	-	-	-	-	-	-
4f.4.6	NRC Fees	-	-	-	-	-	-	455	46	501	501	-	-	-	-	-	-	-	-	-	-
4f.4.7	Site O&M Cost	-	-	-	-	-	-	124	19	143	143	-	-	-	-	-	-	-	-	-	-
4f.4.8	Security Staff Cost	-	-	-	-	-	-	722	108	830	830	-	-	-	-	-	-	-	-	-	11,786
4f.4.9	DOC Staff Cost	-	-	-	-	-	-	3,870	580	4,450	4,450	-	-	-	-	-	-	-	-	-	46,750
4f.4.10	Utility Staff Cost	-	-	-	-	-	-	4,733	710	5,443	5,443	-	-	-	-	-	-	-	-	-	56,964
4f.4	Subtotal Period 4f Period-Dependent Costs	-	600	8	4	-	21	10,926	1,735	13,294	13,294	-	-	-	335	-	-	-	6,698	11	115,500
4f.0	TOTAL PERIOD 4f COST	-	600	8	4	-	21	19,592	4,160	24,385	24,385	-	-	-	335	-	-	-	6,698	97,463	118,620
PERIOD 4 TOTALS		4,351	60,504	22,920	13,910	-	63,681	142,812	64,789	372,968	362,569	-	10,399	-	462,804	1,127	393	2,217	26,037,510	743,524	1,491,686

Table D-1
Braidwood Nuclear Power Station Unit 1
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	Reactor	-	8,057	-	-	-	-	-	1,209	9,266	-	-	9,266	-	-	-	-	-	-	69,546	-
5b.1.1.2	Auxiliary Building	-	6,941	-	-	-	-	-	1,041	7,982	-	-	7,982	-	-	-	-	-	-	61,038	-
5b.1.1.3	Refueling Water Storage Tank	-	1,234	-	-	-	-	-	185	1,419	-	-	1,419	-	-	-	-	-	-	11,692	-
5b.1.1.4	Steam Generator Storage Facility	-	516	-	-	-	-	-	77	593	-	-	593	-	-	-	-	-	-	4,559	-
5b.1.1.5	Turbine Building	-	6,833	-	-	-	-	-	1,025	7,858	-	-	7,858	-	-	-	-	-	-	70,342	-
5b.1.1.6	Turbine Pedestal	-	1,627	-	-	-	-	-	244	1,872	-	-	1,872	-	-	-	-	-	-	12,628	-
5b.1.1	Totals	-	25,209	-	-	-	-	-	3,781	28,990	-	-	28,990	-	-	-	-	-	-	229,806	-
Site Closeout Activities																					
5b.1.2	Grade & landscape site	-	986	-	-	-	-	-	148	1,134	-	-	1,134	-	-	-	-	-	-	1,942	-
5b.1.3	Final report to NRC	-	-	-	-	-	-	193	29	222	222	-	-	-	-	-	-	-	-	-	1,560
5b.1	Subtotal Period 5b Activity Costs	-	26,195	-	-	-	-	193	3,958	30,346	222	-	30,124	-	-	-	-	-	-	231,748	1,560
Period 5b Additional Costs																					
5b.2.1	Site Restoration ISFSI	-	625	-	-	-	-	28	98	751	-	-	751	-	-	-	-	-	-	6,273	80
5b.2.2	Concrete Crushing	-	662	-	-	-	-	4	100	766	-	-	766	-	-	-	-	-	-	2,798	-
5b.2	Subtotal Period 5b Additional Costs	-	1,288	-	-	-	-	31	198	1,517	-	-	1,517	-	-	-	-	-	-	9,071	80
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	327	-	-	-	-	-	49	376	-	-	376	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	327	-	-	-	-	-	49	376	-	-	376	-	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																					
5b.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5b.4.2	Property taxes	-	-	-	-	-	-	1,239	124	1,363	-	-	1,363	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	7,568	-	-	-	-	-	1,135	8,704	-	-	8,704	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	435	65	500	-	-	500	-	-	-	-	-	-	-	-
5b.4.5	Site O&M Cost	-	-	-	-	-	-	409	61	470	-	-	470	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	2,128	319	2,447	-	-	2,447	-	-	-	-	-	-	-	34,287
5b.4.7	DOC Staff Cost	-	-	-	-	-	-	11,846	1,777	13,623	-	-	13,623	-	-	-	-	-	-	-	137,043
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	5,797	869	6,666	-	-	6,666	-	-	-	-	-	-	-	67,229
5b.4	Subtotal Period 5b Period-Dependent Costs	-	7,568	-	-	-	-	21,853	4,351	33,773	-	-	33,773	-	-	-	-	-	-	-	238,558
5b.0	TOTAL PERIOD 5b COST	-	35,378	-	-	-	-	22,078	8,556	66,012	222	-	65,790	-	-	-	-	-	-	240,819	240,198
PERIOD 5 TOTALS		-	35,378	-	-	-	-	22,078	8,556	66,012	222	-	65,790	-	-	-	-	-	-	240,819	240,198
TOTAL COST TO DECOMMISSION		**10,503**	**107,024**	**23,338**	**14,580**	**-**	**64,933**	**685,267**	**151,454**	**1,057,100**	**599,809**	**379,532**	**77,759**	**-**	**473,253**	**1,127**	**393**	**2,217**	**26,327,860**	**1,072,678**	**6,236,384**

TOTAL COST TO DECOMMISSION WITH 16.72% CONTINGENCY:	**$1,057,100**	**thousands of 2014 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 56.74% OR:	**$599,809**	**thousands of 2014 dollars**
SPENT FUEL MANAGEMENT COST IS 35.9% OR:	**$379,532**	**thousands of 2014 dollars**
NON-NUCLEAR DEMOLITION COST IS 7.36% OR:	**$77,759**	**thousands of 2014 dollars**
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	**474,773**	**cubic feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**2,217**	**Cubic Feet**
TOTAL SCRAP METAL REMOVED:	**54,939**	**Tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,072,678**	**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
Braidwood Nuclear Power Station Unit 2
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	481	144	625	625	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	69	10	79	79	-	-	-	-	-	-	-	-	-	556
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	-	-	-	-	-	-	106	16	122	122	-	-	-	-	-	-	-	-	-	856
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	69	10	79	79	-	-	-	-	-	-	-	-	-	556
1a.1.9	Perform detailed rad survey									a											
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	428
1a.1.11	End product description	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	428
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	80	12	91	91	-	-	-	-	-	-	-	-	-	642
1a.1.13	Define major work sequence	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	428
1a.1.14	Perform SER and EA	-	-	-	-	-	-	164	25	189	189	-	-	-	-	-	-	-	-	-	1,327
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	265	40	305	305	-	-	-	-	-	-	-	-	-	2,140
Activity Specifications																					
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	261	39	300	300	-	-	-	-	-	-	-	-	-	2,106
1a.1.16.2	Plant systems	-	-	-	-	-	-	221	33	254	254	-	-	-	-	-	-	-	-	-	1,783
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	1,335
1a.1.16.4	Waste management	-	-	-	-	-	-	106	16	122	122	-	-	-	-	-	-	-	-	-	856
1a.1.16.5	Facility and site dormancy	-	-	-	-	-	-	106	16	122	122	-	-	-	-	-	-	-	-	-	856
1a.1.16	Total	-	-	-	-	-	-	859	129	988	988	-	-	-	-	-	-	-	-	-	6,936
Detailed Work Procedures																					
1a.1.17.1	Plant systems	-	-	-	-	-	-	63	9	72	72	-	-	-	-	-	-	-	-	-	506
1a.1.17.2	Facility closeout & dormancy	-	-	-	-	-	-	64	10	73	73	-	-	-	-	-	-	-	-	-	514
1a.1.17	Total	-	-	-	-	-	-	126	19	145	145	-	-	-	-	-	-	-	-	-	1,020
1a.1.18	Procure vacuum drying system	-	-	-	-	-	-	5	1	6	6	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	2,384	430	2,813	2,813	-	-	-	-	-	-	-	-	-	15,361
Period 1a Collateral Costs																					
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,815	181	1,996	1,996	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	528	-	-	-	-	-	132	660	660	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	566	-	-	-	-	-	85	651	651	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	14	7	-	39	-	12	72	72	-	-	-	611	-	-	-	12,224	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,758	264	2,022	2,022	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	836	84	920	920	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	2,194	219	2,413	-	2,413	-	-	-	-	-	-	-	-	-
1a.4.9	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	397	59	456	-	456	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	48	7	55	-	55	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	8,971	1,346	10,317	10,317	-	-	-	-	-	-	-	-	-	157,903
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	32,151	4,823	36,974	36,974	-	-	-	-	-	-	-	-	-	424,560
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,094	14	7	-	39	48,335	7,237	56,727	53,802	2,925	-	-	611	-	-	-	12,224	20	582,463
1a.0	TOTAL PERIOD 1a COST	-	1,094	14	7	-	39	50,719	7,667	59,540	56,616	2,925	-	-	611	-	-	-	12,224	20	597,824
PERIOD 1b - SAFSTOR Limited DECON Activities																					
Period 1b Direct Decommissioning Activities																					
Decontamination of Site Buildings																					
1b.1.1.1	Reactor	2,496	-	-	-	-	-	-	1,248	3,744	3,744	-	-	-	-	-	-	-	-	33,093	-
1b.1.1.2	Auxiliary Building	287	-	-	-	-	-	-	144	431	431	-	-	-	-	-	-	-	-	3,829	-

Table D-2
Braidwood Nuclear Power Station Unit 2
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Decontamination of Site Buildings (continued)																					
1b.1.1.3	Radwaste/Service Building	187	-	-	-	-	-	-	94	281	281	-	-	-	-	-	-	-	-	2,506	-
1b.1.1.4	Refueling Water Storage Tank	411	-	-	-	-	-	-	205	616	616	-	-	-	-	-	-	-	-	5,322	-
1b.1.1.5	Fuel Handling Building	1,174	-	-	-	-	-	-	587	1,760	1,760	-	-	-	-	-	-	-	-	15,238	-
1b.1.1	Totals	4,555	-	-	-	-	-	-	2,277	6,832	6,832	-	-	-	-	-	-	-	-	59,989	-
1b.1	Subtotal Period 1b Activity Costs	4,555	-	-	-	-	-	-	2,277	6,832	6,832	-	-	-	-	-	-	-	-	59,989	-
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	947	-	-	-	-	-	-	142	1,089	1,089	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process decommissioning water waste	200	-	141	355	-	443	-	278	1,417	1,417	-	-	-	1,262	-	-	-	75,708	246	-
1b.3.3	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1b.3.4	Small tool allowance	-	80	-	-	-	-	-	12	92	92	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	1,146	80	141	355	-	443	-	432	2,598	2,598	-	-	-	1,262	-	-	-	75,708	246	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	871	-	-	-	-	-	-	218	1,089	1,089	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	229	23	252	252	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	3,069	307	3,376	3,376	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	425	-	-	-	-	-	106	531	531	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	141	-	-	-	-	-	21	162	162	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	13	7	-	37	-	12	69	69	-	-	-	585	-	-	-	11,699	19	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	437	66	503	503	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	116	12	128	128	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	546	55	600	-	600	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Cost	-	-	-	-	-	-	41	6	47	47	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	99	15	113	-	113	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	12	2	14	-	14	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	2,231	335	2,565	2,565	-	-	-	-	-	-	-	-	-	39,260
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	7,994	1,199	9,193	9,193	-	-	-	-	-	-	-	-	-	105,560
1b.4	Subtotal Period 1b Period-Dependent Costs	871	566	13	7	-	37	14,773	2,375	18,643	17,916	727	-	-	585	-	-	-	11,699	19	144,820
1b.0	TOTAL PERIOD 1b COST	6,573	646	154	362	-	480	14,773	5,084	28,073	27,346	727	-	-	1,847	-	-	-	87,408	60,254	144,820
PERIOD 1c - Preparations for SAFSTOR Dormancy																					
Period 1c Direct Decommissioning Activities																					
1c.1.1	Prepare support equipment for storage	-	517	-	-	-	-	-	78	595	595	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	55	-	-	-	-	-	8	64	64	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	10,874	-
1c.1.4	Secure building accesses									a											
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	31	5	36	36	-	-	-	-	-	-	-	-	-	250
1c.1	Subtotal Period 1c Activity Costs	-	572	-	-	-	-	764	310	1,647	1,647	-	-	-	-	-	-	-	-	14,574	250
Period 1c Additional Costs																					
1c.2.1	Spent fuel pool isolation	-	-	-	-	-	-	10,813	1,622	12,434	12,434	-	-	-	-	-	-	-	-	-	-
1c.2	Subtotal Period 1c Additional Costs	-	-	-	-	-	-	10,813	1,622	12,434	12,434	-	-	-	-	-	-	-	-	-	-
Period 1c Collateral Costs																					
1c.3.1	Process decommissioning water waste	236	-	167	421	-	525	-	329	1,679	1,679	-	-	-	1,496	-	-	-	89,742	292	-
1c.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1c.3.3	Small tool allowance	-	5	-	-	-	-	-	1	6	6	-	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	236	5	167	421	-	525	-	330	1,685	1,685	-	-	-	1,496	-	-	-	89,742	292	-
Period 1c Period-Dependent Costs																					
1c.4.1	Insurance	-	-	-	-	-	-	229	23	252	252	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	3,069	307	3,376	3,376	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	204	-	-	-	-	-	51	255	255	-	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	141	-	-	-	-	-	21	162	162	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	3	2	-	10	-	3	18	18	-	-	-	152	-	-	-	3,039	5	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	437	66	503	503	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	116	12	128	128	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	546	55	600	-	600	-	-	-	-	-	-	-	-	-
1c.4.9	Site O&M Cost	-	-	-	-	-	-	41	6	47	47	-	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	99	15	113	-	113	-	-	-	-	-	-	-	-	-
1c.4.11	ISFSI Operating Costs	-	-	-	-	-	-	12	2	14	-	14	-	-	-	-	-	-	-	-	-

Table D-2
Braidwood Nuclear Power Station Unit 2
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 1c Period-Dependent Costs (continued)																					
1c.4.12	Security Staff Cost	-	-	-	-	-	-	2,231	335	2,565	2,565	-	-	-	-	-	-	-	-	-	39,260
1c.4.13	Utility Staff Cost	-	-	-	-	-	-	7,994	1,199	9,193	9,193	-	-	-	-	-	-	-	-	-	105,560
1c.4	Subtotal Period 1c Period-Dependent Costs	-	345	3	2	-	10	14,773	2,093	17,226	16,498	727	-	-	152	-	-	-	3,039	5	144,820
1c.0	TOTAL PERIOD 1c COST	236	922	171	423	-	535	26,349	4,355	32,992	32,265	727	-	-	1,648	-	-	-	92,781	14,870	145,070
PERIOD 1 TOTALS		6,809	2,663	339	792	-	1,054	91,841	17,107	120,605	116,226	4,379	-	-	4,106	-	-	-	192,413	75,144	887,713
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	-	-	-	-	-	-	2,004	301	2,304	2,304	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	3,898	974	4,872	4,872	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	5,901	1,275	7,176	7,176	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																					
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	11,250	1,688	12,938	-	12,938	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	11,250	1,688	12,938	-	12,938	-	-	-	-	-	-	-	-	-
Period 2a Period-Dependent Costs																					
2a.4.1	Insurance	-	-	-	-	-	-	15,298	1,530	16,827	15,612	1,216	-	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	32,725	3,272	35,997	35,997	-	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	5,550	-	-	-	-	-	1,388	6,938	6,938	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	134	69	-	379	-	118	700	700	-	-	-	5,915	-	-	-	118,305	193	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	9,840	1,476	11,317	5,658	5,658	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	7,458	746	8,204	8,204	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	53,278	5,328	58,606	-	58,606	-	-	-	-	-	-	-	-	-
2a.4.8	Site O&M Cost	-	-	-	-	-	-	4,629	694	5,323	5,323	-	-	-	-	-	-	-	-	-	-
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	11,099	1,665	12,764	-	12,764	-	-	-	-	-	-	-	-	-
2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	1,340	201	1,541	-	1,541	-	-	-	-	-	-	-	-	-
2a.4.11	Security Staff Cost	-	-	-	-	-	-	89,839	13,476	103,315	-	103,315	-	-	-	-	-	-	-	-	1,558,540
2a.4.12	Utility Staff Cost	-	-	-	-	-	-	107,480	16,122	123,602	18,209	105,392	-	-	-	-	-	-	-	-	1,375,354
2a.4	Subtotal Period 2a Period-Dependent Costs	-	5,550	134	69	-	379	332,985	46,016	385,132	96,641	288,491	-	-	5,915	-	-	-	118,305	193	2,933,894
2a.0	TOTAL PERIOD 2a COST	-	5,550	134	69	-	379	350,137	48,978	405,246	103,818	301,428	-	-	5,915	-	-	-	118,305	193	2,933,894
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	-	-	-	-	-	-	107	16	123	123	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	208	52	260	260	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	315	68	383	383	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	3,688	553	4,241	-	4,241	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	3,688	553	4,241	-	4,241	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	758	76	834	834	-	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	749	75	824	824	-	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	146	-	-	-	-	-	37	183	183	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	4	2	-	10	-	3	18	18	-	-	-	155	-	-	-	3,096	5	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	263	39	302	302	-	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	383	38	422	422	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	2,845	285	3,130	-	3,130	-	-	-	-	-	-	-	-	-
2b.4.8	Site O&M Cost	-	-	-	-	-	-	247	37	284	284	-	-	-	-	-	-	-	-	-	-
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	72	11	82	-	82	-	-	-	-	-	-	-	-	-
2b.4.10	Security Staff Cost	-	-	-	-	-	-	2,550	382	2,932	-	2,932	-	-	-	-	-	-	-	-	42,197
2b.4.11	Utility Staff Cost	-	-	-	-	-	-	2,324	349	2,672	973	1,700	-	-	-	-	-	-	-	-	31,257
2b.4	Subtotal Period 2b Period-Dependent Costs	-	146	4	2	-	10	10,190	1,331	11,683	3,839	7,844	-	-	155	-	-	-	3,096	5	73,454
2b.0	TOTAL PERIOD 2b COST	-	146	4	2	-	10	14,193	1,953	16,307	4,222	12,085	-	-	155	-	-	-	3,096	5	73,454

Table D-2
Braidwood Nuclear Power Station Unit 2
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 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	-	-	-	-	-	-	70	10	80	80	-	-	-	-	-	-	-	-	-	-
2c.1.5	Maintenance supplies	-	-	-	-	-	-	136	34	170	170	-	-	-	-	-	-	-	-	-	-
2c.1	Subtotal Period 2c Activity Costs	-	-	-	-	-	-	206	44	250	250	-	-	-	-	-	-	-	-	-	-
Period 2c Collateral Costs																					
2c.3	Subtotal Period 2c Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	495	49	544	544	-	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	489	49	538	538	-	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	90	-	-	-	-	-	23	113	113	-	-	-	-	-	-	-	-	-	-
2c.4.4	Disposal of DAW generated	-	-	2	1	-	6	-	2	11	11	-	-	-	94	-	-	-	1,879	3	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	172	26	197	197	-	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	241	24	265	265	-	-	-	-	-	-	-	-	-	-
2c.4.7	Site O&M Cost	-	-	-	-	-	-	161	24	186	186	-	-	-	-	-	-	-	-	-	-
2c.4.8	Utility Staff Cost	-	-	-	-	-	-	552	83	635	635	-	-	-	-	-	-	-	-	-	8,160
2c.4	Subtotal Period 2c Period-Dependent Costs	-	90	2	1	-	6	2,109	280	2,488	2,488	-	-	-	94	-	-	-	1,879	3	8,160
2c.0	TOTAL PERIOD 2c COST	-	90	2	1	-	6	2,315	324	2,738	2,738	-	-	-	94	-	-	-	1,879	3	8,160
PERIOD 2 TOTALS		-	5,787	140	72	-	394	366,644	51,255	424,291	110,778	313,513	-	-	6,164	-	-	-	123,281	201	3,015,508
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	69	10	79	79	-	-	-	-	-	-	-	-	-	556
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	244	37	281	281	-	-	-	-	-	-	-	-	-	1,969
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	428
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	69	10	79	79	-	-	-	-	-	-	-	-	-	556
3a.1.6	Define major work sequence	-	-	-	-	-	-	398	60	457	457	-	-	-	-	-	-	-	-	-	3,210
3a.1.7	Perform SER and EA	-	-	-	-	-	-	164	25	189	189	-	-	-	-	-	-	-	-	-	1,327
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	265	40	305	305	-	-	-	-	-	-	-	-	-	2,140
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	217	33	250	250	-	-	-	-	-	-	-	-	-	1,753
3a.1.10	Receive NRC approval of termination plan									a											
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	391	59	449	404	-	45	-	-	-	-	-	-	-	3,154
3a.1.11.2	Plant systems	-	-	-	-	-	-	221	33	254	229	-	25	-	-	-	-	-	-	-	1,783
3a.1.11.3	Reactor internals	-	-	-	-	-	-	376	56	433	433	-	-	-	-	-	-	-	-	-	3,039
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	345	52	396	396	-	-	-	-	-	-	-	-	-	2,782
3a.1.11.5	Biological shield	-	-	-	-	-	-	27	4	30	30	-	-	-	-	-	-	-	-	-	214
3a.1.11.6	Steam generators	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	1,335
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	85	13	98	49	-	49	-	-	-	-	-	-	-	685
3a.1.11.8	Main Turbine	-	-	-	-	-	-	21	3	24	-	-	24	-	-	-	-	-	-	-	171
3a.1.11.9	Main Condensers	-	-	-	-	-	-	21	3	24	-	-	24	-	-	-	-	-	-	-	171
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	165	25	190	95	-	95	-	-	-	-	-	-	-	1,335
3a.1.11.11	Waste management	-	-	-	-	-	-	244	37	281	281	-	-	-	-	-	-	-	-	-	1,969
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-	48	7	55	27	-	27	-	-	-	-	-	-	-	385
3a.1.11	Total	-	-	-	-	-	-	2,109	316	2,426	2,135	-	290	-	-	-	-	-	-	-	17,024
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,027
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	3,000	450	3,450	3,450	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	74	11	85	85	-	-	-	-	-	-	-	-	-	599
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,300	345	2,645	2,645	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	65	10	75	75	-	-	-	-	-	-	-	-	-	526
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	9,155	1,373	10,528	10,238	-	290	-	-	-	-	-	-	-	31,117

Table D-2
Braidwood Nuclear Power Station Unit 2
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	517	52	569	569	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	511	51	562	562	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	446	-	-	-	-	-	112	558	558	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	577	-	-	-	-	-	87	664	664	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	11	6	-	31	-	10	58	58	-	-	-	491	-	-	-	9,823	16	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	1,792	269	2,061	2,061	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	340	34	374	374	-	-	-	-	-	-	-	-	-	-
3a.4.8	Site O&M Cost	-	-	-	-	-	-	169	25	194	194	-	-	-	-	-	-	-	-	-	-
3a.4.9	Security Staff Cost	-	-	-	-	-	-	350	53	403	403	-	-	-	-	-	-	-	-	-	6,394
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	14,577	2,187	16,763	16,763	-	-	-	-	-	-	-	-	-	204,617
3a.4	Subtotal Period 3a Period-Dependent Costs	-	1,023	11	6	-	31	18,255	2,878	22,204	22,204	-	-	-	491	-	-	-	9,823	16	211,011
3a.0	TOTAL PERIOD 3a COST	-	1,023	11	6	-	31	27,410	4,251	32,733	32,442	-	290	-	491	-	-	-	9,823	16	242,128
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	251	38	289	260	-	29	-	-	-	-	-	-	-	2,026
3b.1.1.2	Reactor internals	-	-	-	-	-	-	133	20	152	152	-	-	-	-	-	-	-	-	-	1,070
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	72	11	82	21	-	62	-	-	-	-	-	-	-	578
3b.1.1.4	CRD cooling assembly	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	428
3b.1.1.5	CRD housings & ICI tubes	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	428
3b.1.1.6	Incore instrumentation	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	428
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	192	29	221	221	-	-	-	-	-	-	-	-	-	1,554
3b.1.1.8	Facility closeout	-	-	-	-	-	-	64	10	73	37	-	37	-	-	-	-	-	-	-	514
3b.1.1.9	Missile shields	-	-	-	-	-	-	24	4	27	27	-	-	-	-	-	-	-	-	-	193
3b.1.1.10	Biological shield	-	-	-	-	-	-	64	10	73	73	-	-	-	-	-	-	-	-	-	514
3b.1.1.11	Steam generators	-	-	-	-	-	-	244	37	281	281	-	-	-	-	-	-	-	-	-	1,969
3b.1.1.12	Reinforced concrete	-	-	-	-	-	-	53	8	61	30	-	30	-	-	-	-	-	-	-	428
3b.1.1.13	Main Turbine	-	-	-	-	-	-	83	12	95	-	-	95	-	-	-	-	-	-	-	668
3b.1.1.14	Main Condensers	-	-	-	-	-	-	83	12	95	-	-	95	-	-	-	-	-	-	-	668
3b.1.1.15	Auxiliary building	-	-	-	-	-	-	145	22	166	150	-	17	-	-	-	-	-	-	-	1,168
3b.1.1.16	Reactor building	-	-	-	-	-	-	145	22	166	150	-	17	-	-	-	-	-	-	-	1,168
3b.1.1	Total	-	-	-	-	-	-	1,710	256	1,966	1,585	-	381	-	-	-	-	-	-	-	13,800
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	1,710	256	1,966	1,585	-	381	-	-	-	-	-	-	-	13,800
Period 3b Additional Costs																					
3b.2.1	Site Characterization	-	-	-	-	-	-	2,771	831	3,602	3,602	-	-	-	-	-	-	-	-	13,042	4,640
3b.2	Subtotal Period 3b Additional Costs	-	-	-	-	-	-	2,771	831	3,602	3,602	-	-	-	-	-	-	-	-	13,042	4,640
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	947	-	-	-	-	-	-	142	1,089	1,089	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
3b.3.3	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	947	1,100	-	-	-	-	1,163	482	3,692	3,692	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	29	-	-	-	-	-	-	7	36	36	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	255	25	280	280	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	252	25	277	277	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	238	-	-	-	-	-	59	297	297	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	285	-	-	-	-	-	43	327	327	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	6	3	-	17	-	5	32	32	-	-	-	267	-	-	-	5,344	9	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	884	133	1,017	1,017	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	168	17	184	184	-	-	-	-	-	-	-	-	-	-
3b.4.9	Site O&M Cost	-	-	-	-	-	-	83	12	96	96	-	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	3,154
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	3,382	507	3,889	3,889	-	-	-	-	-	-	-	-	-	43,109
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	7,191	1,079	8,269	8,269	-	-	-	-	-	-	-	-	-	100,937
3b.4	Subtotal Period 3b Period-Dependent Costs	29	522	6	3	-	17	12,387	1,939	14,904	14,904	-	-	-	267	-	-	-	5,344	9	147,200
3b.0	TOTAL PERIOD 3b COST	976	1,622	6	3	-	17	18,031	3,508	24,163	23,782	-	381	-	267	-	-	-	5,344	13,051	165,640
PERIOD 3 TOTALS		976	2,646	17	9	-	49	45,441	7,759	56,896	56,224	-	672	-	758	-	-	-	15,167	13,067	407,768

Table D-2
Braidwood Nuclear Power Station Unit 2
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Reactor Coolant Piping	54	186	39	40	-	271	-	151	742	742	-	-	-	1,838	-	-	-	210,083	3,290	-
4a.1.1.2	Pressurizer Relief Tank	9	34	7	8	-	47	-	27	132	132	-	-	-	329	-	-	-	36,553	596	-
4a.1.1.3	Reactor Coolant Pumps & Motors	32	121	85	198	-	1,390	-	432	2,259	2,259	-	-	-	4,796	-	-	-	780,540	2,726	80
4a.1.1.4	Pressurizer	14	79	370	105	-	879	-	299	1,746	1,746	-	-	-	3,033	-	-	-	240,915	1,532	750
4a.1.1.5	Steam Generators	108	4,584	1,659	2,955	-	10,309	-	4,387	24,003	24,003	-	-	-	62,044	-	-	-	3,098,576	20,508	2,250
4a.1.1.6	CRDMs/ICIs/Service Structure Removal	26	315	219	43	-	141	-	155	899	899	-	-	-	2,843	-	-	-	109,650	4,745	-
4a.1.1.7	Reactor Vessel Internals	104	2,920	6,538	1,071	-	5,085	292	6,730	22,741	22,741	-	-	-	1,835	1,127	393	-	328,507	27,350	1,226
4a.1.1.8	Vessel & Internals GTCC Disposal	-	-	-	-	-	12,062	-	1,809	13,872	13,872	-	-	-	-	-	-	2,217	433,180	-	-
4a.1.1.9	Reactor Vessel	129	5,095	2,175	1,159	-	2,832	292	6,179	17,862	17,862	-	-	-	9,331	-	-	-	960,579	27,350	1,226
4a.1.1	Totals	476	13,334	11,092	5,579	-	33,018	585	20,170	84,254	84,254	-	-	-	86,049	1,127	393	2,217	6,198,583	88,098	5,532
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	682	3,324	1,256	-	3,337	-	1,525	10,124	10,124	-	-	-	57,484	-	-	-	2,984,647	9,146	-
4a.1.3	Main Condensers	-	1,368	1,965	1,022	-	5,039	-	1,952	11,347	11,347	-	-	-	75,240	-	-	-	3,906,532	18,250	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor	-	1,397	-	-	-	-	-	210	1,607	1,607	-	-	-	-	-	-	-	-	12,130	-
4a.1.4.2	Auxiliary Building	-	785	-	-	-	-	-	118	902	902	-	-	-	-	-	-	-	-	6,896	-
4a.1.4.3	Radwaste/Service Building	-	513	-	-	-	-	-	77	590	590	-	-	-	-	-	-	-	-	5,059	-
4a.1.4.4	Refueling Water Storage Tank	-	137	-	-	-	-	-	21	158	158	-	-	-	-	-	-	-	-	1,299	-
4a.1.4.5	Fuel Handling Building	-	403	-	-	-	-	-	60	463	463	-	-	-	-	-	-	-	-	3,690	-
4a.1.4	Totals	-	3,235	-	-	-	-	-	485	3,720	3,720	-	-	-	-	-	-	-	-	29,075	-
Disposal of Plant Systems																					
4a.1.5.1	Auxiliary Feedwater	-	85	-	-	-	-	-	13	97	-	-	97	-	-	-	-	-	-	1,143	-
4a.1.5.2	Auxiliary Steam	-	153	-	-	-	-	-	23	176	-	-	176	-	-	-	-	-	-	2,107	-
4a.1.5.3	Auxiliary Steam RCA	-	410	74	37	-	183	-	161	864	864	-	-	-	2,714	-	-	-	141,487	5,387	-
4a.1.5.4	Boric Acid Processing	-	536	88	48	-	238	-	209	1,120	1,120	-	-	-	3,611	-	-	-	184,114	7,055	-
4a.1.5.5	CO2 & H2	-	21	-	-	-	-	-	3	24	-	-	24	-	-	-	-	-	-	289	-
4a.1.5.6	CO2 & H2 RCA	-	39	7	4	-	18	-	16	84	84	-	-	-	276	-	-	-	14,104	492	-
4a.1.5.7	Chemical Feed	-	194	-	-	-	-	-	29	223	-	-	223	-	-	-	-	-	-	2,663	-
4a.1.5.8	Chemical Feed at Intake	-	27	-	-	-	-	-	4	30	-	-	30	-	-	-	-	-	-	364	-
4a.1.5.9	Chilled Water	-	107	-	-	-	-	-	16	124	-	-	124	-	-	-	-	-	-	1,454	-
4a.1.5.10	Circulating Water	-	641	-	-	-	-	-	96	737	-	-	737	-	-	-	-	-	-	8,814	-
4a.1.5.11	Condensate	-	392	-	-	-	-	-	59	450	-	-	450	-	-	-	-	-	-	5,317	-
4a.1.5.12	Condensate Booster	-	391	-	-	-	-	-	59	449	-	-	449	-	-	-	-	-	-	5,314	-
4a.1.5.13	Condensate Cleanup	-	214	-	-	-	-	-	32	246	-	-	246	-	-	-	-	-	-	3,000	-
4a.1.5.14	Containment Spray	-	289	87	47	-	231	-	146	800	800	-	-	-	3,455	-	-	-	179,291	3,839	-
4a.1.5.15	Diesel Fuel Oil	-	212	-	-	-	-	-	32	244	-	-	244	-	-	-	-	-	-	2,848	-
4a.1.5.16	Essential Service Water	-	368	-	-	-	-	-	55	423	-	-	423	-	-	-	-	-	-	5,049	-
4a.1.5.17	Extraction Steam	-	263	-	-	-	-	-	39	302	-	-	302	-	-	-	-	-	-	3,637	-
4a.1.5.18	Feedwater	-	357	-	-	-	-	-	53	410	-	-	410	-	-	-	-	-	-	4,925	-
4a.1.5.19	Feedwater Drains	-	845	-	-	-	-	-	127	972	-	-	972	-	-	-	-	-	-	11,719	-
4a.1.5.20	Gland Steam	-	44	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	616	-
4a.1.5.21	Gland Water	-	33	-	-	-	-	-	5	37	-	-	37	-	-	-	-	-	-	458	-
4a.1.5.22	Main Steam	-	363	-	-	-	-	-	54	417	-	-	417	-	-	-	-	-	-	4,979	-
4a.1.5.23	Main Steam RCA	-	96	23	13	-	64	-	44	240	240	-	-	-	947	-	-	-	49,262	1,292	-
4a.1.5.24	Make-up Demineralizer	-	183	-	-	-	-	-	27	210	-	-	210	-	-	-	-	-	-	2,595	-
4a.1.5.25	Nitrogen	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	18	-
4a.1.5.26	Non-Essential Service Water	-	426	-	-	-	-	-	64	490	-	-	490	-	-	-	-	-	-	5,903	-
4a.1.5.27	Non-Essential Service Water RCA	-	205	87	51	-	251	-	130	724	724	-	-	-	3,738	-	-	-	194,273	2,692	-
4a.1.5.28	Off Gas	-	768	176	97	-	478	-	344	1,862	1,862	-	-	-	7,112	-	-	-	370,343	10,290	-
4a.1.5.29	Potable Water	-	6	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	75	-
4a.1.5.30	Process Radiation Monitoring	-	76	4	2	-	9	-	22	113	113	-	-	-	134	-	-	-	7,021	1,093	-
4a.1.5.31	Process Sampling	-	168	15	8	-	41	-	55	287	287	-	-	-	615	-	-	-	31,992	2,368	-
4a.1.5.32	Screen Wash	-	53	-	-	-	-	-	8	61	-	-	61	-	-	-	-	-	-	740	-
4a.1.5.33	Station Air	-	51	-	-	-	-	-	8	59	-	-	59	-	-	-	-	-	-	705	-
4a.1.5.34	Station Heating	-	174	-	-	-	-	-	26	200	-	-	200	-	-	-	-	-	-	2,391	-
4a.1.5.35	Steam Humidification	-	8	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	115	-
4a.1.5.36	Switchgear Heat Removal	-	38	-	-	-	-	-	6	44	-	-	44	-	-	-	-	-	-	519	-
4a.1.5.37	Turbine Bldg Equip Drains	-	91	-	-	-	-	-	14	104	-	-	104	-	-	-	-	-	-	1,235	-
4a.1.5.38	Turbine Bldg Floor Drains	-	155	-	-	-	-	-	23	179	-	-	179	-	-	-	-	-	-	2,117	-
4a.1.5.39	Turbine Oil	-	98	-	-	-	-	-	15	112	-	-	112	-	-	-	-	-	-	1,359	-

Table D-2
Braidwood Nuclear Power Station Unit 2
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
4a.1.5.40	Turbine-Generator Auxilaries	-	65	-	-	-	-	-	10	75	-	-	75	-	-	-	-	-	-	884	-
4a.1.5.41	Waste Oil Sumps	-	38	-	-	-	-	-	6	43	-	-	43	-	-	-	-	-	-	517	-
4a.1.5.42	Well Water	-	92	-	-	-	-	-	14	106	-	-	106	-	-	-	-	-	-	1,247	-
4a.1.5	Totals	-	8,775	560	307	-	1,512	-	2,055	13,209	6,093	-	7,116	-	22,603	-	-	-	1,171,887	119,622	-
4a.1.6	Scaffolding in support of decommissioning	-	1,829	15	8	-	37	-	469	2,357	2,357	-	-	-	556	-	-	-	28,884	26,661	-
4a.1	Subtotal Period 4a Activity Costs	476	29,223	16,956	8,171	-	42,943	585	26,657	125,010	117,894	-	7,116	-	241,933	1,127	393	2,217	14,290,530	290,852	5,532
Period 4a Additional Costs																					
4a.2.1	Remedial Action Surveys	-	-	-	-	-	-	1,976	593	2,569	2,569	-	-	-	-	-	-	-	-	31,151	-
4a.2.2	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
4a.2.3	Operational Tools and Equipment	-	-	9	52	-	189	-	56	306	306	-	-	-	5,855	-	-	-	146,375	16	-
4a.2	Subtotal Period 4a Additional Costs	-	-	9	52	-	189	2,026	656	2,933	2,933	-	-	-	5,855	-	-	-	146,375	31,167	-
Period 4a Collateral Costs																					
4a.3.1	Process decommissioning water waste	9	-	12	30	-	37	-	19	107	107	-	-	-	106	-	-	-	6,375	21	-
4a.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4a.3.3	Small tool allowance	-	380	-	-	-	-	-	57	437	393	-	44	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	9	380	12	30	-	37	-	76	544	500	-	44	-	106	-	-	-	6,375	21	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	90	-	-	-	-	-	-	23	113	113	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	790	79	869	869	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	780	78	858	772	-	86	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	2,376	-	-	-	-	-	594	2,969	2,969	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	3,389	-	-	-	-	-	508	3,898	3,898	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	85	44	-	240	-	75	444	444	-	-	-	3,758	-	-	-	75,152	123	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	2,601	390	2,992	2,992	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	654	65	719	719	-	-	-	-	-	-	-	-	-	-
4a.4.9	Site O&M Cost	-	-	-	-	-	-	258	39	296	296	-	-	-	-	-	-	-	-	-	-
4a.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	626	94	720	720	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	4,500	675	5,176	5,176	-	-	-	-	-	-	-	-	-	75,891
4a.4.12	DOC Staff Cost	-	-	-	-	-	-	18,176	2,726	20,903	20,903	-	-	-	-	-	-	-	-	-	222,723
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	29,285	4,393	33,678	33,678	-	-	-	-	-	-	-	-	-	394,082
4a.4	Subtotal Period 4a Period-Dependent Costs	90	5,765	85	44	-	240	57,671	9,740	73,635	73,549	-	86	-	3,758	-	-	-	75,152	123	692,697
4a.0	TOTAL PERIOD 4a COST	575	35,368	17,062	8,296	-	43,410	60,282	37,129	202,123	194,877	-	7,246	-	251,652	1,127	393	2,217	14,518,430	322,162	698,229
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
4b.1.1	Remove spent fuel racks	1,277	139	369	143	-	705	-	908	3,541	3,541	-	-	-	10,524	-	-	-	546,426	2,174	-
Disposal of Plant Systems																					
4b.1.2.1	Chemical & Volume Control	-	1,209	164	82	-	407	-	433	2,296	2,296	-	-	-	6,063	-	-	-	315,292	15,801	-
4b.1.2.2	Chilled Water RCA	-	742	180	95	-	470	-	335	1,823	1,823	-	-	-	7,000	-	-	-	364,517	9,521	-
4b.1.2.3	Component Cooling	-	790	224	122	-	600	-	388	2,123	2,123	-	-	-	8,936	-	-	-	464,778	10,502	-
4b.1.2.4	Electrical	-	4,890	-	-	-	-	-	734	5,624	-	-	5,624	-	-	-	-	-	-	66,259	-
4b.1.2.5	Electrical - Contaminated	-	1,953	194	123	-	608	-	678	3,557	3,557	-	-	-	9,079	-	-	-	471,393	26,007	-
4b.1.2.6	Electrical - RCA	-	2,815	454	278	-	1,372	-	1,134	6,054	6,054	-	-	-	20,491	-	-	-	1,063,899	38,351	-
4b.1.2.7	Emergency Diesel Generator	-	111	-	-	-	-	-	17	127	-	-	127	-	-	-	-	-	-	1,514	-
4b.1.2.8	Essential Service Water RCA	-	385	209	122	-	601	-	286	1,603	1,603	-	-	-	8,972	-	-	-	466,273	5,336	-
4b.1.2.9	Fire Protection	-	362	-	-	-	-	-	54	416	-	-	416	-	-	-	-	-	-	4,983	-
4b.1.2.10	Fire Protection RCA	-	597	153	85	-	419	-	282	1,537	1,537	-	-	-	6,243	-	-	-	324,808	7,672	-
4b.1.2.11	Fuel Handling Bldg Equip Drains	-	186	34	18	-	91	-	75	405	405	-	-	-	1,386	-	-	-	70,185	2,442	-
4b.1.2.12	Fuel Handling Bldg Equip Drains (Unit 1)	-	33	4	2	-	9	-	11	58	58	-	-	-	129	-	-	-	6,739	429	-
4b.1.2.13	Fuel Handling Bldg Floor Drains	-	190	33	17	-	82	-	74	395	395	-	-	-	1,241	-	-	-	63,725	2,480	-
4b.1.2.14	Fuel Handling Bldg Floor Drains (Unit 1)	-	132	23	12	-	58	-	52	277	277	-	-	-	874	-	-	-	44,626	1,769	-
4b.1.2.15	Fuel Pool Cooling & Cleanup	-	252	49	27	-	133	-	105	567	567	-	-	-	1,989	-	-	-	103,404	3,329	-
4b.1.2.16	Fuel Pool Cooling & Cleanup (Unit 1)	-	234	46	25	-	124	-	98	528	528	-	-	-	1,857	-	-	-	96,476	3,103	-
4b.1.2.17	HVAC-Auxiliary Building	-	623	116	73	-	361	-	269	1,442	1,442	-	-	-	5,390	-	-	-	279,889	8,029	-
4b.1.2.18	HVAC-Control Room HVAC	-	9	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	127	-
4b.1.2.19	HVAC-Diesel Generator Room	-	51	-	-	-	-	-	8	58	-	-	58	-	-	-	-	-	-	686	-
4b.1.2.20	HVAC-Laboratory	-	23	-	-	-	-	-	3	27	-	-	27	-	-	-	-	-	-	315	-
4b.1.2.21	HVAC-Machine Shop	-	21	-	-	-	-	-	3	24	-	-	24	-	-	-	-	-	-	297	-
4b.1.2.22	HVAC-Miscellaneous	-	128	-	-	-	-	-	19	148	-	-	148	-	-	-	-	-	-	1,769	-

Table D-2
Braidwood Nuclear Power Station Unit 2
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
4b.1.2.23	HVAC-Primary Containment	-	692	218	139	-	683	-	386	2,119	2,119	-	-	-	10,197	-	-	-	529,451	8,908	-
4b.1.2.24	HVAC-Pumphouse	-	20	-	-	-	-	-	3	23	-	-	23	-	-	-	-	-	-	275	-
4b.1.2.25	HVAC-Radwaste	-	358	68	43	-	213	-	156	838	838	-	-	-	3,177	-	-	-	164,931	4,412	-
4b.1.2.26	HVAC-Turbine Building	-	218	-	-	-	-	-	33	250	-	-	250	-	-	-	-	-	-	3,158	-
4b.1.2.27	Instrument Air Supply	-	85	-	-	-	-	-	13	97	-	-	97	-	-	-	-	-	-	1,197	-
4b.1.2.28	Instrument Air Supply RCA	-	276	31	14	-	68	-	91	480	480	-	-	-	1,002	-	-	-	52,414	3,630	-
4b.1.2.29	Miscellaneous Drains	-	84	15	8	-	40	-	34	181	181	-	-	-	592	-	-	-	30,841	1,125	-
4b.1.2.30	Primary Containment Purge	-	336	138	76	-	375	-	203	1,128	1,128	-	-	-	5,582	-	-	-	290,664	4,721	-
4b.1.2.31	Primary Water	-	939	234	136	-	670	-	446	2,424	2,424	-	-	-	10,451	-	-	-	519,324	12,918	-
4b.1.2.32	Radioactive Waste Disposal	-	3,117	523	282	-	1,391	-	1,222	6,535	6,535	-	-	-	21,101	-	-	-	1,078,202	40,671	-
4b.1.2.33	Reactor Bldg Equipment Drains	-	122	25	14	-	67	-	52	279	279	-	-	-	997	-	-	-	51,818	1,605	-
4b.1.2.34	Reactor Building Floor Drains	-	46	6	3	-	16	-	17	89	89	-	-	-	245	-	-	-	12,768	604	-
4b.1.2.35	Reactor Coolant	-	186	22	10	-	51	-	63	332	332	-	-	-	763	-	-	-	39,871	2,413	-
4b.1.2.36	Residual Heat Removal	-	213	51	29	-	143	-	98	534	534	-	-	-	2,129	-	-	-	110,771	2,894	-
4b.1.2.37	Safety Injection	-	980	241	137	-	676	-	459	2,493	2,493	-	-	-	10,357	-	-	-	523,998	13,451	-
4b.1.2.38	Station Air RCA	-	65	8	4	-	19	-	22	118	118	-	-	-	283	-	-	-	14,808	833	-
4b.1.2.39	Station Heating RCA	-	281	60	32	-	156	-	120	648	648	-	-	-	2,315	-	-	-	120,573	3,664	-
4b.1.2.40	Tritium ALPS	-	427	110	64	-	316	-	206	1,123	1,123	-	-	-	4,948	-	-	-	245,163	5,864	-
4b.1.2.41	Waste Oil Sumps RCA	-	29	4	2	-	10	-	10	56	56	-	-	-	149	-	-	-	7,762	370	-
4b.1.2.42	Waste Water Treatment	-	105	-	-	-	-	-	16	120	-	-	120	-	-	-	-	-	-	1,464	-
4b.1.2	Totals	-	24,315	3,638	2,075	-	10,229	-	8,709	48,965	42,040	-	6,926	-	153,939	-	-	-	7,929,364	324,897	-
4b.1.3	Scaffolding in support of decommissioning	-	2,743	22	11	-	56	-	704	3,536	3,536	-	-	-	834	-	-	-	43,325	39,992	-
Decontamination of Site Buildings																					
4b.1.4.1	Reactor	2,264	1,625	233	347	-	1,358	-	1,953	7,782	7,782	-	-	-	24,850	-	-	-	1,271,843	50,420	-
4b.1.4.2	Auxiliary Building	265	138	22	20	-	75	-	191	710	710	-	-	-	1,209	-	-	-	72,597	5,258	-
4b.1.4.3	Radwaste/Service Building	174	54	9	12	-	38	-	112	399	399	-	-	-	686	-	-	-	42,196	2,958	-
4b.1.4.4	Refueling Water Storage Tank	412	480	41	18	-	83	-	354	1,388	1,388	-	-	-	1,240	-	-	-	67,350	11,972	-
4b.1.4.5	Fuel Handling Building	1,180	1,321	110	53	-	236	-	998	3,898	3,898	-	-	-	3,552	-	-	-	198,847	33,507	-
4b.1.4	Totals	4,295	3,619	415	450	-	1,790	-	3,609	14,177	14,177	-	-	-	31,536	-	-	-	1,652,832	104,115	-
4b.1	Subtotal Period 4b Activity Costs	5,572	30,816	4,445	2,679	-	12,779	-	13,929	70,220	63,294	-	6,926	-	196,834	-	-	-	10,171,950	471,178	-
Period 4b Additional Costs																					
4b.2.1	License Termination Survey Planning	-	-	-	-	-	-	983	295	1,278	1,278	-	-	-	-	-	-	-	-	-	6,240
4b.2.2	Remedial Action Surveys	-	-	-	-	-	-	3,566	1,070	4,636	4,636	-	-	-	-	-	-	-	-	56,209	-
4b.2.3	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
4b.2.4	License Termination ISFSI	-	443	207	278	-	893	1,283	776	3,880	3,880	-	-	-	14,543	-	-	-	1,178,709	7,632	5,262
4b.2.5	Underground Services Excavation	-	554	-	-	-	-	-	83	637	637	-	-	-	-	-	-	-	-	2,755	-
4b.2	Subtotal Period 4b Additional Costs	-	997	207	278	-	893	5,882	2,232	10,490	10,490	-	-	-	14,543	-	-	-	1,178,709	66,596	11,502
Period 4b Collateral Costs																					
4b.3.1	Process decommissioning water waste	24	-	34	87	-	108	-	56	309	309	-	-	-	308	-	-	-	18,491	60	-
4b.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4b.3.3	Small tool allowance	-	638	-	-	-	-	-	96	733	733	-	-	-	-	-	-	-	-	-	-
4b.3.4	Decommissioning Equipment Disposition	-	-	184	96	-	472	-	151	903	903	-	-	-	7,054	-	-	-	366,237	88	-
4b.3	Subtotal Period 4b Collateral Costs	24	638	219	183	-	581	-	302	1,946	1,946	-	-	-	7,362	-	-	-	384,729	148	-
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	1,013	-	-	-	-	-	-	253	1,267	1,267	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	1,368	137	1,504	1,504	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	1,351	135	1,486	1,486	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	4,007	-	-	-	-	-	1,002	5,009	5,009	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	5,810	-	-	-	-	-	872	6,682	6,682	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	152	78	-	429	-	134	793	793	-	-	-	6,704	-	-	-	134,081	219	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	3,556	533	4,090	4,090	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	1,132	113	1,246	1,246	-	-	-	-	-	-	-	-	-	-
4b.4.9	Site O&M Cost	-	-	-	-	-	-	446	67	513	513	-	-	-	-	-	-	-	-	-	-
4b.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	1,084	163	1,247	1,247	-	-	-	-	-	-	-	-	-	-
4b.4.11	Security Staff Cost	-	-	-	-	-	-	10,515	1,577	12,092	12,092	-	-	-	-	-	-	-	-	-	176,250
4b.4.12	DOC Staff Cost	-	-	-	-	-	-	31,109	4,666	35,776	35,776	-	-	-	-	-	-	-	-	-	377,880
4b.4.13	Utility Staff Cost	-	-	-	-	-	-	50,609	7,591	58,201	58,201	-	-	-	-	-	-	-	-	-	665,520
4b.4	Subtotal Period 4b Period-Dependent Costs	1,013	9,818	152	78	-	429	101,171	17,244	129,904	129,904	-	-	-	6,704	-	-	-	134,081	219	1,219,650
4b.0	TOTAL PERIOD 4b COST	6,609	42,268	5,023	3,218	-	14,682	107,053	33,706	212,559	205,633	-	6,926	-	225,443	-	-	-	11,869,460	538,141	1,231,152

Table D-2
Braidwood Nuclear Power Station Unit 2
Delayed DECON Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 4f - License Termination																					
Period 4f Direct Decommissioning Activities																					
4f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
4f.1.2	Terminate license									a											
4f.1	Subtotal Period 4f Activity Costs	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
Period 4f Additional Costs																					
4f.2.1	License Termination Survey	-	-	-	-	-	-	9,744	2,923	12,667	12,667	-	-	-	-	-	-	-	-	132,123	3,120
4f.2	Subtotal Period 4f Additional Costs	-	-	-	-	-	-	9,744	2,923	12,667	12,667	-	-	-	-	-	-	-	-	132,123	3,120
Period 4f Collateral Costs																					
4f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
4f.3	Subtotal Period 4f Collateral Costs	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
Period 4f Period-Dependent Costs																					
4f.4.1	Insurance	-	-	-	-	-	-	381	38	419	419	-	-	-	-	-	-	-	-	-	-
4f.4.2	Property taxes	-	-	-	-	-	-	376	38	414	414	-	-	-	-	-	-	-	-	-	-
4f.4.3	Health physics supplies	-	703	-	-	-	-	-	176	879	879	-	-	-	-	-	-	-	-	-	-
4f.4.4	Disposal of DAW generated	-	-	8	4	-	21	-	7	40	40	-	-	-	335	-	-	-	6,698	11	-
4f.4.5	Plant energy budget	-	-	-	-	-	-	264	40	304	304	-	-	-	-	-	-	-	-	-	-
4f.4.6	NRC Fees	-	-	-	-	-	-	302	30	333	333	-	-	-	-	-	-	-	-	-	-
4f.4.7	Site O&M Cost	-	-	-	-	-	-	124	19	143	143	-	-	-	-	-	-	-	-	-	-
4f.4.8	Security Staff Cost	-	-	-	-	-	-	722	108	830	830	-	-	-	-	-	-	-	-	-	11,786
4f.4.9	DOC Staff Cost	-	-	-	-	-	-	3,870	580	4,450	4,450	-	-	-	-	-	-	-	-	-	46,750
4f.4.10	Utility Staff Cost	-	-	-	-	-	-	4,733	710	5,443	5,443	-	-	-	-	-	-	-	-	-	56,964
4f.4	Subtotal Period 4f Period-Dependent Costs	-	703	8	4	-	21	10,773	1,745	13,255	13,255	-	-	-	335	-	-	-	6,698	11	115,500
4f.0	TOTAL PERIOD 4f COST	-	703	8	4	-	21	21,853	4,895	27,484	27,484	-	-	-	335	-	-	-	6,698	132,134	118,620
PERIOD 4 TOTALS		7,184	78,340	22,092	11,518	-	58,113	189,188	75,730	442,166	427,994	-	14,172	-	477,429	1,127	393	2,217	26,394,600	992,436	2,048,001
PERIOD 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	Reactor	-	8,057	-	-	-	-	-	1,209	9,266	-	-	9,266	-	-	-	-	-	-	69,546	-
5b.1.1.2	Aux Feedwater-Steam Tunnel/Penetr. Area	-	795	-	-	-	-	-	119	914	-	-	914	-	-	-	-	-	-	5,187	-
5b.1.1.3	Auxiliary Building	-	7,062	-	-	-	-	-	1,059	8,121	-	-	8,121	-	-	-	-	-	-	62,064	-
5b.1.1.4	Blowdown Outfall Structure	-	35	-	-	-	-	-	5	40	-	-	40	-	-	-	-	-	-	295	-
5b.1.1.5	Bottled Gas Storage	-	31	-	-	-	-	-	5	36	-	-	36	-	-	-	-	-	-	340	-
5b.1.1.6	Circulating Water Discharge	-	265	-	-	-	-	-	40	305	-	-	305	-	-	-	-	-	-	2,887	-
5b.1.1.7	Gatehouse and Extension	-	397	-	-	-	-	-	60	457	-	-	457	-	-	-	-	-	-	4,193	-
5b.1.1.8	Instrument Maintenance Building	-	112	-	-	-	-	-	17	129	-	-	129	-	-	-	-	-	-	1,190	-
5b.1.1.9	Lake Screen House	-	1,788	-	-	-	-	-	268	2,056	-	-	2,056	-	-	-	-	-	-	15,283	-
5b.1.1.10	Make-up Demineralizer Area	-	764	-	-	-	-	-	115	878	-	-	878	-	-	-	-	-	-	8,158	-
5b.1.1.11	Miscellaneous Warehouses	-	2,333	-	-	-	-	-	350	2,683	-	-	2,683	-	-	-	-	-	-	26,794	-
5b.1.1.12	Miscellaneous Yard Structures	-	1,517	-	-	-	-	-	228	1,744	-	-	1,744	-	-	-	-	-	-	14,701	-
5b.1.1.13	Radwaste/Service Building	-	4,681	-	-	-	-	-	702	5,383	-	-	5,383	-	-	-	-	-	-	45,685	-
5b.1.1.14	Receiving Building	-	218	-	-	-	-	-	33	250	-	-	250	-	-	-	-	-	-	2,293	-
5b.1.1.15	Refueling Water Storage Tank	-	1,234	-	-	-	-	-	185	1,419	-	-	1,419	-	-	-	-	-	-	11,692	-
5b.1.1.16	River Screen House	-	726	-	-	-	-	-	109	835	-	-	835	-	-	-	-	-	-	6,844	-
5b.1.1.17	Security Modifications	-	1,084	-	-	-	-	-	163	1,246	-	-	1,246	-	-	-	-	-	-	6,939	-
5b.1.1.18	Sewage Treatment Plant	-	124	-	-	-	-	-	19	143	-	-	143	-	-	-	-	-	-	1,330	-
5b.1.1.19	Tech Support Center & Cond Cleanup Bldg	-	594	-	-	-	-	-	89	683	-	-	683	-	-	-	-	-	-	6,095	-
5b.1.1.20	Turbine Building	-	6,833	-	-	-	-	-	1,025	7,858	-	-	7,858	-	-	-	-	-	-	70,342	-
5b.1.1.21	Turbine Pedestal	-	1,627	-	-	-	-	-	244	1,872	-	-	1,872	-	-	-	-	-	-	12,628	-
5b.1.1.22	Waste Treatment Building	-	122	-	-	-	-	-	18	141	-	-	141	-	-	-	-	-	-	1,265	-
5b.1.1.23	Fuel Handling Building	-	3,632	-	-	-	-	-	545	4,177	-	-	4,177	-	-	-	-	-	-	33,245	-
5b.1.1	Totals	-	44,032	-	-	-	-	-	6,605	50,637	-	-	50,637	-	-	-	-	-	-	408,996	-
Site Closeout Activities																					
5b.1.2	Remove Rubble	-	294	-	-	-	-	-	44	339	-	-	339	-	-	-	-	-	-	1,367	-
5b.1.3	Grade & landscape site	-	986	-	-	-	-	-	148	1,134	-	-	1,134	-	-	-	-	-	-	1,942	-
5b.1.4	Final report to NRC	-	-	-	-	-	-	83	12	95	95	-	-	-	-	-	-	-	-	-	668
5b.1	Subtotal Period 5b Activity Costs	-	45,312	-	-	-	-	83	6,809	52,204	95	-	52,109	-	-	-	-	-	-	412,305	668

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															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 5b Additional Costs																					
5b.2.1	Site Restoration ISFSI	-	625	-	-	-	-	28	98	751	-	-	751	-	-	-	-	-	-	6,273	80
5b.2.2	Concrete Crushing	-	1,120	-	-	-	-	6	169	1,295	-	-	1,295	-	-	-	-	-	-	4,730	-
5b.2.3	Cofferdam Construction and Teardown	-	889	-	-	-	-	-	133	1,023	-	-	1,023	-	-	-	-	-	-	7,391	-
5b.2	Subtotal Period 5b Additional Costs	-	2,634	-	-	-	-	34	400	3,068	-	-	3,068	-	-	-	-	-	-	18,394	80
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	581	-	-	-	-	-	87	668	-	-	668	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	581	-	-	-	-	-	87	668	-	-	668	-	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																					
5b.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5b.4.2	Property taxes	-	-	-	-	-	-	1,239	124	1,363	-	-	1,363	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	7,568	-	-	-	-	-	1,135	8,704	-	-	8,704	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	435	65	500	-	-	500	-	-	-	-	-	-	-	-
5b.4.5	Site O&M Cost	-	-	-	-	-	-	409	61	470	-	-	470	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	2,128	319	2,447	-	-	2,447	-	-	-	-	-	-	-	34,287
5b.4.7	DOC Staff Cost	-	-	-	-	-	-	11,846	1,777	13,623	-	-	13,623	-	-	-	-	-	-	-	137,043
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	5,797	869	6,666	-	-	6,666	-	-	-	-	-	-	-	67,229
5b.4	Subtotal Period 5b Period-Dependent Costs	-	7,568	-	-	-	-	21,853	4,351	33,773	-	-	33,773	-	-	-	-	-	-	-	238,558
5b.0	TOTAL PERIOD 5b COST	-	56,096	-	-	-	-	21,970	11,648	89,713	95	-	89,618	-	-	-	-	-	-	430,699	239,306
PERIOD 5 TOTALS		-	56,096	-	-	-	-	21,970	11,648	89,713	95	-	89,618	-	-	-	-	-	-	430,699	239,306
TOTAL COST TO DECOMMISSION		**14,969**	**145,531**	**22,588**	**12,390**	**-**	**59,611**	**715,084**	**163,499**	**1,133,671**	**711,318**	**317,892**	**104,462**	**-**	**488,457**	**1,127**	**393**	**2,217**	**26,725,460**	**1,511,547**	**6,598,296**

TOTAL COST TO DECOMMISSION WITH 16.85% CONTINGENCY:	**$1,133,671**	**thousands of 2014 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 62.74% OR:	**$711,318**	**thousands of 2014 dollars**
SPENT FUEL MANAGEMENT COST IS 28.04% OR:	**$317,892**	**thousands of 2014 dollars**
NON-NUCLEAR DEMOLITION COST IS 9.21% OR:	**$104,462**	**thousands of 2014 dollars**
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	**489,977**	**cubic feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**2,217**	**Cubic Feet**
TOTAL SCRAP METAL REMOVED:	**74,045**	**Tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,511,547**	**Man-hours**

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

APPENDIX E

DETAILED COST ANALYSIS

SAFSTOR

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Braidwood Nuclear Power Station, Unit 2 ..... E-12

Table E-1
Braidwood Nuclear Power Station Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	481	144	625	625	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	161	24	185	185	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	248	37	285	285	-	-	-	-	-	-	-	-	-	2,000
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	161	24	185	185	-	-	-	-	-	-	-	-	-	1,300
1a.1.9	Perform detailed rad survey									a											
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	124	19	142	142	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	End product description	-	-	-	-	-	-	124	19	142	142	-	-	-	-	-	-	-	-	-	1,000
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	186	28	214	214	-	-	-	-	-	-	-	-	-	1,500
1a.1.13	Define major work sequence	-	-	-	-	-	-	124	19	142	142	-	-	-	-	-	-	-	-	-	1,000
1a.1.14	Perform SER and EA	-	-	-	-	-	-	384	58	442	442	-	-	-	-	-	-	-	-	-	3,100
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	619	93	712	712	-	-	-	-	-	-	-	-	-	5,000
Activity Specifications																					
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	610	91	701	701	-	-	-	-	-	-	-	-	-	4,920
1a.1.16.2	Plant systems	-	-	-	-	-	-	516	77	594	594	-	-	-	-	-	-	-	-	-	4,167
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	387	58	445	445	-	-	-	-	-	-	-	-	-	3,120
1a.1.16.4	Waste management	-	-	-	-	-	-	248	37	285	285	-	-	-	-	-	-	-	-	-	2,000
1a.1.16.5	Facility and site dormancy	-	-	-	-	-	-	248	37	285	285	-	-	-	-	-	-	-	-	-	2,000
1a.1.16	Total	-	-	-	-	-	-	2,008	301	2,309	2,309	-	-	-	-	-	-	-	-	-	16,207
Detailed Work Procedures																					
1a.1.17.1	Plant systems	-	-	-	-	-	-	147	22	169	169	-	-	-	-	-	-	-	-	-	1,183
1a.1.17.2	Facility closeout & dormancy	-	-	-	-	-	-	149	22	171	171	-	-	-	-	-	-	-	-	-	1,200
1a.1.17	Total	-	-	-	-	-	-	295	44	340	340	-	-	-	-	-	-	-	-	-	2,383
1a.1.18	Procure vacuum drying system	-	-	-	-	-	-	12	2	14	14	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	4,927	811	5,738	5,738	-	-	-	-	-	-	-	-	-	35,890
Period 1a Additional Costs																					
1a.2.1	ISFSI Expansion	-	-	-	-	-	-	4,800	720	5,520	-	5,520	-	-	-	-	-	-	-	-	-
1a.2	Subtotal Period 1a Additional Costs	-	-	-	-	-	-	4,800	720	5,520	-	5,520	-	-	-	-	-	-	-	-	-
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	7,923	1,188	9,111	-	9,111	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	7,923	1,188	9,111	-	9,111	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,815	181	1,996	1,996	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	527	-	-	-	-	-	132	658	658	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	565	-	-	-	-	-	85	649	649	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	14	7	-	39	-	12	72	72	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,753	263	2,016	2,016	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	1,181	118	1,299	1,299	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	2,188	219	2,407	-	2,407	-	-	-	-	-	-	-	-	-
1a.4.9	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	396	59	455	-	455	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	48	7	55	-	55	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	672	101	772	772	-	-	-	-	-	-	-	-	-	12,264
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	32,063	4,809	36,873	36,873	-	-	-	-	-	-	-	-	-	423,400
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,091	14	7	-	39	40,280	6,011	47,443	44,526	2,917	-	-	610	-	-	-	12,190	20	435,664
1a.0	TOTAL PERIOD 1a COST	-	1,091	14	7	-	39	57,930	8,731	67,812	50,264	17,548	-	-	610	-	-	-	12,190	20	471,554

Table E-1
Braidwood Nuclear Power Station Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1b - SAFSTOR Limited DECON Activities																					
Period 1b Direct Decommissioning Activities																					
Decontamination of Site Buildings																					
1b.1.1.1	Reactor	2,496	-	-	-	-	-	-	1,248	3,744	3,744	-	-	-	-	-	-	-	-	33,093	-
1b.1.1.2	Auxiliary Building	247	-	-	-	-	-	-	124	371	371	-	-	-	-	-	-	-	-	3,289	-
1b.1.1.3	Refueling Water Storage Tank	411	-	-	-	-	-	-	205	616	616	-	-	-	-	-	-	-	-	5,322	-
1b.1.1.4	Steam Generator Storage Facility	67	-	-	-	-	-	-	33	100	100	-	-	-	-	-	-	-	-	887	-
1b.1.1	Totals	3,221	-	-	-	-	-	-	1,610	4,831	4,831	-	-	-	-	-	-	-	-	42,591	-
1b.1	Subtotal Period 1b Activity Costs	3,221	-	-	-	-	-	-	1,610	4,831	4,831	-	-	-	-	-	-	-	-	42,591	-
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	947	-	-	-	-	-	-	142	1,089	1,089	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process decommissioning water waste	180	-	127	321	-	400	-	251	1,279	1,279	-	-	-	1,139	-	-	-	68,312	222	-
1b.3.3	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1b.3.4	Small tool allowance	-	56	-	-	-	-	-	8	65	65	-	-	-	-	-	-	-	-	-	-
1b.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,975	296	2,271	-	2,271	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	1,127	56	127	321	-	400	1,975	698	4,703	2,432	2,271	-	-	1,139	-	-	-	68,312	222	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	687	-	-	-	-	-	-	172	859	859	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	342	34	376	376	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	3,061	306	3,367	3,367	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	340	-	-	-	-	-	85	425	425	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	141	-	-	-	-	-	21	162	162	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	12	6	-	34	-	11	63	63	-	-	-	529	-	-	-	10,586	17	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	437	66	503	503	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	172	17	189	189	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	546	55	600	-	600	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Cost	-	-	-	-	-	-	41	6	47	47	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	99	15	113	-	113	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	12	2	14	-	14	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	167	25	193	193	-	-	-	-	-	-	-	-	-	3,058
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	7,994	1,199	9,193	9,193	-	-	-	-	-	-	-	-	-	105,560
1b.4	Subtotal Period 1b Period-Dependent Costs	687	481	12	6	-	34	12,871	2,013	16,104	15,376	727	-	-	529	-	-	-	10,586	17	108,618
1b.0	TOTAL PERIOD 1b COST	5,034	537	139	327	-	434	14,846	4,321	25,638	22,639	2,999	-	-	1,668	-	-	-	78,898	42,830	108,618
PERIOD 1c - Preparations for SAFSTOR Dormancy																					
Period 1c Direct Decommissioning Activities																					
1c.1.1	Prepare support equipment for storage	-	517	-	-	-	-	-	78	595	595	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	55	-	-	-	-	-	8	64	64	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	10,874	-
1c.1.4	Secure building accesses									a											
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	72	11	83	83	-	-	-	-	-	-	-	-	-	583
1c.1	Subtotal Period 1c Activity Costs	-	572	-	-	-	-	805	317	1,694	1,694	-	-	-	-	-	-	-	-	14,574	583
Period 1c Collateral Costs																					
1c.3.1	Process decommissioning water waste	142	-	100	252	-	314	-	197	1,006	1,006	-	-	-	896	-	-	-	53,749	175	-
1c.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1c.3.3	Small tool allowance	-	5	-	-	-	-	-	1	6	6	-	-	-	-	-	-	-	-	-	-
1c.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,975	296	2,271	-	2,271	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	142	5	100	252	-	314	1,975	494	3,283	1,012	2,271	-	-	896	-	-	-	53,749	175	-
Period 1c Period-Dependent Costs																					
1c.4.1	Insurance	-	-	-	-	-	-	342	34	376	376	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	3,061	306	3,367	3,367	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	203	-	-	-	-	-	51	254	254	-	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	141	-	-	-	-	-	21	162	162	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	3	2	-	10	-	3	18	18	-	-	-	152	-	-	-	3,039	5	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	437	66	503	503	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	172	17	189	189	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	546	55	600	-	600	-	-	-	-	-	-	-	-	-

Table E-1
Braidwood Nuclear Power Station Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 1c Period-Dependent Costs (continued)																					
1c.4.9	Site O&M Cost	-	-	-	-	-	-	41	6	47	47	-	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	99	15	113	-	113	-	-	-	-	-	-	-	-	-
1c.4.11	ISFSI Operating Costs	-	-	-	-	-	-	12	2	14	-	14	-	-	-	-	-	-	-	-	-
1c.4.12	Security Staff Cost	-	-	-	-	-	-	167	25	193	193	-	-	-	-	-	-	-	-	-	3,058
1c.4.13	Utility Staff Cost	-	-	-	-	-	-	7,994	1,199	9,193	9,193	-	-	-	-	-	-	-	-	-	105,560
1c.4	Subtotal Period 1c Period-Dependent Costs	-	344	3	2	-	10	12,871	1,800	15,029	14,302	727	-	-	152	-	-	-	3,039	5	108,618
1c.0	TOTAL PERIOD 1c COST	142	922	104	254	-	324	15,651	2,610	20,006	17,008	2,999	-	-	1,048	-	-	-	56,788	14,753	109,201
PERIOD 1 TOTALS		5,176	2,550	257	588	-	797	88,426	15,662	113,456	89,911	23,545	-	-	3,325	-	-	-	147,877	57,603	689,372
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	-	-	-	-	-	-	26	4	30	30	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	719	180	899	899	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	745	184	929	929	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																					
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	41,002	6,150	47,152	-	47,152	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	41,002	6,150	47,152	-	47,152	-	-	-	-	-	-	-	-	-
Period 2a Period-Dependent Costs																					
2a.4.1	Insurance	-	-	-	-	-	-	3,488	349	3,837	2,879	958	-	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	21,299	2,130	23,429	23,429	-	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	954	-	-	-	-	-	239	1,193	1,193	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	22	11	-	63	-	20	117	117	-	-	-	991	-	-	-	19,825	32	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	1,815	272	2,087	1,044	1,044	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	1,498	150	1,647	1,647	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	9,826	983	10,809	-	10,809	-	-	-	-	-	-	-	-	-
2a.4.8	Site O&M Cost	-	-	-	-	-	-	854	128	982	982	-	-	-	-	-	-	-	-	-	-
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	2,047	307	2,354	-	2,354	-	-	-	-	-	-	-	-	-
2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	247	37	284	-	284	-	-	-	-	-	-	-	-	-
2a.4.11	Utility Staff Cost	-	-	-	-	-	-	13,924	2,089	16,012	5,611	10,401	-	-	-	-	-	-	-	-	80,957
2a.4	Subtotal Period 2a Period-Dependent Costs	-	954	22	11	-	63	54,998	6,702	62,752	36,902	25,850	-	-	991	-	-	-	19,825	32	80,957
2a.0	TOTAL PERIOD 2a COST	-	954	22	11	-	63	96,745	13,036	110,833	37,831	73,002	-	-	991	-	-	-	19,825	32	80,957
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	-	-	-	-	-	-	130	20	150	150	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	3,550	887	4,437	4,437	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	3,680	907	4,587	4,587	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	9,313	1,397	10,709	-	10,709	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	9,313	1,397	10,709	-	10,709	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	12,926	1,293	14,219	14,219	-	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	12,769	1,277	14,046	14,046	-	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	2,490	-	-	-	-	-	622	3,112	3,112	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	60	31	-	169	-	53	312	312	-	-	-	2,640	-	-	-	52,796	86	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	4,481	672	5,153	5,153	-	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	7,053	705	7,758	7,758	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	48,524	4,852	53,376	-	53,376	-	-	-	-	-	-	-	-	-
2b.4.8	Site O&M Cost	-	-	-	-	-	-	4,216	632	4,848	4,848	-	-	-	-	-	-	-	-	-	-
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	1,220	183	1,403	-	1,403	-	-	-	-	-	-	-	-	-

Table E-1
Braidwood Nuclear Power Station Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 2b Period-Dependent Costs (continued)																					
2b.4.10	Security Staff Cost	-	-	-	-	-	-	43,478	6,522	50,000	29,842	20,158	-	-	-	-	-	-	-	-	719,589
2b.4.11	Utility Staff Cost	-	-	-	-	-	-	39,625	5,944	45,569	27,708	17,861	-	-	-	-	-	-	-	-	533,029
2b.4	Subtotal Period 2b Period-Dependent Costs	-	2,490	60	31	-	169	174,293	22,756	199,798	107,000	92,798	-	-	2,640	-	-	-	52,796	86	1,252,617
2b.0	TOTAL PERIOD 2b COST	-	2,490	60	31	-	169	187,285	25,059	215,094	111,587	103,507	-	-	2,640	-	-	-	52,796	86	1,252,617
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	-	-	-	-	-	-	104	16	119	119	-	-	-	-	-	-	-	-	-	-
2c.1.5	Maintenance supplies	-	-	-	-	-	-	2,826	707	3,533	3,533	-	-	-	-	-	-	-	-	-	-
2c.1	Subtotal Period 2c Activity Costs	-	-	-	-	-	-	2,930	722	3,652	3,652	-	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	10,292	1,029	11,321	11,321	-	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	10,167	1,017	11,184	11,184	-	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	1,921	-	-	-	-	-	480	2,401	2,401	-	-	-	-	-	-	-	-	-	-
2c.4.4	Disposal of DAW generated	-	-	46	23	-	129	-	40	238	238	-	-	-	2,013	-	-	-	40,262	66	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	3,568	535	4,103	4,103	-	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	5,162	516	5,678	5,678	-	-	-	-	-	-	-	-	-	-
2c.4.7	Site O&M Cost	-	-	-	-	-	-	3,357	504	3,860	3,860	-	-	-	-	-	-	-	-	-	-
2c.4.8	Security Staff Cost	-	-	-	-	-	-	20,661	3,099	23,760	23,760	-	-	-	-	-	-	-	-	-	318,300
2c.4.9	Utility Staff Cost	-	-	-	-	-	-	19,184	2,878	22,062	22,062	-	-	-	-	-	-	-	-	-	270,767
2c.4	Subtotal Period 2c Period-Dependent Costs	-	1,921	46	23	-	129	72,390	10,098	84,607	84,607	-	-	-	2,013	-	-	-	40,262	66	589,067
2c.0	TOTAL PERIOD 2c COST	-	1,921	46	23	-	129	75,321	10,820	88,259	88,259	-	-	-	2,013	-	-	-	40,262	66	589,067
PERIOD 2 TOTALS		-	5,365	128	65	-	361	359,351	48,916	414,186	237,677	176,509	-	-	5,644	-	-	-	112,884	184	1,922,641
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	161	24	185	185	-	-	-	-	-	-	-	-	-	1,300
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	570	85	655	655	-	-	-	-	-	-	-	-	-	4,600
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	124	19	142	142	-	-	-	-	-	-	-	-	-	1,000
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	161	24	185	185	-	-	-	-	-	-	-	-	-	1,300
3a.1.6	Define major work sequence	-	-	-	-	-	-	929	139	1,069	1,069	-	-	-	-	-	-	-	-	-	7,500
3a.1.7	Perform SER and EA	-	-	-	-	-	-	384	58	442	442	-	-	-	-	-	-	-	-	-	3,100
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	619	93	712	712	-	-	-	-	-	-	-	-	-	5,000
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	507	76	584	584	-	-	-	-	-	-	-	-	-	4,096
3a.1.10	Receive NRC approval of termination plan									a											
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	913	137	1,050	945	-	105	-	-	-	-	-	-	-	7,370
3a.1.11.2	Plant systems	-	-	-	-	-	-	516	77	594	534	-	59	-	-	-	-	-	-	-	4,167
3a.1.11.3	Reactor internals	-	-	-	-	-	-	880	132	1,012	1,012	-	-	-	-	-	-	-	-	-	7,100
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	805	121	926	926	-	-	-	-	-	-	-	-	-	6,500
3a.1.11.5	Biological shield	-	-	-	-	-	-	62	9	71	71	-	-	-	-	-	-	-	-	-	500
3a.1.11.6	Steam generators	-	-	-	-	-	-	387	58	445	445	-	-	-	-	-	-	-	-	-	3,120
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	198	30	228	114	-	114	-	-	-	-	-	-	-	1,600
3a.1.11.8	Main Turbine	-	-	-	-	-	-	50	7	57	-	-	57	-	-	-	-	-	-	-	400
3a.1.11.9	Main Condensers	-	-	-	-	-	-	50	7	57	-	-	57	-	-	-	-	-	-	-	400
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	387	58	445	222	-	222	-	-	-	-	-	-	-	3,120
3a.1.11.11	Waste management	-	-	-	-	-	-	570	85	655	655	-	-	-	-	-	-	-	-	-	4,600
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-	112	17	128	64	-	64	-	-	-	-	-	-	-	900
3a.1.11	Total	-	-	-	-	-	-	4,928	739	5,667	4,988	-	679	-	-	-	-	-	-	-	39,777
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	297	45	342	342	-	-	-	-	-	-	-	-	-	2,400
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	3,000	450	3,450	3,450	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	1,400
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,300	345	2,645	2,645	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	152	23	175	175	-	-	-	-	-	-	-	-	-	1,230
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	14,307	2,146	16,453	15,775	-	679	-	-	-	-	-	-	-	72,703

Table E-1
Braidwood Nuclear Power Station Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	506	51	556	556	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	500	50	550	550	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	460	-	-	-	-	-	115	575	575	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	565	-	-	-	-	-	85	649	649	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	12	6	-	33	-	10	61	61	-	-	-	514	-	-	-	10,287	17	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	1,753	263	2,016	2,016	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	378	38	416	416	-	-	-	-	-	-	-	-	-	-
3a.4.8	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
3a.4.9	Security Staff Cost	-	-	-	-	-	-	3,888	583	4,472	4,472	-	-	-	-	-	-	-	-	-	65,179
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	19,542	2,931	22,473	22,473	-	-	-	-	-	-	-	-	-	258,629
3a.4	Subtotal Period 3a Period-Dependent Costs	-	1,025	12	6	-	33	26,732	4,151	31,958	31,958	-	-	-	514	-	-	-	10,287	17	323,807
3a.0	TOTAL PERIOD 3a COST	-	1,025	12	6	-	33	41,039	6,297	48,411	47,733	-	679	-	514	-	-	-	10,287	17	396,510
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	586	88	674	607	-	67	-	-	-	-	-	-	-	4,733
3b.1.1.2	Reactor internals	-	-	-	-	-	-	310	46	356	356	-	-	-	-	-	-	-	-	-	2,500
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	167	25	192	48	-	144	-	-	-	-	-	-	-	1,350
3b.1.1.4	CRD cooling assembly	-	-	-	-	-	-	124	19	142	142	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.5	CRD housings & ICI tubes	-	-	-	-	-	-	124	19	142	142	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.6	Incore instrumentation	-	-	-	-	-	-	124	19	142	142	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	450	67	517	517	-	-	-	-	-	-	-	-	-	3,630
3b.1.1.8	Facility closeout	-	-	-	-	-	-	149	22	171	85	-	85	-	-	-	-	-	-	-	1,200
3b.1.1.9	Missile shields	-	-	-	-	-	-	56	8	64	64	-	-	-	-	-	-	-	-	-	450
3b.1.1.10	Biological shield	-	-	-	-	-	-	149	22	171	171	-	-	-	-	-	-	-	-	-	1,200
3b.1.1.11	Steam generators	-	-	-	-	-	-	570	85	655	655	-	-	-	-	-	-	-	-	-	4,600
3b.1.1.12	Reinforced concrete	-	-	-	-	-	-	124	19	142	71	-	71	-	-	-	-	-	-	-	1,000
3b.1.1.13	Main Turbine	-	-	-	-	-	-	193	29	222	-	-	222	-	-	-	-	-	-	-	1,560
3b.1.1.14	Main Condensers	-	-	-	-	-	-	193	29	222	-	-	222	-	-	-	-	-	-	-	1,560
3b.1.1.15	Auxiliary building	-	-	-	-	-	-	338	51	389	350	-	39	-	-	-	-	-	-	-	2,730
3b.1.1.16	Reactor building	-	-	-	-	-	-	338	51	389	350	-	39	-	-	-	-	-	-	-	2,730
3b.1.1	Total	-	-	-	-	-	-	3,995	599	4,594	3,703	-	891	-	-	-	-	-	-	-	32,243
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	3,995	599	4,594	3,703	-	891	-	-	-	-	-	-	-	32,243
Period 3b Additional Costs																					
3b.2.1	Site Characterization	-	-	-	-	-	-	6,480	1,944	8,424	8,424	-	-	-	-	-	-	-	-	30,500	10,852
3b.2	Subtotal Period 3b Additional Costs	-	-	-	-	-	-	6,480	1,944	8,424	8,424	-	-	-	-	-	-	-	-	30,500	10,852
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	947	-	-	-	-	-	-	142	1,089	1,089	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
3b.3.3	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	947	1,100	-	-	-	-	1,163	482	3,692	3,692	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	29	-	-	-	-	-	-	7	36	36	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	254	25	279	279	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	251	25	276	276	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	254	-	-	-	-	-	64	318	318	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	283	-	-	-	-	-	42	326	326	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	7	3	-	19	-	6	34	34	-	-	-	292	-	-	-	5,834	10	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	879	132	1,011	1,011	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	190	19	208	208	-	-	-	-	-	-	-	-	-	-
3b.4.9	Site O&M Cost	-	-	-	-	-	-	83	12	95	95	-	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	1,950	292	2,242	2,242	-	-	-	-	-	-	-	-	-	32,679
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	5,002	750	5,752	5,752	-	-	-	-	-	-	-	-	-	58,560
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	9,798	1,470	11,267	11,267	-	-	-	-	-	-	-	-	-	129,669
3b.4	Subtotal Period 3b Period-Dependent Costs	29	537	7	3	-	19	18,405	2,845	21,845	21,845	-	-	-	292	-	-	-	5,834	10	220,907
3b.0	TOTAL PERIOD 3b COST	976	1,637	7	3	-	19	30,043	5,870	38,554	37,664	-	891	-	292	-	-	-	5,834	30,510	264,002
PERIOD 3 TOTALS		976	2,662	18	9	-	52	71,082	12,167	86,966	85,396	-	1,569	-	806	-	-	-	16,121	30,526	660,512

Table E-1
Braidwood Nuclear Power Station Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Reactor Coolant Piping	54	186	39	40	-	271	-	151	742	742	-	-	-	1,838	-	-	-	210,083	3,290	-
4a.1.1.2	Pressurizer Relief Tank	9	34	7	8	-	47	-	27	132	132	-	-	-	329	-	-	-	36,553	596	-
4a.1.1.3	Reactor Coolant Pumps & Motors	32	121	85	198	-	1,390	-	432	2,259	2,259	-	-	-	4,796	-	-	-	780,540	2,726	80
4a.1.1.4	Pressurizer	14	79	370	105	-	879	-	299	1,746	1,746	-	-	-	3,033	-	-	-	240,915	1,532	750
4a.1.1.5	Steam Generators	109	4,584	2,883	3,734	-	11,075	-	4,818	27,202	27,202	-	-	-	67,463	-	-	-	3,820,664	20,508	4,500
4a.1.1.6	Retired Steam Generator Units	-	-	1,659	2,955	-	10,309	-	3,187	18,110	18,110	-	-	-	62,044	-	-	-	3,098,576	10,800	2,250
4a.1.1.7	CRDMs/ICIs/Service Structure Removal	26	315	219	43	-	141	-	155	899	899	-	-	-	2,843	-	-	-	109,650	4,745	-
4a.1.1.8	Reactor Vessel Internals	104	2,920	6,538	1,091	-	4,329	292	6,357	21,631	21,631	-	-	-	2,461	501	393	-	328,507	27,350	1,226
4a.1.1.9	Vessel & Internals GTCC Disposal	-	-	-	-	-	12,062	-	1,809	13,872	13,872	-	-	-	-	-	-	2,217	433,180	-	-
4a.1.1.10	Reactor Vessel	129	5,095	2,175	1,159	-	2,832	292	6,179	17,862	17,862	-	-	-	9,331	-	-	-	960,579	27,350	1,226
4a.1.1	Totals	477	13,334	13,975	9,332	-	43,337	585	23,414	104,454	104,454	-	-	-	154,138	501	393	2,217	10,019,250	98,898	10,032
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	695	3,385	1,093	-	3,399	-	1,526	10,098	10,098	-	-	-	58,555	-	-	-	3,040,215	9,317	-
4a.1.3	Main Condensers	-	1,368	1,965	1,020	-	5,039	-	1,951	11,344	11,344	-	-	-	75,240	-	-	-	3,906,532	18,250	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor	-	1,397	-	-	-	-	-	210	1,607	1,607	-	-	-	-	-	-	-	-	12,130	-
4a.1.4.2	Auxiliary Building	-	771	-	-	-	-	-	116	887	887	-	-	-	-	-	-	-	-	6,782	-
4a.1.4.3	Refueling Water Storage Tank	-	137	-	-	-	-	-	21	158	158	-	-	-	-	-	-	-	-	1,299	-
4a.1.4.4	Steam Generator Storage Facility	-	57	-	-	-	-	-	9	66	66	-	-	-	-	-	-	-	-	507	-
4a.1.4	Totals	-	2,363	-	-	-	-	-	354	2,717	2,717	-	-	-	-	-	-	-	-	20,718	-
Disposal of Plant Systems																					
4a.1.5.1	Auxiliary Feedwater	-	92	-	-	-	-	-	14	106	-	-	106	-	-	-	-	-	-	1,244	-
4a.1.5.2	Auxiliary Steam	-	82	-	-	-	-	-	12	95	-	-	95	-	-	-	-	-	-	1,126	-
4a.1.5.3	Auxiliary Steam RCA	-	153	24	11	-	54	-	56	298	298	-	-	-	805	-	-	-	42,068	1,984	-
4a.1.5.4	Boric Acid Processing	-	578	137	79	-	392	-	268	1,454	1,454	-	-	-	6,102	-	-	-	303,638	8,026	-
4a.1.5.5	CO2 & H2	-	31	-	-	-	-	-	5	35	-	-	35	-	-	-	-	-	-	419	-
4a.1.5.6	CO2 & H2 RCA	-	44	5	2	-	11	-	15	77	77	-	-	-	159	-	-	-	8,312	583	-
4a.1.5.7	Chemical Feed	-	68	-	-	-	-	-	10	78	-	-	78	-	-	-	-	-	-	934	-
4a.1.5.8	Chilled Water	-	85	-	-	-	-	-	13	98	-	-	98	-	-	-	-	-	-	1,142	-
4a.1.5.9	Circulating Water	-	375	-	-	-	-	-	56	432	-	-	432	-	-	-	-	-	-	5,174	-
4a.1.5.10	Condensate	-	443	-	-	-	-	-	66	509	-	-	509	-	-	-	-	-	-	6,023	-
4a.1.5.11	Condensate Booster	-	399	-	-	-	-	-	60	459	-	-	459	-	-	-	-	-	-	5,428	-
4a.1.5.12	Condensate Cleanup	-	78	-	-	-	-	-	12	90	-	-	90	-	-	-	-	-	-	1,060	-
4a.1.5.13	Containment Spray	-	294	88	47	-	233	-	148	810	810	-	-	-	3,481	-	-	-	180,655	3,897	-
4a.1.5.14	Diesel Fuel Oil	-	120	-	-	-	-	-	18	138	-	-	138	-	-	-	-	-	-	1,615	-
4a.1.5.15	Essential Service Water	-	280	-	-	-	-	-	42	322	-	-	322	-	-	-	-	-	-	3,837	-
4a.1.5.16	Extraction Steam	-	223	-	-	-	-	-	33	257	-	-	257	-	-	-	-	-	-	3,089	-
4a.1.5.17	Feedwater	-	372	-	-	-	-	-	56	428	-	-	428	-	-	-	-	-	-	5,142	-
4a.1.5.18	Feedwater Drains	-	891	-	-	-	-	-	134	1,025	-	-	1,025	-	-	-	-	-	-	12,366	-
4a.1.5.19	Gland Steam	-	67	-	-	-	-	-	10	77	-	-	77	-	-	-	-	-	-	932	-
4a.1.5.20	Gland Water	-	59	-	-	-	-	-	9	68	-	-	68	-	-	-	-	-	-	828	-
4a.1.5.21	Main Steam	-	380	-	-	-	-	-	57	437	-	-	437	-	-	-	-	-	-	5,216	-
4a.1.5.22	Main Steam RCA	-	59	17	10	-	49	-	30	164	164	-	-	-	726	-	-	-	37,727	769	-
4a.1.5.23	Nitrogen	-	4	1	1	-	3	-	2	10	10	-	-	-	49	-	-	-	2,447	50	-
4a.1.5.24	Non-Essential Service Water	-	210	-	-	-	-	-	32	242	-	-	242	-	-	-	-	-	-	2,916	-
4a.1.5.25	Non-Essential Service Water RCA	-	107	34	19	-	94	-	56	310	310	-	-	-	1,400	-	-	-	72,790	1,358	-
4a.1.5.26	Off Gas	-	650	135	73	-	360	-	277	1,494	1,494	-	-	-	5,352	-	-	-	278,775	8,689	-
4a.1.5.27	Process Radiation Monitoring	-	48	3	1	-	7	-	14	74	74	-	-	-	109	-	-	-	5,726	671	-
4a.1.5.28	Process Sampling	-	139	14	8	-	40	-	47	248	248	-	-	-	590	-	-	-	30,697	1,947	-
4a.1.5.29	Screen Wash	-	59	-	-	-	-	-	9	68	-	-	68	-	-	-	-	-	-	821	-
4a.1.5.30	Station Air	-	36	-	-	-	-	-	5	42	-	-	42	-	-	-	-	-	-	498	-
4a.1.5.31	Station Heating	-	130	-	-	-	-	-	19	149	-	-	149	-	-	-	-	-	-	1,771	-
4a.1.5.32	Switchgear Heat Removal	-	10	-	-	-	-	-	2	12	-	-	12	-	-	-	-	-	-	139	-
4a.1.5.33	Turbine Bldg Equip Drains	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	17	-
4a.1.5.34	Turbine Generator	-	67	-	-	-	-	-	10	77	-	-	77	-	-	-	-	-	-	901	-
4a.1.5.35	Turbine Oil	-	103	-	-	-	-	-	15	118	-	-	118	-	-	-	-	-	-	1,399	-
4a.1.5.36	Waste Oil Sumps	-	35	-	-	-	-	-	5	41	-	-	41	-	-	-	-	-	-	483	-
4a.1.5	Totals	-	6,772	457	251	-	1,242	-	1,617	10,340	4,939	-	5,401	-	18,774	-	-	-	962,836	92,492	-

Table E-1
Braidwood Nuclear Power Station Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
4a.1.6	Scaffolding in support of decommissioning	-	1,242	9	5	-	24	-	318	1,598	1,598	-	-	-	359	-	-	-	18,654	18,101	-
4a.1	Subtotal Period 4a Activity Costs	477	25,774	19,792	11,701	-	53,042	585	29,182	140,552	135,151	-	5,401	-	307,066	501	393	2,217	17,947,480	257,777	10,032
Period 4a Additional Costs																					
4a.2.1	Remedial Action Surveys	-	-	-	-	-	-	1,976	593	2,569	2,569	-	-	-	-	-	-	-	-	31,151	-
4a.2.2	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
4a.2.3	Operational Tools and Equipment	-	-	9	52	-	189	-	56	306	306	-	-	-	5,855	-	-	-	146,375	16	-
4a.2	Subtotal Period 4a Additional Costs	-	-	9	52	-	189	2,026	656	2,933	2,933	-	-	-	5,855	-	-	-	146,375	31,167	-
Period 4a Collateral Costs																					
4a.3.1	Process decommissioning water waste	5	-	9	24	-	30	-	15	83	83	-	-	-	85	-	-	-	5,091	17	-
4a.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4a.3.3	Small tool allowance	-	323	-	-	-	-	-	49	372	335	-	37	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	5	323	9	24	-	30	-	63	455	418	-	37	-	85	-	-	-	5,091	17	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	87	-	-	-	-	-	-	22	108	108	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	758	76	834	834	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	749	75	824	741	-	82	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	2,188	-	-	-	-	-	547	2,734	2,734	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	3,253	-	-	-	-	-	488	3,740	3,740	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	83	43	-	236	-	74	435	435	-	-	-	3,680	-	-	-	73,605	120	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	2,496	374	2,871	2,871	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	905	90	995	995	-	-	-	-	-	-	-	-	-	-
4a.4.9	Site O&M Cost	-	-	-	-	-	-	247	37	284	284	-	-	-	-	-	-	-	-	-	-
4a.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	601	90	691	691	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	5,827	874	6,701	6,701	-	-	-	-	-	-	-	-	-	97,679
4a.4.12	DOC Staff Cost	-	-	-	-	-	-	17,700	2,655	20,355	20,355	-	-	-	-	-	-	-	-	-	215,674
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	29,528	4,429	33,957	33,957	-	-	-	-	-	-	-	-	-	390,714
4a.4	Subtotal Period 4a Period-Dependent Costs	87	5,440	83	43	-	236	58,812	9,831	74,531	74,449	-	82	-	3,680	-	-	-	73,605	120	704,067
4a.0	TOTAL PERIOD 4a COST	568	31,538	19,894	11,820	-	53,496	61,422	39,732	218,471	212,950	-	5,521	-	316,686	501	393	2,217	18,172,550	289,080	714,099
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
4b.1.1	Remove spent fuel racks	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Disposal of Plant Systems																					
4b.1.2.1	Chemical & Volume Control	-	1,265	171	85	-	419	-	451	2,391	2,391	-	-	-	6,236	-	-	-	324,551	16,476	-
4b.1.2.2	Chilled Water RCA	-	360	116	62	-	304	-	187	1,028	1,028	-	-	-	4,527	-	-	-	235,699	4,956	-
4b.1.2.3	Component Cooling RCA	-	760	209	112	-	553	-	366	1,999	1,999	-	-	-	8,239	-	-	-	428,586	10,074	-
4b.1.2.4	Electrical	-	3,573	-	-	-	-	-	536	4,109	-	-	4,109	-	-	-	-	-	-	48,490	-
4b.1.2.5	Electrical - Contaminated	-	1,289	137	87	-	430	-	457	2,400	2,400	-	-	-	6,418	-	-	-	333,233	17,294	-
4b.1.2.6	Electrical - RCA	-	2,162	372	227	-	1,123	-	892	4,776	4,776	-	-	-	16,763	-	-	-	870,329	29,753	-
4b.1.2.7	Emergency Diesel Generator	-	152	-	-	-	-	-	23	175	-	-	175	-	-	-	-	-	-	2,066	-
4b.1.2.8	Essential Service Water RCA	-	342	120	67	-	333	-	191	1,053	1,053	-	-	-	4,958	-	-	-	257,885	4,643	-
4b.1.2.9	Fire Protection	-	146	-	-	-	-	-	22	168	-	-	168	-	-	-	-	-	-	1,984	-
4b.1.2.10	Fire Protection RCA	-	206	30	14	-	68	-	74	391	391	-	-	-	1,002	-	-	-	52,396	2,641	-
4b.1.2.11	HVAC-Auxiliary Building	-	572	104	65	-	323	-	244	1,309	1,309	-	-	-	4,827	-	-	-	250,668	7,298	-
4b.1.2.12	HVAC-Diesel Generator Room	-	50	-	-	-	-	-	8	58	-	-	58	-	-	-	-	-	-	682	-
4b.1.2.13	HVAC-Miscellaneous	-	48	-	-	-	-	-	7	56	-	-	56	-	-	-	-	-	-	656	-
4b.1.2.14	HVAC-Primary Containment	-	692	218	138	-	683	-	386	2,118	2,118	-	-	-	10,197	-	-	-	529,451	8,908	-
4b.1.2.15	HVAC-Turbine Building	-	219	-	-	-	-	-	33	252	-	-	252	-	-	-	-	-	-	3,177	-
4b.1.2.16	Instrument Air Supply	-	54	-	-	-	-	-	8	62	-	-	62	-	-	-	-	-	-	760	-
4b.1.2.17	Instrument Air Supply RCA	-	84	11	5	-	24	-	29	153	153	-	-	-	354	-	-	-	18,493	1,096	-
4b.1.2.18	Miscellaneous Drains	-	44	7	4	-	20	-	17	93	93	-	-	-	299	-	-	-	15,562	594	-
4b.1.2.19	Primary Containment Purge	-	318	138	76	-	377	-	199	1,109	1,109	-	-	-	5,614	-	-	-	292,306	4,509	-
4b.1.2.20	Primary Water	-	69	7	3	-	15	-	22	116	116	-	-	-	218	-	-	-	11,425	924	-
4b.1.2.21	Radioactive Waste Disposal	-	1,052	171	90	-	446	-	405	2,164	2,164	-	-	-	6,808	-	-	-	345,754	14,349	-
4b.1.2.22	Reactor Building Equipment Drains	-	112	18	9	-	47	-	43	229	229	-	-	-	695	-	-	-	36,107	1,451	-
4b.1.2.23	Reactor Building Floor Drains	-	52	7	4	-	18	-	19	99	99	-	-	-	265	-	-	-	13,801	686	-
4b.1.2.24	Reactor Coolant	-	195	23	11	-	55	-	67	351	351	-	-	-	812	-	-	-	42,440	2,529	-
4b.1.2.25	Residual Heat Removal	-	220	52	30	-	147	-	101	550	550	-	-	-	2,184	-	-	-	113,636	2,985	-
4b.1.2.26	Safety Injection	-	1,008	247	140	-	694	-	471	2,561	2,561	-	-	-	10,622	-	-	-	537,761	13,820	-

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(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
4b.1.2.27	Station Air RCA	-	41	5	2	-	11	-	14	74	74	-	-	-	169	-	-	-	8,811	531	-
4b.1.2.28	Station Heating RCA	-	138	33	16	-	81	-	61	330	330	-	-	-	1,209	-	-	-	63,061	1,826	-
4b.1.2.29	Waste Oil Sumps RCA	-	8	1	1	-	3	-	3	17	17	-	-	-	50	-	-	-	2,602	95	-
4b.1.2	Totals	-	15,233	2,199	1,249	-	6,172	-	5,334	30,188	25,309	-	4,879	-	92,465	-	-	-	4,784,556	205,253	-
4b.1.3	Scaffolding in support of decommissioning	-	1,863	14	7	-	36	-	477	2,398	2,398	-	-	-	539	-	-	-	27,981	27,151	-
Decontamination of Site Buildings																					
4b.1.4.1	Reactor	2,264	1,625	233	346	-	1,358	-	1,953	7,781	7,781	-	-	-	24,850	-	-	-	1,271,843	50,420	-
4b.1.4.2	Auxiliary Building	226	123	21	17	-	69	-	166	622	622	-	-	-	1,101	-	-	-	63,292	4,575	-
4b.1.4.3	Refueling Water Storage Tank	412	480	41	18	-	83	-	354	1,388	1,388	-	-	-	1,240	-	-	-	67,350	11,972	-
4b.1.4.4	Steam Generator Storage Facility	67	0	0	0	-	0	-	34	101	101	-	-	-	1	-	-	-	46	888	-
4b.1.4	Totals	2,969	2,228	296	381	-	1,510	-	2,506	9,892	9,892	-	-	-	27,192	-	-	-	1,402,531	67,855	-
4b.1	Subtotal Period 4b Activity Costs	2,969	19,324	2,509	1,638	-	7,719	-	8,318	42,478	37,599	-	4,879	-	120,196	-	-	-	6,215,068	300,260	-
Period 4b Additional Costs																					
4b.2.1	License Termination Survey Planning	-	-	-	-	-	-	983	295	1,278	1,278	-	-	-	-	-	-	-	-	-	6,240
4b.2.2	Remedial Action Surveys	-	-	-	-	-	-	2,923	877	3,800	3,800	-	-	-	-	-	-	-	-	46,072	-
4b.2.3	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
4b.2.4	License Termination ISFSI	-	498	207	324	-	893	1,816	935	4,674	4,674	-	-	-	14,549	-	-	-	1,178,830	11,786	5,370
4b.2.5	Underground Services Excavation	-	554	-	-	-	-	-	83	637	637	-	-	-	-	-	-	-	-	2,755	-
4b.2	Subtotal Period 4b Additional Costs	-	1,052	207	324	-	893	5,773	2,197	10,447	10,447	-	-	-	14,549	-	-	-	1,178,830	60,612	11,610
Period 4b Collateral Costs																					
4b.3.1	Process decommissioning water waste	6	-	12	30	-	37	-	18	104	104	-	-	-	107	-	-	-	6,394	21	-
4b.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4b.3.3	Small tool allowance	-	397	-	-	-	-	-	60	457	457	-	-	-	-	-	-	-	-	-	-
4b.3.4	Decommissioning Equipment Disposition	-	-	184	96	-	472	-	151	903	903	-	-	-	7,054	-	-	-	366,237	88	-
4b.3	Subtotal Period 4b Collateral Costs	6	397	196	126	-	510	-	229	1,464	1,464	-	-	-	7,160	-	-	-	372,631	109	-
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	801	-	-	-	-	-	-	200	1,001	1,001	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	1,121	112	1,233	1,233	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	1,107	111	1,218	1,218	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	2,794	-	-	-	-	-	699	3,493	3,493	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	4,762	-	-	-	-	-	714	5,477	5,477	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	98	50	-	277	-	86	511	511	-	-	-	4,321	-	-	-	86,419	141	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	2,915	437	3,352	3,352	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	1,338	134	1,472	1,472	-	-	-	-	-	-	-	-	-	-
4b.4.9	Site O&M Cost	-	-	-	-	-	-	366	55	420	420	-	-	-	-	-	-	-	-	-	-
4b.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	889	133	1,022	1,022	-	-	-	-	-	-	-	-	-	-
4b.4.11	Security Staff Cost	-	-	-	-	-	-	1,394	209	1,603	1,603	-	-	-	-	-	-	-	-	-	25,426
4b.4.12	DOC Staff Cost	-	-	-	-	-	-	16,403	2,460	18,864	18,864	-	-	-	-	-	-	-	-	-	217,274
4b.4.13	Utility Staff Cost	-	-	-	-	-	-	27,793	4,169	31,962	31,962	-	-	-	-	-	-	-	-	-	388,320
4b.4	Subtotal Period 4b Period-Dependent Costs	801	7,557	98	50	-	277	53,325	9,520	71,627	71,627	-	-	-	4,321	-	-	-	86,419	141	631,020
4b.0	TOTAL PERIOD 4b COST	3,777	28,330	3,011	2,138	-	9,398	59,098	20,264	126,016	121,137	-	4,879	-	146,227	-	-	-	7,852,947	361,122	642,630
PERIOD 4e - Delay before License Termination																					
Period 4e Period-Dependent Costs																					
4e.4.1	Insurance	-	-	-	-	-	-	754	75	829	829	-	-	-	-	-	-	-	-	-	-
4e.4.2	Property taxes	-	-	-	-	-	-	745	74	819	819	-	-	-	-	-	-	-	-	-	-
4e.4.3	Health physics supplies	-	141	-	-	-	-	-	35	177	177	-	-	-	-	-	-	-	-	-	-
4e.4.4	Disposal of DAW generated	-	-	3	2	-	10	-	3	18	18	-	-	-	149	-	-	-	2,971	5	-
4e.4.5	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4e.4.6	NRC Fees	-	-	-	-	-	-	378	38	416	416	-	-	-	-	-	-	-	-	-	-
4e.4.7	Site O&M Cost	-	-	-	-	-	-	246	37	283	283	-	-	-	-	-	-	-	-	-	-
4e.4.8	Utility Staff Cost	-	-	-	-	-	-	1,464	220	1,683	1,683	-	-	-	-	-	-	-	-	-	21,760
4e.4	Subtotal Period 4e Period-Dependent Costs	-	141	3	2	-	10	3,586	482	4,225	4,225	-	-	-	149	-	-	-	2,971	5	21,760
4e.0	TOTAL PERIOD 4e COST	-	141	3	2	-	10	3,586	482	4,225	4,225	-	-	-	149	-	-	-	2,971	5	21,760

Table E-1
Braidwood Nuclear Power Station Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 4f - License Termination																					
Period 4f Direct Decommissioning Activities																					
4f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
4f.1.2	Terminate license									a											
4f.1	Subtotal Period 4f Activity Costs	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
Period 4f Additional Costs																					
4f.2.1	License Termination Survey	-	-	-	-	-	-	7,331	2,199	9,530	9,530	-	-	-	-	-	-	-	-	97,452	3,120
4f.2	Subtotal Period 4f Additional Costs	-	-	-	-	-	-	7,331	2,199	9,530	9,530	-	-	-	-	-	-	-	-	97,452	3,120
Period 4f Collateral Costs																					
4f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
4f.3	Subtotal Period 4f Collateral Costs	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
Period 4f Period-Dependent Costs																					
4f.4.1	Insurance	-	-	-	-	-	-	381	38	419	419	-	-	-	-	-	-	-	-	-	-
4f.4.2	Property taxes	-	-	-	-	-	-	376	38	414	414	-	-	-	-	-	-	-	-	-	-
4f.4.3	Health physics supplies	-	600	-	-	-	-	-	150	750	750	-	-	-	-	-	-	-	-	-	-
4f.4.4	Disposal of DAW generated	-	-	8	4	-	21	-	7	40	40	-	-	-	335	-	-	-	6,698	11	-
4f.4.5	Plant energy budget	-	-	-	-	-	-	264	40	304	304	-	-	-	-	-	-	-	-	-	-
4f.4.6	NRC Fees	-	-	-	-	-	-	455	46	501	501	-	-	-	-	-	-	-	-	-	-
4f.4.7	Site O&M Cost	-	-	-	-	-	-	124	19	143	143	-	-	-	-	-	-	-	-	-	-
4f.4.8	Security Staff Cost	-	-	-	-	-	-	722	108	830	830	-	-	-	-	-	-	-	-	-	11,786
4f.4.9	DOC Staff Cost	-	-	-	-	-	-	3,870	580	4,450	4,450	-	-	-	-	-	-	-	-	-	46,750
4f.4.10	Utility Staff Cost	-	-	-	-	-	-	4,733	710	5,443	5,443	-	-	-	-	-	-	-	-	-	56,964
4f.4	Subtotal Period 4f Period-Dependent Costs	-	600	8	4	-	21	10,926	1,735	13,294	13,294	-	-	-	335	-	-	-	6,698	11	115,500
4f.0	TOTAL PERIOD 4f COST	-	600	8	4	-	21	19,592	4,160	24,385	24,385	-	-	-	335	-	-	-	6,698	97,463	118,620
PERIOD 4 TOTALS		4,345	60,609	22,916	13,964	-	62,925	143,699	64,639	373,097	362,697	-	10,400	-	463,396	501	393	2,217	26,035,170	747,670	1,497,109
PERIOD 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	Reactor	-	8,057	-	-	-	-	-	1,209	9,266	-	-	9,266	-	-	-	-	-	-	69,546	-
5b.1.1.2	Auxiliary Building	-	6,941	-	-	-	-	-	1,041	7,982	-	-	7,982	-	-	-	-	-	-	61,038	-
5b.1.1.3	Refueling Water Storage Tank	-	1,234	-	-	-	-	-	185	1,419	-	-	1,419	-	-	-	-	-	-	11,692	-
5b.1.1.4	Steam Generator Storage Facility	-	516	-	-	-	-	-	77	593	-	-	593	-	-	-	-	-	-	4,559	-
5b.1.1.5	Turbine Building	-	6,833	-	-	-	-	-	1,025	7,858	-	-	7,858	-	-	-	-	-	-	70,342	-
5b.1.1.6	Turbine Pedestal	-	1,627	-	-	-	-	-	244	1,872	-	-	1,872	-	-	-	-	-	-	12,628	-
5b.1.1	Totals	-	25,209	-	-	-	-	-	3,781	28,990	-	-	28,990	-	-	-	-	-	-	229,806	-
Site Closeout Activities																					
5b.1.2	Grade & landscape site	-	986	-	-	-	-	-	148	1,134	-	-	1,134	-	-	-	-	-	-	1,942	-
5b.1.3	Final report to NRC	-	-	-	-	-	-	193	29	222	222	-	-	-	-	-	-	-	-	-	1,560
5b.1	Subtotal Period 5b Activity Costs	-	26,195	-	-	-	-	193	3,958	30,346	222	-	30,124	-	-	-	-	-	-	231,748	1,560
Period 5b Additional Costs																					
5b.2.1	Site Restoration ISFSI	-	1,147	-	-	-	-	28	176	1,351	-	-	1,351	-	-	-	-	-	-	13,036	80
5b.2.2	Concrete Crushing	-	662	-	-	-	-	4	100	766	-	-	766	-	-	-	-	-	-	2,798	-
5b.2	Subtotal Period 5b Additional Costs	-	1,809	-	-	-	-	31	276	2,116	-	-	2,116	-	-	-	-	-	-	15,833	80
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	335	-	-	-	-	-	50	385	-	-	385	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	335	-	-	-	-	-	50	385	-	-	385	-	-	-	-	-	-	-	-

Table E-1
Braidwood Nuclear Power Station Unit 1
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 5b Period-Dependent Costs																					
5b.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5b.4.2	Property taxes	-	-	-	-	-	-	1,239	124	1,363	-	-	1,363	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	7,568	-	-	-	-	-	1,135	8,704	-	-	8,704	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	435	65	500	-	-	500	-	-	-	-	-	-	-	-
5b.4.5	Site O&M Cost	-	-	-	-	-	-	409	61	470	-	-	470	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	2,128	319	2,447	-	-	2,447	-	-	-	-	-	-	-	34,287
5b.4.7	DOC Staff Cost	-	-	-	-	-	-	11,846	1,777	13,623	-	-	13,623	-	-	-	-	-	-	-	137,043
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	5,797	869	6,666	-	-	6,666	-	-	-	-	-	-	-	67,229
5b.4	Subtotal Period 5b Period-Dependent Costs	-	7,568	-	-	-	-	21,853	4,351	33,773	-	-	33,773	-	-	-	-	-	-	-	238,558
5b.0	TOTAL PERIOD 5b COST	-	35,907	-	-	-	-	22,078	8,636	66,621	222	-	66,399	-	-	-	-	-	-	247,581	240,198
PERIOD 5 TOTALS		-	35,907	-	-	-	-	22,078	8,636	66,621	222	-	66,399	-	-	-	-	-	-	247,581	240,198
TOTAL COST TO DECOMMISSION		**10,497**	**107,095**	**23,319**	**14,626**	**-**	**64,134**	**684,636**	**150,020**	**1,054,326**	**775,905**	**200,054**	**78,368**	**-**	**473,171**	**501**	**393**	**2,217**	**26,312,050**	**1,083,564**	**5,009,833**

TOTAL COST TO DECOMMISSION WITH 16.59% CONTINGENCY:	**$1,054,326**	**thousands of 2014 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 73.59% OR:	**$775,905**	**thousands of 2014 dollars**
SPENT FUEL MANAGEMENT COST IS 18.97% OR:	**$200,054**	**thousands of 2014 dollars**
NON-NUCLEAR DEMOLITION COST IS 7.43% OR:	**$78,368**	**thousands of 2014 dollars**
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	**474,064**	**cubic feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**2,217**	**Cubic Feet**
TOTAL SCRAP METAL REMOVED:	**54,939**	**Tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,083,564**	**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 E-2
Braidwood Nuclear Power Station Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	481	144	625	625	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	69	10	79	79	-	-	-	-	-	-	-	-	-	556
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	-	-	-	-	-	-	106	16	122	122	-	-	-	-	-	-	-	-	-	856
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	69	10	79	79	-	-	-	-	-	-	-	-	-	556
1a.1.9	Perform detailed rad survey									a											
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	428
1a.1.11	End product description	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	428
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	80	12	91	91	-	-	-	-	-	-	-	-	-	642
1a.1.13	Define major work sequence	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	428
1a.1.14	Perform SER and EA	-	-	-	-	-	-	164	25	189	189	-	-	-	-	-	-	-	-	-	1,327
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	265	40	305	305	-	-	-	-	-	-	-	-	-	2,140
Activity Specifications																					
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	261	39	300	300	-	-	-	-	-	-	-	-	-	2,106
1a.1.16.2	Plant systems	-	-	-	-	-	-	221	33	254	254	-	-	-	-	-	-	-	-	-	1,783
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	1,335
1a.1.16.4	Waste management	-	-	-	-	-	-	106	16	122	122	-	-	-	-	-	-	-	-	-	856
1a.1.16.5	Facility and site dormancy	-	-	-	-	-	-	106	16	122	122	-	-	-	-	-	-	-	-	-	856
1a.1.16	Total	-	-	-	-	-	-	859	129	988	988	-	-	-	-	-	-	-	-	-	6,936
Detailed Work Procedures																					
1a.1.17.1	Plant systems	-	-	-	-	-	-	63	9	72	72	-	-	-	-	-	-	-	-	-	506
1a.1.17.2	Facility closeout & dormancy	-	-	-	-	-	-	64	10	73	73	-	-	-	-	-	-	-	-	-	514
1a.1.17	Total	-	-	-	-	-	-	126	19	145	145	-	-	-	-	-	-	-	-	-	1,020
1a.1.18	Procure vacuum drying system	-	-	-	-	-	-	5	1	6	6	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	2,384	430	2,813	2,813	-	-	-	-	-	-	-	-	-	15,361
Period 1a Additional Costs																					
1a.2.1	ISFSI Expansion	-	-	-	-	-	-	4,800	720	5,520	-	5,520	-	-	-	-	-	-	-	-	-
1a.2	Subtotal Period 1a Additional Costs	-	-	-	-	-	-	4,800	720	5,520	-	5,520	-	-	-	-	-	-	-	-	-
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	9,633	1,445	11,078	-	11,078	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	9,633	1,445	11,078	-	11,078	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,815	181	1,996	1,996	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	528	-	-	-	-	-	132	660	660	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	566	-	-	-	-	-	85	651	651	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	14	7	-	39	-	12	72	72	-	-	-	611	-	-	-	12,224	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,758	264	2,022	2,022	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	836	84	920	920	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	2,194	219	2,413	-	2,413	-	-	-	-	-	-	-	-	-
1a.4.9	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	397	59	456	-	456	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	48	7	55	-	55	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	8,971	1,346	10,317	10,317	-	-	-	-	-	-	-	-	-	157,903
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	32,151	4,823	36,974	36,974	-	-	-	-	-	-	-	-	-	424,560
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,094	14	7	-	39	48,335	7,237	56,727	53,802	2,925	-	-	611	-	-	-	12,224	20	582,463
1a.0	TOTAL PERIOD 1a COST	-	1,094	14	7	-	39	65,152	9,832	76,138	56,616	19,522	-	-	611	-	-	-	12,224	20	597,824

Table E-2
Braidwood Nuclear Power Station Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1b - SAFSTOR Limited DECON Activities																					
Period 1b Direct Decommissioning Activities																					
Decontamination of Site Buildings																					
1b.1.1.1	Reactor	2,496	-	-	-	-	-	-	1,248	3,744	3,744	-	-	-	-	-	-	-	-	33,093	-
1b.1.1.2	Auxiliary Building	287	-	-	-	-	-	-	144	431	431	-	-	-	-	-	-	-	-	3,829	-
1b.1.1.3	Radwaste/Service Building	187	-	-	-	-	-	-	94	281	281	-	-	-	-	-	-	-	-	2,506	-
1b.1.1.4	Refueling Water Storage Tank	411	-	-	-	-	-	-	205	616	616	-	-	-	-	-	-	-	-	5,322	-
1b.1.1.5	Fuel Handling Building	1,174	-	-	-	-	-	-	587	1,760	1,760	-	-	-	-	-	-	-	-	15,238	-
1b.1.1	Totals	4,555	-	-	-	-	-	-	2,277	6,832	6,832	-	-	-	-	-	-	-	-	59,989	-
1b.1	Subtotal Period 1b Activity Costs	4,555	-	-	-	-	-	-	2,277	6,832	6,832	-	-	-	-	-	-	-	-	59,989	-
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	947	-	-	-	-	-	-	142	1,089	1,089	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process decommissioning water waste	200	-	141	355	-	443	-	278	1,417	1,417	-	-	-	1,262	-	-	-	75,708	246	-
1b.3.3	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1b.3.4	Small tool allowance	-	80	-	-	-	-	-	12	92	92	-	-	-	-	-	-	-	-	-	-
1b.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,395	359	2,754	-	2,754	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	1,146	80	141	355	-	443	2,395	791	5,352	2,598	2,754	-	-	1,262	-	-	-	75,708	246	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	871	-	-	-	-	-	-	218	1,089	1,089	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	229	23	252	252	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	3,069	307	3,376	3,376	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	425	-	-	-	-	-	106	531	531	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	141	-	-	-	-	-	21	162	162	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	13	7	-	37	-	12	69	69	-	-	-	585	-	-	-	11,699	19	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	437	66	503	503	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	116	12	128	128	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	546	55	600	-	600	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Cost	-	-	-	-	-	-	41	6	47	47	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	99	15	113	-	113	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	12	2	14	-	14	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	2,231	335	2,565	2,565	-	-	-	-	-	-	-	-	-	39,260
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	7,994	1,199	9,193	9,193	-	-	-	-	-	-	-	-	-	105,560
1b.4	Subtotal Period 1b Period-Dependent Costs	871	566	13	7	-	37	14,773	2,375	18,643	17,916	727	-	-	585	-	-	-	11,699	19	144,820
1b.0	TOTAL PERIOD 1b COST	6,573	646	154	362	-	480	17,168	5,444	30,827	27,346	3,481	-	-	1,847	-	-	-	87,408	60,254	144,820
PERIOD 1c - Preparations for SAFSTOR Dormancy																					
Period 1c Direct Decommissioning Activities																					
1c.1.1	Prepare support equipment for storage	-	517	-	-	-	-	-	78	595	595	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	55	-	-	-	-	-	8	64	64	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	10,874	-
1c.1.4	Secure building accesses									a											
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	31	5	36	36	-	-	-	-	-	-	-	-	-	250
1c.1	Subtotal Period 1c Activity Costs	-	572	-	-	-	-	764	310	1,647	1,647	-	-	-	-	-	-	-	-	14,574	250
Period 1c Additional Costs																					
1c.2.1	Spent fuel pool isolation	-	-	-	-	-	-	10,813	1,622	12,434	12,434	-	-	-	-	-	-	-	-	-	-
1c.2	Subtotal Period 1c Additional Costs	-	-	-	-	-	-	10,813	1,622	12,434	12,434	-	-	-	-	-	-	-	-	-	-
Period 1c Collateral Costs																					
1c.3.1	Process decommissioning water waste	236	-	167	421	-	525	-	329	1,679	1,679	-	-	-	1,496	-	-	-	89,742	292	-
1c.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1c.3.3	Small tool allowance	-	5	-	-	-	-	-	1	6	6	-	-	-	-	-	-	-	-	-	-
1c.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,395	359	2,754	-	2,754	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	236	5	167	421	-	525	2,395	689	4,439	1,685	2,754	-	-	1,496	-	-	-	89,742	292	-
Period 1c Period-Dependent Costs																					
1c.4.1	Insurance	-	-	-	-	-	-	229	23	252	252	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	3,069	307	3,376	3,376	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	204	-	-	-	-	-	51	255	255	-	-	-	-	-	-	-	-	-	-

Table E-2
Braidwood Nuclear Power Station Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Burial Volumes Class B Cu. Feet	Burial Volumes Class C Cu. Feet	Burial Volumes GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 1c Period-Dependent Costs (continued)																					
1c.4.4	Heavy equipment rental	-	141	-	-	-	-	-	21	162	162	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	3	2	-	10	-	3	18	18	-	-	-	152	-	-	-	3,039	5	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	437	66	503	503	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	116	12	128	128	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	546	55	600	-	600	-	-	-	-	-	-	-	-	-
1c.4.9	Site O&M Cost	-	-	-	-	-	-	41	6	47	47	-	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	99	15	113	-	113	-	-	-	-	-	-	-	-	-
1c.4.11	ISFSI Operating Costs	-	-	-	-	-	-	12	2	14	-	14	-	-	-	-	-	-	-	-	-
1c.4.12	Security Staff Cost	-	-	-	-	-	-	2,231	335	2,565	2,565	-	-	-	-	-	-	-	-	-	39,260
1c.4.13	Utility Staff Cost	-	-	-	-	-	-	7,994	1,199	9,193	9,193	-	-	-	-	-	-	-	-	-	105,560
1c.4	Subtotal Period 1c Period-Dependent Costs	-	345	3	2	-	10	14,773	2,093	17,226	16,498	727	-	-	152	-	-	-	3,039	5	144,820
1c.0	TOTAL PERIOD 1c COST	236	922	171	423	-	535	28,744	4,715	35,746	32,265	3,481	-	-	1,648	-	-	-	92,781	14,870	145,070
PERIOD 1 TOTALS		6,809	2,663	339	792	-	1,054	111,064	19,990	142,711	116,226	26,485	-	-	4,106	-	-	-	192,413	75,144	887,713
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	-	-	-	-	-	-	286	43	329	329	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	556	139	695	695	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	842	182	1,024	1,024	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																					
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	38,452	5,768	44,220	-	44,220	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	38,452	5,768	44,220	-	44,220	-	-	-	-	-	-	-	-	-
Period 2a Period-Dependent Costs																					
2a.4.1	Insurance	-	-	-	-	-	-	3,121	312	3,433	2,227	1,206	-	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	20,696	2,070	22,765	22,765	-	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	845	-	-	-	-	-	211	1,057	1,057	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	21	11	-	59	-	18	109	109	-	-	-	921	-	-	-	18,419	30	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	1,404	211	1,614	807	807	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	1,064	106	1,170	1,170	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	7,600	760	8,360	-	8,360	-	-	-	-	-	-	-	-	-
2a.4.8	Site O&M Cost	-	-	-	-	-	-	660	99	759	759	-	-	-	-	-	-	-	-	-	-
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	1,583	237	1,821	-	1,821	-	-	-	-	-	-	-	-	-
2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	191	29	220	-	220	-	-	-	-	-	-	-	-	-
2a.4.11	Security Staff Cost	-	-	-	-	-	-	25,631	3,845	29,475	4,674	24,801	-	-	-	-	-	-	-	-	444,561
2a.4.12	Utility Staff Cost	-	-	-	-	-	-	26,351	3,953	30,303	4,340	25,963	-	-	-	-	-	-	-	-	329,769
2a.4	Subtotal Period 2a Period-Dependent Costs	-	845	21	11	-	59	88,301	11,851	101,088	37,909	63,179	-	-	921	-	-	-	18,419	30	774,330
2a.0	TOTAL PERIOD 2a COST	-	845	21	11	-	59	127,595	17,801	146,331	38,933	107,399	-	-	921	-	-	-	18,419	30	774,330
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	-	-	-	-	-	-	1,825	274	2,099	2,099	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	3,550	887	4,437	4,437	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	5,375	1,161	6,536	6,536	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	9,313	1,397	10,709	-	10,709	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	9,313	1,397	10,709	-	10,709	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	12,926	1,293	14,219	14,219	-	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	12,769	1,277	14,046	14,046	-	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	2,490	-	-	-	-	-	622	3,112	3,112	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	60	31	-	169	-	53	312	312	-	-	-	2,640	-	-	-	52,796	86	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	4,481	672	5,153	5,153	-	-	-	-	-	-	-	-	-	-

Table E-2
Braidwood Nuclear Power Station Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 2b Period-Dependent Costs (continued)																					
2b.4.6	NRC Fees	-	-	-	-	-	-	6,536	654	7,190	7,190	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	48,524	4,852	53,376	-	53,376	-	-	-	-	-	-	-	-	-
2b.4.8	Site O&M Cost	-	-	-	-	-	-	4,216	632	4,848	4,848	-	-	-	-	-	-	-	-	-	-
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	1,220	183	1,403	-	1,403	-	-	-	-	-	-	-	-	-
2b.4.10	Security Staff Cost	-	-	-	-	-	-	43,478	6,522	50,000	29,842	20,158	-	-	-	-	-	-	-	-	719,589
2b.4.11	Utility Staff Cost	-	-	-	-	-	-	39,625	5,944	45,569	27,708	17,861	-	-	-	-	-	-	-	-	533,029
2b.4	Subtotal Period 2b Period-Dependent Costs	-	2,490	60	31	-	169	173,776	22,704	199,229	106,432	92,798	-	-	2,640	-	-	-	52,796	86	1,252,617
2b.0	TOTAL PERIOD 2b COST	-	2,490	60	31	-	169	188,463	25,262	216,474	112,967	103,507	-	-	2,640	-	-	-	52,796	86	1,252,617
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	-	-	-	-	-	-	1,524	229	1,753	1,753	-	-	-	-	-	-	-	-	-	-
2c.1.5	Maintenance supplies	-	-	-	-	-	-	2,965	741	3,707	3,707	-	-	-	-	-	-	-	-	-	-
2c.1	Subtotal Period 2c Activity Costs	-	-	-	-	-	-	4,490	970	5,460	5,460	-	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	10,798	1,080	11,877	11,877	-	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	10,667	1,067	11,733	11,733	-	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	2,015	-	-	-	-	-	504	2,519	2,519	-	-	-	-	-	-	-	-	-	-
2c.4.4	Disposal of DAW generated	-	-	48	25	-	135	-	42	250	250	-	-	-	2,112	-	-	-	42,241	69	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	3,743	561	4,305	4,305	-	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	5,256	526	5,782	5,782	-	-	-	-	-	-	-	-	-	-
2c.4.7	Site O&M Cost	-	-	-	-	-	-	3,522	528	4,050	4,050	-	-	-	-	-	-	-	-	-	-
2c.4.8	Security Staff Cost	-	-	-	-	-	-	21,677	3,251	24,928	24,928	-	-	-	-	-	-	-	-	-	333,943
2c.4.9	Utility Staff Cost	-	-	-	-	-	-	20,127	3,019	23,146	23,146	-	-	-	-	-	-	-	-	-	284,074
2c.4	Subtotal Period 2c Period-Dependent Costs	-	2,015	48	25	-	135	75,789	10,578	88,590	88,590	-	-	-	2,112	-	-	-	42,241	69	618,017
2c.0	TOTAL PERIOD 2c COST	-	2,015	48	25	-	135	80,279	11,548	94,049	94,049	-	-	-	2,112	-	-	-	42,241	69	618,017
PERIOD 2 TOTALS		-	5,350	128	66	-	363	396,336	54,611	456,855	245,949	210,906	-	-	5,673	-	-	-	113,456	185	2,644,964
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	69	10	79	79	-	-	-	-	-	-	-	-	-	556
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	244	37	281	281	-	-	-	-	-	-	-	-	-	1,969
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	428
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	69	10	79	79	-	-	-	-	-	-	-	-	-	556
3a.1.6	Define major work sequence	-	-	-	-	-	-	398	60	457	457	-	-	-	-	-	-	-	-	-	3,210
3a.1.7	Perform SER and EA	-	-	-	-	-	-	164	25	189	189	-	-	-	-	-	-	-	-	-	1,327
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	265	40	305	305	-	-	-	-	-	-	-	-	-	2,140
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	217	33	250	250	-	-	-	-	-	-	-	-	-	1,753
3a.1.10	Receive NRC approval of termination plan									a											
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	391	59	449	404	-	45	-	-	-	-	-	-	-	3,154
3a.1.11.2	Plant systems	-	-	-	-	-	-	221	33	254	229	-	25	-	-	-	-	-	-	-	1,783
3a.1.11.3	Reactor internals	-	-	-	-	-	-	376	56	433	433	-	-	-	-	-	-	-	-	-	3,039
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	345	52	396	396	-	-	-	-	-	-	-	-	-	2,782
3a.1.11.5	Biological shield	-	-	-	-	-	-	27	4	30	30	-	-	-	-	-	-	-	-	-	214
3a.1.11.6	Steam generators	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	1,335
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	85	13	98	49	-	49	-	-	-	-	-	-	-	685
3a.1.11.8	Main Turbine	-	-	-	-	-	-	21	3	24	-	-	24	-	-	-	-	-	-	-	171
3a.1.11.9	Main Condensers	-	-	-	-	-	-	21	3	24	-	-	24	-	-	-	-	-	-	-	171
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	165	25	190	95	-	95	-	-	-	-	-	-	-	1,335
3a.1.11.11	Waste management	-	-	-	-	-	-	244	37	281	281	-	-	-	-	-	-	-	-	-	1,969
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-	48	7	55	27	-	27	-	-	-	-	-	-	-	385
3a.1.11	Total	-	-	-	-	-	-	2,109	316	2,426	2,135	-	290	-	-	-	-	-	-	-	17,024

Table E-2
Braidwood Nuclear Power Station Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,027
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	3,000	450	3,450	3,450	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	74	11	85	85	-	-	-	-	-	-	-	-	-	599
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,300	345	2,645	2,645	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	65	10	75	75	-	-	-	-	-	-	-	-	-	526
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	9,155	1,373	10,528	10,238	-	290	-	-	-	-	-	-	-	31,117
Period 3a Collateral Costs																					
3a.3	Subtotal Period 3a Collateral Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	506	51	556	556	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	500	50	550	550	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	437	-	-	-	-	-	109	546	546	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	565	-	-	-	-	-	85	649	649	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	11	6	-	31	-	10	57	57	-	-	-	481	-	-	-	9,613	16	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	1,753	263	2,016	2,016	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	332	33	366	366	-	-	-	-	-	-	-	-	-	-
3a.4.8	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
3a.4.9	Security Staff Cost	-	-	-	-	-	-	343	51	394	394	-	-	-	-	-	-	-	-	-	6,257
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	14,264	2,140	16,404	16,404	-	-	-	-	-	-	-	-	-	200,229
3a.4	Subtotal Period 3a Period-Dependent Costs	-	1,002	11	6	-	31	17,863	2,816	21,728	21,728	-	-	-	481	-	-	-	9,613	16	206,486
3a.0	TOTAL PERIOD 3a COST	-	1,002	11	6	-	31	27,018	4,189	32,256	31,966	-	290	-	481	-	-	-	9,613	16	237,603
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	251	38	289	260	-	29	-	-	-	-	-	-	-	2,026
3b.1.1.2	Reactor internals	-	-	-	-	-	-	133	20	152	152	-	-	-	-	-	-	-	-	-	1,070
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	72	11	82	21	-	62	-	-	-	-	-	-	-	578
3b.1.1.4	CRD cooling assembly	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	428
3b.1.1.5	CRD housings & ICI tubes	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	428
3b.1.1.6	Incore instrumentation	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	428
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	192	29	221	221	-	-	-	-	-	-	-	-	-	1,554
3b.1.1.8	Facility closeout	-	-	-	-	-	-	64	10	73	37	-	37	-	-	-	-	-	-	-	514
3b.1.1.9	Missile shields	-	-	-	-	-	-	24	4	27	27	-	-	-	-	-	-	-	-	-	193
3b.1.1.10	Biological shield	-	-	-	-	-	-	64	10	73	73	-	-	-	-	-	-	-	-	-	514
3b.1.1.11	Steam generators	-	-	-	-	-	-	244	37	281	281	-	-	-	-	-	-	-	-	-	1,969
3b.1.1.12	Reinforced concrete	-	-	-	-	-	-	53	8	61	30	-	30	-	-	-	-	-	-	-	428
3b.1.1.13	Main Turbine	-	-	-	-	-	-	83	12	95	-	-	95	-	-	-	-	-	-	-	668
3b.1.1.14	Main Condensers	-	-	-	-	-	-	83	12	95	-	-	95	-	-	-	-	-	-	-	668
3b.1.1.15	Auxiliary building	-	-	-	-	-	-	145	22	166	150	-	17	-	-	-	-	-	-	-	1,168
3b.1.1.16	Reactor building	-	-	-	-	-	-	145	22	166	150	-	17	-	-	-	-	-	-	-	1,168
3b.1.1	Total	-	-	-	-	-	-	1,710	256	1,966	1,585	-	381	-	-	-	-	-	-	-	13,800
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	1,710	256	1,966	1,585	-	381	-	-	-	-	-	-	-	13,800
Period 3b Additional Costs																					
3b.2.1	Site Characterization	-	-	-	-	-	-	2,771	831	3,602	3,602	-	-	-	-	-	-	-	-	13,042	4,640
3b.2	Subtotal Period 3b Additional Costs	-	-	-	-	-	-	2,771	831	3,602	3,602	-	-	-	-	-	-	-	-	13,042	4,640
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	947	-	-	-	-	-	-	142	1,089	1,089	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
3b.3.3	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	947	1,100	-	-	-	-	1,163	482	3,692	3,692	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	29	-	-	-	-	-	-	7	36	36	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	255	25	280	280	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	252	25	277	277	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	238	-	-	-	-	-	59	297	297	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	285	-	-	-	-	-	43	327	327	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	6	3	-	17	-	5	32	32	-	-	-	267	-	-	-	5,344	9	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	884	133	1,017	1,017	-	-	-	-	-	-	-	-	-	-

Table E-2
Braidwood Nuclear Power Station Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 3b Period-Dependent Costs (continued)																					
3b.4.8	NRC Fees	-	-	-	-	-	-	168	17	184	184	-	-	-	-	-	-	-	-	-	-
3b.4.9	Site O&M Cost	-	-	-	-	-	-	83	12	96	96	-	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	3,154
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	3,382	507	3,889	3,889	-	-	-	-	-	-	-	-	-	43,109
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	7,191	1,079	8,269	8,269	-	-	-	-	-	-	-	-	-	100,937
3b.4	Subtotal Period 3b Period-Dependent Costs	29	522	6	3	-	17	12,387	1,939	14,904	14,904	-	-	-	267	-	-	-	5,344	9	147,200
3b.0	TOTAL PERIOD 3b COST	976	1,622	6	3	-	17	18,031	3,508	24,163	23,782	-	381	-	267	-	-	-	5,344	13,051	165,640
PERIOD 3 TOTALS		976	2,624	17	9	-	48	45,049	7,698	56,420	55,748	-	672	-	748	-	-	-	14,956	13,066	403,242
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Reactor Coolant Piping	54	186	39	40	-	271	-	151	742	742	-	-	-	1,838	-	-	-	210,083	3,290	-
4a.1.1.2	Pressurizer Relief Tank	9	34	7	8	-	47	-	27	132	132	-	-	-	329	-	-	-	36,553	596	-
4a.1.1.3	Reactor Coolant Pumps & Motors	32	121	85	198	-	1,390	-	432	2,259	2,259	-	-	-	4,796	-	-	-	780,540	2,726	80
4a.1.1.4	Pressurizer	14	79	370	105	-	879	-	299	1,746	1,746	-	-	-	3,033	-	-	-	240,915	1,532	750
4a.1.1.5	Steam Generators	108	4,584	1,659	2,955	-	10,309	-	4,387	24,003	24,003	-	-	-	62,044	-	-	-	3,098,576	20,508	2,250
4a.1.1.6	CRDMs/ICIs/Service Structure Removal	26	315	219	43	-	141	-	155	899	899	-	-	-	2,843	-	-	-	109,650	4,745	-
4a.1.1.7	Reactor Vessel Internals	104	2,920	6,538	1,091	-	4,352	292	6,368	21,664	21,664	-	-	-	2,461	501	393	-	328,507	27,350	1,226
4a.1.1.8	Vessel & Internals GTCC Disposal	-	-	-	-	-	12,062	-	1,809	13,872	13,872	-	-	-	-	-	-	2,217	433,180	-	-
4a.1.1.9	Reactor Vessel	129	5,095	2,175	1,159	-	2,832	292	6,179	17,862	17,862	-	-	-	9,331	-	-	-	960,579	27,350	1,226
4a.1.1	Totals	476	13,334	11,092	5,598	-	32,284	585	19,808	83,178	83,178	-	-	-	86,675	501	393	2,217	6,198,583	88,098	5,532
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	682	3,324	1,256	-	3,337	-	1,525	10,124	10,124	-	-	-	57,484	-	-	-	2,984,647	9,146	-
4a.1.3	Main Condensers	-	1,368	1,965	1,022	-	5,039	-	1,952	11,347	11,347	-	-	-	75,240	-	-	-	3,906,532	18,250	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor	-	1,397	-	-	-	-	-	210	1,607	1,607	-	-	-	-	-	-	-	-	12,130	-
4a.1.4.2	Auxiliary Building	-	785	-	-	-	-	-	118	902	902	-	-	-	-	-	-	-	-	6,896	-
4a.1.4.3	Radwaste/Service Building	-	513	-	-	-	-	-	77	590	590	-	-	-	-	-	-	-	-	5,059	-
4a.1.4.4	Refueling Water Storage Tank	-	137	-	-	-	-	-	21	158	158	-	-	-	-	-	-	-	-	1,299	-
4a.1.4.5	Fuel Handling Building	-	403	-	-	-	-	-	60	463	463	-	-	-	-	-	-	-	-	3,690	-
4a.1.4	Totals	-	3,235	-	-	-	-	-	485	3,720	3,720	-	-	-	-	-	-	-	-	29,075	-
Disposal of Plant Systems																					
4a.1.5.1	Auxiliary Feedwater	-	85	-	-	-	-	-	13	97	-	-	97	-	-	-	-	-	-	1,143	-
4a.1.5.2	Auxiliary Steam	-	153	-	-	-	-	-	23	176	-	-	176	-	-	-	-	-	-	2,107	-
4a.1.5.3	Auxiliary Steam RCA	-	410	74	37	-	183	-	161	864	864	-	-	-	2,714	-	-	-	141,487	5,387	-
4a.1.5.4	Boric Acid Processing	-	536	88	48	-	238	-	209	1,120	1,120	-	-	-	3,611	-	-	-	184,114	7,055	-
4a.1.5.5	CO2 & H2	-	21	-	-	-	-	-	3	24	-	-	24	-	-	-	-	-	-	289	-
4a.1.5.6	CO2 & H2 RCA	-	39	7	4	-	18	-	16	84	84	-	-	-	276	-	-	-	14,104	492	-
4a.1.5.7	Chemical Feed	-	194	-	-	-	-	-	29	223	-	-	223	-	-	-	-	-	-	2,663	-
4a.1.5.8	Chemical Feed at Intake	-	27	-	-	-	-	-	4	30	-	-	30	-	-	-	-	-	-	364	-
4a.1.5.9	Chilled Water	-	107	-	-	-	-	-	16	124	-	-	124	-	-	-	-	-	-	1,454	-
4a.1.5.10	Circulating Water	-	641	-	-	-	-	-	96	737	-	-	737	-	-	-	-	-	-	8,814	-
4a.1.5.11	Condensate	-	392	-	-	-	-	-	59	450	-	-	450	-	-	-	-	-	-	5,317	-
4a.1.5.12	Condensate Booster	-	391	-	-	-	-	-	59	449	-	-	449	-	-	-	-	-	-	5,314	-
4a.1.5.13	Condensate Cleanup	-	214	-	-	-	-	-	32	246	-	-	246	-	-	-	-	-	-	3,000	-
4a.1.5.14	Containment Spray	-	289	87	47	-	231	-	146	800	800	-	-	-	3,455	-	-	-	179,291	3,839	-
4a.1.5.15	Diesel Fuel Oil	-	212	-	-	-	-	-	32	244	-	-	244	-	-	-	-	-	-	2,848	-
4a.1.5.16	Essential Service Water	-	368	-	-	-	-	-	55	423	-	-	423	-	-	-	-	-	-	5,049	-
4a.1.5.17	Extraction Steam	-	263	-	-	-	-	-	39	302	-	-	302	-	-	-	-	-	-	3,637	-
4a.1.5.18	Feedwater	-	357	-	-	-	-	-	53	410	-	-	410	-	-	-	-	-	-	4,925	-
4a.1.5.19	Feedwater Drains	-	845	-	-	-	-	-	127	972	-	-	972	-	-	-	-	-	-	11,719	-
4a.1.5.20	Gland Steam	-	44	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	616	-
4a.1.5.21	Gland Water	-	33	-	-	-	-	-	5	37	-	-	37	-	-	-	-	-	-	458	-
4a.1.5.22	Main Steam	-	363	-	-	-	-	-	54	417	-	-	417	-	-	-	-	-	-	4,979	-
4a.1.5.23	Main Steam RCA	-	96	23	13	-	64	-	44	240	240	-	-	-	947	-	-	-	49,262	1,292	-
4a.1.5.24	Make-up Demineralizer	-	183	-	-	-	-	-	27	210	-	-	210	-	-	-	-	-	-	2,595	-
4a.1.5.25	Nitrogen	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	18	-
4a.1.5.26	Non-Essential Service Water	-	426	-	-	-	-	-	64	490	-	-	490	-	-	-	-	-	-	5,903	-
4a.1.5.27	Non-Essential Service Water RCA	-	205	87	51	-	251	-	130	724	724	-	-	-	3,738	-	-	-	194,273	2,692	-

Table E-2
Braidwood Nuclear Power Station Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
4a.1.5.28	Off Gas	-	768	176	97	-	478	-	344	1,862	1,862	-	-	-	7,112	-	-	-	370,343	10,290	-
4a.1.5.29	Potable Water	-	6	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	75	-
4a.1.5.30	Process Radiation Monitoring	-	76	4	2	-	9	-	22	113	113	-	-	-	134	-	-	-	7,021	1,093	-
4a.1.5.31	Process Sampling	-	168	15	8	-	41	-	55	287	287	-	-	-	615	-	-	-	31,992	2,368	-
4a.1.5.32	Screen Wash	-	53	-	-	-	-	-	8	61	-	-	61	-	-	-	-	-	-	740	-
4a.1.5.33	Station Air	-	51	-	-	-	-	-	8	59	-	-	59	-	-	-	-	-	-	705	-
4a.1.5.34	Station Heating	-	174	-	-	-	-	-	26	200	-	-	200	-	-	-	-	-	-	2,391	-
4a.1.5.35	Steam Humidification	-	8	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	115	-
4a.1.5.36	Switchgear Heat Removal	-	38	-	-	-	-	-	6	44	-	-	44	-	-	-	-	-	-	519	-
4a.1.5.37	Turbine Bldg Equip Drains	-	91	-	-	-	-	-	14	104	-	-	104	-	-	-	-	-	-	1,235	-
4a.1.5.38	Turbine Bldg Floor Drains	-	155	-	-	-	-	-	23	179	-	-	179	-	-	-	-	-	-	2,117	-
4a.1.5.39	Turbine Oil	-	98	-	-	-	-	-	15	112	-	-	112	-	-	-	-	-	-	1,359	-
4a.1.5.40	Turbine-Generator Auxilaries	-	65	-	-	-	-	-	10	75	-	-	75	-	-	-	-	-	-	884	-
4a.1.5.41	Waste Oil Sumps	-	38	-	-	-	-	-	6	43	-	-	43	-	-	-	-	-	-	517	-
4a.1.5.42	Well Water	-	92	-	-	-	-	-	14	106	-	-	106	-	-	-	-	-	-	1,247	-
4a.1.5	Totals	-	8,775	560	307	-	1,512	-	2,055	13,209	6,093	-	7,116	-	22,603	-	-	-	1,171,887	119,622	-
4a.1.6	Scaffolding in support of decommissioning	-	1,829	15	8	-	37	-	469	2,357	2,357	-	-	-	556	-	-	-	28,884	26,661	-
4a.1	Subtotal Period 4a Activity Costs	476	29,223	16,956	8,190	-	42,210	585	26,295	123,934	116,818	-	7,116	-	242,559	501	393	2,217	14,290,530	290,852	5,532
Period 4a Additional Costs																					
4a.2.1	Remedial Action Surveys	-	-	-	-	-	-	1,976	593	2,569	2,569	-	-	-	-	-	-	-	-	31,151	-
4a.2.2	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
4a.2.3	Operational Tools and Equipment	-	-	9	52	-	189	-	56	306	306	-	-	-	5,855	-	-	-	146,375	16	-
4a.2	Subtotal Period 4a Additional Costs	-	-	9	52	-	189	2,026	656	2,933	2,933	-	-	-	5,855	-	-	-	146,375	31,167	-
Period 4a Collateral Costs																					
4a.3.1	Process decommissioning water waste	5	-	10	24	-	30	-	15	85	85	-	-	-	86	-	-	-	5,186	17	-
4a.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4a.3.3	Small tool allowance	-	380	-	-	-	-	-	57	437	393	-	44	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	5	380	10	24	-	30	-	72	521	478	-	44	-	86	-	-	-	5,186	17	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	87	-	-	-	-	-	-	22	108	108	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	758	76	834	834	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	749	75	824	741	-	82	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	2,349	-	-	-	-	-	587	2,936	2,936	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	3,253	-	-	-	-	-	488	3,740	3,740	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	84	43	-	239	-	75	441	441	-	-	-	3,729	-	-	-	74,572	122	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	2,496	374	2,871	2,871	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	628	63	690	690	-	-	-	-	-	-	-	-	-	-
4a.4.9	Site O&M Cost	-	-	-	-	-	-	247	37	284	284	-	-	-	-	-	-	-	-	-	-
4a.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	601	90	691	691	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	4,211	632	4,842	4,842	-	-	-	-	-	-	-	-	-	71,047
4a.4.12	DOC Staff Cost	-	-	-	-	-	-	17,700	2,655	20,355	20,355	-	-	-	-	-	-	-	-	-	215,674
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	29,528	4,429	33,957	33,957	-	-	-	-	-	-	-	-	-	390,714
4a.4	Subtotal Period 4a Period-Dependent Costs	87	5,601	84	43	-	239	56,918	9,602	72,575	72,493	-	82	-	3,729	-	-	-	74,572	122	677,436
4a.0	TOTAL PERIOD 4a COST	568	35,205	17,059	8,310	-	42,667	59,529	36,625	199,964	192,721	-	7,242	-	252,229	501	393	2,217	14,516,670	322,158	682,968
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
4b.1.1	Remove spent fuel racks	1,277	139	369	143	-	705	-	908	3,541	3,541	-	-	-	10,524	-	-	-	546,426	2,174	-
Disposal of Plant Systems																					
4b.1.2.1	Chemical & Volume Control	-	1,209	164	82	-	407	-	433	2,296	2,296	-	-	-	6,063	-	-	-	315,292	15,801	-
4b.1.2.2	Chilled Water RCA	-	742	180	95	-	470	-	335	1,823	1,823	-	-	-	7,000	-	-	-	364,517	9,521	-
4b.1.2.3	Component Cooling	-	790	224	122	-	600	-	388	2,123	2,123	-	-	-	8,936	-	-	-	464,778	10,502	-
4b.1.2.4	Electrical	-	4,890	-	-	-	-	-	734	5,624		-	5,624	-	-	-	-	-	-	66,259	-
4b.1.2.5	Electrical - Contaminated	-	1,953	194	123	-	608	-	678	3,557	3,557	-	-	-	9,079	-	-	-	471,393	26,007	-
4b.1.2.6	Electrical - RCA	-	2,815	454	278	-	1,372	-	1,134	6,054	6,054	-	-	-	20,491	-	-	-	1,063,899	38,351	-
4b.1.2.7	Emergency Diesel Generator	-	111	-	-	-	-	-	17	127	-	-	127	-	-	-	-	-	-	1,514	-
4b.1.2.8	Essential Service Water RCA	-	385	209	122	-	601	-	286	1,603	1,603	-	-	-	8,972	-	-	-	466,273	5,336	-
4b.1.2.9	Fire Protection	-	362	-	-	-	-	-	54	416	-	-	416	-	-	-	-	-	-	4,983	-
4b.1.2.10	Fire Protection RCA	-	597	153	85	-	419	-	282	1,537	1,537	-	-	-	6,243	-	-	-	324,808	7,672	-

Table E-2
Braidwood Nuclear Power Station Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
4b.1.2.11	Fuel Handling Bldg Equip Drains	-	186	34	18	-	91	-	75	405	405	-	-	-	1,386	-	-	-	70,185	2,442	-
4b.1.2.12	Fuel Handling Bldg Equip Drains (Unit 1)	-	33	4	2	-	9	-	11	58	58	-	-	-	129	-	-	-	6,739	429	-
4b.1.2.13	Fuel Handling Bldg Floor Drains	-	190	33	17	-	82	-	74	395	395	-	-	-	1,241	-	-	-	63,725	2,480	-
4b.1.2.14	Fuel Handling Bldg Floor Drains (Unit 1)	-	132	23	12	-	58	-	52	277	277	-	-	-	874	-	-	-	44,626	1,769	-
4b.1.2.15	Fuel Pool Cooling & Cleanup	-	252	49	27	-	133	-	105	567	567	-	-	-	1,989	-	-	-	103,404	3,329	-
4b.1.2.16	Fuel Pool Cooling & Cleanup (Unit 1)	-	234	46	25	-	124	-	98	528	528	-	-	-	1,857	-	-	-	96,476	3,103	-
4b.1.2.17	HVAC-Auxiliary Building	-	623	116	73	-	361	-	269	1,442	1,442	-	-	-	5,390	-	-	-	279,889	8,029	-
4b.1.2.18	HVAC-Control Room HVAC	-	9	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	127	-
4b.1.2.19	HVAC-Diesel Generator Room	-	51	-	-	-	-	-	8	58	-	-	58	-	-	-	-	-	-	686	-
4b.1.2.20	HVAC-Laboratory	-	23	-	-	-	-	-	3	27	-	-	27	-	-	-	-	-	-	315	-
4b.1.2.21	HVAC-Machine Shop	-	21	-	-	-	-	-	3	24	-	-	24	-	-	-	-	-	-	297	-
4b.1.2.22	HVAC-Miscellaneous	-	128	-	-	-	-	-	19	148	-	-	148	-	-	-	-	-	-	1,769	-
4b.1.2.23	HVAC-Primary Containment	-	692	218	139	-	683	-	386	2,119	2,119	-	-	-	10,197	-	-	-	529,451	8,908	-
4b.1.2.24	HVAC-Pumphouse	-	20	-	-	-	-	-	3	23	-	-	23	-	-	-	-	-	-	275	-
4b.1.2.25	HVAC-Radwaste	-	358	68	43	-	213	-	156	838	838	-	-	-	3,177	-	-	-	164,931	4,412	-
4b.1.2.26	HVAC-Turbine Building	-	218	-	-	-	-	-	33	250	-	-	250	-	-	-	-	-	-	3,158	-
4b.1.2.27	Instrument Air Supply	-	85	-	-	-	-	-	13	97	-	-	97	-	-	-	-	-	-	1,197	-
4b.1.2.28	Instrument Air Supply RCA	-	276	31	14	-	68	-	91	480	480	-	-	-	1,002	-	-	-	52,414	3,630	-
4b.1.2.29	Miscellaneous Drains	-	84	15	8	-	40	-	34	181	181	-	-	-	592	-	-	-	30,841	1,125	-
4b.1.2.30	Primary Containment Purge	-	336	138	76	-	375	-	203	1,128	1,128	-	-	-	5,582	-	-	-	290,664	4,721	-
4b.1.2.31	Primary Water	-	939	234	136	-	670	-	446	2,424	2,424	-	-	-	10,451	-	-	-	519,324	12,918	-
4b.1.2.32	Radioactive Waste Disposal	-	3,117	523	282	-	1,391	-	1,222	6,535	6,535	-	-	-	21,101	-	-	-	1,078,202	40,671	-
4b.1.2.33	Reactor Bldg Equipment Drains	-	122	25	14	-	67	-	52	279	279	-	-	-	997	-	-	-	51,818	1,605	-
4b.1.2.34	Reactor Building Floor Drains	-	46	6	3	-	16	-	17	89	89	-	-	-	245	-	-	-	12,768	604	-
4b.1.2.35	Reactor Coolant	-	186	22	10	-	51	-	63	332	332	-	-	-	763	-	-	-	39,871	2,413	-
4b.1.2.36	Residual Heat Removal	-	213	51	29	-	143	-	98	534	534	-	-	-	2,129	-	-	-	110,771	2,894	-
4b.1.2.37	Safety Injection	-	980	241	137	-	676	-	459	2,493	2,493	-	-	-	10,357	-	-	-	523,998	13,451	-
4b.1.2.38	Station Air RCA	-	65	8	4	-	19	-	22	118	118	-	-	-	283	-	-	-	14,808	833	-
4b.1.2.39	Station Heating RCA	-	281	60	32	-	156	-	120	648	648	-	-	-	2,315	-	-	-	120,573	3,664	-
4b.1.2.40	Tritium ALPS	-	427	110	64	-	316	-	206	1,123	1,123	-	-	-	4,948	-	-	-	245,163	5,864	-
4b.1.2.41	Waste Oil Sumps RCA	-	29	4	2	-	10	-	10	56	56	-	-	-	149	-	-	-	7,762	370	-
4b.1.2.42	Waste Water Treatment	-	105	-	-	-	-	-	16	120	-	-	120	-	-	-	-	-	-	1,464	-
4b.1.2	Totals	-	24,315	3,638	2,075	-	10,229	-	8,709	48,965	42,040	-	6,926	-	153,939	-	-	-	7,929,364	324,897	-
4b.1.3	Scaffolding in support of decommissioning	-	2,743	22	11	-	56	-	704	3,536	3,536	-	-	-	834	-	-	-	43,325	39,992	-
Decontamination of Site Buildings																					
4b.1.4.1	Reactor	2,264	1,625	233	347	-	1,358	-	1,953	7,782	7,782	-	-	-	24,850	-	-	-	1,271,843	50,420	-
4b.1.4.2	Auxiliary Building	265	138	22	20	-	75	-	191	710	710	-	-	-	1,209	-	-	-	72,597	5,258	-
4b.1.4.3	Radwaste/Service Building	174	54	9	12	-	38	-	112	399	399	-	-	-	686	-	-	-	42,196	2,958	-
4b.1.4.4	Refueling Water Storage Tank	412	480	41	18	-	83	-	354	1,388	1,388	-	-	-	1,240	-	-	-	67,350	11,972	-
4b.1.4.5	Fuel Handling Building	1,180	1,321	110	53	-	236	-	998	3,898	3,898	-	-	-	3,552	-	-	-	198,847	33,507	-
4b.1.4	Totals	4,295	3,619	415	450	-	1,790	-	3,609	14,177	14,177	-	-	-	31,536	-	-	-	1,652,832	104,115	-
4b.1	Subtotal Period 4b Activity Costs	5,572	30,816	4,445	2,679	-	12,779	-	13,929	70,220	63,294	-	6,926	-	196,834	-	-	-	10,171,950	471,178	-
Period 4b Additional Costs																					
4b.2.1	License Termination Survey Planning	-	-	-	-	-	-	983	295	1,278	1,278	-	-	-	-	-	-	-	-	-	6,240
4b.2.2	Remedial Action Surveys	-	-	-	-	-	-	3,566	1,070	4,636	4,636	-	-	-	-	-	-	-	-	56,209	-
4b.2.3	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
4b.2.4	License Termination ISFSI	-	498	207	324	-	893	1,816	935	4,674	4,674	-	-	-	14,549	-	-	-	1,178,830	11,786	5,370
4b.2.5	Underground Services Excavation	-	554	-	-	-	-	-	83	637	637	-	-	-	-	-	-	-	-	2,755	-
4b.2	Subtotal Period 4b Additional Costs	-	1,052	207	324	-	893	6,416	2,390	11,283	11,283	-	-	-	14,549	-	-	-	1,178,830	70,749	11,610
Period 4b Collateral Costs																					
4b.3.1	Process decommissioning water waste	15	-	29	72	-	90	-	44	250	250	-	-	-	257	-	-	-	15,400	50	-
4b.3.2	Process decommissioning chemical flush waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4b.3.3	Small tool allowance	-	638	-	-	-	-	-	96	734	734	-	-	-	-	-	-	-	-	-	-
4b.3.4	Decommissioning Equipment Disposition	-	-	184	96	-	472	-	151	903	903	-	-	-	7,054	-	-	-	366,237	88	-
4b.3	Subtotal Period 4b Collateral Costs	15	638	213	168	-	563	-	291	1,888	1,888	-	-	-	7,310	-	-	-	381,637	138	-

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Braidwood Nuclear Power Station Unit 2
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Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	1,013	-	-	-	-	-	-	253	1,267	1,267	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	1,368	137	1,504	1,504	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	1,351	135	1,486	1,486	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	4,028	-	-	-	-	-	1,007	5,034	5,034	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	5,810	-	-	-	-	-	872	6,682	6,682	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	152	78	-	429	-	134	793	793	-	-	-	6,704	-	-	-	134,081	219	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	3,556	533	4,090	4,090	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	1,132	113	1,246	1,246	-	-	-	-	-	-	-	-	-	-
4b.4.9	Site O&M Cost	-	-	-	-	-	-	446	67	513	513	-	-	-	-	-	-	-	-	-	-
4b.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	1,084	163	1,247	1,247	-	-	-	-	-	-	-	-	-	-
4b.4.11	Security Staff Cost	-	-	-	-	-	-	10,515	1,577	12,092	12,092	-	-	-	-	-	-	-	-	-	176,250
4b.4.12	DOC Staff Cost	-	-	-	-	-	-	31,109	4,666	35,776	35,776	-	-	-	-	-	-	-	-	-	377,880
4b.4.13	Utility Staff Cost	-	-	-	-	-	-	50,609	7,591	58,201	58,201	-	-	-	-	-	-	-	-	-	665,520
4b.4	Subtotal Period 4b Period-Dependent Costs	1,013	9,838	152	78	-	429	101,171	17,249	129,929	129,929	-	-	-	6,704	-	-	-	134,081	219	1,219,650
4b.0	TOTAL PERIOD 4b COST	6,601	42,344	5,017	3,249	-	14,664	107,587	33,859	213,320	206,394	-	6,926	-	225,397	-	-	-	11,866,490	542,284	1,231,260
PERIOD 4f - License Termination																					
Period 4f Direct Decommissioning Activities																					
4f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
4f.1.2	Terminate license									a											
4f.1	Subtotal Period 4f Activity Costs	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
Period 4f Additional Costs																					
4f.2.1	License Termination Survey	-	-	-	-	-	-	9,744	2,923	12,667	12,667	-	-	-	-	-	-	-	132,123	3,120	
4f.2	Subtotal Period 4f Additional Costs	-	-	-	-	-	-	9,744	2,923	12,667	12,667	-	-	-	-	-	-	-	132,123	3,120	
Period 4f Collateral Costs																					
4f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
4f.3	Subtotal Period 4f Collateral Costs	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
Period 4f Period-Dependent Costs																					
4f.4.1	Insurance	-	-	-	-	-	-	381	38	419	419	-	-	-	-	-	-	-	-	-	-
4f.4.2	Property taxes	-	-	-	-	-	-	376	38	414	414	-	-	-	-	-	-	-	-	-	-
4f.4.3	Health physics supplies	-	703	-	-	-	-	-	176	879	879	-	-	-	-	-	-	-	-	-	-
4f.4.4	Disposal of DAW generated	-	-	8	4	-	21	-	7	40	40	-	-	-	335	-	-	-	6,698	11	-
4f.4.5	Plant energy budget	-	-	-	-	-	-	264	40	304	304	-	-	-	-	-	-	-	-	-	-
4f.4.6	NRC Fees	-	-	-	-	-	-	302	30	333	333	-	-	-	-	-	-	-	-	-	-
4f.4.7	Site O&M Cost	-	-	-	-	-	-	124	19	143	143	-	-	-	-	-	-	-	-	-	-
4f.4.8	Security Staff Cost	-	-	-	-	-	-	722	108	830	830	-	-	-	-	-	-	-	-	-	11,786
4f.4.9	DOC Staff Cost	-	-	-	-	-	-	3,870	580	4,450	4,450	-	-	-	-	-	-	-	-	-	46,750
4f.4.10	Utility Staff Cost	-	-	-	-	-	-	4,733	710	5,443	5,443	-	-	-	-	-	-	-	-	-	56,964
4f.4	Subtotal Period 4f Period-Dependent Costs	-	703	8	4	-	21	10,773	1,745	13,255	13,255	-	-	-	335	-	-	-	6,698	11	115,500
4f.0	TOTAL PERIOD 4f COST	-	703	8	4	-	21	21,853	4,895	27,484	27,484	-	-	-	335	-	-	-	6,698	132,134	118,620
PERIOD 4 TOTALS		7,169	78,252	22,084	11,563	-	57,353	188,968	75,379	440,767	426,599	-	14,168	-	477,961	501	393	2,217	26,389,860	996,575	2,032,848
PERIOD 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	Reactor	-	8,057	-	-	-	-	-	1,209	9,266	-	-	9,266	-	-	-	-	-	-	69,546	-
5b.1.1.2	Aux Feedwater-Steam Tunnel/Penetr. Area	-	795	-	-	-	-	-	119	914	-	-	914	-	-	-	-	-	-	5,187	-
5b.1.1.3	Auxiliary Building	-	7,062	-	-	-	-	-	1,059	8,121	-	-	8,121	-	-	-	-	-	-	62,064	-
5b.1.1.4	Blowdown Outfall Structure	-	35	-	-	-	-	-	5	40	-	-	40	-	-	-	-	-	-	295	-
5b.1.1.5	Bottled Gas Storage	-	31	-	-	-	-	-	5	36	-	-	36	-	-	-	-	-	-	340	-
5b.1.1.6	Circulating Water Discharge	-	265	-	-	-	-	-	40	305	-	-	305	-	-	-	-	-	-	2,887	-
5b.1.1.7	Gatehouse and Extension	-	397	-	-	-	-	-	60	457	-	-	457	-	-	-	-	-	-	4,193	-
5b.1.1.8	Instrument Maintenance Building	-	112	-	-	-	-	-	17	129	-	-	129	-	-	-	-	-	-	1,190	-
5b.1.1.9	Lake Screen House	-	1,788	-	-	-	-	-	268	2,056	-	-	2,056	-	-	-	-	-	-	15,283	-
5b.1.1.10	Make-up Demineralizer Area	-	764	-	-	-	-	-	115	878	-	-	878	-	-	-	-	-	-	8,158	-
5b.1.1.11	Miscellaneous Warehouses	-	2,333	-	-	-	-	-	350	2,683	-	-	2,683	-	-	-	-	-	-	26,794	-
5b.1.1.12	Miscellaneous Yard Structures	-	1,517	-	-	-	-	-	228	1,744	-	-	1,744	-	-	-	-	-	-	14,701	-
5b.1.1.13	Radwaste/Service Building	-	4,681	-	-	-	-	-	702	5,383	-	-	5,383	-	-	-	-	-	-	45,685	-

Table E-2
Braidwood Nuclear Power Station Unit 2
SAFSTOR Decommissioning Cost Estimate
(Thousands of 2014 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Demolition of Remaining Site Buildings (continued)																					
5b.1.1.14	Receiving Building	-	218	-	-	-	-	-	33	250	-	-	250	-	-	-	-	-	-	2,293	-
5b.1.1.15	Refueling Water Storage Tank	-	1,234	-	-	-	-	-	185	1,419	-	-	1,419	-	-	-	-	-	-	11,692	-
5b.1.1.16	River Screen House	-	726	-	-	-	-	-	109	835	-	-	835	-	-	-	-	-	-	6,844	-
5b.1.1.17	Security Modifications	-	1,084	-	-	-	-	-	163	1,246	-	-	1,246	-	-	-	-	-	-	6,939	-
5b.1.1.18	Sewage Treatment Plant	-	124	-	-	-	-	-	19	143	-	-	143	-	-	-	-	-	-	1,330	-
5b.1.1.19	Tech Support Center & Cond Cleanup Bldg	-	594	-	-	-	-	-	89	683	-	-	683	-	-	-	-	-	-	6,095	-
5b.1.1.20	Turbine Building	-	6,833	-	-	-	-	-	1,025	7,858	-	-	7,858	-	-	-	-	-	-	70,342	-
5b.1.1.21	Turbine Pedestal	-	1,627	-	-	-	-	-	244	1,872	-	-	1,872	-	-	-	-	-	-	12,628	-
5b.1.1.22	Waste Treatment Building	-	122	-	-	-	-	-	18	141	-	-	141	-	-	-	-	-	-	1,265	-
5b.1.1.23	Fuel Handling Building	-	3,632	-	-	-	-	-	545	4,177	-	-	4,177	-	-	-	-	-	-	33,245	-
5b.1.1	Totals	-	44,032	-	-	-	-	-	6,605	50,637	-	-	50,637	-	-	-	-	-	-	408,996	-
Site Closeout Activities																					
5b.1.2	Remove Rubble	-	294	-	-	-	-	-	44	339	-	-	339	-	-	-	-	-	-	1,367	-
5b.1.3	Grade & landscape site	-	986	-	-	-	-	-	148	1,134	-	-	1,134	-	-	-	-	-	-	1,942	-
5b.1.4	Final report to NRC	-	-	-	-	-	-	83	12	95	95	-	-	-	-	-	-	-	-	-	668
5b.1	Subtotal Period 5b Activity Costs	-	45,312	-	-	-	-	83	6,809	52,204	95	-	52,109	-	-	-	-	-	-	412,305	668
Period 5b Additional Costs																					
5b.2.1	Site Restoration ISFSI	-	1,147	-	-	-	-	28	176	1,351	-	-	1,351	-	-	-	-	-	-	13,036	80
5b.2.2	Concrete Crushing	-	1,120	-	-	-	-	6	169	1,295	-	-	1,295	-	-	-	-	-	-	4,730	-
5b.2.3	Cofferdam Construction and Teardown	-	889	-	-	-	-	-	133	1,023	-	-	1,023	-	-	-	-	-	-	7,391	-
5b.2	Subtotal Period 5b Additional Costs	-	3,156	-	-	-	-	34	478	3,668	-	-	3,668	-	-	-	-	-	-	25,156	80
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	589	-	-	-	-	-	88	677	-	-	677	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	589	-	-	-	-	-	88	677	-	-	677	-	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																					
5b.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5b.4.2	Property taxes	-	-	-	-	-	-	1,239	124	1,363	-	-	1,363	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	7,568	-	-	-	-	-	1,135	8,704	-	-	8,704	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	435	65	500	-	-	500	-	-	-	-	-	-	-	-
5b.4.5	Site O&M Cost	-	-	-	-	-	-	409	61	470	-	-	470	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	2,128	319	2,447	-	-	2,447	-	-	-	-	-	-	-	34,287
5b.4.7	DOC Staff Cost	-	-	-	-	-	-	11,846	1,777	13,623	-	-	13,623	-	-	-	-	-	-	-	137,043
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	5,797	869	6,666	-	-	6,666	-	-	-	-	-	-	-	67,229
5b.4	Subtotal Period 5b Period-Dependent Costs	-	7,568	-	-	-	-	21,853	4,351	33,773	-	-	33,773	-	-	-	-	-	-	-	238,558
5b.0	TOTAL PERIOD 5b COST	-	56,625	-	-	-	-	21,970	11,727	90,322	95	-	90,227	-	-	-	-	-	-	437,462	239,306
PERIOD 5 TOTALS		-	56,625	-	-	-	-	21,970	11,727	90,322	95	-	90,227	-	-	-	-	-	-	437,462	239,306
TOTAL COST TO DECOMMISSION		**14,953**	**145,514**	**22,568**	**12,430**	**-**	**58,818**	**763,388**	**169,405**	**1,187,075**	**844,618**	**237,391**	**105,067**	**-**	**488,487**	**501**	**393**	**2,217**	**26,710,680**	**1,522,432**	**6,208,073**

TOTAL COST TO DECOMMISSION WITH 16.65% CONTINGENCY:	**$1,187,075**	**thousands of 2014 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 71.15% OR:	**$844,618**	**thousands of 2014 dollars**
SPENT FUEL MANAGEMENT COST IS 20% OR:	**$237,391**	**thousands of 2014 dollars**
NON-NUCLEAR DEMOLITION COST IS 8.85% OR:	**$105,067**	**thousands of 2014 dollars**
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	**489,381**	**cubic feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**2,217**	**Cubic Feet**
TOTAL SCRAP METAL REMOVED:	**74,045**	**Tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,522,432**	**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 F

ISFSI DECOMMISSIONING

Page

DECON and SAFSTOR Alternative F-2

Delayed DECON Alternative F-3

Table F-1
Braidwood Nuclear Power Station
ISFSI Decommissioning Cost Estimate
DECON and SAFSTOR Decommissioning Alternatives
(thousands of 2014 dollars)

Activity Description	Removal Costs	Packaging Costs	Transport Costs	LLRW Disposal Costs	Other Costs	Total Costs	Burial Volume Class A (cubic feet)	Craft Manhours	Oversight and Contractor Manhours
Decommissioning Contractor									
Planning (characterization, specs and procedures)	-	-	-	-	451	451	-	-	1,288
Decontamination (activated overpack disposition)	401	415	649	1,787	19	3,270	29,098	4,234	
License Termination (radiological surveys)	-	-	-	-	2,329	2,329	-	19,338	-
Subtotal	**401**	**415**	**649**	**1,787**	**2,800**	**6,051**	**29,098**	**23,572**	**1,288**
Supporting Costs									
NRC and NRC Contractor Fees and Costs	-	-	-	-	384	384	-	-	776
Insurance					124	124			
Property Taxes					326	326			
Plant Energy Budget					-	-			
Security Staff Cost					295	295			4,937
Oversight Staff Cost					299	299			3,740
Subtotal	**-**	**-**	**-**	**-**	**1,428**	**1,428**	**-**	**-**	**9,453**
Total (w/o contingency)	**401**	**415**	**649**	**1,787**	**4,227**	**7,478**	**29,098**	**23,572**	**10,741**
Total (w/25% contingency)						**9,348**			

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

Table F-2
Braidwood Nuclear Power Station
ISFSI Decommissioning Cost Estimate
Delayed DECON Decommissioning Alternative
(thousands of 2014 dollars)

Activity Description	Removal Costs	Packaging Costs	Transport Costs	LLRW Disposal Costs	Other Costs	Total Costs	Burial Volume Class A (cubic feet)	Craft Manhours	Oversight and Contractor Manhours
Decommissioning Contractor									
Planning (characterization, specs and procedures)	-	-	-	-	273	273	-	-	1,072
Decontamination (activated overpack disposition)	291	415	557	1,786	19	3,068	29,086	3,368	
License Termination (radiological surveys)	-	-	-	-	1,440	1,440	-	11,896	-
Subtotal	**291**	**415**	**557**	**1,786**	**1,732**	**4,781**	**29,086**	**15,264**	**1,072**
Supporting Costs									
NRC and NRC Contractor Fees and Costs	-	-	-	-	384	384	-	-	776
Insurance					124	124			
Property Taxes					326	326			
Plant Energy Budget					-	-			
Security Staff Cost					295	295			4,937
Oversight Staff Cost					299	299			3,740
Subtotal	**-**	**-**	**-**	**-**	**1,428**	**1,428**	**-**	**-**	**9,453**
Total (w/o contingency)	**291**	**415**	**557**	**1,786**	**3,160**	**6,208**	**29,086**	**15,264**	**10,525**
Total (w/25% contingency)						**7,761**			

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

ATTACHMENT 2

Byron Station, Units 1 and 2
Decommissioning Cost Estimate

DECOMMISSIONING COST ANALYSIS

for the

BYRON NUCLEAR POWER STATION

prepared for

Exelon Generation Company LLC

prepared by

TLG Services, Inc.
Bridgewater, Connecticut

September 2014

APPROVALS

Project Manager	William A. Cloutier **William A. Cloutier, Jr.**	15 Sept 2014 **Date**
Project Engineer	**John A. Carlson**	9/15/14 **Date**
Technical Manager	**Francis W. Seymore**	9/15/14 **Date**

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REVISION LOG

No.	CRA No.	Date	Item Revised	Reason for Revision
0		09-05-2014		Original Issue
1		09-15-2014	Section 6 text	Clarification to Comparison of the 2009 and 2014 Estimates; specifically on Property Taxes and Decommissioning and Demolition

EXECUTIVE SUMMARY

This report presents estimates of the cost to decommission the Byron Nuclear Power Station (Byron) for the selected decommissioning scenarios following a scheduled cessation of plant operations. The updated estimates are designed to provide Exelon Generation Company LLC (Exelon) with the information to assess its current decommissioning liability, as it relates to the nuclear station.

The analysis relies upon site-specific, technical information, developed in an evaluation in 2009,[1] and updated to reflect current assumptions pertaining to the disposition of the nuclear units and relevant industry experience in undertaking such projects. The costs are based on several key assumptions in areas of regulation, component characterization, high-level radioactive waste management, low-level radioactive waste disposal, performance uncertainties (contingency) and site restoration requirements.

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

The 2009 inventory, the basis for the decontamination and dismantling requirements and cost, and the decommissioning waste streams, was reviewed for this analysis. No substantive changes were identified to the configuration of the station or site facilities (that would impact decommissioning).

The costs to decommission Byron for the scenarios evaluated are tabulated at the end of this section. Costs are reported in 2014 dollars and include monies anticipated to be spent for radiological remediation and operating license termination, spent fuel management, and site restoration activities.

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

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1 "Decommissioning Cost Analysis for the Byron Nuclear Power Station," Document No. E16-1555-013, Rev. 0, TLG Services, Inc., September 2009

Consistent with the 2009 analysis, the current cost estimates assume that the shutdown of the nuclear station is a scheduled and pre-planned event (e.g., there is no delay in transitioning the plant and workforce from operations or in obtaining regulatory relief from operating requirements, etc.). The estimates incorporate a minimum cooling period of approximately five and one-half years for the spent fuel in the storage pool at the cessation of Unit 2 operations. In the DECON and SAFSTOR scenarios, any residual fuel remaining in the pool after the cooling period is relocated to an on-site independent spent fuel storage installation (ISFSI) to await transfer to a Department of Energy (DOE) facility (the fuel present in the spent fuel pools or reactors is assumed to remain in the storage pool for the Delayed DECON scenario and transferred directly from the pool to DOE). The estimates also include the dismantling of non-essential structures and limited restoration of the site.

Alternatives and Regulations

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

> DECON is defined as "the alternative in which the equipment, structures, and portions of a facility and site containing radioactive contaminants are removed or decontaminated to a level that permits the property to be released for unrestricted use shortly after cessation of operations."[3]
>
> SAFSTOR is defined as "the alternative in which the nuclear facility is placed and maintained in a condition that allows the nuclear facility to be safely stored and subsequently decontaminated (deferred decontamination) to levels that permit release for unrestricted use."[4] Decommissioning is to be completed within 60 years, although longer time periods will be considered when necessary to protect public health and safety.

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

3 Ibid. Page FR24022, Column 3

4 Ibid.

> ENTOMB is defined as "the alternative in which radioactive contaminants are encased in a structurally long-lived material, such as concrete; the entombed structure is appropriately maintained and continued surveillance is carried out until the radioactive material decays to a level permitting unrestricted release of the property."[5] As with the SAFSTOR alternative, decommissioning is currently required to be completed within 60 years.
>
> The 60-year restriction has limited the practicality for the ENTOMB alternative at commercial reactors that generate significant amounts of long-lived radioactive material. In 1997, the Commission directed its staff to re-evaluate this alternative and identify the technical requirements and regulatory actions that would be necessary for entombment to become a viable option. The resulting evaluation provided several recommendations, however, rulemaking has been deferred based upon several factors (e.g., no licensee has committed to pursuing the entombment option, the unresolved issues associated with the disposition of greater-than-Class C material (GTCC), and the NRC's current priorities) at least until after the additional research studies are complete. The Commission concurred with the staff's recommendation.

In 1996, the NRC amended its decommissioning regulations to clarify ambiguities and codify procedures and terminology as a means of enhancing efficiency and uniformity in the decommissioning process.[6] The amendments allow for greater public participation and better define the transition process from operations to decommissioning. Regulatory Guide 1.184, issued in July 2000, further described the methods and procedures acceptable to the NRC staff for implementing the requirements of the 1996 amendments relating to the initial activities and major phases of the decommissioning process. The costs and schedules presented in this analysis follow the general guidance and processes described in 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]

In 2011, the NRC published amended regulations to improve decommissioning planning and thereby reduce the likelihood that any current operating facility will

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5 Ibid. Page FR24023, Column 2

6 U.S. Code of Federal Regulations, Title 10, Parts 2, 50, and 51, "Decommissioning of Nuclear Power Reactors," NRC, 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

become a legacy site.[8] The amended regulations require licensees to conduct their operations to minimize the introduction of residual radioactivity into the site, which includes the site's subsurface soil and groundwater. Licensees also may be required to perform site surveys to determine whether residual radioactivity is present in subsurface areas and to keep records of these surveys with records important for decommissioning. The amended regulations require licensees to report additional details in their decommissioning cost estimate as well as requiring additional financial reporting and assurances. These additional details are included in this analysis, including the ISFSI decommissioning estimate (Appendix F).

Decommissioning Scenarios

The following scenarios were evaluated and are representative of the alternatives available to the owner. The scenarios assume that the units operate for 60 years, followed by a planned and scheduled shutdown.

1. DECON: The first scenario assumes that the two units are promptly decommissioned as an integrated activity. Spent fuel is relocated from the wet storage pool to the ISFSI so as to facilitate decontamination and dismantling activities within the fuel handling building. Spent fuel storage operations continue at the site, independent of decommissioning operations, until the transfer of the fuel to the DOE is complete, assumed for purposes of this study to be in the year 2070. At that time, the ISFSI is decommissioned and the site released for alternative use.

2. Delayed DECON: In the second scenario, the units are prepared for an abbreviated period of safe-storage. The spent fuel resident in the fuel handling building's storage pool, remains in the pool until it can be transferred to the DOE (i.e., the ISFSI is not used to off-load the pool following the cessation of operations). Spent fuel placed at the ISFSI during operations remains in storage until the pool is emptied at which time the ISFSI is also emptied. Decommissioning is scheduled to commence once the transfer of the fuel to the DOE is complete (i.e., in the year 2070).

3. SAFSTOR: The units are also placed into safe-storage in the third scenario. However, decommissioning is deferred beyond the fuel storage period to the maximum extent permitted by the current regulations. Similar to the DECON alternative, the spent fuel in the wet storage pool is relocated to the ISFSI for interim storage. The units remain in protective storage following the removal

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

of spent fuel from the site. Decommissioning operations commence such that license termination is completed within the required 60-year period. As with the first two scenarios, decommissioning activities at the two units are sequenced and integrated so as to minimize the total duration of the physical dismantling process.

Methodology

The methodology used to develop the estimates described within this document follows the basic approach originally presented in the cost estimating guidelines [9] developed by the Atomic Industrial Forum (now Nuclear Energy Institute). This reference describes a unit factor method for determining decommissioning activity costs. The unit factors used in this analysis incorporate site-specific costs and the latest available information on worker productivity in decommissioning.

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

Contingency

Consistent with standard cost estimating practice, contingencies are applied to the decontamination and dismantling costs as "specific provision for unforeseeable elements of cost within the defined project scope, particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur."[10] 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.

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

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

The use and role of contingency within decommissioning estimates is not a safety factor issue. Safety factors provide additional security and address situations that may never occur. Contingency funds, by contrast, are expected to be fully expended throughout the program. Inclusion of contingency is necessary to provide assurance that sufficient funding will be available to accomplish the intended tasks.

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,[11] and its Amendments of 1985,[12] the states became ultimately responsible for the disposition of low-level radioactive waste generated within their own borders.

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

Disposition of the various waste streams produced by the decommissioning process considered all options and services currently available to Exelon. The majority of the low-level radioactive waste designated for direct disposal (Class A[13]) can be sent to Energy*Solutions*' facility in Clive, Utah. Therefore, disposal costs for Class A waste were based upon Exelon's *Life of Plant Agreement* with Energy*Solutions*. This facility is not licensed to receive the higher activity portion (Classes B and C) of the decommissioning waste stream.

As a proxy for future disposal facilities, waste disposal costs for the higher activity waste (Class B and C) are based upon the last published rate schedule for non-compact waste for the Barnwell facility, adjusted for escalation of the Atlantic Compact rates.

Material exceeding Class C limits (limited to material closest to the reactor core and comprising a small percentage of the total waste volume) is generally not suitable for shallow-land disposal. For purposes of this analysis, GTCC radioactive waste is assumed to be packaged and disposed of in a similar manner to, and at a cost equivalent to that envisioned for the spent fuel. The GTCC is either stored on site with

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

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

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

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).

High-Level Radioactive Waste Management

Congress passed the "Nuclear Waste Policy Act" (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 DOE was to begin accepting spent fuel by January 31, 1998; however, to date no progress in the removal of spent fuel from commercial generating sites has been made.

Today, the country is at an impasse on high-level waste disposal, even with the License Application for a geologic repository submitted by the DOE to the NRC in 2008. The current administration has cut the budget for the repository program while promising to "conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle … and make recommendations for a new plan."[14] Towards this goal, the administration appointed a Blue Ribbon Commission on America's Nuclear Future (Blue Ribbon Commission) to make recommendations for a new plan for nuclear waste disposal. The Blue Ribbon Commission's charter includes a requirement that it consider "[o]ptions for safe storage of used nuclear fuel while final disposition pathways are selected and deployed."[15]

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

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

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14 Blue Ribbon Commission on America's Nuclear Future Charter, http://cybercemetery.unt.edu/archive/brc/20120620215336/http://brc.gov/index.php?q=page/charter

15 Ibid.

16 "Blue Ribbon Commission on America's Nuclear Future, Report to the Secretary of Energy," http://www.brc.gov/sites/default/files/documents/brc_finalreport_jan2012.pdf, p. 32, January 2012

17 Ibid., p.27

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

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

- Sites, designs and licenses, constructs and begins operations of a pilot interim storage facility by 2021 with an initial focus on accepting used nuclear fuel from shut-down reactor sites;
- Advances toward the siting and licensing of a larger interim storage facility to be available by 2025 that will have sufficient capacity to provide flexibility in the waste management system and allows for acceptance of enough used nuclear fuel to reduce expected government liabilities; and
- Makes demonstrable progress on the siting and characterization of repository sites to facilitate the availability of a geologic repository by 2048."[19]

The NRC's review of DOE's license application to construct a geologic repository at Yucca Mountain was suspended in 2011 when the Administration slashed the budget for completing that work. However, the US Court of Appeals for the District of Columbia Circuit recently issued a writ of mandamus (in August 2013) [20] ordering NRC to comply with federal law and restart its review of DOE's Yucca Mountain repository license application to the extent of previously appropriated funding for the review.

Completion of the decommissioning process is dependent upon the DOE's ability to remove spent fuel from the site in a timely manner. DOE's repository program had assumed that spent fuel allocations would be accepted for disposal from the nation's commercial nuclear plants, with limited exceptions, in the order (the "queue") in

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18 "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," U.S. DOE, January 11, 2013

19 Ibid., p.2

20 United States Court of Appeals for the District Of Columbia Circuit, In Re: Aiken County, et al, August 2013 http://www.cadc.uscourts.gov/internet/opinions.nsf/BAE0CF34F762EBD985257BC6004DEB18/$file/11-1271-1451347.pdf

which it was discharged from the reactor.[21] With a large fleet of reactors, Exelon may be able to re-assign allocations between its units to minimize on-site storage costs.

Assuming a 2025 start date for DOE initiating transfer of commercial spent fuel to a federal facility (based upon the proposed timeline for the availability of the larger interim storage facility), the assemblies generated from Byron operations are projected to be shipped from the Byron site in the years 2066 through 2070 (assuming the cessation of plant operations in 2044 and 2046 for Units 1 and 2, respectively). This equates to 94 multi-purpose canisters (at 32 assemblies per canister), in addition to the 61 on the pad from operations.

An ISFSI, operated under a Part 50 General License (in accordance with 10 CFR 72, Subpart K[22]), has been constructed to support continued plant operations. This analysis assumes that the facility can be expanded to support decommissioning operations (in the DECON and SAFSTOR scenarios).

The spent fuel in the wet storage pools at the cessation of plant operations is expected to be transferred to the ISFSI (DECON and SAFSTOR scenarios) within the first five and one-half years following shutdown. Once the wet storage pool is emptied, the fuel handling building can be either decontaminated and dismantled or prepared for long-term storage. The pool is kept operational in the Delayed DECON scenario until the spent fuel stored in the pools can be transferred to the DOE.

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

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21 U.S. Code of Federal Regulations, Title 10, Part 961.11, Article IV – Responsibilities of the Parties, B. DOE Responsibilities, 5.(a) … DOE shall issue an annual acceptance priority ranking for receipt of SNF and/or HLW at the DOE repository. This priority ranking shall be based on the age of SNF and/or HLW as calculated from the date of discharge of such materials from the civilian nuclear power reactor. The oldest fuel or waste will have the highest priority for acceptance …"

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

Site Restoration

The efficient removal of the contaminated materials at the site will result in damage to many of the site structures. Blasting, coring, drilling, and the other decontamination activities will substantially damage power block structures, potentially weakening the footings and structural supports. Prompt demolition once the license is terminated is clearly the most appropriate and cost-effective option. It is unreasonable to anticipate that these structures would be repaired and preserved after the radiological contamination is removed. The effort to dismantle site structures with a work force already mobilized is more efficient and less costly than if the process were deferred. Experience at shutdown generating stations has shown that plant facilities quickly degrade without maintenance, adding additional expense and creating potential hazards to the public and the demolition work force.

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

Consequently, this analysis assumes that non-essential site structures within the restricted access area are removed to a nominal depth of three feet below the local grade level wherever possible. The site is then graded and stabilized.

Summary

The costs to decommission Byron were evaluated for several decommissioning scenarios, incorporating the attributes of both the DECON and SAFSTOR decommissioning alternatives. Regardless of the timing of the decommissioning activities, the estimates assume the eventual removal of all the contaminated and activated plant components and structural materials, such that the facility operator may then have unrestricted use of the site with no further requirement for an operating license. Delayed decommissioning is initiated after the spent fuel has been removed from the site and is accomplished within the 60-year period required by current NRC regulations. In the interim, the spent fuel remains in storage at the site until such time that the transfer to a DOE facility can be completed. Once the transfer is complete, the storage facilities are also decommissioned.

The scenarios analyzed for the purpose of generating the estimates are described in Section 2. The assumptions are presented in Section 3, along with schedules of annual expenditures. The major cost contributors are identified in Section 6, with detailed activity costs, waste volumes, and associated manpower requirements

delineated in Appendices C, D, and E. Cost summaries for the various scenarios are provided at the end of this section for the major cost components.

The cost elements in the estimates for the DECON and SAFSTOR alternatives are assigned to one of three subcategories: NRC License Termination (radiological remediation), Spent Fuel Management, and Site Restoration. The subcategory "NRC License Termination" is used to accumulate costs that are consistent with "decommissioning" as defined by the NRC in its financial assurance regulations (i.e., 10 CFR §50.75). The cost reported for this subcategory is generally sufficient to terminate the operating license(s), recognizing that there may be some additional cost impact from spent fuel management. The License Termination cost subcategory also includes costs to decommission the ISFSI (as required by 10 CFR §72.30). Section 3.5.1 provides the basis for the ISFSI decommissioning cost.

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

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

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

As noted within this document, the estimates were developed and costs are presented in 2014 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 station or during the decommissioning period.

SUMMARY OF DECOMMISSIONING COST ELEMENTS
DECON ALTERNATIVE
(thousands of 2014 dollars)

Cost Element	Unit 1	Unit 2	Total
Decontamination	15,331	23,038	38,368
Removal	123,116	169,939	293,055
Packaging	31,386	30,130	61,516
Transportation	18,769	16,350	35,119
Waste Disposal	92,380	85,612	177,992
Off-site Waste Processing	0	0	0
Program Management [1]	260,099	295,868	555,968
Security	40,382	86,575	126,957
Spent Fuel Pool Isolation	0	12,434	12,434
Spent Fuel Management [2]	144,255	140,851	285,106
Insurance and Regulatory Fees	18,777	15,633	34,410
Energy	11,752	12,320	24,072
Characterization and Licensing Surveys	25,084	24,530	49,614
Property Taxes	50,959	49,851	100,810
Miscellaneous Equipment	6,639	6,958	13,598
Site O&M	4,975	4,593	9,568
Total [3]	843,904	974,682	1,818,587

Cost Element			
NRC License Termination	560,921	666,303	1,227,223
Spent Fuel Management	203,244	199,840	403,084
Site Restoration	79,740	108,540	188,280
Total [3]	843,904	974,682	1,818,587

[1] Includes engineering 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

SUMMARY OF DECOMMISSIONING COST ELEMENTS
DELAYED DECON ALTERNATIVE
(thousands of 2014 dollars)

Cost Element	Unit 1	Unit 2	Total
Decontamination	13,137	19,289	32,426
Removal	126,306	171,327	297,633
Packaging	26,060	25,073	51,133
Transportation	16,793	14,045	30,837
Waste Disposal	81,682	74,749	156,431
Off-site Waste Processing	0	0	0
Program Management [1]	361,785	372,600	734,385
Security	102,701	112,798	215,500
Spent Fuel Pool Isolation	0	12,434	12,434
Spent Fuel Management [2]	87,175	81,936	169,111
Insurance and Regulatory Fees	35,732	31,928	67,659
Energy	23,002	23,120	46,122
Characterization and Licensing Surveys	26,173	25,272	51,444
Property Taxes	56,104	54,993	111,097
Miscellaneous Equipment	12,236	12,605	24,841
Site O&M	6,852	6,469	13,321
Total [3]	975,737	1,038,639	2,014,375

Cost Element			
NRC License Termination	592,143	722,840	1,314,983
Spent Fuel Management	304,536	208,046	512,582
Site Restoration	79,057	107,752	186,810
Total [3]	975,737	1,038,639	2,014,375

[1] Includes engineering 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

SUMMARY OF DECOMMISSIONING COST ELEMENTS
SAFSTOR ALTERNATIVE
(thousands of 2014 dollars)

Cost Element	Unit 1	Unit 2	Total
Decontamination	13,120	19,258	32,378
Removal	127,990	173,043	301,033
Packaging	26,060	25,066	51,125
Transportation	16,852	14,086	30,939
Waste Disposal	80,307	73,346	153,653
Off-site Waste Processing	0	0	0
Program Management [1]	347,085	358,289	705,374
Security	83,256	128,599	211,854
Spent Fuel Pool Isolation	0	12,434	12,434
Spent Fuel Management [2]	142,353	137,114	279,466
Insurance and Regulatory Fees	57,984	54,026	112,010
Energy	24,939	25,077	50,016
Characterization and Licensing Surveys	26,173	25,272	51,444
Property Taxes	70,609	69,499	140,108
Miscellaneous Equipment	16,978	17,719	34,697
Site O&M	11,861	11,478	23,339
Total [3]	1,045,566	1,144,306	2,189,872

Cost Element			
NRC License Termination	776,133	834,580	1,610,713
Spent Fuel Management	189,729	201,327	391,055
Site Restoration	79,704	108,399	188,103
Total [3]	1,045,566	1,144,306	2,189,872

[1] Includes engineering 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

1. INTRODUCTION

This report presents estimates of the cost to decommission the Byron Nuclear Power Station (Byron) for the selected decommissioning scenarios following a scheduled cessation of plant operations. The updated estimates are designed to provide Exelon Generation Company LLC (Exelon) with the information to assess its current decommissioning liability, as it relates to the nuclear station.

The analysis relies upon site-specific, technical information, developed in an evaluation in 2009,[1] * and updated to reflect current assumptions pertaining to the disposition of the nuclear units and relevant industry experience in undertaking such projects. The costs are based on several key assumptions in areas of regulation, component characterization, high-level radioactive waste management, low-level radioactive waste disposal, performance uncertainties (contingency) and site restoration requirements.

The analysis is not a comprehensive engineering evaluation, but presents estimates prepared in advance of the detailed planning required to execute the decommissioning of the nuclear unit. It may also not reflect the actual plan to decommission Byron; the plan may differ from the assumptions made in this analysis based on facts that exist at the time of decommissioning.

1.1 OBJECTIVES OF STUDY

The objectives of this study are to prepare comprehensive estimates of the cost to decommission Byron, to provide a sequence or schedule for the associated activities, and to develop waste stream projections from the decontamination and dismantling activities. Operating licenses were issued on October 31, 1984, for Unit 1 and November 6, 1986, for Unit 2. A sixty year operating lifetime has been assumed for the purpose of this study. As such, the cessation of operations would then be October 31, 2044, for Unit 1 and November 6, 2046, for Units 1 and 2, respectively. These dates were used to schedule the decommissioning activities.

1.2 SITE DESCRIPTION

Byron is located in northern Illinois. The site is situated in a predominately agricultural area approximately 3.7 miles southwest of the city of Byron and

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

2.2 miles east of Rock River, in Ogle County. The station is comprised of two essentially identical pressurized water reactors with supporting facilities.

The primary coolant system for each unit consists of a pressurized water reactor system designed by the Westinghouse Corporation. The reactor coolant system is comprised of the reactor vessel and four heat transfer loops. Each loop contains a reactor coolant pump, steam generator, and associated piping and valves. In addition, the system includes a pressurizer, a pressurizer relief tank, interconnected piping, and instrumentation necessary for operational control. Components of the reactor coolant system are located in the containment building. The design reactor thermal power level is 3,645 Megawatts thermal (MWth). The corresponding electrical outputs are approximately 1,295 Megawatts electric (MWe) and 1,265 MWe for Units 1 and 2, respectively.

The containment structure at Byron Station is a prestressed concrete shell structure made up of a cylinder with a shallow dome roof and a flat foundation slab. The entire structure is lined on the inside with steel plate, which acts as a leaktight membrane. The containment completely encloses the entire primary coolant system, including portions of the auxiliary and engineered safety features systems.

Heat produced in the reactor is converted to electrical energy by the power conversion system. A turbine-generator system converts the thermal energy of steam produced in the reactor into mechanical shaft power and then into electrical energy. The main turbine consists of one double-flow, high-pressure turbine and three double-flow, low-pressure turbines. The generator is driven at 1800 rpm and is rated at 1300 MVA. The exhaust steam from the turbine is condensed and deaerated in the main condenser. The heat rejected to the main condenser is removed by the circulating water system.

The essential service water system provides the heat sink required for removal of waste heat in the power plant's thermal cycle. The system has the principal function of removing heat by absorbing this energy in the main condenser. Water is withdrawn from Rock River by the circulating water pumps via the intake pipes. After passing through the plant condensers, the heat added to the circulating water is the rejected to a natural draft cooling tower.

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 recent rulemaking permitting the controlled release of a site, the NRC has re-evaluated this alternative.[4] The resulting feasibility study, based upon an assessment by Pacific Northwest National Laboratory, concluded that the method did have conditional merit for some, if not most, reactors. However, the staff also found that additional rulemaking would be needed before this option could be treated as a generic alternative. The NRC had considered rulemaking to alter the 60-year time for completing decommissioning and to clarify the use of engineered barriers for reactor entombments.[5] However, the NRC's staff has recommended that rulemaking be deferred, based upon several factors, e.g., no

licensee has committed to pursuing the entombment option, the unresolved issues associated with the disposition of greater-than-Class C material (GTCC), and the NRC's current priorities, at least until after the additional research studies are complete. The Commission concurred with the staff's recommendation.

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

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

In 2011, the NRC published amended regulations to improve decommissioning planning and thereby reduce the likelihood that any current operating facility will become a legacy site.[7] The amended regulations require licensees to conduct their operations to minimize the introduction of residual radioactivity into the site, which includes the site's subsurface soil and groundwater. Licensees also may be required to perform site surveys to determine whether residual radioactivity is present in subsurface areas and to keep records of these surveys with records important for decommissioning. The amended regulations require licensees to report additional details in their decommissioning cost estimate as well as requiring additional financial

reporting and assurances. These additional details, including an ISFSI decommissioning estimate, are included in this analysis.

1.3.1 High-Level Radioactive Waste Management

Congress passed the "Nuclear Waste Policy Act" (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 DOE was to begin accepting spent fuel by January 31, 1998; however, to date no progress in the removal of spent fuel from commercial generating sites has been made.

Today, the country is at an impasse on high-level waste disposal, even with the License Application for a geologic repository submitted by the DOE to the NRC in 2008. The current administration has cut the budget for the repository program while promising to "conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle … and make recommendations for a new plan."[8] Towards this goal, the administration appointed a Blue Ribbon Commission on America's Nuclear Future (Blue Ribbon Commission) to make recommendations for a new plan for nuclear waste disposal. The Blue Ribbon Commission's charter includes a requirement that it consider "[o]ptions for safe storage of used nuclear fuel while final disposition pathways are selected and deployed."[9]

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

- "[T]he United States [should] establish a program that leads to the timely development of one or more consolidated storage facilities"
- "[T]he United States should undertake an integrated nuclear waste management program that leads to the timely development of one or more permanent deep geological facilities for the safe disposal of spent fuel and high-level nuclear waste."[10]

In January 2013, the DOE issued the "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," in response to the recommendations made by the Blue Ribbon Commission

and as "a framework for moving toward a sustainable program to deploy an integrated system capable of transporting, storing, and disposing of used nuclear fuel..."[11]

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

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

The NRC's review of DOE's license application to construct a geologic repository at Yucca Mountain was suspended in 2011 when the Administration slashed the budget for completing that work. However, the US Court of Appeals for the District of Columbia Circuit recently issued a writ of mandamus (in August 2013)[12] ordering NRC to comply with federal law and restart its review of DOE's Yucca Mountain repository license application to the extent of previously appropriated funding for the review.

Completion of the decommissioning process is dependent upon the DOE's ability to remove spent fuel from the site in a timely manner. DOE's repository program had assumed that spent fuel allocations would be accepted for disposal from the nation's commercial nuclear plants, with limited exceptions, in the order (the "queue") in which it was discharged from the reactor.[13] With a large fleet of reactors, Exelon may be able to re-assign allocations between its units to minimize on-site storage costs.

Assuming a 2025 start date for DOE initiating transfer of commercial spent fuel to a federal facility (based upon the proposed timeline for the availability of the larger interim storage facility), the assemblies generated from Byron operations are projected to be shipped from the

Byron site in the years 2066 through 2070 (assuming the cessation of plant operations in 2044 and 2046 for Units 1 and 2, respectively). This equates to 94 multi-purpose canisters (at 32 assemblies per canister), in addition to the 61 on the pad from operations.

An ISFSI, operated under a Part 50 General License (in accordance with 10 CFR 72, Subpart K[14]), has been constructed to support continued plant operations. This analysis assumes that the facility can be expanded to support decommissioning operations (in the DECON and SAFSTOR scenarios).

The spent fuel in the wet storage pools at the cessation of plant operations is expected to be transferred to the ISFSI (DECON and SAFSTOR scenarios) within the first five and one-half years following shutdown. Once the wet storage pool is emptied, the fuel handling building can be either decontaminated and dismantled or prepared for long-term storage. The spent fuel pool is kept operational in the Delayed DECON scenario until the transfer of spent fuel from the pool to the DOE can be completed.

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

1.3.2 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,[15] and its Amendments of 1985,[16] the states became ultimately responsible for the disposition of low-level radioactive waste generated within their own borders. It was expected that groups of states would combine together to jointly deal with their radioactive wastes; these organizations are referred to as waste disposal compacts.

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

All options and services currently available to Exelon for disposition of the various waste streams produced by the decommissioning process were considered. The majority of the low-level radioactive waste designated for direct disposal (Class A[17]) can be sent to Energy*Solutions*' facility in Clive, Utah. Therefore, disposal costs for Class A waste were based upon Exelon's *Life of Plant Agreement* with Energy*Solutions*. This facility is not licensed to receive the higher activity portion (Classes B and C) of the decommissioning waste stream.

As a proxy for future disposal facilities, waste disposal costs for the higher activity waste (Class B and C) are based upon the last published rate schedule for non-compact waste for the Barnwell facility, adjusted for escalation of the Atlantic Compact rates.

Material exceeding Class C limits (limited to material closest to the reactor core and comprising a small percentage of the total waste volume) is generally not suitable for shallow-land disposal. For purposes of this analysis, GTCC radioactive waste is assumed to be packaged and disposed of in a similar manner to, and at a cost equivalent to that envisioned for the spent fuel. The GTCC is either stored on site 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).

1.3.3 Radiological Criteria for License Termination

In 1997, the NRC published Subpart E, "Radiological Criteria for License Termination,"[18] amending 10 CFR §20. This subpart provides radiological criteria for releasing a facility for unrestricted use. The regulation states that the site can be released for unrestricted use if radioactivity levels are such that the average member of a critical group would not receive a Total Effective Dose Equivalent (TEDE) in excess of 25 millirem per year, and provided that residual radioactivity has been reduced to levels that are As Low As Reasonably Achievable (ALARA). The decommissioning estimates for Byron assume that the site will be remediated to a residual level consistent with the NRC-prescribed level.

It should be noted that the NRC and the Environmental Protection Agency (EPA) differ on the amount of residual radioactivity considered acceptable in site remediation. The EPA has two limits that apply to radioactive materials. An EPA limit of 15 millirem per year is derived from criteria established by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund).[19] An additional limit of 4 millirem per year, as defined in 40 CFR §141.16, is applied to drinking water.[20]

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)[21] 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 Byron for three variations of the approved decommissioning alternatives: DECON and SAFSTOR. Although the scenarios differ with respect to technique, process, cost, and schedule, they attain the same result: the ultimate release of the site for unrestricted use.

The following scenarios were evaluated and are representative of the alternatives available to the owner. The scenarios assume that the units operate for 60 years, followed by a planned and scheduled shutdown.

1. DECON: The first scenario assumes that the two units are promptly decommissioned as an integrated activity. Spent fuel in the wet storage pool is relocated to the ISFSI so as to facilitate decontamination and dismantling activities within the fuel handling building. Spent fuel storage operations continue at the site, independent of decommissioning operations, until the transfer of the fuel to the DOE is complete, assumed for purposes of this study to be in the year 2070. At that time, the ISFSI is decommissioned and the site released for alternative use.

2. Delayed DECON: In the second scenario, the units are prepared for an abbreviated period of safe-storage. The spent fuel resident in the fuel handling building's storage pool, remains in the pool until it can be transferred to the DOE (i.e., the ISFSI is not used to off-load the pool following the cessation of operations). Spent fuel placed at the ISFSI during operations remains in storage until the pool is emptied at which time the ISFSI is also emptied. Decommissioning is scheduled to commence once the transfer of the fuel to the DOE is complete (i.e., in the year 2070).

3. SAFSTOR: The units are also placed into safe-storage in the third scenario. However, decommissioning is deferred beyond the fuel storage period to the maximum extent permitted by the current regulations. Similar to the DECON alternative, the spent fuel in the wet storage pool is relocated to the ISFSI for interim storage. The units remain in protective storage following the removal of spent fuel from the site. Decommissioning operations commence such that license termination is completed within the required 60-year period. As with the first two scenarios, decommissioning activities at the two units are sequenced and integrated so as to minimize the total duration of the physical dismantling process.

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

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

The second phase encompasses activities during the storage period or during major decommissioning activities, or a combination of the two. The third phase pertains to the activities involved in license termination. The decommissioning estimates developed for Byron 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 of cessation of operations, provides a description of the licensee's planned decommissioning activities, a timetable, and the associated financial requirements of the intended decommissioning program. Upon receipt of the PSDAR, the NRC will make the document available to the public for comment in a local meeting to be held in the vicinity of the reactor site. Ninety days following submittal and NRC receipt of the PSDAR, the licensee may begin to perform major decommissioning activities under a modified 10 CFR §50.59 procedure (10 CFR §50.59 establishes the conditions under which licensees may make changes to the facility or procedures and conduct test or experiments, i.e., without prior 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, and work packages and procedures, would be assembled to support the proposed decontamination and dismantling activities.

Site Preparations

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

- Characterization of the site and surrounding environs. This includes radiation surveys of work areas, major components (including the reactor vessel and its internals), internal piping, and biological shield cores.
- Isolation of the spent fuel storage pool and fuel handling systems, such that decommissioning operations can commence on the balance of the plant. Decommissioning operations are scheduled around the fuel handling areas to optimize the overall project schedule. The fuel is transferred to the ISFSI as it decays to the point that it meets the heat load criteria of the containers. Consequently, it is assumed that the fuel pool remains operational for approximately five and one-half years following the cessation of Unit 2 operations.
- Specification of transport and disposal requirements for activated materials and/or hazardous materials, including shielding and waste stabilization.
- Development of procedures for occupational exposure control, control and release of liquid and gaseous effluent, processing of radwaste (including dry-active waste, resins, filter media, metallic and non-metallic components generated in decommissioning), site security and emergency programs, and industrial safety.

2.1.2 Period 2 - Decommissioning Operations

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

10 CFR §50 operating license. Significant decommissioning activities in this phase include:

- Construction of temporary facilities and/or modification of existing facilities to support dismantling activities. This may include a centralized processing area to facilitate equipment removal and component preparations for off-site disposal.
- Reconfiguration and modification of site structures and facilities as needed to support decommissioning operations. This may include the upgrading of roads (on- and off-site) to facilitate hauling and transport. Modifications may be required to the containment structure to facilitate access of large/heavy equipment. Modifications may also be required to the refueling area of the 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.
- 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 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 former 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 steam generator cubicles necessary for access and component extraction are removed.
- Removal of the steam generators and pressurizer for material recovery and controlled 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 lightweight grout). Steel shielding is added, as necessary, to those external areas of the package to meet transportation limits and regulations.
- Transfer of the spent fuel from the storage pool to the ISFSI pad for interim storage.
- Expansion of the ISFSI and transfer of the spent fuel from the storage pool to the ISFSI pad for interim storage. Spent fuel storage operations continue throughout the active decommissioning period. Fuel transfer is expected to begin in 2066 and to be completed by the end of the year 2070.

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

- Removal of remaining plant systems and associated components as they become nonessential to the decommissioning program or worker health and safety (e.g., waste collection and treatment systems, electrical power and ventilation systems).
- Removal of the steel liners from the 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 structures.
- Removal of the contaminated equipment and material from the auxiliary and fuel buildings, and any other contaminated facility. Use radiation and contamination control techniques until radiation surveys 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 will facilitate surface decontamination and subsequent verification surveys required prior to obtaining release for demolition.
- Removal of the remaining components, equipment, and plant services in support of the area release survey(s).
- Routing of material removed during 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 for 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)."[22] This document incorporates the statistical approaches to survey design and data interpretation used by the EPA. It also identifies commercially available instrumentation and procedures for conducting radiological surveys. Use of this guidance ensures that the surveys are conducted in a manner that provides a high degree of confidence that applicable NRC criteria are satisfied. Once the survey is complete, the results are provided to the NRC in a format that can be

verified. The NRC then reviews and evaluates the information, performs an independent confirmation of radiological site conditions, and makes a determination on final termination of the license.

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

2.1.3 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 may result in substantial damage to many of the structures. Although performed in a controlled, safe manner, blasting, coring, drilling, scarification (surface removal), and the other decontamination activities will substantially degrade power block structures including the reactor 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 effort to dismantle site structures with a work force already mobilized on site is more efficient than if the process were deferred. Site facilities quickly degrade without maintenance, adding additional expense and creating potential hazards to the public as well as to future workers. Abandonment creates a breeding ground for vermin infestation as well as other biological hazards.

This cost study presumes that non-essential structures and site facilities are dismantled as a continuation of the decommissioning activity.

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

Concrete rubble produced by demolition activities is processed to remove rebar and miscellaneous embedments. The processed material is then used on site to backfill voids. Excess materials are trucked to an off-site area for disposal as construction debris.

2.1.4 ISFSI Operations and Decommissioning

The ISFSI will continue to operate under the general license provisions of 10 CFR §72 following the amendment of the §50 operating license to release the adjacent (power block) property. Assuming the DOE starts accepting fuel in 2025, transfer of spent fuel from Byron is anticipated to begin in 2066 and continue through the year 2070.

At the conclusion of the spent fuel transfer process, the ISFSI will be decommissioned. The Commission will terminate the Part 50 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, and the license for the facility terminated, the modules can be dismantled using conventional techniques for the demolition of reinforced concrete. The concrete storage pad will then be removed, and the area graded and landscaped to conform to the surrounding environment.

2.2 SAFSTOR and DELAYED DECON

The NRC defines SAFSTOR as "the alternative in which the nuclear facility is placed and maintained in a condition that allows the nuclear facility to be safely stored and subsequently decontaminated (deferred decontamination) to levels that permit release for unrestricted use." The facility is left intact (during the dormancy period), with structures maintained in a sound condition. Systems not required to operate in support of the spent fuel pool or site surveillance and security are drained, de-energized, and secured. Minimal cleaning/removal of loose contamination and/or fixation and sealing of remaining contamination are 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. Site preparations are also similar to those for the DECON alternative. However, with the exception of the required radiation surveys and site characterizations, the mobilization and preparation of site facilities is less extensive.

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

2.2.1 Period 1 - Preparations

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

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

- Isolation of the spent fuel storage services and fuel handling systems located in the fuel handling building so that safe-storage operations may commence on the balance of the plant. This activity may be

carried out by plant personnel in accordance with existing operating technical specifications.

- 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 systems, decontaminating them 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 phase 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 their own actions. The security fence, sensors, alarms, and other surveillance equipment provide security. Fire and radiation alarms are also monitored and maintained. While remote surveillance is an option, it does not offer the immediate response time of a physical presence.

The transfer of the spent fuel to a DOE facility continues during this period until complete. Fuel is shipped exclusively from the ISFSI in the SAFSTOR scenario and from both the pool and the ISFSI in the Delayed DECON scenario.

After an optional period of storage (such that license terminations are accomplished within 60 years of final shutdown of Unit 1), it is required that the licensee submit applications to terminate the license, along with an LTP (described in Section 2.1.2), thereby initiating the third phase.

2.2.3 Periods 3 and 4 - Delayed Decommissioning

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

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

the availability of the fuel storage facilities located within the fuel handling building 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 estimates for the delayed scenarios incorporate reduced ALARA controls for the lower occupational exposure potential.

Although the initial radiation levels due to ^{60}Co will decrease during the dormancy period, the internal components of the reactor vessel will still exhibit sufficiently high radiation dose rates to require remote sectioning under water due to the presence of long-lived radionuclides such as ^{94}Nb, ^{59}Ni, and ^{63}Ni. Therefore, the dismantling procedures described for the DECON alternative would still be employed during deferred scenarios. Portions of the 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. If the site structures are to be dismantled, dismantling as a continuation of the decommissioning process is clearly the most appropriate and cost-effective option, as described in Section 2.1.3. The basis for the dismantling cost in the deferred scenarios is consistent with that described for DECON, removal of structures and

site facilities to a nominal depth of three feet below grade and limited restoration of the site.

3. COST ESTIMATE

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

3.1 BASIS OF ESTIMATE

The estimates were developed with site-specific, technical information developed in an evaluation prepared for Exelon in 2009. The information was reviewed for the current analysis and updated as deemed appropriate. The site-specific considerations and assumptions used in the previous evaluation were also revisited. Modifications were incorporated where new information was available or experience from ongoing decommissioning programs provided viable alternatives or improved processes.

3.2 METHODOLOGY

The methodology used to develop the estimates follows the basic approach originally presented in the AIF/NESP-036 study report, "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates,"[23] and the DOE "Decommissioning Handbook."[24] These documents present a unit factor method for estimating decommissioning activity costs, which simplifies the estimating calculations. Unit factors for concrete removal ($/cubic yard), steel removal ($/ton), and cutting costs ($/inch) were developed using local labor rates. The activity-dependent costs were estimated with the item quantities (cubic yards and tons), developed from plant drawings and inventory documents. Removal rates and material costs for the conventional disposition of components and structures relied upon information available in the industry publication, "Building Construction Cost Data," published by R.S. Means.[25]

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, San

Onofre-1, Crystal River and Vermont Yankee nuclear units have provided additional insight into the process, the regulatory aspects, and the technical challenges of decommissioning commercial nuclear units.

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

Work Difficulty Factors

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

- Access Factor 10% to 20%
- Respiratory Protection Factor 10% to 50%
- Radiation/ALARA Factor 10% to 40%
- Protective Clothing Factor 10% to 30%
- Work Break Factor 8.33%

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

Scheduling Program Durations

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

An activity duration critical path is used to determine the total decommissioning program schedule. The schedule is relied upon in calculating the carrying costs, which include program management, administration, field

engineering, equipment rental, and support services such as quality control and security. This systematic approach for assembling decommissioning estimates ensures a high degree of confidence in the reliability of the resulting cost estimate.

3.3 IMPACT OF DECOMMISSIONING MULTIPLE REACTOR UNITS

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

- The sequence of work generally follows the principal that the work is done at Unit 1 first, followed by similar work at Unit 2. This permits the experience gained at Unit 1 to be applied by the workforce at the second unit. It should be noted however, that the estimates do not consider productivity improvements at the second unit, since there is little documented experience with decommissioning two units simultaneously The work associated with developing activity specifications and procedures can be considered essentially identical between the two units, therefore the second unit costs are assumed to be a fraction of the first unit (~ 43%).
- Segmenting the reactor vessel and internals will require the use of special equipment. The decommissioning project will be scheduled such that Unit 2's reactor internals and vessel are segmented immediately after the activities at Unit 1 have been completed. This permits sharing of the segmentation equipment between the two units.
- 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. Trying to complete the final status survey of Unit 1, while Unit 2 still has ongoing radiological remediation work and waste handling in process is considered impractical. As such, the transfer of

the spent fuel from the storage pool and subsequent decontamination of the fuel handling building 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 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.

3.4.1 Contingency

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.

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[26] as "specific provision for unforeseeable elements of cost within the defined project scope; particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur." The cost elements in this

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

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

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

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

operation of highly specialized tooling, field conditions, and water clarity.

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

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

Operations and Maintenance Expenses	15%
ISFSI Decommissioning	25%

The contingency values are applied to the appropriate components of the estimates on a line item basis. A composite value is then reported at the end of each estimate. For example, the composite contingency values reported for the DECON alternative are 17.5% and 17.5% for Units 1 and 2, respectively. Values for the other alternatives are delineated within the detailed cost tables in Appendices D and E.

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 (e.g., affecting worker health and safety, site release criteria, waste transportation, and disposal).

- Policy decisions altering national commitments (e.g., in the ability to accommodate certain waste forms for disposition or in the timetable for such, for example, in the start and rate of acceptance of spent fuel by the DOE).
- Pricing changes for basic inputs, such as labor, energy, materials, and burial.

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

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 impacts of the considerations identified below are included in this cost study.

3.5.1 Spent Fuel Management

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

The total inventory of assemblies that will require handling during decommissioning is based upon several assumptions. The pickup of commercial fuel is assumed to begin in the year 2025. The maximum rate at which the fuel is removed from the commercial sites is based upon an annual capacity at the geologic repository of 3,000 metric tons of uranium (MTU). Any delay in the startup of the repository or decrease in the rate of acceptance will correspondingly prolong the transfer process and result in the fuel remaining at the site longer.

In all three scenarios, the ISFSI will continue to operate until such time that the transfer of spent fuel to the DOE can be completed. Assuming that the DOE commences repository operation in 2025, fuel is projected to be removed from the Byron site by the year 2070. In the Delayed DECON scenario, the ISFSI is only used to store fuel placed during plant operations. Spent fuel off-loaded from the reactors after operations cease, remains in the pool during the transfer period. The inventory of fuel assemblies located in the spent fuel pool is preferentially off-loaded as the allocations permit.

Operation and maintenance costs for the storage facilities (the ISFSI and the pool for the Delayed DECON scenario) are included within the estimates and address the cost for staffing the facilities, as well as security, insurance, and licensing fees. The estimates include the costs to purchase (DECON and SAFSTOR scenarios), load, and transfer the fuel storage canisters. Costs are also provided for the final disposition of the facilities once the transfer is complete.

Repository Startup

Operation of the DOE's yet-to-be constructed geologic repository is contingent upon the review and approval of the facility's license application by the NRC, the successful resolution of pending litigation, and the development of a national transportation system. With the appropriate authorizations from Congress, the Administration currently plans to implement a program over the next 10 years that could result in an interim storage facility being available by 2025.

Spent Fuel Management Model

The Exelon nuclear fleet consists of 26 units at 14 sites in Illinois, Pennsylvania, New Jersey, New York and Maryland, including the inactive units at Dresden, Peach Bottom and Zion (Zion is still included in the spent fuel analysis model since the fuel transfer to DOE will be done as part of the Exelon allocation). The ability to complete the decommissioning of these units, particularly for the DECON and Delayed DECON alternatives, is highly dependent upon when the DOE is assumed to remove spent fuel from the sites.

The DOE's repository program assumes that spent fuel will be accepted for disposal from the nation's commercial nuclear plants in the order (the "queue") in which it was removed from service ("oldest fuel first"). A

computer model developed by Exelon Nuclear was used to determine when the DOE would provide allocations in the queue for removal of spent fuel from the individual sites. Repository operations were based upon annual industry-wide receipt of 400 Metric Tons Heavy Metal (MTHM) in the first year of operation, a total of 3,800 MTHM in years 2 through 4 and 3,000 MTHM for year 5 and beyond.[27]

ISFSIs are constructed as necessary to maintain full-core discharge capability at the individual sites. Once the DOE begins repository operations, spent fuel shipments are managed across the fleet to optimize spent fuel storage.

Canister Design

The design and capacity of the ISFSI is based upon a Holtec HI-STORM vertical cask system, with a 32-fuel assembly capacity. This is also the basis for future cask acquisitions. The DOE is assumed to provide the MPC for fuel transferred directly from the pool to the DOE at no cost to the owner.

Canister Loading and Transfer

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

Operations and Maintenance

Annual costs (excluding labor) of approximately $792,000 and $96,000 are used for operation and maintenance of each spent fuel pool and the ISFSI, respectively.

ISFSI Decommissioning

A multi-purpose (storage and transport) dry shielded storage canister with a vertical, reinforced concrete storage module is used as a basis for the cost analysis. The final core off load from each unit, equivalent to 14 total casks, 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 is included in the estimate. Appendix F details the costs

necessary to survey, decontaminate, and terminate the NRC license on the ISFSI facility. The estimates in Appendices C through E also include the costs for the demolition of the ISFSI facility following NRC license termination (as a Site Restoration expense).

3.5.2 Reactor Vessel and Internal Components

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

The reactor pressure vessel and internal components are segmented for disposal in shielded, reusable transportation casks. Segmentation is performed in the 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 will dictate segmentation and packaging methodology.

The dismantling of the reactor internals will generate radioactive waste considered unsuitable for shallow land disposal (i.e., GTCC). Although the material is not classified as high-level waste, federal regulations under the LLRW Policy Amendments Act specifies the GTCC LLWR is designated a federal responsibility under Section 3(b)(1)(D). However, the DOE has not been forthcoming with an acceptance criteria or disposition schedule for this material, and numerous questions remain as to the ultimate disposal cost and waste form requirements. As such, for purposes of this study, the GTCC has been packaged and disposed of in the same manner as high-level waste, at a cost equivalent to that envisioned for the spent fuel. This is consistent with the concept that the generator of GTCC waste will bear all reasonable costs of disposing of such wastes. [28]

It is not anticipated that the DOE would accept this waste prior to completing the transfer of spent fuel. Therefore, until such time the DOE is ready to accept GTCC waste, it is reasonable to assume that this material would remain in storage at the Byron site.

Intact disposal of the reactor vessel and internal components can provide savings in cost and worker exposure by eliminating the complex

segmentation requirements, isolation of the GTCC material, and transport/storage of the resulting waste packages. Portland General Electric (PGE) was able to dispose of the Trojan reactor as an intact package. However, its location on the Columbia River simplified the transportation analysis since:

- the reactor package could be secured to the transport vehicle for the entire journey, i.e., the package was not lifted during transport,
- there were no man-made or natural terrain features between the plant site and the disposal location that could produce a large drop, and
- transport speeds were very low, limited by the overland transport vehicle and the river barge.

As a member of the Northwest Compact, PGE had a site available for disposal of the package - the US Ecology facility in Washington State. The characteristics of this arid site proved favorable in demonstrating compliance with land disposal regulations.

It is not known whether this option will be available when Byron 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.

3.5.3 Primary System Components

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 will be 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, will be removed to create sufficient laydown space for processing these large components.

The generators will be rigged for removal, disconnected from the surrounding piping and supports, and maneuvered into the open area where they will be lowered onto a dolly. Once each steam generator has been placed in the horizontal position, nozzles and other openings will be welded closed. The lower shell will have a carbon steel membrane welded to its outside surface for shielding, if required, during transport. The interior volume will be filled with low-density cellular concrete for stabilization of the internal contamination and to satisfy burial ground packaging requirements. When this stage has been completed, each generator will be moved out of containment and lowered onto a multi-wheeled transporter to be staged at an on-site storage area and await transport to the disposal facility. The pressurizer will be removed using the same technique. Each component will then be loaded onto a railcar 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 disposal.

Byron Unit 1 has replaced its original set of steam generators; this original set is still on site, stored within a concrete protective structure. The cost for transportation and disposal of this original set of Unit 1 steam generators has been included in this analysis.

3.5.4 Main Turbine and Condenser

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

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

3.5.5 Transportation Methods

Contaminated piping, components, and structural material other than the highly activated reactor vessel and internal components will qualify as LSA-I, II or III or Surface Contaminated Object, SCO-I or II, as described in Title 49.[29] The contaminated material will be packaged in Industrial Packages (IP 1, IP-2, or IP-3, as defined in subpart 173.411) for transport unless demonstrated to qualify as their own shipping containers. The reactor vessel and internal components are expected to be transported in accordance with §71, as Type B. It is conceivable that the reactor, due to its limited specific activity, could qualify as LSA II or III. However, the high radiation levels on the outer surface would require that additional shielding be incorporated within the packaging so as to attenuate the dose to levels acceptable for transport.

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

The transport of large intact components (e.g., large heat exchangers and other oversized components) will be by a combination of truck, rail, and/or multi-wheeled transporter. Truck transport costs were estimated using published tariffs from Tri-State Motor Transit.[30]

3.5.6 Low-Level Radioactive Waste Disposal

The mass of radioactive waste generated during the various decommissioning activities is reported by line-item in Appendices C, D and E, and summarized in Section 5. The Section 5 waste summaries are consistent with 10 CFR §61 classifications. Commercially available steel containers are used for the disposal of piping, small components, and concrete. Larger components can serve as their own containers, with proper closure of all openings, access ways, and penetrations. The waste volumes are calculated on the exterior package dimensions for

containerized material or a dimensional calculation for components serving as their own waste containers.

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

Disposal fees are calculated using current disposal agreements, with surcharges added for the highly activated components, such as those generated in the segmentation of the reactor vessel. The cost to dispose of the majority of the material generated from the decontamination and dismantling activities is based upon Exelon's current disposal agreement with Energy*Solutions* for its facility in Clive, Utah.

EnergySolutions is not able to accept the higher activity waste (Class B and C) generated in the decontamination of the reactor vessel and segmentation of the components closest to the core. As a proxy for future disposal facilities, waste disposal costs for the higher activity waste (Class B and C) are based upon the last published rate schedule for non-compact waste for the Barnwell facility, adjusted for escalation of the Atlantic Compact rates.

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

3.5.7 Site Conditions Following Decommissioning

The NRC will terminate (or amend) the site license when it determines that site remediation has been performed in accordance with the license termination plan, and that the terminal radiation survey and associated documentation demonstrate that the facility is suitable for release. The NRC's involvement in the decommissioning process will end at this point. Building codes and environmental regulations will dictate the

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

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

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

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

Exelon, as the operator, will continue to provide site operations support, including decommissioning program management, licensing, radiological protection, and site security. A Decommissioning Operations Contractor (DOC) will provide the supervisory staff needed to oversee the labor subcontractors, consultants, and specialty contractors needed to perform the work required for the decontamination and dismantling effort. The DOC will also provide the engineering services needed to develop

activity specifications, detailed procedures, detailed activation analyses, and support field activities such as structural modifications.

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

The craft labor required to decontaminate and dismantle the Byron units will be acquired through standard site contracting practices. Craft labor costs were based upon information from Exelon. Craft labor costs include applicable overheads and profit.

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

Staffing levels are assigned for each unit by sub-period and functional area. Economies of a multi-unit decommissioning are recognized by establishing a primary and a secondary staff level. The unit assigned the primary staff will include common supervisory positions and positions that may be shared across both units. The types of positions and staffing levels are adjusted based upon the type of activity occurring in each sub-period.

A profile of the staffing level for the two-unit decommissioning, including contractors and craft, is provided in Figures 3.1 through 3.3 for the DECON, Delayed DECON, and SAFSTOR scenarios, respectively. Utility staffing levels will gradually decrease after completing the removal of physical systems at each of the units.

Staffing levels and management support will vary based upon the amount and type of decommissioning work. Craft manpower levels decrease after systems removal and structures decontamination and drop substantially during the delay period and the license termination survey period. However, craft staff levels increase again during the site restoration period due to the work associated with structures demolition.

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.[31] Actual estimates are derived from the curie/gram values contained therein and adjusted for the different mass of the Byron components, projected operating life, and different periods of decay. Additional short-lived isotopes were derived from CR-0130[32] and CR-0672,[33] and benchmarked to the long-lived values from CR-3474.

It is anticipated that there will be control element assemblies (CEAs) in the spent fuel pool at the cessation of operations, including those CEAs from the final core. This analysis assumes that the CEAs can be disposed of along with the spent fuel at no additional cost (in accordance with Appendix E of the Standard Contract)

Activation of the reactor building structures is confined to the biological shield.

3.6.4 General

Transition Activities

Existing warehouses will be cleared of non-essential material and remain for use by Exelon and its subcontractors. The plant's operating staff will perform the following activities at no additional cost or credit to the project during the transition period:

- Drain and collect fuel oils, lubricating oils, and transformer oils for recycle and/or sale.
- Drain and collect acids, caustics, and other chemical stores for recycle and/or sale.
- Processes operating waste inventories, i.e., the estimates do not address the disposition of any legacy wastes; the disposal of

operating wastes during this initial period is not considered a decommissioning expense.

Scrap and Salvage

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

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

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

The concrete debris resulting from building demolition activities is crushed on site to reduce the size of the debris. The resulting crushed concrete is used to backfill below grade voids, with the excess assumed to be removed from the site as recycled material at no cost or credit to

the decommissioning program. The rebar removed from the concrete crushing process is disposed of as scrap steel in a similar fashion as other scrap metal as discussed previously.

Energy

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

Insurance

Costs for continuing coverage (nuclear liability and property insurance) following cessation of plant operations and during decommissioning are included and based upon current operating premiums. Reductions in premiums throughout the decommissioning process are based upon guidance provided by Exelon.

Taxes

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

Site Modifications

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

3.7 COST ESTIMATE SUMMARY

A schedule of expenditures for each scenario is provided in Tables 3.1 through 3.3. Decommissioning costs are reported in the year of projected expenditure; however, the values are provided in thousands of 2014 dollars. Costs are not inflated, escalated, or discounted over the period of expenditure. The annual expenditures are based upon the detailed activity costs reported in Appendices C through E, along with the schedules discussed in Section 4.

TABLE 3.1a
BYRON NUCLEAR POWER STATION, UNIT 1
DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2044	9,687	1,784	347	8	2,031	13,858
2045	60,404	13,191	2,393	1,758	14,086	91,832
2046	69,389	30,431	2,655	27,890	27,628	157,992
2047	65,000	31,957	1,931	35,754	28,617	163,259
2048	43,705	15,527	1,538	5,165	10,581	76,516
2049	43,585	15,485	1,534	5,150	10,552	76,307
2050	15,357	5,167	504	1,699	5,977	28,704
2051	1,531	113	0	8	3,737	5,389
2052	1,535	113	0	8	3,747	5,403
2053	25,853	2,803	351	27	3,957	32,992
2054	19,502	8,932	205	0	3,387	32,026
2055	19,502	8,932	205	0	3,387	32,026
2056	7,093	2,398	55	0	3,369	12,915
2057	2,528	0	0	0	3,350	5,879
2058	2,528	0	0	0	3,350	5,879
2059	2,528	0	0	0	3,350	5,879
2060	2,535	0	0	0	3,359	5,895
2061	2,528	0	0	0	3,350	5,879
2062	2,528	0	0	0	3,350	5,879
2063	2,528	0	0	0	3,350	5,879
2064	2,535	0	0	0	3,359	5,895
2065	2,528	0	0	0	3,350	5,879
2066	2,726	593	0	0	3,350	6,669
2067	3,175	1,941	0	0	3,350	8,466
2068	3,182	1,941	0	0	3,359	8,482
2069	3,175	1,941	0	0	3,350	8,466
2070	3,175	1,941	0	0	3,350	8,466
2071	1,883	1,564	35	1,117	16,600	21,199
Total	422,227	146,752	11,752	78,584	184,588	843,904

TABLE 3.1b
BYRON NUCLEAR POWER STATION, UNIT 2
DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2046	9,193	1,611	314	7	1,772	12,898
2047	62,082	12,342	2,353	1,427	17,200	95,403
2048	74,766	28,402	2,701	21,724	34,387	161,980
2049	74,618	31,151	1,937	28,081	26,159	161,946
2050	68,148	17,029	1,534	7,057	11,221	104,989
2051	68,148	17,029	1,534	7,057	11,221	104,989
2052	52,091	9,831	1,067	5,171	8,522	76,681
2053	31,719	4,050	380	175	3,908	40,232
2054	25,734	13,240	205	0	3,388	42,567
2055	25,734	13,240	205	0	3,388	42,567
2056	8,766	3,555	55	0	3,370	15,745
2057	2,528	0	0	0	3,350	5,879
2058	2,528	0	0	0	3,350	5,879
2059	2,528	0	0	0	3,350	5,879
2060	2,535	0	0	0	3,359	5,895
2061	2,528	0	0	0	3,350	5,879
2062	2,528	0	0	0	3,350	5,879
2063	2,528	0	0	0	3,350	5,879
2064	2,535	0	0	0	3,359	5,895
2065	2,528	0	0	0	3,350	5,879
2066	2,726	593	0	0	3,350	6,669
2067	3,175	1,941	0	0	3,350	8,466
2068	3,182	1,941	0	0	3,359	8,482
2069	3,175	1,941	0	0	3,350	8,466
2070	3,175	1,941	0	0	3,350	8,466
2071	1,883	1,564	35	1,117	16,600	21,199
Total	541,081	161,399	12,320	71,816	188,066	974,682

TABLE 3.2a
BYRON NUCLEAR POWER STATION, UNIT 1
DELAYED DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2044	7,408	231	347	8	1,093	9,088
2045	45,380	3,169	2,045	408	9,590	60,593
2046	20,297	2,347	947	588	11,829	36,009
2047	7,922	411	409	17	5,493	14,253
2048	7,944	412	410	17	5,508	14,292
2049	7,922	411	409	17	5,493	14,253
2050	7,922	411	409	17	5,493	14,253
2051	7,922	411	409	17	5,493	14,253
2052	7,944	412	410	17	5,508	14,292
2053	7,922	411	409	17	5,493	14,253
2054	7,922	411	409	17	5,493	14,253
2055	7,922	411	409	17	5,493	14,253
2056	7,944	412	410	17	5,508	14,292
2057	7,922	411	409	17	5,493	14,253
2058	7,922	411	409	17	5,493	14,253
2059	7,922	411	409	17	5,493	14,253
2060	7,944	412	410	17	5,508	14,292
2061	7,922	411	409	17	5,493	14,253
2062	7,922	411	409	17	5,493	14,253
2063	7,922	411	409	17	5,493	14,253
2064	7,944	412	410	17	5,508	14,292
2065	7,922	411	409	17	5,493	14,253
2066	8,713	2,783	409	17	5,493	17,415
2067	10,510	8,173	409	17	5,493	24,603
2068	7,944	412	410	17	5,508	14,292
2069	5,534	1,678	272	11	4,331	11,826
2070	4,341	2,232	205	8	3,762	10,548
2071	43,033	1,767	2,045	41	1,735	48,622
2072	61,002	17,520	1,999	18,398	12,208	111,128
2073	60,202	22,953	1,938	36,306	22,430	143,831

TABLE 3.2a (continued)
BYRON NUCLEAR POWER STATION, UNIT 1
DELAYED DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2074	35,381	6,582	1,534	5,308	5,943	54,747
2075	35,381	6,582	1,534	5,308	5,943	54,747
2076	8,191	1,443	315	1,097	2,491	13,537
2077	9,165	453	127	17	1,714	11,475
2078	21,798	5,564	295	16	1,342	29,015
2079	17,625	9,037	205	0	830	27,696
2080	16,273	8,343	189	0	767	25,572
2074	35,381	6,582	1,534	5,308	5,943	54,747
2075	35,381	6,582	1,534	5,308	5,943	54,747
2076	8,191	1,443	315	1,097	2,491	13,537
2077	9,165	453	127	17	1,714	11,475
2078	21,798	5,564	295	16	1,342	29,015
2079	17,625	9,037	205	0	830	27,696
2080	16,273	8,343	189	0	767	25,572
Total	568,812	109,082	23,002	67,886	206,954	975,736

TABLE 3.2b
BYRON NUCLEAR POWER STATION, UNIT 2
DELAYED DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2046	7,624	209	314	7	928	9,082
2047	52,823	3,238	2,045	404	8,816	67,326
2048	25,057	2,956	979	917	24,668	54,577
2049	7,932	414	409	17	5,603	14,374
2050	7,932	414	409	17	5,603	14,374
2051	7,932	414	409	17	5,603	14,374
2052	7,953	415	410	17	5,618	14,413
2053	7,932	414	409	17	5,603	14,374
2054	7,932	414	409	17	5,603	14,374
2055	7,932	414	409	17	5,603	14,374
2056	7,953	415	410	17	5,618	14,413
2057	7,932	414	409	17	5,603	14,374
2058	7,932	414	409	17	5,603	14,374
2059	7,932	414	409	17	5,603	14,374
2060	7,953	415	410	17	5,618	14,413
2061	7,932	414	409	17	5,603	14,374
2062	7,932	414	409	17	5,603	14,374
2063	7,932	414	409	17	5,603	14,374
2064	7,953	415	410	17	5,618	14,413
2065	7,932	414	409	17	5,603	14,374
2066	7,932	414	409	17	5,603	14,374
2067	7,932	414	409	17	5,603	14,374
2068	10,541	8,178	410	17	5,618	24,763
2069	6,334	4,053	272	11	4,353	15,023
2070	4,351	2,235	205	8	3,741	10,540
2071	2,232	291	205	8	1,587	4,322
2072	26,780	1,732	2,036	38	1,688	32,274
2073	48,200	15,162	1,995	13,691	10,543	89,591
2074	61,164	22,194	1,938	27,640	19,596	132,532
2075	54,289	7,593	1,534	6,633	5,854	75,902

TABLE 3.2b (continued)
BYRON NUCLEAR POWER STATION, UNIT 2
DELAYED DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2076	54,437	7,614	1,538	6,651	5,870	76,110
2077	47,105	5,670	1,186	4,590	4,587	63,138
2078	27,065	8,036	295	16	1,243	36,656
2079	23,857	13,345	205	0	831	38,237
2080	22,027	12,321	189	0	767	35,304
Total	624,669	122,693	23,120	60,954	207,203	1,038,639

TABLE 3.3a
BYRON NUCLEAR POWER STATION, UNIT 1
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2044	7,767	1,308	347	8	2,031	11,461
2045	47,492	9,505	2,045	408	14,164	73,614
2046	20,046	8,683	947	588	14,204	44,468
2047	6,514	6,747	409	17	9,055	22,742
2048	6,532	6,765	410	17	9,080	22,804
2049	6,514	6,747	409	17	9,055	22,742
2050	6,514	6,747	409	17	9,055	22,742
2051	6,514	6,747	409	17	9,055	22,742
2052	4,678	2,520	276	11	5,599	13,085
2053	3,695	291	205	8	3,762	7,960
2054	3,695	291	205	8	3,762	7,960
2055	3,695	291	205	8	3,762	7,960
2056	3,705	292	205	8	3,772	7,982
2057	3,695	291	205	8	3,762	7,960
2058	3,695	291	205	8	3,762	7,960
2059	3,695	291	205	8	3,762	7,960
2060	3,705	292	205	8	3,772	7,982
2061	3,695	291	205	8	3,762	7,960
2062	3,695	291	205	8	3,762	7,960
2063	3,695	291	205	8	3,762	7,960
2064	3,705	292	205	8	3,772	7,982
2065	3,695	291	205	8	3,762	7,960
2066	3,892	884	205	8	3,762	8,751
2067	4,341	2,232	205	8	3,762	10,548
2068	4,352	2,233	205	8	3,772	10,570
2069	4,341	2,232	205	8	3,762	10,548
2070	4,341	2,232	205	8	3,762	10,548
2071	2,223	287	205	8	1,594	4,317
2072	2,229	288	205	8	1,598	4,328
2073	2,223	287	205	8	1,594	4,317

TABLE 3.3a (continued)
BYRON NUCLEAR POWER STATION, UNIT 1
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2074	2,223	287	205	8	1,594	4,317
2075	2,223	287	205	8	1,594	4,317
2076	2,229	288	205	8	1,598	4,328
2077	2,223	287	205	8	1,594	4,317
2078	2,223	287	205	8	1,594	4,317
2079	2,223	287	205	8	1,594	4,317
2080	2,229	288	205	8	1,598	4,328
2081	2,223	287	205	8	1,594	4,317
2082	2,223	287	205	8	1,594	4,317
2083	2,223	287	205	8	1,594	4,317
2084	2,229	288	205	8	1,598	4,328
2085	2,223	287	205	8	1,594	4,317
2086	2,223	287	205	8	1,594	4,317
2087	2,223	287	205	8	1,594	4,317
2088	2,229	288	205	8	1,598	4,328
2089	2,223	287	205	8	1,594	4,317
2090	2,223	287	205	8	1,594	4,317
2091	2,223	287	205	8	1,594	4,317
2092	2,229	288	205	8	1,598	4,328
2093	2,223	287	205	8	1,594	4,317
2094	2,223	287	205	8	1,594	4,317
2095	2,223	287	205	8	1,594	4,317
2096	2,229	288	205	8	1,598	4,328
2097	27,827	1,216	1,359	29	1,683	32,113
2098	54,323	9,481	2,032	4,550	4,354	74,740
2099	60,370	23,017	1,943	35,798	22,511	143,639
2100	44,701	12,716	1,686	16,538	12,307	87,948
2101	35,396	6,598	1,534	5,099	6,247	54,873
2102	21,325	3,933	903	3,007	4,334	33,502
2103	1,155	113	0	8	1,593	2,869

TABLE 3.3a (continued)
BYRON NUCLEAR POWER STATION, UNIT 1
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2104	23,486	2,465	343	27	1,762	28,083
2105	17,841	9,081	205	0	830	27,957
2106	17,841	9,081	205	0	830	27,957
2107	5,523	2,811	63	0	257	8,655
Total	549,528	157,358	24,939	66,511	247,230	1,045,566

TABLE 3.3b
BYRON NUCLEAR POWER STATION, UNIT 2
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2046	8,067	1,537	314	7	1,772	11,698
2047	55,709	11,897	2,045	404	13,491	83,546
2048	30,256	11,637	979	917	28,544	72,334
2049	14,338	9,072	409	17	11,522	35,358
2050	14,338	9,072	409	17	11,522	35,358
2051	14,338	9,072	409	17	11,522	35,358
2052	7,385	3,325	276	11	6,438	17,434
2053	3,704	294	205	8	3,741	7,952
2054	3,704	294	205	8	3,741	7,952
2055	3,704	294	205	8	3,741	7,952
2056	3,714	295	205	8	3,752	7,974
2057	3,704	294	205	8	3,741	7,952
2058	3,704	294	205	8	3,741	7,952
2059	3,704	294	205	8	3,741	7,952
2060	3,714	295	205	8	3,752	7,974
2061	3,704	294	205	8	3,741	7,952
2062	3,704	294	205	8	3,741	7,952
2063	3,704	294	205	8	3,741	7,952
2064	3,714	295	205	8	3,752	7,974
2065	3,704	294	205	8	3,741	7,952
2066	3,901	887	205	8	3,741	8,743
2067	4,351	2,235	205	8	3,741	10,540
2068	4,361	2,236	205	8	3,752	10,561
2069	4,351	2,235	205	8	3,741	10,540
2070	4,351	2,235	205	8	3,741	10,540
2071	2,232	291	205	8	1,587	4,322
2072	2,238	291	205	8	1,592	4,334
2073	2,232	291	205	8	1,587	4,322
2074	2,232	291	205	8	1,587	4,322

TABLE 3.3b (continued)
BYRON NUCLEAR POWER STATION, UNIT 2
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2075	2,232	291	205	8	1,587	4,322
2076	2,238	291	205	8	1,592	4,334
2077	2,232	291	205	8	1,587	4,322
2078	2,232	291	205	8	1,587	4,322
2079	2,232	291	205	8	1,587	4,322
2080	2,238	291	205	8	1,592	4,334
2081	2,232	291	205	8	1,587	4,322
2082	2,232	291	205	8	1,587	4,322
2083	2,232	291	205	8	1,587	4,322
2084	2,238	291	205	8	1,592	4,334
2085	2,232	291	205	8	1,587	4,322
2086	2,232	291	205	8	1,587	4,322
2087	2,232	291	205	8	1,587	4,322
2088	2,238	291	205	8	1,592	4,334
2089	2,232	291	205	8	1,587	4,322
2090	2,232	291	205	8	1,587	4,322
2091	2,232	291	205	8	1,587	4,322
2092	2,238	291	205	8	1,592	4,334
2093	2,232	291	205	8	1,587	4,322
2094	2,232	291	205	8	1,587	4,322
2095	2,232	291	205	8	1,587	4,322
2096	2,238	291	205	8	1,592	4,334
2097	2,232	291	205	8	1,587	4,322
2098	17,714	1,199	1,359	27	1,648	21,948
2099	35,559	7,561	2,033	3,348	3,885	52,386
2100	60,939	22,099	1,943	26,864	19,533	131,378
2101	56,793	13,042	1,687	14,114	11,140	96,775
2102	54,301	7,599	1,534	6,453	6,096	75,983
2103	54,301	7,599	1,534	6,453	6,096	75,983
2104	31,825	3,920	465	539	1,952	38,700

TABLE 3.3b (continued)
BYRON NUCLEAR POWER STATION, UNIT 2
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2105	24,073	13,389	205	0	831	38,498
2106	24,073	13,389	205	0	831	38,498
2107	7,453	4,145	63	0	257	11,918
Total	641,259	171,059	25,077	59,551	247,360	1,144,306

FIGURE 3.1
DECON SCENARIO
BYRON NUCLEAR POWER STATION
MANPOWER LEVELS

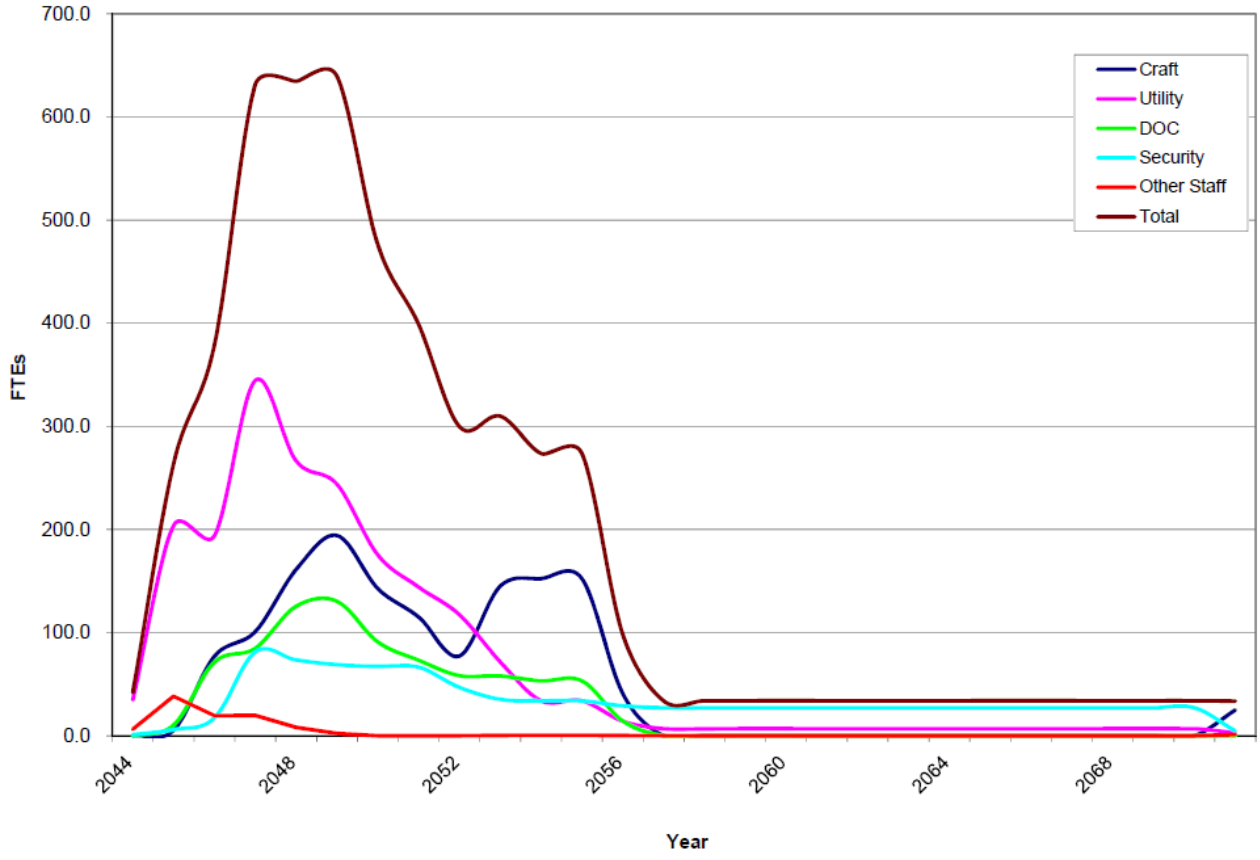


FIGURE 3.2
DELAYED DECON SCENARIO
BYRON NUCLEAR POWER STATION
MANPOWER LEVELS

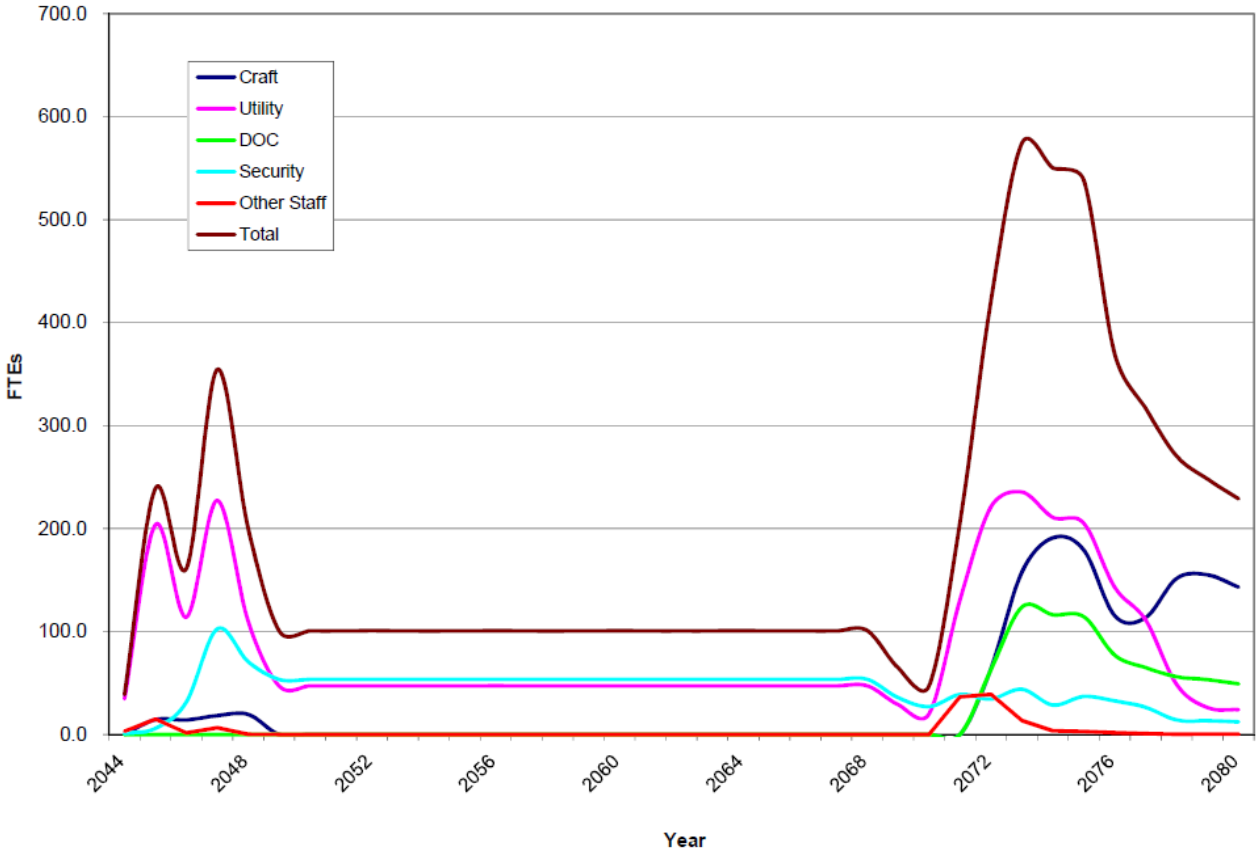
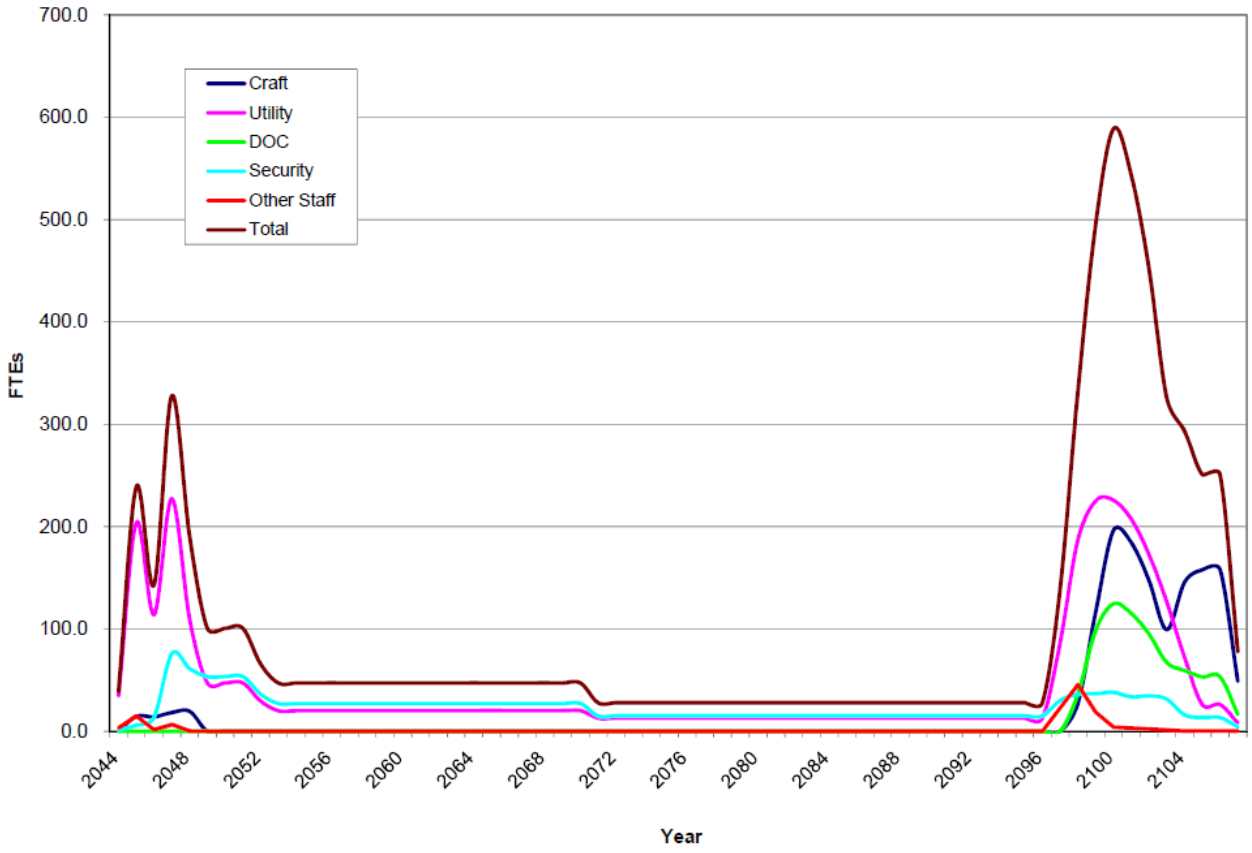


FIGURE 3.3
SAFSTOR SCENARIO
BYRON NUCLEAR POWER STATION
MANPOWER LEVELS



4. SCHEDULE ESTIMATE

The schedules for the decommissioning scenarios considered in this study follow the sequence presented in the AIF/NESP-036 study, with minor changes to reflect recent experience and site-specific constraints. In addition, the scheduling has been revised to reflect the spent fuel management plans described in Section 3.5.1.

A schedule or sequence of activities is presented in Figure 4.1 for the DECON decommissioning alternative. The schedule is also representative of the work activities identified in the delayed dismantling scenarios, absent any spent fuel constraints. The scheduling sequence assumes that fuel is removed from the spent fuel pool within the first five and one-half years after operations cease at Unit 2. 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 2010" computer software.[34]

4.1 SCHEDULE ESTIMATE ASSUMPTIONS

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

- The fuel handling building is isolated until such time that all spent fuel has been discharged to the ISFSI (DECON and SAFSTOR) or to the DOE (Delayed DECON). Decontamination and dismantling of the storage pool are initiated once the transfer of spent fuel to the ISFSI or DOE is complete.
- All work (except vessel and internals removal) is performed during an 8-hour workday, 5 days per week, with no overtime. There are eleven paid holidays per year.
- Reactor and internals removal activities are performed by using separate crews for different activities working on different shifts, with a corresponding backshift charge for the second shift.
- Multiple crews work parallel activities to the maximum extent possible, consistent with optimum efficiency, adequate access for cutting, removal

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

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

4.2 PROJECT SCHEDULE

The period-dependent costs presented in the detailed cost tables are based upon the durations developed in the schedule for decommissioning Byron. Durations are established between several milestones in each project period; these durations are used to establish a critical path for the entire project. In turn, the critical path duration for each period is used as the basis for determining the period-dependent costs. A second critical path is also shown for the spent fuel cooling period, which determines the release of the fuel handling building for final decontamination.

Project timelines are provided in Figures 4.2 through 4.4; the milestone dates are based on this same shutdown date. The start of decommissioning activities in the Delayed Decommissioning scenario is concurrent with the end of the fuel transfer activity (i.e. to an off-site DOE facility).

FIGURE 4.1
DECON ACTIVITY SCHEDULE

ID	Task Name
1	Byron Unit 1 & 2 schedule
2	Shutdown Unit 1
3	Period 1a Unit 1 - Shutdown through transition
4	Certificate of permanent cessation of operations submitted
5	Fuel storage pool operations
6	Dry fuel storage operations
7	Reconfigure plant
8	Prepare activity specifications
9	Perform site characterization
10	PSDAR submitted
11	Written certificate of permanent removal of fuel submitted
12	Site specific decommissioning cost estimate submitted
13	DOC staff mobilized
14	Period 1b Unit 1 - Decommissioning preparations
15	Fuel storage pool operations
16	Reconfigure plant (continued)
17	Dry fuel storage operations
18	Prepare detailed work procedures
19	Decon NSSS
20	Isolate spent fuel pool
21	Period 2a Unit 1 - Large component removal
22	Fuel storage pool operations
23	Dry fuel storage operations

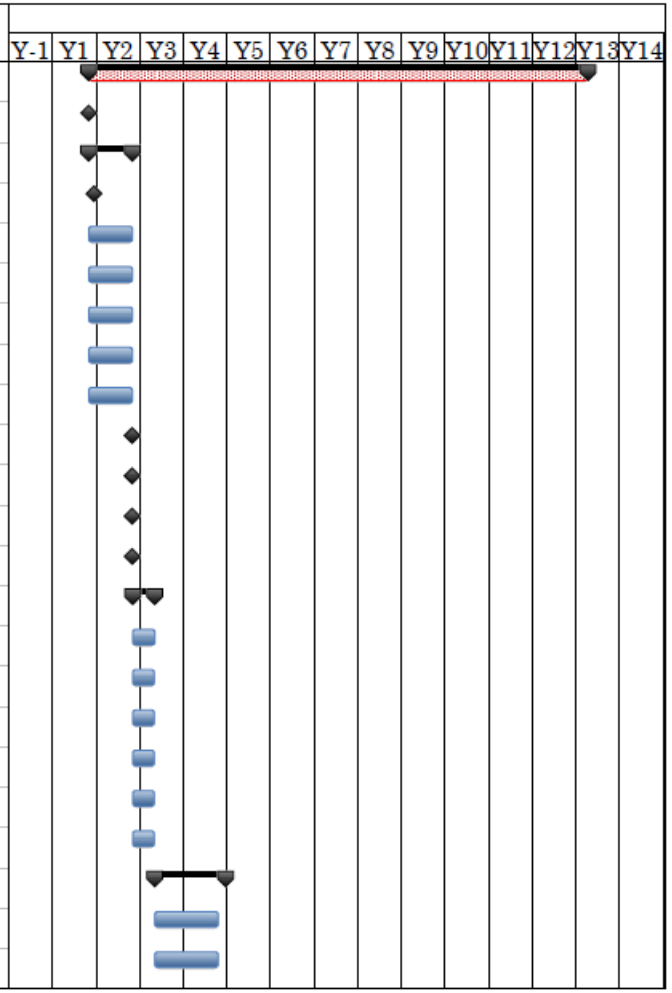


FIGURE 4.1 (continued)
DECON ACTIVITY SCHEDULE

ID	Task Name
24	Preparation for reactor vessel removal
25	Reactor vessel & internals
26	Remaining large NSSS components disposition
27	Move vessel cutter to Unit 2
28	Non-essential systems
29	Main turbine/generator
30	Main condenser
31	License termination plan submitted
32	Period 2b Unit 1 - Decontamination (wet fuel)
33	Fuel storage pool operations
34	Dry fuel storage operations
35	Remove systems not supporting wet fuel storage
36	Decon buildings not supporting wet fuel storage
37	License termination plan approved
38	
39	Unit 2 Operations
40	Shutdown Unit 2
41	Period 1a Unit 2 - Shutdown through transition
42	Certificate of permanent cessation of operations submitted
43	Fuel storage pool operations
44	Dry fuel storage operations
45	Reconfigure plant
46	Prepare activity specifications

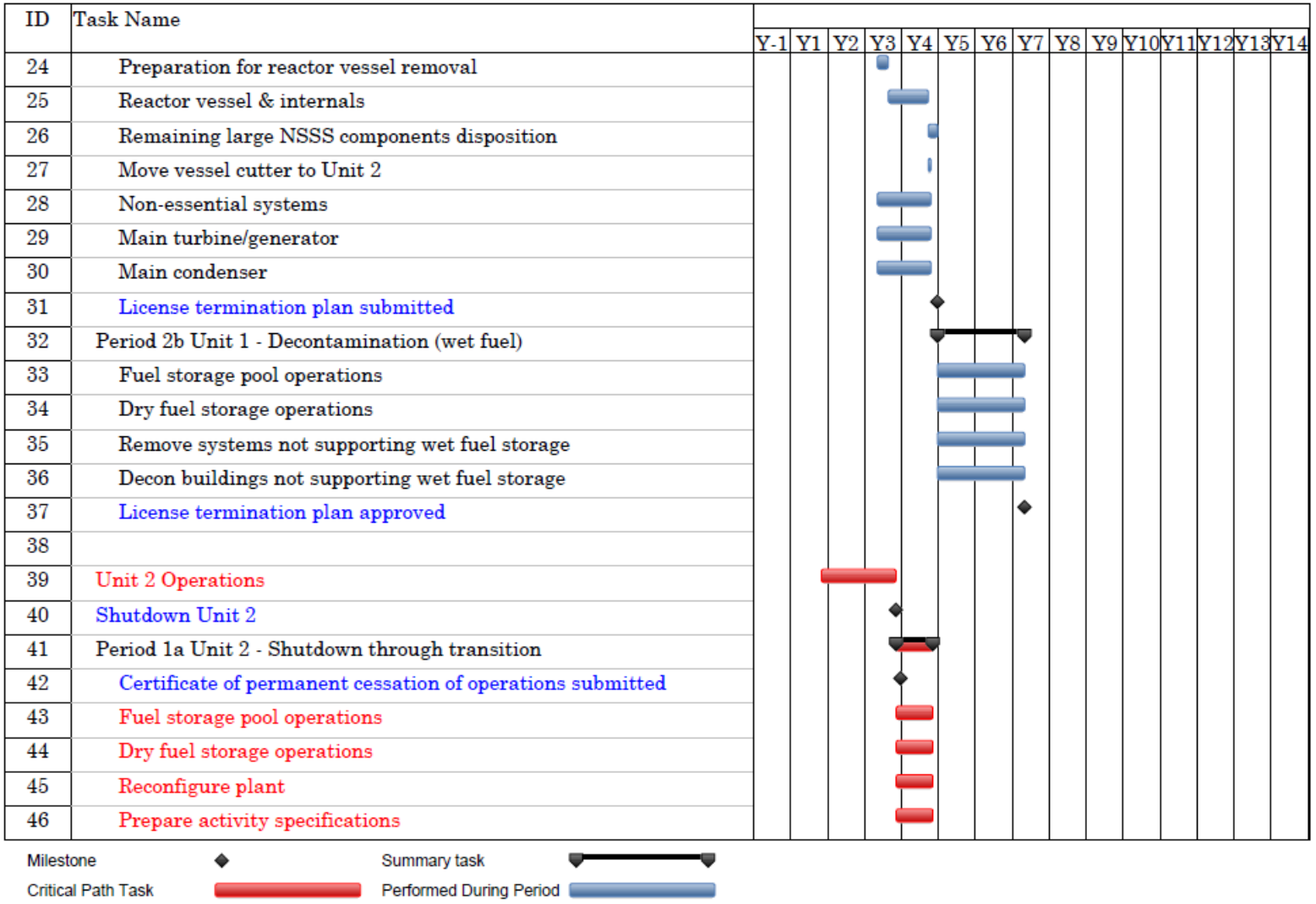


FIGURE 4.1 (continued)
DECON ACTIVITY SCHEDULE

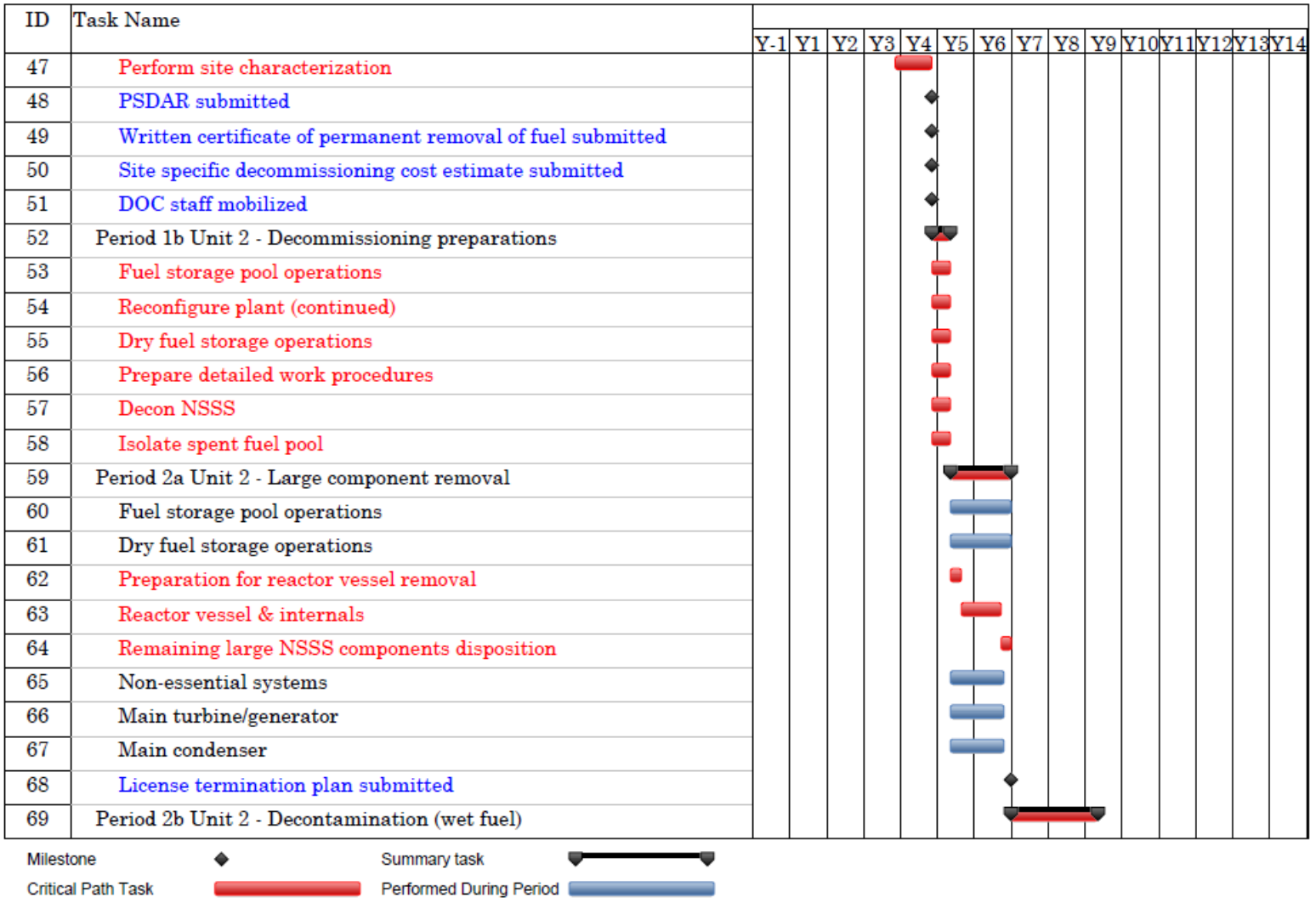


FIGURE 4.1 (continued)
DECON ACTIVITY SCHEDULE

ID	Task Name
70	Fuel storage pool operations
71	Dry fuel storage operations
72	Remove systems not supporting wet fuel storage
73	Decon buildings not supporting wet fuel storage
74	License termination plan approved
75	Fuel storage pool available for decommissioning
76	Period 2d Unit 2 - Decontamination following wet fuel storage
77	Dry fuel storage operations
78	Remove remaining systems
79	Decon wet fuel storage area
80	
81	Period 2f Unit 1 & 2 - Plant license termination
82	Dry fuel storage operations
83	Final Site Survey
84	NRC review & approval
85	Part 50 license terminated
86	Period 3b Unit 1 & 2 - Site restoration
87	Dry fuel storage operations
88	Building demolitions, backfill and landscaping
89	Building demolition
90	Landscape Site

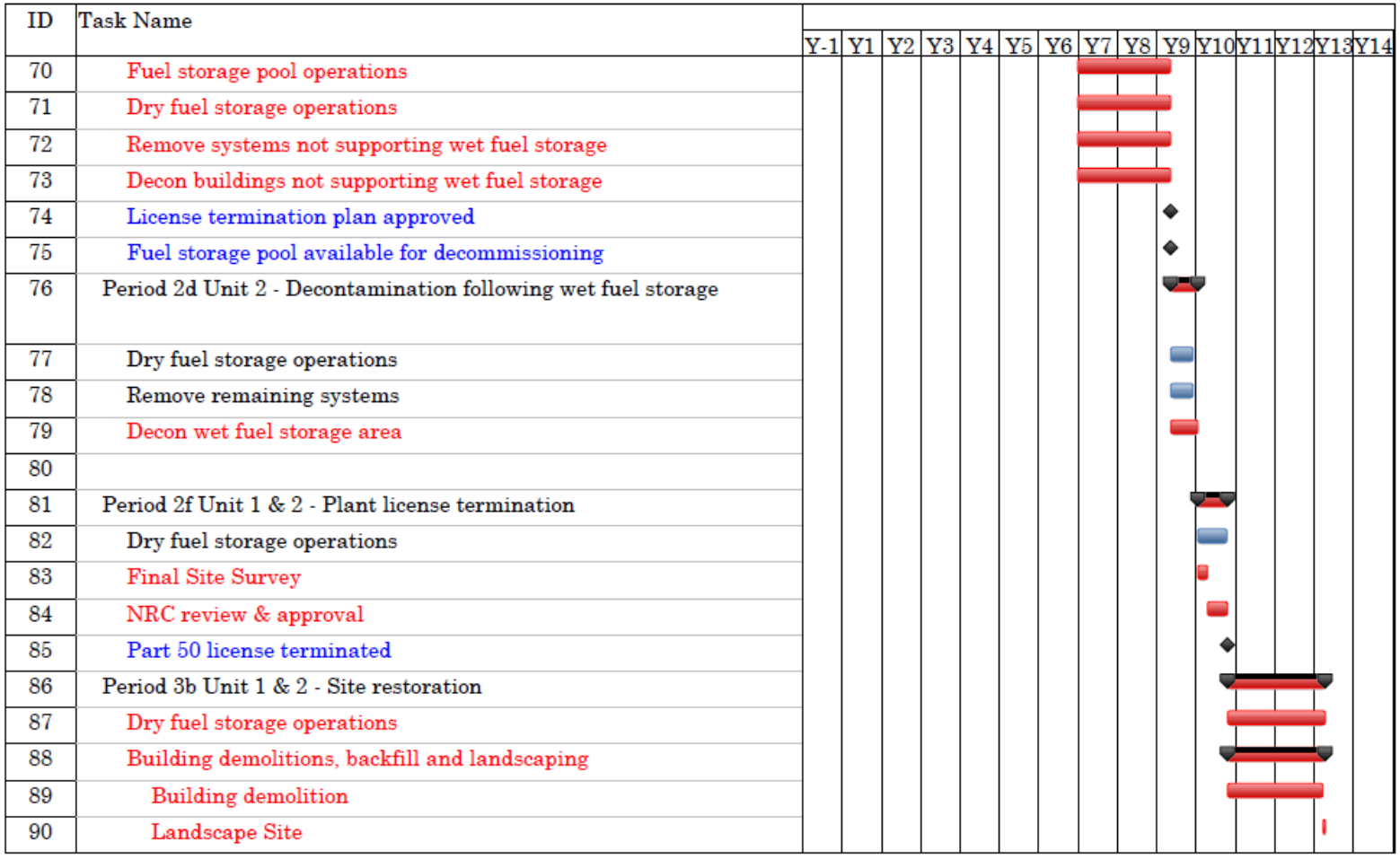


FIGURE 4.2
DECOMMISSIONING TIMELINE
DECON
(not to scale)

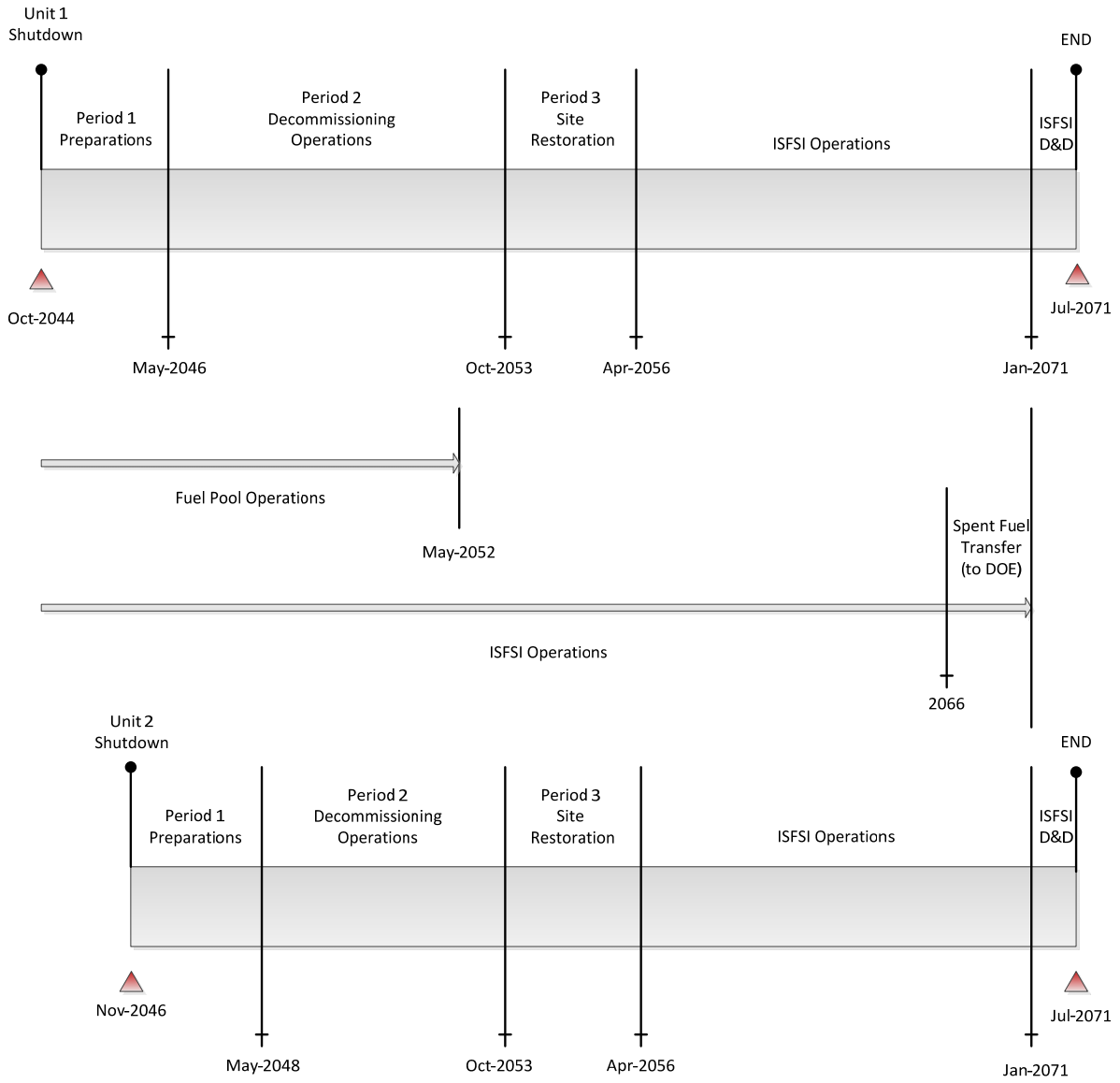


FIGURE 4.3
DECOMMISSIONING TIMELINE
DELAYED DECON
(not to scale)

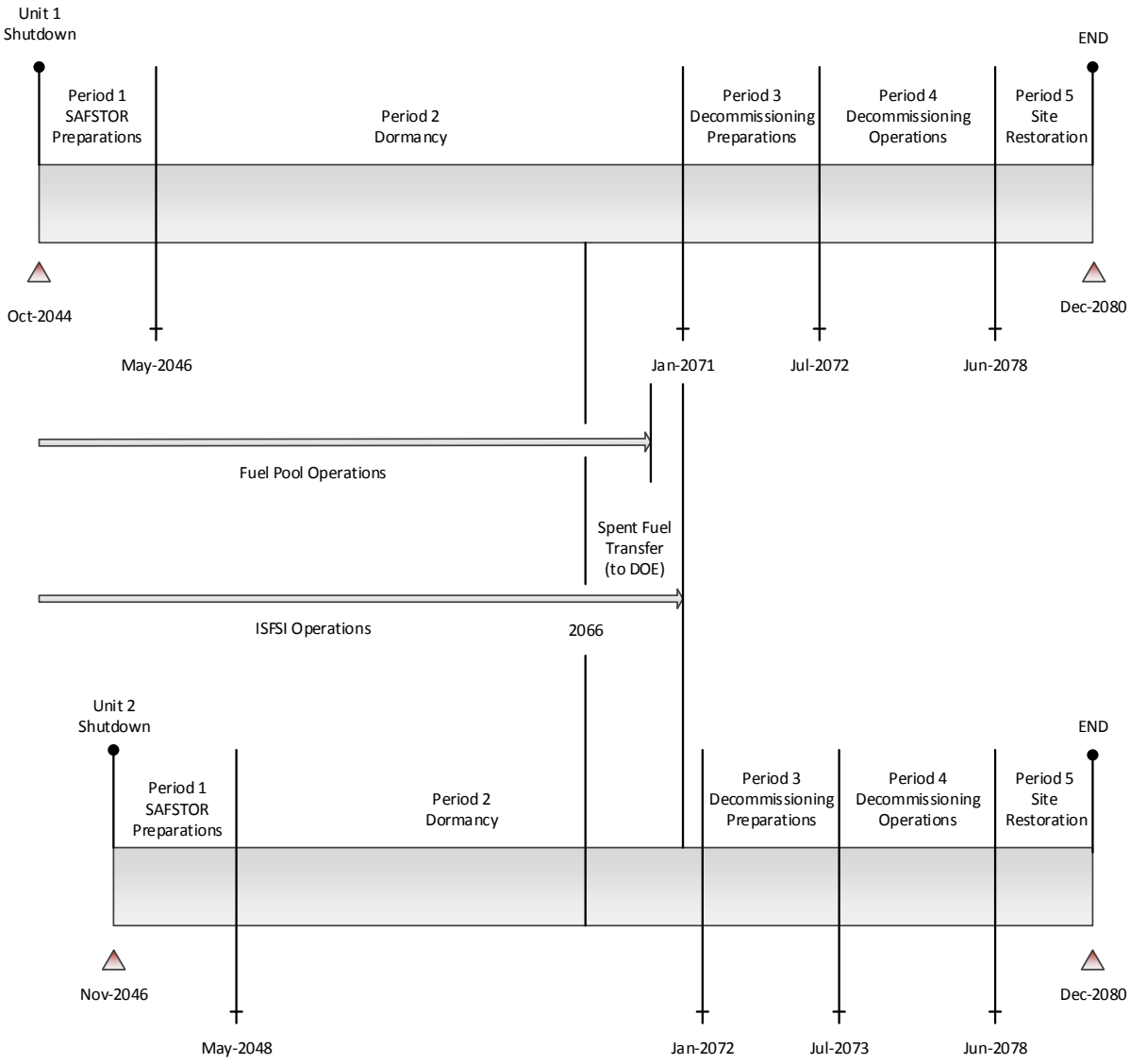
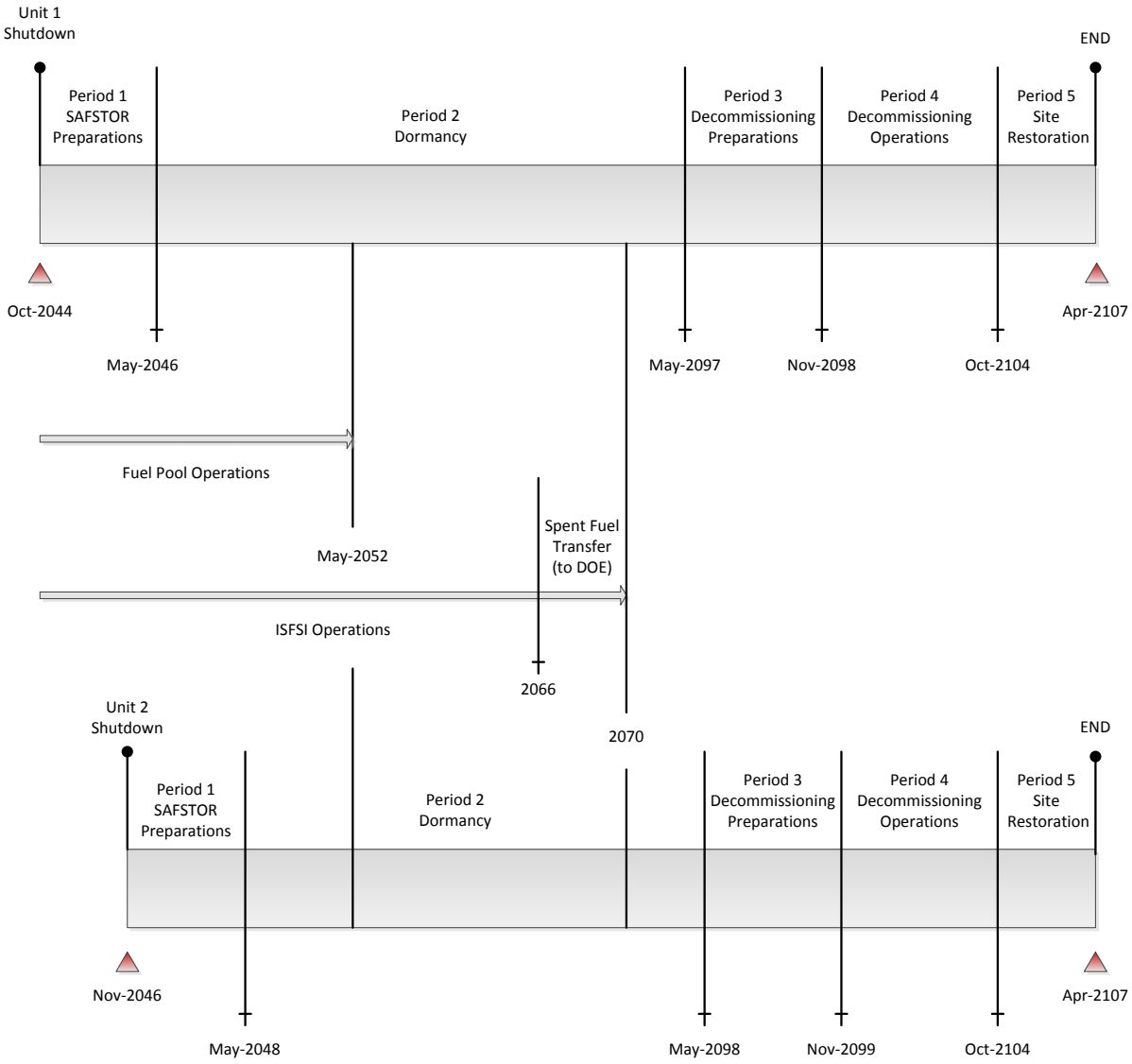


FIGURE 4.4
DECOMMISSIONING TIMELINE
SAFSTOR
(not to scale)



5. RADIOACTIVE WASTES

The objectives of the decommissioning process are the removal of all radioactive material from the site that would restrict its future use and the termination of the NRC license(s). This currently requires the remediation of all radioactive material at the site in excess of applicable legal limits. Under the Atomic Energy Act,[35] the NRC is responsible for protecting the public from sources of ionizing radiation. Title 10 of the Code of Federal Regulations delineates the production, utilization, and disposal of radioactive materials and processes. In particular, §71 defines radioactive material as it pertains to packaging and transportation and §61 specifies its disposition.

Most of the materials being transported for controlled burial are categorized as Low Specific Activity (LSA) or Surface Contaminated Object (SCO) materials containing Type A quantities, as defined in 49 CFR §173-178. Shipping containers are required to be Industrial Packages (IP-1, IP-2 or IP-3, as defined in subpart 173.411). For this study, commercially available steel containers are presumed to be used for the disposal of piping, small components, and concrete. Larger components can serve as their own containers, with proper closure of all openings, access ways, and penetrations.

The destinations for the various waste streams from decommissioning are identified in Figures 5.1 and 5.2. The volumes of radioactive waste generated during the various decommissioning activities at the site is shown on a line-item basis in Appendices C, D, and E and summarized in Tables 5.1 through 5.3. The quantified waste volume summaries shown in these tables are consistent with §61 classifications. The volumes are calculated based on the exterior dimensions for containerized material and on the displaced volume of components serving as their own waste containers.

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

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

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

The waste material generated in the decontamination and dismantling of Byron is primarily generated during Period 2 of the DECON alternative and Period 4 of the deferred alternatives. All radioactive waste is sent offsite for controlled disposal.

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

Energy*Solutions* is not able to accept the higher activity waste (Class B and C) generated in the decontamination of the reactor vessel and segmentation of the components closest to the core. As a proxy for future disposal facilities, waste disposal costs for the higher activity waste (Class B and C) are based upon the last published rate schedule for non-compact waste for the Barnwell facility, adjusted for escalation of the Atlantic Compact rates.

FIGURE 5.1
RADIOACTIVE WASTE DISPOSITION

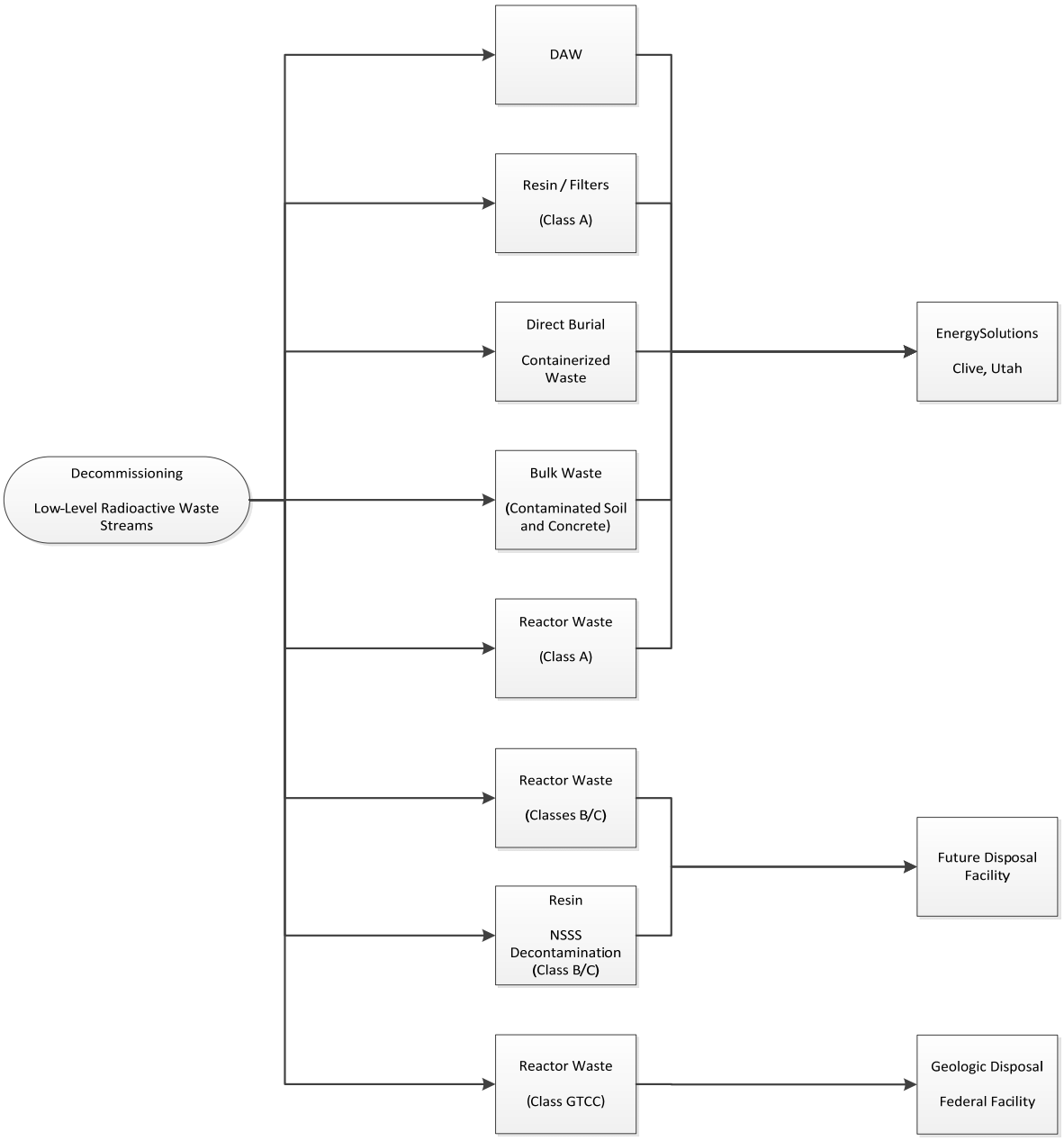
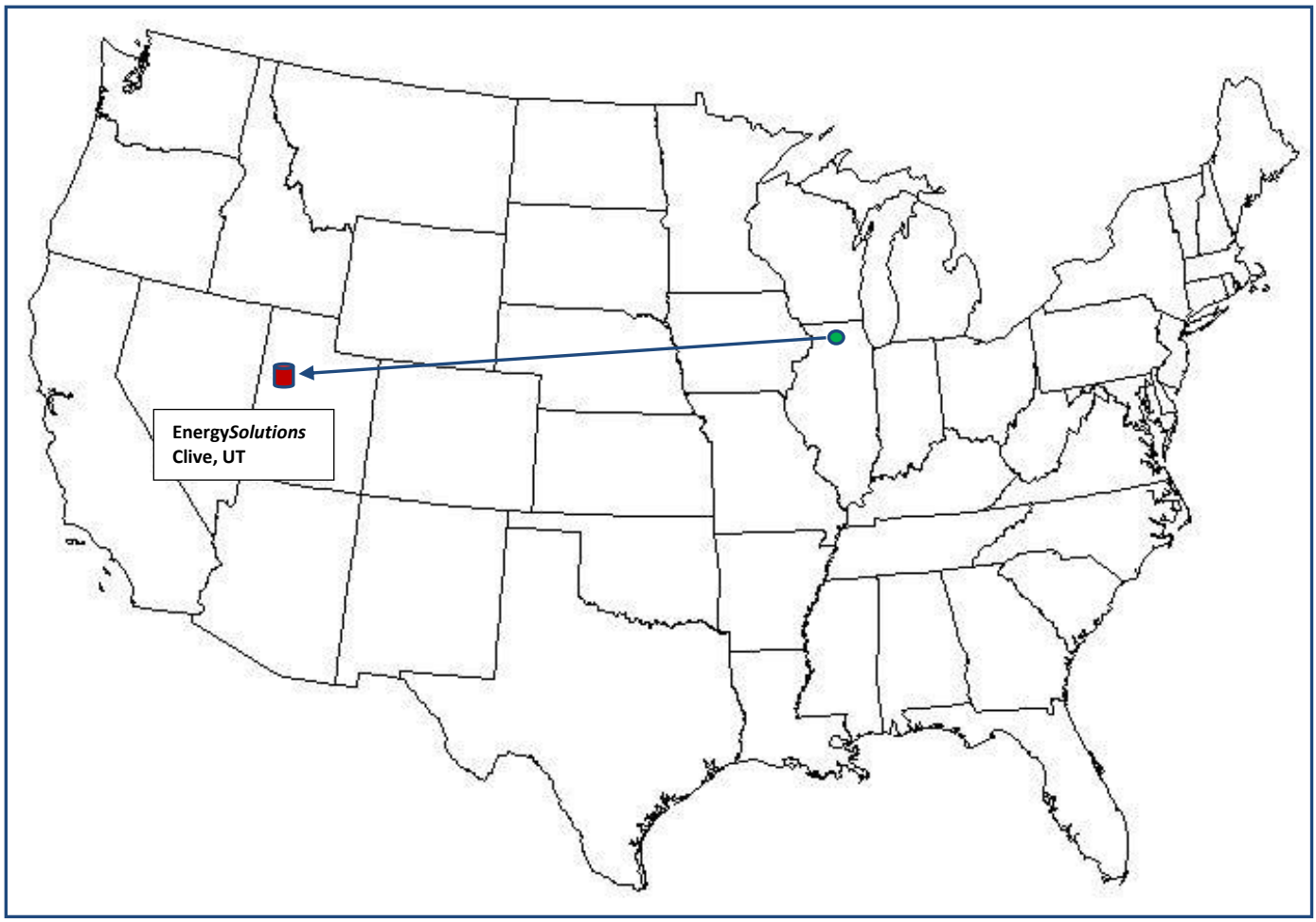


FIGURE 5.2
DECOMMISSIONING WASTE DESTINATIONS
RADIOLOGICAL



The figure indicates the destinations for the low-level radioactive waste designated for direct disposal (Class A at Energy*Solutions*).

Disposition of the Class B and C low-level radioactive waste will be at a future disposal facility (to be determined). For estimating purposes, the facility is located (for capturing transportation costs) at a distance equivalent to the Energy*Solutions* facility and the disposal cost is based upon the currently operating Barnwell Low-Level Radioactive Waste Disposal Facility in South Carolina.

Disposal options (and destinations) for GTCC are still being evaluated.

TABLE 5.1
DECOMMISSIONING WASTE SUMMARY
DECON

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Mass (pounds)
Low-Level Radioactive Waste (near-surface disposal)	Energy*Solutions* Containerized	A	899,025	49,347,140
	Energy*Solutions* Bulk	A	55,624	3,186,782
	Future LLRW Disposal Facility (Proxy)	B	3,691	403,221
	Future LLRW Disposal Facility (Proxy)	C	785	94,822
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC	4,433	866,361
Total [2]			963,558	53,898,326
Scrap Metal				255,644,000

[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
DECOMMISSIONING WASTE SUMMARY
DELAYED DECON

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Mass (pounds)
Low-Level Radioactive Waste (near-surface disposal)	Energy*Solutions* Containerized	A	896,145	48,597,270
	Energy*Solutions* Bulk	A	61,234	3,110,905
	Future LLRW Disposal Facility (Proxy)	B	2,254	213,522
	Future LLRW Disposal Facility (Proxy)	C	785	94,822
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC	4,433	866,361
Total [2]			964,851	52,882,880
Scrap Metal				255,568,000

[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
DECOMMISSIONING WASTE SUMMARY
SAFSTOR

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Mass (pounds)
Low-Level Radioactive Waste (near-surface disposal)	Energy*Solutions* Containerized	A	871,998	47,760,770
	Energy*Solutions* Bulk	A	71,570	3,900,172
	Future LLRW Disposal Facility (Proxy)	B	1,002	100,508
	Future LLRW Disposal Facility (Proxy)	C	785	94,822
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC	4,433	866,361
Total [2]			949,788	52,722,633
Scrap Metal				255,568,000

[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 Byron relied upon the site-specific, technical information developed for a previous analysis prepared in 2009. While not an engineering study, the estimates provide Exelon with sufficient information to assess its financial obligations, as they pertain to the eventual decommissioning of the nuclear station.

The estimates described in this report are based on numerous fundamental assumptions, including regulatory requirements, project contingencies, low-level radioactive waste disposal practices, high-level radioactive waste management options, and site restoration requirements. The decommissioning scenarios assume continued operation of the plant's spent fuel pool for a minimum of five and one-half years following the cessation of operations for continued cooling of the assemblies. For the DECON and SAFSTOR scenarios, the ISFSI is expanded to accommodate the spent fuel, once sufficiently cooled, until such time that the DOE can complete the transfer of the assemblies to its repository. The spent fuel in the storage pools and reactors at the cessation of operations remains in the storage pools in the Delayed-DECON alternative.

The cost projected to promptly decommission (DECON) Byron is estimated to be $1.82 billion. The majority of this cost (approximately 67.4%) is associated with the physical decontamination and dismantling of the nuclear units so that the licenses can be terminated. Another 22.2% is associated with the management, interim storage, and eventual transfer of the spent fuel. The remaining 10.4% is for the demolition of the designated structures and limited restoration of the site.

The primary cost contributors, identified in Tables 6.1 through 6.3, are either labor-related or associated with the management and disposition of the radioactive waste. Program management is the largest single contributor to the overall cost. The magnitude of the expense is a function of both the size of the organization required to manage the decommissioning, as well as the duration of the program. This analysis assumes that Exelon will oversee the decommissioning program, using a DOC to manage the decommissioning labor force and the associated subcontractors. The size and composition of the management organization varies with the decommissioning phase and associated site activities. However, once the operating license is terminated, the staff is substantially reduced for the conventional demolition and restoration of the site, and the long-term care of the spent fuel (for the DECON alternative).

As described in this report, the spent fuel pool will remain operational for a minimum of five and one-half years following the cessation of operations. The pool will be isolated and an independent spent fuel island created. This will allow decommissioning operations to proceed in and around the pool areas. Over the five and one-half year period, the spent fuel will be packaged into transportable steel canisters for future loading into a DOE-provided transport cask (DECON and SAFSTOR alternatives). The canisters will be stored in concrete overpacks at the ISFSI until the DOE is able to receive them. Dry storage of the fuel provides additional flexibility in the event the DOE is not able to meet the current timetable for completing the transfer of assemblies to an off-site facility and minimizes the associated caretaking expenses.

The cost for waste disposal includes only those costs associated with the controlled disposition of the low-level radioactive waste generated from decontamination and dismantling activities, including plant equipment and components, structural material, filters, resins and dry-active waste. As described in Section 5, disposal of the majority of the radioactive material is at EnergySolutions facility in Clive, Utah or some alternative facility. Highly activated components, requiring additional isolation from the environment, are packaged for geologic disposal. Disposal of these components is based upon a cost equivalent for spent fuel.

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. 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.

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.

Comparison of the 2009 and 2014 Estimates

For illustrative purposes, the estimates for the 2009 and 2014 DECON scenarios are compared, with the cost difference for the major cost elements shown in Table 6.4. The 2009 cost elements are inflated using the CPI, Services index to 2014 dollars to remove the effect of financial escalation from the comparison. The cost difference between the escalated 2009 estimate (increased approximately 8.6%) and the 2014 estimate is approximately $351 million. Unless otherwise noted, all cost values and percentages reflect 2009 estimate costs adjusted for inflation.

Spent Fuel Management

Approximately $94 million, or 27% of the total cost difference, is directly attributable to the additional 8 years of post-dismantling ISFSI operation reflected in the 2014 estimate. The cost of ISFSI operations (including plant staff, security, insurance, property taxes, fees, and other operating costs) during this timeframe is approximately $5.88 million per year per unit (2014 estimate $s). The increased residence time was based upon Exelon's revised projections for fleet-wide DOE spent fuel acceptance, and with consideration of an additional delay in DOE startup (first acceptance of commercial spent fuel) from 2018 to 2025.

Spent Fuel Management (Direct Costs)

This cost category increased approximately $107 million. It includes the costs for the dry storage casks and loading campaign costs, as well as emergency planning fees while fuel is on site. The principal contributor to the increase was from emergency planning fees, which represents approximately $101 million or 94% of the increase. In 2009, a nominal emergency planning fee allowance was used. The 2014 estimate incorporates an annual state emergency planning fee of $3.8 million (for the station) while spent fuel was on site. An increase (14%) in the capital cost of the dry storage system was responsible for the remainder of the increase in this cost category from years 2009 to 2014.

There was also a slight increase in the number of dry storage overpacks and canisters required (92 in 2009 to 94 in 2014) and a reduction in the costs to expand the ISFSI (from a nominal cost of $200 thousand per cask in 2009 dollars to a nominal cost of $100 thousand per slot in 2014 dollars).

Security

The majority of the increase in security costs (64%) was due to the longer spent fuel site residence time as described previously. Contributing to the increase was a 22% increase in average personnel costs.

Property Taxes

Property taxes for the 1st four years following unit shut down changed substantially. This was due to the method by which the Exelon schedule of property taxes was applied in the two estimates. Property taxes are assumed to be paid in arrears; therefore the tax payment in the year following shutdown is actually for the final year of operations, and therefore is not included in either the 2009 or 2014 estimates. In 2009 the cost model assumed that this first year (which as not included) was part of the reduction in tax payments; the 2014 estimate does not make this assumption. The 2009 estimate also assumed that the second year of payment was already reduced to 67% of the operations level; the 2014 estimate begins property tax payments at the operations level for the second year. The total impact of the change was that the 2009 estimate paid the equivalent of one year of operations-level taxes before beginning the $1 million per year level payments; the 2014 estimate paid the equivalent of approximately two years of operations-level taxes prior to the $1 million per year level payments. The increase in the spent fuel site residence time (13 years) also contributed to the increased in costs.

Decommissioning and Demolition

Plant system and structural commodity "Removal" costs increased as a result of an 7% increase in craft labor over the five year period (used to perform physical plant dismantling) and a 14% increase in health physics personnel (used to support work crew activities, perform interim radiological assessments, and license termination surveys). The 2014 "Removal" cost also includes the perimeter excavation of the power blocks for removing underground services. This was added in 2014 based upon industry experience.

In the 2009 cost estimate, a significant portion of the contaminated waste stream was designated for off-site processing, volume reduction and recovery. This included

the secondary side of the steam generators. In the 2014 estimate, he LLRW strategy changed such that metal material was sent directly to the LLRW burial facility, where is can be separated for burial or processing by the waste vendor consistent with recent industry practice. This results in a single rate for burial or processing of waste metals. With the low direct disposal rate, third-party off-site processing was not utilized in the 2014 estimate. As a result of the change:

1) The packaging cost increased, since direct disposal of contaminated metals incorporates the mass and volume of the waste package, as well as the cost of the one-time use waste package. Off-site processing typically uses reusable containers that do not contribute substantially to the packaging cost. "Packaging" costs also increased with the addition (in 2014) of four spent fuel multi-purpose canisters and storage overpacks for GTCC waste (2 per unit at a nominal cost of $1.2 million for each canister and transfer costs). The additional packages resulted from a payload constraint being applied on the storage canisters, as a result of industry experience.

2) Shipping costs increased for three reasons, the greater distance to the waste disposal site v. the off-site waste processing site, the increased number of waste packages weight, and a 2014 price for diesel fuel being 46% higher than in 2009.

3) In 2014 low-level waste disposal costs increased relative to the combination of waste disposal and processing cost in 2009 principally because the 2014 cost of waste disposal for system components (using a single waste stream) is substantially larger than 2009 cost for disposal (which used separate waste streams for direct burial and off-site waste processing). Also contributing to the change was a 10% increase in the large component disposal rate (applied to large primary system components such as steam generators and the reactor vessel. This cost increase was offset to a limited extent by a decrease in the on-site decontamination of systems.

Characterization and Licensing Surveys

Characterization and surveys increased by $15.5 million (45%). The majority of the increase in this cost category (96%) is associated with the addition (in 2014) of remedial action survey personnel during the active decontamination and dismantling periods. These teams are used to assess, process, and identify areas of concerns, and confirm that the desired remediation results have been achieved. This activity has been added based on industry experience.

Other

Additional costs were realized in the 2014 cost model from an updated "Insurance" model and "Site O&M" charges provided by Exelon (combined with the longer spent fuel site residence time). "Energy" costs increased 80% percent since the 2009 estimate. This is commensurate with the 91% increase in the price of electricity used in the 2014 estimate and the model that adjusts energy consumption based on reactor thermal rating (Byron had a power uprate between the 2009 and 2014 studies).

TABLE 6.1
SUMMARY OF DECOMMISSIONING COST ELEMENTS
DECON ALTERNATIVE
(thousands of 2014 dollars)

Cost Element	Total	Percentage
Decontamination	38,368	2.1
Removal	293,055	16.1
Packaging	61,516	3.4
Transportation	35,119	1.9
Waste Disposal	177,992	9.8
Off-site Waste Processing	0	0.0
Program Management [1]	555,968	30.6
Security	126,957	7.0
Spent Fuel Pool Isolation	12,434	0.7
Spent Fuel Management [2]	285,106	15.7
Insurance and Regulatory Fees	34,410	1.9
Energy	24,072	1.3
Characterization and Licensing Surveys	49,614	2.7
Property Taxes	100,810	5.5
Miscellaneous Equipment	13,598	0.8
Site O&M	9,568	0.5
Total [3]	1,818,587	100.0

Cost Element	Total	Percentage
NRC License Termination	1,227,223	67.4
Spent Fuel Management	403,084	22.2
Site Restoration	188,280	10.4
Total [3]	1,818,587	100.0

[1] Includes security and engineering 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

TABLE 6.2
SUMMARY OF DECOMMISSIONING COST ELEMENTS
DELAYED DECON ALTERNATIVE
(thousands of 2014 dollars)

Cost Element	Total	Percentage
Decontamination	32,426	1.6
Removal	297,633	14.8
Packaging	51,133	2.5
Transportation	30,837	1.5
Waste Disposal	156,431	7.8
Off-site Waste Processing	0	0.0
Program Management [1]	734,385	36.5
Security	215,500	10.7
Spent Fuel Pool Isolation	12,434	0.6
Spent Fuel Management [2]	169,111	8.4
Insurance and Regulatory Fees	67,659	3.4
Energy	46,122	2.3
Characterization and Licensing Surveys	51,444	2.6
Property Taxes	111,097	5.5
Miscellaneous Equipment	24,841	1.2
Site O&M	13,321	0.7
Total [3]	2,014,375	100.0

Cost Element	Total	Percentage
NRC License Termination	1,314,983	65.3
Spent Fuel Management	512,582	25.5
Site Restoration	186,810	9.3
Total [3]	2,014,375	100.0

[1] Includes security and engineering 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

TABLE 6.3
SUMMARY OF DECOMMISSIONING COST ELEMENTS
SAFSTOR ALTERNATIVE
(thousands of 2014 dollars)

Cost Element	Total	Percentage
Decontamination	32,378	1.5
Removal	301,033	13.8
Packaging	51,125	2.3
Transportation	30,939	1.4
Waste Disposal	153,653	7.0
Off-site Waste Processing	0	0.0
Program Management [1]	705,374	32.2
Security	211,854	9.7
Spent Fuel Pool Isolation	12,434	0.6
Spent Fuel Management [2]	279,466	12.8
Insurance and Regulatory Fees	112,010	5.1
Energy	50,016	2.3
Characterization and Licensing Surveys	51,444	2.4
Property Taxes	140,108	6.4
Miscellaneous Equipment	34,697	1.6
Site O&M	23,339	1.1
Total [3]	2,189,872	100.0

Cost Element	Total	Percentage
NRC License Termination	1,610,713	73.6
Spent Fuel Management	391,055	17.9
Site Restoration	188,103	8.6
Total [3]	2,189,872	100.0

[1] Includes security and engineering 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

TABLE 6.4
SUMMARY COMPARISON
DECON ALTERNATIVE
(thousands of dollars)

Cost Element	2009 Estimate (dollars)	2009 Escalated to 2014 [1] (dollars)	2014 Estimate (dollars)	Delta [2]
Decontamination	33,761	36,648	38,368	1,721
Removal	242,355	263,078	293,055	29,977
Packaging	29,594	32,124	61,516	29,391
Transportation	20,501	22,254	35,119	12,865
Waste Disposal	119,478	129,694	177,992	48,297
Off-site Waste Processing	8,002	8,686	0	-8,686
Program Management	516,437	560,596	555,968	-4,628
Security	73,840	80,154	126,957	46,803
Spent Fuel Pool Isolation	11,143	12,096	12,434	339
Spent Fuel Management (Direct Costs)	163,436	177,411	285,106	107,695
Insurance and Regulatory Fees	22,834	24,786	34,410	9,624
Energy	12,320	13,373	24,072	10,699
Characterization/Licensing Surveys	31,452	34,141	49,614	15,472
Property Taxes	48,613	52,770	100,810	48,040
Miscellaneous Equipment	12,886	13,988	13,598	-390
Site O&M	5,087	5,522	9,568	4,046
Total	1,351,739	1,467,322	1,818,587	351,265

NRC License Termination	969,616	1,052,525	1,227,223	174,699
Spent Fuel Management	226,513	245,881	309,028	63,146
Additional 8 Years of ISFSI Ops [3]			94,056	94,056
Site Restoration	155,609	168,915	188,280	19,365
Total	1,351,738	1,467,321	1,818,587	351,266

[1] Escalated by CPI, Services for comparative purposes
[2] "2014 Estimate" value minus "2009 Escalated to 2014" value
[3] Based upon average annual cost of $5.88 million per unit for 8 years

7. REFERENCES

1. "Decommissioning Cost Analysis for the Byron Nuclear Power Station," Document No. E16-1555-013, Rev. 0, TLG Services, Inc., September 2009

2. U.S. Code of Federal Regulations, Title 10, Parts 30, 40, 50, 51, 70 and 72, "General Requirements for Decommissioning Nuclear Facilities," Nuclear Regulatory Commission, 53 Fed. Reg., 24018-, June 27, 1988

3. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.159, "Assuring the Availability of Funds for Decommissioning Nuclear Reactors," Rev. 2, October 2011

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, 66 Fed. Reg. 52551, 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, 61 Fed. Reg. 39278, July 29, 1996.

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

8. "Nuclear Waste Policy Act of 1982," 42 U.S. Code 10101, et seq. http://pbadupws.nrc.gov/docs/ML1327/ML13274A489.pdf#page=419

9. Blue Ribbon Commission on America's Nuclear Future Charter, http://cybercemetery.unt.edu/archive/brc/20120620215336/http://brc.gov/index.php?q=page/charter

10. "Blue Ribbon Commission on America's Nuclear Future, Report to the Secretary of Energy," http://www.brc.gov/, January 2012.

11. "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," U.S. DOE, January 11, 2013.

7. REFERENCES
(continued)

12. United States Court of Appeals for the District Of Columbia Circuit, In Re: Aiken County, Et Al., August 2013, http://www.cadc.uscourts.gov/internet/opinions.nsf/BAE0CF34F762EBD985257BC6004DEB18/$file/11-1271-1451347.pdf

13. U.S. Code of Federal Regulations, Title 10, Part 961.11, Article IV – Responsibilities of the Parties, B. DOE Responsibilities, 5.(a) "… DOE shall issue an annual acceptance priority ranking for receipt of SNF and/or HLW at the DOE repository. This priority ranking shall be based on the age of SNF and/or HLW as calculated from the date of discharge of such materials from the civilian nuclear power reactor. The oldest fuel or waste will have the highest priority for acceptance …"

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

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

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

17. U.S. Code of Federal Regulations, Title 10, Part 61.55 "Waste Classification"

18. U.S. Code of Federal Regulations, Title 10, Part 20, Subpart E, "Final Rule, Radiological Criteria for License Termination," 62 Fed. Reg. 39058, July 21, 1997

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

20. 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."

21. "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

7. REFERENCES
(continued)

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

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

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

25. "Building Construction Cost Data 2014," Robert Snow Means Company, Inc., Kingston, Massachusetts

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

27. Civilian Radioactive Waste Management System Waste Acceptance System Requirements Document," Revision 5, ICN01 (DOE/RW-0351) effective March 10, 2008

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

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

30. Tri-State Motor Transit Company Radioactive Materials Tariff

31. 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.

32. 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.

7. REFERENCES
(continued)

33. 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

34. "Microsoft Project 2010," Microsoft Corporation, Redmond, WA, 2003

35. “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	57.33	1,929.21
Craftsmen	2.00	11.217	69.16	1,551.54
Foreman	1.00	11.217	71.41	801.01
General Foreman	0.25	11.217	75.35	211.30
Fire Watch	0.05	11.217	57.33	32.15
Health Physics Technician	1.00	11.217	63.44	711.61
Total labor cost				$5,236.82

4. EQUIPMENT & CONSUMABLES COSTS

Equipment Costs	none
Consumables/Materials Costs	
• Blotting paper 50 @ $0.59/sq ft {1}	$29.50
• Plastic sheets/bags 50 @ $0.27/sq ft {2}	$13.50
• Gas torch consumables 1 @ $18.72 x 1 /hr {3}	$18.72
Subtotal cost of equipment and materials	$61.72
Overhead & profit on equipment and materials @ 16.25 %	$10.03
Total costs, equipment & material	$71.75

TOTAL COST:

Removal of contaminated heat exchanger <3000 pounds:	$5,308.57
Total labor cost:	$5,236.82
Total equipment/material costs:	$71.75
Total craft labor man-hours required per unit:	81.88

5. NOTES AND REFERENCES

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

- References for equipment & consumables costs:

    1. www.mcmaster.com online catalog, McMaster Carr Spill Control (7193T88)
    2. R.S. Means (2014) Division 01 56, Section 13.60-0600, page 23
    3. R.S. Means (2014) Division 01 54 33, Section 40-6360, page 698

- Material and consumable costs were adjusted using the regional indices for Rockford, Illinois.

APPENDIX B

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

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
Removal of clean instrument and sampling tubing, $/linear foot	0.61
Removal of clean pipe 0.25 to 2 inches diameter, $/linear foot	6.62
Removal of clean pipe >2 to 4 inches diameter, $/linear foot	9.33
Removal of clean pipe >4 to 8 inches diameter, $/linear foot	17.92
Removal of clean pipe >8 to 14 inches diameter, $/linear foot	34.88
Removal of clean pipe >14 to 20 inches diameter, $/linear foot	45.36
Removal of clean pipe >20 to 36 inches diameter, $/linear foot	66.73
Removal of clean pipe >36 inches diameter, $/linear foot	79.28
Removal of clean valve >2 to 4 inches	118.90
Removal of clean valve >4 to 8 inches	179.25
Removal of clean valve >8 to 14 inches	348.77
Removal of clean valve >14 to 20 inches	453.60
Removal of clean valve >20 to 36 inches	667.33
Removal of clean valve >36 inches	792.84
Removal of clean pipe hanger for small bore piping	41.27
Removal of clean pipe hanger for large bore piping	148.59
Removal of clean pump, <300 pound	302.78
Removal of clean pump, 300-1000 pound	832.26
Removal of clean pump, 1000-10,000 pound	3,298.22
Removal of clean pump, >10,000 pound	6,380.28
Removal of clean pump motor, 300-1000 pound	347.89
Removal of clean pump motor, 1000-10,000 pound	1,370.33
Removal of clean pump motor, >10,000 pound	3,083.23
Removal of clean heat exchanger <3000 pound	1,769.79
Removal of clean heat exchanger >3000 pound	4,457.34
Removal of clean feedwater heater/deaerator	12,574.09
Removal of clean moisture separator/reheater	25,860.89
Removal of clean tank, <300 gallons	389.43
Removal of clean tank, 300-3000 gallon	1,227.18
Removal of clean tank, >3000 gallons, $/square foot surface area	10.22

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
Removal of clean electrical equipment, <300 pound	164.15
Removal of clean electrical equipment, 300-1000 pound	566.40
Removal of clean electrical equipment, 1000-10,000 pound	1,132.80
Removal of clean electrical equipment, >10,000 pound	2,677.18
Removal of clean electrical transformer < 30 tons	1,859.26
Removal of clean electrical transformer > 30 tons	5,354.36
Removal of clean standby diesel generator, <100 kW	1,899.07
Removal of clean standby diesel generator, 100 kW to 1 MW	4,238.85
Removal of clean standby diesel generator, >1 MW	8,775.30
Removal of clean electrical cable tray, $/linear foot	15.43
Removal of clean electrical conduit, $/linear foot	6.74
Removal of clean mechanical equipment, <300 pound	164.15
Removal of clean mechanical equipment, 300-1000 pound	566.40
Removal of clean mechanical equipment, 1000-10,000 pound	1,132.80
Removal of clean mechanical equipment, >10,000 pound	2,677.18
Removal of clean HVAC equipment, <300 pound	198.50
Removal of clean HVAC equipment, 300-1000 pound	680.56
Removal of clean HVAC equipment, 1000-10,000 pound	1,356.38
Removal of clean HVAC equipment, >10,000 pound	2,677.18
Removal of clean HVAC ductwork, $/pound	0.65
Removal of contaminated instrument and sampling tubing, $/linear foot	1.92
Removal of contaminated pipe 0.25 to 2 inches diameter, $/linear foot	25.69
Removal of contaminated pipe >2 to 4 inches diameter, $/linear foot	44.62
Removal of contaminated pipe >4 to 8 inches diameter, $/linear foot	70.38
Removal of contaminated pipe >8 to 14 inches diameter, $/linear foot	139.47
Removal of contaminated pipe >14 to 20 inches diameter, $/linear foot	168.04
Removal of contaminated pipe >20 to 36 inches diameter, $/linear foot	233.45
Removal of contaminated pipe >36 inches diameter, $/linear foot	276.32
Removal of contaminated valve >2 to 4 inches	541.40
Removal of contaminated valve >4 to 8 inches	651.50

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
Removal of contaminated valve >8 to 14 inches	1,344.70
Removal of contaminated valve >14 to 20 inches	1,712.55
Removal of contaminated valve >20 to 36 inches	2,284.48
Removal of contaminated valve >36 inches	2,713.21
Removal of contaminated pipe hanger for small bore piping	178.40
Removal of contaminated pipe hanger for large bore piping	583.47
Removal of contaminated pump, <300 pound	1,161.24
Removal of contaminated pump, 300-1000 pound	2,671.55
Removal of contaminated pump, 1000-10,000 pound	8,765.13
Removal of contaminated pump, >10,000 pound	21,354.30
Removal of contaminated pump motor, 300-1000 pound	1,124.22
Removal of contaminated pump motor, 1000-10,000 pound	3,554.32
Removal of contaminated pump motor, >10,000 pound	7,979.82
Removal of contaminated heat exchanger <3000 pound	5,308.57
Removal of contaminated heat exchanger >3000 pound	15,357.89
Removal of contaminated tank, <300 gallons	1,926.66
Removal of contaminated tank, >300 gallons, $/square foot	37.68
Removal of contaminated electrical equipment, <300 pound	904.59
Removal of contaminated electrical equipment, 300-1000 pound	2,176.43
Removal of contaminated electrical equipment, 1000-10,000 pound	4,190.50
Removal of contaminated electrical equipment, >10,000 pound	8,154.87
Removal of contaminated electrical cable tray, $/linear foot	43.78
Removal of contaminated electrical conduit, $/linear foot	20.44
Removal of contaminated mechanical equipment, <300 pound	1,006.91
Removal of contaminated mechanical equipment, 300-1000 pound	2,405.64
Removal of contaminated mechanical equipment, 1000-10,000 pound	4,624.37
Removal of contaminated mechanical equipment, >10,000 pound	8,154.87
Removal of contaminated HVAC equipment, <300 pound	1,006.91
Removal of contaminated HVAC equipment, 300-1000 pound	2,405.64
Removal of contaminated HVAC equipment, 1000-10,000 pound	4,624.37

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
Removal of contaminated HVAC equipment, >10,000 pound	8,154.87
Removal of contaminated HVAC ductwork, $/pound	2.61
Removal/plasma arc cut of contaminated thin metal components, $/linear in.	4.78
Additional decontamination of surface by washing, $/square foot	10.03
Additional decontamination of surfaces by hydrolasing, $/square foot	41.93
Decontamination rig hook up and flush, $/ 250 foot length	8,532.64
Chemical flush of components/systems, $/gallon	18.99
Removal of clean standard reinforced concrete, $/cubic yard	165.62
Removal of grade slab concrete, $/cubic yard	223.42
Removal of clean concrete floors, $/cubic yard	430.13
Removal of sections of clean concrete floors, $/cubic yard	1,289.00
Removal of clean heavily rein concrete w/#9 rebar, $/cubic yard	276.49
Removal of contaminated heavily rein concrete w/#9 rebar, $/cubic yard	2,546.64
Removal of clean heavily rein concrete w/#18 rebar, $/cubic yard	349.54
Removal of contaminated heavily rein concrete w/#18 rebar, $/cubic yard	3,370.98
Removal heavily rein concrete w/#18 rebar & steel embedments, $/cubic yard	534.15
Removal of below-grade suspended floors, $/cubic yard	430.13
Removal of clean monolithic concrete structures, $/cubic yard	1,079.83
Removal of contaminated monolithic concrete structures, $/cubic yard	2,541.92
Removal of clean foundation concrete, $/cubic yard	848.60
Removal of contaminated foundation concrete, $/cubic yard	2,368.28
Explosive demolition of bulk concrete, $/cubic yard	36.47
Removal of clean hollow masonry block wall, $/cubic yard	122.47
Removal of contaminated hollow masonry block wall, $/cubic yard	408.71
Removal of clean solid masonry block wall, $/cubic yard	122.47
Removal of contaminated solid masonry block wall, $/cubic yard	408.71
Backfill of below-grade voids, $/cubic yard	33.87
Removal of subterranean tunnels/voids, $/linear foot	139.46
Placement of concrete for below-grade voids, $/cubic yard	130.21
Excavation of clean material, $/cubic yard	3.53

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
Excavation of contaminated material, $/cubic yard	48.35
Removal of clean concrete rubble (tipping fee included), $/cubic yard	26.96
Removal of contaminated concrete rubble, $/cubic yard	31.19
Removal of building by volume, $/cubic foot	0.36
Removal of clean building metal siding, $/square foot	1.64
Removal of contaminated building metal siding, $/square foot	5.53
Removal of standard asphalt roofing, $/square foot	2.87
Removal of transite panels, $/square foot	2.56
Scarifying contaminated concrete surfaces (drill & spall), $/square foot	14.90
Scabbling contaminated concrete floors, $/square foot	9.44
Scabbling contaminated concrete walls, $/square foot	25.27
Scabbling contaminated ceilings, $/square foot	87.02
Scabbling structural steel, $/square foot	7.58
Removal of clean overhead crane/monorail < 10 ton capacity	782.51
Removal of contaminated overhead crane/monorail < 10 ton capacity	2,220.77
Removal of clean overhead crane/monorail >10-50 ton capacity	1,878.04
Removal of contaminated overhead crane/monorail >10-50 ton capacity	5,328.91
Removal of polar crane > 50 ton capacity	7,805.00
Removal of gantry crane > 50 ton capacity	33,464.69
Removal of structural steel, $/pound	0.24
Removal of clean steel floor grating, $/square foot	5.56
Removal of contaminated steel floor grating, $/square foot	16.19
Removal of clean free standing steel liner, $/square foot	15.32
Removal of contaminated free standing steel liner, $/square foot	44.12
Removal of clean concrete-anchored steel liner, $/square foot	7.66
Removal of contaminated concrete-anchored steel liner, $/square foot	51.44
Placement of scaffolding in clean areas, $/square foot	16.62
Placement of scaffolding in contaminated areas, $/square foot	29.50
Landscaping with topsoil, $/acre	25,057.45
Cost of CPC B-88 LSA box & preparation for use	2,070.88

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	1,896.83
Cost of CPC B-12V 12 gauge LSA box & preparation for use	1,551.35
Cost of CPC B-144 LSA box & preparation for use	10,441.07
Cost of LSA drum & preparation for use	217.98
Cost of cask liner for CNSI 8 120A cask (resins)	12,455.91
Cost of cask liner for CNSI 8 120A cask (filters)	9,035.60
Decontamination of surfaces with vacuuming, $/square foot	0.97

APPENDIX C

DETAILED COST ANALYSIS

DECON

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Table C-1
Byron Nuclear Power Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	166	25	190	190	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	255	38	293	293	-	-	-	-	-	-	-	-	-	2,000
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	586	88	674	674	-	-	-	-	-	-	-	-	-	4,600
1a.1.8	Perform detailed rad survey									a											
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,000
1a.1.10	End product description	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	166	25	190	190	-	-	-	-	-	-	-	-	-	1,300
1a.1.12	Define major work sequence	-	-	-	-	-	-	955	143	1,098	1,098	-	-	-	-	-	-	-	-	-	7,500
1a.1.13	Perform SER and EA	-	-	-	-	-	-	395	59	454	454	-	-	-	-	-	-	-	-	-	3,100
1a.1.14	Perform Site-Specific Cost Study	-	-	-	-	-	-	637	95	732	732	-	-	-	-	-	-	-	-	-	5,000
1a.1.15	Prepare/submit License Termination Plan	-	-	-	-	-	-	522	78	600	600	-	-	-	-	-	-	-	-	-	4,096
1a.1.16	Receive NRC approval of termination plan									a											
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	626	94	720	648	-	72	-	-	-	-	-	-	-	4,920
1a.1.17.2	Plant systems	-	-	-	-	-	-	531	80	610	549	-	61	-	-	-	-	-	-	-	4,167
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	64	10	73	73	-	-	-	-	-	-	-	-	-	500
1a.1.17.4	Reactor internals	-	-	-	-	-	-	904	136	1,040	1,040	-	-	-	-	-	-	-	-	-	7,100
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	828	124	952	952	-	-	-	-	-	-	-	-	-	6,500
1a.1.17.6	Biological shield	-	-	-	-	-	-	64	10	73	73	-	-	-	-	-	-	-	-	-	500
1a.1.17.7	Steam generators	-	-	-	-	-	-	397	60	457	457	-	-	-	-	-	-	-	-	-	3,120
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	204	31	234	117	-	117	-	-	-	-	-	-	-	1,600
1a.1.17.9	Main Turbine	-	-	-	-	-	-	51	8	59	-	-	59	-	-	-	-	-	-	-	400
1a.1.17.10	Main Condensers	-	-	-	-	-	-	51	8	59	-	-	59	-	-	-	-	-	-	-	400
1a.1.17.11	Plant structures & buildings	-	-	-	-	-	-	397	60	457	228	-	228	-	-	-	-	-	-	-	3,120
1a.1.17.12	Waste management	-	-	-	-	-	-	586	88	674	674	-	-	-	-	-	-	-	-	-	4,600
1a.1.17.13	Facility & site closeout	-	-	-	-	-	-	115	17	132	66	-	66	-	-	-	-	-	-	-	900
1a.1.17	Total	-	-	-	-	-	-	4,816	722	5,539	4,877	-	662	-	-	-	-	-	-	-	37,827
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	306	46	351	351	-	-	-	-	-	-	-	-	-	2,400
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	3,000	450	3,450	3,450	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	178	27	205	205	-	-	-	-	-	-	-	-	-	1,400
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,300	345	2,645	2,645	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	157	23	180	180	-	-	-	-	-	-	-	-	-	1,230
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	14,690	2,204	16,894	16,232	-	662	-	-	-	-	-	-	-	73,753
Period 1a Additional Costs																					
1a.2.1	ISFSI Expansion	-	-	-	-	-	-	4,800	720	5,520	-	5,520	-	-	-	-	-	-	-	-	-
1a.2	Subtotal Period 1a Additional Costs	-	-	-	-	-	-	4,800	720	5,520	-	5,520	-	-	-	-	-	-	-	-	-
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	10,038	1,506	11,544	-	11,544	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	10,038	1,506	11,544	-	11,544	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,855	185	2,040	2,040	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	493	-	-	-	-	-	123	616	616	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	529	-	-	-	-	-	79	608	608	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	13	7	-	39	-	12	71	71	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,778	267	2,045	2,045	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	1,181	118	1,299	1,299	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	2,171	217	2,388	-	2,388	-	-	-	-	-	-	-	-	-
1a.4.9	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	396	59	455	-	455	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	48	7	55	-	55	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	640	96	736	736	-	-	-	-	-	-	-	-	-	12,264
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	32,279	4,842	37,121	37,121	-	-	-	-	-	-	-	-	-	423,400

Table C-1
Byron Nuclear Power Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,022	13	7	-	39	40,512	6,031	47,624	44,727	2,898	-	-	610	-	-	-	12,190	20	435,664
1a.0	TOTAL PERIOD 1a COST	-	1,022	13	7	-	39	70,041	10,460	81,582	60,959	19,962	662	-	610	-	-	-	12,190	20	509,417
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems	-	-	-	-	-	-	603	90	693	624	-	69	-	-	-	-	-	-	-	4,733
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.3	Reactor internals	-	-	-	-	-	-	318	48	366	366	-	-	-	-	-	-	-	-	-	2,500
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	172	26	198	49	-	148	-	-	-	-	-	-	-	1,350
1b.1.1.5	CRD cooling assembly	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.6	CRD housings & ICI tubes	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.7	Incore instrumentation	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	462	69	531	531	-	-	-	-	-	-	-	-	-	3,630
1b.1.1.9	Facility closeout	-	-	-	-	-	-	153	23	176	88	-	88	-	-	-	-	-	-	-	1,200
1b.1.1.10	Missile shields	-	-	-	-	-	-	57	9	66	66	-	-	-	-	-	-	-	-	-	450
1b.1.1.11	Biological shield	-	-	-	-	-	-	153	23	176	176	-	-	-	-	-	-	-	-	-	1,200
1b.1.1.12	Steam generators	-	-	-	-	-	-	586	88	674	674	-	-	-	-	-	-	-	-	-	4,600
1b.1.1.13	Reinforced concrete	-	-	-	-	-	-	127	19	146	73	-	73	-	-	-	-	-	-	-	1,000
1b.1.1.14	Main Turbine	-	-	-	-	-	-	199	30	228	-	-	228	-	-	-	-	-	-	-	1,560
1b.1.1.15	Main Condensers	-	-	-	-	-	-	199	30	228	-	-	228	-	-	-	-	-	-	-	1,560
1b.1.1.16	Auxiliary building	-	-	-	-	-	-	348	52	400	360	-	40	-	-	-	-	-	-	-	2,730
1b.1.1.17	Reactor building	-	-	-	-	-	-	348	52	400	360	-	40	-	-	-	-	-	-	-	2,730
1b.1.1	Total	-	-	-	-	-	-	4,232	635	4,867	3,952	-	915	-	-	-	-	-	-	-	33,243
1b.1.2	Decon primary loop	753	-	-	-	-	-	-	377	1,130	1,130	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	753	-	-	-	-	-	4,232	1,011	5,997	5,082	-	915	-	-	-	-	-	-	1,067	33,243
Period 1b Additional Costs																					
1b.2.1	Site Characterization	-	-	-	-	-	-	6,444	1,933	8,377	8,377	-	-	-	-	-	-	-	-	30,500	10,852
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	6,444	1,933	8,377	8,377	-	-	-	-	-	-	-	-	30,500	10,852
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	886	-	-	-	-	-	-	133	1,019	1,019	-	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,080	162	1,242	1,242	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning water waste	52	-	34	91	-	115	-	72	364	364	-	-	-	328	-	-	-	19,686	64	-
1b.3.4	Process decommissioning chemical flush waste	2	-	92	348	-	3,918	-	1,042	5,403	5,403	-	-	-	-	926	-	-	98,699	173	-
1b.3.5	Small tool allowance	-	2	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-
1b.3.6	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-
1b.3.7	Decon rig	1,500	-	-	-	-	-	-	225	1,725	1,725	-	-	-	-	-	-	-	-	-	-
1b.3.8	Spent Fuel Capital and Transfer	-	-	-	-	-	-	5,033	755	5,788	-	5,788	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	2,440	1,102	126	439	-	4,034	6,113	2,554	16,808	11,020	5,788	-	-	328	926	-	-	118,386	237	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	27	-	-	-	-	-	-	7	34	34	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	704	70	774	774	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	8,248	825	9,072	9,072	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	278	-	-	-	-	-	69	347	347	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	265	-	-	-	-	-	40	305	305	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	8	4	-	23	-	7	42	42	-	-	-	358	-	-	-	7,159	12	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	1,783	267	2,051	2,051	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	346	35	381	381	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	1,088	109	1,197	-	1,197	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Cost	-	-	-	-	-	-	83	12	95	95	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	198	30	228	-	228	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	24	4	28	-	28	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	321	48	369	369	-	-	-	-	-	-	-	-	-	6,149
1b.4.14	DOC Staff Cost	-	-	-	-	-	-	5,535	830	6,365	6,365	-	-	-	-	-	-	-	-	-	63,789
1b.4.15	Utility Staff Cost	-	-	-	-	-	-	16,249	2,437	18,687	18,687	-	-	-	-	-	-	-	-	-	213,326
1b.4	Subtotal Period 1b Period-Dependent Costs	27	543	8	4	-	23	34,579	4,791	39,974	38,521	1,453	-	-	358	-	-	-	7,159	12	283,263
1b.0	TOTAL PERIOD 1b COST	3,221	1,645	134	443	-	4,056	51,368	10,289	71,156	63,000	7,241	915	-	686	926	-	-	125,545	31,816	327,358
PERIOD 1 TOTALS		3,221	2,667	147	450	-	4,095	121,409	20,750	152,739	123,959	27,203	1,577	-	1,296	926	-	-	137,735	31,836	836,775

Table C-1
Byron Nuclear Power Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 2a - Large Component Removal																					
Period 2a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
2a.1.1.1	Reactor Coolant Piping	211	178	35	51	-	263	-	227	965	965	-	-	-	1,783	-	-	-	203,843	5,830	-
2a.1.1.2	Pressurizer Relief Tank	38	34	7	10	-	47	-	41	176	176	-	-	-	329	-	-	-	36,553	1,072	-
2a.1.1.3	Reactor Coolant Pumps & Motors	120	122	146	213	-	1,390	-	485	2,476	2,476	-	-	-	4,796	-	-	-	780,540	4,291	100
2a.1.1.4	Pressurizer	56	69	532	116	-	879	-	336	1,988	1,988	-	-	-	3,033	-	-	-	284,696	2,482	938
2a.1.1.5	Steam Generators	451	4,496	3,888	3,749	-	11,272	-	5,119	28,975	28,975	-	-	-	68,143	-	-	-	4,044,803	23,233	5,750
2a.1.1.6	Retired Steam Generator Units	-	-	1,671	2,916	-	10,319	-	3,184	18,089	18,089	-	-	-	62,044	-	-	-	3,098,576	10,800	2,250
2a.1.1.7	CRDMs/ICIs/Service Structure Removal	188	343	230	60	-	188	-	258	1,266	1,266	-	-	-	3,881	-	-	-	145,494	7,976	-
2a.1.1.8	Reactor Vessel Internals	168	3,171	8,521	1,751	-	8,240	327	9,199	31,377	31,377	-	-	-	1,878	963	393	-	329,968	31,267	1,383
2a.1.1.9	Reactor Vessel	134	5,347	2,459	1,176	-	2,847	327	6,458	18,747	18,747	-	-	-	9,361	-	-	-	960,884	31,267	1,383
2a.1.1	Totals	1,365	13,759	17,489	10,041	-	35,444	654	25,307	104,061	104,061	-	-	-	155,248	963	393	-	9,885,355	118,218	11,803
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	695	3,150	1,094	-	3,399	-	1,503	9,841	9,841	-	-	-	58,555	-	-	-	3,040,215	10,564	-
2a.1.3	Main Condensers	-	1,344	1,828	998	-	5,039	-	1,928	11,138	11,138	-	-	-	75,240	-	-	-	3,906,532	20,428	-
Cascading Costs from Clean Building Demolition																					
2a.1.4.1	Reactor	-	1,250	-	-	-	-	-	188	1,438	1,438	-	-	-	-	-	-	-	-	12,130	-
2a.1.4.2	Auxiliary Building	-	692	-	-	-	-	-	104	796	796	-	-	-	-	-	-	-	-	6,810	-
2a.1.4.3	Refueling Water Storage Tank	-	122	-	-	-	-	-	18	140	140	-	-	-	-	-	-	-	-	1,299	-
2a.1.4	Totals	-	2,065	-	-	-	-	-	310	2,374	2,374	-	-	-	-	-	-	-	-	20,238	-
Disposal of Plant Systems																					
2a.1.5.1	Auxiliary Feedwater	-	80	-	-	-	-	-	12	92	-	-	92	-	-	-	-	-	-	1,244	-
2a.1.5.2	Auxiliary Steam	-	72	-	-	-	-	-	11	83	-	-	83	-	-	-	-	-	-	1,126	-
2a.1.5.3	Auxiliary Steam RCA	-	138	22	11	-	54	-	52	276	276	-	-	-	805	-	-	-	42,068	1,984	-
2a.1.5.4	Boric Acid Processing	529	573	127	78	-	392	-	530	2,230	2,230	-	-	-	6,102	-	-	-	303,638	16,061	-
2a.1.5.5	CO2 & H2	-	27	-	-	-	-	-	4	31	-	-	31	-	-	-	-	-	-	419	-
2a.1.5.6	CO2 & H2 RCA	-	40	5	2	-	11	-	13	71	71	-	-	-	159	-	-	-	8,312	583	-
2a.1.5.7	Chemical Feed	-	59	-	-	-	-	-	9	68	-	-	68	-	-	-	-	-	-	934	-
2a.1.5.8	Chilled Water	-	74	-	-	-	-	-	11	85	-	-	85	-	-	-	-	-	-	1,142	-
2a.1.5.9	Circulating Water	-	323	-	-	-	-	-	48	372	-	-	372	-	-	-	-	-	-	5,150	-
2a.1.5.10	Condensate	-	386	-	-	-	-	-	58	444	-	-	444	-	-	-	-	-	-	6,023	-
2a.1.5.11	Condensate Booster	-	347	-	-	-	-	-	52	400	-	-	400	-	-	-	-	-	-	5,428	-
2a.1.5.12	Condensate Cleanup	-	68	-	-	-	-	-	10	79	-	-	79	-	-	-	-	-	-	1,060	-
2a.1.5.13	Containment Spray	-	264	82	46	-	233	-	139	765	765	-	-	-	3,481	-	-	-	180,655	3,897	-
2a.1.5.14	Diesel Fuel Oil	-	105	-	-	-	-	-	16	120	-	-	120	-	-	-	-	-	-	1,615	-
2a.1.5.15	Essential Service Water	-	244	-	-	-	-	-	37	280	-	-	280	-	-	-	-	-	-	3,837	-
2a.1.5.16	Extraction Steam	-	194	-	-	-	-	-	29	223	-	-	223	-	-	-	-	-	-	3,089	-
2a.1.5.17	Feedwater	-	324	-	-	-	-	-	49	372	-	-	372	-	-	-	-	-	-	5,142	-
2a.1.5.18	Feedwater Drains	-	776	-	-	-	-	-	116	892	-	-	892	-	-	-	-	-	-	12,366	-
2a.1.5.19	Gland Steam	-	58	-	-	-	-	-	9	67	-	-	67	-	-	-	-	-	-	932	-
2a.1.5.20	Gland Water	-	51	-	-	-	-	-	8	59	-	-	59	-	-	-	-	-	-	828	-
2a.1.5.21	Main Steam	-	331	-	-	-	-	-	50	380	-	-	380	-	-	-	-	-	-	5,216	-
2a.1.5.22	Main Steam RCA	-	53	16	10	-	49	-	28	155	155	-	-	-	726	-	-	-	37,727	769	-
2a.1.5.23	Nitrogen	-	3	1	1	-	3	-	2	10	10	-	-	-	49	-	-	-	2,447	50	-
2a.1.5.24	Non-Essential Service Water	-	183	-	-	-	-	-	27	211	-	-	211	-	-	-	-	-	-	2,916	-
2a.1.5.25	Non-Essential Service Water RCA	-	96	32	19	-	94	-	53	294	294	-	-	-	1,400	-	-	-	72,790	1,358	-
2a.1.5.26	Off Gas	-	645	125	71	-	360	-	274	1,476	1,476	-	-	-	5,352	-	-	-	278,775	9,696	-
2a.1.5.27	Process Radiation Monitoring	-	48	3	1	-	7	-	14	74	74	-	-	-	109	-	-	-	5,726	753	-
2a.1.5.28	Process Sampling	-	140	13	8	-	40	-	47	247	247	-	-	-	590	-	-	-	30,697	2,183	-
2a.1.5.29	Station Air	-	31	-	-	-	-	-	5	36	-	-	36	-	-	-	-	-	-	498	-
2a.1.5.30	Station Heating	-	113	-	-	-	-	-	17	130	-	-	130	-	-	-	-	-	-	1,771	-
2a.1.5.31	Switchgear Heat Removal	-	9	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	139	-
2a.1.5.32	Turbine Bldg Equip Drains	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	17	-
2a.1.5.33	Turbine Generator	-	58	-	-	-	-	-	9	67	-	-	67	-	-	-	-	-	-	901	-
2a.1.5.34	Turbine Oil	-	89	-	-	-	-	-	13	103	-	-	103	-	-	-	-	-	-	1,399	-
2a.1.5.35	Waste Oil Sumps	-	31	-	-	-	-	-	5	35	-	-	35	-	-	-	-	-	-	483	-
2a.1.5	Totals	529	6,033	426	246	-	1,242	-	1,759	10,235	5,597	-	4,638	-	18,774	-	-	-	962,836	101,007	-
2a.1.6	Scaffolding in support of decommissioning	-	1,134	9	5	-	24	-	291	1,463	1,463	-	-	-	359	-	-	-	18,654	18,871	-
2a.1	Subtotal Period 2a Activity Costs	1,895	25,030	22,902	12,384	-	45,149	654	31,098	139,112	134,473	-	4,638	-	308,175	963	393	-	17,813,590	289,326	11,803

Table C-1
Byron Nuclear Power Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 2a Additional Costs																					
2a.2.1	Remedial Action Surveys	-	-	-	-	-	-	2,161	648	2,809	2,809	-	-	-	-	-	-	-	-	34,055	-
2a.2.2	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
2a.2	Subtotal Period 2a Additional Costs	-	-	-	-	-	-	2,211	656	2,866	2,866	-	-	-	-	-	-	-	-	34,055	-
Period 2a Collateral Costs																					
2a.3.1	Process decommissioning water waste	167	-	111	297	-	377	-	233	1,186	1,186	-	-	-	1,074	-	-	-	64,421	209	-
2a.3.2	Process decommissioning chemical flush waste	0	-	12	44	-	73	-	26	155	155	-	-	-	117	-	-	-	12,475	22	-
2a.3.3	Small tool allowance	-	316	-	-	-	-	-	47	363	327	-	36	-	-	-	-	-	-	-	-
2a.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	16,446	2,467	18,913	-	18,913	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	167	316	123	341	-	450	16,446	2,774	20,617	1,668	18,913	36	-	1,191	-	-	-	76,896	231	-
Period 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	89	-	-	-	-	-	-	22	111	111	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	1,737	174	1,911	1,911	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	20,314	2,031	22,345	20,110	-	2,234	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	2,305	-	-	-	-	-	576	2,881	2,881	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	3,329	-	-	-	-	-	499	3,829	3,829	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	96	52	-	293	-	91	532	532	-	-	-	4,574	-	-	-	91,471	149	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	2,768	415	3,183	3,183	-	-	-	-	-	-	-	-	-	-
2a.4.8	NRC Fees	-	-	-	-	-	-	1,026	103	1,128	1,128	-	-	-	-	-	-	-	-	-	-
2a.4.9	Emergency Planning Fees	-	-	-	-	-	-	3,111	311	3,422	-	3,422	-	-	-	-	-	-	-	-	-
2a.4.10	Site O&M Cost	-	-	-	-	-	-	270	41	311	311	-	-	-	-	-	-	-	-	-	-
2a.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	648	97	745	-	745	-	-	-	-	-	-	-	-	-
2a.4.12	ISFSI Operating Costs	-	-	-	-	-	-	78	12	90	-	90	-	-	-	-	-	-	-	-	-
2a.4.13	Security Staff Cost	-	-	-	-	-	-	982	147	1,129	1,129	-	-	-	-	-	-	-	-	-	18,794
2a.4.14	DOC Staff Cost	-	-	-	-	-	-	21,774	3,266	25,040	25,040	-	-	-	-	-	-	-	-	-	259,703
2a.4.15	Utility Staff Cost	-	-	-	-	-	-	37,088	5,563	42,651	42,651	-	-	-	-	-	-	-	-	-	483,526
2a.4	Subtotal Period 2a Period-Dependent Costs	89	5,634	96	52	-	293	89,795	13,348	109,308	102,816	4,257	2,234	-	4,574	-	-	-	91,471	149	762,023
2a.0	TOTAL PERIOD 2a COST	2,151	30,979	23,121	12,777	-	45,892	109,107	47,876	271,903	241,823	23,170	6,909	-	313,939	963	393	-	17,981,960	323,761	773,826
PERIOD 2b - Site Decontamination																					
Disposal of Plant Systems																					
2b.1.2.1	Chemical & Volume Control	966	1,254	159	83	-	419	-	930	3,811	3,811	-	-	-	6,236	-	-	-	324,551	31,161	-
2b.1.2.2	Chilled Water RCA	-	322	108	60	-	304	-	176	970	970	-	-	-	4,527	-	-	-	235,699	4,956	-
2b.1.2.3	Component Cooling RCA	-	682	194	110	-	553	-	345	1,884	1,884	-	-	-	8,239	-	-	-	428,586	10,074	-
2b.1.2.4	Electrical	-	3,113	-	-	-	-	-	467	3,580	-	-	3,580	-	-	-	-	-	-	48,490	-
2b.1.2.5	Electrical - Contaminated	-	1,287	128	85	-	430	-	455	2,384	2,384	-	-	-	6,418	-	-	-	333,233	19,322	-
2b.1.2.6	Electrical - RCA	-	1,940	347	222	-	1,123	-	834	4,466	4,466	-	-	-	16,763	-	-	-	870,329	29,753	-
2b.1.2.7	Emergency Diesel Generator	-	132	-	-	-	-	-	20	152	-	-	152	-	-	-	-	-	-	2,066	-
2b.1.2.8	Essential Service Water RCA	-	306	112	66	-	333	-	181	998	998	-	-	-	4,958	-	-	-	257,885	4,643	-
2b.1.2.9	Fire Protection	-	127	-	-	-	-	-	19	146	-	-	146	-	-	-	-	-	-	1,984	-
2b.1.2.10	Fire Protection RCA	-	185	28	13	-	68	-	68	363	363	-	-	-	1,002	-	-	-	52,396	2,641	-
2b.1.2.11	HVAC-Auxiliary Building	-	575	97	64	-	323	-	244	1,303	1,303	-	-	-	4,827	-	-	-	250,668	8,352	-
2b.1.2.12	HVAC-Diesel Generator Room	-	44	-	-	-	-	-	7	50	-	-	50	-	-	-	-	-	-	682	-
2b.1.2.13	HVAC-Miscellaneous	-	42	-	-	-	-	-	6	49	-	-	49	-	-	-	-	-	-	656	-
2b.1.2.14	HVAC-Primary Containment	-	696	203	135	-	683	-	385	2,102	2,102	-	-	-	10,197	-	-	-	529,451	10,184	-
2b.1.2.15	HVAC-Turbine Building	-	190	-	-	-	-	-	28	218	-	-	218	-	-	-	-	-	-	3,177	-
2b.1.2.16	Instrument Air Supply	-	47	-	-	-	-	-	7	54	-	-	54	-	-	-	-	-	-	760	-
2b.1.2.17	Instrument Air Supply RCA	-	76	10	5	-	24	-	27	141	141	-	-	-	354	-	-	-	18,493	1,096	-
2b.1.2.18	Miscellaneous Drains	-	44	7	4	-	20	-	17	92	92	-	-	-	299	-	-	-	15,562	663	-
2b.1.2.19	Primary Containment Purge	-	317	128	75	-	377	-	198	1,095	1,095	-	-	-	5,614	-	-	-	292,306	5,019	-
2b.1.2.20	Primary Water	-	69	6	3	-	15	-	22	115	115	-	-	-	218	-	-	-	11,425	1,032	-
2b.1.2.21	Radioactive Waste Disposal	503	1,049	159	88	-	446	-	655	2,900	2,900	-	-	-	6,808	-	-	-	345,754	22,518	-
2b.1.2.22	Reactor Building Equipment Drains	97	111	17	9	-	47	-	91	372	372	-	-	-	695	-	-	-	36,107	2,758	-
2b.1.2.23	Reactor Building Floor Drains	21	52	7	4	-	18	-	29	131	131	-	-	-	265	-	-	-	13,801	1,040	-
2b.1.2.24	Reactor Coolant	-	194	22	11	-	55	-	66	347	347	-	-	-	812	-	-	-	42,440	2,826	-
2b.1.2.25	Residual Heat Removal	175	218	49	29	-	147	-	188	805	805	-	-	-	2,184	-	-	-	113,636	4,279	-
2b.1.2.26	Safety Injection	-	999	230	137	-	694	-	467	2,527	2,527	-	-	-	10,622	-	-	-	537,761	15,372	-
2b.1.2.27	Station Air RCA	-	37	5	2	-	11	-	13	68	68	-	-	-	169	-	-	-	8,811	531	-
2b.1.2.28	Station Heating RCA	-	124	31	16	-	81	-	57	309	309	-	-	-	1,209	-	-	-	63,061	1,826	-
2b.1.2.29	Waste Oil Sumps RCA	-	7	1	1	-	3	-	3	15	15	-	-	-	50	-	-	-	2,602	95	-
2b.1.2	Totals	1,763	14,240	2,048	1,223	-	6,172	-	6,003	31,448	27,198	-	4,250	-	92,465	-	-	-	4,784,556	237,956	-
2b.1.3	Scaffolding in support of decommissioning	-	1,701	13	7	-	36	-	437	2,194	2,194	-	-	-	539	-	-	-	27,981	28,306	-

Table C-1
Byron Nuclear Power Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Decontamination of Site Buildings																					
2b.1.4.1	Reactor	2,249	1,735	219	357	-	1,399	-	1,983	7,942	7,942	-	-	-	25,577	-	-	-	1,334,819	57,983	-
2b.1.4.2	Auxiliary Building	226	144	20	22	-	82	-	175	670	670	-	-	-	1,329	-	-	-	83,048	5,420	-
2b.1.4.3	Refueling Water Storage Tank	413	494	39	19	-	87	-	358	1,410	1,410	-	-	-	1,304	-	-	-	72,865	13,643	-
2b.1.4	Totals	2,888	2,373	278	399	-	1,568	-	2,517	10,022	10,022	-	-	-	28,210	-	-	-	1,490,731	77,045	-
2b.1	Subtotal Period 2b Activity Costs	4,651	18,314	2,339	1,628	-	7,776	-	8,956	43,664	39,414	-	4,250	-	121,214	-	-	-	6,303,268	343,308	-
Period 2b Additional Costs																					
2b.2.1	License Termination Survey Planning	-	-	-	-	-	-	993	298	1,291	1,291	-	-	-	-	-	-	-	-	-	6,240
2b.2.2	Remedial Action Surveys	-	-	-	-	-	-	3,114	934	4,049	4,049	-	-	-	-	-	-	-	-	49,090	-
2b.2.3	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
2b.2.4	Underground Services Excavation	-	506	-	-	-	-	-	76	581	581	-	-	-	-	-	-	-	-	2,755	-
2b.2.5	Operational Tools and Equipment	-	-	9	51	-	189	-	56	304	304	-	-	-	5,855	-	-	-	146,375	16	-
2b.2	Subtotal Period 2b Additional Costs	-	506	9	51	-	189	4,158	1,371	6,283	6,283	-	-	-	5,855	-	-	-	146,375	51,861	6,240
Period 2b Collateral Costs																					
2b.3.1	Process decommissioning water waste	135	-	92	246	-	312	-	191	976	976	-	-	-	889	-	-	-	53,334	173	-
2b.3.2	Process decommissioning chemical flush waste	3	-	107	405	-	672	-	241	1,427	1,427	-	-	-	1,077	-	-	-	114,790	202	-
2b.3.3	Small tool allowance	-	370	-	-	-	-	-	55	425	425	-	-	-	-	-	-	-	-	-	-
2b.3.4	Decommissioning Equipment Disposition	-	-	171	94	-	472	-	149	887	887	-	-	-	7,054	-	-	-	366,237	88	-
2b.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	23,707	3,556	27,263	-	27,263	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	137	370	371	745	-	1,456	23,707	4,193	30,978	3,715	27,263	-	-	9,020	-	-	-	534,361	463	-
Period 2b Period-Dependent Costs																					
2b.4.1	Decon supplies	765	-	-	-	-	-	-	191	956	956	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	1,232	123	1,355	1,355	-	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	7,140	714	7,854	7,854	-	-	-	-	-	-	-	-	-	-
2b.4.4	Health physics supplies	-	2,882	-	-	-	-	-	720	3,602	3,602	-	-	-	-	-	-	-	-	-	-
2b.4.5	Heavy equipment rental	-	4,751	-	-	-	-	-	713	5,464	5,464	-	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	102	55	-	310	-	96	563	563	-	-	-	4,843	-	-	-	96,855	158	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	3,150	472	3,622	3,622	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	1,479	148	1,627	1,627	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	4,484	448	4,932	-	4,932	-	-	-	-	-	-	-	-	-
2b.4.10	Site O&M Cost	-	-	-	-	-	-	390	58	448	448	-	-	-	-	-	-	-	-	-	-
2b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	934	140	1,074	-	1,074	-	-	-	-	-	-	-	-	-
2b.4.12	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	473	71	544	544	-	-	-	-	-	-	-	-	-	-
2b.4.13	ISFSI Operating Costs	-	-	-	-	-	-	113	17	130	-	130	-	-	-	-	-	-	-	-	-
2b.4.14	Security Staff Cost	-	-	-	-	-	-	1,415	212	1,627	1,627	-	-	-	-	-	-	-	-	-	27,091
2b.4.15	DOC Staff Cost	-	-	-	-	-	-	20,786	3,118	23,904	23,904	-	-	-	-	-	-	-	-	-	265,989
2b.4.16	Utility Staff Cost	-	-	-	-	-	-	36,157	5,424	41,581	41,581	-	-	-	-	-	-	-	-	-	495,034
2b.4	Subtotal Period 2b Period-Dependent Costs	765	7,633	102	55	-	310	77,753	12,666	99,284	93,147	6,136	-	-	4,843	-	-	-	96,855	158	788,114
2b.0	TOTAL PERIOD 2b COST	5,553	26,822	2,820	2,479	-	9,731	105,618	27,187	180,209	142,560	33,400	4,250	-	140,932	-	-	-	7,080,860	395,790	794,354
PERIOD 2e - Delay before License Termination																					
Period 2e Period-Dependent Costs																					
2e.4.1	Insurance	-	-	-	-	-	-	1,412	141	1,554	1,554	-	-	-	-	-	-	-	-	-	-
2e.4.2	Property taxes	-	-	-	-	-	-	1,354	135	1,489	1,489	-	-	-	-	-	-	-	-	-	-
2e.4.3	Health physics supplies	-	241	-	-	-	-	-	60	301	301	-	-	-	-	-	-	-	-	-	-
2e.4.4	Disposal of DAW generated	-	-	6	3	-	17	-	5	31	31	-	-	-	270	-	-	-	5,402	9	-
2e.4.6	NRC Fees	-	-	-	-	-	-	687	69	756	756	-	-	-	-	-	-	-	-	-	-
2e.4.7	Emergency Planning Fees	-	-	-	-	-	-	5,145	514	5,659	-	5,659	-	-	-	-	-	-	-	-	-
2e.4.8	Site O&M Cost	-	-	-	-	-	-	447	67	514	514	-	-	-	-	-	-	-	-	-	-
2e.4.9	ISFSI Operating Costs	-	-	-	-	-	-	129	19	149	-	149	-	-	-	-	-	-	-	-	-
2e.4.10	Security Staff Cost	-	-	-	-	-	-	886	133	1,018	1,018	-	-	-	-	-	-	-	-	-	16,954
2e.4.11	Utility Staff Cost	-	-	-	-	-	-	2,721	408	3,129	3,129	-	-	-	-	-	-	-	-	-	39,560
2e.4	Subtotal Period 2e Period-Dependent Costs	-	241	6	3	-	17	12,781	1,553	14,601	8,793	5,808	-	-	270	-	-	-	5,402	9	56,514
2e.0	TOTAL PERIOD 2e COST	-	241	6	3	-	17	12,781	1,553	14,601	8,793	5,808	-	-	270	-	-	-	5,402	9	56,514
PERIOD 2f - License Termination																					
Period 2f Direct Decommissioning Activities																					
2f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
2f.1.2	Terminate license									a											

Table C-1
Byron Nuclear Power Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
2f.1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2f.2.1	License Termination Survey	-	-	-	-	-	-	6,411	1,923	8,334	8,334	-	-	-	-	-	-	-	-	91,892	3,120
2f.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	6,411	1,923	8,334	8,334	-	-	-	-	-	-	-	-	91,892	3,120
Period 2f Collateral Costs																					
2f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,080	162	1,242	1,242	-	-	-	-	-	-	-	-	-	-
2f.3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	1,080	162	1,242	1,242	-	-	-	-	-	-	-	-	-	-
Period 2f Period-Dependent Costs																					
2f.4.1	Insurance	-	-	-	-	-	-	393	39	432	432	-	-	-	-	-	-	-	-	-	-
2f.4.2	Property taxes	-	-	-	-	-	-	376	38	414	414	-	-	-	-	-	-	-	-	-	-
2f.4.3	Health physics supplies	-	548	-	-	-	-	-	137	685	685	-	-	-	-	-	-	-	-	-	-
2f.4.4	Disposal of DAW generated	-	-	7	4	-	22	-	7	39	39	-	-	-	337	-	-	-	6,734	11	-
2f.4.5	Plant energy budget	-	-	-	-	-	-	268	40	308	308	-	-	-	-	-	-	-	-	-	-
2f.4.6	NRC Fees	-	-	-	-	-	-	455	46	501	501	-	-	-	-	-	-	-	-	-	-
2f.4.7	Emergency Planning Fees	-	-	-	-	-	-	1,431	143	1,574	-	1,574	-	-	-	-	-	-	-	-	-
2f.4.8	Site O&M Cost	-	-	-	-	-	-	124	19	143	143	-	-	-	-	-	-	-	-	-	-
2f.4.9	ISFSI Operating Costs	-	-	-	-	-	-	36	5	41	-	41	-	-	-	-	-	-	-	-	-
2f.4.10	Security Staff Cost	-	-	-	-	-	-	1,578	237	1,814	1,814	-	-	-	-	-	-	-	-	-	27,893
2f.4.11	DOC Staff Cost	-	-	-	-	-	-	3,919	588	4,507	4,507	-	-	-	-	-	-	-	-	-	46,750
2f.4.12	Utility Staff Cost	-	-	-	-	-	-	5,032	755	5,786	5,786	-	-	-	-	-	-	-	-	-	60,107
2f.4	Subtotal Period 2f Period-Dependent Costs	-	548	7	4	-	22	13,611	2,053	16,244	14,629	1,615	-	-	337	-	-	-	6,734	11	134,750
2f.0	TOTAL PERIOD 2f COST	-	548	7	4	-	22	21,274	4,189	26,044	24,429	1,615	-	-	337	-	-	-	6,734	91,903	137,870
PERIOD 2 TOTALS		7,703	58,590	25,954	15,263	-	55,661	248,780	80,805	492,757	417,605	63,993	11,159	-	455,478	963	393	-	25,074,950	811,463	1,762,565
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	Reactor	-	7,213	-	-	-	-	-	1,082	8,294	-	-	8,294	-	-	-	-	-	-	69,541	-
3b.1.1.2	Auxiliary Building	-	6,230	-	-	-	-	-	934	7,164	-	-	7,164	-	-	-	-	-	-	61,288	-
3b.1.1.3	Old Steam Generator Storage Facility	-	490	-	-	-	-	-	74	564	-	-	564	-	-	-	-	-	-	4,868	-
3b.1.1.4	Refueling Water Storage Tank	-	1,099	-	-	-	-	-	165	1,263	-	-	1,263	-	-	-	-	-	-	11,688	-
3b.1.1.5	Turbine Building	-	6,069	-	-	-	-	-	910	6,979	-	-	6,979	-	-	-	-	-	-	70,347	-
3b.1.1.6	Turbine Pedestal	-	1,463	-	-	-	-	-	219	1,682	-	-	1,682	-	-	-	-	-	-	12,628	-
3b.1.1	Totals	-	22,563	-	-	-	-	-	3,384	25,947	-	-	25,947	-	-	-	-	-	-	230,359	-
Site Closeout Activities																					
3b.1.2	Grade & landscape site	-	345	-	-	-	-	-	52	397	-	-	397	-	-	-	-	-	-	869	-
3b.1.3	Final report to NRC	-	-	-	-	-	-	199	30	228	228	-	-	-	-	-	-	-	-	-	1,560
3b.1	Subtotal Period 3b Activity Costs	-	22,908	-	-	-	-	199	3,466	26,572	228	-	26,344	-	-	-	-	-	-	231,229	1,560
Period 3b Additional Costs																					
3b.2.1	Concrete Crushing	-	607	-	-	-	-	4	92	702	-	-	702	-	-	-	-	-	-	2,798	-
3b.2.2	Demolish Cooling Tower	-	5,877	-	-	-	-	165	906	6,948	-	-	6,948	-	-	-	-	-	-	73,296	-
3b.2	Subtotal Period 3b Additional Costs	-	6,483	-	-	-	-	168	998	7,649	-	-	7,649	-	-	-	-	-	-	76,093	-
Period 3b Collateral Costs																					
3b.3.1	Small tool allowance	-	301	-	-	-	-	-	45	346	-	-	346	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	301	-	-	-	-	-	45	346	-	-	346	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Insurance	-	-	-	-	-	-	646	65	711	-	711	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	1,239	124	1,363	-	1,363	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	7,086	-	-	-	-	-	1,063	8,149	-	-	8,149	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	441	66	507	-	-	507	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	314	31	346	-	346	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	4,708	471	5,179	-	5,179	-	-	-	-	-	-	-	-	-
3b.4.7	ISFSI Operating Costs	-	-	-	-	-	-	118	18	136	-	136	-	-	-	-	-	-	-	-	-
3b.4.8	Site O&M Cost	-	-	-	-	-	-	409	61	470	-	-	470	-	-	-	-	-	-	-	-
3b.4.9	Security Staff Cost	-	-	-	-	-	-	4,955	743	5,699	0	4,673	1,026	-	-	-	-	-	-	-	87,294
3b.4.10	DOC Staff Cost	-	-	-	-	-	-	11,965	1,795	13,760	-	-	13,760	-	-	-	-	-	-	-	137,043

Table C-1
Byron Nuclear Power Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2014 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 (continued)																					
3b.4.11	Utility Staff Cost	-	-	-	-	-	-	7,407	1,111	8,519	-	1,619	6,900	-	-	-	-	-	-	-	87,294
3b.4	Subtotal Period 3b Period-Dependent Costs	-	7,086	-	-	-	-	32,203	5,548	44,838	0	14,026	30,812	-	-	-	-	-	-	-	311,630
3b.0	TOTAL PERIOD 3b COST	-	36,779	-	-	-	-	32,570	10,057	79,406	228	14,026	65,152	-	-	-	-	-	-	307,322	313,190
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Collateral Costs																					
3c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	9,688	1,453	11,141	-	11,141	-	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	9,688	1,453	11,141	-	11,141	-	-	-	-	-	-	-	-	-
Period 3c Period-Dependent Costs																					
3c.4.1	Insurance	-	-	-	-	-	-	3,842	384	4,226	-	4,226	-	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	7,366	737	8,103	-	8,103	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	2,423	242	2,665	-	2,665	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	27,992	2,799	30,791	-	30,791	-	-	-	-	-	-	-	-	-
3c.4.6	Site O&M Cost	-	-	-	-	-	-	2,432	365	2,797	-	2,797	-	-	-	-	-	-	-	-	-
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	704	106	809	-	809	-	-	-	-	-	-	-	-	-
3c.4.8	Security Staff Cost	-	-	-	-	-	-	24,043	3,606	27,650	-	27,650	-	-	-	-	-	-	-	-	415,106
3c.4.9	Utility Staff Cost	-	-	-	-	-	-	8,367	1,255	9,623	-	9,623	-	-	-	-	-	-	-	-	103,930
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	77,169	9,494	86,664	-	86,664	-	-	-	-	-	-	-	-	519,036
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	86,857	10,947	97,804	-	97,804	-	-	-	-	-	-	-	-	519,036
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	625	-	-	11,996	-	1,956	14,577	14,577	-	-	-	-	-	-	2,217	433,180	-	-
3d.1.1	Totals	-	-	625	-	-	11,996	-	1,956	14,577	14,577	-	-	-	-	-	-	2,217	433,180	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	625	-	-	11,996	-	1,956	14,577	14,577	-	-	-	-	-	-	2,217	433,180	-	-
Period 3d Period-Dependent Costs																					
3d.4.1	Insurance	-	-	-	-	-	-	10	1	11	-	11	-	-	-	-	-	-	-	-	-
3d.4.2	Property taxes	-	-	-	-	-	-	19	2	21	-	21	-	-	-	-	-	-	-	-	-
3d.4.4	Emergency Planning Fees	-	-	-	-	-	-	73	7	80	-	80	-	-	-	-	-	-	-	-	-
3d.4.5	Site O&M Cost	-	-	-	-	-	-	6	1	7	-	7	-	-	-	-	-	-	-	-	-
3d.4.6	ISFSI Operating Costs	-	-	-	-	-	-	2	0	2	-	2	-	-	-	-	-	-	-	-	-
3d.4.7	Security Staff Cost	-	-	-	-	-	-	63	9	72	-	72	-	-	-	-	-	-	-	-	1,080
3d.4.8	Utility Staff Cost	-	-	-	-	-	-	22	3	25	-	25	-	-	-	-	-	-	-	-	270
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	194	24	219	-	219	-	-	-	-	-	-	-	-	1,350
3d.0	TOTAL PERIOD 3d COST	-	-	625	-	-	11,996	194	1,980	14,795	14,577	219	-	-	-	-	-	2,217	433,180	-	1,350
PERIOD 3e - ISFSI Decontamination																					
Period 3e Direct Decommissioning Activities																					
Period 3e Additional Costs																					
3e.2.1	License Termination ISFSI	-	207	197	322	-	893	1,503	781	3,903	3,903	-	-	-	14,550	-	-	-	1,178,838	11,245	1,044
3e.2	Subtotal Period 3e Additional Costs	-	207	197	322	-	893	1,503	781	3,903	3,903	-	-	-	14,550	-	-	-	1,178,838	11,245	1,044
Period 3e Period-Dependent Costs																					
3e.4.1	Insurance	-	-	-	-	-	-	57	14	71	71	-	-	-	-	-	-	-	-	-	-
3e.4.2	Property taxes	-	-	-	-	-	-	163	41	204	204	-	-	-	-	-	-	-	-	-	-
3e.4.4	Security Staff Cost	-	-	-	-	-	-	144	36	180	180	-	-	-	-	-	-	-	-	-	2,468
3e.4.5	Utility Staff Cost	-	-	-	-	-	-	155	39	194	194	-	-	-	-	-	-	-	-	-	1,870
3e.4	Subtotal Period 3e Period-Dependent Costs	-	-	-	-	-	-	519	130	649	649	-	-	-	-	-	-	-	-	-	4,338
3e.0	TOTAL PERIOD 3e COST	-	207	197	322	-	893	2,022	910	4,552	4,552	-	-	-	14,550	-	-	-	1,178,838	11,245	5,382

Table C-1
Byron Nuclear Power Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 3f - ISFSI Site Restoration																					
Period 3f Direct Decommissioning Activities																					
Period 3f Additional Costs																					
3f.2.1	Site Restoration ISFSI	-	1,199	-	-	-	-	28	184	1,411	-	-	1,411	-	-	-	-	-	-	13,522	80
3f.2	Subtotal Period 3f Additional Costs	-	1,199	-	-	-	-	28	184	1,411	-	-	1,411	-	-	-	-	-	-	13,522	80
Period 3f Collateral Costs																					
3f.3.1	Small tool allowance	-	18	-	-	-	-	-	3	21	-	-	21	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	18	-	-	-	-	-	3	21	-	-	21	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																					
3f.4.2	Property taxes	-	-	-	-	-	-	86	9	95	-	-	95	-	-	-	-	-	-	-	-
3f.4.3	Heavy equipment rental	-	109	-	-	-	-	-	16	125	-	-	125	-	-	-	-	-	-	-	-
3f.4.4	Plant energy budget	-	-	-	-	-	-	31	5	35	-	-	35	-	-	-	-	-	-	-	-
3f.4.5	Security Staff Cost	-	-	-	-	-	-	76	11	88	-	-	88	-	-	-	-	-	-	-	1,307
3f.4.6	Utility Staff Cost	-	-	-	-	-	-	68	10	78	-	-	78	-	-	-	-	-	-	-	810
3f.4	Subtotal Period 3f Period-Dependent Costs	-	109	-	-	-	-	261	51	421	-	-	421	-	-	-	-	-	-	-	2,117
3f.0	TOTAL PERIOD 3f COST	-	1,326	-	-	-	-	288	238	1,852	-	-	1,852	-	-	-	-	-	-	13,522	2,197
PERIOD 3 TOTALS		-	38,311	822	322	-	12,889	121,932	24,132	198,409	19,357	112,048	67,004	-	14,550	-	-	2,217	1,612,018	332,089	841,156
TOTAL COST TO DECOMMISSION		**10,924**	**99,568**	**26,923**	**16,035**	**-**	**72,646**	**492,121**	**125,688**	**843,904**	**560,921**	**203,244**	**79,740**	**-**	**471,323**	**1,889**	**393**	**2,217**	**26,824,710**	**1,175,387**	**3,440,495**

TOTAL COST TO DECOMMISSION WITH 17.5% CONTINGENCY:	**$843,904**	**thousands of 2014 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 66.47% OR:	**$560,921**	**thousands of 2014 dollars**
SPENT FUEL MANAGEMENT COST IS 24.08% OR:	**$203,244**	**thousands of 2014 dollars**
NON-NUCLEAR DEMOLITION COST IS 9.45% OR:	**$79,740**	**thousands of 2014 dollars**
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	**473,605**	**cubic feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**2,217**	**cubic feet**
TOTAL SCRAP METAL REMOVED:	**56,010**	**tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,175,387**	**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
Byron Nuclear Power Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	71	11	81	81	-	-	-	-	-	-	-	-	-	556
1a.1.2	Notification of Cessation of Operations									a											
1a.1.3	Remove fuel & source material									n/a											
1a.1.4	Notification of Permanent Defueling									a											
1a.1.5	Deactivate plant systems & process waste									a											
1a.1.6	Prepare and submit PSDAR	-	-	-	-	-	-	109	16	125	125	-	-	-	-	-	-	-	-	-	856
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	251	38	288	288	-	-	-	-	-	-	-	-	-	1,969
1a.1.8	Perform detailed rad survey									a											
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	54	8	63	63	-	-	-	-	-	-	-	-	-	428
1a.1.10	End product description	-	-	-	-	-	-	54	8	63	63	-	-	-	-	-	-	-	-	-	428
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	71	11	81	81	-	-	-	-	-	-	-	-	-	556
1a.1.12	Define major work sequence	-	-	-	-	-	-	409	61	470	470	-	-	-	-	-	-	-	-	-	3,210
1a.1.13	Perform SER and EA	-	-	-	-	-	-	169	25	194	194	-	-	-	-	-	-	-	-	-	1,327
1a.1.14	Perform Site-Specific Cost Study	-	-	-	-	-	-	272	41	313	313	-	-	-	-	-	-	-	-	-	2,140
1a.1.15	Prepare/submit License Termination Plan	-	-	-	-	-	-	223	33	257	257	-	-	-	-	-	-	-	-	-	1,753
1a.1.16	Receive NRC approval of termination plan									a											
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	268	40	308	277	-	31	-	-	-	-	-	-	-	2,106
1a.1.17.2	Plant systems	-	-	-	-	-	-	227	34	261	235	-	26	-	-	-	-	-	-	-	1,783
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	27	4	31	31	-	-	-	-	-	-	-	-	-	214
1a.1.17.4	Reactor internals	-	-	-	-	-	-	387	58	445	445	-	-	-	-	-	-	-	-	-	3,039
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	354	53	407	407	-	-	-	-	-	-	-	-	-	2,782
1a.1.17.6	Biological shield	-	-	-	-	-	-	27	4	31	31	-	-	-	-	-	-	-	-	-	214
1a.1.17.7	Steam generators	-	-	-	-	-	-	170	26	196	196	-	-	-	-	-	-	-	-	-	1,335
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	87	13	100	50	-	50	-	-	-	-	-	-	-	685
1a.1.17.9	Main Turbine	-	-	-	-	-	-	22	3	25	-	-	25	-	-	-	-	-	-	-	171
1a.1.17.10	Main Condensers	-	-	-	-	-	-	22	3	25	-	-	25	-	-	-	-	-	-	-	171
1a.1.17.11	Plant structures & buildings	-	-	-	-	-	-	170	26	196	98	-	98	-	-	-	-	-	-	-	1,335
1a.1.17.12	Waste management	-	-	-	-	-	-	251	38	288	288	-	-	-	-	-	-	-	-	-	1,969
1a.1.17.13	Facility & site closeout	-	-	-	-	-	-	49	7	56	28	-	28	-	-	-	-	-	-	-	385
1a.1.17	Total	-	-	-	-	-	-	2,061	309	2,370	2,087	-	283	-	-	-	-	-	-	-	16,190
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	131	20	150	150	-	-	-	-	-	-	-	-	-	1,027
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	3,000	450	3,450	3,450	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	76	11	88	88	-	-	-	-	-	-	-	-	-	599
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,300	345	2,645	2,645	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	67	10	77	77	-	-	-	-	-	-	-	-	-	526
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	9,319	1,398	10,717	10,434	-	283	-	-	-	-	-	-	-	31,566
Period 1a Additional Costs																					
1a.2.1	ISFSI Expansion	-	-	-	-	-	-	4,800	720	5,520	-	5,520	-	-	-	-	-	-	-	-	-
1a.2	Subtotal Period 1a Additional Costs	-	-	-	-	-	-	4,800	720	5,520	-	5,520	-	-	-	-	-	-	-	-	-
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	10,066	1,510	11,576	-	11,576	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	10,066	1,510	11,576	-	11,576	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,855	185	2,040	2,040	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	494	-	-	-	-	-	124	618	618	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	530	-	-	-	-	-	80	610	610	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	13	7	-	39	-	12	71	71	-	-	-	611	-	-	-	12,224	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,783	267	2,051	2,051	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	836	84	920	920	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	2,177	218	2,394	-	2,394	-	-	-	-	-	-	-	-	-
1a.4.9	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	397	59	456	-	456	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	48	7	55	-	55	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	8,569	1,285	9,855	9,855	-	-	-	-	-	-	-	-	-	157,903
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	32,368	4,855	37,223	37,223	-	-	-	-	-	-	-	-	-	424,560

Table C-2
Byron Nuclear Power Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,025	13	7	-	39	48,198	7,202	56,483	53,577	2,906	-	-	611	-	-	-	12,224	20	582,463
1a.0	TOTAL PERIOD 1a COST	-	1,025	13	7	-	39	72,383	10,829	84,295	64,011	20,001	283	-	611	-	-	-	12,224	20	614,029
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems	-	-	-	-	-	-	258	39	297	267	-	30	-	-	-	-	-	-	-	2,026
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	54	8	63	63	-	-	-	-	-	-	-	-	-	428
1b.1.1.3	Reactor internals	-	-	-	-	-	-	136	20	157	157	-	-	-	-	-	-	-	-	-	1,070
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	74	11	85	21	-	63	-	-	-	-	-	-	-	578
1b.1.1.5	CRD cooling assembly	-	-	-	-	-	-	54	8	63	63	-	-	-	-	-	-	-	-	-	428
1b.1.1.6	CRD housings & ICI tubes	-	-	-	-	-	-	54	8	63	63	-	-	-	-	-	-	-	-	-	428
1b.1.1.7	Incore instrumentation	-	-	-	-	-	-	54	8	63	63	-	-	-	-	-	-	-	-	-	428
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	198	30	227	227	-	-	-	-	-	-	-	-	-	1,554
1b.1.1.9	Facility closeout	-	-	-	-	-	-	65	10	75	38	-	38	-	-	-	-	-	-	-	514
1b.1.1.10	Missile shields	-	-	-	-	-	-	25	4	28	28	-	-	-	-	-	-	-	-	-	193
1b.1.1.11	Biological shield	-	-	-	-	-	-	65	10	75	75	-	-	-	-	-	-	-	-	-	514
1b.1.1.12	Steam generators	-	-	-	-	-	-	251	38	288	288	-	-	-	-	-	-	-	-	-	1,969
1b.1.1.13	Reinforced concrete	-	-	-	-	-	-	54	8	63	31	-	31	-	-	-	-	-	-	-	428
1b.1.1.14	Main Turbine	-	-	-	-	-	-	85	13	98	-	-	98	-	-	-	-	-	-	-	668
1b.1.1.15	Main Condensers	-	-	-	-	-	-	85	13	98	-	-	98	-	-	-	-	-	-	-	668
1b.1.1.16	Auxiliary building	-	-	-	-	-	-	149	22	171	154	-	17	-	-	-	-	-	-	-	1,168
1b.1.1.17	Reactor building	-	-	-	-	-	-	149	22	171	154	-	17	-	-	-	-	-	-	-	1,168
1b.1.1	Total	-	-	-	-	-	-	1,812	272	2,083	1,691	-	392	-	-	-	-	-	-	-	14,228
1b.1.2	Decon primary loop	694	-	-	-	-	-	-	347	1,040	1,040	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	694	-	-	-	-	-	1,812	619	3,124	2,732	-	392	-	-	-	-	-	-	1,067	14,228
Period 1b Additional Costs																					
1b.2.1	Site Characterization	-	-	-	-	-	-	2,755	827	3,582	3,582	-	-	-	-	-	-	-	-	13,042	4,640
1b.2.2	Spent Fuel Pool Isolation	-	-	-	-	-	-	10,813	1,622	12,434	12,434	-	-	-	-	-	-	-	-	-	-
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	13,568	2,448	16,016	16,016	-	-	-	-	-	-	-	-	13,042	4,640
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	886	-	-	-	-	-	-	133	1,019	1,019	-	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,080	162	1,242	1,242	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning water waste	51	-	34	90	-	114	-	71	360	360	-	-	-	325	-	-	-	19,489	63	-
1b.3.4	Process decommissioning chemical flush waste	2	-	84	315	-	3,550	-	944	4,895	4,895	-	-	-	-	839	-	-	89,417	157	-
1b.3.5	Small tool allowance	-	2	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-
1b.3.6	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-
1b.3.7	Decon rig	1,500	-	-	-	-	-	-	225	1,725	1,725	-	-	-	-	-	-	-	-	-	-
1b.3.8	Spent Fuel Capital and Transfer	-	-	-	-	-	-	5,033	755	5,788	-	5,788	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	2,440	1,102	117	405	-	3,664	6,113	2,455	16,296	10,508	5,788	-	-	325	839	-	-	108,906	220	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	27	-	-	-	-	-	-	7	34	34	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	706	71	776	776	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	8,270	827	9,097	9,097	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	277	-	-	-	-	-	69	347	347	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	265	-	-	-	-	-	40	305	305	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	8	4	-	23	-	7	42	42	-	-	-	358	-	-	-	7,159	12	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	1,783	267	2,051	2,051	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	234	23	257	257	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	1,088	109	1,197	-	1,197	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Cost	-	-	-	-	-	-	83	12	95	95	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	198	30	228	-	228	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	24	4	28	-	28	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	4,285	643	4,927	4,927	-	-	-	-	-	-	-	-	-	78,951
1b.4.14	DOC Staff Cost	-	-	-	-	-	-	5,535	830	6,365	6,365	-	-	-	-	-	-	-	-	-	63,789
1b.4.15	Utility Staff Cost	-	-	-	-	-	-	16,249	2,437	18,687	18,687	-	-	-	-	-	-	-	-	-	213,326
1b.4	Subtotal Period 1b Period-Dependent Costs	27	543	8	4	-	23	38,455	5,376	44,436	42,983	1,453	-	-	358	-	-	-	7,159	12	356,066
1b.0	TOTAL PERIOD 1b COST	3,160	1,645	125	409	-	3,687	59,947	10,899	79,872	72,239	7,241	392	-	683	839	-	-	116,066	14,341	374,934

Table C-2
Byron Nuclear Power Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 1 TOTALS		3,160	2,669	138	416	-	3,726	132,330	21,728	164,167	136,250	27,242	675	-	1,294	839	-	-	128,289	14,361	988,963
PERIOD 2a - Large Component Removal																					
Period 2a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
2a.1.1.1	Reactor Coolant Piping	199	168	34	48	-	252	-	215	917	917	-	-	-	1,708	-	-	-	195,190	5,503	-
2a.1.1.2	Pressurizer Relief Tank	38	34	7	10	-	47	-	41	176	176	-	-	-	329	-	-	-	36,553	1,072	-
2a.1.1.3	Reactor Coolant Pumps & Motors	120	122	146	213	-	1,390	-	485	2,476	2,476	-	-	-	4,796	-	-	-	780,540	4,291	100
2a.1.1.4	Pressurizer	56	69	532	116	-	879	-	336	1,988	1,988	-	-	-	3,033	-	-	-	284,696	2,482	938
2a.1.1.5	Steam Generators	451	4,496	2,454	2,958	-	10,512	-	4,667	25,538	25,538	-	-	-	62,711	-	-	-	3,280,862	23,233	3,500
2a.1.1.6	CRDMs/ICIs/Service Structure Removal	188	343	230	60	-	188	-	258	1,266	1,266	-	-	-	3,881	-	-	-	145,494	7,976	-
2a.1.1.7	Reactor Vessel Internals	168	3,171	8,521	1,751	-	8,242	327	9,200	31,380	31,380	-	-	-	1,878	963	393	-	329,968	31,267	1,383
2a.1.1.8	Reactor Vessel	134	5,347	2,459	1,176	-	2,847	327	6,458	18,747	18,747	-	-	-	9,361	-	-	-	960,884	31,267	1,383
2a.1.1	Totals	1,353	13,749	14,383	6,332	-	24,356	654	21,660	82,489	82,489	-	-	-	87,696	963	393	-	6,014,187	107,091	7,303
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	683	3,092	1,094	-	3,337	-	1,478	9,684	9,684	-	-	-	57,484	-	-	-	2,984,647	10,371	-
2a.1.3	Main Condensers	-	1,344	1,828	998	-	5,039	-	1,928	11,138	11,138	-	-	-	75,240	-	-	-	3,906,532	20,428	-
Cascading Costs from Clean Building Demolition																					
2a.1.4.1	Reactor	-	1,250	-	-	-	-	-	188	1,438	1,438	-	-	-	-	-	-	-	-	12,130	-
2a.1.4.2	Auxiliary Building	-	702	-	-	-	-	-	105	807	807	-	-	-	-	-	-	-	-	6,896	-
2a.1.4.3	Radwaste/Service Building	-	456	-	-	-	-	-	68	525	525	-	-	-	-	-	-	-	-	5,060	-
2a.1.4.4	Refueling Water Storage Tank	-	122	-	-	-	-	-	18	140	140	-	-	-	-	-	-	-	-	1,299	-
2a.1.4.5	Fuel Handling Building	-	360	-	-	-	-	-	54	414	414	-	-	-	-	-	-	-	-	3,690	-
2a.1.4	Totals	-	2,890	-	-	-	-	-	434	3,324	3,324	-	-	-	-	-	-	-	-	29,074	-
Disposal of Plant Systems																					
2a.1.5.1	Auxiliary Feedwater	-	74	-	-	-	-	-	11	85	-	-	85	-	-	-	-	-	-	1,143	-
2a.1.5.2	Auxiliary Steam	-	134	-	-	-	-	-	20	154	-	-	154	-	-	-	-	-	-	2,107	-
2a.1.5.3	Auxiliary Steam RCA	-	368	69	36	-	183	-	150	805	805	-	-	-	2,714	-	-	-	141,487	5,387	-
2a.1.5.4	Boric Acid Processing	500	531	82	47	-	238	-	458	1,855	1,855	-	-	-	3,611	-	-	-	184,114	14,498	-
2a.1.5.5	CO2 & H2	-	18	-	-	-	-	-	3	21	-	-	21	-	-	-	-	-	-	289	-
2a.1.5.6	CO2 & H2 RCA	-	35	7	4	-	18	-	14	78	78	-	-	-	276	-	-	-	14,104	492	-
2a.1.5.7	Chemical Feed	-	169	-	-	-	-	-	25	195	-	-	195	-	-	-	-	-	-	2,663	-
2a.1.5.8	Chilled Water	-	94	-	-	-	-	-	14	108	-	-	108	-	-	-	-	-	-	1,454	-
2a.1.5.9	Circulating Water	-	608	-	-	-	-	-	91	700	-	-	700	-	-	-	-	-	-	9,669	-
2a.1.5.10	Condensate	-	341	-	-	-	-	-	51	392	-	-	392	-	-	-	-	-	-	5,317	-
2a.1.5.11	Condensate Booster	-	340	-	-	-	-	-	51	391	-	-	391	-	-	-	-	-	-	5,314	-
2a.1.5.12	Condensate Cleanup	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	-	3,000	-
2a.1.5.13	Containment Spray	-	259	81	46	-	231	-	138	755	755	-	-	-	3,455	-	-	-	179,291	3,839	-
2a.1.5.14	Diesel Fuel Oil	-	185	-	-	-	-	-	28	213	-	-	213	-	-	-	-	-	-	2,848	-
2a.1.5.15	Essential Service Water	-	320	-	-	-	-	-	48	368	-	-	368	-	-	-	-	-	-	5,049	-
2a.1.5.16	Extraction Steam	-	229	-	-	-	-	-	34	263	-	-	263	-	-	-	-	-	-	3,637	-
2a.1.5.17	Feedwater	-	310	-	-	-	-	-	47	357	-	-	357	-	-	-	-	-	-	4,925	-
2a.1.5.18	Feedwater Drains	-	736	-	-	-	-	-	110	846	-	-	846	-	-	-	-	-	-	11,719	-
2a.1.5.19	Gland Steam	-	39	-	-	-	-	-	6	44	-	-	44	-	-	-	-	-	-	616	-
2a.1.5.20	Gland Water	-	28	-	-	-	-	-	4	33	-	-	33	-	-	-	-	-	-	458	-
2a.1.5.21	Main Steam	-	316	-	-	-	-	-	47	363	-	-	363	-	-	-	-	-	-	4,979	-
2a.1.5.22	Main Steam RCA	-	87	21	13	-	64	-	42	225	225	-	-	-	947	-	-	-	49,262	1,292	-
2a.1.5.23	Make-up Demineralizer	-	159	-	-	-	-	-	24	183	-	-	183	-	-	-	-	-	-	2,595	-
2a.1.5.24	Nitrogen	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	18	-
2a.1.5.25	Non-Essential Service Water	-	370	-	-	-	-	-	56	426	-	-	426	-	-	-	-	-	-	5,903	-
2a.1.5.26	Non-Essential Service Water RCA	-	184	81	50	-	251	-	124	690	690	-	-	-	3,738	-	-	-	194,273	2,692	-
2a.1.5.27	Off Gas	-	762	163	95	-	478	-	340	1,838	1,838	-	-	-	7,112	-	-	-	370,343	11,479	-
2a.1.5.28	Potable Water	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	75	-
2a.1.5.29	Process Radiation Monitoring	-	77	4	2	-	9	-	22	114	114	-	-	-	134	-	-	-	7,021	1,219	-
2a.1.5.30	Process Sampling	-	169	14	8	-	41	-	55	287	287	-	-	-	615	-	-	-	31,992	2,649	-
2a.1.5.31	Sewage Treatment Plant	-	98	-	-	-	-	-	15	113	-	-	113	-	-	-	-	-	-	1,579	-
2a.1.5.32	Station Air	-	44	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	705	-
2a.1.5.33	Station Heating	-	151	-	-	-	-	-	23	174	-	-	174	-	-	-	-	-	-	2,391	-
2a.1.5.34	Steam Humidification	-	7	-	-	-	-	-	1	8	-	-	8	-	-	-	-	-	-	115	-
2a.1.5.35	Switchgear Heat Removal	-	33	-	-	-	-	-	5	38	-	-	38	-	-	-	-	-	-	519	-
2a.1.5.36	Turbine Bldg Equip Drains	-	79	-	-	-	-	-	12	91	-	-	91	-	-	-	-	-	-	1,235	-
2a.1.5.37	Turbine Bldg Floor Drains	-	135	-	-	-	-	-	20	156	-	-	156	-	-	-	-	-	-	2,117	-

Table C-2
Byron Nuclear Power Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
2a.1.5.38	Turbine Oil	-	85	-	-	-	-	-	13	98	-	-	98	-	-	-	-	-	-	1,359	-
2a.1.5.39	Turbine-Generator Auxilaries	-	57	-	-	-	-	-	9	66	-	-	66	-	-	-	-	-	-	884	-
2a.1.5.40	Waste Oil Sumps	-	33	-	-	-	-	-	5	38	-	-	38	-	-	-	-	-	-	517	-
2a.1.5.41	Well Water	-	80	-	-	-	-	-	12	93	-	-	93	-	-	-	-	-	-	1,247	-
2a.1.5	Totals	500	7,938	522	299	-	1,512	-	2,163	12,934	6,647	-	6,286	-	22,603	-	-	-	1,171,887	129,991	-
2a.1.6	Scaffolding in support of decommissioning	-	1,643	14	7	-	37	-	422	2,124	2,124	-	-	-	556	-	-	-	28,884	27,326	-
2a.1	Subtotal Period 2a Activity Costs	1,854	28,247	19,839	8,731	-	34,282	654	28,086	121,692	115,406	-	6,286	-	243,579	963	393	-	14,106,140	324,281	7,303
Period 2a Additional Costs																					
2a.2.1	Remedial Action Surveys	-	-	-	-	-	-	2,161	648	2,809	2,809	-	-	-	-	-	-	-	-	34,055	-
2a.2.2	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
2a.2	Subtotal Period 2a Additional Costs	-	-	-	-	-	-	2,211	656	2,866	2,866	-	-	-	-	-	-	-	-	34,055	-
Period 2a Collateral Costs																					
2a.3.1	Process decommissioning water waste	119	-	79	211	-	267	-	166	842	842	-	-	-	762	-	-	-	45,715	149	-
2a.3.2	Process decommissioning chemical flush waste	0	-	21	77	-	128	-	46	273	273	-	-	-	206	-	-	-	21,943	39	-
2a.3.3	Small tool allowance	-	363	-	-	-	-	-	54	418	376	-	42	-	-	-	-	-	-	-	-
2a.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	16,446	2,467	18,913	-	18,913	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	119	363	100	288	-	396	16,446	2,733	20,446	1,490	18,913	42	-	968	-	-	-	67,658	187	-
Period 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	89	-	-	-	-	-	-	22	111	111	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	1,737	174	1,911	1,911	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	20,311	2,031	22,342	20,108	-	2,234	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	2,464	-	-	-	-	-	616	3,080	3,080	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	3,329	-	-	-	-	-	499	3,829	3,829	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	96	52	-	293	-	91	531	531	-	-	-	4,569	-	-	-	91,376	149	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	2,768	415	3,183	3,183	-	-	-	-	-	-	-	-	-	-
2a.4.8	NRC Fees	-	-	-	-	-	-	714	71	785	785	-	-	-	-	-	-	-	-	-	-
2a.4.9	Emergency Planning Fees	-	-	-	-	-	-	3,111	311	3,422	-	3,422	-	-	-	-	-	-	-	-	-
2a.4.10	Site O&M Cost	-	-	-	-	-	-	270	41	311	311	-	-	-	-	-	-	-	-	-	-
2a.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	648	97	745	-	745	-	-	-	-	-	-	-	-	-
2a.4.12	ISFSI Operating Costs	-	-	-	-	-	-	78	12	90	-	90	-	-	-	-	-	-	-	-	-
2a.4.13	Security Staff Cost	-	-	-	-	-	-	11,814	1,772	13,587	13,587	-	-	-	-	-	-	-	-	-	216,134
2a.4.14	DOC Staff Cost	-	-	-	-	-	-	21,774	3,266	25,040	25,040	-	-	-	-	-	-	-	-	-	259,703
2a.4.15	Utility Staff Cost	-	-	-	-	-	-	37,088	5,563	42,651	42,651	-	-	-	-	-	-	-	-	-	483,526
2a.4	Subtotal Period 2a Period-Dependent Costs	89	5,794	96	52	-	293	100,313	14,982	121,618	115,126	4,257	2,234	-	4,569	-	-	-	91,376	149	959,363
2a.0	TOTAL PERIOD 2a COST	2,061	34,404	20,035	9,072	-	34,970	119,625	46,456	266,622	234,889	23,170	8,562	-	249,116	963	393	-	14,265,170	358,673	966,666
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b.1.1.1	Chemical & Volume Control	903	1,199	153	81	-	407	-	880	3,622	3,622	-	-	-	6,063	-	-	-	315,292	29,388	-
2b.1.1.2	Chilled Water RCA	-	667	168	93	-	470	-	315	1,713	1,713	-	-	-	7,000	-	-	-	364,517	9,521	-
2b.1.1.3	Component Cooling	-	709	209	119	-	600	-	366	2,002	2,002	-	-	-	8,936	-	-	-	464,778	10,502	-
2b.1.1.4	Electrical	-	4,261	-	-	-	-	-	639	4,900	-	-	4,900	-	-	-	-	-	-	66,259	-
2b.1.1.5	Electrical - Contaminated	-	1,948	181	120	-	608	-	675	3,533	3,533	-	-	-	9,079	-	-	-	471,393	29,048	-
2b.1.1.6	Electrical - RCA	-	2,529	424	272	-	1,372	-	1,058	5,655	5,655	-	-	-	20,491	-	-	-	1,063,899	38,351	-
2b.1.1.7	Emergency Diesel Generator	-	96	-	-	-	-	-	14	111	-	-	111	-	-	-	-	-	-	1,514	-
2b.1.1.8	Essential Service Water RCA	-	345	195	119	-	601	-	274	1,535	1,535	-	-	-	8,972	-	-	-	466,273	5,336	-
2b.1.1.9	Fire Protection	-	315	-	-	-	-	-	47	362	-	-	362	-	-	-	-	-	-	4,983	-
2b.1.1.10	Fire Protection RCA	-	537	143	83	-	419	-	266	1,447	1,447	-	-	-	6,243	-	-	-	324,808	7,672	-
2b.1.1.11	HVAC-Auxiliary Building	-	626	108	72	-	361	-	268	1,435	1,435	-	-	-	5,390	-	-	-	279,889	9,167	-
2b.1.1.12	HVAC-Control Room HVAC	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	127	-
2b.1.1.13	HVAC-Diesel Generator Room	-	44	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	686	-
2b.1.1.14	HVAC-Laboratory	-	20	-	-	-	-	-	3	23	-	-	23	-	-	-	-	-	-	315	-
2b.1.1.15	HVAC-Machine Shop	-	18	-	-	-	-	-	3	21	-	-	21	-	-	-	-	-	-	297	-
2b.1.1.16	HVAC-Primary Containment	-	696	203	135	-	683	-	385	2,102	2,102	-	-	-	10,197	-	-	-	529,451	10,184	-
2b.1.1.17	HVAC-Pumphouse	-	18	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	275	-
2b.1.1.18	HVAC-Radwaste	-	361	63	42	-	213	-	156	835	835	-	-	-	3,177	-	-	-	164,931	5,099	-
2b.1.1.19	HVAC-Turbine Building	-	189	-	-	-	-	-	28	217	-	-	217	-	-	-	-	-	-	3,158	-

Table C-2
Byron Nuclear Power Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
2b.1.1.20	Instrument Air Supply	-	73	-	-	-	-	-	11	84	-	-	84	-	-	-	-	-	-	1,197	-
2b.1.1.21	Instrument Air Supply RCA	-	249	29	13	-	68	-	84	443	443	-	-	-	1,002	-	-	-	52,414	3,630	-
2b.1.1.22	Miscellaneous Drains	-	84	14	8	-	40	-	34	179	179	-	-	-	592	-	-	-	30,841	1,259	-
2b.1.1.23	Primary Containment Purge	-	334	128	74	-	375	-	201	1,113	1,113	-	-	-	5,582	-	-	-	290,664	5,256	-
2b.1.1.24	Primary Water	-	929	218	133	-	670	-	441	2,391	2,391	-	-	-	10,451	-	-	-	519,324	14,343	-
2b.1.1.25	Radioactive Waste Disposal	2,814	3,053	478	270	-	1,365	-	2,600	10,580	10,580	-	-	-	20,695	-	-	-	1,058,144	83,019	-
2b.1.1.26	Reactor Bldg Equipment Drains	123	121	23	13	-	67	-	113	460	460	-	-	-	997	-	-	-	51,818	2,929	-
2b.1.1.27	Reactor Building Floor Drains	21	46	6	3	-	16	-	27	120	120	-	-	-	245	-	-	-	12,768	948	-
2b.1.1.28	Reactor Coolant	-	184	20	10	-	51	-	62	328	328	-	-	-	763	-	-	-	39,871	2,697	-
2b.1.1.29	Residual Heat Removal	163	211	47	28	-	143	-	179	771	771	-	-	-	2,129	-	-	-	110,771	4,042	-
2b.1.1.30	Safety Injection	-	971	224	134	-	676	-	454	2,460	2,460	-	-	-	10,357	-	-	-	523,998	14,960	-
2b.1.1.31	Station Air RCA	-	58	8	4	-	19	-	21	110	110	-	-	-	283	-	-	-	14,808	833	-
2b.1.1.32	Station Heating RCA	-	253	56	31	-	156	-	112	607	607	-	-	-	2,315	-	-	-	120,573	3,664	-
2b.1.1.33	Waste Oil Sumps RCA	-	26	4	2	-	10	-	10	52	52	-	-	-	149	-	-	-	7,762	370	-
2b.1.1.34	Waste Water Treatment	-	91	-	-	-	-	-	14	105	-	-	105	-	-	-	-	-	-	1,464	-
2b.1.1	Totals	4,024	21,269	3,101	1,860	-	9,390	-	9,752	49,396	43,492	-	5,904	-	141,109	-	-	-	7,278,986	372,493	-
2b.1.2	Scaffolding in support of decommissioning	-	2,054	17	9	-	47	-	528	2,654	2,654	-	-	-	695	-	-	-	36,104	34,158	-
Decontamination of Site Buildings																					
2b.1.3.1	Reactor	2,249	1,735	219	357	-	1,399	-	1,983	7,942	7,942	-	-	-	25,577	-	-	-	1,334,819	57,983	-
2b.1.3.2	Auxiliary Building	266	176	21	28	-	94	-	207	792	792	-	-	-	1,545	-	-	-	101,702	6,427	-
2b.1.3.3	Radwaste/Service Building	175	81	9	19	-	55	-	125	464	464	-	-	-	988	-	-	-	68,359	3,692	-
2b.1.3.4	Refueling Water Storage Tank	413	494	39	19	-	87	-	358	1,410	1,410	-	-	-	1,304	-	-	-	72,865	13,643	-
2b.1.3	Totals	3,103	2,486	288	423	-	1,635	-	2,674	10,608	10,608	-	-	-	29,413	-	-	-	1,577,745	81,745	-
2b.1	Subtotal Period 2b Activity Costs	7,127	25,808	3,406	2,292	-	11,071	-	12,954	62,659	56,754	-	5,904	-	171,217	-	-	-	8,892,835	488,395	-
Period 2b Additional Costs																					
2b.2.1	License Termination Survey Planning	-	-	-	-	-	-	993	298	1,291	1,291	-	-	-	-	-	-	-	-	-	6,240
2b.2.2	Remedial Action Surveys	-	-	-	-	-	-	3,111	933	4,044	4,044	-	-	-	-	-	-	-	-	49,033	-
2b.2.3	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
2b.2.4	Underground Services Excavation	-	506	-	-	-	-	-	76	581	581	-	-	-	-	-	-	-	-	2,755	-
2b.2.5	Operational Tools and Equipment	-	-	9	51	-	189	-	56	304	304	-	-	-	5,855	-	-	-	146,375	16	-
2b.2	Subtotal Period 2b Additional Costs	-	506	9	51	-	189	4,154	1,370	6,279	6,279	-	-	-	5,855	-	-	-	146,375	51,804	6,240
Period 2b Collateral Costs																					
2b.3.1	Process decommissioning water waste	186	-	128	341	-	432	-	265	1,351	1,351	-	-	-	1,230	-	-	-	73,805	240	-
2b.3.2	Process decommissioning chemical flush waste	5	-	195	735	-	1,218	-	437	2,589	2,589	-	-	-	1,954	-	-	-	208,231	366	-
2b.3.3	Small tool allowance	-	524	-	-	-	-	-	79	603	603	-	-	-	-	-	-	-	-	-	-
2b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	23,680	3,552	27,232	-	27,232	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	191	524	322	1,075	-	1,650	23,680	4,332	31,774	4,542	27,232	-	-	3,184	-	-	-	282,036	606	-
Period 2b Period-Dependent Costs																					
2b.4.1	Decon supplies	840	-	-	-	-	-	-	210	1,050	1,050	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	1,230	123	1,353	1,353	-	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	7,119	712	7,831	7,831	-	-	-	-	-	-	-	-	-	-
2b.4.4	Health physics supplies	-	3,644	-	-	-	-	-	911	4,554	4,554	-	-	-	-	-	-	-	-	-	-
2b.4.5	Heavy equipment rental	-	4,746	-	-	-	-	-	712	5,458	5,458	-	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	134	72	-	409	-	126	742	742	-	-	-	6,378	-	-	-	127,567	208	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	3,146	472	3,618	3,618	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	1,028	103	1,131	1,131	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	4,479	448	4,927	-	4,927	-	-	-	-	-	-	-	-	-
2b.4.10	Site O&M Cost	-	-	-	-	-	-	389	58	448	448	-	-	-	-	-	-	-	-	-	-
2b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	1,731	260	1,990	-	1,990	-	-	-	-	-	-	-	-	-
2b.4.12	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	473	71	544	544	-	-	-	-	-	-	-	-	-	-
2b.4.13	ISFSI Operating Costs	-	-	-	-	-	-	113	17	130	-	130	-	-	-	-	-	-	-	-	-
2b.4.14	Security Staff Cost	-	-	-	-	-	-	17,010	2,552	19,562	19,562	-	-	-	-	-	-	-	-	-	311,190
2b.4.15	DOC Staff Cost	-	-	-	-	-	-	30,085	4,513	34,598	34,598	-	-	-	-	-	-	-	-	-	359,160
2b.4.16	Utility Staff Cost	-	-	-	-	-	-	51,315	7,697	59,012	59,012	-	-	-	-	-	-	-	-	-	666,660
2b.4	Subtotal Period 2b Period-Dependent Costs	840	8,389	134	72	-	409	118,118	18,984	146,947	139,901	7,046	-	-	6,378	-	-	-	127,567	208	1,337,010
2b.0	TOTAL PERIOD 2b COST	8,158	35,227	3,871	3,491	-	13,318	145,952	37,641	247,658	207,476	34,278	5,904	-	186,635	-	-	-	9,448,813	541,013	1,343,250

Table C-2
Byron Nuclear Power Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 2d - Decontamination Following Wet Fuel Storage																					
Period 2d Direct Decommissioning Activities																					
2d.1.1	Remove spent fuel racks	1,257	123	344	140	-	705	-	891	3,459	3,459	-	-	-	10,524	-	-	-	546,426	2,174	-
Disposal of Plant Systems																					
2d.1.2.1	Fuel Handling Bldg Equip Drains	-	184	32	18	-	91	-	75	399	399	-	-	-	1,386	-	-	-	70,185	2,721	-
2d.1.2.2	Fuel Handling Bldg Equip Drains (Unit 1)	-	33	4	2	-	9	-	11	58	58	-	-	-	129	-	-	-	6,739	479	-
2d.1.2.3	Fuel Handling Bldg Floor Drains	-	188	31	16	-	82	-	73	390	390	-	-	-	1,241	-	-	-	63,725	2,768	-
2d.1.2.4	Fuel Handling Bldg Floor Drains (Unit 1)	-	132	22	11	-	58	-	51	273	273	-	-	-	874	-	-	-	44,626	1,978	-
2d.1.2.5	Fuel Pool Cooling & Cleanup	-	250	46	26	-	133	-	104	560	560	-	-	-	1,989	-	-	-	103,404	3,712	-
2d.1.2.6	Fuel Pool Cooling & Cleanup (Unit 1)	-	232	42	25	-	124	-	97	521	521	-	-	-	1,857	-	-	-	96,476	3,463	-
2d.1.2.7	HVAC-Miscellaneous	-	112	-	-	-	-	-	17	128	-	-	128	-	-	-	-	-	-	1,769	-
2d.1.2	Totals	-	1,130	176	98	-	497	-	428	2,330	2,201	-	128	-	7,476	-	-	-	385,156	16,890	-
Decontamination of Site Buildings																					
2d.1.3.1	Fuel Handling Building	1,179	1,373	103	61	-	257	-	1,016	3,989	3,989	-	-	-	3,927	-	-	-	231,371	38,266	-
2d.1.3	Totals	1,179	1,373	103	61	-	257	-	1,016	3,989	3,989	-	-	-	3,927	-	-	-	231,371	38,266	-
2d.1.4	Scaffolding in support of decommissioning	-	411	3	2	-	9	-	106	531	531	-	-	-	139	-	-	-	7,221	6,832	-
2d.1	Subtotal Period 2d Activity Costs	2,436	3,037	626	301	-	1,468	-	2,441	10,308	10,180	-	128	-	22,066	-	-	-	1,170,174	64,161	-
Period 2d Additional Costs																					
2d.2.1	Remedial Action Surveys	-	-	-	-	-	-	914	274	1,188	1,188	-	-	-	-	-	-	-	-	14,408	-
2d.2	Subtotal Period 2d Additional Costs	-	-	-	-	-	-	914	274	1,188	1,188	-	-	-	-	-	-	-	-	14,408	-
Period 2d Collateral Costs																					
2d.3.1	Process decommissioning water waste	115	-	80	212	-	269	-	165	841	841	-	-	-	767	-	-	-	46,017	150	-
2d.3.3	Small tool allowance	-	90	-	-	-	-	-	13	103	103	-	-	-	-	-	-	-	-	-	-
2d.3.4	Decommissioning Equipment Disposition	-	-	171	94	-	472	-	149	887	887	-	-	-	7,054	-	-	-	366,237	88	-
2d.3	Subtotal Period 2d Collateral Costs	115	90	251	306	-	742	-	327	1,831	1,831	-	-	-	7,821	-	-	-	412,254	238	-
Period 2d Period-Dependent Costs																					
2d.4.1	Decon supplies	174	-	-	-	-	-	-	43	217	217	-	-	-	-	-	-	-	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	361	36	397	397	-	-	-	-	-	-	-	-	-	-
2d.4.3	Property taxes	-	-	-	-	-	-	346	35	381	381	-	-	-	-	-	-	-	-	-	-
2d.4.4	Health physics supplies	-	670	-	-	-	-	-	168	838	838	-	-	-	-	-	-	-	-	-	-
2d.4.5	Heavy equipment rental	-	1,394	-	-	-	-	-	209	1,604	1,604	-	-	-	-	-	-	-	-	-	-
2d.4.6	Disposal of DAW generated	-	-	32	17	-	97	-	30	175	175	-	-	-	1,508	-	-	-	30,168	49	-
2d.4.7	Plant energy budget	-	-	-	-	-	-	493	74	567	567	-	-	-	-	-	-	-	-	-	-
2d.4.8	NRC Fees	-	-	-	-	-	-	253	25	279	279	-	-	-	-	-	-	-	-	-	-
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	1,316	132	1,448	-	1,448	-	-	-	-	-	-	-	-	-
2d.4.10	Site O&M Cost	-	-	-	-	-	-	114	17	132	132	-	-	-	-	-	-	-	-	-	-
2d.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	278	42	320	320	-	-	-	-	-	-	-	-	-	-
2d.4.12	ISFSI Operating Costs	-	-	-	-	-	-	33	5	38	-	38	-	-	-	-	-	-	-	-	-
2d.4.13	Security Staff Cost	-	-	-	-	-	-	2,733	410	3,143	3,143	-	-	-	-	-	-	-	-	-	48,070
2d.4.14	DOC Staff Cost	-	-	-	-	-	-	6,076	911	6,987	6,987	-	-	-	-	-	-	-	-	-	72,286
2d.4.15	Utility Staff Cost	-	-	-	-	-	-	11,110	1,666	12,776	12,776	-	-	-	-	-	-	-	-	-	138,066
2d.4	Subtotal Period 2d Period-Dependent Costs	174	2,065	32	17	-	97	23,114	3,803	29,301	27,816	1,486	-	-	1,508	-	-	-	30,168	49	258,421
2d.0	TOTAL PERIOD 2d COST	2,724	5,192	909	624	-	2,306	24,028	6,846	42,629	41,015	1,486	128	-	31,395	-	-	-	1,612,596	78,856	258,421
PERIOD 2f - License Termination																					
Period 2f Direct Decommissioning Activities																					
2f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
2f.1.2	Terminate license									a											
2f.1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2f.2.1	License Termination Survey	-	-	-	-	-	-	8,763	2,629	11,392	11,392	-	-	-	-	-	-	-	-	128,776	3,120
2f.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	8,763	2,629	11,392	11,392	-	-	-	-	-	-	-	-	128,776	3,120
Period 2f Collateral Costs																					
2f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,080	162	1,242	1,242	-	-	-	-	-	-	-	-	-	-
2f.3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	1,080	162	1,242	1,242	-	-	-	-	-	-	-	-	-	-

Table C-2
Byron Nuclear Power Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 2f Period-Dependent Costs																					
2f.4.1	Insurance	-	-	-	-	-	-	393	39	432	432	-	-	-	-	-	-	-	-	-	-
2f.4.2	Property taxes	-	-	-	-	-	-	376	38	414	414	-	-	-	-	-	-	-	-	-	-
2f.4.3	Health physics supplies	-	650	-	-	-	-	-	163	813	813	-	-	-	-	-	-	-	-	-	-
2f.4.4	Disposal of DAW generated	-	-	7	4	-	22	-	7	39	39	-	-	-	337	-	-	-	6,734	11	-
2f.4.5	Plant energy budget	-	-	-	-	-	-	268	40	308	308	-	-	-	-	-	-	-	-	-	-
2f.4.6	NRC Fees	-	-	-	-	-	-	302	30	333	333	-	-	-	-	-	-	-	-	-	-
2f.4.7	Emergency Planning Fees	-	-	-	-	-	-	1,431	143	1,574	-	1,574	-	-	-	-	-	-	-	-	-
2f.4.8	Site O&M Cost	-	-	-	-	-	-	124	19	143	143	-	-	-	-	-	-	-	-	-	-
2f.4.9	ISFSI Operating Costs	-	-	-	-	-	-	36	5	41	-	41	-	-	-	-	-	-	-	-	-
2f.4.10	Security Staff Cost	-	-	-	-	-	-	1,578	237	1,814	1,814	-	-	-	-	-	-	-	-	-	27,893
2f.4.11	DOC Staff Cost	-	-	-	-	-	-	3,919	588	4,507	4,507	-	-	-	-	-	-	-	-	-	46,750
2f.4.12	Utility Staff Cost	-	-	-	-	-	-	5,032	755	5,786	5,786	-	-	-	-	-	-	-	-	-	60,107
2f.4	Subtotal Period 2f Period-Dependent Costs	-	650	7	4	-	22	13,458	2,063	16,204	14,589	1,615	-	-	337	-	-	-	6,734	11	134,750
2f.0	TOTAL PERIOD 2f COST	-	650	7	4	-	22	23,473	4,905	29,062	27,447	1,615	-	-	337	-	-	-	6,734	128,787	137,870
PERIOD 2 TOTALS		12,943	75,473	24,822	13,190	-	50,616	313,078	95,848	585,970	510,826	60,549	14,595	-	467,483	963	393	-	25,333,320	1,107,328	2,706,208
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	Reactor	-	7,213	-	-	-	-	-	1,082	8,294	-	-	8,294	-	-	-	-	-	-	69,541	-
3b.1.1.2	Aux Feedwater-Steam Tunnel/Penetr. Area	-	719	-	-	-	-	-	108	827	-	-	827	-	-	-	-	-	-	5,187	-
3b.1.1.3	Auxiliary Building	-	6,318	-	-	-	-	-	948	7,266	-	-	7,266	-	-	-	-	-	-	62,064	-
3b.1.1.4	Berms, Settling Ponds, and Drying Beds	-	154	-	-	-	-	-	23	178	-	-	178	-	-	-	-	-	-	1,631	-
3b.1.1.5	Circulating Water Pumphouse	-	1,090	-	-	-	-	-	163	1,253	-	-	1,253	-	-	-	-	-	-	11,861	-
3b.1.1.6	Essential Service Cooling Tower	-	510	-	-	-	-	-	76	586	-	-	586	-	-	-	-	-	-	5,067	-
3b.1.1.7	Make-up Demineralizer Area	-	1,817	-	-	-	-	-	273	2,089	-	-	2,089	-	-	-	-	-	-	20,770	-
3b.1.1.8	Miscellaneous Site Structures	-	1,954	-	-	-	-	-	293	2,247	-	-	2,247	-	-	-	-	-	-	20,544	-
3b.1.1.9	Radwaste/Service Building	-	4,166	-	-	-	-	-	625	4,791	-	-	4,791	-	-	-	-	-	-	45,688	-
3b.1.1.10	Receiving Building	-	193	-	-	-	-	-	29	222	-	-	222	-	-	-	-	-	-	2,294	-
3b.1.1.11	Refueling Water Storage Tank	-	1,099	-	-	-	-	-	165	1,263	-	-	1,263	-	-	-	-	-	-	11,688	-
3b.1.1.12	River Screen House	-	591	-	-	-	-	-	89	680	-	-	680	-	-	-	-	-	-	5,869	-
3b.1.1.13	Security Modifications	-	1,103	-	-	-	-	-	166	1,269	-	-	1,269	-	-	-	-	-	-	8,636	-
3b.1.1.14	Turbine Building	-	6,069	-	-	-	-	-	910	6,979	-	-	6,979	-	-	-	-	-	-	70,347	-
3b.1.1.15	Turbine Pedestal	-	1,463	-	-	-	-	-	219	1,682	-	-	1,682	-	-	-	-	-	-	12,628	-
3b.1.1.16	Yard Inventory	-	2,253	-	-	-	-	-	338	2,591	-	-	2,591	-	-	-	-	-	-	20,857	-
3b.1.1.17	Fuel Handling Building	-	3,242	-	-	-	-	-	486	3,729	-	-	3,729	-	-	-	-	-	-	33,246	-
3b.1.1	Totals	-	39,954	-	-	-	-	-	5,993	45,947	-	-	45,947	-	-	-	-	-	-	407,920	-
Site Closeout Activities																					
3b.1.2	BackFill Site	-	5,114	-	-	-	-	-	767	5,881	-	-	5,881	-	-	-	-	-	-	9,059	-
3b.1.3	Grade & landscape site	-	345	-	-	-	-	-	52	397	-	-	397	-	-	-	-	-	-	869	-
3b.1.4	Final report to NRC	-	-	-	-	-	-	85	13	98	98	-	-	-	-	-	-	-	-	-	668
3b.1	Subtotal Period 3b Activity Costs	-	45,413	-	-	-	-	85	6,825	52,322	98	-	52,225	-	-	-	-	-	-	417,849	668
Period 3b Additional Costs																					
3b.2.1	Concrete Crushing	-	988	-	-	-	-	6	149	1,142	-	-	1,142	-	-	-	-	-	-	4,554	-
3b.2.2	Demolish Cooling Tower	-	5,142	-	-	-	-	165	796	6,102	-	-	6,102	-	-	-	-	-	-	18,598	-
3b.2.3	Cofferdam Construction and Teardown	-	455	-	-	-	-	-	68	523	-	-	523	-	-	-	-	-	-	3,996	-
3b.2	Subtotal Period 3b Additional Costs	-	6,584	-	-	-	-	170	1,013	7,768	-	-	7,768	-	-	-	-	-	-	27,148	-
Period 3b Collateral Costs																					
3b.3.1	Small tool allowance	-	534	-	-	-	-	-	80	614	-	-	614	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	534	-	-	-	-	-	80	614	-	-	614	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Insurance	-	-	-	-	-	-	646	65	711	-	711	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	1,239	124	1,363	-	1,363	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	7,086	-	-	-	-	-	1,063	8,149	-	-	8,149	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	441	66	507	-	-	507	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	314	31	346	-	346	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	4,708	471	5,179	-	5,179	-	-	-	-	-	-	-	-	-
3b.4.7	ISFSI Operating Costs	-	-	-	-	-	-	118	18	136	-	136	-	-	-	-	-	-	-	-	-

Table C-2
Byron Nuclear Power Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 3b Period-Dependent Costs (continued)																					
3b.4.8	Site O&M Cost	-	-	-	-	-	-	409	61	470	-	-	470	-	-	-	-	-	-	-	-
3b.4.9	Security Staff Cost	-	-	-	-	-	-	4,955	743	5,699	0	4,673	1,026	-	-	-	-	-	-	-	87,294
3b.4.10	DOC Staff Cost	-	-	-	-	-	-	11,965	1,795	13,760	-	-	13,760	-	-	-	-	-	-	-	137,043
3b.4.11	Utility Staff Cost	-	-	-	-	-	-	7,407	1,111	8,519	-	1,619	6,900	-	-	-	-	-	-	-	87,294
3b.4	Subtotal Period 3b Period-Dependent Costs	-	7,086	-	-	-	-	32,203	5,548	44,838	0	14,026	30,812	-	-	-	-	-	-	-	311,630
3b.0	TOTAL PERIOD 3b COST	-	59,617	-	-	-	-	32,459	13,466	105,542	98	14,026	91,418	-	-	-	-	-	-	444,997	312,298
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Collateral Costs																					
3c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	9,688	1,453	11,141	-	11,141	-	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	9,688	1,453	11,141	-	11,141	-	-	-	-	-	-	-	-	-
Period 3c Period-Dependent Costs																					
3c.4.1	Insurance	-	-	-	-	-	-	3,842	384	4,226	-	4,226	-	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	7,366	737	8,103	-	8,103	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	2,423	242	2,665	-	2,665	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	27,992	2,799	30,791	-	30,791	-	-	-	-	-	-	-	-	-
3c.4.6	Site O&M Cost	-	-	-	-	-	-	2,432	365	2,797	-	2,797	-	-	-	-	-	-	-	-	-
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	704	106	809	-	809	-	-	-	-	-	-	-	-	-
3c.4.8	Security Staff Cost	-	-	-	-	-	-	24,043	3,606	27,650	-	27,650	-	-	-	-	-	-	-	-	415,106
3c.4.9	Utility Staff Cost	-	-	-	-	-	-	8,367	1,255	9,623	-	9,623	-	-	-	-	-	-	-	-	103,930
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	77,169	9,494	86,664	-	86,664	-	-	-	-	-	-	-	-	519,036
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	86,857	10,947	97,804	-	97,804	-	-	-	-	-	-	-	-	519,036
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	625	-	-	11,996	-	1,956	14,577	14,577	-	-	-	-	-	-	2,217	433,180	-	-
3d.1.1	Totals	-	-	625	-	-	11,996	-	1,956	14,577	14,577	-	-	-	-	-	-	2,217	433,180	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	625	-	-	11,996	-	1,956	14,577	14,577	-	-	-	-	-	-	2,217	433,180	-	-
Period 3d Period-Dependent Costs																					
3d.4.1	Insurance	-	-	-	-	-	-	10	1	11	-	11	-	-	-	-	-	-	-	-	-
3d.4.2	Property taxes	-	-	-	-	-	-	19	2	21	-	21	-	-	-	-	-	-	-	-	-
3d.4.4	Emergency Planning Fees	-	-	-	-	-	-	73	7	80	-	80	-	-	-	-	-	-	-	-	-
3d.4.5	Site O&M Cost	-	-	-	-	-	-	6	1	7	-	7	-	-	-	-	-	-	-	-	-
3d.4.6	ISFSI Operating Costs	-	-	-	-	-	-	2	0	2	-	2	-	-	-	-	-	-	-	-	-
3d.4.7	Security Staff Cost	-	-	-	-	-	-	63	9	72	-	72	-	-	-	-	-	-	-	-	1,080
3d.4.8	Utility Staff Cost	-	-	-	-	-	-	22	3	25	-	25	-	-	-	-	-	-	-	-	270
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	194	24	219	-	219	-	-	-	-	-	-	-	-	1,350
3d.0	TOTAL PERIOD 3d COST	-	-	625	-	-	11,996	194	1,980	14,795	14,577	219	-	-	-	-	-	2,217	433,180	-	1,350
PERIOD 3e - ISFSI Decontamination																					
Period 3e Direct Decommissioning Activities																					
Period 3e Additional Costs																					
3e.2.1	License Termination ISFSI	-	207	197	322	-	893	1,503	781	3,903	3,903	-	-	-	14,550	-	-	-	1,178,838	11,245	1,044
3e.2	Subtotal Period 3e Additional Costs	-	207	197	322	-	893	1,503	781	3,903	3,903	-	-	-	14,550	-	-	-	1,178,838	11,245	1,044
Period 3e Period-Dependent Costs																					
3e.4.1	Insurance	-	-	-	-	-	-	57	14	71	71	-	-	-	-	-	-	-	-	-	-
3e.4.2	Property taxes	-	-	-	-	-	-	163	41	204	204	-	-	-	-	-	-	-	-	-	-
3e.4.4	Security Staff Cost	-	-	-	-	-	-	144	36	180	180	-	-	-	-	-	-	-	-	-	2,468
3e.4.5	Utility Staff Cost	-	-	-	-	-	-	155	39	194	194	-	-	-	-	-	-	-	-	-	1,870
3e.4	Subtotal Period 3e Period-Dependent Costs	-	-	-	-	-	-	519	130	649	649	-	-	-	-	-	-	-	-	-	4,338
3e.0	TOTAL PERIOD 3e COST	-	207	197	322	-	893	2,022	910	4,552	4,552	-	-	-	14,550	-	-	-	1,178,838	11,245	5,382

Table C-2
Byron Nuclear Power Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 3f - ISFSI Site Restoration																					
Period 3f Direct Decommissioning Activities																					
Period 3f Additional Costs																					
3f.2.1	Site Restoration ISFSI	-	1,199	-	-	-	-	28	184	1,411	-	-	1,411	-	-	-	-	-	-	13,522	80
3f.2	Subtotal Period 3f Additional Costs	-	1,199	-	-	-	-	28	184	1,411	-	-	1,411	-	-	-	-	-	-	13,522	80
Period 3f Collateral Costs																					
3f.3.1	Small tool allowance	-	18	-	-	-	-	-	3	21	-	-	21	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	18	-	-	-	-	-	3	21	-	-	21	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																					
3f.4.2	Property taxes	-	-	-	-	-	-	86	9	95	-	-	95	-	-	-	-	-	-	-	-
3f.4.3	Heavy equipment rental	-	109	-	-	-	-	-	16	125	-	-	125	-	-	-	-	-	-	-	-
3f.4.4	Plant energy budget	-	-	-	-	-	-	31	5	35	-	-	35	-	-	-	-	-	-	-	-
3f.4.5	Security Staff Cost	-	-	-	-	-	-	76	11	88	-	-	88	-	-	-	-	-	-	-	1,307
3f.4.6	Utility Staff Cost	-	-	-	-	-	-	68	10	78	-	-	78	-	-	-	-	-	-	-	810
3f.4	Subtotal Period 3f Period-Dependent Costs	-	109	-	-	-	-	261	51	421	-	-	421	-	-	-	-	-	-	-	2,117
3f.0	TOTAL PERIOD 3f COST	-	1,326	-	-	-	-	288	238	1,852	-	-	1,852	-	-	-	-	-	-	13,522	2,197
PERIOD 3 TOTALS		-	61,150	822	322	-	12,889	121,821	27,541	224,545	19,226	112,048	93,270	-	14,550	-	-	2,217	1,612,018	469,764	840,263
TOTAL COST TO DECOMMISSION		**16,104**	**139,292**	**25,782**	**13,929**	**-**	**67,231**	**567,228**	**145,117**	**974,682**	**666,303**	**199,840**	**108,540**	**-**	**483,326**	**1,802**	**393**	**2,217**	**27,073,620**	**1,591,452**	**4,535,434**

TOTAL COST TO DECOMMISSION WITH 17.49% CONTINGENCY:	**$974,682**	**thousands of 2014 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 68.36% OR:	**$666,303**	**thousands of 2014 dollars**
SPENT FUEL MANAGEMENT COST IS 20.5% OR:	**$199,840**	**thousands of 2014 dollars**
NON-NUCLEAR DEMOLITION COST IS 11.14% OR:	**$108,540**	**thousands of 2014 dollars**
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	**485,521**	**cubic feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**2,217**	**cubic feet**
TOTAL SCRAP METAL REMOVED:	**71,812**	**tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,591,452**	**man-hours**

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

APPENDIX D

DETAILED COST ANALYSIS

DELAYED DECON

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Byron Nuclear Power Station, Unit 2 .....D-11

Table D-1
Byron Nuclear Power Station, Unit 1
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	481	144	625	625	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	166	25	190	190	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	255	38	293	293	-	-	-	-	-	-	-	-	-	2,000
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	166	25	190	190	-	-	-	-	-	-	-	-	-	1,300
1a.1.9	Perform detailed rad survey									a											
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	End product description	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,000
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	191	29	220	220	-	-	-	-	-	-	-	-	-	1,500
1a.1.13	Define major work sequence	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,000
1a.1.14	Perform SER and EA	-	-	-	-	-	-	395	59	454	454	-	-	-	-	-	-	-	-	-	3,100
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	637	95	732	732	-	-	-	-	-	-	-	-	-	5,000
Activity Specifications																					
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	626	94	720	720	-	-	-	-	-	-	-	-	-	4,920
1a.1.16.2	Plant systems	-	-	-	-	-	-	531	80	610	610	-	-	-	-	-	-	-	-	-	4,167
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	397	60	457	457	-	-	-	-	-	-	-	-	-	3,120
1a.1.16.4	Waste management	-	-	-	-	-	-	255	38	293	293	-	-	-	-	-	-	-	-	-	2,000
1a.1.16.5	Facility and site dormancy	-	-	-	-	-	-	255	38	293	293	-	-	-	-	-	-	-	-	-	2,000
1a.1.16	Total	-	-	-	-	-	-	2,063	310	2,373	2,373	-	-	-	-	-	-	-	-	-	16,207
Detailed Work Procedures																					
1a.1.17.1	Plant systems	-	-	-	-	-	-	151	23	173	173	-	-	-	-	-	-	-	-	-	1,183
1a.1.17.2	Facility closeout & dormancy	-	-	-	-	-	-	153	23	176	176	-	-	-	-	-	-	-	-	-	1,200
1a.1.17	Total	-	-	-	-	-	-	303	46	349	349	-	-	-	-	-	-	-	-	-	2,383
1a.1.18	Procure vacuum drying system	-	-	-	-	-	-	13	2	15	15	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	5,050	830	5,880	5,880	-	-	-	-	-	-	-	-	-	35,890
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,855	185	2,040	2,040	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	493	-	-	-	-	-	123	616	616	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	529	-	-	-	-	-	79	608	608	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	13	7	-	39	-	12	71	71	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,778	267	2,045	2,045	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	1,181	118	1,299	1,299	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	2,171	217	2,388	-	2,388	-	-	-	-	-	-	-	-	-
1a.4.9	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	396	59	455	-	455	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	48	7	55	-	55	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	640	96	736	736	-	-	-	-	-	-	-	-	-	12,264
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	32,279	4,842	37,121	37,121	-	-	-	-	-	-	-	-	-	423,400
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,022	13	7	-	39	40,512	6,031	47,624	44,727	2,898	-	-	610	-	-	-	12,190	20	435,664
1a.0	TOTAL PERIOD 1a COST	-	1,022	13	7	-	39	45,563	6,861	53,504	50,606	2,898	-	-	610	-	-	-	12,190	20	471,554
PERIOD 1b - SAFSTOR Limited DECON Activities																					
Period 1b Direct Decommissioning Activities																					
Decontamination of Site Buildings																					
1b.1.1.1	Reactor	2,223	-	-	-	-	-	-	1,111	3,334	3,334	-	-	-	-	-	-	-	-	33,093	-
1b.1.1.2	Auxiliary Building	220	-	-	-	-	-	-	110	330	330	-	-	-	-	-	-	-	-	3,289	-
1b.1.1.3	Refueling Water Storage Tank	366	-	-	-	-	-	-	183	549	549	-	-	-	-	-	-	-	-	5,322	-
1b.1.1	Totals	2,809	-	-	-	-	-	-	1,404	4,213	4,213	-	-	-	-	-	-	-	-	41,705	-

Table D-1
Byron Nuclear Power Station, Unit 1
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
1b.1	Subtotal Period 1b Activity Costs	2,809	-	-	-	-	-	-	1,404	4,213	4,213	-	-	-	-	-	-	-	-	41,705	-
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	886	-	-	-	-	-	-	133	1,019	1,019	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process decommissioning water waste	180	-	118	314	-	398	-	248	1,258	1,258	-	-	-	1,135	-	-	-	68,086	221	-
1b.3.4	Small tool allowance	-	46	-	-	-	-	-	7	53	53	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	1,066	46	118	314	-	398	-	388	2,330	2,330	-	-	-	1,135	-	-	-	68,086	221	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	624	-	-	-	-	-	-	156	780	780	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	350	35	385	385	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	4,112	411	4,524	4,524	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	314	-	-	-	-	-	79	393	393	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	132	-	-	-	-	-	20	152	152	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	11	6	-	33	-	10	60	60	-	-	-	517	-	-	-	10,338	17	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	443	67	510	510	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	172	17	189	189	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	541	54	595	-	595	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Cost	-	-	-	-	-	-	41	6	47	47	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	99	15	113	-	113	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	12	2	14	-	14	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	160	24	184	184	-	-	-	-	-	-	-	-	-	3,058
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	8,048	1,207	9,255	9,255	-	-	-	-	-	-	-	-	-	105,560
1b.4	Subtotal Period 1b Period-Dependent Costs	624	446	11	6	-	33	13,978	2,102	17,200	16,478	722	-	-	517	-	-	-	10,338	17	108,618
1b.0	TOTAL PERIOD 1b COST	4,498	492	129	320	-	431	13,978	3,895	23,744	23,021	722	-	-	1,652	-	-	-	78,424	41,943	108,618
PERIOD 1c - Preparations for SAFSTOR Dormancy																					
Period 1c Direct Decommissioning Activities																					
1c.1.1	Prepare support equipment for storage	-	487	-	-	-	-	-	73	561	561	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	48	-	-	-	-	-	7	56	56	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	10,874	-
1c.1.4	Secure building accesses									a											
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	74	11	85	85	-	-	-	-	-	-	-	-	-	583
1c.1	Subtotal Period 1c Activity Costs	-	536	-	-	-	-	807	311	1,654	1,654	-	-	-	-	-	-	-	-	14,574	583
Period 1c Collateral Costs																					
1c.3.1	Process decommissioning water waste	142	-	93	248	-	314	-	196	993	993	-	-	-	896	-	-	-	53,749	175	-
1c.3.3	Small tool allowance	-	4	-	-	-	-	-	1	5	5	-	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	142	4	93	248	-	314	-	197	998	998	-	-	-	896	-	-	-	53,749	175	-
Period 1c Period-Dependent Costs																					
1c.4.1	Insurance	-	-	-	-	-	-	350	35	385	385	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	4,112	411	4,524	4,524	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	190	-	-	-	-	-	48	238	238	-	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	132	-	-	-	-	-	20	152	152	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	3	2	-	10	-	3	18	18	-	-	-	152	-	-	-	3,039	5	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	443	67	510	510	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	172	17	189	189	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	541	54	595	-	595	-	-	-	-	-	-	-	-	-
1c.4.9	Site O&M Cost	-	-	-	-	-	-	41	6	47	47	-	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	99	15	113	-	113	-	-	-	-	-	-	-	-	-
1c.4.11	ISFSI Operating Costs	-	-	-	-	-	-	12	2	14	-	14	-	-	-	-	-	-	-	-	-
1c.4.12	Security Staff Cost	-	-	-	-	-	-	160	24	184	184	-	-	-	-	-	-	-	-	-	3,058
1c.4.13	Utility Staff Cost	-	-	-	-	-	-	8,048	1,207	9,255	9,255	-	-	-	-	-	-	-	-	-	105,560
1c.4	Subtotal Period 1c Period-Dependent Costs	-	322	3	2	-	10	13,978	1,908	16,223	15,501	722	-	-	152	-	-	-	3,039	5	108,618
1c.0	TOTAL PERIOD 1c COST	142	862	96	250	-	324	14,785	2,416	18,875	18,153	722	-	-	1,048	-	-	-	56,788	14,753	109,201
PERIOD 1 TOTALS		4,640	2,376	238	577	-	795	74,326	13,172	96,123	91,781	4,343	-	-	3,309	-	-	-	147,402	56,716	689,372

Table D-1
Byron Nuclear Power Station, Unit 1
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 2a - 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	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	3,197	799	3,996	3,996	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	3,315	817	4,132	4,132	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																					
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	11,750	1,763	13,513	-	13,513	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	11,750	1,763	13,513	-	13,513	-	-	-	-	-	-	-	-	-
Period 2a Period-Dependent Costs																					
2a.4.1	Insurance	-	-	-	-	-	-	12,890	1,289	14,179	-	14,179	-	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	36,983	3,698	40,681	40,681	-	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	4,263	-	-	-	-	-	1,066	5,328	5,328	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	102	55	-	311	-	96	564	564	-	-	-	4,852	-	-	-	97,040	158	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	8,186	1,228	9,414	-	9,414	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	6,660	666	7,326	7,326	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	43,701	4,370	48,071	-	48,071	-	-	-	-	-	-	-	-	-
2a.4.8	Site O&M Cost	-	-	-	-	-	-	3,797	570	4,367	-	4,367	-	-	-	-	-	-	-	-	-
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	9,104	1,366	10,469	-	10,469	-	-	-	-	-	-	-	-	-
2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	1,099	165	1,264	-	1,264	-	-	-	-	-	-	-	-	-
2a.4.11	Security Staff Cost	-	-	-	-	-	-	70,450	10,567	81,017	-	81,017	-	-	-	-	-	-	-	-	1,278,392
2a.4.12	Utility Staff Cost	-	-	-	-	-	-	88,026	13,204	101,230	-	101,230	-	-	-	-	-	-	-	-	1,128,134
2a.4	Subtotal Period 2a Period-Dependent Costs	-	4,263	102	55	-	311	280,896	38,284	323,911	53,900	270,011	-	-	4,852	-	-	-	97,040	158	2,406,526
2a.0	TOTAL PERIOD 2a COST	-	4,263	102	55	-	311	295,961	40,864	341,556	58,032	283,524	-	-	4,852	-	-	-	97,040	158	2,406,526
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	-	-	-	-	-	-	9	1	10	10	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	232	58	290	290	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	241	59	300	300	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	3,813	572	4,384	-	4,384	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	3,813	572	4,384	-	4,384	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	871	87	958	-	958	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	835	84	919	-	919	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	152	-	-	-	-	-	38	191	191	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	4	2	-	11	-	3	20	20	-	-	-	173	-	-	-	3,453	6	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	297	45	342	-	342	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	461	46	507	507	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	3,173	317	3,490	-	3,490	-	-	-	-	-	-	-	-	-
2b.4.8	Site O&M Cost	-	-	-	-	-	-	276	41	317	-	317	-	-	-	-	-	-	-	-	-
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	80	12	92	-	92	-	-	-	-	-	-	-	-	-
2b.4.10	Security Staff Cost	-	-	-	-	-	-	2,726	409	3,134	-	3,134	-	-	-	-	-	-	-	-	47,057
2b.4.11	Utility Staff Cost	-	-	-	-	-	-	2,638	396	3,033	-	3,033	-	-	-	-	-	-	-	-	34,857
2b.4	Subtotal Period 2b Period-Dependent Costs	-	152	4	2	-	11	11,356	1,478	13,004	718	12,286	-	-	173	-	-	-	3,453	6	81,914
2b.0	TOTAL PERIOD 2b COST	-	152	4	2	-	11	15,410	2,109	17,688	1,018	16,670	-	-	173	-	-	-	3,453	6	81,914
PERIOD 2 TOTALS		-	4,415	106	57	-	322	311,371	42,973	359,244	59,050	300,194	-	-	5,025	-	-	-	100,493	164	2,488,441

Table D-1
Byron Nuclear Power Station, Unit 1
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	166	25	190	190	-	-	-	-	-	-	-	-	-	1,300
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	586	88	674	674	-	-	-	-	-	-	-	-	-	4,600
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,000
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	166	25	190	190	-	-	-	-	-	-	-	-	-	1,300
3a.1.6	Define major work sequence	-	-	-	-	-	-	955	143	1,098	1,098	-	-	-	-	-	-	-	-	-	7,500
3a.1.7	Perform SER and EA	-	-	-	-	-	-	395	59	454	454	-	-	-	-	-	-	-	-	-	3,100
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	637	95	732	732	-	-	-	-	-	-	-	-	-	5,000
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	522	78	600	600	-	-	-	-	-	-	-	-	-	4,096
3a.1.10	Receive NRC approval of termination plan									a											
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	938	141	1,079	971	-	108	-	-	-	-	-	-	-	7,370
3a.1.11.2	Plant systems	-	-	-	-	-	-	531	80	610	549	-	61	-	-	-	-	-	-	-	4,167
3a.1.11.3	Reactor internals	-	-	-	-	-	-	904	136	1,040	1,040	-	-	-	-	-	-	-	-	-	7,100
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	828	124	952	952	-	-	-	-	-	-	-	-	-	6,500
3a.1.11.5	Biological shield	-	-	-	-	-	-	64	10	73	73	-	-	-	-	-	-	-	-	-	500
3a.1.11.6	Steam generators	-	-	-	-	-	-	397	60	457	457	-	-	-	-	-	-	-	-	-	3,120
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	204	31	234	117	-	117	-	-	-	-	-	-	-	1,600
3a.1.11.8	Main Turbine	-	-	-	-	-	-	51	8	59	-	-	59	-	-	-	-	-	-	-	400
3a.1.11.9	Main Condensers	-	-	-	-	-	-	51	8	59	-	-	59	-	-	-	-	-	-	-	400
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	397	60	457	228	-	228	-	-	-	-	-	-	-	3,120
3a.1.11.11	Waste management	-	-	-	-	-	-	586	88	674	674	-	-	-	-	-	-	-	-	-	4,600
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-	115	17	132	66	-	66	-	-	-	-	-	-	-	900
3a.1.11	Total	-	-	-	-	-	-	5,064	760	5,824	5,127	-	697	-	-	-	-	-	-	-	39,777
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	306	46	351	351	-	-	-	-	-	-	-	-	-	2,400
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	3,000	450	3,450	3,450	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	178	27	205	205	-	-	-	-	-	-	-	-	-	1,400
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,300	345	2,645	2,645	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	157	23	180	180	-	-	-	-	-	-	-	-	-	1,230
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	14,557	2,183	16,740	16,043	-	697	-	-	-	-	-	-	-	72,703
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	521	52	573	573	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	500	50	550	550	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	431	-	-	-	-	-	108	539	539	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	529	-	-	-	-	-	79	608	608	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	11	6	-	33	-	10	60	60	-	-	-	514	-	-	-	10,287	17	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	1,778	267	2,045	2,045	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	378	38	416	416	-	-	-	-	-	-	-	-	-	-
3a.4.8	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
3a.4.9	Security Staff Cost	-	-	-	-	-	-	3,725	559	4,283	4,283	-	-	-	-	-	-	-	-	-	65,179
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	19,668	2,950	22,618	22,618	-	-	-	-	-	-	-	-	-	258,629
3a.4	Subtotal Period 3a Period-Dependent Costs	-	960	11	6	-	33	26,735	4,138	31,882	31,882	-	-	-	514	-	-	-	10,287	17	323,807
3a.0	TOTAL PERIOD 3a COST	-	960	11	6	-	33	41,291	6,321	48,622	47,924	-	697	-	514	-	-	-	10,287	17	396,510
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	603	90	693	624	-	69	-	-	-	-	-	-	-	4,733
3b.1.1.2	Reactor internals	-	-	-	-	-	-	318	48	366	366	-	-	-	-	-	-	-	-	-	2,500
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	172	26	198	49	-	148	-	-	-	-	-	-	-	1,350
3b.1.1.4	CRD cooling assembly	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.5	CRD housings & ICI tubes	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.6	Incore instrumentation	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	462	69	531	531	-	-	-	-	-	-	-	-	-	3,630
3b.1.1.8	Facility closeout	-	-	-	-	-	-	153	23	176	88	-	88	-	-	-	-	-	-	-	1,200
3b.1.1.9	Missile shields	-	-	-	-	-	-	57	9	66	66	-	-	-	-	-	-	-	-	-	450

Table D-1
Byron Nuclear Power Station, Unit 1
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(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Detailed Work Procedures (continued)																					
3b.1.1.10	Biological shield	-	-	-	-	-	-	153	23	176	176	-	-	-	-	-	-	-	-	-	1,200
3b.1.1.11	Steam generators	-	-	-	-	-	-	586	88	674	674	-	-	-	-	-	-	-	-	-	4,600
3b.1.1.12	Reinforced concrete	-	-	-	-	-	-	127	19	146	73	-	73	-	-	-	-	-	-	-	1,000
3b.1.1.13	Main Turbine	-	-	-	-	-	-	199	30	228	-	-	228	-	-	-	-	-	-	-	1,560
3b.1.1.14	Main Condensers	-	-	-	-	-	-	199	30	228	-	-	228	-	-	-	-	-	-	-	1,560
3b.1.1.15	Auxiliary building	-	-	-	-	-	-	348	52	400	360	-	40	-	-	-	-	-	-	-	2,730
3b.1.1.16	Reactor building	-	-	-	-	-	-	348	52	400	360	-	40	-	-	-	-	-	-	-	2,730
3b.1.1	Total	-	-	-	-	-	-	4,105	616	4,721	3,806	-	915	-	-	-	-	-	-	-	32,243
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	4,105	616	4,721	3,806	-	915	-	-	-	-	-	-	-	32,243
Period 3b Additional Costs																					
3b.2.1	Site Characterization	-	-	-	-	-	-	6,444	1,933	8,377	8,377	-	-	-	-	-	-	-	-	30,500	10,852
3b.2	Subtotal Period 3b Additional Costs	-	-	-	-	-	-	6,444	1,933	8,377	8,377	-	-	-	-	-	-	-	-	30,500	10,852
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	886	-	-	-	-	-	-	133	1,019	1,019	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,080	162	1,242	1,242	-	-	-	-	-	-	-	-	-	-
3b.3.3	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	886	1,100	-	-	-	-	1,080	460	3,526	3,526	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	27	-	-	-	-	-	-	7	34	34	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	261	26	287	287	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	251	25	276	276	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	238	-	-	-	-	-	60	298	298	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	265	-	-	-	-	-	40	305	305	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	6	3	-	19	-	6	34	34	-	-	-	292	-	-	-	5,834	10	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	892	134	1,025	1,025	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	190	19	208	208	-	-	-	-	-	-	-	-	-	-
3b.4.9	Site O&M Cost	-	-	-	-	-	-	83	12	95	95	-	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	1,867	280	2,148	2,148	-	-	-	-	-	-	-	-	-	32,679
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	5,085	763	5,847	5,847	-	-	-	-	-	-	-	-	-	58,560
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	9,861	1,479	11,340	11,340	-	-	-	-	-	-	-	-	-	129,669
3b.4	Subtotal Period 3b Period-Dependent Costs	27	503	6	3	-	19	18,489	2,850	21,897	21,897	-	-	-	292	-	-	-	5,834	10	220,907
3b.0	TOTAL PERIOD 3b COST	913	1,603	6	3	-	19	30,117	5,859	38,521	37,606	-	915	-	292	-	-	-	5,834	30,510	264,002
PERIOD 3 TOTALS		913	2,563	17	9	-	52	71,409	12,180	87,143	85,530	-	1,613	-	806	-	-	-	16,121	30,526	660,512
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Reactor Coolant Piping	46	160	35	38	-	263	-	138	680	680	-	-	-	1,783	-	-	-	203,843	3,153	-
4a.1.1.2	Pressurizer Relief Tank	8	30	7	7	-	47	-	25	125	125	-	-	-	329	-	-	-	36,553	596	-
4a.1.1.3	Reactor Coolant Pumps & Motors	29	108	79	198	-	1,390	-	426	2,230	2,230	-	-	-	4,796	-	-	-	780,540	2,726	80
4a.1.1.4	Pressurizer	12	69	368	106	-	879	-	296	1,731	1,731	-	-	-	3,033	-	-	-	240,915	1,527	750
4a.1.1.5	Steam Generators	98	4,496	2,810	3,697	-	11,075	-	4,777	26,953	26,953	-	-	-	67,463	-	-	-	3,820,664	20,508	4,500
4a.1.1.6	Retired Steam Generator Units	-	-	1,591	2,916	-	10,319	-	3,176	18,002	18,002	-	-	-	62,044	-	-	-	3,098,575	10,800	2,250
4a.1.1.7	CRDMs/ICIs/Service Structure Removal	41	301	230	47	-	188	-	173	979	979	-	-	-	3,881	-	-	-	145,494	5,232	-
4a.1.1.8	Reactor Vessel Internals	93	2,899	6,520	1,058	-	4,971	290	6,644	22,475	22,475	-	-	-	1,835	1,127	393	-	328,507	27,350	1,226
4a.1.1.9	Vessel & Internals GTCC Disposal	-	-	-	-	-	11,996	-	1,799	13,795	13,795	-	-	-	-	-	-	2,217	433,180	-	-
4a.1.1.10	Reactor Vessel	115	5,075	2,149	1,140	-	2,832	290	6,146	17,747	17,747	-	-	-	9,331	-	-	-	960,579	27,350	1,226
4a.1.1	Totals	441	13,139	13,789	9,207	-	43,960	580	23,600	104,717	104,717	-	-	-	154,495	1,127	393	2,217	10,048,850	99,243	10,032
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	614	3,150	1,094	-	3,399	-	1,482	9,739	9,739	-	-	-	58,555	-	-	-	3,040,215	9,317	-
4a.1.3	Main Condensers	-	1,204	1,828	998	-	5,039	-	1,893	10,963	10,963	-	-	-	75,240	-	-	-	3,906,532	18,250	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor	-	1,250	-	-	-	-	-	188	1,438	1,438	-	-	-	-	-	-	-	-	12,130	-
4a.1.4.2	Auxiliary Building	-	692	-	-	-	-	-	104	796	796	-	-	-	-	-	-	-	-	6,810	-
4a.1.4.3	Refueling Water Storage Tank	-	122	-	-	-	-	-	18	140	140	-	-	-	-	-	-	-	-	1,299	-
4a.1.4	Totals	-	2,065	-	-	-	-	-	310	2,374	2,374	-	-	-	-	-	-	-	-	20,238	-

Table D-1
Byron Nuclear Power Station, Unit 1
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems																					
4a.1.5.1	Auxiliary Feedwater	-	80	-	-	-	-	-	12	92	-	-	92	-	-	-	-	-	-	1,244	-
4a.1.5.2	Auxiliary Steam	-	72	-	-	-	-	-	11	83	-	-	83	-	-	-	-	-	-	1,126	-
4a.1.5.3	Auxiliary Steam RCA	-	138	22	11	-	54	-	52	276	276	-	-	-	805	-	-	-	42,068	1,984	-
4a.1.5.4	Boric Acid Processing	-	517	127	78	-	392	-	252	1,366	1,366	-	-	-	6,102	-	-	-	303,638	8,026	-
4a.1.5.5	CO2 & H2	-	27	-	-	-	-	-	4	31	-	-	31	-	-	-	-	-	-	419	-
4a.1.5.6	CO2 & H2 RCA	-	40	5	2	-	11	-	13	71	71	-	-	-	159	-	-	-	8,312	583	-
4a.1.5.7	Chemical Feed	-	59	-	-	-	-	-	9	68	-	-	68	-	-	-	-	-	-	934	-
4a.1.5.8	Chilled Water	-	74	-	-	-	-	-	11	85	-	-	85	-	-	-	-	-	-	1,142	-
4a.1.5.9	Circulating Water	-	323	-	-	-	-	-	48	372	-	-	372	-	-	-	-	-	-	5,150	-
4a.1.5.10	Condensate	-	386	-	-	-	-	-	58	444	-	-	444	-	-	-	-	-	-	6,023	-
4a.1.5.11	Condensate Booster	-	347	-	-	-	-	-	52	400	-	-	400	-	-	-	-	-	-	5,428	-
4a.1.5.12	Condensate Cleanup	-	68	-	-	-	-	-	10	79	-	-	79	-	-	-	-	-	-	1,060	-
4a.1.5.13	Containment Spray	-	264	82	46	-	233	-	139	765	765	-	-	-	3,481	-	-	-	180,655	3,897	-
4a.1.5.14	Diesel Fuel Oil	-	105	-	-	-	-	-	16	120	-	-	120	-	-	-	-	-	-	1,615	-
4a.1.5.15	Essential Service Water	-	244	-	-	-	-	-	37	280	-	-	280	-	-	-	-	-	-	3,837	-
4a.1.5.16	Extraction Steam	-	194	-	-	-	-	-	29	223	-	-	223	-	-	-	-	-	-	3,089	-
4a.1.5.17	Feedwater	-	324	-	-	-	-	-	49	372	-	-	372	-	-	-	-	-	-	5,142	-
4a.1.5.18	Feedwater Drains	-	776	-	-	-	-	-	116	892	-	-	892	-	-	-	-	-	-	12,366	-
4a.1.5.19	Gland Steam	-	58	-	-	-	-	-	9	67	-	-	67	-	-	-	-	-	-	932	-
4a.1.5.20	Gland Water	-	51	-	-	-	-	-	8	59	-	-	59	-	-	-	-	-	-	828	-
4a.1.5.21	Main Steam	-	331	-	-	-	-	-	50	380	-	-	380	-	-	-	-	-	-	5,216	-
4a.1.5.22	Main Steam RCA	-	53	16	10	-	49	-	28	155	155	-	-	-	726	-	-	-	37,727	769	-
4a.1.5.23	Nitrogen	-	3	1	1	-	3	-	2	10	10	-	-	-	49	-	-	-	2,447	50	-
4a.1.5.24	Non-Essential Service Water	-	183	-	-	-	-	-	27	211	-	-	211	-	-	-	-	-	-	2,916	-
4a.1.5.25	Non-Essential Service Water RCA	-	96	32	19	-	94	-	53	294	294	-	-	-	1,400	-	-	-	72,790	1,358	-
4a.1.5.26	Off Gas	-	583	125	71	-	360	-	259	1,398	1,398	-	-	-	5,352	-	-	-	278,775	8,689	-
4a.1.5.27	Process Radiation Monitoring	-	43	3	1	-	7	-	13	68	68	-	-	-	109	-	-	-	5,726	671	-
4a.1.5.28	Process Sampling	-	125	13	8	-	40	-	44	228	228	-	-	-	590	-	-	-	30,697	1,947	-
4a.1.5.29	Station Air	-	31	-	-	-	-	-	5	36	-	-	36	-	-	-	-	-	-	498	-
4a.1.5.30	Station Heating	-	113	-	-	-	-	-	17	130	-	-	130	-	-	-	-	-	-	1,771	-
4a.1.5.31	Switchgear Heat Removal	-	9	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	139	-
4a.1.5.32	Turbine Bldg Equip Drains	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	17	-
4a.1.5.33	Turbine Generator	-	58	-	-	-	-	-	9	67	-	-	67	-	-	-	-	-	-	901	-
4a.1.5.34	Turbine Oil	-	89	-	-	-	-	-	13	103	-	-	103	-	-	-	-	-	-	1,399	-
4a.1.5.35	Waste Oil Sumps	-	31	-	-	-	-	-	5	35	-	-	35	-	-	-	-	-	-	483	-
4a.1.5	Totals	-	5,894	426	246	-	1,242	-	1,460	9,268	4,630	-	4,638	-	18,774	-	-	-	962,836	91,647	-
4a.1.6	Scaffolding in support of decommissioning	-	1,088	9	5	-	24	-	280	1,406	1,406	-	-	-	359	-	-	-	18,654	18,101	-
4a.1	Subtotal Period 4a Activity Costs	441	24,004	19,201	11,550	-	53,665	580	29,026	138,466	133,828	-	4,638	-	307,423	1,127	393	2,217	17,977,090	256,796	10,032
Period 4a Additional Costs																					
4a.2.1	Remedial Action Surveys	-	-	-	-	-	-	1,976	593	2,569	2,569	-	-	-	-	-	-	-	-	31,151	-
4a.2.2	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
4a.2.3	Operational Tools and Equipment	-	-	9	51	-	189	-	56	304	304	-	-	-	5,855	-	-	-	146,375	16	-
4a.2	Subtotal Period 4a Additional Costs	-	-	9	51	-	189	2,026	656	2,931	2,931	-	-	-	5,855	-	-	-	146,375	31,167	-
Period 4a Collateral Costs																					
4a.3.1	Process decommissioning water waste	11	-	12	33	-	41	-	22	119	119	-	-	-	118	-	-	-	7,064	23	-
4a.3.3	Small tool allowance	-	273	-	-	-	-	-	41	314	283	-	31	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	11	273	12	33	-	41	-	63	433	402	-	31	-	118	-	-	-	7,064	23	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	81	-	-	-	-	-	-	20	101	101	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	777	78	855	855	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	745	74	819	737	-	82	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	2,040	-	-	-	-	-	510	2,550	2,550	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	3,029	-	-	-	-	-	454	3,483	3,483	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	78	42	-	239	-	74	433	433	-	-	-	3,728	-	-	-	74,552	122	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	2,518	378	2,896	2,896	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	900	90	990	990	-	-	-	-	-	-	-	-	-	-
4a.4.9	Site O&M Cost	-	-	-	-	-	-	246	37	283	283	-	-	-	-	-	-	-	-	-	-
4a.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	597	90	687	687	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	5,551	833	6,384	6,384	-	-	-	-	-	-	-	-	-	97,143
4a.4.12	DOC Staff Cost	-	-	-	-	-	-	17,837	2,676	20,513	20,513	-	-	-	-	-	-	-	-	-	214,491
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	29,578	4,437	34,015	34,015	-	-	-	-	-	-	-	-	-	388,571

Table D-1
Byron Nuclear Power Station, Unit 1
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
4a.4	Subtotal Period 4a Period-Dependent Costs	81	5,069	78	42	-	239	58,749	9,750	74,007	73,925	-	82	-	3,728	-	-	-	74,552	122	700,206
4a.0	TOTAL PERIOD 4a COST	532	29,345	19,301	11,676	-	54,134	61,356	39,494	215,838	211,086	-	4,752	-	317,123	1,127	393	2,217	18,205,080	288,108	710,238
PERIOD 4b - Site Decontamination																					
Disposal of Plant Systems																					
4b.1.2.1	Chemical & Volume Control	-	1,136	159	83	-	419	-	417	2,213	2,213	-	-	-	6,236	-	-	-	324,551	16,476	-
4b.1.2.2	Chilled Water RCA	-	322	108	60	-	304	-	176	970	970	-	-	-	4,527	-	-	-	235,699	4,956	-
4b.1.2.3	Component Cooling RCA	-	682	194	110	-	553	-	345	1,884	1,884	-	-	-	8,239	-	-	-	428,586	10,074	-
4b.1.2.4	Electrical	-	3,113	-	-	-	-	-	467	3,580	-	-	3,580	-	-	-	-	-	-	48,490	-
4b.1.2.5	Electrical - Contaminated	-	1,160	128	85	-	430	-	423	2,225	2,225	-	-	-	6,418	-	-	-	333,233	17,294	-
4b.1.2.6	Electrical - RCA	-	1,940	347	222	-	1,123	-	834	4,466	4,466	-	-	-	16,763	-	-	-	870,329	29,753	-
4b.1.2.7	Emergency Diesel Generator	-	132	-	-	-	-	-	20	152	-	-	152	-	-	-	-	-	-	2,066	-
4b.1.2.8	Essential Service Water RCA	-	306	112	66	-	333	-	181	998	998	-	-	-	4,958	-	-	-	257,885	4,643	-
4b.1.2.9	Fire Protection	-	127	-	-	-	-	-	19	146	-	-	146	-	-	-	-	-	-	1,984	-
4b.1.2.10	Fire Protection RCA	-	189	29	14	-	70	-	70	371	371	-	-	-	1,032	-	-	-	53,961	2,693	-
4b.1.2.11	HVAC-Auxiliary Building	-	518	97	64	-	323	-	230	1,233	1,233	-	-	-	4,827	-	-	-	250,668	7,298	-
4b.1.2.12	HVAC-Diesel Generator Room	-	44	-	-	-	-	-	7	50	-	-	50	-	-	-	-	-	-	682	-
4b.1.2.13	HVAC-Miscellaneous	-	42	-	-	-	-	-	6	49	-	-	49	-	-	-	-	-	-	656	-
4b.1.2.14	HVAC-Primary Containment	-	627	203	135	-	683	-	368	2,017	2,017	-	-	-	10,197	-	-	-	529,451	8,908	-
4b.1.2.15	HVAC-Turbine Building	-	190	-	-	-	-	-	28	218	-	-	218	-	-	-	-	-	-	3,177	-
4b.1.2.16	Instrument Air Supply	-	47	-	-	-	-	-	7	54	-	-	54	-	-	-	-	-	-	760	-
4b.1.2.17	Instrument Air Supply RCA	-	76	10	5	-	24	-	27	141	141	-	-	-	354	-	-	-	18,493	1,096	-
4b.1.2.18	Miscellaneous Drains	-	40	7	4	-	20	-	16	87	87	-	-	-	299	-	-	-	15,562	594	-
4b.1.2.19	Primary Containment Purge	-	285	128	75	-	377	-	189	1,054	1,054	-	-	-	5,614	-	-	-	292,306	4,509	-
4b.1.2.20	Primary Water	-	62	6	3	-	15	-	20	106	106	-	-	-	218	-	-	-	11,425	924	-
4b.1.2.21	Radioactive Waste Disposal	-	945	159	88	-	446	-	377	2,015	2,015	-	-	-	6,808	-	-	-	345,754	14,349	-
4b.1.2.22	Reactor Building Equipment Drains	-	100	17	9	-	47	-	40	213	213	-	-	-	695	-	-	-	36,107	1,451	-
4b.1.2.23	Reactor Building Floor Drains	-	47	7	4	-	18	-	17	92	92	-	-	-	265	-	-	-	13,801	686	-
4b.1.2.24	Reactor Coolant	-	175	22	11	-	55	-	61	324	324	-	-	-	812	-	-	-	42,440	2,529	-
4b.1.2.25	Residual Heat Removal	-	197	49	29	-	147	-	95	516	516	-	-	-	2,184	-	-	-	113,636	2,985	-
4b.1.2.26	Safety Injection	-	902	230	137	-	694	-	443	2,405	2,405	-	-	-	10,622	-	-	-	537,761	13,820	-
4b.1.2.27	Station Air RCA	-	37	5	2	-	11	-	13	68	68	-	-	-	169	-	-	-	8,811	531	-
4b.1.2.28	Station Heating RCA	-	124	31	16	-	81	-	57	309	309	-	-	-	1,209	-	-	-	63,061	1,826	-
4b.1.2.29	Waste Oil Sumps RCA	-	7	1	1	-	3	-	3	15	15	-	-	-	50	-	-	-	2,602	95	-
4b.1.2	Totals	-	13,572	2,048	1,223	-	6,174	-	4,955	27,973	23,724	-	4,250	-	92,495	-	-	-	4,786,121	205,305	-
4b.1.3	Scaffolding in support of decommissioning	-	1,633	13	7	-	36	-	420	2,108	2,108	-	-	-	539	-	-	-	27,981	27,151	-
Decontamination of Site Buildings																					
4b.1.4.1	Reactor	2,018	1,452	217	339	-	1,358	-	1,784	7,169	7,169	-	-	-	24,850	-	-	-	1,271,867	50,421	-
4b.1.4.2	Auxiliary Building	202	110	20	17	-	69	-	150	567	567	-	-	-	1,101	-	-	-	63,260	4,568	-
4b.1.4.3	Refueling Water Storage Tank	367	428	38	17	-	83	-	318	1,253	1,253	-	-	-	1,240	-	-	-	67,351	11,972	-
4b.1.4	Totals	2,587	1,990	275	373	-	1,510	-	2,252	8,988	8,988	-	-	-	27,192	-	-	-	1,402,477	66,961	-
4b.1	Subtotal Period 4b Activity Costs	2,587	17,195	2,337	1,603	-	7,721	-	7,627	39,070	34,820	-	4,250	-	120,226	-	-	-	6,216,579	299,417	-
Period 4b Additional Costs																					
4b.2.1	License Termination Survey Planning	-	-	-	-	-	-	993	298	1,291	1,291	-	-	-	-	-	-	-	-	-	6,240
4b.2.2	Remedial Action Surveys	-	-	-	-	-	-	2,923	877	3,800	3,800	-	-	-	-	-	-	-	-	46,072	-
4b.2.3	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
4b.2.4	License Termination ISFSI	-	450	197	274	-	893	1,213	757	3,783	3,783	-	-	-	14,543	-	-	-	1,178,711	7,043	7,144
4b.2.5	Underground Services Excavation	-	506	-	-	-	-	-	76	581	581	-	-	-	-	-	-	-	-	2,755	-
4b.2	Subtotal Period 4b Additional Costs	-	955	197	274	-	893	5,179	2,015	9,513	9,513	-	-	-	14,543	-	-	-	1,178,711	55,869	13,384
Period 4b Collateral Costs																					
4b.3.1	Process decommissioning water waste	13	-	15	39	-	50	-	26	143	143	-	-	-	142	-	-	-	8,523	28	-
4b.3.3	Small tool allowance	-	329	-	-	-	-	-	49	379	379	-	-	-	-	-	-	-	-	-	-
4b.3.4	Decommissioning Equipment Disposition	-	-	171	94	-	472	-	149	887	887	-	-	-	7,054	-	-	-	366,237	88	-
4b.3	Subtotal Period 4b Collateral Costs	13	329	186	133	-	522	-	225	1,408	1,408	-	-	-	7,196	-	-	-	374,761	116	-
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	730	-	-	-	-	-	-	183	913	913	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	1,155	116	1,271	1,271	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	1,107	111	1,218	1,218	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	2,591	-	-	-	-	-	648	3,238	3,238	-	-	-	-	-	-	-	-	-	-

Table D-1
Byron Nuclear Power Station, Unit 1
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 4b Period-Dependent Costs (continued)																					
4b.4.5	Heavy equipment rental	-	4,459	-	-	-	-	-	669	5,128	5,128	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	91	49	-	276	-	85	501	501	-	-	-	4,309	-	-	-	86,182	141	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	2,956	443	3,400	3,400	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	1,338	134	1,472	1,472	-	-	-	-	-	-	-	-	-	-
4b.4.9	Site O&M Cost	-	-	-	-	-	-	366	55	420	420	-	-	-	-	-	-	-	-	-	-
4b.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	889	133	1,022	1,022	-	-	-	-	-	-	-	-	-	-
4b.4.11	Security Staff Cost	-	-	-	-	-	-	1,328	199	1,527	1,527	-	-	-	-	-	-	-	-	-	25,426
4b.4.12	DOC Staff Cost	-	-	-	-	-	-	16,578	2,487	19,065	19,065	-	-	-	-	-	-	-	-	-	217,274
4b.4.13	Utility Staff Cost	-	-	-	-	-	-	27,981	4,197	32,178	32,178	-	-	-	-	-	-	-	-	-	388,320
4b.4	Subtotal Period 4b Period-Dependent Costs	730	7,050	91	49	-	276	53,698	9,459	71,353	71,353	-	-	-	4,309	-	-	-	86,182	141	631,020
4b.0	TOTAL PERIOD 4b COST	3,330	25,529	2,811	2,059	-	9,412	58,877	19,326	121,344	117,094	-	4,250	-	146,274	-	-	-	7,856,233	355,543	644,404
PERIOD 4e - Delay before License Termination																					
Period 4e Period-Dependent Costs																					
4e.4.1	Insurance	-	-	-	-	-	-	775	78	853	853	-	-	-	-	-	-	-	-	-	-
4e.4.2	Property taxes	-	-	-	-	-	-	743	74	818	818	-	-	-	-	-	-	-	-	-	-
4e.4.3	Health physics supplies	-	132	-	-	-	-	-	33	165	165	-	-	-	-	-	-	-	-	-	-
4e.4.4	Disposal of DAW generated	-	-	3	2	-	9	-	3	17	17	-	-	-	148	-	-	-	2,966	5	-
4e.4.6	NRC Fees	-	-	-	-	-	-	377	38	415	415	-	-	-	-	-	-	-	-	-	-
4e.4.7	Site O&M Cost	-	-	-	-	-	-	245	37	282	282	-	-	-	-	-	-	-	-	-	-
4e.4.8	Utility Staff Cost	-	-	-	-	-	-	1,494	224	1,718	1,718	-	-	-	-	-	-	-	-	-	21,720
4e.4	Subtotal Period 4e Period-Dependent Costs	-	132	3	2	-	9	3,635	486	4,268	4,268	-	-	-	148	-	-	-	2,966	5	21,720
4e.0	TOTAL PERIOD 4e COST	-	132	3	2	-	9	3,635	486	4,268	4,268	-	-	-	148	-	-	-	2,966	5	21,720
PERIOD 4f - License Termination																					
Period 4f Direct Decommissioning Activities																					
4f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
4f.1.2	Terminate license									a											
4f.1	Subtotal Period 4f Activity Costs	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
Period 4f Additional Costs																					
4f.2.1	License Termination Survey	-	-	-	-	-	-	6,411	1,923	8,334	8,334	-	-	-	-	-	-	-	-	91,892	3,120
4f.2	Subtotal Period 4f Additional Costs	-	-	-	-	-	-	6,411	1,923	8,334	8,334	-	-	-	-	-	-	-	-	91,892	3,120
Period 4f Collateral Costs																					
4f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,080	162	1,242	1,242	-	-	-	-	-	-	-	-	-	-
4f.3	Subtotal Period 4f Collateral Costs	-	-	-	-	-	-	1,080	162	1,242	1,242	-	-	-	-	-	-	-	-	-	-
Period 4f Period-Dependent Costs																					
4f.4.1	Insurance	-	-	-	-	-	-	393	39	432	432	-	-	-	-	-	-	-	-	-	-
4f.4.2	Property taxes	-	-	-	-	-	-	376	38	414	414	-	-	-	-	-	-	-	-	-	-
4f.4.3	Health physics supplies	-	546	-	-	-	-	-	137	683	683	-	-	-	-	-	-	-	-	-	-
4f.4.4	Disposal of DAW generated	-	-	7	4	-	21	-	7	39	39	-	-	-	335	-	-	-	6,698	11	-
4f.4.5	Plant energy budget	-	-	-	-	-	-	268	40	308	308	-	-	-	-	-	-	-	-	-	-
4f.4.6	NRC Fees	-	-	-	-	-	-	455	46	501	501	-	-	-	-	-	-	-	-	-	-
4f.4.7	Site O&M Cost	-	-	-	-	-	-	124	19	143	143	-	-	-	-	-	-	-	-	-	-
4f.4.8	Security Staff Cost	-	-	-	-	-	-	684	103	787	787	-	-	-	-	-	-	-	-	-	11,786
4f.4.9	DOC Staff Cost	-	-	-	-	-	-	3,919	588	4,507	4,507	-	-	-	-	-	-	-	-	-	46,750
4f.4.10	Utility Staff Cost	-	-	-	-	-	-	4,776	716	5,493	5,493	-	-	-	-	-	-	-	-	-	56,964
4f.4	Subtotal Period 4f Period-Dependent Costs	-	546	7	4	-	21	10,996	1,731	13,306	13,306	-	-	-	335	-	-	-	6,698	11	115,500
4f.0	TOTAL PERIOD 4f COST	-	546	7	4	-	21	18,659	3,868	23,106	23,106	-	-	-	335	-	-	-	6,698	91,902	118,620
PERIOD 4 TOTALS		3,862	55,553	22,122	13,741	-	63,576	142,527	63,175	364,556	355,555	-	9,001	-	463,880	1,127	393	2,217	26,070,970	735,558	1,494,982

Table D-1
Byron Nuclear Power Station, Unit 1
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	Reactor	-	7,213	-	-	-	-	-	1,082	8,294	-	-	8,294	-	-	-	-	-	-	69,541	-
5b.1.1.2	Auxiliary Building	-	6,230	-	-	-	-	-	934	7,164	-	-	7,164	-	-	-	-	-	-	61,288	-
5b.1.1.3	Old Steam Generator Storage Facility	-	490	-	-	-	-	-	74	564	-	-	564	-	-	-	-	-	-	4,868	-
5b.1.1.4	Refueling Water Storage Tank	-	1,099	-	-	-	-	-	165	1,263	-	-	1,263	-	-	-	-	-	-	11,688	-
5b.1.1.5	Turbine Building	-	6,069	-	-	-	-	-	910	6,979	-	-	6,979	-	-	-	-	-	-	70,347	-
5b.1.1.6	Turbine Pedestal	-	1,463	-	-	-	-	-	219	1,682	-	-	1,682	-	-	-	-	-	-	12,628	-
5b.1.1	Totals	-	22,563	-	-	-	-	-	3,384	25,947	-	-	25,947	-	-	-	-	-	-	230,359	-
Site Closeout Activities																					
5b.1.2	Grade & landscape site	-	345	-	-	-	-	-	52	397	-	-	397	-	-	-	-	-	-	869	-
5b.1.3	Final report to NRC	-	-	-	-	-	-	199	30	228	228	-	-	-	-	-	-	-	-	-	1,560
5b.1	Subtotal Period 5b Activity Costs	-	22,908	-	-	-	-	199	3,466	26,572	228	-	26,344	-	-	-	-	-	-	231,229	1,560
Period 5b Additional Costs																					
5b.2.1	Site Restoration ISFSI	-	645	-	-	-	-	28	101	774	-	-	774	-	-	-	-	-	-	6,477	80
5b.2.2	Concrete Crushing	-	607	-	-	-	-	4	92	702	-	-	702	-	-	-	-	-	-	2,798	-
5b.2.3	Demolish Cooling Tower	-	5,877	-	-	-	-	165	906	6,948	-	-	6,948	-	-	-	-	-	-	73,296	-
5b.2	Subtotal Period 5b Additional Costs	-	7,129	-	-	-	-	196	1,099	8,423	-	-	8,423	-	-	-	-	-	-	82,571	80
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	308	-	-	-	-	-	46	355	-	-	355	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	308	-	-	-	-	-	46	355	-	-	355	-	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																					
5b.4.2	Property taxes	-	-	-	-	-	-	1,239	124	1,363	-	-	1,363	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	7,086	-	-	-	-	-	1,063	8,149	-	-	8,149	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	441	66	507	-	-	507	-	-	-	-	-	-	-	-
5b.4.5	Site O&M Cost	-	-	-	-	-	-	409	61	470	-	-	470	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	2,015	302	2,317	-	-	2,317	-	-	-	-	-	-	-	34,287
5b.4.7	DOC Staff Cost	-	-	-	-	-	-	11,965	1,795	13,760	-	-	13,760	-	-	-	-	-	-	-	137,043
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	5,873	881	6,754	-	-	6,754	-	-	-	-	-	-	-	67,229
5b.4	Subtotal Period 5b Period-Dependent Costs	-	7,086	-	-	-	-	21,942	4,292	33,321	-	-	33,321	-	-	-	-	-	-	-	238,558
5b.0	TOTAL PERIOD 5b COST	-	37,431	-	-	-	-	22,337	8,903	68,671	228	-	68,443	-	-	-	-	-	-	313,799	240,198
PERIOD 5 TOTALS		-	37,431	-	-	-	-	22,337	8,903	68,671	228	-	68,443	-	-	-	-	-	-	313,799	240,198
TOTAL COST TO DECOMMISSION		**9,415**	**102,339**	**22,482**	**14,384**	**-**	**64,744**	**621,969**	**140,403**	**975,737**	**592,143**	**304,536**	**79,057**	**-**	**473,020**	**1,127**	**393**	**2,217**	**26,334,990**	**1,136,763**	**5,573,505**

TOTAL COST TO DECOMMISSION WITH 16.81% CONTINGENCY:	**$975,737**	**thousands of 2014 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 60.69% OR:	**$592,143**	**thousands of 2014 dollars**
SPENT FUEL MANAGEMENT COST IS 31.21% OR:	**$304,536**	**thousands of 2014 dollars**
NON-NUCLEAR DEMOLITION COST IS 8.1% OR:	**$79,057**	**thousands of 2014 dollars**
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	**474,539**	**cubic feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**2,217**	**cubic feet**
TOTAL SCRAP METAL REMOVED:	**56,010**	**tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,136,763**	**man-hours**

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

Table D-2
Byron Nuclear Power Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	481	144	625	625	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	71	11	81	81	-	-	-	-	-	-	-	-	-	556
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	-	-	-	-	-	-	109	16	125	125	-	-	-	-	-	-	-	-	-	856
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	71	11	81	81	-	-	-	-	-	-	-	-	-	556
1a.1.9	Perform detailed rad survey									a											
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	54	8	63	63	-	-	-	-	-	-	-	-	-	428
1a.1.11	End product description	-	-	-	-	-	-	54	8	63	63	-	-	-	-	-	-	-	-	-	428
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	82	12	94	94	-	-	-	-	-	-	-	-	-	642
1a.1.13	Define major work sequence	-	-	-	-	-	-	54	8	63	63	-	-	-	-	-	-	-	-	-	428
1a.1.14	Perform SER and EA	-	-	-	-	-	-	169	25	194	194	-	-	-	-	-	-	-	-	-	1,327
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	272	41	313	313	-	-	-	-	-	-	-	-	-	2,140
Activity Specifications																					
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	268	40	308	308	-	-	-	-	-	-	-	-	-	2,106
1a.1.16.2	Plant systems	-	-	-	-	-	-	227	34	261	261	-	-	-	-	-	-	-	-	-	1,783
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	170	26	196	196	-	-	-	-	-	-	-	-	-	1,335
1a.1.16.4	Waste management	-	-	-	-	-	-	109	16	125	125	-	-	-	-	-	-	-	-	-	856
1a.1.16.5	Facility and site dormancy	-	-	-	-	-	-	109	16	125	125	-	-	-	-	-	-	-	-	-	856
1a.1.16	Total	-	-	-	-	-	-	883	132	1,016	1,016	-	-	-	-	-	-	-	-	-	6,936
Detailed Work Procedures																					
1a.1.17.1	Plant systems	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	506
1a.1.17.2	Facility closeout & dormancy	-	-	-	-	-	-	65	10	75	75	-	-	-	-	-	-	-	-	-	514
1a.1.17	Total	-	-	-	-	-	-	130	19	149	149	-	-	-	-	-	-	-	-	-	1,020
1a.1.18	Procure vacuum drying system	-	-	-	-	-	-	5	1	6	6	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	2,436	438	2,874	2,874	-	-	-	-	-	-	-	-	-	15,361
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,855	185	2,040	2,040	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	494	-	-	-	-	-	124	618	618	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	530	-	-	-	-	-	80	610	610	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	13	7	-	39	-	12	71	71	-	-	-	611	-	-	-	12,224	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,783	267	2,051	2,051	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	836	84	920	920	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	2,177	218	2,394	-	2,394	-	-	-	-	-	-	-	-	-
1a.4.9	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	397	59	456	-	456	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	48	7	55	-	55	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	8,569	1,285	9,855	9,855	-	-	-	-	-	-	-	-	-	157,903
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	32,368	4,855	37,223	37,223	-	-	-	-	-	-	-	-	-	424,560
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,025	13	7	-	39	48,198	7,202	56,483	53,577	2,906	-	-	611	-	-	-	12,224	20	582,463
1a.0	TOTAL PERIOD 1a COST	-	1,025	13	7	-	39	50,634	7,639	59,357	56,451	2,906	-	-	611	-	-	-	12,224	20	597,824
PERIOD 1b - SAFSTOR Limited DECON Activities																					
Period 1b Direct Decommissioning Activities																					
Decontamination of Site Buildings																					
1b.1.1.1	Reactor	2,223	-	-	-	-	-	-	1,111	3,334	3,334	-	-	-	-	-	-	-	-	33,093	-
1b.1.1.2	Auxiliary Building	256	-	-	-	-	-	-	128	384	384	-	-	-	-	-	-	-	-	3,830	-
1b.1.1.3	Radwaste/Service Building	167	-	-	-	-	-	-	83	250	250	-	-	-	-	-	-	-	-	2,506	-
1b.1.1.4	Refueling Water Storage Tank	366	-	-	-	-	-	-	183	549	549	-	-	-	-	-	-	-	-	5,322	-
1b.1.1.5	Fuel Handling Building	1,046	-	-	-	-	-	-	523	1,569	1,569	-	-	-	-	-	-	-	-	15,238	-

Table D-2
Byron Nuclear Power Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
1b.1.1	Totals	4,058	-	-	-	-	-	-	2,029	6,086	6,086	-	-	-	-	-	-	-	-	59,990	-
1b.1	Subtotal Period 1b Activity Costs	4,058	-	-	-	-	-	-	2,029	6,086	6,086	-	-	-	-	-	-	-	-	59,990	-
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	886	-	-	-	-	-	-	133	1,019	1,019	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process decommissioning water waste	200	-	131	349	-	443	-	276	1,399	1,399	-	-	-	1,262	-	-	-	75,709	246	-
1b.3.4	Small tool allowance	-	67	-	-	-	-	-	10	77	77	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	1,086	67	131	349	-	443	-	419	2,495	2,495	-	-	-	1,262	-	-	-	75,709	246	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	816	-	-	-	-	-	-	204	1,020	1,020	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	234	23	258	258	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	4,112	411	4,524	4,524	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	398	-	-	-	-	-	100	498	498	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	132	-	-	-	-	-	20	152	152	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	12	7	-	37	-	12	68	68	-	-	-	585	-	-	-	11,700	19	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	443	67	510	510	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	116	12	128	128	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	541	54	595	-	595	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Cost	-	-	-	-	-	-	41	6	47	47	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	99	15	113	-	113	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	12	2	14	-	14	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	2,131	320	2,450	2,450	-	-	-	-	-	-	-	-	-	39,260
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	8,048	1,207	9,255	9,255	-	-	-	-	-	-	-	-	-	105,560
1b.4	Subtotal Period 1b Period-Dependent Costs	816	530	12	7	-	37	15,777	2,451	19,631	18,908	722	-	-	585	-	-	-	11,700	19	144,820
1b.0	TOTAL PERIOD 1b COST	5,960	597	143	356	-	480	15,777	4,899	28,212	27,490	722	-	-	1,847	-	-	-	87,408	60,255	144,820
PERIOD 1c - Preparations for SAFSTOR Dormancy																					
Period 1c Direct Decommissioning Activities																					
1c.1.1	Prepare support equipment for storage	-	487	-	-	-	-	-	73	561	561	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	48	-	-	-	-	-	7	56	56	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	10,874	-
1c.1.4	Secure building accesses									a											
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	32	5	37	37	-	-	-	-	-	-	-	-	-	250
1c.1	Subtotal Period 1c Activity Costs	-	536	-	-	-	-	765	305	1,606	1,606	-	-	-	-	-	-	-	-	14,574	250
Period 1c Additional Costs																					
1c.2.1	Spent fuel pool isolation	-	-	-	-	-	-	10,813	1,622	12,434	12,434	-	-	-	-	-	-	-	-	-	-
1c.2	Subtotal Period 1c Additional Costs	-	-	-	-	-	-	10,813	1,622	12,434	12,434	-	-	-	-	-	-	-	-	-	-
Period 1c Collateral Costs																					
1c.3.1	Process decommissioning water waste	236	-	155	414	-	525	-	327	1,658	1,658	-	-	-	1,496	-	-	-	89,742	292	-
1c.3.3	Small tool allowance	-	4	-	-	-	-	-	1	5	5	-	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	236	4	155	414	-	525	-	328	1,663	1,663	-	-	-	1,496	-	-	-	89,742	292	-
Period 1c Period-Dependent Costs																					
1c.4.1	Insurance	-	-	-	-	-	-	234	23	258	258	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	4,112	411	4,524	4,524	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	191	-	-	-	-	-	48	239	239	-	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	132	-	-	-	-	-	20	152	152	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	3	2	-	10	-	3	18	18	-	-	-	152	-	-	-	3,039	5	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	443	67	510	510	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	116	12	128	128	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	541	54	595	-	595	-	-	-	-	-	-	-	-	-
1c.4.9	Site O&M Cost	-	-	-	-	-	-	41	6	47	47	-	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	99	15	113	-	113	-	-	-	-	-	-	-	-	-
1c.4.11	ISFSI Operating Costs	-	-	-	-	-	-	12	2	14	-	14	-	-	-	-	-	-	-	-	-
1c.4.12	Security Staff Cost	-	-	-	-	-	-	2,131	320	2,450	2,450	-	-	-	-	-	-	-	-	-	39,260
1c.4.13	Utility Staff Cost	-	-	-	-	-	-	8,048	1,207	9,255	9,255	-	-	-	-	-	-	-	-	-	105,560
1c.4	Subtotal Period 1c Period-Dependent Costs	-	323	3	2	-	10	15,777	2,187	18,301	17,579	722	-	-	152	-	-	-	3,039	5	144,820
1c.0	TOTAL PERIOD 1c COST	236	863	158	416	-	535	27,355	4,442	34,004	33,282	722	-	-	1,648	-	-	-	92,781	14,870	145,070

Table D-2
Byron Nuclear Power Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1 TOTALS		6,196	2,484	315	779	-	1,054	93,766	16,980	121,573	117,223	4,351	-	-	4,106	-	-	-	192,413	75,145	887,713
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	-	-	-	-	-	-	363	54	417	417	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	2,917	729	3,646	3,646	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	3,279	784	4,063	4,063	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																					
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	11,750	1,763	13,513	-	13,513	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	11,750	1,763	13,513	-	13,513	-	-	-	-	-	-	-	-	-
Period 2a Period-Dependent Costs																					
2a.4.1	Insurance	-	-	-	-	-	-	12,069	1,207	13,276	12,039	1,237	-	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	35,973	3,597	39,570	39,570	-	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	3,889	-	-	-	-	-	972	4,861	4,861	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	93	50	-	284	-	88	515	515	-	-	-	4,426	-	-	-	88,527	144	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	7,468	1,120	8,588	4,294	4,294	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	5,581	558	6,139	6,139	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	39,868	3,987	43,854	-	43,854	-	-	-	-	-	-	-	-	-
2a.4.8	Site O&M Cost	-	-	-	-	-	-	3,464	520	3,983	3,983	-	-	-	-	-	-	-	-	-	-
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	8,305	1,246	9,551	-	9,551	-	-	-	-	-	-	-	-	-
2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	1,002	150	1,153	-	1,153	-	-	-	-	-	-	-	-	-
2a.4.11	Security Staff Cost	-	-	-	-	-	-	64,269	9,640	73,910	23,596	50,314	-	-	-	-	-	-	-	-	1,166,242
2a.4.12	Utility Staff Cost	-	-	-	-	-	-	80,303	12,046	92,349	22,995	69,354	-	-	-	-	-	-	-	-	1,029,166
2a.4	Subtotal Period 2a Period-Dependent Costs	-	3,889	93	50	-	284	258,303	35,131	297,749	117,992	179,757	-	-	4,426	-	-	-	88,527	144	2,195,408
2a.0	TOTAL PERIOD 2a COST	-	3,889	93	50	-	284	273,332	37,677	315,325	122,055	193,270	-	-	4,426	-	-	-	88,527	144	2,195,408
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	-	-	-	-	-	-	29	4	33	33	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	232	58	290	290	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	261	62	323	323	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	3,813	572	4,384	-	4,384	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	3,813	572	4,384	-	4,384	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	871	87	958	958	-	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	835	84	919	919	-	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	152	-	-	-	-	-	38	191	191	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	4	2	-	11	-	3	20	20	-	-	-	173	-	-	-	3,453	6	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	297	45	342	342	-	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	427	43	470	470	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	3,173	317	3,490	-	3,490	-	-	-	-	-	-	-	-	-
2b.4.8	Site O&M Cost	-	-	-	-	-	-	276	41	317	317	-	-	-	-	-	-	-	-	-	-
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	80	12	92	-	92	-	-	-	-	-	-	-	-	-
2b.4.10	Security Staff Cost	-	-	-	-	-	-	2,726	409	3,134	1,878	1,256	-	-	-	-	-	-	-	-	47,057
2b.4.11	Utility Staff Cost	-	-	-	-	-	-	2,638	396	3,033	1,830	1,203	-	-	-	-	-	-	-	-	34,857
2b.4	Subtotal Period 2b Period-Dependent Costs	-	152	4	2	-	11	11,323	1,475	12,966	6,925	6,042	-	-	173	-	-	-	3,453	6	81,914
2b.0	TOTAL PERIOD 2b COST	-	152	4	2	-	11	15,396	2,109	17,674	7,248	10,426	-	-	173	-	-	-	3,453	6	81,914

Table D-2
Byron Nuclear Power Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 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	-	-	-	-	-	-	17	3	20	20	-	-	-	-	-	-	-	-	-	-
2c.1.5	Maintenance supplies	-	-	-	-	-	-	140	35	175	175	-	-	-	-	-	-	-	-	-	-
2c.1	Subtotal Period 2c Activity Costs	-	-	-	-	-	-	157	38	195	195	-	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	526	53	578	578	-	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	504	50	554	554	-	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	89	-	-	-	-	-	22	111	111	-	-	-	-	-	-	-	-	-	-
2c.4.4	Disposal of DAW generated	-	-	2	1	-	6	-	2	12	12	-	-	-	100	-	-	-	1,995	3	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	179	27	206	206	-	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	248	25	273	273	-	-	-	-	-	-	-	-	-	-
2c.4.7	Site O&M Cost	-	-	-	-	-	-	166	25	191	191	-	-	-	-	-	-	-	-	-	-
2c.4.8	Security Staff Cost	-	-	-	-	-	-	985	148	1,133	1,133	-	-	-	-	-	-	-	-	-	15,771
2c.4.9	Utility Staff Cost	-	-	-	-	-	-	960	144	1,104	1,104	-	-	-	-	-	-	-	-	-	13,416
2c.4	Subtotal Period 2c Period-Dependent Costs	-	89	2	1	-	6	3,568	496	4,163	4,163	-	-	-	100	-	-	-	1,995	3	29,188
2c.0	TOTAL PERIOD 2c COST	-	89	2	1	-	6	3,726	533	4,358	4,358	-	-	-	100	-	-	-	1,995	3	29,188
PERIOD 2 TOTALS		-	4,130	99	53	-	301	292,454	40,319	337,357	133,661	203,696	-	-	4,699	-	-	-	93,974	153	2,306,509
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	71	11	81	81	-	-	-	-	-	-	-	-	-	556
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	251	38	288	288	-	-	-	-	-	-	-	-	-	1,969
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	54	8	63	63	-	-	-	-	-	-	-	-	-	428
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	71	11	81	81	-	-	-	-	-	-	-	-	-	556
3a.1.6	Define major work sequence	-	-	-	-	-	-	409	61	470	470	-	-	-	-	-	-	-	-	-	3,210
3a.1.7	Perform SER and EA	-	-	-	-	-	-	169	25	194	194	-	-	-	-	-	-	-	-	-	1,327
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	272	41	313	313	-	-	-	-	-	-	-	-	-	2,140
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	223	33	257	257	-	-	-	-	-	-	-	-	-	1,753
3a.1.10	Receive NRC approval of termination plan									a											
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	402	60	462	416	-	46	-	-	-	-	-	-	-	3,154
3a.1.11.2	Plant systems	-	-	-	-	-	-	227	34	261	235	-	26	-	-	-	-	-	-	-	1,783
3a.1.11.3	Reactor internals	-	-	-	-	-	-	387	58	445	445	-	-	-	-	-	-	-	-	-	3,039
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	354	53	407	407	-	-	-	-	-	-	-	-	-	2,782
3a.1.11.5	Biological shield	-	-	-	-	-	-	27	4	31	31	-	-	-	-	-	-	-	-	-	214
3a.1.11.6	Steam generators	-	-	-	-	-	-	170	26	196	196	-	-	-	-	-	-	-	-	-	1,335
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	87	13	100	50	-	50	-	-	-	-	-	-	-	685
3a.1.11.8	Main Turbine	-	-	-	-	-	-	22	3	25	-	-	25	-	-	-	-	-	-	-	171
3a.1.11.9	Main Condensers	-	-	-	-	-	-	22	3	25	-	-	25	-	-	-	-	-	-	-	171
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	170	26	196	98	-	98	-	-	-	-	-	-	-	1,335
3a.1.11.11	Waste management	-	-	-	-	-	-	251	38	288	288	-	-	-	-	-	-	-	-	-	1,969
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-	49	7	56	28	-	28	-	-	-	-	-	-	-	385
3a.1.11	Total	-	-	-	-	-	-	2,168	325	2,493	2,194	-	299	-	-	-	-	-	-	-	17,024
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	131	20	150	150	-	-	-	-	-	-	-	-	-	1,027
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	3,000	450	3,450	3,450	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	76	11	88	88	-	-	-	-	-	-	-	-	-	599
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,300	345	2,645	2,645	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	67	10	77	77	-	-	-	-	-	-	-	-	-	526
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	9,262	1,389	10,651	10,353	-	299	-	-	-	-	-	-	-	31,117
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	521	52	573	573	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	500	50	550	550	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	409	-	-	-	-	-	102	511	511	-	-	-	-	-	-	-	-	-	-

Table D-2
Byron Nuclear Power Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 3a Period-Dependent Costs (continued)																					
3a.4.4	Heavy equipment rental	-	529	-	-	-	-	-	79	608	608	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	10	5	-	31	-	10	56	56	-	-	-	481	-	-	-	9,613	16	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	1,778	267	2,045	2,045	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	332	33	366	366	-	-	-	-	-	-	-	-	-	-
3a.4.8	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
3a.4.9	Security Staff Cost	-	-	-	-	-	-	327	49	376	376	-	-	-	-	-	-	-	-	-	6,257
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	14,339	2,151	16,490	16,490	-	-	-	-	-	-	-	-	-	200,229
3a.4	Subtotal Period 3a Period-Dependent Costs	-	938	10	5	-	31	17,963	2,818	21,765	21,765	-	-	-	481	-	-	-	9,613	16	206,486
3a.0	TOTAL PERIOD 3a COST	-	938	10	5	-	31	27,225	4,207	32,416	32,117	-	299	-	481	-	-	-	9,613	16	237,603
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	258	39	297	267	-	30	-	-	-	-	-	-	-	2,026
3b.1.1.2	Reactor internals	-	-	-	-	-	-	136	20	157	157	-	-	-	-	-	-	-	-	-	1,070
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	74	11	85	21	-	63	-	-	-	-	-	-	-	578
3b.1.1.4	CRD cooling assembly	-	-	-	-	-	-	54	8	63	63	-	-	-	-	-	-	-	-	-	428
3b.1.1.5	CRD housings & ICI tubes	-	-	-	-	-	-	54	8	63	63	-	-	-	-	-	-	-	-	-	428
3b.1.1.6	Incore instrumentation	-	-	-	-	-	-	54	8	63	63	-	-	-	-	-	-	-	-	-	428
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	198	30	227	227	-	-	-	-	-	-	-	-	-	1,554
3b.1.1.8	Facility closeout	-	-	-	-	-	-	65	10	75	38	-	38	-	-	-	-	-	-	-	514
3b.1.1.9	Missile shields	-	-	-	-	-	-	25	4	28	28	-	-	-	-	-	-	-	-	-	193
3b.1.1.10	Biological shield	-	-	-	-	-	-	65	10	75	75	-	-	-	-	-	-	-	-	-	514
3b.1.1.11	Steam generators	-	-	-	-	-	-	251	38	288	288	-	-	-	-	-	-	-	-	-	1,969
3b.1.1.12	Reinforced concrete	-	-	-	-	-	-	54	8	63	31	-	31	-	-	-	-	-	-	-	428
3b.1.1.13	Main Turbine	-	-	-	-	-	-	85	13	98	-	-	98	-	-	-	-	-	-	-	668
3b.1.1.14	Main Condensers	-	-	-	-	-	-	85	13	98	-	-	98	-	-	-	-	-	-	-	668
3b.1.1.15	Auxiliary building	-	-	-	-	-	-	149	22	171	154	-	17	-	-	-	-	-	-	-	1,168
3b.1.1.16	Reactor building	-	-	-	-	-	-	149	22	171	154	-	17	-	-	-	-	-	-	-	1,168
3b.1.1	Total	-	-	-	-	-	-	1,757	264	2,021	1,629	-	392	-	-	-	-	-	-	-	13,800
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	1,757	264	2,021	1,629	-	392	-	-	-	-	-	-	-	13,800
Period 3b Additional Costs																					
3b.2.1	Site Characterization	-	-	-	-	-	-	2,755	827	3,582	3,582	-	-	-	-	-	-	-	-	13,042	4,640
3b.2	Subtotal Period 3b Additional Costs	-	-	-	-	-	-	2,755	827	3,582	3,582	-	-	-	-	-	-	-	-	13,042	4,640
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	886	-	-	-	-	-	-	133	1,019	1,019	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,080	162	1,242	1,242	-	-	-	-	-	-	-	-	-	-
3b.3.3	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	886	1,100	-	-	-	-	1,080	460	3,526	3,526	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	27	-	-	-	-	-	-	7	34	34	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	263	26	289	289	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	252	25	277	277	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	222	-	-	-	-	-	56	278	278	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	267	-	-	-	-	-	40	307	307	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	6	3	-	17	-	5	31	31	-	-	-	267	-	-	-	5,344	9	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	896	134	1,031	1,031	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	168	17	184	184	-	-	-	-	-	-	-	-	-	-
3b.4.9	Site O&M Cost	-	-	-	-	-	-	83	12	96	96	-	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	165	25	189	189	-	-	-	-	-	-	-	-	-	3,154
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	3,437	516	3,953	3,953	-	-	-	-	-	-	-	-	-	43,109
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	7,229	1,084	8,313	8,313	-	-	-	-	-	-	-	-	-	100,937
3b.4	Subtotal Period 3b Period-Dependent Costs	27	489	6	3	-	17	12,493	1,947	14,982	14,982	-	-	-	267	-	-	-	5,344	9	147,200
3b.0	TOTAL PERIOD 3b COST	914	1,589	6	3	-	17	18,085	3,498	24,111	23,719	-	392	-	267	-	-	-	5,344	13,051	165,640
PERIOD 3 TOTALS		914	2,527	16	8	-	48	45,309	7,705	56,526	55,836	-	690	-	748	-	-	-	14,956	13,066	403,242

Table D-2
Byron Nuclear Power Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Reactor Coolant Piping	43	151	34	37	-	252	-	131	648	648	-	-	-	1,708	-	-	-	195,190	2,979	-
4a.1.1.2	Pressurizer Relief Tank	8	30	7	7	-	47	-	25	125	125	-	-	-	329	-	-	-	36,553	596	-
4a.1.1.3	Reactor Coolant Pumps & Motors	29	108	79	198	-	1,390	-	426	2,230	2,230	-	-	-	4,796	-	-	-	780,540	2,726	80
4a.1.1.4	Pressurizer	12	69	368	106	-	879	-	296	1,731	1,731	-	-	-	3,033	-	-	-	240,915	1,527	750
4a.1.1.5	Steam Generators	98	4,496	1,591	2,916	-	10,319	-	4,349	23,769	23,769	-	-	-	62,044	-	-	-	3,098,575	20,508	2,250
4a.1.1.6	CRDMs/ICIs/Service Structure Removal	41	301	230	47	-	188	-	173	979	979	-	-	-	3,881	-	-	-	145,494	5,232	-
4a.1.1.7	Reactor Vessel Internals	93	2,899	6,520	1,058	-	4,995	290	6,656	22,511	22,511	-	-	-	1,835	1,127	393	-	328,507	27,350	1,226
4a.1.1.8	Vessel & Internals GTCC Disposal	-	-	-	-	-	11,996	-	1,799	13,795	13,795	-	-	-	-	-	-	2,217	433,180	-	-
4a.1.1.9	Reactor Vessel	115	5,075	2,149	1,140	-	2,832	290	6,146	17,747	17,747	-	-	-	9,331	-	-	-	960,579	27,350	1,226
4a.1.1	Totals	438	13,130	10,978	5,508	-	32,898	580	20,002	83,534	83,534	-	-	-	86,956	1,127	393	2,217	6,219,533	88,269	5,532
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	603	3,092	1,094	-	3,337	-	1,458	9,584	9,584	-	-	-	57,484	-	-	-	2,984,647	9,146	-
4a.1.3	Main Condensers	-	1,204	1,828	998	-	5,039	-	1,893	10,963	10,963	-	-	-	75,240	-	-	-	3,906,532	18,250	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor	-	1,250	-	-	-	-	-	188	1,438	1,438	-	-	-	-	-	-	-	-	12,130	-
4a.1.4.2	Auxiliary Building	-	702	-	-	-	-	-	105	807	807	-	-	-	-	-	-	-	-	6,896	-
4a.1.4.3	Radwaste/Service Building	-	456	-	-	-	-	-	68	525	525	-	-	-	-	-	-	-	-	5,060	-
4a.1.4.4	Refueling Water Storage Tank	-	122	-	-	-	-	-	18	140	140	-	-	-	-	-	-	-	-	1,299	-
4a.1.4.5	Fuel Handling Building	-	360	-	-	-	-	-	54	414	414	-	-	-	-	-	-	-	-	3,690	-
4a.1.4	Totals	-	2,890	-	-	-	-	-	434	3,324	3,324	-	-	-	-	-	-	-	-	29,074	-
Disposal of Plant Systems																					
4a.1.5.1	Auxiliary Feedwater	-	256	41	24	-	120	-	102	543	543	-	-	-	1,791	-	-	-	93,271	3,811	-
4a.1.5.2	Auxiliary Steam	-	134	-	-	-	-	-	20	154	-	-	154	-	-	-	-	-	-	2,107	-
4a.1.5.3	Auxiliary Steam RCA	-	368	69	36	-	183	-	150	805	805	-	-	-	2,714	-	-	-	141,487	5,387	-
4a.1.5.4	Boric Acid Processing	-	481	82	47	-	238	-	195	1,042	1,042	-	-	-	3,611	-	-	-	184,114	7,055	-
4a.1.5.5	CO2 & H2	-	18	-	-	-	-	-	3	21	-	-	21	-	-	-	-	-	-	289	-
4a.1.5.6	CO2 & H2 RCA	-	35	7	4	-	18	-	14	78	78	-	-	-	276	-	-	-	14,104	492	-
4a.1.5.7	Chemical Feed	-	169	-	-	-	-	-	25	195	-	-	195	-	-	-	-	-	-	2,663	-
4a.1.5.8	Chilled Water	-	94	-	-	-	-	-	14	108	-	-	108	-	-	-	-	-	-	1,454	-
4a.1.5.9	Circulating Water	-	608	-	-	-	-	-	91	700	-	-	700	-	-	-	-	-	-	9,669	-
4a.1.5.10	Condensate	-	341	-	-	-	-	-	51	392	-	-	392	-	-	-	-	-	-	5,317	-
4a.1.5.11	Condensate Booster	-	340	-	-	-	-	-	51	391	-	-	391	-	-	-	-	-	-	5,314	-
4a.1.5.12	Condensate Cleanup	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	-	3,000	-
4a.1.5.13	Containment Spray	-	259	81	46	-	231	-	138	755	755	-	-	-	3,455	-	-	-	179,291	3,839	-
4a.1.5.14	Diesel Fuel Oil	-	185	-	-	-	-	-	28	213	-	-	213	-	-	-	-	-	-	2,848	-
4a.1.5.15	Essential Service Water	-	320	-	-	-	-	-	48	368	-	-	368	-	-	-	-	-	-	5,049	-
4a.1.5.16	Extraction Steam	-	229	-	-	-	-	-	34	263	-	-	263	-	-	-	-	-	-	3,637	-
4a.1.5.17	Feedwater	-	310	-	-	-	-	-	47	357	-	-	357	-	-	-	-	-	-	4,925	-
4a.1.5.18	Feedwater Drains	-	736	-	-	-	-	-	110	846	-	-	846	-	-	-	-	-	-	11,719	-
4a.1.5.19	Gland Steam	-	39	-	-	-	-	-	6	44	-	-	44	-	-	-	-	-	-	616	-
4a.1.5.20	Gland Water	-	28	-	-	-	-	-	4	33	-	-	33	-	-	-	-	-	-	458	-
4a.1.5.21	Main Steam	-	316	-	-	-	-	-	47	363	-	-	363	-	-	-	-	-	-	4,979	-
4a.1.5.22	Main Steam RCA	-	87	21	13	-	64	-	42	225	225	-	-	-	947	-	-	-	49,262	1,292	-
4a.1.5.23	Make-up Demineralizer	-	159	-	-	-	-	-	24	183	-	-	183	-	-	-	-	-	-	2,595	-
4a.1.5.24	Nitrogen	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	18	-
4a.1.5.25	Non-Essential Service Water	-	370	-	-	-	-	-	56	426	-	-	426	-	-	-	-	-	-	5,903	-
4a.1.5.26	Non-Essential Service Water RCA	-	184	81	50	-	251	-	124	690	690	-	-	-	3,738	-	-	-	194,273	2,692	-
4a.1.5.27	Off Gas	-	689	163	95	-	478	-	322	1,746	1,746	-	-	-	7,112	-	-	-	370,343	10,290	-
4a.1.5.28	Potable Water	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	75	-
4a.1.5.29	Process Radiation Monitoring	-	68	4	2	-	9	-	20	103	103	-	-	-	134	-	-	-	7,021	1,093	-
4a.1.5.30	Process Sampling	-	150	14	8	-	41	-	50	264	264	-	-	-	615	-	-	-	31,992	2,368	-
4a.1.5.31	Sewage Treatment Plant	-	98	-	-	-	-	-	15	113	-	-	113	-	-	-	-	-	-	1,579	-
4a.1.5.32	Station Air	-	44	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	705	-
4a.1.5.33	Station Heating	-	151	-	-	-	-	-	23	174	-	-	174	-	-	-	-	-	-	2,391	-
4a.1.5.34	Steam Humidification	-	7	-	-	-	-	-	1	8	-	-	8	-	-	-	-	-	-	115	-
4a.1.5.35	Switchgear Heat Removal	-	33	-	-	-	-	-	5	38	-	-	38	-	-	-	-	-	-	519	-
4a.1.5.36	Turbine Bldg Equip Drains	-	79	-	-	-	-	-	12	91	-	-	91	-	-	-	-	-	-	1,235	-
4a.1.5.37	Turbine Bldg Floor Drains	-	135	-	-	-	-	-	20	156	-	-	156	-	-	-	-	-	-	2,117	-
4a.1.5.38	Turbine Oil	-	85	-	-	-	-	-	13	98	-	-	98	-	-	-	-	-	-	1,359	-
4a.1.5.39	Turbine-Generator Auxilaries	-	57	-	-	-	-	-	9	66	-	-	66	-	-	-	-	-	-	884	-

Table D-2
Byron Nuclear Power Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
4a.1.5.40	Waste Oil Sumps	-	33	-	-	-	-	-	5	38	-	-	38	-	-	-	-	-	-	517	-
4a.1.5.41	Well Water	-	80	-	-	-	-	-	12	93	-	-	93	-	-	-	-	-	-	1,247	-
4a.1.5	Totals	-	7,970	563	323	-	1,632	-	1,966	12,454	6,253	-	6,202	-	24,394	-	-	-	1,265,158	123,619	-
4a.1.6	Scaffolding in support of decommissioning	-	1,572	14	7	-	37	-	405	2,035	2,035	-	-	-	556	-	-	-	28,884	26,134	-
4a.1	Subtotal Period 4a Activity Costs	438	27,368	16,475	7,932	-	42,944	580	26,157	121,894	115,692	-	6,202	-	244,631	1,127	393	2,217	14,404,750	294,493	5,532
Period 4a Additional Costs																					
4a.2.1	Remedial Action Surveys	-	-	-	-	-	-	1,976	593	2,569	2,569	-	-	-	-	-	-	-	-	31,151	-
4a.2.2	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
4a.2.3	Operational Tools and Equipment	-	-	9	51	-	189	-	56	304	304	-	-	-	5,855	-	-	-	146,375	16	-
4a.2	Subtotal Period 4a Additional Costs	-	-	9	51	-	189	2,026	656	2,931	2,931	-	-	-	5,855	-	-	-	146,375	31,167	-
Period 4a Collateral Costs																					
4a.3.1	Process decommissioning water waste	12	-	13	34	-	43	-	23	125	125	-	-	-	123	-	-	-	7,395	24	-
4a.3.3	Small tool allowance	-	324	-	-	-	-	-	49	373	336	-	37	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	12	324	13	34	-	43	-	72	498	461	-	37	-	123	-	-	-	7,395	24	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	80	-	-	-	-	-	-	20	100	100	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	771	77	848	848	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	739	74	813	732	-	81	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	2,207	-	-	-	-	-	552	2,758	2,758	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	3,006	-	-	-	-	-	451	3,457	3,457	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	80	43	-	245	-	76	444	444	-	-	-	3,819	-	-	-	76,389	125	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	2,499	375	2,874	2,874	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	620	62	681	681	-	-	-	-	-	-	-	-	-	-
4a.4.9	Site O&M Cost	-	-	-	-	-	-	244	37	281	281	-	-	-	-	-	-	-	-	-	-
4a.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	593	89	682	682	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	4,012	602	4,614	4,614	-	-	-	-	-	-	-	-	-	70,694
4a.4.12	DOC Staff Cost	-	-	-	-	-	-	17,706	2,656	20,362	20,362	-	-	-	-	-	-	-	-	-	212,914
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	29,360	4,404	33,764	33,764	-	-	-	-	-	-	-	-	-	385,714
4a.4	Subtotal Period 4a Period-Dependent Costs	80	5,213	80	43	-	245	56,545	9,474	71,680	71,599	-	81	-	3,819	-	-	-	76,389	125	669,322
4a.0	TOTAL PERIOD 4a COST	530	32,906	16,577	8,060	-	43,420	59,152	36,359	197,003	190,683	-	6,320	-	254,429	1,127	393	2,217	14,634,910	325,808	674,854
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
4b.1.1	Remove spent fuel racks	1,138	123	344	140	-	705	-	831	3,280	3,280	-	-	-	10,524	-	-	-	546,426	2,174	-
Disposal of Plant Systems																					
4b.1.2.1	Chemical & Volume Control	-	1,085	153	81	-	407	-	400	2,126	2,126	-	-	-	6,063	-	-	-	315,292	15,801	-
4b.1.2.2	Chilled Water RCA	-	667	168	93	-	470	-	315	1,713	1,713	-	-	-	7,000	-	-	-	364,517	9,521	-
4b.1.2.3	Component Cooling	-	709	209	119	-	600	-	366	2,002	2,002	-	-	-	8,936	-	-	-	464,778	10,502	-
4b.1.2.4	Electrical	-	4,261	-	-	-	-	-	639	4,900	-	-	4,900	-	-	-	-	-	-	66,259	-
4b.1.2.5	Electrical - Contaminated	-	1,757	181	120	-	608	-	627	3,294	3,294	-	-	-	9,079	-	-	-	471,393	26,007	-
4b.1.2.6	Electrical - RCA	-	2,529	424	272	-	1,372	-	1,058	5,655	5,655	-	-	-	20,491	-	-	-	1,063,899	38,351	-
4b.1.2.7	Emergency Diesel Generator	-	96	-	-	-	-	-	14	111	-	-	111	-	-	-	-	-	-	1,514	-
4b.1.2.8	Essential Service Water RCA	-	345	195	119	-	601	-	274	1,535	1,535	-	-	-	8,972	-	-	-	466,273	5,336	-
4b.1.2.9	Fire Protection	-	315	-	-	-	-	-	47	362	-	-	362	-	-	-	-	-	-	4,983	-
4b.1.2.10	Fire Protection RCA	-	537	143	83	-	419	-	266	1,447	1,447	-	-	-	6,243	-	-	-	324,808	7,672	-
4b.1.2.11	Fuel Handling Bldg Equip Drains	-	167	32	18	-	91	-	70	377	377	-	-	-	1,386	-	-	-	70,185	2,442	-
4b.1.2.12	Fuel Handling Bldg Floor Drains	-	170	31	16	-	82	-	69	368	368	-	-	-	1,241	-	-	-	63,725	2,480	-
4b.1.2.13	Fuel Handling Bldg Floor Drains (Unit 1)	-	119	22	11	-	58	-	48	257	257	-	-	-	874	-	-	-	44,626	1,769	-
4b.1.2.14	Fuel Hnadling Bldg Equip Drains (Unit 1)	-	30	4	2	-	9	-	10	54	54	-	-	-	129	-	-	-	6,739	429	-
4b.1.2.15	Fuel Pool Cooling & Cleanup	-	226	46	26	-	133	-	98	530	530	-	-	-	1,989	-	-	-	103,404	3,329	-
4b.1.2.16	Fuel Pool Cooling & Cleanup (Unit 1)	-	210	42	25	-	124	-	92	493	493	-	-	-	1,857	-	-	-	96,476	3,103	-
4b.1.2.17	HVAC-Auxiliary Building	-	564	108	72	-	361	-	253	1,358	1,358	-	-	-	5,390	-	-	-	279,889	8,029	-
4b.1.2.18	HVAC-Control Room HVAC	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	127	-
4b.1.2.19	HVAC-Diesel Generator Room	-	44	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	686	-
4b.1.2.20	HVAC-Laboratory	-	20	-	-	-	-	-	3	23	-	-	23	-	-	-	-	-	-	315	-
4b.1.2.21	HVAC-Machine Shop	-	18	-	-	-	-	-	3	21	-	-	21	-	-	-	-	-	-	297	-
4b.1.2.22	HVAC-Miscellaneous	-	112	-	-	-	-	-	17	128	-	-	128	-	-	-	-	-	-	1,769	-
4b.1.2.23	HVAC-Primary Containment	-	627	203	135	-	683	-	368	2,017	2,017	-	-	-	10,197	-	-	-	529,451	8,908	-
4b.1.2.24	HVAC-Pumphouse	-	18	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	275	-

Table D-2
Byron Nuclear Power Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
4b.1.2.25	HVAC-Radwaste	-	326	63	42	-	213	-	147	791	791	-	-	-	3,177	-	-	-	164,931	4,412	-
4b.1.2.26	HVAC-Turbine Building	-	189	-	-	-	-	-	28	217	-	-	217	-	-	-	-	-	-	3,158	-
4b.1.2.27	Instrument Air Supply	-	73	-	-	-	-	-	11	84	-	-	84	-	-	-	-	-	-	1,197	-
4b.1.2.28	Instrument Air Supply RCA	-	249	29	13	-	68	-	84	443	443	-	-	-	1,002	-	-	-	52,414	3,630	-
4b.1.2.29	Miscellaneous Drains	-	76	14	8	-	40	-	31	168	168	-	-	-	592	-	-	-	30,841	1,125	-
4b.1.2.30	Primary Containment Purge	-	301	128	74	-	375	-	193	1,071	1,071	-	-	-	5,582	-	-	-	290,664	4,721	-
4b.1.2.31	Primary Water	-	839	218	133	-	670	-	419	2,278	2,278	-	-	-	10,451	-	-	-	519,324	12,918	-
4b.1.2.32	Radioactive Waste Disposal	-	2,769	478	270	-	1,365	-	1,122	6,004	6,004	-	-	-	20,695	-	-	-	1,058,144	40,223	-
4b.1.2.33	Reactor Bldg Equipment Drains	-	110	23	13	-	67	-	48	261	261	-	-	-	997	-	-	-	51,818	1,605	-
4b.1.2.34	Reactor Building Floor Drains	-	41	6	3	-	16	-	16	83	83	-	-	-	245	-	-	-	12,768	604	-
4b.1.2.35	Reactor Coolant	-	167	20	10	-	51	-	58	307	307	-	-	-	763	-	-	-	39,871	2,413	-
4b.1.2.36	Residual Heat Removal	-	190	47	28	-	143	-	92	501	501	-	-	-	2,129	-	-	-	110,771	2,894	-
4b.1.2.37	Safety Injection	-	877	224	134	-	676	-	431	2,341	2,341	-	-	-	10,357	-	-	-	523,998	13,451	-
4b.1.2.38	Station Air RCA	-	58	8	4	-	19	-	21	110	110	-	-	-	283	-	-	-	14,808	833	-
4b.1.2.39	Station Heating RCA	-	253	56	31	-	156	-	112	607	607	-	-	-	2,315	-	-	-	120,573	3,664	-
4b.1.2.40	Waste Oil Sumps RCA	-	26	4	2	-	10	-	10	52	52	-	-	-	149	-	-	-	7,762	370	-
4b.1.2.41	Waste Water Treatment	-	91	-	-	-	-	-	14	105	-	-	105	-	-	-	-	-	-	1,464	-
4b.1.2	Totals	-	21,267	3,277	1,959	-	9,887	-	7,885	44,275	38,242	-	6,033	-	148,585	-	-	-	7,664,142	318,585	-
4b.1.3	Scaffolding in support of decommissioning	-	2,358	20	11	-	56	-	607	3,052	3,052	-	-	-	834	-	-	-	43,325	39,201	-
Decontamination of Site Buildings																					
4b.1.4.1	Reactor	2,018	1,452	217	339	-	1,358	-	1,784	7,169	7,169	-	-	-	24,850	-	-	-	1,271,867	50,421	-
4b.1.4.2	Auxiliary Building	236	124	20	19	-	75	-	173	647	647	-	-	-	1,209	-	-	-	72,602	5,258	-
4b.1.4.3	Radwaste/Service Building	155	49	9	12	-	38	-	102	363	363	-	-	-	686	-	-	-	42,199	2,958	-
4b.1.4.4	Refueling Water Storage Tank	367	428	38	17	-	83	-	318	1,253	1,253	-	-	-	1,240	-	-	-	67,351	11,972	-
4b.1.4.5	Fuel Handling Building	1,052	1,179	102	52	-	236	-	898	3,518	3,518	-	-	-	3,552	-	-	-	198,851	33,507	-
4b.1.4	Totals	3,828	3,232	386	439	-	1,790	-	3,274	12,950	12,950	-	-	-	31,537	-	-	-	1,652,869	104,117	-
4b.1	Subtotal Period 4b Activity Costs	4,966	26,980	4,027	2,549	-	12,437	-	12,598	63,557	57,524	-	6,033	-	191,480	-	-	-	9,906,763	464,076	-
Period 4b Additional Costs																					
4b.2.1	License Termination Survey Planning	-	-	-	-	-	-	993	298	1,291	1,291	-	-	-	-	-	-	-	-	-	6,240
4b.2.2	Remedial Action Surveys	-	-	-	-	-	-	3,566	1,070	4,636	4,636	-	-	-	-	-	-	-	-	56,209	-
4b.2.3	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
4b.2.4	License Termination ISFSI	-	450	197	274	-	893	1,213	757	3,783	3,783	-	-	-	14,543	-	-	-	1,178,711	7,043	7,144
4b.2.5	Underground Services Excavation	-	506	-	-	-	-	-	76	581	581	-	-	-	-	-	-	-	-	2,755	-
4b.2	Subtotal Period 4b Additional Costs	-	955	197	274	-	893	5,822	2,208	10,349	10,349	-	-	-	14,543	-	-	-	1,178,711	66,006	13,384
Period 4b Collateral Costs																					
4b.3.1	Process decommissioning water waste	31	-	36	96	-	122	-	64	349	349	-	-	-	348	-	-	-	20,864	68	-
4b.3.3	Small tool allowance	-	523	-	-	-	-	-	78	601	601	-	-	-	-	-	-	-	-	-	-
4b.3.4	Decommissioning Equipment Disposition	-	-	171	94	-	472	-	149	887	887	-	-	-	7,054	-	-	-	366,237	88	-
4b.3	Subtotal Period 4b Collateral Costs	31	523	207	190	-	594	-	292	1,837	1,837	-	-	-	7,401	-	-	-	387,101	156	-
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	949	-	-	-	-	-	-	237	1,186	1,186	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	1,409	141	1,550	1,550	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	1,351	135	1,486	1,486	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	3,717	-	-	-	-	-	929	4,646	4,646	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	5,440	-	-	-	-	-	816	6,256	6,256	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	139	75	-	424	-	131	769	769	-	-	-	6,618	-	-	-	132,358	216	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	3,607	541	4,148	4,148	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	1,132	113	1,246	1,246	-	-	-	-	-	-	-	-	-	-
4b.4.9	Site O&M Cost	-	-	-	-	-	-	446	67	513	513	-	-	-	-	-	-	-	-	-	-
4b.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	1,084	163	1,247	1,247	-	-	-	-	-	-	-	-	-	-
4b.4.11	Security Staff Cost	-	-	-	-	-	-	10,072	1,511	11,583	11,583	-	-	-	-	-	-	-	-	-	176,250
4b.4.12	DOC Staff Cost	-	-	-	-	-	-	31,501	4,725	36,226	36,226	-	-	-	-	-	-	-	-	-	377,880
4b.4.13	Utility Staff Cost	-	-	-	-	-	-	50,998	7,650	58,648	58,648	-	-	-	-	-	-	-	-	-	665,520
4b.4	Subtotal Period 4b Period-Dependent Costs	949	9,157	139	75	-	424	101,601	17,159	129,505	129,505	-	-	-	6,618	-	-	-	132,358	216	1,219,650
4b.0	TOTAL PERIOD 4b COST	5,946	37,615	4,571	3,088	-	14,349	107,424	32,256	205,248	199,216	-	6,033	-	220,043	-	-	-	11,604,930	530,454	1,233,034

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Byron Nuclear Power Station, Unit 2
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(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 4f - License Termination																					
Period 4f Direct Decommissioning Activities																					
4f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
4f.1.2	Terminate license									a											
4f.1	Subtotal Period 4f Activity Costs	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
Period 4f Additional Costs																					
4f.2.1	License Termination Survey	-	-	-	-	-	-	8,763	2,629	11,392	11,392	-	-	-	-	-	-	-	-	128,776	3,120
4f.2	Subtotal Period 4f Additional Costs	-	-	-	-	-	-	8,763	2,629	11,392	11,392	-	-	-	-	-	-	-	-	128,776	3,120
Period 4f Collateral Costs																					
4f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,080	162	1,242	1,242	-	-	-	-	-	-	-	-	-	-
4f.3	Subtotal Period 4f Collateral Costs	-	-	-	-	-	-	1,080	162	1,242	1,242	-	-	-	-	-	-	-	-	-	-
Period 4f Period-Dependent Costs																					
4f.4.1	Insurance	-	-	-	-	-	-	393	39	432	432	-	-	-	-	-	-	-	-	-	-
4f.4.2	Property taxes	-	-	-	-	-	-	376	38	414	414	-	-	-	-	-	-	-	-	-	-
4f.4.3	Health physics supplies	-	649	-	-	-	-	-	162	812	812	-	-	-	-	-	-	-	-	-	-
4f.4.4	Disposal of DAW generated	-	-	7	4	-	21	-	7	39	39	-	-	-	335	-	-	-	6,698	11	-
4f.4.5	Plant energy budget	-	-	-	-	-	-	268	40	308	308	-	-	-	-	-	-	-	-	-	-
4f.4.6	NRC Fees	-	-	-	-	-	-	302	30	333	333	-	-	-	-	-	-	-	-	-	-
4f.4.7	Site O&M Cost	-	-	-	-	-	-	124	19	143	143	-	-	-	-	-	-	-	-	-	-
4f.4.8	Security Staff Cost	-	-	-	-	-	-	684	103	787	787	-	-	-	-	-	-	-	-	-	11,786
4f.4.9	DOC Staff Cost	-	-	-	-	-	-	3,919	588	4,507	4,507	-	-	-	-	-	-	-	-	-	46,750
4f.4.10	Utility Staff Cost	-	-	-	-	-	-	4,776	716	5,493	5,493	-	-	-	-	-	-	-	-	-	56,964
4f.4	Subtotal Period 4f Period-Dependent Costs	-	649	7	4	-	21	10,843	1,742	13,266	13,266	-	-	-	335	-	-	-	6,698	11	115,500
4f.0	TOTAL PERIOD 4f COST	-	649	7	4	-	21	20,858	4,584	26,124	26,124	-	-	-	335	-	-	-	6,698	128,787	118,620
PERIOD 4 TOTALS		6,476	71,170	21,155	11,152	-	57,790	187,433	73,200	428,375	416,023	-	12,353	-	474,807	1,127	393	2,217	26,246,550	985,049	2,026,509
PERIOD 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	Reactor	-	7,213	-	-	-	-	-	1,082	8,294	-	-	8,294	-	-	-	-	-	-	69,541	-
5b.1.1.2	Aux Feedwater-Steam Tunnel/Penetr. Area	-	719	-	-	-	-	-	108	827	-	-	827	-	-	-	-	-	-	5,187	-
5b.1.1.3	Auxiliary Building	-	6,318	-	-	-	-	-	948	7,266	-	-	7,266	-	-	-	-	-	-	62,064	-
5b.1.1.4	Berms, Settling Ponds, and Drying Beds	-	154	-	-	-	-	-	23	178	-	-	178	-	-	-	-	-	-	1,631	-
5b.1.1.5	Circulating Water Pumphouse	-	1,090	-	-	-	-	-	163	1,253	-	-	1,253	-	-	-	-	-	-	11,861	-
5b.1.1.6	Essential Service Cooling Tower	-	510	-	-	-	-	-	76	586	-	-	586	-	-	-	-	-	-	5,067	-
5b.1.1.7	Make-up Demineralizer Area	-	1,817	-	-	-	-	-	273	2,089	-	-	2,089	-	-	-	-	-	-	20,770	-
5b.1.1.8	Miscellaneous Site Structures	-	1,954	-	-	-	-	-	293	2,247	-	-	2,247	-	-	-	-	-	-	20,544	-
5b.1.1.9	Radwaste/Service Building	-	4,166	-	-	-	-	-	625	4,791	-	-	4,791	-	-	-	-	-	-	45,688	-
5b.1.1.10	Receiving Building	-	193	-	-	-	-	-	29	222	-	-	222	-	-	-	-	-	-	2,294	-
5b.1.1.11	Refueling Water Storage Tank	-	1,099	-	-	-	-	-	165	1,263	-	-	1,263	-	-	-	-	-	-	11,688	-
5b.1.1.12	River Screen House	-	591	-	-	-	-	-	89	680	-	-	680	-	-	-	-	-	-	5,869	-
5b.1.1.13	Security Modifications	-	1,103	-	-	-	-	-	166	1,269	-	-	1,269	-	-	-	-	-	-	8,636	-
5b.1.1.14	Turbine Building	-	6,069	-	-	-	-	-	910	6,979	-	-	6,979	-	-	-	-	-	-	70,347	-
5b.1.1.15	Turbine Pedestal	-	1,463	-	-	-	-	-	219	1,682	-	-	1,682	-	-	-	-	-	-	12,628	-
5b.1.1.16	Yard Inventory	-	2,253	-	-	-	-	-	338	2,591	-	-	2,591	-	-	-	-	-	-	20,857	-
5b.1.1.17	Fuel Handling Building	-	3,242	-	-	-	-	-	486	3,729	-	-	3,729	-	-	-	-	-	-	33,246	-
5b.1.1	Totals	-	39,954	-	-	-	-	-	5,993	45,947	-	-	45,947	-	-	-	-	-	-	407,920	-
Site Closeout Activities																					
5b.1.2	BackFill Site	-	5,114	-	-	-	-	-	767	5,881	-	-	5,881	-	-	-	-	-	-	9,059	-
5b.1.3	Grade & landscape site	-	345	-	-	-	-	-	52	397	-	-	397	-	-	-	-	-	-	869	-
5b.1.4	Final report to NRC	-	-	-	-	-	-	85	13	98	98	-	-	-	-	-	-	-	-	-	668
5b.1	Subtotal Period 5b Activity Costs	-	45,413	-	-	-	-	85	6,825	52,322	98	-	52,225	-	-	-	-	-	-	417,849	668
Period 5b Additional Costs																					
5b.2.1	Site Restoration ISFSI	-	645	-	-	-	-	28	101	774	-	-	774	-	-	-	-	-	-	6,477	80
5b.2.2	Concrete Crushing	-	988	-	-	-	-	6	149	1,142	-	-	1,142	-	-	-	-	-	-	4,554	-
5b.2.3	Cofferdam Construction and Teardown	-	455	-	-	-	-	-	68	523	-	-	523	-	-	-	-	-	-	3,996	-
5b.2.4	Demolish Cooling Tower	-	5,142	-	-	-	-	165	796	6,102	-	-	6,102	-	-	-	-	-	-	18,598	-
5b.2	Subtotal Period 5b Additional Costs	-	7,229	-	-	-	-	198	1,114	8,542	-	-	8,542	-	-	-	-	-	-	33,625	80

Table D-2
Byron Nuclear Power Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	541	-	-	-	-	-	81	622	-	-	622	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	541	-	-	-	-	-	81	622	-	-	622	-	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																					
5b.4.2	Property taxes	-	-	-	-	-	-	1,239	124	1,363	-	-	1,363	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	7,086	-	-	-	-	-	1,063	8,149	-	-	8,149	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	441	66	507	-	-	507	-	-	-	-	-	-	-	-
5b.4.5	Site O&M Cost	-	-	-	-	-	-	409	61	470	-	-	470	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	2,015	302	2,317	-	-	2,317	-	-	-	-	-	-	-	34,287
5b.4.7	DOC Staff Cost	-	-	-	-	-	-	11,965	1,795	13,760	-	-	13,760	-	-	-	-	-	-	-	137,043
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	5,873	881	6,754	-	-	6,754	-	-	-	-	-	-	-	67,229
5b.4	Subtotal Period 5b Period-Dependent Costs	-	7,086	-	-	-	-	21,942	4,292	33,321	-	-	33,321	-	-	-	-	-	-	-	238,558
5b.0	TOTAL PERIOD 5b COST	-	60,269	-	-	-	-	22,226	12,312	94,807	98	-	94,709	-	-	-	-	-	-	451,474	239,306
PERIOD 5 TOTALS		-	60,269	-	-	-	-	22,226	12,312	94,807	98	-	94,709	-	-	-	-	-	-	451,474	239,306
TOTAL COST TO DECOMMISSION		**13,585**	**140,581**	**21,584**	**11,992**	**-**	**59,193**	**641,188**	**150,515**	**1,038,639**	**722,840**	**208,046**	**107,753**	**-**	**484,359**	**1,127**	**393**	**2,217**	**26,547,890**	**1,524,888**	**5,863,279**

TOTAL COST TO DECOMMISSION WITH 16.95% CONTINGENCY:	**$1,038,639**	**thousands of 2014 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 69.59% OR:	**$722,840**	**thousands of 2014 dollars**
SPENT FUEL MANAGEMENT COST IS 20.03% OR:	**$208,046**	**thousands of 2014 dollars**
NON-NUCLEAR DEMOLITION COST IS 10.37% OR:	**$107,753**	**thousands of 2014 dollars**
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	**485,879**	**cubic feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**2,217**	**cubic feet**
TOTAL SCRAP METAL REMOVED:	**71,774**	**tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,524,888**	**man-hours**

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

APPENDIX E

DETAILED COST ANALYSIS

SAFSTOR

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Table E-1
Byron Nuclear Power Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	481	144	625	625	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	166	25	190	190	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	255	38	293	293	-	-	-	-	-	-	-	-	-	2,000
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	166	25	190	190	-	-	-	-	-	-	-	-	-	1,300
1a.1.9	Perform detailed rad survey									a											
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	End product description	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,000
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	191	29	220	220	-	-	-	-	-	-	-	-	-	1,500
1a.1.13	Define major work sequence	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,000
1a.1.14	Perform SER and EA	-	-	-	-	-	-	395	59	454	454	-	-	-	-	-	-	-	-	-	3,100
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	637	95	732	732	-	-	-	-	-	-	-	-	-	5,000
Activity Specifications																					
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	626	94	720	720	-	-	-	-	-	-	-	-	-	4,920
1a.1.16.2	Plant systems	-	-	-	-	-	-	531	80	610	610	-	-	-	-	-	-	-	-	-	4,167
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	397	60	457	457	-	-	-	-	-	-	-	-	-	3,120
1a.1.16.4	Waste management	-	-	-	-	-	-	255	38	293	293	-	-	-	-	-	-	-	-	-	2,000
1a.1.16.5	Facility and site dormancy	-	-	-	-	-	-	255	38	293	293	-	-	-	-	-	-	-	-	-	2,000
1a.1.16	Total	-	-	-	-	-	-	2,063	310	2,373	2,373	-	-	-	-	-	-	-	-	-	16,207
Detailed Work Procedures																					
1a.1.17.1	Plant systems	-	-	-	-	-	-	151	23	173	173	-	-	-	-	-	-	-	-	-	1,183
1a.1.17.2	Facility closeout & dormancy	-	-	-	-	-	-	153	23	176	176	-	-	-	-	-	-	-	-	-	1,200
1a.1.17	Total	-	-	-	-	-	-	303	46	349	349	-	-	-	-	-	-	-	-	-	2,383
1a.1.18	Procure vacuum drying system	-	-	-	-	-	-	13	2	15	15	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	5,050	830	5,880	5,880	-	-	-	-	-	-	-	-	-	35,890
Period 1a Additional Costs																					
1a.2.1	ISFSI Expansion	-	-	-	-	-	-	4,800	720	5,520	-	5,520	-	-	-	-	-	-	-	-	-
1a.2	Subtotal Period 1a Additional Costs	-	-	-	-	-	-	4,800	720	5,520	-	5,520	-	-	-	-	-	-	-	-	-
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	7,346	1,102	8,448	-	8,448	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	7,346	1,102	8,448	-	8,448	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,855	185	2,040	2,040	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	493	-	-	-	-	-	123	616	616	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	529	-	-	-	-	-	79	608	608	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	13	7	-	39	-	12	71	71	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,778	267	2,045	2,045	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	1,181	118	1,299	1,299	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	2,171	217	2,388	-	2,388	-	-	-	-	-	-	-	-	-
1a.4.9	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	396	59	455	-	455	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	48	7	55	-	55	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	640	96	736	736	-	-	-	-	-	-	-	-	-	12,264
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	32,279	4,842	37,121	37,121	-	-	-	-	-	-	-	-	-	423,400
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,022	13	7	-	39	40,512	6,031	47,624	44,727	2,898	-	-	610	-	-	-	12,190	20	435,664
1a.0	TOTAL PERIOD 1a COST	-	1,022	13	7	-	39	57,709	8,683	67,472	50,606	16,865	-	-	610	-	-	-	12,190	20	471,554

Table E-1
Byron Nuclear Power Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1b - SAFSTOR Limited DECON Activities																					
Period 1b Direct Decommissioning Activities																					
Decontamination of Site Buildings																					
1b.1.1.1	Reactor	2,223	-	-	-	-	-	-	1,111	3,334	3,334	-	-	-	-	-	-	-	-	33,093	-
1b.1.1.2	Auxiliary Building	220	-	-	-	-	-	-	110	330	330	-	-	-	-	-	-	-	-	3,289	-
1b.1.1.3	Refueling Water Storage Tank	366	-	-	-	-	-	-	183	549	549	-	-	-	-	-	-	-	-	5,322	-
1b.1.1	Totals	2,809	-	-	-	-	-	-	1,404	4,213	4,213	-	-	-	-	-	-	-	-	41,705	-
1b.1	Subtotal Period 1b Activity Costs	2,809	-	-	-	-	-	-	1,404	4,213	4,213	-	-	-	-	-	-	-	-	41,705	-
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	886	-	-	-	-	-	-	133	1,019	1,019	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process decommissioning water waste	180	-	118	314	-	398	-	248	1,258	1,258	-	-	-	1,135	-	-	-	68,086	221	-
1b.3.4	Small tool allowance	-	46	-	-	-	-	-	7	53	53	-	-	-	-	-	-	-	-	-	-
1b.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,831	275	2,106	-	2,106	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	1,066	46	118	314	-	398	1,831	663	4,436	2,330	2,106	-	-	1,135	-	-	-	68,086	221	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	624	-	-	-	-	-	-	156	780	780	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	350	35	385	385	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	4,101	410	4,511	4,511	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	314	-	-	-	-	-	79	393	393	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	132	-	-	-	-	-	20	152	152	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	11	6	-	33	-	10	60	60	-	-	-	517	-	-	-	10,338	17	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	443	67	510	510	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	172	17	189	189	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	541	54	595	-	595	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Cost	-	-	-	-	-	-	41	6	47	47	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	99	15	113	-	113	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	12	2	14	-	14	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	160	24	184	184	-	-	-	-	-	-	-	-	-	3,058
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	8,048	1,207	9,255	9,255	-	-	-	-	-	-	-	-	-	105,560
1b.4	Subtotal Period 1b Period-Dependent Costs	624	446	11	6	-	33	13,967	2,101	17,188	16,466	722	-	-	517	-	-	-	10,338	17	108,618
1b.0	TOTAL PERIOD 1b COST	4,498	492	129	320	-	431	15,798	4,169	25,837	23,009	2,829	-	-	1,652	-	-	-	78,424	41,943	108,618
PERIOD 1c - Preparations for SAFSTOR Dormancy																					
Period 1c Direct Decommissioning Activities																					
1c.1.1	Prepare support equipment for storage	-	487	-	-	-	-	-	73	561	561	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	48	-	-	-	-	-	7	56	56	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	10,874	-
1c.1.4	Secure building accesses									a											
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	74	11	85	85	-	-	-	-	-	-	-	-	-	583
1c.1	Subtotal Period 1c Activity Costs	-	536	-	-	-	-	807	311	1,654	1,654	-	-	-	-	-	-	-	-	14,574	583
Period 1c Collateral Costs																					
1c.3.1	Process decommissioning water waste	142	-	93	248	-	314	-	196	993	993	-	-	-	896	-	-	-	53,749	175	-
1c.3.3	Small tool allowance	-	4	-	-	-	-	-	1	5	5	-	-	-	-	-	-	-	-	-	-
1c.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,831	275	2,106	-	2,106	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	142	4	93	248	-	314	1,831	471	3,104	998	2,106	-	-	896	-	-	-	53,749	175	-
Period 1c Period-Dependent Costs																					
1c.4.1	Insurance	-	-	-	-	-	-	350	35	385	385	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	4,101	410	4,511	4,511	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	190	-	-	-	-	-	48	238	238	-	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	132	-	-	-	-	-	20	152	152	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	3	2	-	10	-	3	18	18	-	-	-	152	-	-	-	3,039	5	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	443	67	510	510	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	172	17	189	189	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	541	54	595	-	595	-	-	-	-	-	-	-	-	-
1c.4.9	Site O&M Cost	-	-	-	-	-	-	41	6	47	47	-	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	99	15	113	-	113	-	-	-	-	-	-	-	-	-
1c.4.11	ISFSI Operating Costs	-	-	-	-	-	-	12	2	14	-	14	-	-	-	-	-	-	-	-	-

Table E-1
Byron Nuclear Power Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 1c Period-Dependent Costs (continued)																					
1c.4.12	Security Staff Cost	-	-	-	-	-	-	160	24	184	184	-	-	-	-	-	-	-	-	-	3,058
1c.4.13	Utility Staff Cost	-	-	-	-	-	-	8,048	1,207	9,255	9,255	-	-	-	-	-	-	-	-	-	105,560
1c.4	Subtotal Period 1c Period-Dependent Costs	-	322	3	2	-	10	13,967	1,907	16,211	15,488	722	-	-	152	-	-	-	3,039	5	108,618
1c.0	TOTAL PERIOD 1c COST	142	862	96	250	-	324	16,605	2,690	20,969	18,141	2,829	-	-	1,048	-	-	-	56,788	14,753	109,201
PERIOD 1 TOTALS		4,640	2,376	238	577	-	795	90,112	15,541	114,279	91,756	22,523	-	-	3,309	-	-	-	147,402	56,716	689,372
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	-	-	-	-	-	-	31	5	35	35	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	836	209	1,045	1,045	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	867	214	1,081	1,081	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																					
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	44,216	6,632	50,849	-	50,849	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	44,216	6,632	50,849	-	50,849	-	-	-	-	-	-	-	-	-
Period 2a Period-Dependent Costs																					
2a.4.1	Insurance	-	-	-	-	-	-	4,025	402	4,427	3,451	976	-	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	28,506	2,851	31,357	31,357	-	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	1,115	-	-	-	-	-	279	1,393	1,393	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	27	14	-	81	-	25	148	148	-	-	-	1,269	-	-	-	25,378	41	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	2,141	321	2,462	1,231	1,231	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	1,742	174	1,916	1,916	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	11,429	1,143	12,571	-	12,571	-	-	-	-	-	-	-	-	-
2a.4.8	Site O&M Cost	-	-	-	-	-	-	993	149	1,142	1,142	-	-	-	-	-	-	-	-	-	-
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	2,381	357	2,738	-	2,738	-	-	-	-	-	-	-	-	-
2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	287	43	330	-	330	-	-	-	-	-	-	-	-	-
2a.4.11	Utility Staff Cost	-	-	-	-	-	-	23,020	3,453	26,473	6,592	19,881	-	-	-	-	-	-	-	-	295,026
2a.4	Subtotal Period 2a Period-Dependent Costs	-	1,115	27	14	-	81	74,524	9,197	84,958	47,230	37,728	-	-	1,269	-	-	-	25,378	41	295,026
2a.0	TOTAL PERIOD 2a COST	-	1,115	27	14	-	81	119,607	16,043	136,888	48,310	88,577	-	-	1,269	-	-	-	25,378	41	295,026
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	-	-	-	-	-	-	96	14	110	110	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	2,593	648	3,241	3,241	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	2,689	663	3,352	3,352	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	9,688	1,453	11,141	-	11,141	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	9,688	1,453	11,141	-	11,141	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	9,731	973	10,704	10,704	-	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	9,328	933	10,261	10,261	-	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	1,703	-	-	-	-	-	426	2,129	2,129	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	41	22	-	124	-	38	224	224	-	-	-	1,928	-	-	-	38,567	63	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	3,320	498	3,818	3,818	-	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	5,152	515	5,667	5,667	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	35,446	3,545	38,990	-	38,990	-	-	-	-	-	-	-	-	-
2b.4.8	Site O&M Cost	-	-	-	-	-	-	3,080	462	3,542	3,542	-	-	-	-	-	-	-	-	-	-
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	891	134	1,025	-	1,025	-	-	-	-	-	-	-	-	-
2b.4.10	Security Staff Cost	-	-	-	-	-	-	30,446	4,567	35,013	20,979	14,034	-	-	-	-	-	-	-	-	525,651
2b.4.11	Utility Staff Cost	-	-	-	-	-	-	29,464	4,420	33,883	20,444	13,439	-	-	-	-	-	-	-	-	389,371
2b.4	Subtotal Period 2b Period-Dependent Costs	-	1,703	41	22	-	124	126,857	16,510	145,256	77,768	67,488	-	-	1,928	-	-	-	38,567	63	915,023
2b.0	TOTAL PERIOD 2b COST	-	1,703	41	22	-	124	139,234	18,626	159,748	81,119	78,629	-	-	1,928	-	-	-	38,567	63	915,023

Table E-1
Byron Nuclear Power Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 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	-	-	-	-	-	-	135	20	156	156	-	-	-	-	-	-	-	-	-	-
2c.1.5	Maintenance supplies	-	-	-	-	-	-	3,666	916	4,582	4,582	-	-	-	-	-	-	-	-	-	-
2c.1	Subtotal Period 2c Activity Costs	-	-	-	-	-	-	3,801	937	4,738	4,738	-	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	13,756	1,376	15,132	15,132	-	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	13,187	1,319	14,506	14,506	-	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	2,332	-	-	-	-	-	583	2,916	2,916	-	-	-	-	-	-	-	-	-	-
2c.4.4	Disposal of DAW generated	-	-	55	30	-	167	-	52	304	304	-	-	-	2,611	-	-	-	52,221	85	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	4,693	704	5,397	5,397	-	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	6,695	670	7,365	7,365	-	-	-	-	-	-	-	-	-	-
2c.4.7	Site O&M Cost	-	-	-	-	-	-	4,354	653	5,007	5,007	-	-	-	-	-	-	-	-	-	-
2c.4.8	Security Staff Cost	-	-	-	-	-	-	25,789	3,868	29,658	29,658	-	-	-	-	-	-	-	-	-	412,843
2c.4.9	Utility Staff Cost	-	-	-	-	-	-	25,133	3,770	28,902	28,902	-	-	-	-	-	-	-	-	-	351,192
2c.4	Subtotal Period 2c Period-Dependent Costs	-	2,332	55	30	-	167	93,607	12,994	109,186	109,186	-	-	-	2,611	-	-	-	52,221	85	764,035
2c.0	TOTAL PERIOD 2c COST	-	2,332	55	30	-	167	97,409	13,931	113,924	113,924	-	-	-	2,611	-	-	-	52,221	85	764,035
PERIOD 2 TOTALS		-	5,150	122	66	-	372	356,249	48,600	410,560	243,353	167,206	-	-	5,808	-	-	-	116,166	189	1,974,083
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	166	25	190	190	-	-	-	-	-	-	-	-	-	1,300
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	586	88	674	674	-	-	-	-	-	-	-	-	-	4,600
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,000
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	166	25	190	190	-	-	-	-	-	-	-	-	-	1,300
3a.1.6	Define major work sequence	-	-	-	-	-	-	955	143	1,098	1,098	-	-	-	-	-	-	-	-	-	7,500
3a.1.7	Perform SER and EA	-	-	-	-	-	-	395	59	454	454	-	-	-	-	-	-	-	-	-	3,100
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	637	95	732	732	-	-	-	-	-	-	-	-	-	5,000
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	522	78	600	600	-	-	-	-	-	-	-	-	-	4,096
3a.1.10	Receive NRC approval of termination plan									a											
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	938	141	1,079	971	-	108	-	-	-	-	-	-	-	7,370
3a.1.11.2	Plant systems	-	-	-	-	-	-	531	80	610	549	-	61	-	-	-	-	-	-	-	4,167
3a.1.11.3	Reactor internals	-	-	-	-	-	-	904	136	1,040	1,040	-	-	-	-	-	-	-	-	-	7,100
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	828	124	952	952	-	-	-	-	-	-	-	-	-	6,500
3a.1.11.5	Biological shield	-	-	-	-	-	-	64	10	73	73	-	-	-	-	-	-	-	-	-	500
3a.1.11.6	Steam generators	-	-	-	-	-	-	397	60	457	457	-	-	-	-	-	-	-	-	-	3,120
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	204	31	234	117	-	117	-	-	-	-	-	-	-	1,600
3a.1.11.8	Main Turbine	-	-	-	-	-	-	51	8	59	-	-	59	-	-	-	-	-	-	-	400
3a.1.11.9	Main Condensers	-	-	-	-	-	-	51	8	59	-	-	59	-	-	-	-	-	-	-	400
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	397	60	457	228	-	228	-	-	-	-	-	-	-	3,120
3a.1.11.11	Waste management	-	-	-	-	-	-	586	88	674	674	-	-	-	-	-	-	-	-	-	4,600
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-	115	17	132	66	-	66	-	-	-	-	-	-	-	900
3a.1.11	Total	-	-	-	-	-	-	5,064	760	5,824	5,127	-	697	-	-	-	-	-	-	-	39,777
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	306	46	351	351	-	-	-	-	-	-	-	-	-	2,400
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	3,000	450	3,450	3,450	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	178	27	205	205	-	-	-	-	-	-	-	-	-	1,400
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,300	345	2,645	2,645	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	157	23	180	180	-	-	-	-	-	-	-	-	-	1,230
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	14,557	2,183	16,740	16,043	-	697	-	-	-	-	-	-	-	72,703
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	521	52	573	573	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	500	50	550	550	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	431	-	-	-	-	-	108	539	539	-	-	-	-	-	-	-	-	-	-

Table E-1
Byron Nuclear Power Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 3a Period-Dependent Costs (continued)																					
3a.4.4	Heavy equipment rental	-	529	-	-	-	-	-	79	608	608	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	11	6	-	33	-	10	60	60	-	-	-	514	-	-	-	10,287	17	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	1,778	267	2,045	2,045	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	378	38	416	416	-	-	-	-	-	-	-	-	-	-
3a.4.8	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
3a.4.9	Security Staff Cost	-	-	-	-	-	-	3,725	559	4,283	4,283	-	-	-	-	-	-	-	-	-	65,179
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	19,668	2,950	22,618	22,618	-	-	-	-	-	-	-	-	-	258,629
3a.4	Subtotal Period 3a Period-Dependent Costs	-	960	11	6	-	33	26,735	4,138	31,882	31,882	-	-	-	514	-	-	-	10,287	17	323,807
3a.0	TOTAL PERIOD 3a COST	-	960	11	6	-	33	41,291	6,321	48,622	47,924	-	697	-	514	-	-	-	10,287	17	396,510
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	603	90	693	624	-	69	-	-	-	-	-	-	-	4,733
3b.1.1.2	Reactor internals	-	-	-	-	-	-	318	48	366	366	-	-	-	-	-	-	-	-	-	2,500
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	172	26	198	49	-	148	-	-	-	-	-	-	-	1,350
3b.1.1.4	CRD cooling assembly	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.5	CRD housings & ICI tubes	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.6	Incore instrumentation	-	-	-	-	-	-	127	19	146	146	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	462	69	531	531	-	-	-	-	-	-	-	-	-	3,630
3b.1.1.8	Facility closeout	-	-	-	-	-	-	153	23	176	88	-	88	-	-	-	-	-	-	-	1,200
3b.1.1.9	Missile shields	-	-	-	-	-	-	57	9	66	66	-	-	-	-	-	-	-	-	-	450
3b.1.1.10	Biological shield	-	-	-	-	-	-	153	23	176	176	-	-	-	-	-	-	-	-	-	1,200
3b.1.1.11	Steam generators	-	-	-	-	-	-	586	88	674	674	-	-	-	-	-	-	-	-	-	4,600
3b.1.1.12	Reinforced concrete	-	-	-	-	-	-	127	19	146	73	-	73	-	-	-	-	-	-	-	1,000
3b.1.1.13	Main Turbine	-	-	-	-	-	-	199	30	228	-	-	228	-	-	-	-	-	-	-	1,560
3b.1.1.14	Main Condensers	-	-	-	-	-	-	199	30	228	-	-	228	-	-	-	-	-	-	-	1,560
3b.1.1.15	Auxiliary building	-	-	-	-	-	-	348	52	400	360	-	40	-	-	-	-	-	-	-	2,730
3b.1.1.16	Reactor building	-	-	-	-	-	-	348	52	400	360	-	40	-	-	-	-	-	-	-	2,730
3b.1.1	Total	-	-	-	-	-	-	4,105	616	4,721	3,806	-	915	-	-	-	-	-	-	-	32,243
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	4,105	616	4,721	3,806	-	915	-	-	-	-	-	-	-	32,243
Period 3b Additional Costs																					
3b.2.1	Site Characterization	-	-	-	-	-	-	6,444	1,933	8,377	8,377	-	-	-	-	-	-	-	30,500	10,852	
3b.2	Subtotal Period 3b Additional Costs	-	-	-	-	-	-	6,444	1,933	8,377	8,377	-	-	-	-	-	-	-	30,500	10,852	
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	886	-	-	-	-	-	-	133	1,019	1,019	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,080	162	1,242	1,242	-	-	-	-	-	-	-	-	-	-
3b.3.3	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	886	1,100	-	-	-	-	1,080	460	3,526	3,526	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	27	-	-	-	-	-	-	7	34	34	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	261	26	287	287	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	251	25	276	276	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	238	-	-	-	-	-	60	298	298	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	265	-	-	-	-	-	40	305	305	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	6	3	-	19	-	6	34	34	-	-	-	292	-	-	-	5,834	10	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	892	134	1,025	1,025	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	190	19	208	208	-	-	-	-	-	-	-	-	-	-
3b.4.9	Site O&M Cost	-	-	-	-	-	-	83	12	95	95	-	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	1,867	280	2,148	2,148	-	-	-	-	-	-	-	-	-	32,679
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	5,085	763	5,847	5,847	-	-	-	-	-	-	-	-	-	58,560
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	9,861	1,479	11,340	11,340	-	-	-	-	-	-	-	-	-	129,669
3b.4	Subtotal Period 3b Period-Dependent Costs	27	503	6	3	-	19	18,489	2,850	21,897	21,897	-	-	-	292	-	-	-	5,834	10	220,907
3b.0	TOTAL PERIOD 3b COST	913	1,603	6	3	-	19	30,117	5,859	38,521	37,606	-	915	-	292	-	-	-	5,834	30,510	264,002
PERIOD 3 TOTALS		913	2,563	17	9	-	52	71,409	12,180	87,143	85,530	-	1,613	-	806	-	-	-	16,121	30,526	660,512

Table E-1
Byron Nuclear Power Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Reactor Coolant Piping	46	160	35	38	-	263	-	138	680	680	-	-	-	1,783	-	-	-	203,843	3,153	-
4a.1.1.2	Pressurizer Relief Tank	8	30	7	7	-	47	-	25	125	125	-	-	-	329	-	-	-	36,553	596	-
4a.1.1.3	Reactor Coolant Pumps & Motors	29	108	79	198	-	1,390	-	426	2,230	2,230	-	-	-	4,796	-	-	-	780,540	2,726	80
4a.1.1.4	Pressurizer	12	69	368	106	-	879	-	296	1,731	1,731	-	-	-	3,033	-	-	-	240,915	1,527	750
4a.1.1.5	Steam Generators	98	4,496	2,810	3,697	-	11,075	-	4,777	26,953	26,953	-	-	-	67,463	-	-	-	3,820,664	20,508	4,500
4a.1.1.6	Retired Steam Generator Units	-	-	1,591	2,916	-	10,319	-	3,176	18,002	18,002	-	-	-	62,044	-	-	-	3,098,575	10,800	2,250
4a.1.1.7	CRDMs/ICIs/Service Structure Removal	41	301	230	47	-	188	-	173	979	979	-	-	-	3,881	-	-	-	145,494	5,232	-
4a.1.1.8	Reactor Vessel Internals	93	2,899	6,520	1,077	-	4,331	290	6,329	21,539	21,539	-	-	-	2,461	501	393	-	328,507	27,350	1,226
4a.1.1.9	Vessel & Internals GTCC Disposal	-	-	-	-	-	11,996	-	1,799	13,795	13,795	-	-	-	-	-	-	2,217	433,180	-	-
4a.1.1.10	Reactor Vessel	115	5,075	2,149	1,140	-	2,832	290	6,146	17,747	17,747	-	-	-	9,331	-	-	-	960,579	27,350	1,226
4a.1.1	Totals	441	13,139	13,789	9,226	-	43,320	580	23,285	103,781	103,781	-	-	-	155,121	501	393	2,217	10,048,850	99,243	10,032
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	614	3,150	1,094	-	3,399	-	1,482	9,739	9,739	-	-	-	58,555	-	-	-	3,040,215	9,317	-
4a.1.3	Main Condensers	-	1,204	1,828	998	-	5,039	-	1,893	10,963	10,963	-	-	-	75,240	-	-	-	3,906,532	18,250	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor	-	1,250	-	-	-	-	-	188	1,438	1,438	-	-	-	-	-	-	-	-	12,130	-
4a.1.4.2	Auxiliary Building	-	692	-	-	-	-	-	104	796	796	-	-	-	-	-	-	-	-	6,810	-
4a.1.4.3	Refueling Water Storage Tank	-	122	-	-	-	-	-	18	140	140	-	-	-	-	-	-	-	-	1,299	-
4a.1.4	Totals	-	2,065	-	-	-	-	-	310	2,374	2,374	-	-	-	-	-	-	-	-	20,238	-
Disposal of Plant Systems																					
4a.1.5.1	Auxiliary Feedwater	-	80	-	-	-	-	-	12	92	-	-	92	-	-	-	-	-	-	1,244	-
4a.1.5.2	Auxiliary Steam	-	72	-	-	-	-	-	11	83	-	-	83	-	-	-	-	-	-	1,126	-
4a.1.5.3	Auxiliary Steam RCA	-	138	22	11	-	54	-	52	276	276	-	-	-	805	-	-	-	42,068	1,984	-
4a.1.5.4	Boric Acid Processing	-	517	127	78	-	392	-	252	1,366	1,366	-	-	-	6,102	-	-	-	303,638	8,026	-
4a.1.5.5	CO2 & H2	-	27	-	-	-	-	-	4	31	-	-	31	-	-	-	-	-	-	419	-
4a.1.5.6	CO2 & H2 RCA	-	40	5	2	-	11	-	13	71	71	-	-	-	159	-	-	-	8,312	583	-
4a.1.5.7	Chemical Feed	-	59	-	-	-	-	-	9	68	-	-	68	-	-	-	-	-	-	934	-
4a.1.5.8	Chilled Water	-	74	-	-	-	-	-	11	85	-	-	85	-	-	-	-	-	-	1,142	-
4a.1.5.9	Circulating Water	-	323	-	-	-	-	-	48	372	-	-	372	-	-	-	-	-	-	5,150	-
4a.1.5.10	Condensate	-	386	-	-	-	-	-	58	444	-	-	444	-	-	-	-	-	-	6,023	-
4a.1.5.11	Condensate Booster	-	347	-	-	-	-	-	52	400	-	-	400	-	-	-	-	-	-	5,428	-
4a.1.5.12	Condensate Cleanup	-	68	-	-	-	-	-	10	79	-	-	79	-	-	-	-	-	-	1,060	-
4a.1.5.13	Containment Spray	-	264	82	46	-	233	-	139	765	765	-	-	-	3,481	-	-	-	180,655	3,897	-
4a.1.5.14	Diesel Fuel Oil	-	105	-	-	-	-	-	16	120	-	-	120	-	-	-	-	-	-	1,615	-
4a.1.5.15	Essential Service Water	-	244	-	-	-	-	-	37	280	-	-	280	-	-	-	-	-	-	3,837	-
4a.1.5.16	Extraction Steam	-	194	-	-	-	-	-	29	223	-	-	223	-	-	-	-	-	-	3,089	-
4a.1.5.17	Feedwater	-	324	-	-	-	-	-	49	372	-	-	372	-	-	-	-	-	-	5,142	-
4a.1.5.18	Feedwater Drains	-	776	-	-	-	-	-	116	892	-	-	892	-	-	-	-	-	-	12,366	-
4a.1.5.19	Gland Steam	-	58	-	-	-	-	-	9	67	-	-	67	-	-	-	-	-	-	932	-
4a.1.5.20	Gland Water	-	51	-	-	-	-	-	8	59	-	-	59	-	-	-	-	-	-	828	-
4a.1.5.21	Main Steam	-	331	-	-	-	-	-	50	380	-	-	380	-	-	-	-	-	-	5,216	-
4a.1.5.22	Main Steam RCA	-	53	16	10	-	49	-	28	155	155	-	-	-	726	-	-	-	37,727	769	-
4a.1.5.23	Nitrogen	-	3	1	1	-	3	-	2	10	10	-	-	-	49	-	-	-	2,447	50	-
4a.1.5.24	Non-Essential Service Water	-	183	-	-	-	-	-	27	211	-	-	211	-	-	-	-	-	-	2,916	-
4a.1.5.25	Non-Essential Service Water RCA	-	96	32	19	-	94	-	53	294	294	-	-	-	1,400	-	-	-	72,790	1,358	-
4a.1.5.26	Off Gas	-	583	125	71	-	360	-	259	1,398	1,398	-	-	-	5,352	-	-	-	278,775	8,689	-
4a.1.5.27	Process Radiation Monitoring	-	43	3	1	-	7	-	13	68	68	-	-	-	109	-	-	-	5,726	671	-
4a.1.5.28	Process Sampling	-	125	13	8	-	40	-	44	228	228	-	-	-	590	-	-	-	30,697	1,947	-
4a.1.5.29	Station Air	-	31	-	-	-	-	-	5	36	-	-	36	-	-	-	-	-	-	498	-
4a.1.5.30	Station Heating	-	113	-	-	-	-	-	17	130	-	-	130	-	-	-	-	-	-	1,771	-
4a.1.5.31	Switchgear Heat Removal	-	9	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	139	-
4a.1.5.32	Turbine Bldg Equip Drains	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	17	-
4a.1.5.33	Turbine Generator	-	58	-	-	-	-	-	9	67	-	-	67	-	-	-	-	-	-	901	-
4a.1.5.34	Turbine Oil	-	89	-	-	-	-	-	13	103	-	-	103	-	-	-	-	-	-	1,399	-
4a.1.5.35	Waste Oil Sumps	-	31	-	-	-	-	-	5	35	-	-	35	-	-	-	-	-	-	483	-
4a.1.5	Totals	-	5,894	426	246	-	1,242	-	1,460	9,268	4,630	-	4,638	-	18,774	-	-	-	962,836	91,647	-
4a.1.6	Scaffolding in support of decommissioning	-	1,088	9	5	-	24	-	280	1,406	1,406	-	-	-	359	-	-	-	18,654	18,101	-
4a.1	Subtotal Period 4a Activity Costs	441	24,004	19,201	11,569	-	53,025	580	28,710	137,530	132,892	-	4,638	-	308,049	501	393	2,217	17,977,090	256,796	10,032

Table E-1
Byron Nuclear Power Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 4a Additional Costs																					
4a.2.1	Remedial Action Surveys	-	-	-	-	-	-	1,976	593	2,569	2,569	-	-	-	-	-	-	-	-	31,151	-
4a.2.2	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
4a.2.3	Operational Tools and Equipment	-	-	9	51	-	189	-	56	304	304	-	-	-	5,855	-	-	-	146,375	16	-
4a.2	Subtotal Period 4a Additional Costs	-	-	9	51	-	189	2,026	656	2,931	2,931	-	-	-	5,855	-	-	-	146,375	31,167	-
Period 4a Collateral Costs																					
4a.3.1	Process decommissioning water waste	5	-	9	23	-	30	-	14	82	82	-	-	-	85	-	-	-	5,089	17	-
4a.3.3	Small tool allowance	-	273	-	-	-	-	-	41	314	283	-	31	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	5	273	9	23	-	30	-	55	396	365	-	31	-	85	-	-	-	5,089	17	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	81	-	-	-	-	-	-	20	101	101	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	781	78	859	859	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	749	75	824	741	-	82	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	2,044	-	-	-	-	-	511	2,555	2,555	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	3,045	-	-	-	-	-	457	3,502	3,502	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	79	42	-	239	-	74	434	434	-	-	-	3,733	-	-	-	74,651	122	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	2,532	380	2,912	2,912	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	905	90	995	995	-	-	-	-	-	-	-	-	-	-
4a.4.9	Site O&M Cost	-	-	-	-	-	-	247	37	284	284	-	-	-	-	-	-	-	-	-	-
4a.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	601	90	691	691	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	5,582	837	6,419	6,419	-	-	-	-	-	-	-	-	-	97,679
4a.4.12	DOC Staff Cost	-	-	-	-	-	-	17,936	2,690	20,626	20,626	-	-	-	-	-	-	-	-	-	215,674
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	29,741	4,461	34,202	34,202	-	-	-	-	-	-	-	-	-	390,714
4a.4	Subtotal Period 4a Period-Dependent Costs	81	5,089	79	42	-	239	59,073	9,801	74,404	74,322	-	82	-	3,733	-	-	-	74,651	122	704,067
4a.0	TOTAL PERIOD 4a COST	527	29,366	19,298	11,686	-	53,482	61,679	39,223	215,262	210,510	-	4,752	-	317,721	501	393	2,217	18,203,200	288,101	714,099
PERIOD 4b - Site Decontamination																					
Disposal of Plant Systems																					
4b.1.2.1	Chemical & Volume Control	-	1,136	159	83	-	419	-	417	2,213	2,213	-	-	-	6,236	-	-	-	324,551	16,476	-
4b.1.2.2	Chilled Water RCA	-	322	108	60	-	304	-	176	970	970	-	-	-	4,527	-	-	-	235,699	4,956	-
4b.1.2.3	Component Cooling RCA	-	682	194	110	-	553	-	345	1,884	1,884	-	-	-	8,239	-	-	-	428,586	10,074	-
4b.1.2.4	Electrical	-	3,113	-	-	-	-	-	467	3,580	-	-	3,580	-	-	-	-	-	-	48,490	-
4b.1.2.5	Electrical - Contaminated	-	1,160	128	85	-	430	-	423	2,225	2,225	-	-	-	6,418	-	-	-	333,233	17,294	-
4b.1.2.6	Electrical - RCA	-	1,940	347	222	-	1,123	-	834	4,466	4,466	-	-	-	16,763	-	-	-	870,329	29,753	-
4b.1.2.7	Emergency Diesel Generator	-	132	-	-	-	-	-	20	152	-	-	152	-	-	-	-	-	-	2,066	-
4b.1.2.8	Essential Service Water RCA	-	306	112	66	-	333	-	181	998	998	-	-	-	4,958	-	-	-	257,885	4,643	-
4b.1.2.9	Fire Protection	-	127	-	-	-	-	-	19	146	-	-	146	-	-	-	-	-	-	1,984	-
4b.1.2.10	Fire Protection RCA	-	189	29	14	-	70	-	70	371	371	-	-	-	1,032	-	-	-	53,961	2,693	-
4b.1.2.11	HVAC-Auxiliary Building	-	518	97	64	-	323	-	230	1,233	1,233	-	-	-	4,827	-	-	-	250,668	7,298	-
4b.1.2.12	HVAC-Diesel Generator Room	-	44	-	-	-	-	-	7	50	-	-	50	-	-	-	-	-	-	682	-
4b.1.2.13	HVAC-Miscellaneous	-	42	-	-	-	-	-	6	49	-	-	49	-	-	-	-	-	-	656	-
4b.1.2.14	HVAC-Primary Containment	-	627	203	135	-	683	-	368	2,017	2,017	-	-	-	10,197	-	-	-	529,451	8,908	-
4b.1.2.15	HVAC-Turbine Building	-	190	-	-	-	-	-	28	218	-	-	218	-	-	-	-	-	-	3,177	-
4b.1.2.16	Instrument Air Supply	-	47	-	-	-	-	-	7	54	-	-	54	-	-	-	-	-	-	760	-
4b.1.2.17	Instrument Air Supply RCA	-	76	10	5	-	24	-	27	141	141	-	-	-	354	-	-	-	18,493	1,096	-
4b.1.2.18	Miscellaneous Drains	-	40	7	4	-	20	-	16	87	87	-	-	-	299	-	-	-	15,562	594	-
4b.1.2.19	Primary Containment Purge	-	285	128	75	-	377	-	189	1,054	1,054	-	-	-	5,614	-	-	-	292,306	4,509	-
4b.1.2.20	Primary Water	-	62	6	3	-	15	-	20	106	106	-	-	-	218	-	-	-	11,425	924	-
4b.1.2.21	Radioactive Waste Disposal	-	945	159	88	-	446	-	377	2,015	2,015	-	-	-	6,808	-	-	-	345,754	14,349	-
4b.1.2.22	Reactor Building Equipment Drains	-	100	17	9	-	47	-	40	213	213	-	-	-	695	-	-	-	36,107	1,451	-
4b.1.2.23	Reactor Building Floor Drains	-	47	7	4	-	18	-	17	92	92	-	-	-	265	-	-	-	13,801	686	-
4b.1.2.24	Reactor Coolant	-	175	22	11	-	55	-	61	324	324	-	-	-	812	-	-	-	42,440	2,529	-
4b.1.2.25	Residual Heat Removal	-	197	49	29	-	147	-	95	516	516	-	-	-	2,184	-	-	-	113,636	2,985	-
4b.1.2.26	Safety Injection	-	902	230	137	-	694	-	443	2,405	2,405	-	-	-	10,622	-	-	-	537,761	13,820	-
4b.1.2.27	Station Air RCA	-	37	5	2	-	11	-	13	68	68	-	-	-	169	-	-	-	8,811	531	-
4b.1.2.28	Station Heating RCA	-	124	31	16	-	81	-	57	309	309	-	-	-	1,209	-	-	-	63,061	1,826	-
4b.1.2.29	Waste Oil Sumps RCA	-	7	1	1	-	3	-	3	15	15	-	-	-	50	-	-	-	2,602	95	-
4b.1.2	Totals	-	13,572	2,048	1,223	-	6,174	-	4,955	27,973	23,724	-	4,250	-	92,495	-	-	-	4,786,121	205,305	-
4b.1.3	Scaffolding in support of decommissioning	-	1,633	13	7	-	36	-	420	2,108	2,108	-	-	-	539	-	-	-	27,981	27,151	-

Table E-1
Byron Nuclear Power Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Decontamination of Site Buildings																					
4b.1.4.1	Reactor	2,018	1,452	207	328	-	999	-	1,692	6,696	6,696	-	-	-	16,618	-	-	-	1,181,636	50,402	-
4b.1.4.2	Auxiliary Building	202	110	20	17	-	69	-	150	567	567	-	-	-	1,101	-	-	-	63,260	4,568	-
4b.1.4.3	Refueling Water Storage Tank	367	428	38	17	-	83	-	318	1,253	1,253	-	-	-	1,240	-	-	-	67,351	11,972	-
4b.1.4	Totals	2,587	1,990	265	362	-	1,152	-	2,160	8,516	8,516	-	-	-	18,960	-	-	-	1,312,247	66,942	-
4b.1	Subtotal Period 4b Activity Costs	2,587	17,195	2,327	1,592	-	7,362	-	7,535	38,597	34,348	-	4,250	-	111,994	-	-	-	6,126,348	299,399	-
Period 4b Additional Costs																					
4b.2.1	License Termination Survey Planning	-	-	-	-	-	-	993	298	1,291	1,291	-	-	-	-	-	-	-	-	-	6,240
4b.2.2	Remedial Action Surveys	-	-	-	-	-	-	2,923	877	3,800	3,800	-	-	-	-	-	-	-	-	46,072	-
4b.2.3	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
4b.2.4	License Termination ISFSI	-	506	197	322	-	893	1,723	910	4,552	4,552	-	-	-	14,550	-	-	-	1,178,838	11,245	7,252
4b.2.5	Underground Services Excavation	-	506	-	-	-	-	-	76	581	581	-	-	-	-	-	-	-	-	2,755	-
4b.2	Subtotal Period 4b Additional Costs	-	1,012	197	322	-	893	5,689	2,169	10,282	10,282	-	-	-	14,550	-	-	-	1,178,838	60,071	13,492
Period 4b Collateral Costs																					
4b.3.1	Process decommissioning water waste	6	-	11	29	-	37	-	18	102	102	-	-	-	106	-	-	-	6,368	21	-
4b.3.3	Small tool allowance	-	330	-	-	-	-	-	49	379	379	-	-	-	-	-	-	-	-	-	-
4b.3.4	Decommissioning Equipment Disposition	-	-	171	94	-	472	-	149	887	887	-	-	-	7,054	-	-	-	366,237	88	-
4b.3	Subtotal Period 4b Collateral Costs	6	330	182	123	-	510	-	217	1,368	1,368	-	-	-	7,160	-	-	-	372,606	109	-
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	730	-	-	-	-	-	-	183	913	913	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	1,155	116	1,271	1,271	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	1,107	111	1,218	1,218	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	2,610	-	-	-	-	-	652	3,262	3,262	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	4,459	-	-	-	-	-	669	5,128	5,128	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	91	49	-	276	-	85	501	501	-	-	-	4,309	-	-	-	86,182	141	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	2,956	443	3,400	3,400	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	1,338	134	1,472	1,472	-	-	-	-	-	-	-	-	-	-
4b.4.9	Site O&M Cost	-	-	-	-	-	-	366	55	420	420	-	-	-	-	-	-	-	-	-	-
4b.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	889	133	1,022	1,022	-	-	-	-	-	-	-	-	-	-
4b.4.11	Security Staff Cost	-	-	-	-	-	-	1,328	199	1,527	1,527	-	-	-	-	-	-	-	-	-	25,426
4b.4.12	DOC Staff Cost	-	-	-	-	-	-	16,578	2,487	19,065	19,065	-	-	-	-	-	-	-	-	-	217,274
4b.4.13	Utility Staff Cost	-	-	-	-	-	-	27,981	4,197	32,178	32,178	-	-	-	-	-	-	-	-	-	388,320
4b.4	Subtotal Period 4b Period-Dependent Costs	730	7,069	91	49	-	276	53,698	9,464	71,377	71,377	-	-	-	4,309	-	-	-	86,182	141	631,020
4b.0	TOTAL PERIOD 4b COST	3,324	25,606	2,797	2,086	-	9,041	59,387	19,384	121,624	117,374	-	4,250	-	138,012	-	-	-	7,763,973	359,719	644,512
PERIOD 4e - Delay before License Termination																					
Period 4e Period-Dependent Costs																					
4e.4.1	Insurance	-	-	-	-	-	-	777	78	855	855	-	-	-	-	-	-	-	-	-	-
4e.4.2	Property taxes	-	-	-	-	-	-	745	74	819	819	-	-	-	-	-	-	-	-	-	-
4e.4.3	Health physics supplies	-	132	-	-	-	-	-	33	166	166	-	-	-	-	-	-	-	-	-	-
4e.4.4	Disposal of DAW generated	-	-	3	2	-	10	-	3	17	17	-	-	-	149	-	-	-	2,971	5	-
4e.4.6	NRC Fees	-	-	-	-	-	-	378	38	416	416	-	-	-	-	-	-	-	-	-	-
4e.4.7	Site O&M Cost	-	-	-	-	-	-	246	37	283	283	-	-	-	-	-	-	-	-	-	-
4e.4.8	Utility Staff Cost	-	-	-	-	-	-	1,497	224	1,721	1,721	-	-	-	-	-	-	-	-	-	21,760
4e.4	Subtotal Period 4e Period-Dependent Costs	-	132	3	2	-	10	3,642	487	4,276	4,276	-	-	-	149	-	-	-	2,971	5	21,760
4e.0	TOTAL PERIOD 4e COST	-	132	3	2	-	10	3,642	487	4,276	4,276	-	-	-	149	-	-	-	2,971	5	21,760
PERIOD 4f - License Termination																					
Period 4f Direct Decommissioning Activities																					
4f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
4f.1.2	Terminate license									a											
4f.1	Subtotal Period 4f Activity Costs	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
Period 4f Additional Costs																					
4f.2.1	License Termination Survey	-	-	-	-	-	-	6,411	1,923	8,334	8,334	-	-	-	-	-	-	-	-	91,892	3,120
4f.2	Subtotal Period 4f Additional Costs	-	-	-	-	-	-	6,411	1,923	8,334	8,334	-	-	-	-	-	-	-	-	91,892	3,120
Period 4f Collateral Costs																					
4f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,080	162	1,242	1,242	-	-	-	-	-	-	-	-	-	-
4f.3	Subtotal Period 4f Collateral Costs	-	-	-	-	-	-	1,080	162	1,242	1,242	-	-	-	-	-	-	-	-	-	-

Table E-1
Byron Nuclear Power Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 4f Period-Dependent Costs																					
4f.4.1	Insurance	-	-	-	-	-	-	393	39	432	432	-	-	-	-	-	-	-	-	-	-
4f.4.2	Property taxes	-	-	-	-	-	-	376	38	414	414	-	-	-	-	-	-	-	-	-	-
4f.4.3	Health physics supplies	-	546	-	-	-	-	-	137	683	683	-	-	-	-	-	-	-	-	-	-
4f.4.4	Disposal of DAW generated	-	-	7	4	-	21	-	7	39	39	-	-	-	335	-	-	-	6,698	11	-
4f.4.5	Plant energy budget	-	-	-	-	-	-	268	40	308	308	-	-	-	-	-	-	-	-	-	-
4f.4.6	NRC Fees	-	-	-	-	-	-	455	46	501	501	-	-	-	-	-	-	-	-	-	-
4f.4.7	Site O&M Cost	-	-	-	-	-	-	124	19	143	143	-	-	-	-	-	-	-	-	-	-
4f.4.8	Security Staff Cost	-	-	-	-	-	-	684	103	787	787	-	-	-	-	-	-	-	-	-	11,786
4f.4.9	DOC Staff Cost	-	-	-	-	-	-	3,919	588	4,507	4,507	-	-	-	-	-	-	-	-	-	46,750
4f.4.10	Utility Staff Cost	-	-	-	-	-	-	4,776	716	5,493	5,493	-	-	-	-	-	-	-	-	-	56,964
4f.4	Subtotal Period 4f Period-Dependent Costs	-	546	7	4	-	21	10,996	1,731	13,306	13,306	-	-	-	335	-	-	-	6,698	11	115,500
4f.0	TOTAL PERIOD 4f COST	-	546	7	4	-	21	18,659	3,868	23,106	23,106	-	-	-	335	-	-	-	6,698	91,902	118,620
PERIOD 4 TOTALS		3,851	55,650	22,104	13,778	-	62,554	143,367	62,963	364,268	355,266	-	9,002	-	456,217	501	393	2,217	25,976,840	739,728	1,498,991
PERIOD 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	Reactor	-	7,213	-	-	-	-	-	1,082	8,294	-	-	8,294	-	-	-	-	-	-	69,541	-
5b.1.1.2	Auxiliary Building	-	6,230	-	-	-	-	-	934	7,164	-	-	7,164	-	-	-	-	-	-	61,288	-
5b.1.1.3	Old Steam Generator Storage Facility	-	490	-	-	-	-	-	74	564	-	-	564	-	-	-	-	-	-	4,868	-
5b.1.1.4	Refueling Water Storage Tank	-	1,099	-	-	-	-	-	165	1,263	-	-	1,263	-	-	-	-	-	-	11,688	-
5b.1.1.5	Turbine Building	-	6,069	-	-	-	-	-	910	6,979	-	-	6,979	-	-	-	-	-	-	70,347	-
5b.1.1.6	Turbine Pedestal	-	1,463	-	-	-	-	-	219	1,682	-	-	1,682	-	-	-	-	-	-	12,628	-
5b.1.1	Totals	-	22,563	-	-	-	-	-	3,384	25,947	-	-	25,947	-	-	-	-	-	-	230,359	-
Site Closeout Activities																					
5b.1.2	Grade & landscape site	-	345	-	-	-	-	-	52	397	-	-	397	-	-	-	-	-	-	869	-
5b.1.3	Final report to NRC	-	-	-	-	-	-	199	30	228	228	-	-	-	-	-	-	-	-	-	1,560
5b.1	Subtotal Period 5b Activity Costs	-	22,908	-	-	-	-	199	3,466	26,572	228	-	26,344	-	-	-	-	-	-	231,229	1,560
Period 5b Additional Costs																					
5b.2.1	Site Restoration ISFSI	-	1,199	-	-	-	-	28	184	1,411	-	-	1,411	-	-	-	-	-	-	13,522	80
5b.2.2	Concrete Crushing	-	607	-	-	-	-	4	92	702	-	-	702	-	-	-	-	-	-	2,798	-
5b.2.3	Demolish Cooling Tower	-	5,877	-	-	-	-	165	906	6,948	-	-	6,948	-	-	-	-	-	-	73,296	-
5b.2	Subtotal Period 5b Additional Costs	-	7,682	-	-	-	-	196	1,182	9,060	-	-	9,060	-	-	-	-	-	-	89,615	80
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	316	-	-	-	-	-	47	364	-	-	364	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	316	-	-	-	-	-	47	364	-	-	364	-	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																					
5b.4.2	Property taxes	-	-	-	-	-	-	1,239	124	1,363	-	-	1,363	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	7,086	-	-	-	-	-	1,063	8,149	-	-	8,149	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	441	66	507	-	-	507	-	-	-	-	-	-	-	-
5b.4.5	Site O&M Cost	-	-	-	-	-	-	409	61	470	-	-	470	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	2,015	302	2,317	-	-	2,317	-	-	-	-	-	-	-	34,287
5b.4.7	DOC Staff Cost	-	-	-	-	-	-	11,965	1,795	13,760	-	-	13,760	-	-	-	-	-	-	-	137,043
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	5,873	881	6,754	-	-	6,754	-	-	-	-	-	-	-	67,229
5b.4	Subtotal Period 5b Period-Dependent Costs	-	7,086	-	-	-	-	21,942	4,292	33,321	-	-	33,321	-	-	-	-	-	-	-	238,558
5b.0	TOTAL PERIOD 5b COST	-	37,993	-	-	-	-	22,337	8,988	69,317	228	-	69,089	-	-	-	-	-	-	320,844	240,198
PERIOD 5 TOTALS		-	37,993	-	-	-	-	22,337	8,988	69,317	228	-	69,089	-	-	-	-	-	-	320,844	240,198
TOTAL COST TO DECOMMISSION		**9,404**	**103,733**	**22,481**	**14,430**	**-**	**63,772**	**683,474**	**148,271**	**1,045,566**	**776,133**	**189,729**	**79,704**	**-**	**466,140**	**501**	**393**	**2,217**	**26,256,530**	**1,148,004**	**5,063,157**

Table E-1
Byron Nuclear Power Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			

TOTAL COST TO DECOMMISSION WITH 16.52% CONTINGENCY:	**$1,045,566**	**thousands of 2014 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 74.23% OR:	**$776,133**	**thousands of 2014 dollars**
SPENT FUEL MANAGEMENT COST IS 18.15% OR:	**$189,729**	**thousands of 2014 dollars**
NON-NUCLEAR DEMOLITION COST IS 7.62% OR:	**$79,704**	**thousands of 2014 dollars**
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	**467,034**	**cubic feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**2,217**	**cubic feet**
TOTAL SCRAP METAL REMOVED:	**56,010**	**tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,148,004**	**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 E-2
Byron Nuclear Power Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	481	144	625	625	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	71	11	81	81	-	-	-	-	-	-	-	-	-	556
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	-	-	-	-	-	-	109	16	125	125	-	-	-	-	-	-	-	-	-	856
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	71	11	81	81	-	-	-	-	-	-	-	-	-	556
1a.1.9	Perform detailed rad survey									a											
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	54	8	63	63	-	-	-	-	-	-	-	-	-	428
1a.1.11	End product description	-	-	-	-	-	-	54	8	63	63	-	-	-	-	-	-	-	-	-	428
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	82	12	94	94	-	-	-	-	-	-	-	-	-	642
1a.1.13	Define major work sequence	-	-	-	-	-	-	54	8	63	63	-	-	-	-	-	-	-	-	-	428
1a.1.14	Perform SER and EA	-	-	-	-	-	-	169	25	194	194	-	-	-	-	-	-	-	-	-	1,327
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	272	41	313	313	-	-	-	-	-	-	-	-	-	2,140
Activity Specifications																					
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	268	40	308	308	-	-	-	-	-	-	-	-	-	2,106
1a.1.16.2	Plant systems	-	-	-	-	-	-	227	34	261	261	-	-	-	-	-	-	-	-	-	1,783
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	170	26	196	196	-	-	-	-	-	-	-	-	-	1,335
1a.1.16.4	Waste management	-	-	-	-	-	-	109	16	125	125	-	-	-	-	-	-	-	-	-	856
1a.1.16.5	Facility and site dormancy	-	-	-	-	-	-	109	16	125	125	-	-	-	-	-	-	-	-	-	856
1a.1.16	Total	-	-	-	-	-	-	883	132	1,016	1,016	-	-	-	-	-	-	-	-	-	6,936
Detailed Work Procedures																					
1a.1.17.1	Plant systems	-	-	-	-	-	-	64	10	74	74	-	-	-	-	-	-	-	-	-	506
1a.1.17.2	Facility closeout & dormancy	-	-	-	-	-	-	65	10	75	75	-	-	-	-	-	-	-	-	-	514
1a.1.17	Total	-	-	-	-	-	-	130	19	149	149	-	-	-	-	-	-	-	-	-	1,020
1a.1.18	Procure vacuum drying system	-	-	-	-	-	-	5	1	6	6	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	2,436	438	2,874	2,874	-	-	-	-	-	-	-	-	-	15,361
Period 1a Additional Costs																					
1a.2.1	ISFSI Expansion	-	-	-	-	-	-	4,800	720	5,520	-	5,520	-	-	-	-	-	-	-	-	-
1a.2	Subtotal Period 1a Additional Costs	-	-	-	-	-	-	4,800	720	5,520	-	5,520	-	-	-	-	-	-	-	-	-
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	10,066	1,510	11,576	-	11,576	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	10,066	1,510	11,576	-	11,576	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,855	185	2,040	2,040	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	494	-	-	-	-	-	124	618	618	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	530	-	-	-	-	-	80	610	610	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	13	7	-	39	-	12	71	71	-	-	-	611	-	-	-	12,224	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,783	267	2,051	2,051	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	836	84	920	920	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	2,177	218	2,394	-	2,394	-	-	-	-	-	-	-	-	-
1a.4.9	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	397	59	456	-	456	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	48	7	55	-	55	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	8,569	1,285	9,855	9,855	-	-	-	-	-	-	-	-	-	157,903
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	32,368	4,855	37,223	37,223	-	-	-	-	-	-	-	-	-	424,560
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,025	13	7	-	39	48,198	7,202	56,483	53,577	2,906	-	-	611	-	-	-	12,224	20	582,463
1a.0	TOTAL PERIOD 1a COST	-	1,025	13	7	-	39	65,500	9,869	76,453	56,451	20,001	-	-	611	-	-	-	12,224	20	597,824

Table E-2
Byron Nuclear Power Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 1b - SAFSTOR Limited DECON Activities																					
Period 1b Direct Decommissioning Activities																					
Decontamination of Site Buildings																					
1b.1.1.1	Reactor	2,223	-	-	-	-	-	-	1,111	3,334	3,334	-	-	-	-	-	-	-	33,093	-
1b.1.1.2	Auxiliary Building	256	-	-	-	-	-	-	128	384	384	-	-	-	-	-	-	-	3,830	-
1b.1.1.3	Radwaste/Service Building	167	-	-	-	-	-	-	83	250	250	-	-	-	-	-	-	-	2,506	-
1b.1.1.4	Refueling Water Storage Tank	366	-	-	-	-	-	-	183	549	549	-	-	-	-	-	-	-	5,322	-
1b.1.1.5	Fuel Handling Building	1,046	-	-	-	-	-	-	523	1,569	1,569	-	-	-	-	-	-	-	15,238	-
1b.1.1	Totals	4,058	-	-	-	-	-	-	2,029	6,086	6,086	-	-	-	-	-	-	-	59,990	-
1b.1	Subtotal Period 1b Activity Costs	4,058	-	-	-	-	-	-	2,029	6,086	6,086	-	-	-	-	-	-	-	59,990	-
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	886	-	-	-	-	-	-	133	1,019	1,019	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process decommissioning water waste	200	-	131	349	-	443	-	276	1,399	1,399	-	-	-	1,262	-	-	-	75,709	246	-
1b.3.4	Small tool allowance	-	67	-	-	-	-	-	10	77	77	-	-	-	-	-	-	-	-	-	-
1b.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,503	375	2,878	-	2,878	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	1,086	67	131	349	-	443	2,503	795	5,373	2,495	2,878	-	-	1,262	-	-	-	75,709	246	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	816	-	-	-	-	-	-	204	1,020	1,020	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	234	23	258	258	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	4,112	411	4,524	4,524	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	398	-	-	-	-	-	100	498	498	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	132	-	-	-	-	-	20	152	152	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	12	7	-	37	-	12	68	68	-	-	-	585	-	-	-	11,700	19	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	443	67	510	510	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	116	12	128	128	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	541	54	595	-	595	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Cost	-	-	-	-	-	-	41	6	47	47	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	99	15	113	-	113	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	12	2	14	-	14	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	2,131	320	2,450	2,450	-	-	-	-	-	-	-	-	-	39,260
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	8,048	1,207	9,255	9,255	-	-	-	-	-	-	-	-	-	105,560
1b.4	Subtotal Period 1b Period-Dependent Costs	816	530	12	7	-	37	15,777	2,451	19,631	18,908	722	-	-	585	-	-	-	11,700	19	144,820
1b.0	TOTAL PERIOD 1b COST	5,960	597	143	356	-	480	18,280	5,275	31,091	27,490	3,601	-	-	1,847	-	-	-	87,408	60,255	144,820
PERIOD 1c - Preparations for SAFSTOR Dormancy																					
Period 1c Direct Decommissioning Activities																					
1c.1.1	Prepare support equipment for storage	-	487	-	-	-	-	-	73	561	561	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	48	-	-	-	-	-	7	56	56	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	10,874	-
1c.1.4	Secure building accesses									a											
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	32	5	37	37	-	-	-	-	-	-	-	-	-	250
1c.1	Subtotal Period 1c Activity Costs	-	536	-	-	-	-	765	305	1,606	1,606	-	-	-	-	-	-	-	-	14,574	250
Period 1c Additional Costs																					
1c.2.1	Spent fuel pool isolation	-	-	-	-	-	-	10,813	1,622	12,434	12,434	-	-	-	-	-	-	-	-	-	-
1c.2	Subtotal Period 1c Additional Costs	-	-	-	-	-	-	10,813	1,622	12,434	12,434	-	-	-	-	-	-	-	-	-	-
Period 1c Collateral Costs																					
1c.3.1	Process decommissioning water waste	236	-	155	414	-	525	-	327	1,658	1,658	-	-	-	1,496	-	-	-	89,742	292	-
1c.3.3	Small tool allowance	-	4	-	-	-	-	-	1	5	5	-	-	-	-	-	-	-	-	-	-
1c.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,503	375	2,878	-	2,878	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	236	4	155	414	-	525	2,503	703	4,541	1,663	2,878	-	-	1,496	-	-	-	89,742	292	-
Period 1c Period-Dependent Costs																					
1c.4.1	Insurance	-	-	-	-	-	-	234	23	258	258	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	4,112	411	4,524	4,524	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	191	-	-	-	-	-	48	239	239	-	-	-	-	-	-	-	-	-	-

Table E-2
Byron Nuclear Power Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 1c Period-Dependent Costs (continued)																					
1c.4.4	Heavy equipment rental	-	132	-	-	-	-	-	20	152	152	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	3	2	-	10	-	3	18	18	-	-	-	152	-	-	-	3,039	5	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	443	67	510	510	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	116	12	128	128	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	541	54	595	-	595	-	-	-	-	-	-	-	-	-
1c.4.9	Site O&M Cost	-	-	-	-	-	-	41	6	47	47	-	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	99	15	113	-	113	-	-	-	-	-	-	-	-	-
1c.4.11	ISFSI Operating Costs	-	-	-	-	-	-	12	2	14	-	14	-	-	-	-	-	-	-	-	-
1c.4.12	Security Staff Cost	-	-	-	-	-	-	2,131	320	2,450	2,450	-	-	-	-	-	-	-	-	-	39,260
1c.4.13	Utility Staff Cost	-	-	-	-	-	-	8,048	1,207	9,255	9,255	-	-	-	-	-	-	-	-	-	105,560
1c.4	Subtotal Period 1c Period-Dependent Costs	-	323	3	2	-	10	15,777	2,187	18,301	17,579	722	-	-	152	-	-	-	3,039	5	144,820
1c.0	TOTAL PERIOD 1c COST	236	863	158	416	-	535	29,857	4,817	36,882	33,282	3,601	-	-	1,648	-	-	-	92,781	14,870	145,070
PERIOD 1 TOTALS		6,196	2,484	315	779	-	1,054	113,637	19,960	144,425	117,223	27,203	-	-	4,106	-	-	-	192,413	75,145	887,713
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	-	-	-	-	-	-	69	10	79	79	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	556	139	695	695	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	625	149	774	774	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																					
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	40,154	6,023	46,177	-	46,177	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	40,154	6,023	46,177	-	46,177	-	-	-	-	-	-	-	-	-
Period 2a Period-Dependent Costs																					
2a.4.1	Insurance	-	-	-	-	-	-	3,203	320	3,523	2,293	1,230	-	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	27,474	2,747	30,222	30,222	-	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	741	-	-	-	-	-	185	926	926	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	18	10	-	54	-	17	98	98	-	-	-	843	-	-	-	16,864	28	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	1,423	213	1,636	818	818	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	1,063	106	1,170	1,170	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	7,595	759	8,354	-	8,354	-	-	-	-	-	-	-	-	-
2a.4.8	Site O&M Cost	-	-	-	-	-	-	660	99	759	759	-	-	-	-	-	-	-	-	-	-
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	1,582	237	1,819	-	1,819	-	-	-	-	-	-	-	-	-
2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	191	29	220	-	220	-	-	-	-	-	-	-	-	-
2a.4.11	Security Staff Cost	-	-	-	-	-	-	24,487	3,673	28,160	4,495	23,665	-	-	-	-	-	-	-	-	444,257
2a.4.12	Utility Staff Cost	-	-	-	-	-	-	15,298	2,295	17,593	4,381	13,212	-	-	-	-	-	-	-	-	196,057
2a.4	Subtotal Period 2a Period-Dependent Costs	-	741	18	10	-	54	82,976	10,682	94,479	45,161	49,318	-	-	843	-	-	-	16,864	28	640,314
2a.0	TOTAL PERIOD 2a COST	-	741	18	10	-	54	123,754	16,854	141,430	45,935	95,495	-	-	843	-	-	-	16,864	28	640,314
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	-	-	-	-	-	-	323	48	371	371	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	2,593	648	3,241	3,241	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	2,916	697	3,612	3,612	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	9,688	1,453	11,141	-	11,141	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	9,688	1,453	11,141	-	11,141	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	9,731	973	10,704	10,704	-	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	9,328	933	10,261	10,261	-	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	1,703	-	-	-	-	-	426	2,129	2,129	-	-	-	-	-	-	-	-	-	-

Table E-2
Byron Nuclear Power Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 2b Period-Dependent Costs (continued)																					
2b.4.4	Disposal of DAW generated	-	-	41	22	-	124	-	38	224	224	-	-	-	1,928	-	-	-	38,567	63	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	3,320	498	3,818	3,818	-	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	4,775	477	5,252	5,252	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	35,446	3,545	38,990	-	38,990	-	-	-	-	-	-	-	-	-
2b.4.8	Site O&M Cost	-	-	-	-	-	-	3,080	462	3,542	3,542	-	-	-	-	-	-	-	-	-	-
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	891	134	1,025	-	1,025	-	-	-	-	-	-	-	-	-
2b.4.10	Security Staff Cost	-	-	-	-	-	-	30,446	4,567	35,013	20,979	14,034	-	-	-	-	-	-	-	-	525,651
2b.4.11	Utility Staff Cost	-	-	-	-	-	-	29,464	4,420	33,883	20,444	13,439	-	-	-	-	-	-	-	-	389,371
2b.4	Subtotal Period 2b Period-Dependent Costs	-	1,703	41	22	-	124	126,480	16,472	144,841	77,352	67,488	-	-	1,928	-	-	-	38,567	63	915,023
2b.0	TOTAL PERIOD 2b COST	-	1,703	41	22	-	124	139,083	18,622	159,594	80,965	78,629	-	-	1,928	-	-	-	38,567	63	915,023
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	-	-	-	-	-	-	473	71	544	544	-	-	-	-	-	-	-	-	-	-
2c.1.5	Maintenance supplies	-	-	-	-	-	-	3,805	951	4,756	4,756	-	-	-	-	-	-	-	-	-	-
2c.1	Subtotal Period 2c Activity Costs	-	-	-	-	-	-	4,278	1,022	5,300	5,300	-	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	14,278	1,428	15,705	15,705	-	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	13,687	1,369	15,055	15,055	-	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	2,421	-	-	-	-	-	605	3,026	3,026	-	-	-	-	-	-	-	-	-	-
2c.4.4	Disposal of DAW generated	-	-	57	31	-	174	-	54	315	315	-	-	-	2,710	-	-	-	54,200	88	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	4,871	731	5,602	5,602	-	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	6,744	674	7,419	7,419	-	-	-	-	-	-	-	-	-	-
2c.4.7	Site O&M Cost	-	-	-	-	-	-	4,519	678	5,197	5,197	-	-	-	-	-	-	-	-	-	-
2c.4.8	Security Staff Cost	-	-	-	-	-	-	26,767	4,015	30,782	30,782	-	-	-	-	-	-	-	-	-	428,486
2c.4.9	Utility Staff Cost	-	-	-	-	-	-	26,085	3,913	29,998	29,998	-	-	-	-	-	-	-	-	-	364,499
2c.4	Subtotal Period 2c Period-Dependent Costs	-	2,421	57	31	-	174	96,950	13,466	113,098	113,098	-	-	-	2,710	-	-	-	54,200	88	792,984
2c.0	TOTAL PERIOD 2c COST	-	2,421	57	31	-	174	101,228	14,488	118,399	118,399	-	-	-	2,710	-	-	-	54,200	88	792,984
PERIOD 2 TOTALS		-	4,865	115	62	-	351	364,065	49,964	419,423	245,299	174,124	-	-	5,482	-	-	-	109,632	179	2,348,321
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	71	11	81	81	-	-	-	-	-	-	-	-	-	556
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	251	38	288	288	-	-	-	-	-	-	-	-	-	1,969
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	54	8	63	63	-	-	-	-	-	-	-	-	-	428
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	71	11	81	81	-	-	-	-	-	-	-	-	-	556
3a.1.6	Define major work sequence	-	-	-	-	-	-	409	61	470	470	-	-	-	-	-	-	-	-	-	3,210
3a.1.7	Perform SER and EA	-	-	-	-	-	-	169	25	194	194	-	-	-	-	-	-	-	-	-	1,327
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	272	41	313	313	-	-	-	-	-	-	-	-	-	2,140
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	223	33	257	257	-	-	-	-	-	-	-	-	-	1,753
3a.1.10	Receive NRC approval of termination plan									a											
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	402	60	462	416	-	46	-	-	-	-	-	-	-	3,154
3a.1.11.2	Plant systems	-	-	-	-	-	-	227	34	261	235	-	26	-	-	-	-	-	-	-	1,783
3a.1.11.3	Reactor internals	-	-	-	-	-	-	387	58	445	445	-	-	-	-	-	-	-	-	-	3,039
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	354	53	407	407	-	-	-	-	-	-	-	-	-	2,782
3a.1.11.5	Biological shield	-	-	-	-	-	-	27	4	31	31	-	-	-	-	-	-	-	-	-	214
3a.1.11.6	Steam generators	-	-	-	-	-	-	170	26	196	196	-	-	-	-	-	-	-	-	-	1,335
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	87	13	100	50	-	50	-	-	-	-	-	-	-	685
3a.1.11.8	Main Turbine	-	-	-	-	-	-	22	3	25	-	-	25	-	-	-	-	-	-	-	171
3a.1.11.9	Main Condensers	-	-	-	-	-	-	22	3	25	-	-	25	-	-	-	-	-	-	-	171
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	170	26	196	98	-	98	-	-	-	-	-	-	-	1,335
3a.1.11.11	Waste management	-	-	-	-	-	-	251	38	288	288	-	-	-	-	-	-	-	-	-	1,969

Table E-2
Byron Nuclear Power Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Activity Specifications (continued)																					
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-	49	7	56	28	-	28	-	-	-	-	-	-	-	385
3a.1.11	Total	-	-	-	-	-	-	2,168	325	2,493	2,194	-	299	-	-	-	-	-	-	-	17,024
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	131	20	150	150	-	-	-	-	-	-	-	-	-	1,027
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	3,000	450	3,450	3,450	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	76	11	88	88	-	-	-	-	-	-	-	-	-	599
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,300	345	2,645	2,645	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	67	10	77	77	-	-	-	-	-	-	-	-	-	526
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	9,262	1,389	10,651	10,353	-	299	-	-	-	-	-	-	-	31,117
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	521	52	573	573	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	500	50	550	550	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	409	-	-	-	-	-	102	511	511	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	529	-	-	-	-	-	79	608	608	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	10	5	-	31	-	10	56	56	-	-	-	481	-	-	-	9,613	16	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	1,778	267	2,045	2,045	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	332	33	366	366	-	-	-	-	-	-	-	-	-	-
3a.4.8	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
3a.4.9	Security Staff Cost	-	-	-	-	-	-	327	49	376	376	-	-	-	-	-	-	-	-	-	6,257
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	14,339	2,151	16,490	16,490	-	-	-	-	-	-	-	-	-	200,229
3a.4	Subtotal Period 3a Period-Dependent Costs	-	938	10	5	-	31	17,963	2,818	21,765	21,765	-	-	-	481	-	-	-	9,613	16	206,486
3a.0	TOTAL PERIOD 3a COST	-	938	10	5	-	31	27,225	4,207	32,416	32,117	-	299	-	481	-	-	-	9,613	16	237,603
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	258	39	297	267	-	30	-	-	-	-	-	-	-	2,026
3b.1.1.2	Reactor internals	-	-	-	-	-	-	136	20	157	157	-	-	-	-	-	-	-	-	-	1,070
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	74	11	85	21	-	63	-	-	-	-	-	-	-	578
3b.1.1.4	CRD cooling assembly	-	-	-	-	-	-	54	8	63	63	-	-	-	-	-	-	-	-	-	428
3b.1.1.5	CRD housings & ICI tubes	-	-	-	-	-	-	54	8	63	63	-	-	-	-	-	-	-	-	-	428
3b.1.1.6	Incore instrumentation	-	-	-	-	-	-	54	8	63	63	-	-	-	-	-	-	-	-	-	428
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	198	30	227	227	-	-	-	-	-	-	-	-	-	1,554
3b.1.1.8	Facility closeout	-	-	-	-	-	-	65	10	75	38	-	38	-	-	-	-	-	-	-	514
3b.1.1.9	Missile shields	-	-	-	-	-	-	25	4	28	28	-	-	-	-	-	-	-	-	-	193
3b.1.1.10	Biological shield	-	-	-	-	-	-	65	10	75	75	-	-	-	-	-	-	-	-	-	514
3b.1.1.11	Steam generators	-	-	-	-	-	-	251	38	288	288	-	-	-	-	-	-	-	-	-	1,969
3b.1.1.12	Reinforced concrete	-	-	-	-	-	-	54	8	63	31	-	31	-	-	-	-	-	-	-	428
3b.1.1.13	Main Turbine	-	-	-	-	-	-	85	13	98	-	-	98	-	-	-	-	-	-	-	668
3b.1.1.14	Main Condensers	-	-	-	-	-	-	85	13	98	-	-	98	-	-	-	-	-	-	-	668
3b.1.1.15	Auxiliary building	-	-	-	-	-	-	149	22	171	154	-	17	-	-	-	-	-	-	-	1,168
3b.1.1.16	Reactor building	-	-	-	-	-	-	149	22	171	154	-	17	-	-	-	-	-	-	-	1,168
3b.1.1	Total	-	-	-	-	-	-	1,757	264	2,021	1,629	-	392	-	-	-	-	-	-	-	13,800
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	1,757	264	2,021	1,629	-	392	-	-	-	-	-	-	-	13,800
Period 3b Additional Costs																					
3b.2.1	Site Characterization	-	-	-	-	-	-	2,755	827	3,582	3,582	-	-	-	-	-	-	-	-	13,042	4,640
3b.2	Subtotal Period 3b Additional Costs	-	-	-	-	-	-	2,755	827	3,582	3,582	-	-	-	-	-	-	-	-	13,042	4,640
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	886	-	-	-	-	-	-	133	1,019	1,019	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,080	162	1,242	1,242	-	-	-	-	-	-	-	-	-	-
3b.3.3	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	886	1,100	-	-	-	-	1,080	460	3,526	3,526	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	27	-	-	-	-	-	-	7	34	34	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	263	26	289	289	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	252	25	277	277	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	222	-	-	-	-	-	56	278	278	-	-	-	-	-	-	-	-	-	-

Table E-2
Byron Nuclear Power Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 3b Period-Dependent Costs (continued)																					
3b.4.5	Heavy equipment rental	-	267	-	-	-	-	-	40	307	307	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	6	3	-	17	-	5	31	31	-	-	-	267	-	-	-	5,344	9	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	896	134	1,031	1,031	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	168	17	184	184	-	-	-	-	-	-	-	-	-	-
3b.4.9	Site O&M Cost	-	-	-	-	-	-	83	12	96	96	-	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	165	25	189	189	-	-	-	-	-	-	-	-	-	3,154
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	3,437	516	3,953	3,953	-	-	-	-	-	-	-	-	-	43,109
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	7,229	1,084	8,313	8,313	-	-	-	-	-	-	-	-	-	100,937
3b.4	Subtotal Period 3b Period-Dependent Costs	27	489	6	3	-	17	12,493	1,947	14,982	14,982	-	-	-	267	-	-	-	5,344	9	147,200
3b.0	TOTAL PERIOD 3b COST	914	1,589	6	3	-	17	18,085	3,498	24,111	23,719	-	392	-	267	-	-	-	5,344	13,051	165,640
PERIOD 3 TOTALS		914	2,527	16	8	-	48	45,309	7,705	56,526	55,836	-	690	-	748	-	-	-	14,956	13,066	403,242
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Reactor Coolant Piping	43	151	34	37	-	252	-	131	648	648	-	-	-	1,708	-	-	-	195,190	2,979	-
4a.1.1.2	Pressurizer Relief Tank	8	30	7	7	-	47	-	25	125	125	-	-	-	329	-	-	-	36,553	596	-
4a.1.1.3	Reactor Coolant Pumps & Motors	29	108	79	198	-	1,390	-	426	2,230	2,230	-	-	-	4,796	-	-	-	780,540	2,726	80
4a.1.1.4	Pressurizer	12	69	368	106	-	879	-	296	1,731	1,731	-	-	-	3,033	-	-	-	240,915	1,527	750
4a.1.1.5	Steam Generators	98	4,496	1,591	2,916	-	10,319	-	4,349	23,769	23,769	-	-	-	62,044	-	-	-	3,098,575	20,508	2,250
4a.1.1.6	CRDMs/ICIs/Service Structure Removal	41	301	230	47	-	188	-	173	979	979	-	-	-	3,881	-	-	-	145,494	5,232	-
4a.1.1.7	Reactor Vessel Internals	93	2,899	6,520	1,077	-	4,353	290	6,340	21,572	21,572	-	-	-	2,461	501	393	-	328,507	27,350	1,226
4a.1.1.8	Vessel & Internals GTCC Disposal	-	-	-	-	-	11,996	-	1,799	13,795	13,795	-	-	-	-	-	-	2,217	433,180	-	-
4a.1.1.9	Reactor Vessel	115	5,075	2,149	1,140	-	2,832	290	6,146	17,747	17,747	-	-	-	9,331	-	-	-	960,579	27,350	1,226
4a.1.1	Totals	438	13,130	10,978	5,528	-	32,256	580	19,685	82,596	82,596	-	-	-	87,582	501	393	2,217	6,219,533	88,269	5,532
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	603	3,092	1,094	-	3,337	-	1,458	9,584	9,584	-	-	-	57,484	-	-	-	2,984,647	9,146	-
4a.1.3	Main Condensers	-	1,204	1,828	998	-	5,039	-	1,893	10,963	10,963	-	-	-	75,240	-	-	-	3,906,532	18,250	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor	-	1,250	-	-	-	-	-	188	1,438	1,438	-	-	-	-	-	-	-	-	12,130	-
4a.1.4.2	Auxiliary Building	-	702	-	-	-	-	-	105	807	807	-	-	-	-	-	-	-	-	6,896	-
4a.1.4.3	Radwaste/Service Building	-	456	-	-	-	-	-	68	525	525	-	-	-	-	-	-	-	-	5,060	-
4a.1.4.4	Refueling Water Storage Tank	-	122	-	-	-	-	-	18	140	140	-	-	-	-	-	-	-	-	1,299	-
4a.1.4.5	Fuel Handling Building	-	360	-	-	-	-	-	54	414	414	-	-	-	-	-	-	-	-	3,690	-
4a.1.4	Totals	-	2,890	-	-	-	-	-	434	3,324	3,324	-	-	-	-	-	-	-	-	29,074	-
Disposal of Plant Systems																					
4a.1.5.1	Auxiliary Feedwater	-	256	41	24	-	120	-	102	543	543	-	-	-	1,791	-	-	-	93,271	3,811	-
4a.1.5.2	Auxiliary Steam	-	134	-	-	-	-	-	20	154	-	-	154	-	-	-	-	-	-	2,107	-
4a.1.5.3	Auxiliary Steam RCA	-	368	69	36	-	183	-	150	805	805	-	-	-	2,714	-	-	-	141,487	5,387	-
4a.1.5.4	Boric Acid Processing	-	481	82	47	-	238	-	195	1,042	1,042	-	-	-	3,611	-	-	-	184,114	7,055	-
4a.1.5.5	CO2 & H2	-	18	-	-	-	-	-	3	21	-	-	21	-	-	-	-	-	-	289	-
4a.1.5.6	CO2 & H2 RCA	-	35	7	4	-	18	-	14	78	78	-	-	-	276	-	-	-	14,104	492	-
4a.1.5.7	Chemical Feed	-	169	-	-	-	-	-	25	195	-	-	195	-	-	-	-	-	-	2,663	-
4a.1.5.8	Chilled Water	-	94	-	-	-	-	-	14	108	-	-	108	-	-	-	-	-	-	1,454	-
4a.1.5.9	Circulating Water	-	608	-	-	-	-	-	91	700	-	-	700	-	-	-	-	-	-	9,669	-
4a.1.5.10	Condensate	-	341	-	-	-	-	-	51	392	-	-	392	-	-	-	-	-	-	5,317	-
4a.1.5.11	Condensate Booster	-	340	-	-	-	-	-	51	391	-	-	391	-	-	-	-	-	-	5,314	-
4a.1.5.12	Condensate Cleanup	-	186	-	-	-	-	-	28	214	-	-	214	-	-	-	-	-	-	3,000	-
4a.1.5.13	Containment Spray	-	259	81	46	-	231	-	138	755	755	-	-	-	3,455	-	-	-	179,291	3,839	-
4a.1.5.14	Diesel Fuel Oil	-	185	-	-	-	-	-	28	213	-	-	213	-	-	-	-	-	-	2,848	-
4a.1.5.15	Essential Service Water	-	320	-	-	-	-	-	48	368	-	-	368	-	-	-	-	-	-	5,049	-
4a.1.5.16	Extraction Steam	-	229	-	-	-	-	-	34	263	-	-	263	-	-	-	-	-	-	3,637	-
4a.1.5.17	Feedwater	-	310	-	-	-	-	-	47	357	-	-	357	-	-	-	-	-	-	4,925	-
4a.1.5.18	Feedwater Drains	-	736	-	-	-	-	-	110	846	-	-	846	-	-	-	-	-	-	11,719	-
4a.1.5.19	Gland Steam	-	39	-	-	-	-	-	6	44	-	-	44	-	-	-	-	-	-	616	-
4a.1.5.20	Gland Water	-	28	-	-	-	-	-	4	33	-	-	33	-	-	-	-	-	-	458	-
4a.1.5.21	Main Steam	-	316	-	-	-	-	-	47	363	-	-	363	-	-	-	-	-	-	4,979	-
4a.1.5.22	Main Steam RCA	-	87	21	13	-	64	-	42	225	225	-	-	-	947	-	-	-	49,262	1,292	-

Table E-2
Byron Nuclear Power Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Disposal of Plant Systems (continued)																					
4a.1.5.23	Make-up Demineralizer	-	159	-	-	-	-	-	24	183	-	-	183	-	-	-	-	-	-	2,595	-
4a.1.5.24	Nitrogen	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	18	-
4a.1.5.25	Non-Essential Service Water	-	370	-	-	-	-	-	56	426	-	-	426	-	-	-	-	-	-	5,903	-
4a.1.5.26	Non-Essential Service Water RCA	-	184	81	50	-	251	-	124	690	690	-	-	-	3,738	-	-	-	194,273	2,692	-
4a.1.5.27	Off Gas	-	689	163	95	-	478	-	322	1,746	1,746	-	-	-	7,112	-	-	-	370,343	10,290	-
4a.1.5.28	Potable Water	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	75	-
4a.1.5.29	Process Radiation Monitoring	-	68	4	2	-	9	-	20	103	103	-	-	-	134	-	-	-	7,021	1,093	-
4a.1.5.30	Process Sampling	-	150	14	8	-	41	-	50	264	264	-	-	-	615	-	-	-	31,992	2,368	-
4a.1.5.31	Sewage Treatment Plant	-	98	-	-	-	-	-	15	113	-	-	113	-	-	-	-	-	-	1,579	-
4a.1.5.32	Station Air	-	44	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	705	-
4a.1.5.33	Station Heating	-	151	-	-	-	-	-	23	174	-	-	174	-	-	-	-	-	-	2,391	-
4a.1.5.34	Steam Humidification	-	7	-	-	-	-	-	1	8	-	-	8	-	-	-	-	-	-	115	-
4a.1.5.35	Switchgear Heat Removal	-	33	-	-	-	-	-	5	38	-	-	38	-	-	-	-	-	-	519	-
4a.1.5.36	Turbine Bldg Equip Drains	-	79	-	-	-	-	-	12	91	-	-	91	-	-	-	-	-	-	1,235	-
4a.1.5.37	Turbine Bldg Floor Drains	-	135	-	-	-	-	-	20	156	-	-	156	-	-	-	-	-	-	2,117	-
4a.1.5.38	Turbine Oil	-	85	-	-	-	-	-	13	98	-	-	98	-	-	-	-	-	-	1,359	-
4a.1.5.39	Turbine-Generator Auxilaries	-	57	-	-	-	-	-	9	66	-	-	66	-	-	-	-	-	-	884	-
4a.1.5.40	Waste Oil Sumps	-	33	-	-	-	-	-	5	38	-	-	38	-	-	-	-	-	-	517	-
4a.1.5.41	Well Water	-	80	-	-	-	-	-	12	93	-	-	93	-	-	-	-	-	-	1,247	-
4a.1.5	Totals	-	7,970	563	323	-	1,632	-	1,966	12,454	6,253	-	6,202	-	24,394	-	-	-	1,265,158	123,619	-
4a.1.6	Scaffolding in support of decommissioning	-	1,572	14	7	-	37	-	405	2,035	2,035	-	-	-	556	-	-	-	28,884	26,134	-
4a.1	Subtotal Period 4a Activity Costs	438	27,368	16,475	7,951	-	42,302	580	25,841	120,955	114,754	-	6,202	-	245,257	501	393	2,217	14,404,750	294,493	5,532
Period 4a Additional Costs																					
4a.2.1	Remedial Action Surveys	-	-	-	-	-	-	1,976	593	2,569	2,569	-	-	-	-	-	-	-	-	31,151	-
4a.2.2	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
4a.2.3	Operational Tools and Equipment	-	-	9	51	-	189	-	56	304	304	-	-	-	5,855	-	-	-	146,375	16	-
4a.2	Subtotal Period 4a Additional Costs	-	-	9	51	-	189	2,026	656	2,931	2,931	-	-	-	5,855	-	-	-	146,375	31,167	-
Period 4a Collateral Costs																					
4a.3.1	Process decommissioning water waste	5	-	9	24	-	31	-	15	84	84	-	-	-	87	-	-	-	5,225	17	-
4a.3.3	Small tool allowance	-	324	-	-	-	-	-	49	373	336	-	37	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	5	324	9	24	-	31	-	64	457	420	-	37	-	87	-	-	-	5,225	17	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	81	-	-	-	-	-	-	20	101	101	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	781	78	859	859	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	749	75	824	741	-	82	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	2,216	-	-	-	-	-	554	2,770	2,770	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	3,045	-	-	-	-	-	457	3,502	3,502	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	81	43	-	245	-	76	445	445	-	-	-	3,831	-	-	-	76,618	125	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	2,532	380	2,912	2,912	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	628	63	690	690	-	-	-	-	-	-	-	-	-	-
4a.4.9	Site O&M Cost	-	-	-	-	-	-	247	37	284	284	-	-	-	-	-	-	-	-	-	-
4a.4.10	Liquid Radwaste Processing Equipment/Ser	-	-	-	-	-	-	601	90	691	691	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	4,032	605	4,637	4,637	-	-	-	-	-	-	-	-	-	71,047
4a.4.12	DOC Staff Cost	-	-	-	-	-	-	17,936	2,690	20,626	20,626	-	-	-	-	-	-	-	-	-	215,674
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	29,741	4,461	34,202	34,202	-	-	-	-	-	-	-	-	-	390,714
4a.4	Subtotal Period 4a Period-Dependent Costs	81	5,261	81	43	-	245	57,246	9,586	72,544	72,462	-	82	-	3,831	-	-	-	76,618	125	677,436
4a.0	TOTAL PERIOD 4a COST	525	32,954	16,573	8,069	-	42,766	59,853	36,147	196,888	190,566	-	6,321	-	255,030	501	393	2,217	14,632,970	325,801	682,968
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
4b.1.1	Remove spent fuel racks	1,138	123	344	140	-	705	-	831	3,280	3,280	-	-	-	10,524	-	-	-	546,426	2,174	-
Disposal of Plant Systems																					
4b.1.2.1	Chemical & Volume Control	-	1,085	153	81	-	407	-	400	2,126	2,126	-	-	-	6,063	-	-	-	315,292	15,801	-
4b.1.2.2	Chilled Water RCA	-	667	168	93	-	470	-	315	1,713	1,713	-	-	-	7,000	-	-	-	364,517	9,521	-
4b.1.2.3	Component Cooling	-	709	209	119	-	600	-	366	2,002	2,002	-	-	-	8,936	-	-	-	464,778	10,502	-
4b.1.2.4	Electrical	-	4,261	-	-	-	-	-	639	4,900	-	-	4,900	-	-	-	-	-	-	66,259	-
4b.1.2.5	Electrical - Contaminated	-	1,757	181	120	-	608	-	627	3,294	3,294	-	-	-	9,079	-	-	-	471,393	26,007	-

Table E-2
Byron Nuclear Power Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
4b.1.2.6	Electrical - RCA	-	2,529	424	272	-	1,372	-	1,058	5,655	5,655	-	-	-	20,491	-	-	-	1,063,899	38,351	-
4b.1.2.7	Emergency Diesel Generator	-	96	-	-	-	-	-	14	111	-	-	111	-	-	-	-	-	-	1,514	-
4b.1.2.8	Essential Service Water RCA	-	345	195	119	-	601	-	274	1,535	1,535	-	-	-	8,972	-	-	-	466,273	5,336	-
4b.1.2.9	Fire Protection	-	315	-	-	-	-	-	47	362	-	-	362	-	-	-	-	-	-	4,983	-
4b.1.2.10	Fire Protection RCA	-	537	143	83	-	419	-	266	1,447	1,447	-	-	-	6,243	-	-	-	324,808	7,672	-
4b.1.2.11	Fuel Handling Bldg Equip Drains	-	167	32	18	-	91	-	70	377	377	-	-	-	1,386	-	-	-	70,185	2,442	-
4b.1.2.12	Fuel Handling Bldg Equip Drains (Unit 1)	-	30	4	2	-	9	-	10	54	54	-	-	-	129	-	-	-	6,739	429	-
4b.1.2.13	Fuel Handling Bldg Floor Drains	-	170	31	16	-	82	-	69	368	368	-	-	-	1,241	-	-	-	63,725	2,480	-
4b.1.2.14	Fuel Handling Bldg Floor Drains (Unit 1)	-	119	22	11	-	58	-	48	257	257	-	-	-	874	-	-	-	44,626	1,769	-
4b.1.2.15	Fuel Pool Cooling & Cleanup	-	226	46	26	-	133	-	98	530	530	-	-	-	1,989	-	-	-	103,404	3,329	-
4b.1.2.16	Fuel Pool Cooling & Cleanup (Unit 1)	-	210	42	25	-	124	-	92	493	493	-	-	-	1,857	-	-	-	96,476	3,103	-
4b.1.2.17	HVAC-Auxiliary Building	-	564	108	72	-	361	-	253	1,358	1,358	-	-	-	5,390	-	-	-	279,889	8,029	-
4b.1.2.18	HVAC-Control Room HVAC	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	127	-
4b.1.2.19	HVAC-Diesel Generator Room	-	44	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	686	-
4b.1.2.20	HVAC-Laboratory	-	20	-	-	-	-	-	3	23	-	-	23	-	-	-	-	-	-	315	-
4b.1.2.21	HVAC-Machine Shop	-	18	-	-	-	-	-	3	21	-	-	21	-	-	-	-	-	-	297	-
4b.1.2.22	HVAC-Miscellaneous	-	112	-	-	-	-	-	17	128	-	-	128	-	-	-	-	-	-	1,769	-
4b.1.2.23	HVAC-Primary Containment	-	627	203	135	-	683	-	368	2,017	2,017	-	-	-	10,197	-	-	-	529,451	8,908	-
4b.1.2.24	HVAC-Pumphouse	-	18	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	275	-
4b.1.2.25	HVAC-Radwaste	-	326	63	42	-	213	-	147	791	791	-	-	-	3,177	-	-	-	164,931	4,412	-
4b.1.2.26	HVAC-Turbine Building	-	189	-	-	-	-	-	28	217	-	-	217	-	-	-	-	-	-	3,158	-
4b.1.2.27	Instrument Air Supply	-	73	-	-	-	-	-	11	84	-	-	84	-	-	-	-	-	-	1,197	-
4b.1.2.28	Instrument Air Supply RCA	-	249	29	13	-	68	-	84	443	443	-	-	-	1,002	-	-	-	52,414	3,630	-
4b.1.2.29	Miscellaneous Drains	-	76	14	8	-	40	-	31	168	168	-	-	-	592	-	-	-	30,841	1,125	-
4b.1.2.30	Primary Containment Purge	-	301	128	74	-	375	-	193	1,071	1,071	-	-	-	5,582	-	-	-	290,664	4,721	-
4b.1.2.31	Primary Water	-	839	218	133	-	670	-	419	2,278	2,278	-	-	-	10,451	-	-	-	519,324	12,918	-
4b.1.2.32	Radioactive Waste Disposal	-	2,769	478	270	-	1,365	-	1,122	6,004	6,004	-	-	-	20,695	-	-	-	1,058,144	40,223	-
4b.1.2.33	Reactor Bldg Equipment Drains	-	110	23	13	-	67	-	48	261	261	-	-	-	997	-	-	-	51,818	1,605	-
4b.1.2.34	Reactor Building Floor Drains	-	41	6	3	-	16	-	16	83	83	-	-	-	245	-	-	-	12,768	604	-
4b.1.2.35	Reactor Coolant	-	167	20	10	-	51	-	58	307	307	-	-	-	763	-	-	-	39,871	2,413	-
4b.1.2.36	Residual Heat Removal	-	190	47	28	-	143	-	92	501	501	-	-	-	2,129	-	-	-	110,771	2,894	-
4b.1.2.37	Safety Injection	-	877	224	134	-	676	-	431	2,341	2,341	-	-	-	10,357	-	-	-	523,998	13,451	-
4b.1.2.38	Station Air RCA	-	58	8	4	-	19	-	21	110	110	-	-	-	283	-	-	-	14,808	833	-
4b.1.2.39	Station Heating RCA	-	253	56	31	-	156	-	112	607	607	-	-	-	2,315	-	-	-	120,573	3,664	-
4b.1.2.40	Waste Oil Sumps RCA	-	26	4	2	-	10	-	10	52	52	-	-	-	149	-	-	-	7,762	370	-
4b.1.2.41	Waste Water Treatment	-	91	-	-	-	-	-	14	105	-	-	105	-	-	-	-	-	-	1,464	-
4b.1.2	Totals	-	21,267	3,277	1,959	-	9,887	-	7,885	44,275	38,242	-	6,033	-	148,585	-	-	-	7,664,142	318,585	-
4b.1.3	Scaffolding in support of decommissioning	-	2,358	20	11	-	56	-	607	3,052	3,052	-	-	-	834	-	-	-	43,325	39,201	-
Decontamination of Site Buildings																					
4b.1.4.1	Reactor	2,018	1,452	207	328	-	999	-	1,692	6,696	6,696	-	-	-	16,618	-	-	-	1,181,636	50,402	-
4b.1.4.2	Auxiliary Building	236	124	20	19	-	75	-	173	647	647	-	-	-	1,209	-	-	-	72,602	5,258	-
4b.1.4.3	Radwaste/Service Building	155	49	9	12	-	38	-	102	363	363	-	-	-	686	-	-	-	42,199	2,958	-
4b.1.4.4	Refueling Water Storage Tank	367	428	38	17	-	83	-	318	1,253	1,253	-	-	-	1,240	-	-	-	67,351	11,972	-
4b.1.4.5	Fuel Handling Building	1,052	1,179	102	52	-	236	-	898	3,518	3,518	-	-	-	3,552	-	-	-	198,851	33,507	-
4b.1.4	Totals	3,828	3,232	376	428	-	1,431	-	3,182	12,477	12,477	-	-	-	23,305	-	-	-	1,562,638	104,099	-
4b.1	Subtotal Period 4b Activity Costs	4,966	26,980	4,017	2,538	-	12,079	-	12,505	63,084	57,052	-	6,033	-	183,249	-	-	-	9,816,532	464,058	-
Period 4b Additional Costs																					
4b.2.1	License Termination Survey Planning	-	-	-	-	-	-	993	298	1,291	1,291	-	-	-	-	-	-	-	-	-	6,240
4b.2.2	Remedial Action Surveys	-	-	-	-	-	-	3,566	1,070	4,636	4,636	-	-	-	-	-	-	-	-	56,209	-
4b.2.3	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
4b.2.4	License Termination ISFSI	-	506	197	322	-	893	1,723	910	4,552	4,552	-	-	-	14,550	-	-	-	1,178,838	11,245	7,252
4b.2.5	Underground Services Excavation	-	506	-	-	-	-	-	76	581	581	-	-	-	-	-	-	-	-	2,755	-
4b.2	Subtotal Period 4b Additional Costs	-	1,012	197	322	-	893	6,332	2,361	11,118	11,118	-	-	-	14,550	-	-	-	1,178,838	70,208	13,492
Period 4b Collateral Costs																					
4b.3.1	Process decommissioning water waste	16	-	27	71	-	90	-	44	248	248	-	-	-	258	-	-	-	15,463	50	-
4b.3.3	Small tool allowance	-	523	-	-	-	-	-	78	602	602	-	-	-	-	-	-	-	-	-	-
4b.3.4	Decommissioning Equipment Disposition	-	-	171	94	-	472	-	149	887	887	-	-	-	7,054	-	-	-	366,237	88	-
4b.3	Subtotal Period 4b Collateral Costs	16	523	198	165	-	563	-	272	1,736	1,736	-	-	-	7,311	-	-	-	381,700	138	-

Table E-2
Byron Nuclear Power Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	949	-	-	-	-	-	-	237	1,186	1,186	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	1,409	141	1,550	1,550	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	1,351	135	1,486	1,486	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	3,736	-	-	-	-	-	934	4,670	4,670	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	5,440	-	-	-	-	-	816	6,256	6,256	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	139	75	-	424	-	131	769	769	-	-	-	6,618	-	-	-	132,358	216	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	3,607	541	4,148	4,148	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	1,132	113	1,246	1,246	-	-	-	-	-	-	-	-	-	-
4b.4.9	Site O&M Cost	-	-	-	-	-	-	446	67	513	513	-	-	-	-	-	-	-	-	-	-
4b.4.10	Liquid Radwaste Processing Equipment/Ser	-	-	-	-	-	-	1,084	163	1,247	1,247	-	-	-	-	-	-	-	-	-	-
4b.4.11	Security Staff Cost	-	-	-	-	-	-	10,072	1,511	11,583	11,583	-	-	-	-	-	-	-	-	-	176,250
4b.4.12	DOC Staff Cost	-	-	-	-	-	-	31,501	4,725	36,226	36,226	-	-	-	-	-	-	-	-	-	377,880
4b.4.13	Utility Staff Cost	-	-	-	-	-	-	50,998	7,650	58,648	58,648	-	-	-	-	-	-	-	-	-	665,520
4b.4	Subtotal Period 4b Period-Dependent Costs	949	9,176	139	75	-	424	101,601	17,164	129,529	129,529	-	-	-	6,618	-	-	-	132,358	216	1,219,650
4b.0	TOTAL PERIOD 4b COST	5,931	37,691	4,552	3,100	-	13,959	107,933	32,302	205,467	199,434	-	6,033	-	211,728	-	-	-	11,509,430	534,620	1,233,142
PERIOD 4f - License Termination																					
Period 4f Direct Decommissioning Activities																					
4f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
4f.1.2	Terminate license									a											
4f.1	Subtotal Period 4f Activity Costs	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
Period 4f Additional Costs																					
4f.2.1	License Termination Survey	-	-	-	-	-	-	8,763	2,629	11,392	11,392	-	-	-	-	-	-	-	-	128,776	3,120
4f.2	Subtotal Period 4f Additional Costs	-	-	-	-	-	-	8,763	2,629	11,392	11,392	-	-	-	-	-	-	-	-	128,776	3,120
Period 4f Collateral Costs																					
4f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,080	162	1,242	1,242	-	-	-	-	-	-	-	-	-	-
4f.3	Subtotal Period 4f Collateral Costs	-	-	-	-	-	-	1,080	162	1,242	1,242	-	-	-	-	-	-	-	-	-	-
Period 4f Period-Dependent Costs																					
4f.4.1	Insurance	-	-	-	-	-	-	393	39	432	432	-	-	-	-	-	-	-	-	-	-
4f.4.2	Property taxes	-	-	-	-	-	-	376	38	414	414	-	-	-	-	-	-	-	-	-	-
4f.4.3	Health physics supplies	-	649	-	-	-	-	-	162	812	812	-	-	-	-	-	-	-	-	-	-
4f.4.4	Disposal of DAW generated	-	-	7	4	-	21	-	7	39	39	-	-	-	335	-	-	-	6,698	11	-
4f.4.5	Plant energy budget	-	-	-	-	-	-	268	40	308	308	-	-	-	-	-	-	-	-	-	-
4f.4.6	NRC Fees	-	-	-	-	-	-	302	30	333	333	-	-	-	-	-	-	-	-	-	-
4f.4.7	Site O&M Cost	-	-	-	-	-	-	124	19	143	143	-	-	-	-	-	-	-	-	-	-
4f.4.8	Security Staff Cost	-	-	-	-	-	-	684	103	787	787	-	-	-	-	-	-	-	-	-	11,786
4f.4.9	DOC Staff Cost	-	-	-	-	-	-	3,919	588	4,507	4,507	-	-	-	-	-	-	-	-	-	46,750
4f.4.10	Utility Staff Cost	-	-	-	-	-	-	4,776	716	5,493	5,493	-	-	-	-	-	-	-	-	-	56,964
4f.4	Subtotal Period 4f Period-Dependent Costs	-	649	7	4	-	21	10,843	1,742	13,266	13,266	-	-	-	335	-	-	-	6,698	11	115,500
4f.0	TOTAL PERIOD 4f COST	-	649	7	4	-	21	20,858	4,584	26,124	26,124	-	-	-	335	-	-	-	6,698	128,787	118,620
PERIOD 4 TOTALS		6,455	71,294	21,132	11,173	-	56,747	188,644	73,034	428,478	416,125	-	12,354	-	467,092	501	393	2,217	26,149,100	989,208	2,034,730
PERIOD 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	Reactor	-	7,213	-	-	-	-	-	1,082	8,294	-	-	8,294	-	-	-	-	-	-	69,541	-
5b.1.1.2	Aux Feedwater-Steam Tunnel/Penetr. Area	-	719	-	-	-	-	-	108	827	-	-	827	-	-	-	-	-	-	5,187	-
5b.1.1.3	Auxiliary Building	-	6,318	-	-	-	-	-	948	7,266	-	-	7,266	-	-	-	-	-	-	62,064	-
5b.1.1.4	Berms, Settling Ponds, and Drying Beds	-	154	-	-	-	-	-	23	178	-	-	178	-	-	-	-	-	-	1,631	-
5b.1.1.5	Circulating Water Pumphouse	-	1,090	-	-	-	-	-	163	1,253	-	-	1,253	-	-	-	-	-	-	11,861	-
5b.1.1.6	Essential Service Cooling Tower	-	510	-	-	-	-	-	76	586	-	-	586	-	-	-	-	-	-	5,067	-
5b.1.1.7	Make-up Demineralizer Area	-	1,817	-	-	-	-	-	273	2,089	-	-	2,089	-	-	-	-	-	-	20,770	-
5b.1.1.8	Miscellaneous Site Structures	-	1,954	-	-	-	-	-	293	2,247	-	-	2,247	-	-	-	-	-	-	20,544	-
5b.1.1.9	Radwaste/Service Building	-	4,166	-	-	-	-	-	625	4,791	-	-	4,791	-	-	-	-	-	-	45,688	-
5b.1.1.10	Receiving Building	-	193	-	-	-	-	-	29	222	-	-	222	-	-	-	-	-	-	2,294	-
5b.1.1.11	Refueling Water Storage Tank	-	1,099	-	-	-	-	-	165	1,263	-	-	1,263	-	-	-	-	-	-	11,688	-

Table E-2
Byron Nuclear Power Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Demolition of Remaining Site Buildings (continued)																					
5b.1.1.12	River Screen House	-	591	-	-	-	-	-	89	680	-	-	680	-	-	-	-	-	-	5,869	-
5b.1.1.13	Security Modifications	-	1,103	-	-	-	-	-	166	1,269	-	-	1,269	-	-	-	-	-	-	8,636	-
5b.1.1.14	Turbine Building	-	6,069	-	-	-	-	-	910	6,979	-	-	6,979	-	-	-	-	-	-	70,347	-
5b.1.1.15	Turbine Pedestal	-	1,463	-	-	-	-	-	219	1,682	-	-	1,682	-	-	-	-	-	-	12,628	-
5b.1.1.16	Yard Inventory	-	2,253	-	-	-	-	-	338	2,591	-	-	2,591	-	-	-	-	-	-	20,857	-
5b.1.1.17	Fuel Handling Building	-	3,242	-	-	-	-	-	486	3,729	-	-	3,729	-	-	-	-	-	-	33,246	-
5b.1.1	Totals	-	39,954	-	-	-	-	-	5,993	45,947	-	-	45,947	-	-	-	-	-	-	407,920	-
Site Closeout Activities																					
5b.1.2	BackFill Site	-	5,114	-	-	-	-	-	767	5,881	-	-	5,881	-	-	-	-	-	-	9,059	-
5b.1.3	Grade & landscape site	-	345	-	-	-	-	-	52	397	-	-	397	-	-	-	-	-	-	869	-
5b.1.4	Final report to NRC	-	-	-	-	-	-	85	13	98	98	-	-	-	-	-	-	-	-	-	668
5b.1	Subtotal Period 5b Activity Costs	-	45,413	-	-	-	-	85	6,825	52,322	98	-	52,225	-	-	-	-	-	-	417,849	668
Period 5b Additional Costs																					
5b.2.1	Site Restoration ISFSI	-	1,199	-	-	-	-	28	184	1,411	-	-	1,411	-	-	-	-	-	-	13,522	80
5b.2.2	Concrete Crushing	-	988	-	-	-	-	6	149	1,142	-	-	1,142	-	-	-	-	-	-	4,554	-
5b.2.3	Cofferdam Construction and Teardown	-	455	-	-	-	-	-	68	523	-	-	523	-	-	-	-	-	-	3,996	-
5b.2.4	Demolish Cooling Tower	-	5,142	-	-	-	-	165	796	6,102	-	-	6,102	-	-	-	-	-	-	18,598	-
5b.2	Subtotal Period 5b Additional Costs	-	7,783	-	-	-	-	198	1,197	9,178	-	-	9,178	-	-	-	-	-	-	40,670	80
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	549	-	-	-	-	-	82	631	-	-	631	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	549	-	-	-	-	-	82	631	-	-	631	-	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																					
5b.4.2	Property taxes	-	-	-	-	-	-	1,239	124	1,363	-	-	1,363	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	7,086	-	-	-	-	-	1,063	8,149	-	-	8,149	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	441	66	507	-	-	507	-	-	-	-	-	-	-	-
5b.4.5	Site O&M Cost	-	-	-	-	-	-	409	61	470	-	-	470	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	2,015	302	2,317	-	-	2,317	-	-	-	-	-	-	-	34,287
5b.4.7	DOC Staff Cost	-	-	-	-	-	-	11,965	1,795	13,760	-	-	13,760	-	-	-	-	-	-	-	137,043
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	5,873	881	6,754	-	-	6,754	-	-	-	-	-	-	-	67,229
5b.4	Subtotal Period 5b Period-Dependent Costs	-	7,086	-	-	-	-	21,942	4,292	33,321	-	-	33,321	-	-	-	-	-	-	-	238,558
5b.0	TOTAL PERIOD 5b COST	-	60,831	-	-	-	-	22,226	12,397	95,453	98	-	95,355	-	-	-	-	-	-	458,519	239,306
PERIOD 5 TOTALS		-	60,831	-	-	-	-	22,226	12,397	95,453	98	-	95,355	-	-	-	-	-	-	458,519	239,306
TOTAL COST TO DECOMMISSION		**13,565**	**142,001**	**21,578**	**12,022**	**-**	**58,200**	**733,881**	**163,059**	**1,144,306**	**834,580**	**201,327**	**108,400**	**-**	**477,428**	**501**	**393**	**2,217**	**26,466,100**	**1,536,118**	**5,913,313**

TOTAL COST TO DECOMMISSION WITH 16.62% CONTINGENCY:	**$1,144,306**	**thousands of 2014 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 72.93% OR:	**$834,580**	**thousands of 2014 dollars**
SPENT FUEL MANAGEMENT COST IS 17.59% OR:	**$201,327**	**thousands of 2014 dollars**
NON-NUCLEAR DEMOLITION COST IS 9.47% OR:	**$108,399**	**thousands of 2014 dollars**
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC	**478,321**	**cubic feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED	**2,217**	**cubic feet**
TOTAL SCRAP METAL REMOVED:	**71,774**	**tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,536,118**	**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 F

ISFSI DECOMMISSIONING

Page

DECON and SAFSTOR Alternative F-2

Delayed DECON Alternative F-3

Table F-1
Byron Nuclear Power Station
ISFSI Decommissioning Cost Estimate
DECON and SAFSTOR Decommissioning Alternatives
(thousands of 2014 dollars)

Activity Description	Removal Costs	Packaging Costs	Transport Costs	LLRW Disposal Costs	Other Costs	Total Costs	Burial Volume Class A (cubic feet)	Craft Manhours	Oversight and Contractor Manhours
Decommissioning Contractor									
Planning (characterization, specs and procedures)	-	-	-	-	471	471	-	-	1,312
Decontamination (activated overpack disposition)	414	394	644	1,787	19	3,259	29,099	4,291	-
License Termination (radiological surveys)	-	-	-	-	2,132	2,132	-	18,198	-
Subtotal	**414**	**394**	**644**	**1,787**	**2,622**	**5,862**	**29,099**	**22,489**	**1,312**
Supporting Costs									
NRC and NRC Contractor Fees and Costs	-	-	-	-	384	384	-	-	776
Insurance	-	-	-	-	114	114	-	-	-
Property Taxes	-	-	-	-	326	326	-	-	-
Plant Energy Budget					-	-			
Security Staff Cost	-	-	-	-	288	288	-	-	4,937
Oversight Staff Cost	-	-	-	-	310	310	-	-	3,740
Subtotal	**-**	**-**	**-**	**-**	**1,422**	**1,422**	**-**	**-**	**9,453**
Total (w/o contingency)	**414**	**394**	**644**	**1,787**	**4,044**	**7,283**	**29,099**	**22,489**	**10,765**
Total (w/25% contingency)						**9,104**			

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

Table F-2
Byron Nuclear Power Station
ISFSI Decommissioning Cost Estimate
Delayed DECON Decommissioning Alternative
(thousands of 2014 dollars)

Activity Description	Removal Costs	Packaging Costs	Transport Costs	LLRW Disposal Costs	Other Costs	Total Costs	Burial Volume Class A (cubic feet)	Craft Manhours	Oversight and Contractor Manhours
Decommissioning Contractor									
Planning (characterization, specs and procedures)	-	-	-	-	293	293	-	-	1,096
Decontamination (activated overpack disposition)	900	394	548	1,786	19	3,048	29,086	3,387	-
License Termination (radiological surveys)	-	-	-	-	692	1,291	-	10,698	-
Subtotal	**900**	**394**	**548**	**1,786**	**1,004**	**4,632**	**29,086**	**14,086**	**1,096**
Supporting Costs									
NRC and NRC Contractor Fees and Costs	-	-	-	-	384	384	-	-	776
Insurance	-	-	-	-	114	114	-	-	-
Property Taxes	-	-	-	-	326	326	-	-	-
Plant Energy Budget					-	-			
Security Staff Cost	-	-	-	-	288	288	-	-	3,740
Oversight Staff Cost	-	-	-	-	310	310	-	-	8,677
Subtotal	**-**	**-**	**-**	**-**	**1,422**	**1,422**	**-**	**-**	**13,193**
Total (w/o contingency)	**900**	**394**	**548**	**1,786**	**2,426**	**6,054**	**29,086**	**14,086**	**14,289**
Total (w/25% contingency)						**7,567**			

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

ATTACHMENT 3

LaSalle County Station, Units 1 and 2
Decommissioning Cost Estimate

DECOMMISSIONING COST ANALYSIS

for the

LASALLE COUNTY STATION

UNITS 1 AND 2

prepared for

Exelon Generation Company LLC

prepared by

TLG Services, Inc.
Bridgewater, Connecticut

December 2014

APPROVALS

Project Manager	William A. Cloutier, Jr.	08 Dec 2014 Date
Project Engineer	John A. Carlson	12/8/14 Date
Technical Manager	Francis W. Seymore	12/8/14 Date

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REVISION LOG

No.	Date	Item Revised	Reason for Revision
0	12-08-2014		Original Issue

EXECUTIVE SUMMARY

This report presents estimates of the cost to decommission the LaSalle County Station (LaSalle County) for the selected decommissioning scenarios following a scheduled cessation of plant operations. The updated estimates are designed to provide Exelon Generation Company LLC (Exelon) with the information to assess its current decommissioning liability, as it relates to the nuclear station.

The analysis relies upon site-specific, technical information, developed in an evaluation in 2009,[1] and updated to reflect current assumptions pertaining to the disposition of the nuclear units and relevant industry experience in undertaking such projects. The costs are based on several key assumptions in areas of regulation, component characterization, high-level radioactive waste management, low-level radioactive waste disposal, performance uncertainties (contingency) and site restoration requirements.

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

The 2009 inventory, the basis for the decontamination and dismantling requirements and cost, and the decommissioning waste streams, was reviewed for this analysis. Other than the ISFSI, no currently-planned or recent substantive changes were identified to the configuration of the station or site facilities, (that would impact decommissioning).

The costs to decommission LaSalle County for the scenarios evaluated are tabulated at the end of this section. Costs are reported in 2014 dollars and include monies anticipated to be spent for radiological remediation and operating license termination, spent fuel management, and site restoration activities.

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

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1 "Decommissioning Cost Analysis for the LaSalle County Station, Units 1 and 2," Document No. E16-1555-012, Rev. 0, TLG Services, Inc., June 2009

Consistent with the 2009 analysis, the current cost estimates assume that the shutdown of the nuclear station is a scheduled and pre-planned event (e.g., there is no delay in transitioning the plant and workforce from operations or in obtaining regulatory relief from operating requirements, etc.). The estimates incorporate a minimum cooling period of approximately five and one-half years for the spent fuel in the storage pool at the cessation of Unit 2 operations. In the DECON and SAFSTOR scenarios, any residual fuel remaining in the pools after the cooling period is relocated to an on-site independent spent fuel storage installation (ISFSI) to await transfer to a Department of Energy (DOE) facility (the fuel present in the spent fuel pools or reactors is assumed to remain in the storage pools for the Delayed DECON scenario and transferred directly from the pools to DOE). The estimates also include the dismantling of non-essential structures and limited restoration of the site.

Alternatives and Regulations

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

> DECON is defined as "the alternative in which the equipment, structures, and portions of a facility and site containing radioactive contaminants are removed or decontaminated to a level that permits the property to be released for unrestricted use shortly after cessation of operations."[3]
>
> SAFSTOR is defined as "the alternative in which the nuclear facility is placed and maintained in a condition that allows the nuclear facility to be safely stored and subsequently decontaminated (deferred decontamination) to levels that permit release for unrestricted use."[4] Decommissioning is to be completed within 60 years, although longer time periods will be considered when necessary to protect public health and safety.

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

3 Ibid. Page FR24022, Column 3

4 Ibid.

> ENTOMB is defined as "the alternative in which radioactive contaminants are encased in a structurally long-lived material, such as concrete; the entombed structure is appropriately maintained and continued surveillance is carried out until the radioactive material decays to a level permitting unrestricted release of the property."[5] As with the SAFSTOR alternative, decommissioning is currently required to be completed within 60 years.
>
> The 60-year restriction has limited the practicality for the ENTOMB alternative at commercial reactors that generate significant amounts of long-lived radioactive material. In 1997, the Commission directed its staff to re-evaluate this alternative and identify the technical requirements and regulatory actions that would be necessary for entombment to become a viable option. The resulting evaluation provided several recommendations, however, rulemaking has been deferred based upon several factors (e.g., no licensee has committed to pursuing the entombment option, the unresolved issues associated with the disposition of greater-than-Class C material (GTCC), and the NRC's current priorities) at least until after the additional research studies are complete. The Commission concurred with the staff's recommendation.

In 1996, the NRC amended its decommissioning regulations to clarify ambiguities and codify procedures and terminology as a means of enhancing efficiency and uniformity in the decommissioning process.[6] The amendments allow for greater public participation and better define the transition process from operations to decommissioning. Regulatory Guide 1.184, issued in July 2000, further described the methods and procedures acceptable to the NRC staff for implementing the requirements of the 1996 amendments relating to the initial activities and major phases of the decommissioning process. The costs and schedules presented in this analysis follow the general guidance and processes described in 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]

In 2011, the NRC published amended regulations to improve decommissioning planning and thereby reduce the likelihood that any current operating facility will

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5 Ibid. Page FR24023, Column 2

6 U.S. Code of Federal Regulations, Title 10, Parts 2, 50, and 51, "Decommissioning of Nuclear Power Reactors," NRC, 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

become a legacy site.[8] The amended regulations require licensees to conduct their operations to minimize the introduction of residual radioactivity into the site, which includes the site's subsurface soil and groundwater. Licensees also may be required to perform site surveys to determine whether residual radioactivity is present in subsurface areas and to keep records of these surveys with records important for decommissioning. The amended regulations require licensees to report additional details in their decommissioning cost estimate as well as requiring additional financial reporting and assurances. These additional details are included in this analysis, including the ISFSI decommissioning estimate (Appendix F).

Decommissioning Scenarios

The following scenarios were evaluated and are representative of the alternatives available to the owner. The scenarios assume that the units operate for 60 years, followed by a planned and scheduled shutdown.

1. DECON: The first scenario assumes that the two units are promptly decommissioned as an integrated activity. Spent fuel that is not transferred directly to the DOE from the storage pools is relocated to the ISFSI so as to facilitate decontamination and dismantling activities within the reactor buildings. Spent fuel storage operations continue at the site, independent of decommissioning operations, until the transfer of the fuel to the DOE is complete, assumed for purposes of this study to be in the year 2061. At that time, the ISFSI is decommissioned and the site released for alternative use.

2. Delayed DECON: In the second scenario, the units are prepared for an abbreviated period of safe-storage. The spent fuel resident in the reactor building's storage pools, remains in the pools until it can be transferred to the DOE (i.e., the ISFSI is not used to off-load the pools following the cessation of operations). Spent fuel placed at the ISFSI during operations remains in storage until the pools are emptied at which time the ISFSI is also emptied. Decommissioning is scheduled to commence once the transfer of the fuel to the DOE is complete (i.e., in the year 2061).

3. SAFSTOR: The units are also placed into safe-storage in the third scenario. However, decommissioning is deferred beyond the fuel storage period to the maximum extent permitted by the current regulations. Similar to the DECON alternative, the spent fuel that cannot be transferred directly to the DOE in the first five and one-half years is relocated to the ISFSI for interim storage.

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

The units remain in protective storage following the removal of spent fuel from the site. Decommissioning operations commence such that license termination is completed within the required 60-year period. As with the first two scenarios, decommissioning activities at the two units are sequenced and integrated so as to minimize the total duration of the physical dismantling process.

Methodology

The methodology used to develop the estimates described within this document follows the basic approach originally presented in the cost estimating guidelines [9] developed by the Atomic Industrial Forum (now Nuclear Energy Institute). This reference describes a unit factor method for determining decommissioning activity costs. The unit factors used in this analysis incorporate site-specific costs and the latest available information on worker productivity in decommissioning.

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

Contingency

Consistent with standard cost estimating practice, contingencies are applied to the decontamination and dismantling costs as "specific provision for unforeseeable elements of cost within the defined project scope, particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur."[10] 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.

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

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

The use and role of contingency within decommissioning estimates is not a safety factor issue. Safety factors provide additional security and address situations that may never occur. Contingency funds, by contrast, are expected to be fully expended throughout the program. Inclusion of contingency is necessary to provide assurance that sufficient funding will be available to accomplish the intended tasks.

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,[11] and its Amendments of 1985,[12] the states became ultimately responsible for the disposition of low-level radioactive waste generated within their own borders.

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

Disposition of the various waste streams produced by the decommissioning process considered all options and services currently available to Exelon. The majority of the low-level radioactive waste designated for direct disposal (Class A[13]) can be sent to Energy*Solutions*' facility in Clive, Utah. Therefore, disposal costs for Class A waste were based upon Exelon's *Life of Plant Agreement* with Energy*Solutions*. This facility is not licensed to receive the higher activity portion (Classes B and C) of the decommissioning waste stream.

As a proxy for future disposal facilities, waste disposal costs for the higher activity waste (Class B and C) are based upon the last published rate schedule for non-compact waste for the Barnwell facility, adjusted for escalation of the Atlantic Compact rates.

Material exceeding Class C limits (limited to material closest to the reactor core and comprising a small percentage of the total waste volume) is generally not suitable for shallow-land disposal. For purposes of this analysis, GTCC radioactive waste is assumed to be packaged and disposed of in a similar manner to, and at a cost equivalent to that envisioned for the spent fuel. The GTCC is either stored on site with

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

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

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

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).

High-Level Radioactive Waste Management

Congress passed the "Nuclear Waste Policy Act" (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 DOE was to begin accepting spent fuel by January 31, 1998; however, to date no progress in the removal of spent fuel from commercial generating sites has been made.

Today, the country is at an impasse on high-level waste disposal, even with the License Application for a geologic repository submitted by the DOE to the NRC in 2008. The current Administration has cut the budget for the repository program while promising to "conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle … and make recommendations for a new plan."[14] Towards this goal, the Administration appointed a Blue Ribbon Commission on America's Nuclear Future (Blue Ribbon Commission) to make recommendations for a new plan for nuclear waste disposal. The Blue Ribbon Commission's charter includes a requirement that it consider "[o]ptions for safe storage of used nuclear fuel while final disposition pathways are selected and deployed."[15]

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

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

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14 Blue Ribbon Commission on America's Nuclear Future Charter, http://cybercemetery.unt.edu/archive/brc/20120620215336/http://brc.gov/index.php?q=page/charter

15 Ibid.

16 "Blue Ribbon Commission on America's Nuclear Future, Report to the Secretary of Energy," http://www.brc.gov/sites/default/files/documents/brc_finalreport_jan2012.pdf, p. 32, January 2012

17 Ibid., p.27

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

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

- Sites, designs and licenses, constructs and begins operations of a pilot interim storage facility by 2021 with an initial focus on accepting used nuclear fuel from shut-down reactor sites;
- Advances toward the siting and licensing of a larger interim storage facility to be available by 2025 that will have sufficient capacity to provide flexibility in the waste management system and allows for acceptance of enough used nuclear fuel to reduce expected government liabilities; and
- Makes demonstrable progress on the siting and characterization of repository sites to facilitate the availability of a geologic repository by 2048."[19]

The NRC's review of DOE's license application to construct a geologic repository at Yucca Mountain was suspended in 2011 when the Administration slashed the budget for completing that work. However, the US Court of Appeals for the District of Columbia Circuit recently issued a writ of mandamus (in August 2013) [20] ordering NRC to comply with federal law and restart its review of DOE's Yucca Mountain repository license application to the extent of previously appropriated funding for the review.

Completion of the decommissioning process is dependent upon the DOE's ability to remove spent fuel from the site in a timely manner. DOE's repository program had assumed that spent fuel allocations would be accepted for disposal from the nation's commercial nuclear plants, with limited exceptions, in the order (the "queue") in

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18 "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," U.S. DOE, January 11, 2013

19 Ibid., p.2

20 United States Court of Appeals for the District Of Columbia Circuit, In Re: Aiken County, et al, August 2013 http://www.cadc.uscourts.gov/internet/opinions.nsf/BAE0CF34F762EBD985257BC6004DEB18/$file/11-1271-1451347.pdf

which it was discharged from the reactor.[21] With a large fleet of reactors, Exelon may be able to re-assign allocations between its units to minimize on-site storage costs.

Assuming a 2025 start date for DOE initiating transfer of commercial spent fuel to a federal facility (based upon the proposed timeline for the availability of the larger interim storage facility), the assemblies generated from LaSalle County operations are projected to be shipped from the LaSalle County site in the years 2056 through 2061 (assuming the cessation of plant operations in 2042 and 2043 for Units 1 and 2, respectively). This equates to 117 multi-purpose canisters (at 68 assemblies per canister), in addition to the 68 on the pad from operations.

An ISFSI, operated under a Part 50 General License (in accordance with 10 CFR 72, Subpart K[22]), has been constructed to support continued plant operations. This analysis assumes that the facility can be expanded to support decommissioning operations (in the DECON and SAFSTOR scenarios).

The spent fuel in the wet storage pools at the cessation of plant operations is expected to be transferred to the ISFSI (DECON and SAFSTOR scenarios) within the first five and one-half years following shutdown. Once the wet storage pools are emptied, the reactor buildings can be either decontaminated and dismantled or prepared for long-term storage. The pools are kept operational in the Delayed DECON scenario until the spent fuel stored in the pools can be transferred to the DOE.

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

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21 U.S. Code of Federal Regulations, Title 10, Part 961.11, Article IV – Responsibilities of the Parties, B. DOE Responsibilities, 5.(a) … DOE shall issue an annual acceptance priority ranking for receipt of SNF and/or HLW at the DOE repository. This priority ranking shall be based on the age of SNF and/or HLW as calculated from the date of discharge of such materials from the civilian nuclear power reactor. The oldest fuel or waste will have the highest priority for acceptance …"

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

Site Restoration

The efficient removal of the contaminated materials at the site will result in damage to many of the site structures. Blasting, coring, drilling, and the other decontamination activities will substantially damage power block structures, potentially weakening the footings and structural supports. Prompt demolition once the license is terminated is clearly the most appropriate and cost-effective option. It is unreasonable to anticipate that these structures would be repaired and preserved after the radiological contamination is removed. The effort to dismantle site structures with a work force already mobilized is more efficient and less costly than if the process were deferred. Experience at shutdown generating stations has shown that plant facilities quickly degrade without maintenance, adding additional expense and creating potential hazards to the public and the demolition work force.

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

Consequently, this analysis assumes that non-essential site structures within the restricted access area are removed to a nominal depth of three feet below the local grade level wherever possible. The site is then graded and stabilized.

Summary

The costs to decommission LaSalle County were evaluated for several decommissioning scenarios, incorporating the attributes of both the DECON and SAFSTOR decommissioning alternatives. Regardless of the timing of the decommissioning activities, the estimates assume the eventual removal of all the contaminated and activated plant components and structural materials, such that the facility operator may then have unrestricted use of the site with no further requirement for an operating license. Delayed decommissioning is initiated after the spent fuel has been removed from the site and is accomplished within the 60-year period required by current NRC regulations. In the interim, the spent fuel remains in storage at the site until such time that the transfer to a DOE facility can be completed. Once the transfer is complete, the storage facilities are also decommissioned.

The scenarios analyzed for the purpose of generating the estimates are described in Section 2. The assumptions are presented in Section 3, along with schedules of annual expenditures. The major cost contributors are identified in Section 6, with detailed activity costs, waste volumes, and associated manpower requirements

delineated in Appendices C, D, and E. Cost summaries for the various scenarios are provided at the end of this section for the major cost components.

The cost elements in the estimates for the DECON and SAFSTOR alternatives are assigned to one of three subcategories: NRC License Termination (radiological remediation), Spent Fuel Management, and Site Restoration. The subcategory "NRC License Termination" is used to accumulate costs that are consistent with "decommissioning" as defined by the NRC in its financial assurance regulations (i.e., 10 CFR §50.75). The cost reported for this subcategory is generally sufficient to terminate the operating license(s), recognizing that there may be some additional cost impact from spent fuel management. The License Termination cost subcategory also includes costs to decommission the ISFSI (as required by 10 CFR §72.30). Section 3.5.1 provides the basis for the ISFSI decommissioning cost.

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

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

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

As noted within this document, the estimates were developed and costs are presented in 2014 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 station or during the decommissioning period.

SUMMARY OF DECOMMISSIONING COST ELEMENTS
DECON ALTERNATIVE
(thousands of 2014 dollars)

Cost Element	**Unit 1**	**Unit 2**	**Total**
Decontamination	22,479	25,148	47,627
Removal	144,238	173,786	318,024
Packaging	38,630	40,296	78,925
Transportation	22,492	23,558	46,050
Waste Disposal	129,629	136,835	266,464
Off-site Waste Processing	0	0	0
Program Management [1]	284,697	308,164	592,861
Security	28,064	72,060	100,124
Spent Fuel Pool Isolation	12,434	8,290	20,724
Spent Fuel Management [2]	153,419	149,752	303,171
Insurance and Regulatory Fees	19,087	15,797	34,884
Energy	11,041	10,996	22,037
Characterization and Licensing Surveys	33,874	31,032	64,906
Property Taxes	36,966	36,050	73,016
Miscellaneous Equipment	6,881	6,876	13,757
Site O&M	3,749	3,433	7,182
Total [3]	947,679	1,042,072	1,989,751

Cost Element	**Unit 1**	**Unit 2**	**Total**
NRC License Termination	696,880	774,765	1,471,645
Spent Fuel Management	191,700	188,033	379,733
Site Restoration	59,099	79,274	138,373
Total [3]	947,679	1,042,072	1,989,751

[1] Includes engineering 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

SUMMARY OF DECOMMISSIONING COST ELEMENTS
DELAYED DECON ALTERNATIVE
(thousands of 2014 dollars)

Cost Element	**Unit 1**	**Unit 2**	**Total**
Decontamination	25,134	30,533	55,667
Removal	140,504	170,010	310,514
Packaging	33,215	34,918	68,133
Transportation	17,597	18,814	36,411
Waste Disposal	99,443	106,993	206,436
Off-site Waste Processing	0	0	0
Program Management [1]	365,795	371,103	736,899
Security	74,202	89,316	163,518
Spent Fuel Pool Isolation	12,434	8,290	20,724
Spent Fuel Management [2]	81,845	78,143	159,987
Insurance and Regulatory Fees	34,772	31,056	65,827
Energy	18,593	18,598	37,192
Characterization and Licensing Surveys	34,564	31,792	66,356
Property Taxes	42,227	41,311	83,538
Miscellaneous Equipment	11,957	14,794	26,752
Site O&M	5,596	5,280	10,876
Total [3]	997,878	1,050,952	2,048,830

Cost Element	**Unit 1**	**Unit 2**	**Total**
NRC License Termination	697,417	800,838	1,498,254
Spent Fuel Management	242,164	171,500	413,664
Site Restoration	58,297	78,614	136,911
Total [3]	997,878	1,050,952	2,048,830

[1] Includes engineering 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

SUMMARY OF DECOMMISSIONING COST ELEMENTS
SAFSTOR ALTERNATIVE
(thousands of 2014 dollars)

Cost Element	Unit 1	Unit 2	Total
Decontamination	25,087	30,481	55,568
Removal	143,639	173,133	316,771
Packaging	33,132	34,833	67,965
Transportation	17,494	18,706	36,201
Waste Disposal	96,307	103,796	200,103
Off-site Waste Processing	0	0	0
Program Management [1]	372,618	377,789	750,407
Security	93,793	108,923	202,716
Spent Fuel Pool Isolation	12,434	8,290	20,724
Spent Fuel Management [2]	151,016	147,349	298,365
Insurance and Regulatory Fees	67,355	63,411	130,766
Energy	22,647	22,645	45,291
Characterization and Licensing Surveys	34,564	31,792	66,356
Property Taxes	60,107	59,190	119,298
Miscellaneous Equipment	19,111	27,127	46,237
Site O&M	11,769	11,453	23,222
Total [3]	1,161,072	1,218,918	2,379,990

Cost Element	Unit 1	Unit 2	Total
NRC License Termination	906,058	949,754	1,855,812
Spent Fuel Management	195,915	189,747	385,662
Site Restoration	59,100	79,416	138,516
Total [3]	1,161,072	1,218,918	2,379,990

[1] Includes engineering 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

1. INTRODUCTION

This report presents estimates of the cost to decommission the LaSalle County Station (LaSalle County) for the selected decommissioning scenarios following a scheduled cessation of plant operations. The updated estimates are designed to provide Exelon Generation Company LLC (Exelon) with the information to assess its current decommissioning liability, as it relates to the nuclear station.

The analysis relies upon site-specific, technical information, developed in an evaluation in 2009,[1] * and updated to reflect current assumptions pertaining to the disposition of the nuclear units and relevant industry experience in undertaking such projects. The costs are based on several key assumptions in areas of regulation, component characterization, high-level radioactive waste management, low-level radioactive waste disposal, performance uncertainties (contingency) and site restoration requirements.

The analysis is not a comprehensive engineering evaluation, but presents estimates prepared in advance of the detailed planning required to execute the decommissioning of the nuclear unit. It may also not reflect the actual plan to decommission LaSalle County; the plan may differ from the assumptions made in this analysis based on facts that exist at the time of decommissioning.

1.1 OBJECTIVES OF STUDY

The objectives of this study are to prepare comprehensive estimates of the cost to decommission LaSalle County, to provide a sequence or schedule for the associated activities, and to develop waste stream projections from the decontamination and dismantling activities.

Operating licenses were issued on April 17, 1982 for Unit 1 and on December 16, 1983 for Unit 2. Exelon Generation has notified the NRC that they intend to pursue license renewal. An application for LaSalle County is tentatively scheduled to be submitted in the first quarter of 2015. As such, a sixty year operating lifetime has been assumed for the purpose of this study. The cessation of operations would then be April 17, 2042 and December 16, 2043, for Units 1 and 2, respectively. These dates were used to schedule the decommissioning activities.

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

1.2 SITE DESCRIPTION

LaSalle County is located approximately 55 miles southwest of Chicago, Illinois, and 20 miles west of the Dresden Nuclear Power Station. The station is comprised of two essentially identical boiling water reactors with supporting facilities.

The primary coolant system consists of a boiling water reactor system designed by General Electric. The reactor recirculation system is comprised of the reactor vessel and two recirculation pump loops external to the reactor vessel which provide the driving flow of water to the reactor vessel jet pumps. Each external loop contains one high-capacity, motor driven recirculation pump and three motor-operated gate valves for pump maintenance. The recirculation loops are part of the reactor coolant pressure boundary and are located inside the primary containment structure. The design reactor thermal power level is 3546 Megawatts thermal (MWth). The corresponding maximum net dependable electrical capacity is approximately 1,111 Megawatts electric (MWe).

The containment system at LaSalle County is comprised of a primary containment and a secondary containment. Primary containment is a Mark II type containment, comprised of a steel dome head and post-tensioned concrete wall standing on a base mat of reinforced concrete. The inner surface of containment is lined with steel plate which acts as a leaktight membrane. The suppression system is of the over-and-under configuration. The drywell, in the form of a frustum of a cone, is located directly above the suppression chamber. The suppression pool chamber is cylindrical and separated from the drywell by a reinforced concrete slab. The drywell is topped by an elliptical steel dome called the drywell head. The drywell atmosphere is vented into the suppression chamber through a series of downcomer pipes penetrating and supported by the drywell floor.

Heat produced in the reactor is converted to electrical energy by the power conversion system. A turbine-generator system converts the thermal energy of steam produced in the reactor into mechanical shaft power and then into electrical energy. The main turbine consists of one double-flow, high-pressure turbine and three double-flow, low-pressure turbines. The generator is driven at 1800 rpm and rated at 1300 MVA. The exhaust steam from the turbine is condensed and deaerated in the main condenser. The heat rejected to the main condenser is removed by the circulating water system.

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

1.3 REGULATORY GUIDANCE

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

The rule defined three decommissioning alternatives as being acceptable to the NRC: DECON, SAFSTOR, and ENTOMB. The DECON alternative assumes that any contaminated or activated portion of the plant's systems, structures, and facilities are removed or decontaminated to levels that permit the site to be released for unrestricted use shortly after the cessation of plant operations. The rule also placed limits on the time allowed to complete the decommissioning process. For SAFSTOR, the process is restricted in overall duration to 60 years, unless it can be shown that a longer duration is necessary to protect public health and safety. The guidelines for ENTOMB are similar, providing the NRC with both sufficient leverage and flexibility to ensure that these deferred options are only used in situations where it is reasonable and consistent with the definition of decommissioning. At the conclusion of a 60-year dormancy period (or longer for ENTOMB if the NRC approves such a case), the site would still require significant remediation to meet the unrestricted release limits for license termination.

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

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

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

decommissioning, the licensee is required to submit applications to the NRC to terminate the license, which will include a License Termination Plan (LTP).

In 2011, the NRC published amended regulations to improve decommissioning planning and thereby reduce the likelihood that any current operating facility will become a legacy site.[7] The amended regulations require licensees to conduct their operations to minimize the introduction of residual radioactivity into the site, which includes the site's subsurface soil and groundwater. Licensees also may be required to perform site surveys to determine whether residual radioactivity is present in subsurface areas and to keep records of these surveys with records important for decommissioning. The amended regulations require licensees to report additional details in their decommissioning cost estimate as well as requiring additional financial reporting and assurances. These additional details, including an ISFSI decommissioning estimate, are included in this analysis.

1.3.1 High-Level Radioactive Waste Management

Congress passed the "Nuclear Waste Policy Act" (NWPA) in 1982,[8] 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 DOE was to begin accepting spent fuel by January 31, 1998; however, to date no progress in the removal of spent fuel from commercial generating sites has been made.

Today, the country is at an impasse on high-level waste disposal, even with the License Application for a geologic repository submitted by the DOE to the NRC in 2008. The current Administration has cut the budget for the repository program while promising to "conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle … and make recommendations for a new plan." Towards this goal, the Administration appointed a Blue Ribbon Commission on America's Nuclear Future (Blue Ribbon Commission) to make recommendations for a new plan for nuclear waste disposal. The Blue Ribbon Commission's charter includes a requirement that it consider "[o]ptions for safe storage of used nuclear fuel while final disposition pathways are selected and deployed."[9]

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

- "[T]he United States [should] establish a program that leads to the timely development of one or more consolidated storage facilities"
- "[T]he United States should undertake an integrated nuclear waste management program that leads to the timely development of one or more permanent deep geological facilities for the safe disposal of spent fuel and high-level nuclear waste."[10]

In January 2013, the DOE issued the "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," in response to the recommendations made by the Blue Ribbon Commission and as "a framework for moving toward a sustainable program to deploy an integrated system capable of transporting, storing, and disposing of used nuclear fuel..."[11]

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

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

The NRC's review of DOE's license application to construct a geologic repository at Yucca Mountain was suspended in 2011 when the Administration slashed the budget for completing that work. However, the US Court of Appeals for the District of Columbia Circuit recently issued a writ of mandamus (in August 2013)[12] ordering NRC to comply with federal law and restart its review of DOE's Yucca Mountain repository license application to the extent of previously appropriated funding for the review.

Completion of the decommissioning process is dependent upon the DOE's ability to remove spent fuel from the site in a timely manner. DOE's repository program had assumed that spent fuel allocations would be accepted for disposal from the nation's commercial nuclear plants, with limited exceptions, in the order (the "queue") in which it was discharged from the reactor.[13] With a large fleet of reactors, Exelon may be able to re-assign allocations between its units to minimize on-site storage costs.

Assuming a 2025 start date for DOE initiating transfer of commercial spent fuel to a federal facility (based upon the proposed timeline for the availability of the larger interim storage facility), the assemblies generated from LaSalle County operations are projected to be shipped from the LaSalle County site in the years 2056 through 2061 (assuming the cessation of plant operations in 2042 and 2043 for Units 1 and 2, respectively). This equates to 117 multi-purpose canisters (at 68 assemblies per canister), in addition to the 68 on the pad from operations.

An ISFSI, operated under a Part 50 General License (in accordance with 10 CFR 72, Subpart K[14]), has been constructed to support continued plant operations. This analysis assumes that the facility can be expanded to support decommissioning operations (in the DECON and SAFSTOR scenarios).

The spent fuel in the wet storage pools at the cessation of plant operations is expected to be transferred to the ISFSI (DECON and SAFSTOR scenarios) within the first five and one-half years following shutdown. Once the wet storage pools are emptied, the reactor buildings can be either decontaminated and dismantled or prepared for long-term storage. The spent fuel pools are kept operational in the Delayed DECON scenario until the transfer of spent fuel from the pools to the DOE can be completed.

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

1.3.2 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,[15] and its Amendments of 1985,[16] the states became ultimately responsible for the disposition of low-level radioactive waste generated within their own borders. It was expected that groups of states would combine together to jointly deal with their radioactive wastes; these organizations are referred to as waste disposal compacts.

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

All options and services currently available to Exelon for disposition of the various waste streams produced by the decommissioning process were considered. The majority of the low-level radioactive waste designated for direct disposal (Class A[17]) can be sent to Energy*Solutions*' facility in Clive, Utah. Therefore, disposal costs for Class A waste were based upon Exelon's *Life of Plant Agreement* with Energy*Solutions*. This facility is not licensed to receive the higher activity portion (Classes B and C) of the decommissioning waste stream.

As a proxy for future disposal facilities, waste disposal costs for the higher activity waste (Class B and C) are based upon the last published rate schedule for non-compact waste for the Barnwell facility, adjusted for escalation of the Atlantic Compact rates.

Material exceeding Class C limits (limited to material closest to the reactor core and comprising a small percentage of the total waste volume) is generally not suitable for shallow-land disposal. For purposes of this analysis, GTCC radioactive waste is assumed to be packaged and disposed of in a similar manner to, and at a cost equivalent to that envisioned for the spent fuel. The GTCC is either stored on site 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).

1.3.3 Radiological Criteria for License Termination

In 1997, the NRC published Subpart E, "Radiological Criteria for License Termination,"[18] amending 10 CFR §20. This subpart provides radiological criteria for releasing a facility for unrestricted use. The regulation states that the site can be released for unrestricted use if radioactivity levels are such that the average member of a critical group would not receive a Total Effective Dose Equivalent (TEDE) in excess of 25 millirem per year, and provided that residual radioactivity has been reduced to levels that are As Low As Reasonably Achievable (ALARA). The decommissioning estimates for LaSalle County assume that the site will be remediated to a residual level consistent with the NRC-prescribed level.

It should be noted that the NRC and the Environmental Protection Agency (EPA) differ on the amount of residual radioactivity considered acceptable in site remediation. The EPA has two limits that apply to radioactive materials. An EPA limit of 15 millirem per year is derived from criteria established by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund).[19] An additional limit of 4 millirem per year, as defined in 40 CFR §141.16, is applied to drinking water.[20]

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)[21] 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 LaSalle County for three variations of the approved decommissioning alternatives: DECON and SAFSTOR. Although the scenarios differ with respect to technique, process, cost, and schedule, they attain the same result: the ultimate release of the site for unrestricted use.

The following scenarios were evaluated and are representative of the alternatives available to the owner. The scenarios assume that the units operate for 60 years, followed by a planned and scheduled shutdown.

1. DECON: The first scenario assumes that the two units are promptly decommissioned as an integrated activity. Spent fuel that is not transferred directly to the DOE from the storage pools is relocated to the ISFSI so as to facilitate decontamination and dismantling activities within the reactor buildings. Spent fuel storage operations continue at the site, independent of decommissioning operations, until the transfer of the fuel to the DOE is complete, assumed for purposes of this study to be in the year 2061. At that time, the ISFSI is decommissioned and the site released for alternative use.

2. Delayed DECON: In the second scenario, the units are prepared for an abbreviated period of safe-storage. The spent fuel resident in the reactor buildings' storage pools remains in the pools until it can be transferred to the DOE (i.e., the ISFSI is not used to off-load the pools following the cessation of operations). Spent fuel placed at the ISFSI during operations remains in storage until the pools are emptied, at which time the ISFSI is then emptied. Decommissioning is scheduled to commence once the transfer of the fuel to the DOE is complete (i.e., in the year 2061).

3. SAFSTOR: The units are also placed into safe-storage in the third scenario. However, decommissioning is deferred beyond the fuel storage period to the maximum extent permitted by the current regulations. Similar to the DECON alternative, the spent fuel that cannot be transferred directly to the DOE in the first five and one-half years is relocated to the ISFSI for interim storage. The units remain in protective storage following the removal of spent fuel from the site. Decommissioning operations commence such that license termination is completed within the required 60-year period. As with the first two scenarios, decommissioning activities at the two units are sequenced and integrated so as to minimize the total duration of the physical dismantling process.

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

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

The second phase encompasses activities during the storage period or during major decommissioning activities, or a combination of the two. The third phase pertains to the activities involved in license termination. The decommissioning estimates developed for LaSalle County 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 of cessation of operations, provides a description of the licensee's planned decommissioning activities, a timetable, and the associated financial requirements of the intended decommissioning program. Upon receipt of the PSDAR, the NRC will make the document available to the public for comment in a local meeting to be held in the vicinity of the reactor site. Ninety days following submittal and NRC receipt of the PSDAR, the licensee may begin to perform major decommissioning activities under a modified 10 CFR §50.59 procedure (10 CFR §50.59 establishes the conditions under which licensees may make changes to the facility or procedures and conduct test or experiments, i.e., without prior NRC approval). Major activities are defined as any activity that results in permanent removal of major radioactive components, permanently modifies the structure of the containment, or results in dismantling components (for shipment) containing GTCC, as defined by 10 CFR §61. Major components are further defined as comprising the reactor vessel and internals, large bore reactor recirculation system piping, and other large components that are radioactive. The NRC includes the following additional criteria for use of the §50.59 process in decommissioning. The proposed activity must not:

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

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

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

Site Preparations

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

- Characterization of the site and surrounding environs. This includes radiation surveys of work areas, major components (including the reactor vessel and its internals), internal piping, and sacrificial shield cores.
- Isolation of the spent fuel storage pools and reactor systems, such that decommissioning operations can commence on the balance of the plant. Decommissioning operations are scheduled around the reactor areas to optimize the overall project schedule. The fuel is transferred to the ISFSI as it decays to the point that it meets the heat load criteria of the containers. Consequently, it is assumed that the fuel pool remains operational for approximately five and one-half years following the cessation of each unit's operations.
- Specification of transport and disposal requirements for activated materials and/or hazardous materials, including shielding and waste stabilization.
- Development of procedures for occupational exposure control, control and release of liquid and gaseous effluent, processing of radwaste (including dry-active waste, resins, filter media, metallic and non-metallic components generated in decommissioning), site security and emergency programs, and industrial safety.

2.1.2 Period 2 - Decommissioning Operations

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

10 CFR §50 operating license. Significant decommissioning activities in this phase include:

- Construction of temporary facilities and/or modification of existing facilities to support dismantling activities. This may include a centralized processing area to facilitate equipment removal and component preparations for off-site disposal.
- Reconfiguration and modification of site structures and facilities as needed to support decommissioning operations. This may include the upgrading of roads (on- and off-site) to facilitate hauling and transport. Modifications may be required to the containment structure to facilitate access of large/heavy equipment. Modifications may also be required to the refueling area of the reactor buildings to support the segmentation of the reactor vessel internals and component extraction.
- Design and fabrication of temporary and permanent shielding to support removal and transportation activities, construction of contamination control envelopes, and the procurement of specialty tooling.
- Procurement (lease or purchase) of shipping canisters, cask liners, and industrial packages.
- Decontamination of components and piping systems as required to control (minimize) worker exposure.
- Removal of piping and components no longer essential to support decommissioning operations.
- Transfer of the steam separator and dryer assemblies to the dryer-separator pool for segmentation. Segmentation by weight and activity maximizes the loading of the shielded transport casks. The operations are conducted under water using remotely operated tooling and contamination controls.
- Disconnection of the control blades from the drives on the vessel lower head. Blades are transferred to the spent fuel pool for packaging.
- Disassembly, segmentation, and packaging of the core shroud and in-core guide tubes. Some of the material is expected to exceed Class C disposal requirements. As such, those segments are packaged in a modified fuel storage canister for geologic disposal.

- Removal and segmentation of the remaining internals including the jet pump assemblies, fuel support castings, and core plate assembly.
- Draining and decontamination of the reactor well and the permanent sealing of the spent fuel transfer gate. Install a shielded platform for segmentation of the reactor vessel. Cutting operations are performed in air using remotely operated equipment within a contamination control envelope, with the water level maintained just below the cut to minimize the working area dose rates. Sections are transferred to the dryer-separator pool for packaging and interim storage.
- Disconnection of the control rod drives and instrumentation tubes from reactor vessel lower head. The lower reactor head is then segmented.
- Removal of the reactor recirculation pumps. Exterior surfaces are decontaminated and openings covered. Components can serve as their own burial containers provided that all penetrations are properly sealed.
- Demolition of the sacrificial shield activated concrete by controlled demolition.
- Expansion of the ISFSI and transfer of the spent fuel from the storage pools to the ISFSI pad for interim storage. Spent fuel storage operations continue throughout the active decommissioning period. Fuel transfer is expected to begin in 2056 and to be completed by the end of the year 2061.

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

- Removal of remaining plant systems and associated components as they become nonessential to the decommissioning program or worker

health and safety (e.g., waste collection and treatment systems, electrical power and ventilation systems).

- Removal of the steel liners from the drywell, disposing of the activated and contaminated sections as radioactive waste. Removal of any activated/contaminated concrete.
- Removal of the steel liners from the steam separator and dryer pool, reactor well and spent fuel storage pool.
- Surveys of the decontaminated areas of the containment structures.
- Removal of the contaminated equipment and material from the turbine and auxiliary buildings, and any other contaminated facility. Use radiation and contamination control techniques until radiation surveys indicate that the structures can be released for unrestricted access and conventional demolition. This activity may necessitate the dismantling and disposition of most of the systems and components (both clean and contaminated) located within these buildings. This activity will facilitate surface decontamination and subsequent verification surveys required prior to obtaining release for demolition.
- Removal of the remaining components, equipment, and plant services in support of the area release survey(s).
- Routing of material removed in the decontamination and dismantling to 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)."[22] This document incorporates the statistical approaches to survey design and data interpretation used by the EPA. It also identifies commercially available instrumentation and procedures for conducting radiological surveys. Use of this guidance ensures that the surveys are conducted in a manner that provides a high degree of confidence that applicable NRC criteria are satisfied. Once the survey is complete, the results are provided to the NRC in a format that can be verified. The NRC then reviews and evaluates the information, performs an independent confirmation of radiological site conditions, and makes a determination on final termination of the license.

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

2.1.3 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 may result in substantial damage to many of the structures. Although performed in a controlled, safe manner, blasting, coring, drilling, scarification (surface removal), and the other decontamination activities may 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 effort to dismantle site structures with a work force already mobilized on site is more efficient than if the process were deferred. Site facilities quickly degrade without maintenance, adding additional expense and creating potential hazards to the public as well as to future workers. Abandonment creates a breeding ground for vermin infestation as well as other biological hazards.

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

restored and the plant area graded as required to prevent ponding and inhibit the refloating of subsurface materials.

Concrete rubble produced by demolition activities is processed to remove rebar and miscellaneous embedments. The processed material is then used on site to backfill voids.

2.1.4 ISFSI Operations and Decommissioning

The ISFSI will continue to operate under the general license provisions of 10 CFR §72 following the amendment of the §50 operating license to release the adjacent (power block) property. Assuming the DOE starts accepting fuel in 2025, transfer of spent fuel from LaSalle County is anticipated to begin in 2056 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 Part 50 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.

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

2.2 SAFSTOR and DELAYED DECON

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

remaining contamination are 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. Site preparations are also similar to those for the DECON alternative. However, with the exception of the required radiation surveys and site characterizations, the mobilization and preparation of site facilities is less extensive.

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

2.2.1 Period 1 - Preparations

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

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

- Isolation of the spent fuel storage services and fuel handling systems located in the reactor buildings 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
- 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 systems, decontaminating them 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 phase 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 their own actions. The security fence, sensors, alarms, and other surveillance equipment provide security. Fire and radiation alarms are also monitored and maintained. While remote surveillance is an option, it does not offer the immediate response time of a physical presence.

The transfer of the spent fuel to a DOE facility continues during this period until complete. Fuel is shipped exclusively from the ISFSI in the SAFSTOR scenario and from both the pools and the ISFSI in the Delayed DECON scenario.

After an optional period of storage (such that license terminations are accomplished within 60 years of final shutdown of Unit 1), it is required that the licensee submit applications to terminate the license, along with an LTP (described in Section 2.1.2), thereby initiating the third phase.

2.2.3 Periods 3 and 4 - Delayed Decommissioning

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

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

Variations in the length of the dormancy period are expected to have little effect upon the quantities of radioactive wastes generated from system and structure removal operations. Given the levels of radioactivity and spectrum of radionuclides expected from 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 radioactive decay during the dormancy period, lower activity levels are expected.

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

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

2.2.4 Period 5 - Site Restoration

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

3. COST ESTIMATE

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

3.1 BASIS OF ESTIMATE

The estimates were developed with site-specific, technical information developed in an evaluation prepared for Exelon in 2009. The information was reviewed for the current analysis and updated as deemed appropriate. The site-specific considerations and assumptions used in the previous evaluation were also revisited. Modifications were incorporated where new information was available or experience from ongoing decommissioning programs provided viable alternatives or improved processes.

3.2 METHODOLOGY

The methodology used to develop the estimates follows the basic approach originally presented in the AIF/NESP-036 study report, "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates,"[23] and the DOE "Decommissioning Handbook."[24] These documents present a unit factor method for estimating decommissioning activity costs, which simplifies the estimating calculations. Unit factors for concrete removal ($/cubic yard), steel removal ($/ton), and cutting costs ($/inch) were developed using local labor rates. The activity-dependent costs were estimated with the item quantities (cubic yards and tons), developed from plant drawings and inventory documents. Removal rates and material costs for the conventional disposition of components and structures relied upon information available in the industry publication, "Building Construction Cost Data," published by R.S. Means.[25]

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, San

Onofre-1, Crystal River and Vermont Yankee nuclear units have provided additional insight into the process, the regulatory aspects, and the technical challenges of decommissioning commercial nuclear units.

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

Work Difficulty Factors

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

- Access Factor 10% to 20%
- Respiratory Protection Factor 10% to 50%
- Radiation/ALARA Factor 10% to 40%
- Protective Clothing Factor 10% to 30%
- Work Break Factor 8.33%

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

Scheduling Program Durations

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

An activity duration critical path is used to determine the total decommissioning program schedule. The schedule is relied upon in calculating the carrying costs, which include program management, administration, field

engineering, equipment rental, and support services such as quality control and security. This systematic approach for assembling decommissioning estimates ensures a high degree of confidence in the reliability of the resulting cost estimate.

3.3 IMPACT OF DECOMMISSIONING MULTIPLE REACTOR UNITS

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

- The sequence of work generally follows the principal that the work is done at Unit 1 first, followed by similar work at Unit 2. This permits the experience gained at Unit 1 to be applied by the workforce at the second unit. It should be noted however, that the estimates do not consider productivity improvements at the second unit, since there is little documented experience with decommissioning two units simultaneously The work associated with developing activity specifications and procedures can be considered essentially identical between the two units, therefore the second unit costs are assumed to be a fraction of the first unit (~ 42%).
- 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. This permits sharing of the segmentation equipment between the two units.
- 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. Trying to complete the final status survey of Unit 1, while Unit 2 still has ongoing radiological remediation work and waste handling in process is considered impractical. As such, the transfer of

the spent fuel from the storage pools and subsequent decontamination of the reactor buildings are 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.
- Unit 1, as the first unit to enter decommissioning, incurs the majority of site characterization costs.
- Shared systems and 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.

3.4.1 Contingency

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.

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[26] as "specific provision for unforeseeable elements of cost within the defined project scope; particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur." The cost elements in this analysis are based upon ideal conditions and maximum efficiency;

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

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

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

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

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

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

The contingency values are applied to the appropriate components of the estimates on a line item basis. A composite value is then reported at the end of each estimate. For example, the composite contingency values reported for the DECON alternative are 19.1% and 18.9% for Units 1 and 2, respectively. Values for the other alternatives are delineated within the detailed cost tables in Appendices D and E.

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 (e.g., affecting worker health and safety, site release criteria, waste transportation, and disposal).
- Policy decisions altering national commitments (e.g., in the ability to accommodate certain waste forms for disposition or in the timetable for such, for example, in the start and rate of acceptance of spent fuel by the DOE).

- Pricing changes for basic inputs, such as labor, energy, materials, and burial.

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

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 impacts of the considerations identified below are included in this cost study.

3.5.1 Spent Fuel Management

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

The total inventory of assemblies that will require handling during decommissioning is based upon several assumptions. The pickup of commercial fuel is assumed to begin in the year 2025. The maximum rate at which the fuel is removed from the commercial sites is based upon an annual capacity at the geologic repository of 3,000 metric tons of uranium (MTU). Any delay in the startup of the repository or decrease in the rate of acceptance will correspondingly prolong the transfer process and result in the fuel remaining at the site longer.

In all three scenarios, the ISFSI will continue to operate until such time that the transfer of spent fuel to the DOE can be completed. Assuming that the DOE commences repository operation in 2025, fuel is projected to be

removed from the LaSalle County site by the end of year 2061. In the Delayed DECON scenario, the ISFSI is only used to store fuel placed during plant operations. Spent fuel off-loaded from the reactors after operations cease, remains in the pools during the transfer period. The inventory of fuel assemblies located in the spent fuel pools is preferentially off-loaded as the allocations permit.

Operation and maintenance costs for the storage facilities (the ISFSI and the pools for the Delayed DECON scenario) are included within the estimates and address the cost for staffing the facilities, as well as security, insurance, and licensing fees. The estimates include the costs to purchase (DECON and SAFSTOR scenarios), load, and transfer the fuel storage canisters. Costs are also provided for the final disposition of the facilities once the transfer is complete.

Repository Startup

Operation of the DOE's yet-to-be constructed geologic repository is contingent upon the review and approval of the facility's license application by the NRC, the successful resolution of pending litigation, and the development of a national transportation system. With the appropriate authorizations from Congress, the Administration currently plans to implement a program over the next 10 years that could result in an interim storage facility being available by 2025.

Spent Fuel Management Model

The Exelon nuclear fleet consists of 26 units at 14 sites in Illinois, Pennsylvania, New Jersey, New York and Maryland, including the inactive units at Dresden, Peach Bottom and Zion (Zion is still included in the spent fuel analysis model since the fuel transfer to DOE will be done as part of the Exelon allocation). The ability to complete the decommissioning of these units, particularly for the DECON and Delayed DECON alternatives, is highly dependent upon when the DOE is assumed to remove spent fuel from the sites.

The DOE's repository program assumes that spent fuel will be accepted for disposal from the nation's commercial nuclear plants in the order (the "queue") in which it was removed from service ("oldest fuel first"). A computer model developed by Exelon Nuclear was used to determine when the DOE would provide allocations in the queue for removal of spent fuel from the individual sites. Repository operations were based

upon annual industry-wide receipt of 400 Metric Tons Heavy Metal (MTHM) in the first year of operation, a total of 3,800 MTHM in years 2 through 4 and 3,000 MTHM for year 5 and beyond.[27]

ISFSIs are constructed as necessary to maintain full-core discharge capability at the individual sites. Once the DOE begins repository operations, spent fuel shipments are managed across the fleet to optimize spent fuel storage.

Canister Design

The design and capacity of the ISFSI is based upon a Holtec HI-STORM vertical cask system, with a 68-fuel assembly capacity. This is also the basis for future cask acquisitions. The DOE is assumed to provide the MPC for fuel transferred directly from the pools to the DOE at no cost to the owner.

Canister Loading and Transfer

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

Operations and Maintenance

Annual costs (excluding labor) of approximately $792,000 and $96,000 are used for operation and maintenance of each spent fuel pool and the ISFSI, respectively.

ISFSI Decommissioning

A multi-purpose (storage and transport) dry shielded storage canister with a vertical, reinforced concrete storage module is used as a basis for the cost analysis. The final core off load from each unit, equivalent to 12 total casks, 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 is included in the estimate. Appendix F details the costs necessary to survey, decontaminate, and terminate the NRC license on the ISFSI facility. The estimates in Appendices C through E also include

the costs for the demolition of the ISFSI facility following NRC license termination (as a Site Restoration expense).

3.5.2 Reactor Vessel and Internal Components

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

The reactor pressure vessel and internal components are segmented for disposal in shielded, reusable transportation casks. Segmentation is performed in the dryer/separator pool, where a turntable and remote cutter are installed. The vessel is segmented in place, using a mast-mounted cutter supported off the lower head and directed from a shielded work platform installed overhead in the reactor cavity. Transportation cask specifications and transportation regulations will dictate segmentation and packaging methodology.

The dismantling of the reactor internals will generate radioactive waste considered unsuitable for shallow land disposal (i.e., GTCC). Although the material is not classified as high-level waste, federal regulations under the LLRW Policy Amendments Act specifies the GTCC LLWR is designated a federal responsibility under Section 3(b)(1)(D). However, the DOE has not been forthcoming with an acceptance criteria or disposition schedule for this material, and numerous questions remain as to the ultimate disposal cost and waste form requirements. As such, for purposes of this study, the GTCC has been packaged and disposed of in the same manner as high-level waste, at a cost equivalent to that envisioned for the spent fuel. This is consistent with the concept that the generator of GTCC waste will bear all reasonable costs of disposing of such wastes.[28]

It is not anticipated that the DOE would accept this waste prior to completing the transfer of spent fuel. Therefore, until such time the DOE is ready to accept GTCC waste, it is reasonable to assume that this material would remain in storage at the LaSalle County site.

Intact disposal of the reactor vessel and internal components can provide savings in cost and worker exposure by eliminating the complex segmentation requirements, isolation of the GTCC material, and transport/storage of the resulting waste packages. Portland General

Electric (PGE) was able to dispose of the Trojan reactor as an intact package. However, its location on the Columbia River simplified the transportation analysis since:

- the reactor package could be secured to the transport vehicle for the entire journey, i.e., the package was not lifted during transport,
- there were no man-made or natural terrain features between the plant site and the disposal location that could produce a large drop, and
- transport speeds were very low, limited by the overland transport vehicle and the river barge.

As a member of the Northwest Compact, PGE had a site available for disposal of the package - the US Ecology facility in Washington State. The characteristics of this arid site proved favorable in demonstrating compliance with land disposal regulations.

It is not known whether this option will be available when LaSalle County 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.

3.5.3 Primary System Components

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

3.5.4 Main Turbine and Condenser

The main turbine will be dismantled using conventional maintenance procedures. The turbine rotors and shafts will be removed to a laydown area. The lower turbine casings will be removed from their anchors by controlled demolition. The main condensers will also be disassembled and moved to a laydown area. Clean material is released on site as scrap metal; radioactive or potentially radioactive material is then prepared

for transportation to an offsite facility for controlled disposal. Components will be packaged and readied for transport in accordance with the intended disposition.

3.5.5 Transportation Methods

Contaminated piping, components, and structural material other than the highly activated reactor vessel and internal components will qualify as LSA-I, II or III or Surface Contaminated Object, SCO-I or II, as described in Title 49.[29] The contaminated material will be packaged in Industrial Packages (IP 1, IP-2, or IP-3, as defined in subpart 173.411) for transport unless demonstrated to qualify as their own shipping containers. The reactor vessel and internal components are expected to be transported in accordance with §71, as Type B. It is conceivable that the reactor, due to its limited specific activity, could qualify as LSA II or III. However, the high radiation levels on the outer surface would require that additional shielding be incorporated within the packaging so as to attenuate the dose to levels acceptable for transport.

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

The transport of large intact components (e.g., large heat exchangers and other oversized components) will be by a combination of truck, rail, and/or multi-wheeled transporter. Truck transport costs were estimated using published tariffs from Tri-State Motor Transit.[30]

3.5.6 Low-Level Radioactive Waste Disposal

The mass of radioactive waste generated during the various decommissioning activities is reported by line-item in Appendices C, D and E, and summarized in Section 5. The Section 5 waste summaries are consistent with 10 CFR §61 classifications. Commercially available steel containers are used for the disposal of piping, small components, and concrete. Larger components can serve as their own containers, with proper closure of all openings, access ways, and penetrations. The waste

volumes are calculated on the exterior package dimensions for containerized material or a dimensional calculation for components serving as their own waste containers.

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

Disposal fees are calculated using current disposal agreements, with surcharges added for the highly activated components, such as those generated in the segmentation of the reactor vessel. The cost to dispose of the majority of the material generated from the decontamination and dismantling activities is based upon Exelon's current disposal agreement with Energy*Solutions* for its facility in Clive, Utah.

EnergySolutions is not able to accept the higher activity waste (Class B and C) generated in the decontamination of the reactor vessel and segmentation of the components closest to the core. As a proxy for future disposal facilities, waste disposal costs for the higher activity waste (Class B and C) are based upon the last published rate schedule for non-compact waste for the Barnwell facility, adjusted for escalation of the Atlantic Compact rates.

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

3.5.7 Site Conditions Following Decommissioning

The NRC will terminate (or amend) the site license when it determines that site remediation has been performed in accordance with the license termination plan, and that the terminal radiation survey and associated documentation demonstrate that the facility is suitable for release. The NRC's involvement in the decommissioning process will end at this point. Building codes and environmental regulations will dictate the

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

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

The estimates do assume the remediation of a small volume of contaminated soil. This estimate may be adjusted by continued plant operations and/or future regulatory actions, such as the development of site-specific release criteria.

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

Exelon, as the operator, will continue to provide site operations support, including decommissioning program management, licensing, radiological protection, and site security. A Decommissioning Operations Contractor (DOC) will provide the supervisory staff needed to oversee the labor subcontractors, consultants, and specialty contractors needed to perform the work required for the decontamination and dismantling effort. The DOC will also provide the engineering services needed to develop

activity specifications, detailed procedures, detailed activation analyses, and support field activities such as structural modifications.

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

The craft labor required to decontaminate and dismantle the LaSalle County units will be acquired through standard site contracting practices. Craft labor costs were based upon information from Exelon. Craft labor costs include applicable overheads and profit.

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

Staffing levels are assigned for each unit by sub-period and functional area. Economies of a multi-unit decommissioning are recognized by establishing a primary and a secondary staff level. The unit assigned the primary staff will include common supervisory positions and positions that may be shared across both units. The types of positions and staffing levels are adjusted based upon the type of activity occurring in each sub-period.

A profile of the staffing level for the two-unit decommissioning, including contractors and craft, is provided in Figures 3.1 through 3.3 for the DECON, Delayed DECON, and SAFSTOR scenarios, respectively. Utility staffing levels will gradually decrease after completing the removal of physical systems at each of the units.

Staffing levels and management support will vary based upon the amount and type of decommissioning work. Craft manpower levels decrease after systems removal and structures decontamination and drop substantially during the delay period and the license termination survey period. However, craft staff levels increase again during the site restoration period due to the work associated with structures demolition.

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.[31] Actual estimates are derived from the curie/gram values contained therein and adjusted for the different mass of the LaSalle County components, projected operating life, and different periods of decay. Additional short-lived isotopes were derived from CR-0130[32] and CR-0672,[33] and benchmarked to the long-lived values from CR-3474.

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

Activation of the reactor building structures is confined to the sacrificial shield.

3.6.4 General

Transition Activities

Existing warehouses will be cleared of non-essential material and remain for use by Exelon and its subcontractors. The plant's operating staff will perform the following activities at no additional cost or credit to the project during the transition period:

- Drain and collect fuel oils, lubricating oils, and transformer oils for recycle and/or sale.
- Drain and collect acids, caustics, and other chemical stores for recycle and/or sale.

- Processes operating waste inventories, i.e., the estimates do not address the disposition of any legacy wastes; the disposal of operating wastes during this initial period is not considered a decommissioning expense.

Scrap and Salvage

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

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

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

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

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

Energy

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

Insurance

Costs for continuing coverage (nuclear liability and property insurance) following cessation of plant operations and during decommissioning are included and based upon current operating premiums. Reductions in premiums throughout the decommissioning process are based upon guidance provided by Exelon.

Taxes

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

Site Modifications

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

3.7 COST ESTIMATE SUMMARY

A schedule of expenditures for each scenario is provided in Tables 3.1 through 3.3. Decommissioning costs are reported in the year of projected expenditure; however, the values are provided in thousands of 2014 dollars. Costs are not inflated, escalated, or discounted over the period of expenditure. The annual

expenditures are based upon the detailed activity costs reported in Appendices C through E, along with the schedules discussed in Section 4.

TABLE 3.1a
LaSALLE COUNTY STATION, UNIT 1
DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2042	44,817	9,327	1,325	35	7,655	63,159
2043	75,724	25,808	2,783	15,451	30,981	150,748
2044	75,099	35,728	1,778	48,282	25,246	186,135
2045	62,346	27,694	1,563	26,693	17,606	135,901
2046	52,661	21,568	1,400	10,130	11,762	97,521
2047	49,229	19,039	1,264	11,428	11,367	92,327
2048	12,609	3,072	237	5,206	5,840	26,964
2049	2,878	163	12	9	3,962	7,024
2050	34,488	3,600	323	26	4,099	42,538
2051	19,951	8,901	187	0	3,446	32,485
2052	15,229	6,486	136	0	3,477	25,329
2053	2,516	0	0	0	3,524	6,041
2054	2,516	0	0	0	3,524	6,041
2055	2,516	0	0	0	3,524	6,041
2056	2,613	270	0	0	3,534	6,417
2057	3,163	1,941	0	0	3,524	8,628
2058	3,163	1,941	0	0	3,524	8,628
2059	3,163	1,941	0	0	3,524	8,628
2060	3,170	1,941	0	0	3,534	8,645
2061	3,163	1,941	0	0	3,524	8,628
2062	2,174	1,893	32	1,878	13,875	19,852
Total	473,190	173,254	11,041	119,137	171,056	947,679

TABLE 3.1b
LaSALLE COUNTY STATION, UNIT 2
DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2043	2,845	576	82	2	456	3,962
2044	65,778	13,760	1,959	549	11,654	93,700
2045	82,564	31,614	2,665	31,952	30,402	179,197
2046	84,875	36,651	1,773	49,603	25,253	198,155
2047	76,228	23,618	1,435	15,610	13,070	129,960
2048	75,546	22,340	1,404	12,151	11,851	123,292
2049	63,438	15,402	1,032	14,573	10,600	105,044
2050	38,074	4,670	323	26	3,936	47,030
2051	25,848	12,562	187	0	3,447	42,044
2052	19,527	9,155	136	0	3,478	32,296
2053	2,516	0	0	0	3,524	6,041
2054	2,516	0	0	0	3,524	6,041
2055	2,516	0	0	0	3,524	6,041
2056	2,613	270	0	0	3,534	6,417
2057	3,163	1,941	0	0	3,524	8,628
2058	3,163	1,941	0	0	3,524	8,628
2059	3,163	1,941	0	0	3,524	8,628
2060	3,170	1,941	0	0	3,534	8,645
2061	3,163	1,941	0	0	3,524	8,628
2062	2,174	1,768	0	1,878	13,875	19,695
Total	562,882	182,089	10,996	126,344	159,761	1,042,072

TABLE 3.2a
LaSALLE COUNTY STATION, UNIT 1
DELAYED DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2042	33,955	963	1,325	35	13,908	50,186
2043	46,104	6,125	1,556	966	17,337	72,088
2044	8,387	420	374	17	6,351	15,550
2045	8,365	419	373	17	6,334	15,507
2046	8,365	419	373	17	6,334	15,507
2047	8,365	419	373	17	6,334	15,507
2048	8,387	420	374	17	6,351	15,550
2049	8,365	419	373	17	6,334	15,507
2050	8,365	419	373	17	6,334	15,507
2051	8,365	419	373	17	6,334	15,507
2052	8,387	420	374	17	6,351	15,550
2053	8,365	419	373	17	6,334	15,507
2054	8,365	419	373	17	6,334	15,507
2055	8,365	419	373	17	6,334	15,507
2056	8,747	1,498	374	17	6,351	16,987
2057	10,952	8,181	373	17	6,334	25,857
2058	7,345	4,132	279	13	5,147	16,916
2059	3,848	299	187	8	3,979	8,322
2060	4,433	2,025	187	8	3,990	10,644
2061	4,495	2,240	187	8	3,979	10,909
2062	46,707	1,762	1,867	41	1,889	52,266
2063	67,241	18,243	1,820	20,142	10,499	117,945
2064	68,404	24,053	1,761	39,102	18,654	151,972
2065	43,711	9,439	1,400	11,225	7,264	73,039
2066	43,711	9,439	1,400	11,225	7,264	73,039
2067	23,592	5,019	736	5,908	4,649	39,905
2068	1,268	113	0	8	1,752	3,140
2069	33,275	3,339	327	27	1,817	38,785

TABLE 3.2a (continued)
LaSALLE COUNTY STATION, UNIT 1
DELAYED DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2070	18,139	9,019	187	0	757	28,102
2071	13,915	6,918	143	0	581	21,557
Total	580,285	117,835	18,593	88,952	192,213	997,878

TABLE 3.2b
LaSALLE COUNTY STATION, UNIT 2
DELAYED DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2043	2,341	59	82	2	661	3,145
2044	55,400	2,232	1,872	159	15,375	75,038
2045	37,433	5,449	1,053	925	12,749	57,609
2046	8,468	453	373	17	6,332	15,644
2047	8,468	453	373	17	6,332	15,644
2048	8,492	455	374	17	6,350	15,687
2049	8,468	453	373	17	6,332	15,644
2050	8,468	453	373	17	6,332	15,644
2051	8,468	453	373	17	6,332	15,644
2052	8,492	455	374	17	6,350	15,687
2053	8,468	453	373	17	6,332	15,644
2054	8,468	453	373	17	6,332	15,644
2055	8,468	453	373	17	6,332	15,644
2056	8,492	455	374	17	6,350	15,687
2057	8,468	453	373	17	6,332	15,644
2058	9,798	4,442	373	17	6,332	20,963
2059	11,056	8,216	373	17	6,332	25,994
2060	5,382	2,937	210	9	4,279	12,818
2061	4,599	2,275	187	8	3,978	11,046
2062	2,452	330	187	8	1,766	4,743
2063	17,160	1,096	1,103	25	1,805	21,189
2064	36,171	6,136	1,868	1,967	2,646	48,786
2065	71,942	25,506	1,773	41,394	19,050	159,666
2066	66,439	16,665	1,558	25,110	12,286	122,058
2067	62,423	10,212	1,400	13,224	7,349	94,608
2068	62,594	10,240	1,404	13,261	7,369	94,868
2069	37,332	4,348	342	172	1,711	43,905

TABLE 3.2b (continued)
LaSALLE COUNTY STATION, UNIT 2
DELAYED DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2070	24,036	12,680	187	0	759	37,661
2071	18,504	9,762	144	0	584	28,994
Total	626,751	128,030	18,598	96,501	181,072	1,050,952

TABLE 3.3a
LaSALLE COUNTY STATION, UNIT 1
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2042	36,629	8,983	1,325	35	16,479	63,450
2043	49,871	17,428	1,556	966	19,185	89,006
2044	12,165	11,754	374	17	10,183	34,494
2045	12,132	11,722	373	17	10,156	34,400
2046	12,132	11,722	373	17	10,156	34,400
2047	10,407	9,343	334	15	8,870	28,970
2048	3,858	300	187	8	3,990	8,344
2049	3,848	299	187	8	3,979	8,322
2050	3,848	299	187	8	3,979	8,322
2051	3,848	299	187	8	3,979	8,322
2052	3,858	300	187	8	3,990	8,344
2053	3,848	299	187	8	3,979	8,322
2054	3,848	299	187	8	3,979	8,322
2055	3,848	299	187	8	3,979	8,322
2056	3,948	570	187	8	3,990	8,704
2057	4,495	2,240	187	8	3,979	10,909
2058	4,495	2,240	187	8	3,979	10,909
2059	4,495	2,240	187	8	3,979	10,909
2060	4,505	2,241	187	8	3,990	10,932
2061	4,495	2,240	187	8	3,979	10,909
2062	2,348	296	187	8	1,753	4,592
2063	2,348	296	187	8	1,753	4,592
2064	2,355	297	187	8	1,758	4,604
2065	2,348	296	187	8	1,753	4,592
2066	2,348	296	187	8	1,753	4,592
2067	2,348	296	187	8	1,753	4,592
2068	2,355	297	187	8	1,758	4,604
2069	2,348	296	187	8	1,753	4,592
2070	2,348	296	187	8	1,753	4,592
2071	2,348	296	187	8	1,753	4,592

TABLE 3.3a (continued)
LaSALLE COUNTY STATION, UNIT 1
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2072	2,355	297	187	8	1,758	4,604
2073	2,348	296	187	8	1,753	4,592
2074	2,348	296	187	8	1,753	4,592
2075	2,348	296	187	8	1,753	4,592
2076	2,355	297	187	8	1,758	4,604
2077	2,348	296	187	8	1,753	4,592
2078	2,348	296	187	8	1,753	4,592
2079	2,348	296	187	8	1,753	4,592
2080	2,355	297	187	8	1,758	4,604
2081	2,348	296	187	8	1,753	4,592
2082	2,348	296	187	8	1,753	4,592
2083	2,348	296	187	8	1,753	4,592
2084	2,355	297	187	8	1,758	4,604
2085	2,348	296	187	8	1,753	4,592
2086	2,348	296	187	8	1,753	4,592
2087	2,348	296	187	8	1,753	4,592
2088	2,355	297	187	8	1,758	4,604
2089	2,348	296	187	8	1,753	4,592
2090	2,348	296	187	8	1,753	4,592
2091	2,348	296	187	8	1,753	4,592
2092	2,355	297	187	8	1,758	4,604
2093	2,348	296	187	8	1,753	4,592
2094	22,158	951	937	23	1,814	25,882
2095	54,914	6,256	1,867	44	1,890	64,970
2096	69,560	24,245	1,783	36,798	18,339	150,725
2097	56,424	17,021	1,583	24,669	13,290	112,988
2098	43,728	9,446	1,400	11,055	7,567	73,195
2099	43,728	9,446	1,400	11,055	7,567	73,195
2100	3,940	701	88	704	2,114	7,547
2101	18,729	843	177	21	1,932	21,702

TABLE 3.3a (continued)
LaSALLE COUNTY STATION, UNIT 1
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2102	24,175	6,929	241	10	1,158	32,513
2103	18,472	9,088	187	0	757	28,504
2104	5,314	2,614	54	0	218	8,200
Total	626,913	182,130	22,647	85,815	243,567	1,161,072

TABLE 3.3b
LaSALLE COUNTY STATION, UNIT 2
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2043	2,506	555	82	2	820	3,965
2044	59,178	13,566	1,872	159	18,839	93,614
2045	41,200	16,752	1,053	925	14,831	74,761
2046	12,236	11,756	373	17	10,150	34,532
2047	12,236	11,756	373	17	10,150	34,532
2048	12,270	11,788	374	17	10,177	34,627
2049	7,719	5,529	272	12	6,785	20,317
2050	3,952	334	187	8	3,978	8,459
2051	3,952	334	187	8	3,978	8,459
2052	3,963	335	187	8	3,989	8,482
2053	3,952	334	187	8	3,978	8,459
2054	3,952	334	187	8	3,978	8,459
2055	3,952	334	187	8	3,978	8,459
2056	4,052	604	187	8	3,989	8,841
2057	4,599	2,275	187	8	3,978	11,046
2058	4,599	2,275	187	8	3,978	11,046
2059	4,599	2,275	187	8	3,978	11,046
2060	4,609	2,276	187	8	3,989	11,069
2061	4,599	2,275	187	8	3,978	11,046
2062	2,452	330	187	8	1,766	4,743
2063	2,452	330	187	8	1,766	4,743
2064	2,459	331	187	8	1,771	4,756
2065	2,452	330	187	8	1,766	4,743
2066	2,452	330	187	8	1,766	4,743
2067	2,452	330	187	8	1,766	4,743
2068	2,459	331	187	8	1,771	4,756
2069	2,452	330	187	8	1,766	4,743
2070	2,452	330	187	8	1,766	4,743
2071	2,452	330	187	8	1,766	4,743

TABLE 3.3b (continued)
LaSALLE COUNTY STATION, UNIT 2
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2072	2,459	331	187	8	1,771	4,756
2073	2,452	330	187	8	1,766	4,743
2074	2,452	330	187	8	1,766	4,743
2075	2,452	330	187	8	1,766	4,743
2076	2,459	331	187	8	1,771	4,756
2077	2,452	330	187	8	1,766	4,743
2078	2,452	330	187	8	1,766	4,743
2079	2,452	330	187	8	1,766	4,743
2080	2,459	331	187	8	1,771	4,756
2081	2,452	330	187	8	1,766	4,743
2082	2,452	330	187	8	1,766	4,743
2083	2,452	330	187	8	1,766	4,743
2084	2,459	331	187	8	1,771	4,756
2085	2,452	330	187	8	1,766	4,743
2086	2,452	330	187	8	1,766	4,743
2087	2,452	330	187	8	1,766	4,743
2088	2,459	331	187	8	1,771	4,756
2089	2,452	330	187	8	1,766	4,743
2090	2,452	330	187	8	1,766	4,743
2091	2,452	330	187	8	1,766	4,743
2092	2,459	331	187	8	1,771	4,756
2093	2,452	330	187	8	1,766	4,743
2094	2,452	330	187	8	1,766	4,743
2095	2,674	342	200	8	1,766	4,991
2096	29,612	1,811	1,872	39	1,844	35,177
2097	55,845	17,214	1,819	20,406	10,684	105,968
2098	71,661	24,814	1,750	38,305	18,468	154,999
2099	62,439	10,217	1,400	13,053	7,647	94,757
2100	62,439	10,217	1,400	13,053	7,647	94,757
2101	52,308	6,239	916	6,919	4,946	71,328

TABLE 3.3b (continued)
LaSALLE COUNTY STATION, UNIT 2
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2014 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2102	29,181	9,563	241	10	1,094	40,089
2103	24,369	12,750	187	0	759	38,064
2104	7,010	3,668	54	0	218	10,950
Total	676,640	193,430	22,645	93,305	232,898	1,218,917

FIGURE 3.1
DECON SCENARIO
MANPOWER LEVELS

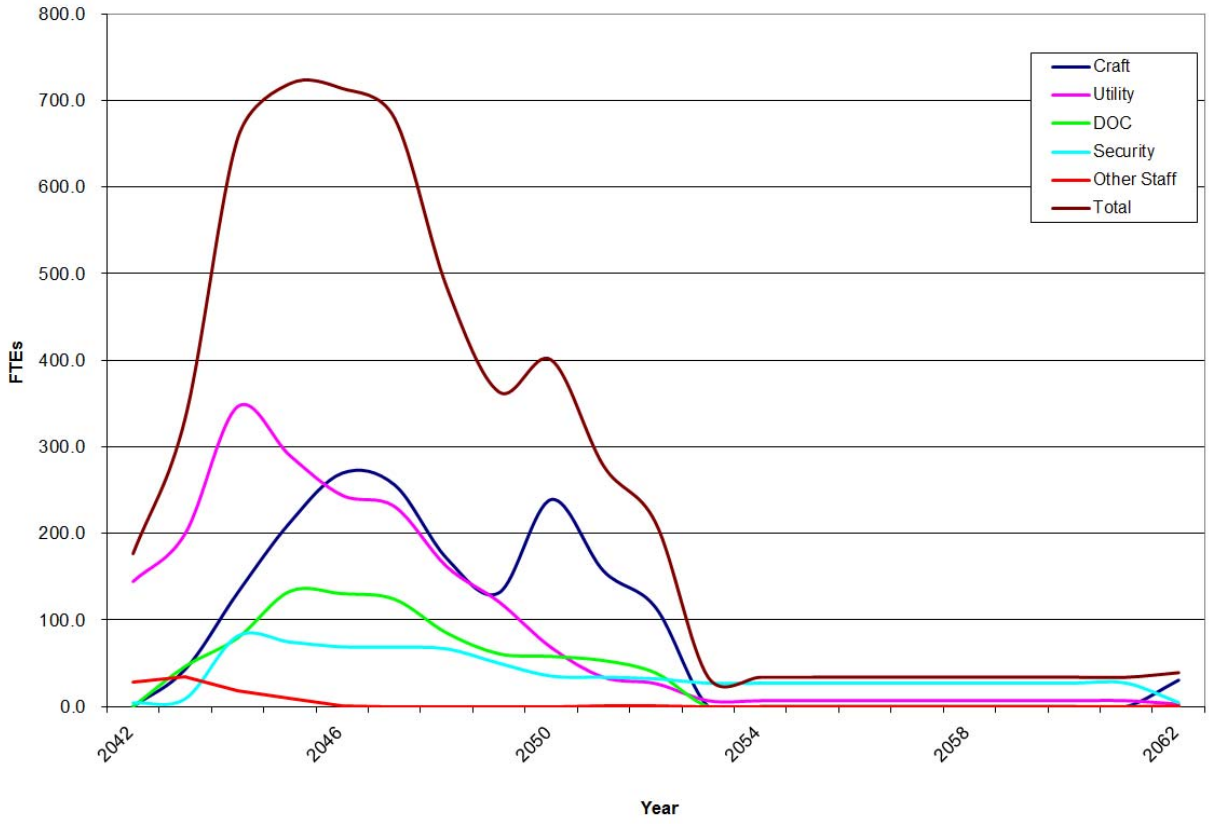


FIGURE 3.2
DELAYED DECON SCENARIO
MANPOWER LEVELS

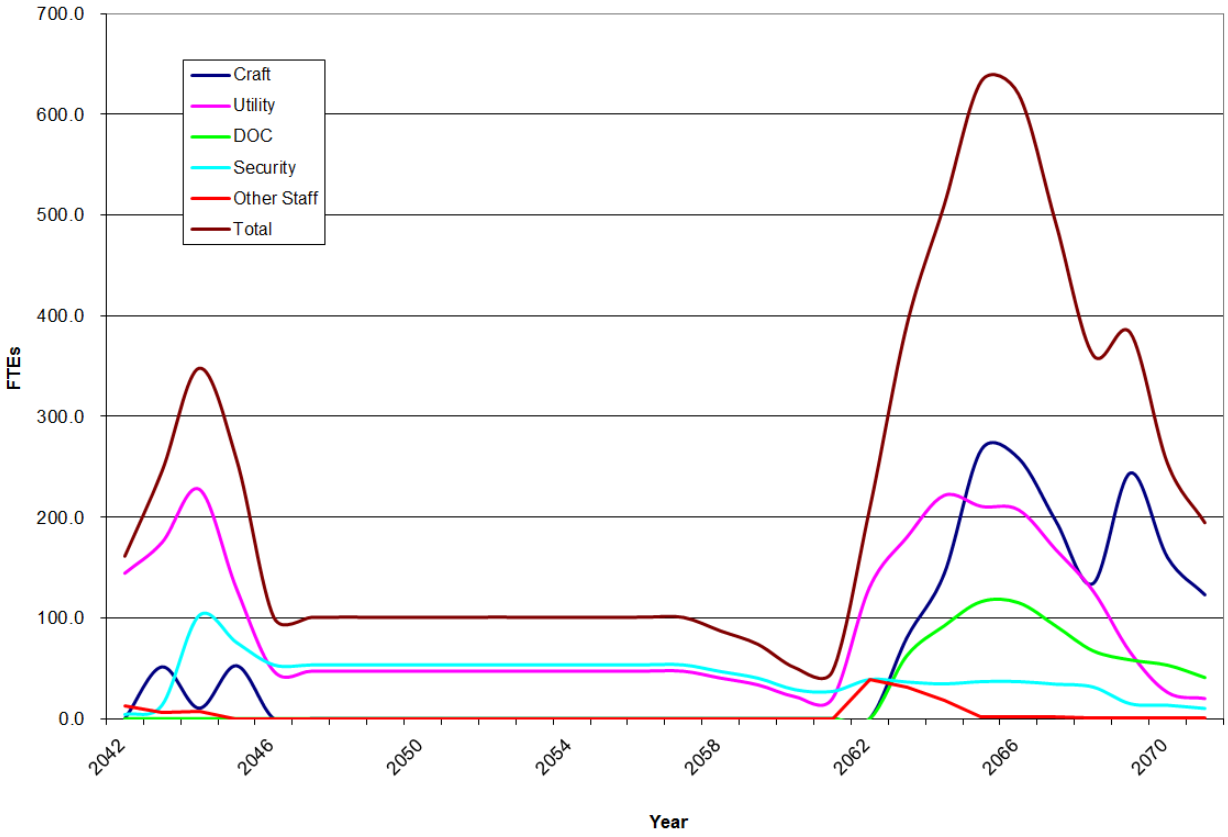
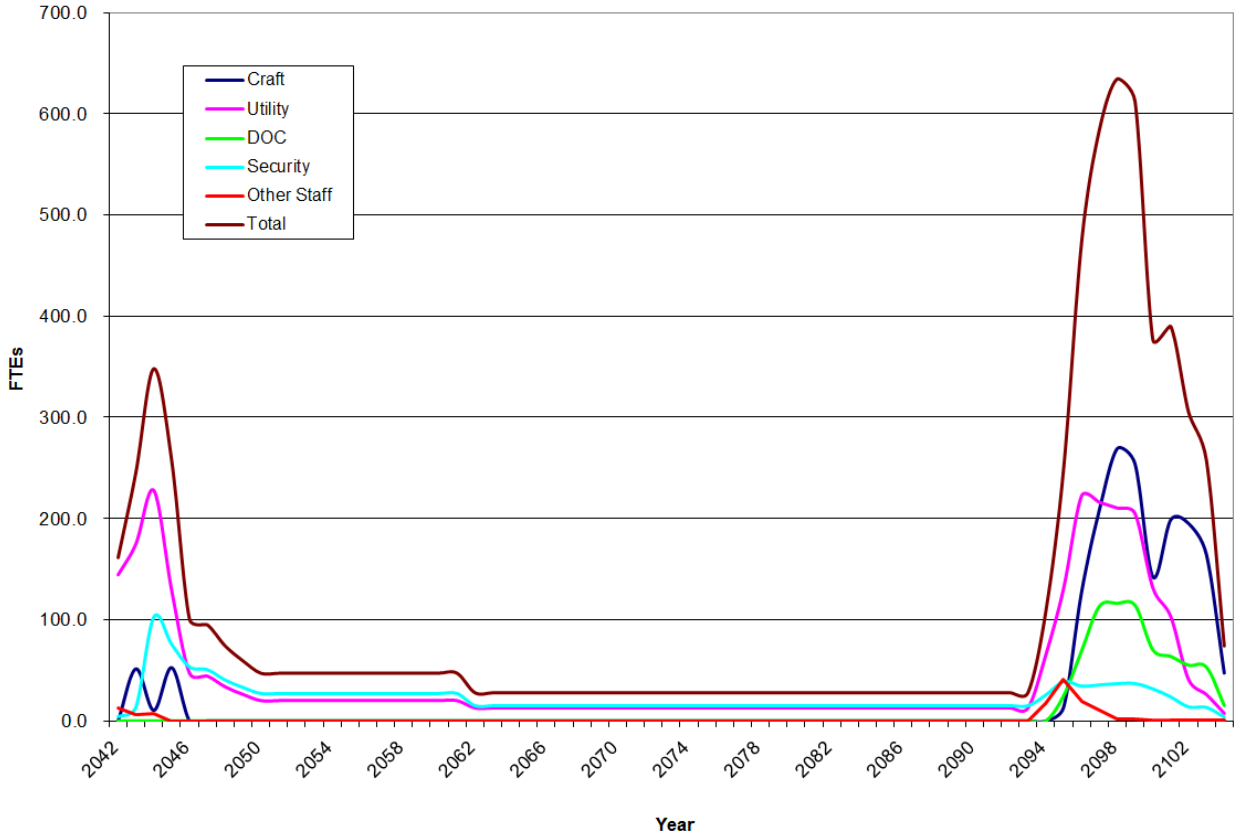


FIGURE 3.3
SAFSTOR SCENARIO
MANPOWER LEVELS



4. SCHEDULE ESTIMATE

The schedules for the decommissioning scenarios considered in this study follow the sequence presented in the AIF/NESP-036 study, with minor changes to reflect recent experience and site-specific constraints. In addition, the scheduling has been revised to reflect the spent fuel management plans described in Section 3.5.1.

A schedule or sequence of activities is presented in Figure 4.1 for the DECON decommissioning alternative. The schedule is also representative of the work activities identified in the delayed dismantling scenarios, absent any spent fuel constraints. The scheduling sequence assumes that fuel is removed from the spent fuel pool within the first five and one-half years after operations cease at Unit 2. 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 2010" computer software.[34]

4.1 SCHEDULE ESTIMATE ASSUMPTIONS

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

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

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

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

4.2 PROJECT SCHEDULE

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

Project timelines are provided in Figures 4.2 through 4.4; the milestone dates are based on this same shutdown date. The start of decommissioning activities in the Delayed Decommissioning scenario is concurrent with the end of the fuel transfer activity (i.e. to an off-site DOE facility).

FIGURE 4.1
DECON ACTIVITY SCHEDULE

ID	Task Name
1	LaSalle Unit 1 & 2 schedule
2	Shutdown Unit 1
3	Period 1a Unit 1 - Shutdown through transition
4	Certificate of permanent cessation of operations submitted
5	Fuel storage pool operations
6	Dry fuel storage operations
7	Reconfigure plant
8	Prepare activity specifications
9	Perform site characterization
10	PSDAR submitted
11	Written certificate of permanent removal of fuel submitted
12	Site specific decommissioning cost estimate submitted
13	DOC staff mobilized
14	Period 1b Unit 1 - Decommissioning preparations
15	Fuel storage pool operations
16	Reconfigure plant (continued)
17	Dry fuel storage operations
18	Prepare detailed work procedures
19	Decon NSSS
20	Isolate spent fuel pool
21	Period 2a Unit 1 - Large component removal
22	Fuel storage pool operations
23	Dry fuel storage operations
24	Preparation for reactor vessel removal
25	Reactor vessel & internals
26	Remaining large NSSS components disposition
27	Move vessel cutter to Unit 2
28	Non-essential systems
29	Main turbine/generator
30	Main condenser
31	License termination plan submitted
32	Period 2b Unit 1 - Decontamination (wet fuel)
33	Fuel storage pool operations
34	Dry fuel storage operations
35	Remove systems not supporting wet fuel storage
36	Decon buildings not supporting wet fuel storage
37	License termination plan approved
38	Fuel storage pool available for decommissioning
39	Period 2d Unit 1 - Decontamination following wet fuel storage
40	Dry fuel storage operations
41	Remove remaining systems

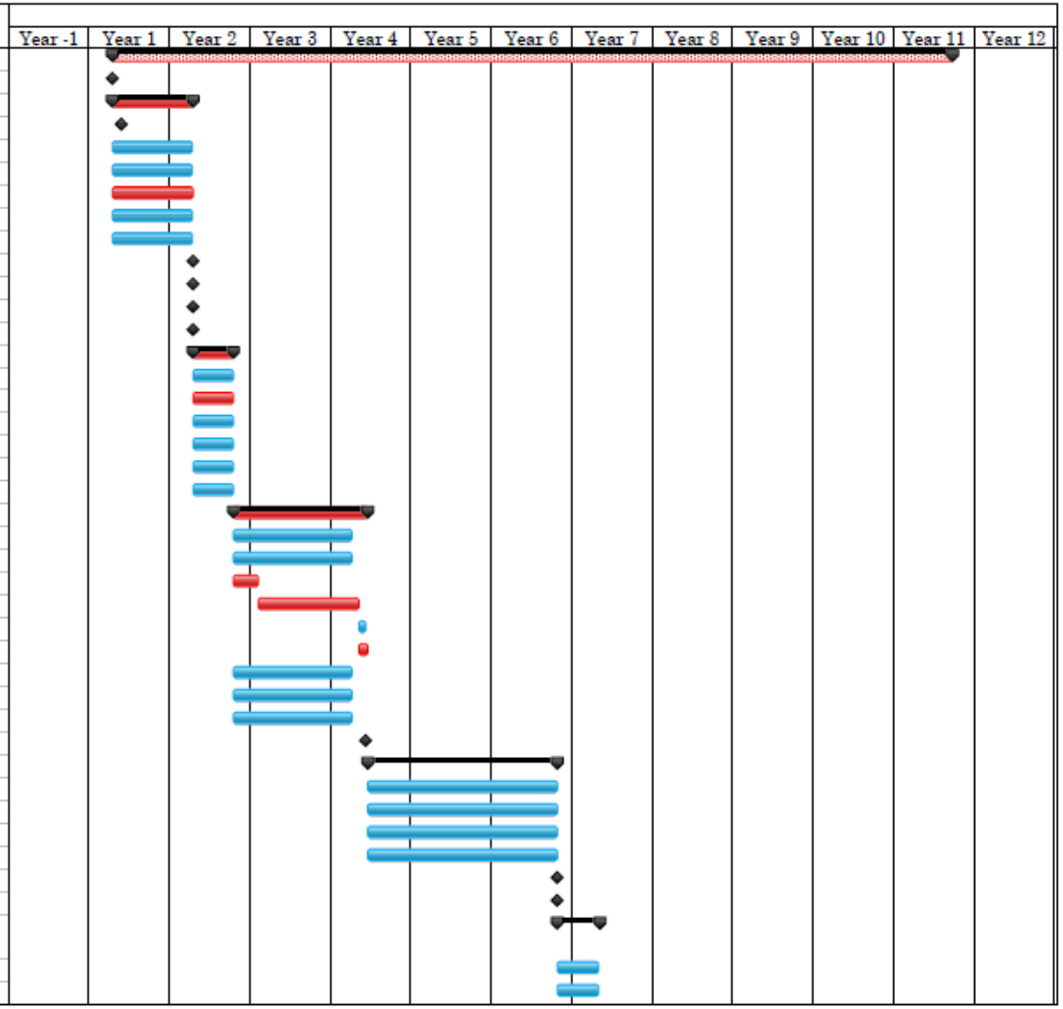


FIGURE 4.1 (continued)
DECON ACTIVITY SCHEDULE

ID	Task Name
42	Decon wet fuel storage area
43	Period 2e Unit 1 - Delay before license termination
44	
45	Shutdown Unit 2
46	Period 1a Unit 2 - Shutdown through transition
47	Certificate of permanent cessation of operations submitted
48	Fuel storage pool operations
49	Dry fuel storage operations
50	Reconfigure plant
51	Prepare activity specifications
52	Perform site characterization
53	PSDAR submitted
54	Written certificate of permanent removal of fuel submitted
55	Site specific decommissioning cost estimate submitted
56	DOC staff mobilized
57	Period 1b Unit 2 - Decommissioning preparations
58	Fuel storage pool operations
59	Reconfigure plant (continued)
60	Dry fuel storage operations
61	Prepare detailed work procedures
62	Decon NSSS
63	Isolate spent fuel pool
64	Period 2a Unit 2 - Large component removal
65	Fuel storage pool operations
66	Dry fuel storage operations
67	Preparation for reactor vessel removal
68	Reactor vessel & internals
69	Remaining large NSSS components disposition
70	Non-essential systems
71	Main turbine/generator
72	Main condenser
73	License termination plan submitted
74	Period 2b Unit 2 - Decontamination (wet fuel)
75	Fuel storage pool operations
76	Dry fuel storage operations
77	Remove systems not supporting wet fuel storage
78	Decon buildings not supporting wet fuel storage
79	License termination plan approved
80	Fuel storage pool available for decommissioning
81	Period 2d Unit 2 - Decontamination following wet fuel storage
82	Dry fuel storage operations

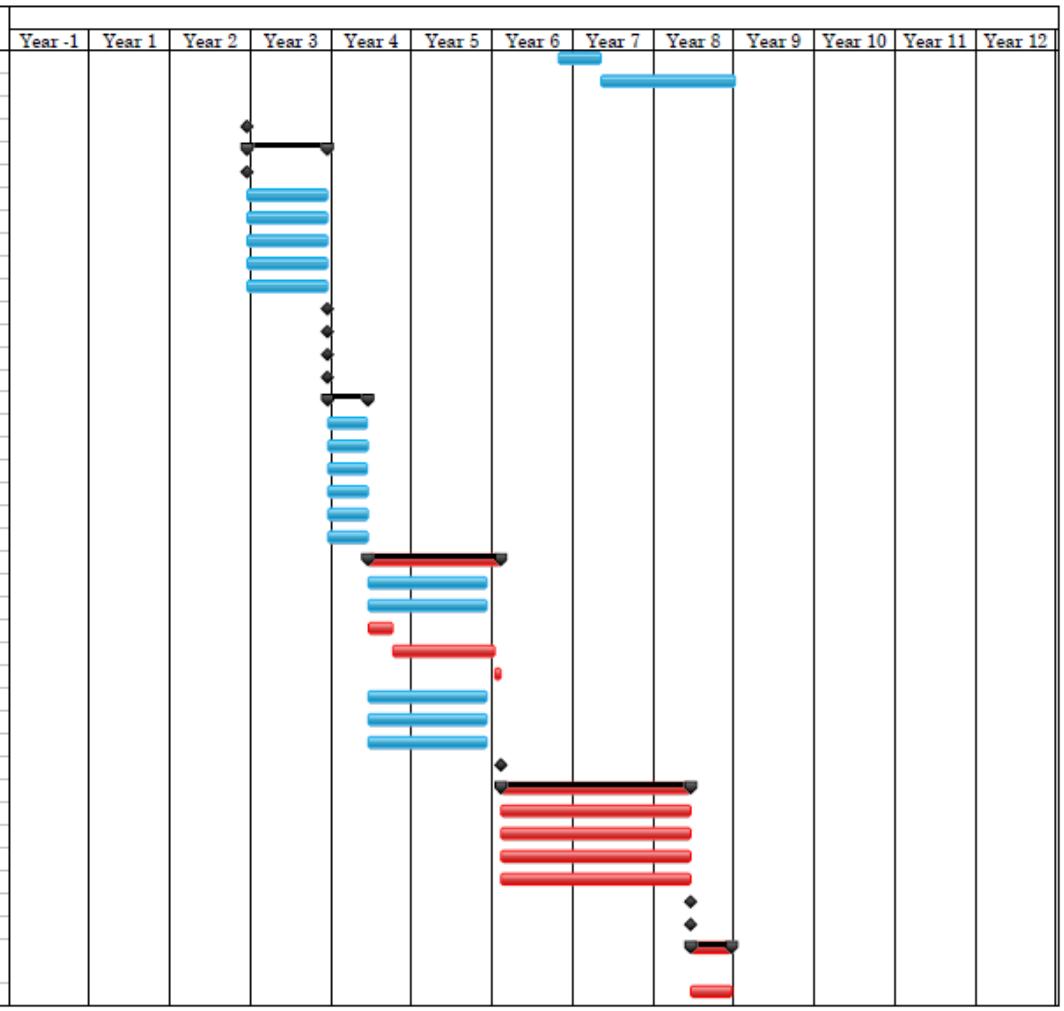


FIGURE 4.1 (continued)
DECON ACTIVITY SCHEDULE

ID	Task Name
83	Remove remaining systems
84	Decon wet fuel storage area
85	
86	Period 2f Unit 1 & 2 - Plant license termination
87	Dry fuel storage operations
88	Final Site Survey
89	NRC review & approval
90	Part 50 license terminated
91	Period 3b Unit 1 & 2 - Site restoration
92	Dry fuel storage operations
93	Building demolitions, backfill and landscaping
94	Building demolition
95	Landscape Site

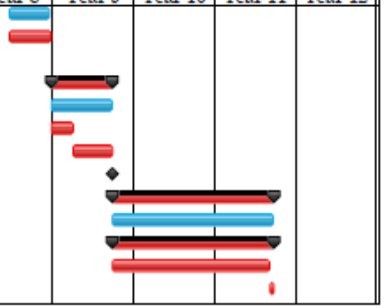


FIGURE 4.2
DECOMMISSIONING TIMELINE
DECON
(not to scale)

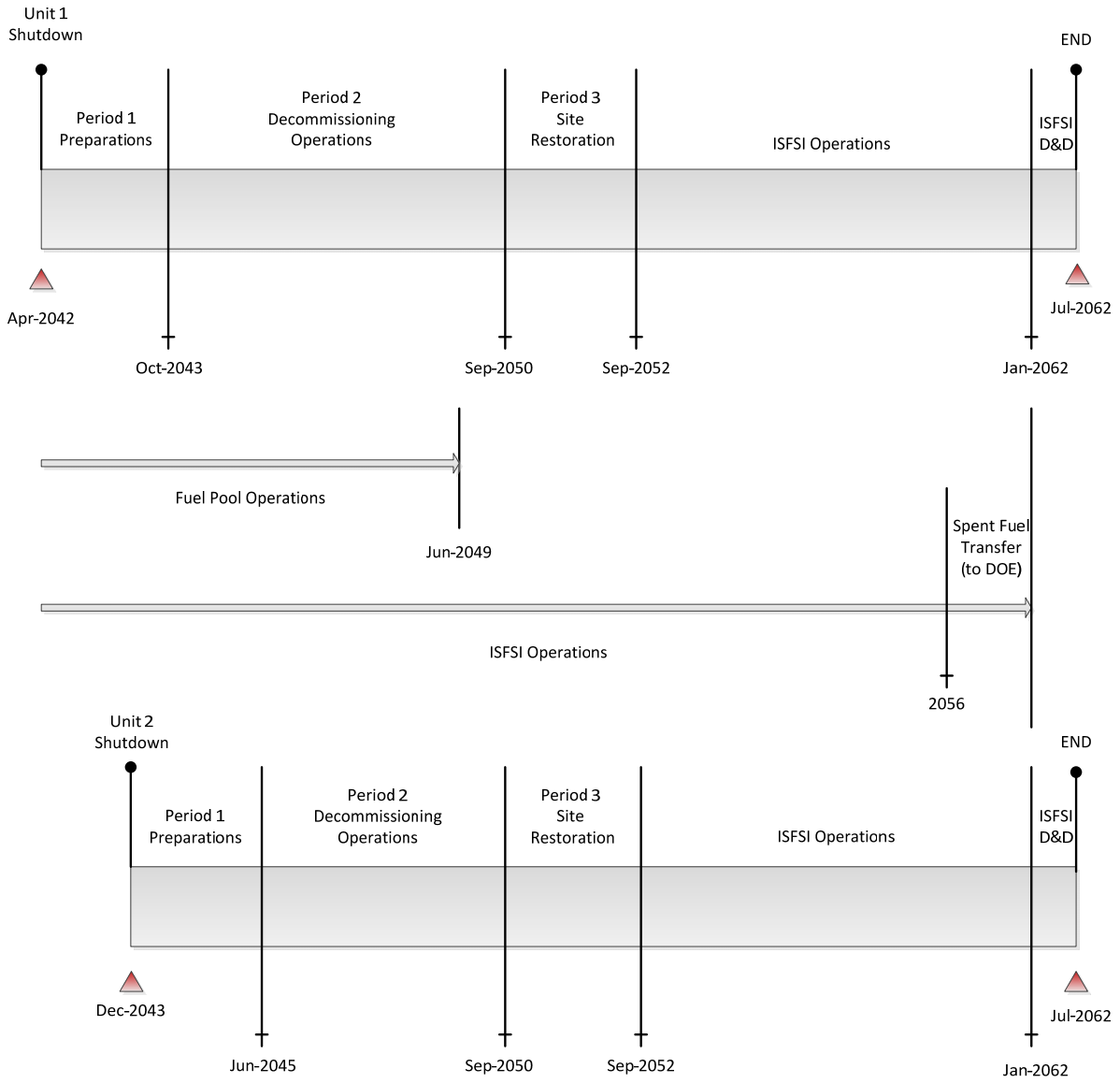


FIGURE 4.3
DECOMMISSIONING TIMELINE
DELAYED DECON
(not to scale)

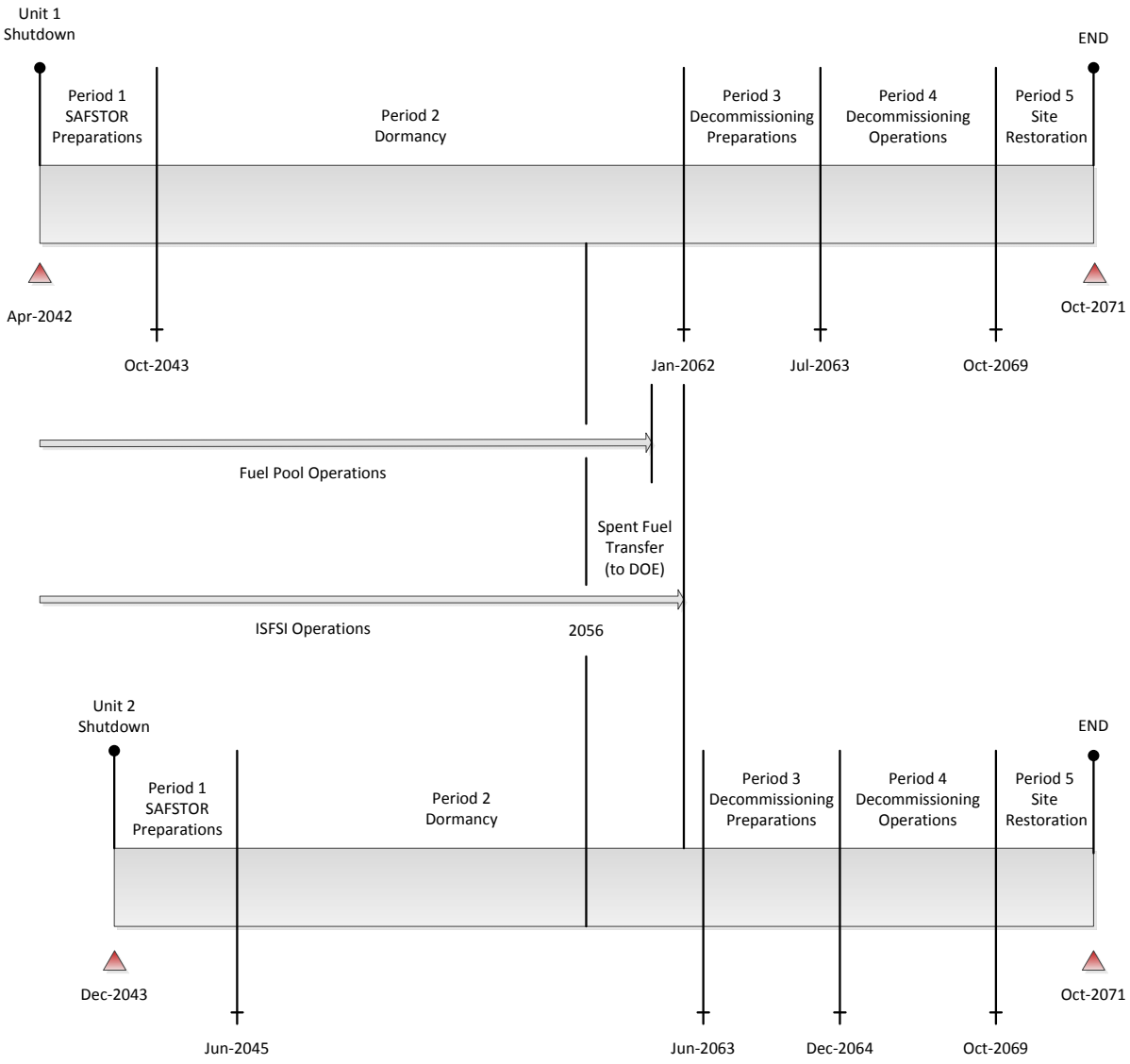
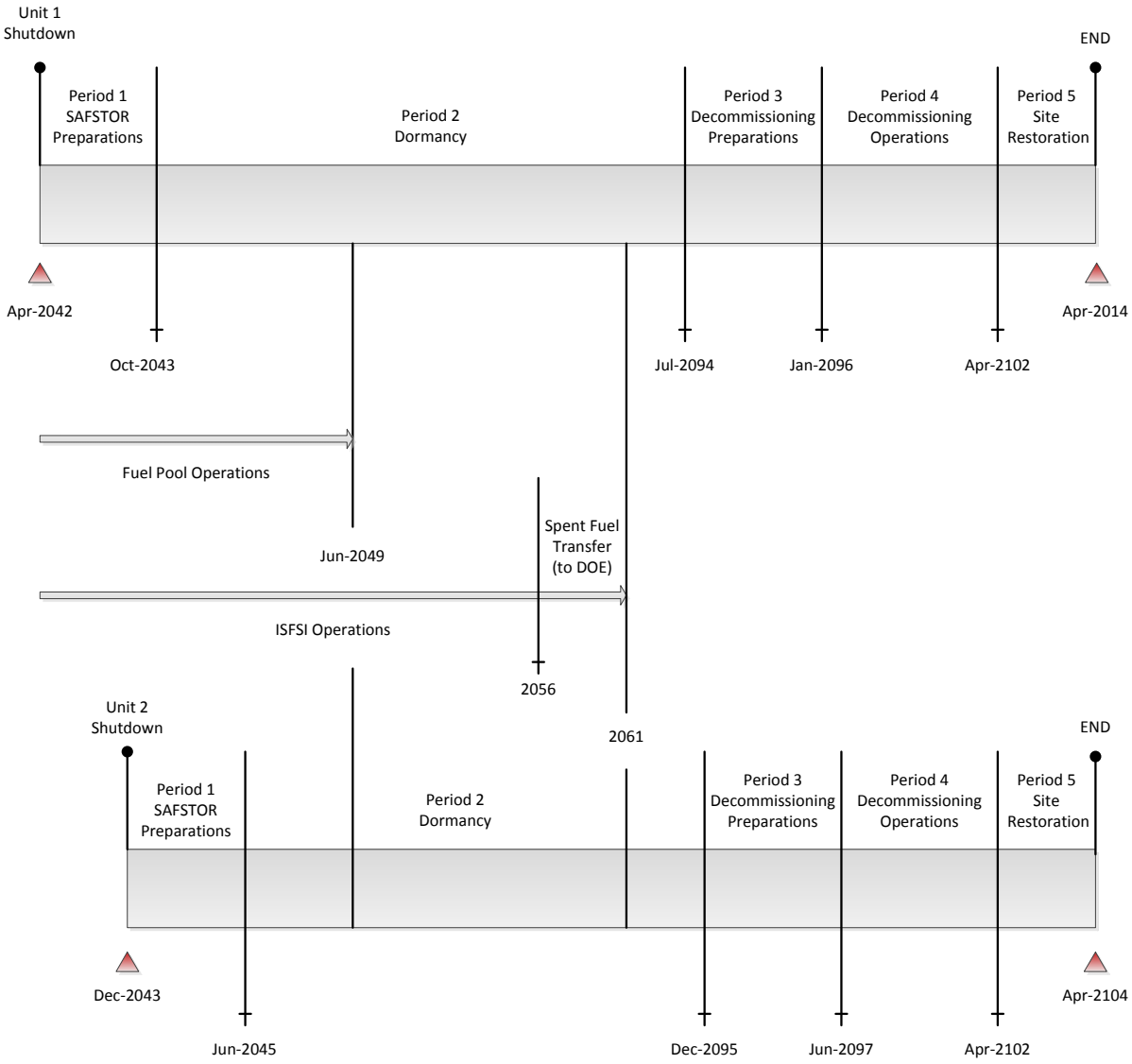


FIGURE 4.4
DECOMMISSIONING TIMELINE
SAFSTOR
(not to scale)



5. RADIOACTIVE WASTES

The objectives of the decommissioning process are the removal of all radioactive material from the site that would restrict its future use and the termination of the NRC license(s). This currently requires the remediation of all radioactive material at the site in excess of applicable legal limits. Under the Atomic Energy Act,[35] the NRC is responsible for protecting the public from sources of ionizing radiation. Title 10 of the Code of Federal Regulations delineates the production, utilization, and disposal of radioactive materials and processes. In particular, §71 defines radioactive material as it pertains to packaging and transportation and §61 specifies its disposition.

Most of the materials being transported for controlled burial are categorized as Low Specific Activity (LSA) or Surface Contaminated Object (SCO) materials containing Type A quantities, as defined in 49 CFR §173-178. Shipping containers are required to be Industrial Packages (IP-1, IP-2 or IP-3, as defined in subpart 173.411). For this study, commercially available steel containers are presumed to be used for the disposal of piping, small components, and concrete. Larger components can serve as their own containers, with proper closure of all openings, access ways, and penetrations.

The destinations for the various waste streams from decommissioning are identified in Figures 5.1 and 5.2. The volumes of radioactive waste generated during the various decommissioning activities at the site is shown on a line-item basis in Appendices C, D, and E and summarized in Tables 5.1 through 5.3. The quantified waste volume summaries shown in these tables are consistent with §61 classifications. The volumes are calculated based on the exterior dimensions for containerized material and on the displaced volume of components serving as their own waste containers.

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

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

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

The waste material generated in the decontamination and dismantling of LaSalle County is primarily generated during Period 2 of the DECON alternative and Period 4 of the deferred alternatives. All radioactive waste is sent offsite for controlled disposal.

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

Energy*Solutions* is not able to accept the higher activity waste (Class B and C) generated in the decontamination of the reactor vessel and segmentation of the components closest to the core. As a proxy for future disposal facilities, waste disposal costs for the higher activity waste (Class B and C) are based upon the last published rate schedule for non-compact waste for the Barnwell facility, adjusted for escalation of the Atlantic Compact rates.

FIGURE 5.1
RADIOACTIVE WASTE DISPOSITION

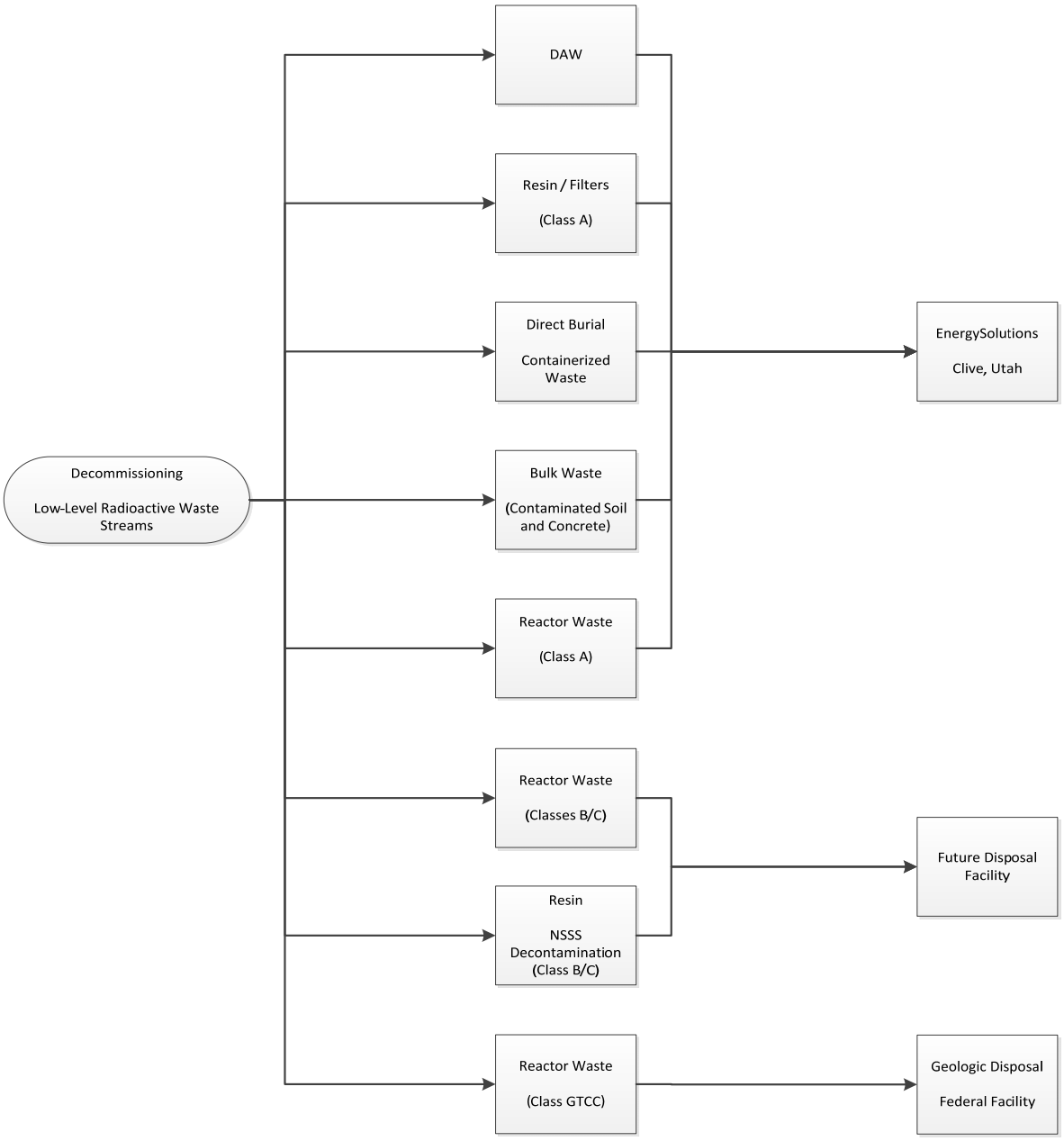
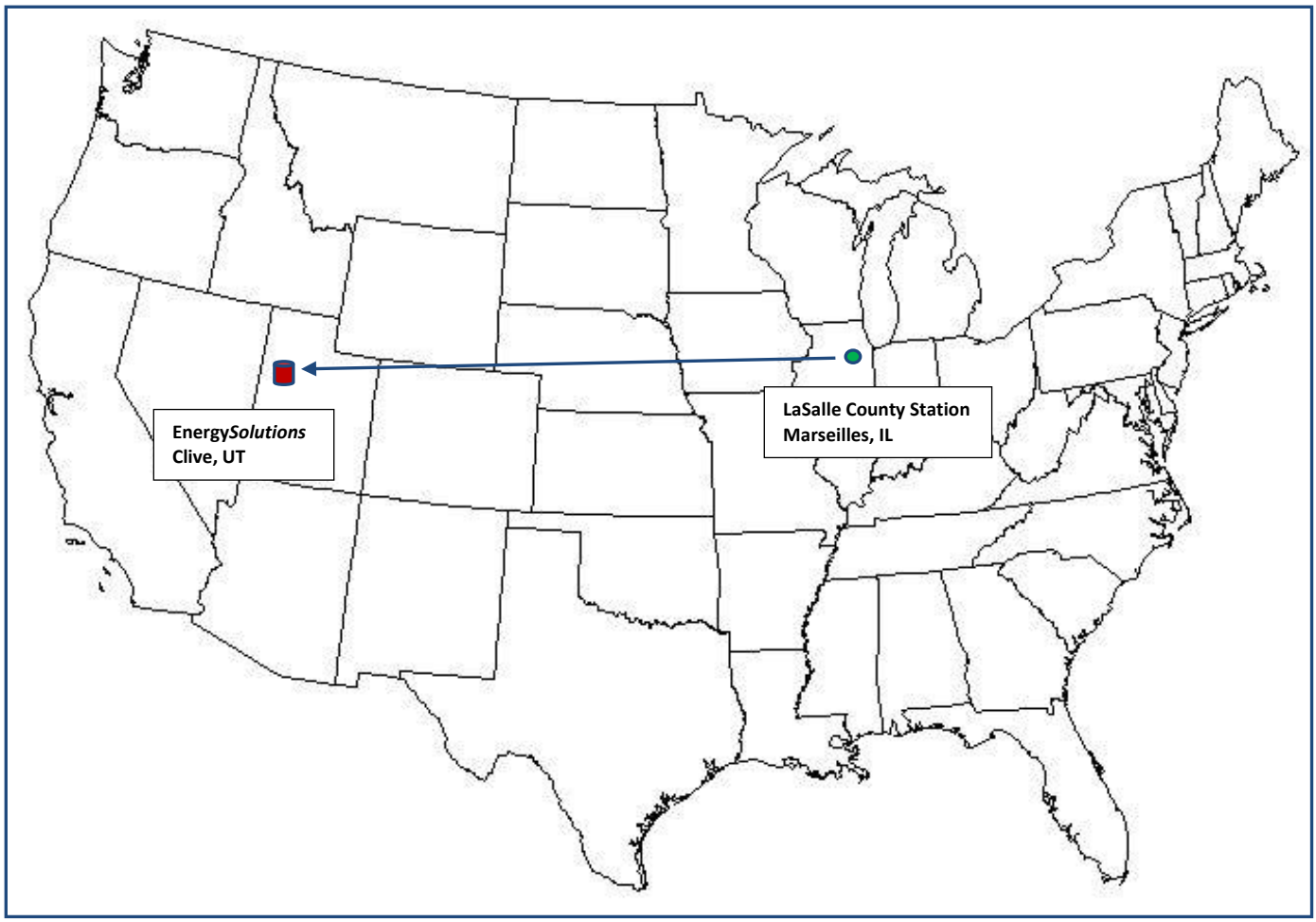


FIGURE 5.2
DECOMMISSIONING WASTE DESTINATIONS
RADIOLOGICAL



The figure indicates the destinations for the low-level radioactive waste designated for direct disposal (Class A at Energy*Solutions*).

Disposition of the Class B and C low-level radioactive waste will be at a future disposal facility (to be determined). For estimating purposes, the facility is located (for capturing transportation costs) at a distance equivalent to the Energy*Solutions* facility and the disposal cost is based upon the currently operating Barnwell Low-Level Radioactive Waste Disposal Facility in South Carolina.

Disposal options (and destinations) for GTCC are still being evaluated.

TABLE 5.1
DECOMMISSIONING WASTE SUMMARY
DECON

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Mass (pounds)
Low-Level Radioactive Waste (near-surface disposal)	Energy*Solutions* Containerized	A	1,605,990	85,668,700
	Energy*Solutions* Bulk	A	153,546	10,167,335
	Future LLRW Disposal Facility (Proxy)	B	4,606	586,953
	Future LLRW Disposal Facility (Proxy)	C	2,132	175,411
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC	4,900	965,294
Total [2]			1,771,173	97,563,693
Scrap Metal				238,404,000

[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
DECOMMISSIONING WASTE SUMMARY
DELAYED DECON

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Mass (pounds)
Low-Level Radioactive Waste (near-surface disposal)	Energy*Solutions* Containerized	A	1,576,608	83,979,700
	Energy*Solutions* Bulk	A	146,645	9,459,232
	Future LLRW Disposal Facility (Proxy)	B	3,799	370,596
	Future LLRW Disposal Facility (Proxy)	C	1,079	133,842
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC	4,900	965,294
Total [2]			1,733,030	94,908,663
Scrap Metal				238,404,000

[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
DECOMMISSIONING WASTE SUMMARY
SAFSTOR

Waste	Cost Basis	Class [1]	Waste Volume (cubic feet)	Mass (pounds)
Low-Level Radioactive Waste (near-surface disposal)	Energy*Solutions* Containerized	A	1,554,737	83,157,800
	Energy*Solutions* Bulk	A	158,229	10,188,185
	Future LLRW Disposal Facility (Proxy)	B	4,093	397,791
	Future LLRW Disposal Facility (Proxy)	C	811	105,319
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC	4,900	965,294
Total [2]			1,722,769	94,814,389
Scrap Metal				238,404,000

[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 LaSalle County relied upon the site-specific, technical information developed for a previous analysis prepared in 2009. While not an engineering study, the estimates provide Exelon with sufficient information to assess its financial obligations, as they pertain to the eventual decommissioning of the nuclear station.

The estimates described in this report are based on numerous fundamental assumptions, including regulatory requirements, project contingencies, low-level radioactive waste disposal practices, high-level radioactive waste management options, and site restoration requirements. The decommissioning scenarios assume continued operation of the plant's spent fuel pools for a minimum of five and one-half years following the cessation of operations for continued cooling of the assemblies. For the DECON and SAFSTOR scenarios, the ISFSI is expanded to accommodate the spent fuel, once sufficiently cooled, until such time that the DOE can complete the transfer of the assemblies to its repository. The spent fuel in the storage pools and reactors at the cessation of operations remains in the storage pools in the Delayed-DECON alternative.

The cost projected to promptly decommission (DECON) LaSalle County is estimated to be $1.99 billion. The majority of this cost (approximately 74.0%) is associated with the physical decontamination and dismantling of the nuclear units so that the licenses can be terminated. Another 19.1% is associated with the management, interim storage, and eventual transfer of the spent fuel. The remaining 6.9% is for the demolition of the designated structures and limited restoration of the site.

The primary cost contributors, identified in Tables 6.1 through 6.3, are either labor-related or associated with the management and disposition of the radioactive waste. Program management is the largest single contributor to the overall cost. The magnitude of the expense is a function of both the size of the organization required to manage the decommissioning, as well as the duration of the program. This analysis assumes that Exelon will oversee the decommissioning program, using a DOC to manage the decommissioning labor force and the associated subcontractors. The size and composition of the management organization varies with the decommissioning phase and associated site activities. However, once the operating license is terminated, the staff is substantially reduced for the conventional demolition and restoration of the site, and the long-term care of the spent fuel (for the DECON alternative).

As described in this report, the spent fuel pools will remain operational for a minimum of five and one-half 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 areas. Over the five and one-half year period, the spent fuel will be packaged into transportable steel canisters for future loading into a DOE-provided transport cask (DECON and SAFSTOR alternatives). The canisters will be stored in concrete overpacks at the ISFSI until the DOE is able to receive them. Dry storage of the fuel provides additional flexibility in the event the DOE is not able to meet the current timetable for completing the transfer of assemblies to an off-site facility and minimizes the associated caretaking expenses.

The cost for waste disposal includes only those costs associated with the controlled disposition of the low-level radioactive waste generated from decontamination and dismantling activities, including plant equipment and components, structural material, filters, resins and dry-active waste. As described in Section 5, disposal of the majority of the radioactive material is at EnergySolutions facility in Clive, Utah or some alternative facility. Highly activated components, requiring additional isolation from the environment, are packaged for geologic disposal. Disposal of these components is based upon a cost equivalent for spent fuel.

Removal costs reflect the labor-intensive nature of the decommissioning process, as well as the management controls required to ensure a safe and successful program. Decontamination and packaging costs also have a large labor component that is based upon prevailing wages. Non-radiological demolition is a natural extension of the decommissioning process. 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.

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.

Comparison of the 2009 and 2014 Estimates

For illustrative purposes, the estimates for the 2009 and 2014 DECON scenarios are compared, with the cost difference for the major cost elements shown in Table 6.4. The 2009 cost elements are inflated using the CPI, Services index to 2014 dollars to remove the effect of financial escalation from the comparison. The cost difference between the escalated 2009 estimate (increased approximately 8.6%) and the 2014 estimate is approximately $414 million. Unless otherwise noted, all cost values and percentages reflect 2009 estimate costs adjusted for inflation.

Spent Fuel Management

The 2014 estimate includes an additional 6 years of post-dismantling ISFSI operation. The increased residence time was based upon Exelon's revised projections for fleet-wide DOE spent fuel acceptance, and with consideration of an additional delay in DOE startup (first acceptance of commercial spent fuel) from 2018 to 2025.

Spent Fuel Management (Direct Costs)

This cost category increased approximately $109 million. There are two components to the category; costs associated with the purchase and loading of the dry storage systems (multi-purpose canister and storage overpack) and the costs associated with emergency planning while fuel is on site.

Dry Storage System

Exelon's 2014 fleet-wide spent fuel management plan, which reflected a seven year delay in DOE performance (as compared to the previous study), increased the on-site storage requirements (from 96 casks in 2009 to 117 casks in 2014). The cost impact of procuring the additional dry storage systems was compounded by a 21% increase in the cost of the dry storage systems (including loading) over the five year period. The combined increase was approximately $43.9 million. The

increase was partially off-set by a savings in the cost estimated to expand the ISFSI in the 2014 estimate.

Emergency Planning

The 2009 estimate included a nominal allowance for emergency planning. The 2014 estimate included the Illinois Emergency Management Agency (IEMA) fee at an annual cost of $3.9 million (for the station). The IEMA fee was maintained at that level while spent fuel was on site. The inclusion of the IEMA fee was the principal contributor in the $78.3 million increase in the 2014 estimate.

Security

Security costs increased approximately $37 million (58.6%) between the 2009 and 2014 estimates. Approximately $22 million is due to the longer ISFSI operating period (six years) in the 2014 estimate. The remaining cost increase is due to the 23% increase in the average labor cost over the five year period.

Property Taxes

Property taxes for the 1st four years following unit shut down changed substantially. This was due to the method by which the Exelon schedule of property taxes was applied in the two estimates. Property taxes are assumed to be paid in arrears; therefore the tax payment in the year following shutdown is actually for the final year of operations, and therefore is not included in either the 2009 or 2014 estimates. In 2009 the cost model assumed that this first year (which as not included) was part of the reduction in tax payments; the 2014 estimate does not make this assumption. The 2009 estimate also assumed that the second year of payment was already reduced to 67% of the operations level; the 2014 estimate begins property tax payments at the operations level for the second year. The total impact of the change was that the 2009 estimate paid the equivalent of one year of operations-level taxes before beginning the $1 million per year level payments; the 2014 estimate paid the equivalent of approximately two years of operations-level taxes prior to the $1 million per year level payments. The increase in the spent fuel site residence time (6 years) also contributed to the increase in costs.

Decommissioning and Demolition

Plant system and structural commodity "Removal" costs increased as a result of an 8% increase in craft labor hourly rate over the five year period (used to perform physical plant dismantling) and a 14% average hourly rate increase in health physics personnel (used to support work crew activities, perform interim

radiological assessments, and license termination surveys). The 2014 "Removal" cost also includes the perimeter excavation of the power blocks for removing underground services. This was added in 2014 based upon industry experience.

In the 2009 cost estimate, a significant portion of the contaminated waste stream was designated for off-site processing, volume reduction and recovery. In the 2014 estimate, the LLRW strategy changed such that metal material was sent directly to the LLRW burial facility, where is can be separated for burial or processing by the waste vendor consistent with recent industry practice. This results in a single rate for burial or processing of waste metals. With the low direct disposal rate, third-party off-site processing was not utilized in the 2014 estimate.

The waste packaging density for Class A containerized waste was revised to reflect industry experience (the lower density used in the 2014 cost model increased the number of waste packages, the disposal volume, and the associated packaging, transport and disposal cost.

As a result of these changes:

1) The packaging cost increased (due to both reduced density and increased quantity of material designated for direct disposal). Direct disposal of contaminated metals incorporates the mass and volume of the waste package, as well as the cost of the one-time use waste package. Off-site processing typically uses reusable containers that do not contribute substantially to the packaging cost. "Packaging" costs also increased with the addition (in 2014) of four spent fuel multi-purpose canisters and storage overpacks for GTCC waste (2 per unit at a nominal cost of $1.2 million for each canister procurement and transfer). The additional packages resulted from a payload constraint being applied on the storage canisters, as a result of industry experience.
2) Shipping costs increased for four reasons, updated waste carrier tariff schedules, a greater distance to the waste disposal site v. the off-site waste processing site, an increased number of waste packages, and a 2014 price for diesel fuel being 45% higher than in 2009.
3) In 2014 low-level waste disposal costs increased relative to the combination of waste disposal and processing costs in 2009 principally because the 2014 cost of waste disposal for system components (using a single waste stream) is substantially larger than 2009 cost for disposal (which used separate waste streams for direct burial and off-site waste processing).

Characterization and Licensing Surveys

Characterization and surveys increased by $18.4 million (40%). The majority of the increase in this cost category (84.6%) is associated with the addition (in 2014) of remedial action survey personnel during the active decontamination and dismantling periods. These teams are used to assess, process, and identify areas of concerns, and confirm that the desired remediation results have been achieved. This activity has been added based on industry experience. The remainder of the change is due to a 14% increase in the average hourly rate for an HP Technician.

Other

Additional costs were realized in the 2014 cost model from an updated "Insurance" model and "Site O&M" charges provided by Exelon (combined with the longer spent fuel site residence time). "Energy" costs increased 8% percent since the 2009 estimate. This is commensurate with a 16% increase (not adjusted for inflation) in the price of electricity used in the 2014 estimate and the model that adjusts energy consumption based on reactor thermal rating (LaSalle County had a power uprate between the 2009 and 2014 studies).

TABLE 6.1
SUMMARY OF DECOMMISSIONING COST ELEMENTS
DECON ALTERNATIVE
(thousands of 2014 dollars)

Cost Element	Total	Percentage
Decontamination	47,627	2.4
Removal	318,024	16.0
Packaging	78,925	4.0
Transportation	46,050	2.3
Waste Disposal	266,464	13.4
Off-site Waste Processing	0	0.0
Program Management [1]	592,861	29.8
Security	100,124	5.0
Spent Fuel Pool Isolation	20,724	1.0
Spent Fuel Management [2]	303,171	15.2
Insurance and Regulatory Fees	34,884	1.8
Energy	22,037	1.1
Characterization and Licensing Surveys	64,906	3.3
Property Taxes	73,016	3.7
Miscellaneous Equipment	13,757	0.7
Site O&M	7,182	0.4
Total [3]	1,989,751	100.0

Cost Element	Total	Percentage
NRC License Termination	1,471,645	74.0
Spent Fuel Management	379,733	19.1
Site Restoration	138,373	6.9
Total [3]	1,989,751	100.0

[1] Includes security and engineering 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

TABLE 6.2
SUMMARY OF DECOMMISSIONING COST ELEMENTS
DELAYED DECON ALTERNATIVE
(thousands of 2014 dollars)

Cost Element	Total	Percentage
Decontamination	55,667	2.7
Removal	310,514	15.2
Packaging	68,133	3.3
Transportation	36,411	1.8
Waste Disposal	206,436	10.1
Off-site Waste Processing	0	0.0
Program Management [1]	736,899	36.0
Security	163,518	8.0
Spent Fuel Pool Isolation	20,724	1.0
Spent Fuel Management [2]	159,987	7.8
Insurance and Regulatory Fees	65,827	3.2
Energy	37,192	1.8
Characterization and Licensing Surveys	66,356	3.2
Property Taxes	83,538	4.1
Miscellaneous Equipment	26,752	1.3
Site O&M	10,876	0.5
Total [3]	2,048,830	100.0

Cost Element	Total	Percentage
NRC License Termination	1,498,254	73.1
Spent Fuel Management	413,664	20.2
Site Restoration	136,911	6.7
Total [3]	2,048,830	100.0

[1] Includes security and engineering 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

TABLE 6.3
SUMMARY OF DECOMMISSIONING COST ELEMENTS
SAFSTOR ALTERNATIVE
(thousands of 2014 dollars)

Cost Element	Total	Percentage
Decontamination	55,568	2.3
Removal	316,771	13.3
Packaging	67,965	2.9
Transportation	36,201	1.5
Waste Disposal	200,103	8.4
Off-site Waste Processing	0	0.0
Program Management [1]	750,407	31.5
Security	202,716	8.5
Spent Fuel Pool Isolation	20,724	0.9
Spent Fuel Management [2]	298,365	12.5
Insurance and Regulatory Fees	130,766	5.5
Energy	45,291	1.9
Characterization and Licensing Surveys	66,356	2.8
Property Taxes	119,298	5.0
Miscellaneous Equipment	46,237	1.9
Site O&M	23,222	1.0
Total [3]	2,379,990	100.0

Cost Element	Total	Percentage
NRC License Termination	1,855,812	78.0
Spent Fuel Management	385,662	16.2
Site Restoration	138,516	5.8
Total [3]	2,379,990	100.0

[1] Includes security and engineering 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

TABLE 6.4
SUMMARY COMPARISON
DECON ALTERNATIVE
(thousands of dollars)

Cost Element	2009 Estimate (dollars)	2009 Escalated to 2014 [1] (dollars)	2014 Estimate (dollars)	Delta [2]
Decontamination	42,821	46,483	47,627	1,144
Removal	264,200	286,791	318,024	31,233
Packaging	40,909	44,407	78,925	34,518
Transportation	25,293	27,455	46,050	18,594
Waste Disposal	160,354	174,066	266,464	92,398
Off-site Waste Processing	26,459	28,721	0	-28,721
Program Management	510,032	553,644	592,861	39,217
Security	58,174	63,149	100,124	36,975
Spent Fuel Pool Isolation	18,572	20,160	20,724	564
Spent Fuel Management (Direct Costs)	179,204	194,527	303,171	108,644
Insurance and Regulatory Fees	21,558	23,402	34,884	11,482
Energy	18,743	20,345	22,037	1,691
Characterization/Licensing Surveys	42,870	46,536	64,906	18,370
Property Taxes	26,701	28,984	73,016	44,033
Miscellaneous Equipment	12,892	13,995	13,757	-238
Site O&M	2,762	2,998	7,182	4,184
Total	1,451,544	1,575,661	1,989,751	414,090

NRC License Termination	1,120,226	1,216,012	1,471,645	255,632
Spent Fuel Management	218,596	237,287	307,243	69,956
6 Additional Years of ISFSI Ops [3]			72,490	72,490
Site Restoration	112,723	122,361	138,373	16,012
Total	1,451,544	1,575,661	1,989,751	414,090

[1] Escalated by CPI, Services for comparative purposes
[2] "2014 Estimate" value minus "2009 Escalated to 2014" value
[3] Based upon average annual cost of $6.04 million per unit for 5 years

7. REFERENCES

1. "Decommissioning Cost Analysis for the LaSalle County Station, Units 1 and 2," Document No. E16-1555-012, Rev. 0, TLG Services, Inc., June 2009

2. U.S. Code of Federal Regulations, Title 10, Parts 30, 40, 50, 51, 70 and 72, "General Requirements for Decommissioning Nuclear Facilities," Nuclear Regulatory Commission, 53 Fed. Reg., 24018-, June 27, 1988

3. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.159, "Assuring the Availability of Funds for Decommissioning Nuclear Reactors," Rev. 2, October 2011

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, 66 Fed. Reg. 52551, 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, 61 Fed. Reg. 39278, July 29, 1996

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

8. "Nuclear Waste Policy Act of 1982," 42 U.S. Code 10101, et seq. http://pbadupws.nrc.gov/docs/ML1327/ML13274A489.pdf#page=419

9. Blue Ribbon Commission on America's Nuclear Future Charter, http://cybercemetery.unt.edu/archive/brc/20120620215336/http://brc.gov/index.php?q=page/charter

10. "Blue Ribbon Commission on America's Nuclear Future, Report to the Secretary of Energy," http://www.brc.gov/sites/default/files/documents/brc_finalreport_jan2012.pdf, p. 32, January 2012

11. "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," U.S. DOE, January 11, 2013

7. REFERENCES
(continued)

12. United States Court of Appeals for the District of Columbia Circuit, In Re: Aiken County, Et Al., August 2013, http://www.cadc.uscourts.gov/internet/opinions.nsf/BAE0CF34F762EBD985257BC6004DEB18/$file/11-1271-1451347.pdf

13. U.S. Code of Federal Regulations, Title 10, Part 961.11, Article IV – Responsibilities of the Parties, B. DOE Responsibilities, 5.(a) "… DOE shall issue an annual acceptance priority ranking for receipt of SNF and/or HLW at the DOE repository. This priority ranking shall be based on the age of SNF and/or HLW as calculated from the date of discharge of such materials from the civilian nuclear power reactor. The oldest fuel or waste will have the highest priority for acceptance …"

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

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

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

17. U.S. Code of Federal Regulations, Title 10, Part 61.55 "Waste Classification"

18. U.S. Code of Federal Regulations, Title 10, Part 20, Subpart E, "Final Rule, Radiological Criteria for License Termination," 62 Fed. Reg. 39058, July 21, 1997

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

20. 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"

21. "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

7. REFERENCES
(continued)

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

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

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

25. "Building Construction Cost Data 2014," Robert Snow Means Company, Inc., Kingston, Massachusetts

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

27. Civilian Radioactive Waste Management System Waste Acceptance System Requirements Document," Revision 5, ICN01 (DOE/RW-0351) effective March 10, 2008

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

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

30. Tri-State Motor Transit Company Radioactive Materials Tariff

31. 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

32. 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

7. REFERENCES
(continued)

33. 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

34. "Microsoft Project 2010," Microsoft Corporation, Redmond, WA, 2003

35. “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	52.35	1,761.63
Craftsmen	2.00	11.217	68.71	1,541.44
Foreman	1.00	11.217	71.78	805.16
General Foreman	0.25	11.217	74.55	209.06
Fire Watch	0.05	11.217	52.35	29.36
Health Physics Technician	1.00	11.217	63.44	711.61
Total labor cost				$5,058.26

4. EQUIPMENT & CONSUMABLES COSTS

Equipment Costs	none
Consumables/Materials Costs	
• Blotting paper 50 @ $0.59/sq ft {1}	$29.50
• Plastic sheets/bags 50 @ $0.26/sq ft {2}	$13.00
• Gas torch consumables 1 @ $18.64 x 1 /hr {3}	$18.64
Subtotal cost of equipment and materials	$61.14
Overhead & profit on equipment and materials @ 16.25 %	$9.94
Total costs, equipment & material	$71.08

TOTAL COST:

Removal of contaminated heat exchanger <3000 pounds:	$5,129.34
Total labor cost:	$5,058.26
Total equipment/material costs:	$71.08
Total craft labor man-hours required per unit:	81.88

5. NOTES AND REFERENCES

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

- References for equipment & consumables costs:

    1. www.mcmaster.com online catalog, McMaster Carr Spill Control (7193T88)
    2. R.S. Means (2014) Division 01 56, Section 13.60-0600, page 23
    3. R.S. Means (2014) Division 01 54 33, Section 40-6360, page 698

- Material and consumable costs were adjusted using the regional indices for LaSalle, Illinois.

APPENDIX B

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

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
Removal of clean instrument and sampling tubing, $/linear foot	0.57
Removal of clean pipe 0.25 to 2 inches diameter, $/linear foot	6.14
Removal of clean pipe >2 to 4 inches diameter, $/linear foot	8.76
Removal of clean pipe >4 to 8 inches diameter, $/linear foot	17.11
Removal of clean pipe >8 to 14 inches diameter, $/linear foot	33.01
Removal of clean pipe >14 to 20 inches diameter, $/linear foot	42.95
Removal of clean pipe >20 to 36 inches diameter, $/linear foot	63.18
Removal of clean pipe >36 inches diameter, $/linear foot	75.05
Removal of clean valve >2 to 4 inches	113.19
Removal of clean valve >4 to 8 inches	171.14
Removal of clean valve >8 to 14 inches	330.10
Removal of clean valve >14 to 20 inches	429.48
Removal of clean valve >20 to 36 inches	631.82
Removal of clean valve >36 inches	750.55
Removal of clean pipe hanger for small bore piping	39.01
Removal of clean pipe hanger for large bore piping	138.54
Removal of clean pump, <300 pound	289.34
Removal of clean pump, 300-1000 pound	802.23
Removal of clean pump, 1000-10,000 pound	3,166.13
Removal of clean pump, >10,000 pound	6,125.57
Removal of clean pump motor, 300-1000 pound	335.30
Removal of clean pump motor, 1000-10,000 pound	1,315.47
Removal of clean pump motor, >10,000 pound	2,959.79
Removal of clean heat exchanger <3000 pound	1,700.73
Removal of clean heat exchanger >3000 pound	4,284.52
Removal of clean feedwater heater/deaerator	12,073.77
Removal of clean moisture separator/reheater	24,815.40
Removal of clean tank, <300 gallons	372.11
Removal of clean tank, 300-3000 gallon	1,172.10
Removal of clean tank, >3000 gallons, $/square foot surface area	9.85

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
Removal of clean electrical equipment, <300 pound	156.75
Removal of clean electrical equipment, 300-1000 pound	545.93
Removal of clean electrical equipment, 1000-10,000 pound	1,091.85
Removal of clean electrical equipment, >10,000 pound	2,593.79
Removal of clean electrical transformer < 30 tons	1,801.35
Removal of clean electrical transformer > 30 tons	5,187.59
Removal of clean standby diesel generator, <100 kW	1,839.93
Removal of clean standby diesel generator, 100 kW to 1 MW	4,106.84
Removal of clean standby diesel generator, >1 MW	8,501.98
Removal of clean electrical cable tray, $/linear foot	14.74
Removal of clean electrical conduit, $/linear foot	6.44
Removal of clean mechanical equipment, <300 pound	156.75
Removal of clean mechanical equipment, 300-1000 pound	545.93
Removal of clean mechanical equipment, 1000-10,000 pound	1,091.85
Removal of clean mechanical equipment, >10,000 pound	2,593.79
Removal of clean HVAC equipment, <300 pound	189.54
Removal of clean HVAC equipment, 300-1000 pound	655.97
Removal of clean HVAC equipment, 1000-10,000 pound	1,307.35
Removal of clean HVAC equipment, >10,000 pound	2,593.79
Removal of clean HVAC ductwork, $/pound	0.61
Removal of contaminated instrument and sampling tubing, $/linear foot	1.83
Removal of contaminated pipe 0.25 to 2 inches diameter, $/linear foot	24.41
Removal of contaminated pipe >2 to 4 inches diameter, $/linear foot	42.51
Removal of contaminated pipe >4 to 8 inches diameter, $/linear foot	67.99
Removal of contaminated pipe >8 to 14 inches diameter, $/linear foot	133.65
Removal of contaminated pipe >14 to 20 inches diameter, $/linear foot	160.97
Removal of contaminated pipe >20 to 36 inches diameter, $/linear foot	223.50
Removal of contaminated pipe >36 inches diameter, $/linear foot	264.49
Removal of contaminated valve >2 to 4 inches	522.01
Removal of contaminated valve >4 to 8 inches	628.82

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
Removal of contaminated valve >8 to 14 inches	1,287.08
Removal of contaminated valve >14 to 20 inches	1,638.84
Removal of contaminated valve >20 to 36 inches	2,185.62
Removal of contaminated valve >36 inches	2,595.45
Removal of contaminated pipe hanger for small bore piping	170.59
Removal of contaminated pipe hanger for large bore piping	550.25
Removal of contaminated pump, <300 pound	1,121.14
Removal of contaminated pump, 300-1000 pound	2,592.98
Removal of contaminated pump, 1000-10,000 pound	8,452.88
Removal of contaminated pump, >10,000 pound	20,593.51
Removal of contaminated pump motor, 300-1000 pound	1,092.55
Removal of contaminated pump motor, 1000-10,000 pound	3,429.72
Removal of contaminated pump motor, >10,000 pound	7,700.11
Removal of contaminated heat exchanger <3000 pound	5,129.34
Removal of contaminated heat exchanger >3000 pound	14,843.57
Removal of contaminated feedwater heater/deaerator	36,275.43
Removal of contaminated moisture separator/reheater	79,265.18
Removal of contaminated tank, <300 gallons	1,860.41
Removal of contaminated tank, >300 gallons, $/square foot	36.56
Removal of contaminated electrical equipment, <300 pound	872.62
Removal of contaminated electrical equipment, 300-1000 pound	2,111.34
Removal of contaminated electrical equipment, 1000-10,000 pound	4,065.17
Removal of contaminated electrical equipment, >10,000 pound	7,938.80
Removal of contaminated electrical cable tray, $/linear foot	42.23
Removal of contaminated electrical conduit, $/linear foot	19.71
Removal of contaminated mechanical equipment, <300 pound	971.35
Removal of contaminated mechanical equipment, 300-1000 pound	2,333.72
Removal of contaminated mechanical equipment, 1000-10,000 pound	4,486.09
Removal of contaminated mechanical equipment, >10,000 pound	7,938.80
Removal of contaminated HVAC equipment, <300 pound	971.35

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
Removal of contaminated HVAC equipment, 300-1000 pound	2,333.72
Removal of contaminated HVAC equipment, 1000-10,000 pound	4,486.09
Removal of contaminated HVAC equipment, >10,000 pound	7,938.80
Removal of contaminated HVAC ductwork, $/pound	2.52
Removal/plasma arc cut of contaminated thin metal components, $/linear in.	4.62
Additional decontamination of surface by washing, $/square foot	9.56
Additional decontamination of surfaces by hydrolasing, $/square foot	41.77
Decontamination rig hook up and flush, $/ 250 foot length	8,231.32
Chemical flush of components/systems, $/gallon	18.91
Removal of clean standard reinforced concrete, $/cubic yard	161.84
Removal of grade slab concrete, $/cubic yard	216.45
Removal of clean concrete floors, $/cubic yard	421.02
Removal of sections of clean concrete floors, $/cubic yard	1,259.53
Removal of clean heavily rein concrete w/#9 rebar, $/cubic yard	271.01
Removal of contaminated heavily rein concrete w/#9 rebar, $/cubic yard	2,486.70
Removal of clean heavily rein concrete w/#18 rebar, $/cubic yard	342.66
Removal of contaminated heavily rein concrete w/#18 rebar, $/cubic yard	3,291.64
Removal heavily rein concrete w/#18 rebar & steel embedments, $/cubic yard	521.35
Removal of below-grade suspended floors, $/cubic yard	421.02
Removal of clean monolithic concrete structures, $/cubic yard	1,052.84
Removal of contaminated monolithic concrete structures, $/cubic yard	2,481.68
Removal of clean foundation concrete, $/cubic yard	827.64
Removal of contaminated foundation concrete, $/cubic yard	2,312.22
Explosive demolition of bulk concrete, $/cubic yard	36.00
Removal of clean hollow masonry block wall, $/cubic yard	115.17
Removal of contaminated hollow masonry block wall, $/cubic yard	390.96
Removal of clean solid masonry block wall, $/cubic yard	115.17
Removal of contaminated solid masonry block wall, $/cubic yard	390.96
Backfill of below-grade voids, $/cubic yard	33.68
Removal of subterranean tunnels/voids, $/linear foot	133.68

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
Placement of concrete for below-grade voids, $/cubic yard	128.64
Excavation of clean material, $/cubic yard	3.51
Excavation of contaminated material, $/cubic yard	48.12
Removal of clean concrete rubble (tipping fee included), $/cubic yard	26.64
Removal of contaminated concrete rubble, $/cubic yard	30.70
Removal of building by volume, $/cubic foot	0.35
Removal of clean building metal siding, $/square foot	1.53
Removal of contaminated building metal siding, $/square foot	5.27
Removal of standard asphalt roofing, $/square foot	2.69
Removal of transite panels, $/square foot	2.47
Scarifying contaminated concrete surfaces (drill & spall), $/square foot	14.52
Scabbling contaminated concrete floors, $/square foot	9.06
Scabbling contaminated concrete walls, $/square foot	24.18
Scabbling contaminated ceilings, $/square foot	83.20
Scabbling structural steel, $/square foot	7.35
Removal of clean overhead crane/monorail < 10 ton capacity	763.68
Removal of contaminated overhead crane/monorail < 10 ton capacity	2,178.46
Removal of clean overhead crane/monorail >10-50 ton capacity	1,832.84
Removal of contaminated overhead crane/monorail >10-50 ton capacity	5,227.41
Removal of polar crane > 50 ton capacity	7,649.11
Removal of gantry crane > 50 ton capacity	32,422.41
Removal of structural steel, $/pound	0.23
Removal of clean steel floor grating, $/square foot	5.53
Removal of contaminated steel floor grating, $/square foot	16.14
Removal of clean free standing steel liner, $/square foot	14.77
Removal of contaminated free standing steel liner, $/square foot	42.80
Removal of clean concrete-anchored steel liner, $/square foot	7.39
Removal of contaminated concrete-anchored steel liner, $/square foot	49.89
Placement of scaffolding in clean areas, $/square foot	16.16
Placement of scaffolding in contaminated areas, $/square foot	28.45

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit
Landscaping with topsoil, $/acre	24,866.56
Cost of CPC B-88 LSA box & preparation for use	2,049.49
Cost of CPC B-25 LSA box & preparation for use	1,876.15
Cost of CPC B-12V 12 gauge LSA box & preparation for use	1,532.60
Cost of CPC B-144 LSA box & preparation for use	10,383.63
Cost of LSA drum & preparation for use	211.74
Cost of cask liner for CNSI 8 120A cask (resins)	12,308.04
Cost of cask liner for CNSI 8 120A cask (filters)	8,901.63
Decontamination of surfaces with vacuuming, $/square foot	0.93

APPENDIX C

DETAILED COST ANALYSIS

DECON

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Table C-1
LaSalle County Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,000
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	614	92	706	706	-	-	-	-	-	-	-	-	-	4,600
1a.1.8	Perform detailed rad survey									a											
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	133	20	153	153	-	-	-	-	-	-	-	-	-	1,000
1a.1.10	End product description	-	-	-	-	-	-	133	20	153	153	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	1,300
1a.1.12	Define major work sequence	-	-	-	-	-	-	1,001	150	1,151	1,151	-	-	-	-	-	-	-	-	-	7,500
1a.1.13	Perform SER and EA	-	-	-	-	-	-	414	62	476	476	-	-	-	-	-	-	-	-	-	3,100
1a.1.14	Perform Site-Specific Cost Study	-	-	-	-	-	-	667	100	767	767	-	-	-	-	-	-	-	-	-	5,000
1a.1.15	Prepare/submit License Termination Plan	-	-	-	-	-	-	546	82	628	628	-	-	-	-	-	-	-	-	-	4,096
1a.1.16	Receive NRC approval of termination plan									a											
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	656	98	755	679	-	75	-	-	-	-	-	-	-	4,920
1a.1.17.2	Plant systems	-	-	-	-	-	-	556	83	639	575	-	64	-	-	-	-	-	-	-	4,167
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	67	10	77	77	-	-	-	-	-	-	-	-	-	500
1a.1.17.4	Reactor internals	-	-	-	-	-	-	947	142	1,089	1,089	-	-	-	-	-	-	-	-	-	7,100
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	867	130	997	997	-	-	-	-	-	-	-	-	-	6,500
1a.1.17.6	Sacrificial shield	-	-	-	-	-	-	67	10	77	77	-	-	-	-	-	-	-	-	-	500
1a.1.17.7	Moisture separators/reheaters	-	-	-	-	-	-	133	20	153	153	-	-	-	-	-	-	-	-	-	1,000
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	213	32	245	123	-	123	-	-	-	-	-	-	-	1,600
1a.1.17.9	Main Turbine	-	-	-	-	-	-	279	42	320	320	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.10	Main Condensers	-	-	-	-	-	-	279	42	320	320	-	-	-	-	-	-	-	-	-	2,088
1a.1.17.11	Pressure suppression structure	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,000
1a.1.17.12	Drywell	-	-	-	-	-	-	213	32	245	245	-	-	-	-	-	-	-	-	-	1,600
1a.1.17.13	Plant structures & buildings	-	-	-	-	-	-	416	62	479	239	-	239	-	-	-	-	-	-	-	3,120
1a.1.17.14	Waste management	-	-	-	-	-	-	614	92	706	706	-	-	-	-	-	-	-	-	-	4,600
1a.1.17.15	Facility & site closeout	-	-	-	-	-	-	120	18	138	69	-	69	-	-	-	-	-	-	-	900
1a.1.17	Total	-	-	-	-	-	-	5,694	854	6,548	5,977	-	570	-	-	-	-	-	-	-	42,683
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	320	48	368	368	-	-	-	-	-	-	-	-	-	2,400
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	3,000	450	3,450	3,450	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	187	28	215	215	-	-	-	-	-	-	-	-	-	1,400
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,300	345	2,645	2,645	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	164	25	189	189	-	-	-	-	-	-	-	-	-	1,230
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	15,786	2,368	18,154	17,584	-	570	-	-	-	-	-	-	-	78,609
Period 1a Additional Costs																					
1a.2.1	ISFSI Expansion	-	-	-	-	-	-	3,150	473	3,623	-	3,623	-	-	-	-	-	-	-	-	-
1a.2	Subtotal Period 1a Additional Costs	-	-	-	-	-	-	3,150	473	3,623	-	3,623	-	-	-	-	-	-	-	-	-
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	13,105	1,966	15,071	-	15,071	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	13,105	1,966	15,071	-	15,071	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	2,050	205	2,255	2,255	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	491	-	-	-	-	-	123	614	614	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	527	-	-	-	-	-	79	606	606	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	13	7	-	39	-	12	71	71	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,623	243	1,867	1,867	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	1,181	118	1,299	1,299	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	2,227	223	2,450	-	2,450	-	-	-	-	-	-	-	-	-

Table C-1
LaSalle County Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 1a Period-Dependent Costs (continued)																					
1a.4.9	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	791	119	910	-	910	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	48	7	55	-	55	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	610	91	701	701	-	-	-	-	-	-	-	-	-	12,264
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	35,778	5,367	41,144	41,144	-	-	-	-	-	-	-	-	-	423,400
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,018	13	7	-	39	44,472	6,612	52,160	48,746	3,415	-	-	610	-	-	-	12,190	20	435,664
1a.0	TOTAL PERIOD 1a COST	-	1,018	13	7	-	39	76,513	11,418	89,008	66,329	22,108	570	-	610	-	-	-	12,190	20	514,273
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems	-	-	-	-	-	-	631	95	726	653	-	73	-	-	-	-	-	-	-	4,733
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	133	20	153	153	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.3	Reactor internals	-	-	-	-	-	-	534	80	614	614	-	-	-	-	-	-	-	-	-	4,000
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	180	27	207	52	-	155	-	-	-	-	-	-	-	1,350
1b.1.1.5	CRD housings & NIs	-	-	-	-	-	-	133	20	153	153	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.6	Incore instrumentation	-	-	-	-	-	-	133	20	153	153	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.7	Removal primary containment	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	484	73	557	557	-	-	-	-	-	-	-	-	-	3,630
1b.1.1.9	Facility closeout	-	-	-	-	-	-	160	24	184	92	-	92	-	-	-	-	-	-	-	1,200
1b.1.1.10	Sacrificial shield	-	-	-	-	-	-	160	24	184	184	-	-	-	-	-	-	-	-	-	1,200
1b.1.1.11	Reinforced concrete	-	-	-	-	-	-	133	20	153	77	-	77	-	-	-	-	-	-	-	1,000
1b.1.1.12	Main Turbine	-	-	-	-	-	-	277	42	319	319	-	-	-	-	-	-	-	-	-	2,080
1b.1.1.13	Main Condensers	-	-	-	-	-	-	279	42	320	320	-	-	-	-	-	-	-	-	-	2,088
1b.1.1.14	Moisture separators & reheaters	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,000
1b.1.1.15	Radwaste building	-	-	-	-	-	-	364	55	419	377	-	42	-	-	-	-	-	-	-	2,730
1b.1.1.16	Reactor building	-	-	-	-	-	-	364	55	419	377	-	42	-	-	-	-	-	-	-	2,730
1b.1.1	Total	-	-	-	-	-	-	4,501	675	5,176	4,696	-	480	-	-	-	-	-	-	-	33,741
1b.1.2	Decon NSSS	805	-	-	-	-	-	-	403	1,208	1,208	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	805	-	-	-	-	-	4,501	1,078	6,384	5,904	-	480	-	-	-	-	-	-	1,067	33,741
Period 1b Additional Costs																					
1b.2.1	Site Characterization	-	-	-	-	-	-	6,502	1,951	8,453	8,453	-	-	-	-	-	-	-	-	30,500	10,852
1b.2.2	Spent Fuel Pool Isolation	-	-	-	-	-	-	10,813	1,622	12,434	12,434	-	-	-	-	-	-	-	-	-	-
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	17,315	3,573	20,888	20,888	-	-	-	-	-	-	-	-	30,500	10,852
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	883	-	-	-	-	-	-	132	1,015	1,015	-	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning water waste	35	-	23	61	-	77	-	48	244	244	-	-	-	221	-	-	-	13,236	43	-
1b.3.4	Process decommissioning chemical flush waste	2	-	98	374	-	4,228	-	1,124	5,828	5,828	-	-	-	-	1,000	-	-	106,507	187	-
1b.3.5	Small tool allowance	-	2	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-
1b.3.6	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-
1b.3.7	Decon rig	1,500	-	-	-	-	-	-	225	1,725	1,725	-	-	-	-	-	-	-	-	-	-
1b.3.8	Spent Fuel Capital and Transfer	-	-	-	-	-	-	6,570	986	7,556	-	7,556	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	2,420	1,102	121	435	-	4,306	7,734	2,855	18,973	11,417	7,556	-	-	221	1,000	-	-	119,743	230	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	27	-	-	-	-	-	-	7	34	34	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	791	79	870	870	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	6,008	601	6,608	6,608	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	276	-	-	-	-	-	69	346	346	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	264	-	-	-	-	-	40	304	304	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	7	4	-	23	-	7	42	42	-	-	-	358	-	-	-	7,159	12	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	1,628	244	1,872	1,872	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	346	35	381	381	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	1,117	112	1,228	-	1,228	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Cost	-	-	-	-	-	-	83	12	95	95	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	397	59	456	-	456	-	-	-	-	-	-	-	-	-

Table C-1
LaSalle County Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 1b Period-Dependent Costs (continued)																					
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	24	4	28	-	28	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	306	46	351	351	-	-	-	-	-	-	-	-	-	6,149
1b.4.14	DOC Staff Cost	-	-	-	-	-	-	5,810	871	6,681	6,681	-	-	-	-	-	-	-	-	-	63,789
1b.4.15	Utility Staff Cost	-	-	-	-	-	-	18,007	2,701	20,708	20,708	-	-	-	-	-	-	-	-	-	213,326
1b.4	Subtotal Period 1b Period-Dependent Costs	27	540	7	4	-	23	34,514	4,887	40,003	38,291	1,712	-	-	358	-	-	-	7,159	12	283,263
1b.0	TOTAL PERIOD 1b COST	3,252	1,643	128	439	-	4,329	64,064	12,392	86,248	76,499	9,268	480	-	579	1,000	-	-	126,903	31,808	327,856
PERIOD 1 TOTALS		3,252	2,660	141	446	-	4,368	140,578	23,810	175,256	142,829	31,376	1,051	-	1,188	1,000	-	-	139,093	31,828	842,129
PERIOD 2a - Large Component Removal																					
Period 2a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
2a.1.1.1	Recirculation System Piping & Valves	120	100	21	30	-	157	-	131	559	559	-	-	-	1,064	-	-	-	121,654	3,377	-
2a.1.1.2	Recirculation Pumps & Motors	64	57	16	43	-	273	-	122	574	574	-	-	-	2,594	-	-	-	211,420	1,957	-
2a.1.1.3	CRDMs & NIs Removal	271	1,449	605	164	-	420	-	688	3,597	3,597	-	-	-	5,536	-	-	-	325,500	26,826	-
2a.1.1.4	Reactor Vessel Internals	244	3,409	11,066	3,558	-	23,003	371	17,892	59,542	59,542	-	-	-	1,753	1,303	1,066	-	448,975	35,575	1,555
2a.1.1.5	Reactor Vessel	180	6,595	3,061	1,805	-	5,587	371	9,102	26,700	26,700	-	-	-	18,654	-	-	-	1,914,434	35,575	1,555
2a.1.1	Totals	878	11,609	14,769	5,600	-	29,439	741	27,934	90,972	90,972	-	-	-	29,602	1,303	1,066	-	3,021,984	103,310	3,110
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	619	3,165	1,736	-	8,822	-	2,937	17,280	17,280	-	-	-	131,716	-	-	-	6,838,856	9,664	-
2a.1.3	Main Condensers	-	1,195	2,256	1,238	-	6,288	-	2,282	13,258	13,258	-	-	-	93,880	-	-	-	4,874,376	18,785	-
Cascading Costs from Clean Building Demolition																					
2a.1.4.1	Reactor Building	-	1,179	-	-	-	-	-	177	1,356	1,356	-	-	-	-	-	-	-	-	11,163	-
2a.1.4.2	Auxiliary Building	-	489	-	-	-	-	-	73	562	562	-	-	-	-	-	-	-	-	4,733	-
2a.1.4.3	Off Gas Building	-	85	-	-	-	-	-	13	97	97	-	-	-	-	-	-	-	-	920	-
2a.1.4.4	Turbine Building	-	705	-	-	-	-	-	106	811	811	-	-	-	-	-	-	-	-	7,337	-
2a.1.4	Totals	-	2,457	-	-	-	-	-	369	2,825	2,825	-	-	-	-	-	-	-	-	24,153	-
Disposal of Plant Systems																					
2a.1.5.1	Auxiliary Steam	-	124	29	16	-	81	-	57	307	307	-	-	-	1,201	-	-	-	62,558	1,924	-
2a.1.5.2	CSCS Equipment Cooling	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	122	-
2a.1.5.3	Circulating Water	-	208	-	-	-	-	-	31	239	-	-	239	-	-	-	-	-	-	3,464	-
2a.1.5.4	Circulating Water - RCA	-	258	66	33	-	169	-	118	644	644	-	-	-	2,504	-	-	-	130,688	3,946	-
2a.1.5.5	Clean Condensate Storage	-	99	-	-	-	-	-	15	114	-	-	114	-	-	-	-	-	-	1,677	-
2a.1.5.6	Clean Condensate Storage - RCA	-	29	4	2	-	10	-	10	55	55	-	-	-	146	-	-	-	7,618	428	-
2a.1.5.7	Condensate	-	1,087	550	324	-	1,644	-	786	4,391	4,391	-	-	-	24,478	-	-	-	1,274,330	18,095	-
2a.1.5.8	Condensate Booster	-	1,126	1,177	718	-	3,646	-	1,418	8,084	8,084	-	-	-	54,329	-	-	-	2,826,158	19,748	-
2a.1.5.9	Condensate Polishing Demineralizer	-	1,045	136	73	-	370	-	378	2,002	2,002	-	-	-	5,589	-	-	-	286,960	16,338	-
2a.1.5.10	Containment Combustible Gas Control	-	97	17	9	-	44	-	38	205	205	-	-	-	647	-	-	-	33,798	1,474	-
2a.1.5.11	Cycled Condensate Storage	-	344	55	31	-	156	-	135	721	721	-	-	-	2,327	-	-	-	121,304	5,426	-
2a.1.5.12	Drywell Instrument Nitrogen	-	71	15	8	-	41	-	31	165	165	-	-	-	620	-	-	-	31,995	1,100	-
2a.1.5.13	Extraction Steam	-	416	128	83	-	420	-	234	1,281	1,281	-	-	-	6,260	-	-	-	325,273	6,826	-
2a.1.5.14	Feedwater	-	691	315	197	-	999	-	483	2,685	2,685	-	-	-	14,903	-	-	-	774,516	11,459	-
2a.1.5.15	Feedwater Heater Vents & Drains	-	3,295	965	567	-	2,880	-	1,725	9,433	9,433	-	-	-	42,923	-	-	-	2,232,839	53,650	-
2a.1.5.16	Gland Steam	-	294	44	24	-	122	-	112	595	595	-	-	-	1,807	-	-	-	94,247	4,660	-
2a.1.5.17	HVAC-River\Lake Screen House	-	9	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	151	-
2a.1.5.18	HVAC-Service Building	-	14	-	-	-	-	-	2	16	-	-	16	-	-	-	-	-	-	221	-
2a.1.5.19	Hydrogen & Carbon Dioxide	-	126	29	15	-	79	-	56	306	306	-	-	-	1,168	-	-	-	60,856	1,940	-
2a.1.5.20	Main Steam	-	160	20	11	-	56	-	58	304	304	-	-	-	833	-	-	-	43,458	2,508	-
2a.1.5.21	Misc Bldgs Floor Drains	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	9	-
2a.1.5.22	Screen Wash	-	30	-	-	-	-	-	5	35	-	-	35	-	-	-	-	-	-	506	-
2a.1.5.23	Service Air	-	13	-	-	-	-	-	2	15	-	-	15	-	-	-	-	-	-	222	-
2a.1.5.24	Standby Gas Treatment	-	66	21	13	-	67	-	37	204	204	-	-	-	1,003	-	-	-	52,115	1,073	-
2a.1.5.25	Station Heat Recovery	-	289	53	27	-	137	-	116	622	622	-	-	-	2,028	-	-	-	105,836	4,428	-
2a.1.5.26	Switchgear Heat Removal	-	11	-	-	-	-	-	2	13	-	-	13	-	-	-	-	-	-	180	-
2a.1.5.27	Turbine Bldg Closed Cooling Water	-	603	206	110	-	558	-	327	1,804	1,804	-	-	-	8,298	-	-	-	432,636	9,720	-
2a.1.5.28	Turbine Building Equip Drains	-	112	22	13	-	67	-	49	262	262	-	-	-	993	-	-	-	51,593	1,783	-
2a.1.5.29	Turbine Building Floor Drains	-	44	4	2	-	10	-	14	74	74	-	-	-	146	-	-	-	7,632	679	-

Table C-1
LaSalle County Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
2a.1.5.30	Turbine Generator	-	233	103	68	-	346	-	165	915	915	-	-	-	5,174	-	-	-	267,870	3,873	-
2a.1.5.31	Turbine Oil	-	684	138	82	-	419	-	302	1,625	1,625	-	-	-	6,488	-	-	-	324,845	10,868	-
2a.1.5	Totals	-	11,585	4,097	2,424	-	12,318	-	6,710	37,135	36,683	-	452	-	183,863	-	-	-	9,549,126	188,497	-
2a.1.6	Scaffolding in support of decommissioning	-	2,796	58	32	-	162	-	750	3,798	3,798	-	-	-	2,414	-	-	-	125,345	48,820	-
2a.1	Subtotal Period 2a Activity Costs	878	30,262	24,346	11,030	-	57,029	741	40,982	165,269	164,817	-	452	-	441,476	1,303	1,066	-	24,409,690	393,231	3,110
Period 2a Additional Costs																					
2a.2.1	Remedial Action Surveys	-	-	-	-	-	-	2,171	651	2,823	2,823	-	-	-	-	-	-	-	-	34,226	-
2a.2.2	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
2a.2	Subtotal Period 2a Additional Costs	-	-	-	-	-	-	2,221	659	2,880	2,880	-	-	-	-	-	-	-	-	34,226	-
Period 2a Collateral Costs																					
2a.3.1	Process decommissioning water waste	73	-	48	130	-	165	-	102	519	519	-	-	-	471	-	-	-	28,288	92	-
2a.3.3	Small tool allowance	-	425	-	-	-	-	-	64	489	440	-	49	-	-	-	-	-	-	-	-
2a.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	21,578	3,237	24,815	-	24,815	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	73	425	48	130	-	165	21,578	3,403	25,823	959	24,815	49	-	471	-	-	-	28,288	92	-
Period 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	89	-	-	-	-	-	-	22	111	111	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	2,006	201	2,207	2,207	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	14,841	1,484	16,325	14,693	-	1,633	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	2,772	-	-	-	-	-	693	3,465	3,465	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	3,333	-	-	-	-	-	500	3,832	3,832	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	167	90	-	514	-	159	930	930	-	-	-	8,024	-	-	-	160,477	262	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	2,539	381	2,920	2,920	-	-	-	-	-	-	-	-	-	-
2a.4.8	NRC Fees	-	-	-	-	-	-	1,031	103	1,134	1,134	-	-	-	-	-	-	-	-	-	-
2a.4.9	Emergency Planning Fees	-	-	-	-	-	-	3,213	321	3,535	-	3,535	-	-	-	-	-	-	-	-	-
2a.4.10	Site O&M Cost	-	-	-	-	-	-	272	41	312	312	-	-	-	-	-	-	-	-	-	-
2a.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	1,303	195	1,498	-	1,498	-	-	-	-	-	-	-	-	-
2a.4.12	ISFSI Operating Costs	-	-	-	-	-	-	79	12	90	-	90	-	-	-	-	-	-	-	-	-
2a.4.13	Security Staff Cost	-	-	-	-	-	-	940	141	1,081	1,081	-	-	-	-	-	-	-	-	-	18,889
2a.4.14	DOC Staff Cost	-	-	-	-	-	-	23,070	3,460	26,530	26,530	-	-	-	-	-	-	-	-	-	261,006
2a.4.15	Utility Staff Cost	-	-	-	-	-	-	41,482	6,222	47,704	47,704	-	-	-	-	-	-	-	-	-	485,951
2a.4	Subtotal Period 2a Period-Dependent Costs	89	6,105	167	90	-	514	90,775	13,936	111,676	104,920	5,123	1,633	-	8,024	-	-	-	160,477	262	765,846
2a.0	TOTAL PERIOD 2a COST	1,040	36,792	24,561	11,250	-	57,709	115,316	58,979	305,648	273,576	29,938	2,134	-	449,971	1,303	1,066	-	24,598,450	427,811	768,956
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b.1.1.1	Aux Diesel Bldg Floor Drains	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	86	-
2b.1.1.2	Auxiliary Diesel Generator	-	61	-	-	-	-	-	9	70	-	-	70	-	-	-	-	-	-	1,006	-
2b.1.1.3	Control Rod Drive	-	253	21	13	-	65	-	83	435	435	-	-	-	963	-	-	-	50,095	4,090	-
2b.1.1.4	Diesel Oil	-	51	-	-	-	-	-	8	59	-	-	59	-	-	-	-	-	-	823	-
2b.1.1.5	Electrical	-	322	-	-	-	-	-	48	371	-	-	371	-	-	-	-	-	-	5,201	-
2b.1.1.6	Electrical - RCA	-	5,255	985	635	-	3,225	-	2,314	12,414	12,414	-	-	-	48,150	-	-	-	2,499,995	81,135	-
2b.1.1.7	Fire Protection	-	139	-	-	-	-	-	21	160	-	-	160	-	-	-	-	-	-	2,339	-
2b.1.1.8	HVAC-Auxiliary Building	-	261	54	36	-	185	-	122	659	659	-	-	-	2,759	-	-	-	143,239	3,849	-
2b.1.1.9	HVAC-Diesel Generator Room	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	127	-
2b.1.1.10	HVAC-Off Gas Building	-	26	4	3	-	15	-	11	59	59	-	-	-	227	-	-	-	11,772	382	-
2b.1.1.11	HVAC-Radwaste Building	-	7	2	1	-	7	-	4	21	21	-	-	-	105	-	-	-	5,437	111	-
2b.1.1.12	HVAC-Turbine Building	-	964	174	117	-	592	-	424	2,270	2,270	-	-	-	8,842	-	-	-	459,063	14,113	-
2b.1.1.13	High Pressure Core Spray	-	406	200	112	-	567	-	280	1,564	1,564	-	-	-	8,429	-	-	-	439,323	6,695	-
2b.1.1.14	Instrument Air	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	94	-
2b.1.1.15	Instrument Air - RCA	-	155	18	8	-	41	-	52	274	274	-	-	-	609	-	-	-	31,863	2,413	-
2b.1.1.16	Low Pressure Core Spray	-	194	93	51	-	261	-	131	730	730	-	-	-	3,878	-	-	-	202,203	3,188	-
2b.1.1.17	Nuclear Boiler	-	1,978	604	369	-	1,876	-	1,079	5,907	5,907	-	-	-	27,962	-	-	-	1,454,480	32,354	-
2b.1.1.18	Off Gas	-	768	166	100	-	506	-	350	1,890	1,890	-	-	-	7,545	-	-	-	392,222	12,232	-
2b.1.1.19	Primary Containment Vent & Purge	-	527	219	145	-	734	-	359	1,984	1,984	-	-	-	10,959	-	-	-	569,165	8,774	-

Table C-1
LaSalle County Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
2b.1.1.20	Process Radiation Monitoring	-	26	1	1	-	3	-	7	38	38	-	-	-	40	-	-	-	2,101	438	-
2b.1.1.21	Process Sampling	-	35	2	1	-	6	-	11	55	55	-	-	-	86	-	-	-	4,496	591	-
2b.1.1.22	Radioactive Waste Disposal	-	1,869	290	162	-	823	-	726	3,871	3,871	-	-	-	12,585	-	-	-	638,228	29,426	-
2b.1.1.23	Reactor Building Equipment Drains	-	83	11	6	-	30	-	30	160	160	-	-	-	455	-	-	-	23,195	1,306	-
2b.1.1.24	Reactor Core Isolation Cooling	-	274	42	23	-	119	-	106	565	565	-	-	-	1,773	-	-	-	92,418	4,365	-
2b.1.1.25	Reactor Recirculation	-	51	4	2	-	10	-	16	83	83	-	-	-	148	-	-	-	7,742	824	-
2b.1.1.26	Reactor Water Clean-up	584	1,060	105	51	-	261	-	640	2,701	2,701	-	-	-	3,864	-	-	-	202,069	24,813	-
2b.1.1.27	Residual Heat Removal	1,958	1,995	932	529	-	2,689	-	2,322	10,424	10,424	-	-	-	40,005	-	-	-	2,084,289	39,971	-
2b.1.1.28	Service Air - RCA	-	269	37	17	-	87	-	95	504	504	-	-	-	1,283	-	-	-	67,085	4,079	-
2b.1.1.29	Service Water	-	57	-	-	-	-	-	9	65	-	-	65	-	-	-	-	-	-	938	-
2b.1.1.30	Service Water - RCA	-	785	286	164	-	832	-	458	2,526	2,526	-	-	-	12,398	-	-	-	645,252	12,468	-
2b.1.1.31	Standby Liquid Control	-	58	9	4	-	22	-	22	116	116	-	-	-	329	-	-	-	17,192	874	-
2b.1.1	Totals	2,541	17,948	4,262	2,550	-	12,955	-	9,740	49,997	49,250	-	747	-	193,392	-	-	-	10,042,920	299,105	-
2b.1.2	Scaffolding in support of decommissioning	-	3,495	73	40	-	202	-	938	4,747	4,747	-	-	-	3,018	-	-	-	156,682	61,026	-
Decontamination of Site Buildings																					
2b.1.3.1	Reactor Building	3,073	3,181	345	279	-	1,070	-	2,675	10,623	10,623	-	-	-	16,918	-	-	-	1,044,312	95,032	-
2b.1.3.2	Auxiliary Building	379	119	6	27	-	66	-	240	837	837	-	-	-	1,154	-	-	-	96,369	7,550	-
2b.1.3.3	Off Gas Building	173	69	3	19	-	45	-	118	427	427	-	-	-	795	-	-	-	67,233	3,602	-
2b.1.3.4	Turbine Building	2,027	1,191	130	272	-	803	-	1,566	5,988	5,988	-	-	-	13,551	-	-	-	982,342	47,906	-
2b.1.3	Totals	5,651	4,560	484	597	-	1,985	-	4,599	17,875	17,875	-	-	-	32,418	-	-	-	2,190,256	154,090	-
2b.1	Subtotal Period 2b Activity Costs	8,192	26,003	4,818	3,187	-	15,142	-	15,277	72,619	71,872	-	747	-	228,828	-	-	-	12,389,860	514,221	-
Period 2b Additional Costs																					
2b.2.1	License Termination Survey Planning	-	-	-	-	-	-	983	295	1,277	1,277	-	-	-	-	-	-	-	-	-	6,240
2b.2.2	Remedial Action Surveys	-	-	-	-	-	-	3,107	932	4,039	4,039	-	-	-	-	-	-	-	-	48,976	-
2b.2.3	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
2b.2.4	Underground Services Excavation	-	542	-	-	-	-	-	81	623	623	-	-	-	-	-	-	-	-	3,627	-
2b.2.5	Operational Tools and Equipment	-	-	9	13	-	189	-	50	261	261	-	-	-	5,855	-	-	-	146,375	16	-
2b.2	Subtotal Period 2b Additional Costs	-	542	9	13	-	189	4,140	1,366	6,259	6,259	-	-	-	5,855	-	-	-	146,375	52,619	6,240
Period 2b Collateral Costs																					
2b.3.1	Process decommissioning water waste	105	-	71	192	-	244	-	150	762	762	-	-	-	696	-	-	-	41,765	136	-
2b.3.2	Process decommissioning chemical flush waste	11	-	468	1,778	-	2,960	-	1,059	6,276	6,276	-	-	-	4,748	-	-	-	505,981	889	-
2b.3.3	Small tool allowance	-	524	-	-	-	-	-	79	602	602	-	-	-	-	-	-	-	-	-	-
2b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	30,877	4,632	35,509	-	35,509	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	117	524	539	1,970	-	3,204	30,877	5,919	43,150	7,641	35,509	-	-	5,444	-	-	-	547,746	1,024	-
Period 2b Period-Dependent Costs																					
2b.4.1	Decon supplies	1,728	-	-	-	-	-	-	432	2,160	2,160	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	1,559	156	1,715	1,715	-	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	5,361	536	5,897	5,897	-	-	-	-	-	-	-	-	-	-
2b.4.4	Health physics supplies	-	3,651	-	-	-	-	-	913	4,564	4,564	-	-	-	-	-	-	-	-	-	-
2b.4.5	Heavy equipment rental	-	4,721	-	-	-	-	-	708	5,429	5,429	-	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	182	99	-	560	-	173	1,013	1,013	-	-	-	8,737	-	-	-	174,749	285	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	2,869	430	3,299	3,299	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	1,475	148	1,623	1,623	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	4,598	460	5,058	-	5,058	-	-	-	-	-	-	-	-	-
2b.4.10	Site O&M Cost	-	-	-	-	-	-	389	58	447	447	-	-	-	-	-	-	-	-	-	-
2b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	1,864	280	2,143	-	2,143	-	-	-	-	-	-	-	-	-
2b.4.12	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	472	71	543	543	-	-	-	-	-	-	-	-	-	-
2b.4.13	ISFSI Operating Costs	-	-	-	-	-	-	112	17	129	-	129	-	-	-	-	-	-	-	-	-
2b.4.14	Security Staff Cost	-	-	-	-	-	-	1,344	202	1,546	1,546	-	-	-	-	-	-	-	-	-	27,029
2b.4.15	DOC Staff Cost	-	-	-	-	-	-	22,260	3,339	25,599	25,599	-	-	-	-	-	-	-	-	-	265,371
2b.4.16	Utility Staff Cost	-	-	-	-	-	-	40,506	6,076	46,582	46,582	-	-	-	-	-	-	-	-	-	493,886
2b.4	Subtotal Period 2b Period-Dependent Costs	1,728	8,372	182	99	-	560	82,811	13,998	107,748	100,417	7,331	-	-	8,737	-	-	-	174,749	285	786,286
2b.0	TOTAL PERIOD 2b COST	10,036	35,441	5,547	5,269	-	19,095	117,828	36,560	229,775	186,189	42,840	747	-	248,865	-	-	-	13,258,730	568,149	792,526

Table C-1
LaSalle County Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 2d - Decontamination Following Wet Fuel Storage																					
Period 2d Direct Decommissioning Activities																					
2d.1.1	Remove spent fuel racks	1,078	96	195	242	-	1,231	-	927	3,769	3,769	-	-	-	18,378	-	-	-	954,202	1,632	-
Disposal of Plant Systems																					
2d.1.2.1	Containment Monitoring	-	27	2	1	-	5	-	8	43	43	-	-	-	75	-	-	-	3,888	441	-
2d.1.2.2	Electrical - Contaminated	-	860	104	69	-	352	-	324	1,709	1,709	-	-	-	5,260	-	-	-	273,105	13,471	-
2d.1.2.3	Fire Protection - RCA	-	760	182	95	-	485	-	344	1,867	1,867	-	-	-	7,210	-	-	-	375,999	11,689	-
2d.1.2.4	Fuel Pool Cooling & Cleanup	-	939	301	169	-	858	-	505	2,772	2,772	-	-	-	12,790	-	-	-	665,463	15,166	-
2d.1.2.5	HVAC-Primary Containment	-	1,124	235	148	-	753	-	515	2,775	2,775	-	-	-	11,263	-	-	-	583,908	17,282	-
2d.1.2.6	Reactor Bldg Closed Cooling Water	-	391	291	153	-	778	-	344	1,957	1,957	-	-	-	11,570	-	-	-	602,953	6,573	-
2d.1.2.7	Reactor Building Floor Drains	-	8	1	0	-	1	-	2	13	13	-	-	-	21	-	-	-	1,101	123	-
2d.1.2	Totals	-	4,109	1,115	636	-	3,233	-	2,042	11,136	11,136	-	-	-	48,189	-	-	-	2,506,418	64,746	-
Decontamination of Site Buildings																					
2d.1.3.1	Reactor Building Spent Fuel Pool	309	1,161	82	401	-	1,516	-	893	4,363	4,363	-	-	-	29,927	-	-	-	1,499,988	20,237	-
2d.1.3	Totals	309	1,161	82	401	-	1,516	-	893	4,363	4,363	-	-	-	29,927	-	-	-	1,499,988	20,237	-
2d.1.4	Scaffolding in support of decommissioning	-	699	15	8	-	40	-	188	949	949	-	-	-	604	-	-	-	31,336	12,205	-
2d.1	Subtotal Period 2d Activity Costs	1,388	6,065	1,407	1,288	-	6,021	-	4,049	20,217	20,217	-	-	-	97,097	-	-	-	4,991,944	98,820	-
Period 2d Additional Costs																					
2d.2.1	Remedial Action Surveys	-	-	-	-	-	-	694	208	902	902	-	-	-	-	-	-	-	-	10,934	-
2d.2	Subtotal Period 2d Additional Costs	-	-	-	-	-	-	694	208	902	902	-	-	-	-	-	-	-	-	10,934	-
Period 2d Collateral Costs																					
2d.3.1	Process decommissioning water waste	86	-	58	157	-	200	-	122	622	622	-	-	-	569	-	-	-	34,123	111	-
2d.3.3	Small tool allowance	-	116	-	-	-	-	-	17	134	134	-	-	-	-	-	-	-	-	-	-
2d.3.4	Decommissioning Equipment Disposition	-	-	170	93	-	472	-	149	884	884	-	-	-	7,054	-	-	-	366,237	88	-
2d.3	Subtotal Period 2d Collateral Costs	86	116	228	250	-	672	-	288	1,640	1,640	-	-	-	7,622	-	-	-	400,361	199	-
Period 2d Period-Dependent Costs																					
2d.4.1	Decon supplies	56	-	-	-	-	-	-	14	70	70	-	-	-	-	-	-	-	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	348	35	383	383	-	-	-	-	-	-	-	-	-	-
2d.4.3	Property taxes	-	-	-	-	-	-	263	26	289	289	-	-	-	-	-	-	-	-	-	-
2d.4.4	Health physics supplies	-	715	-	-	-	-	-	179	894	894	-	-	-	-	-	-	-	-	-	-
2d.4.5	Heavy equipment rental	-	1,054	-	-	-	-	-	158	1,212	1,212	-	-	-	-	-	-	-	-	-	-
2d.4.6	Disposal of DAW generated	-	-	63	34	-	193	-	60	349	349	-	-	-	3,008	-	-	-	60,169	98	-
2d.4.7	Plant energy budget	-	-	-	-	-	-	342	51	393	393	-	-	-	-	-	-	-	-	-	-
2d.4.8	NRC Fees	-	-	-	-	-	-	280	28	308	308	-	-	-	-	-	-	-	-	-	-
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	1,027	103	1,129	-	1,129	-	-	-	-	-	-	-	-	-
2d.4.10	Site O&M Cost	-	-	-	-	-	-	87	13	100	100	-	-	-	-	-	-	-	-	-	-
2d.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	211	32	243	243	-	-	-	-	-	-	-	-	-	-
2d.4.12	ISFSI Operating Costs	-	-	-	-	-	-	25	4	29	-	29	-	-	-	-	-	-	-	-	-
2d.4.13	Security Staff Cost	-	-	-	-	-	-	164	25	188	188	-	-	-	-	-	-	-	-	-	3,291
2d.4.14	DOC Staff Cost	-	-	-	-	-	-	3,349	502	3,852	3,852	-	-	-	-	-	-	-	-	-	40,046
2d.4.15	Utility Staff Cost	-	-	-	-	-	-	5,201	780	5,981	5,981	-	-	-	-	-	-	-	-	-	66,377
2d.4	Subtotal Period 2d Period-Dependent Costs	56	1,769	63	34	-	193	11,296	2,009	15,419	14,260	1,158	-	-	3,008	-	-	-	60,169	98	109,714
2d.0	TOTAL PERIOD 2d COST	1,529	7,950	1,697	1,571	-	6,886	11,990	6,555	38,177	37,019	1,158	-	-	107,728	-	-	-	5,452,474	110,051	109,714
PERIOD 2e - Delay before License Termination																					
Period 2e Period-Dependent Costs																					
2e.4.1	Insurance	-	-	-	-	-	-	1,093	109	1,202	1,202	-	-	-	-	-	-	-	-	-	-
2e.4.2	Property taxes	-	-	-	-	-	-	825	83	908	908	-	-	-	-	-	-	-	-	-	-
2e.4.3	Health physics supplies	-	146	-	-	-	-	-	37	183	183	-	-	-	-	-	-	-	-	-	-
2e.4.4	Disposal of DAW generated	-	-	3	2	-	11	-	3	19	19	-	-	-	165	-	-	-	3,294	5	-
2e.4.6	NRC Fees	-	-	-	-	-	-	419	42	461	461	-	-	-	-	-	-	-	-	-	-
2e.4.7	Emergency Planning Fees	-	-	-	-	-	-	3,224	322	3,546	-	3,546	-	-	-	-	-	-	-	-	-
2e.4.8	Site O&M Cost	-	-	-	-	-	-	273	41	313	313	-	-	-	-	-	-	-	-	-	-
2e.4.9	ISFSI Operating Costs	-	-	-	-	-	-	79	12	91	-	91	-	-	-	-	-	-	-	-	-

Table C-1
LaSalle County Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 2e Period-Dependent Costs (continued)																					
2e.4.10	Security Staff Cost	-	-	-	-	-	-	514	77	591	591	-	-	-	-	-	-	-	-	-	10,337
2e.4.11	Utility Staff Cost	-	-	-	-	-	-	1,816	272	2,088	2,088	-	-	-	-	-	-	-	-	-	24,120
2e.4	Subtotal Period 2e Period-Dependent Costs	-	146	3	2	-	11	8,242	998	9,403	5,765	3,637	-	-	165	-	-	-	3,294	5	34,457
2e.0	TOTAL PERIOD 2e COST	-	146	3	2	-	11	8,242	998	9,403	5,765	3,637	-	-	165	-	-	-	3,294	5	34,457
PERIOD 2f - License Termination																					
Period 2f Direct Decommissioning Activities																					
2f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
2f.1.2	Terminate license									a											
2f.1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2f.2.1	License Termination Survey	-	-	-	-	-	-	12,428	3,728	16,156	16,156	-	-	-	-	-	-	-	-	192,095	3,120
2f.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	12,428	3,728	16,156	16,156	-	-	-	-	-	-	-	-	192,095	3,120
Period 2f Collateral Costs																					
2f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
2f.3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
Period 2f Period-Dependent Costs																					
2f.4.1	Insurance	-	-	-	-	-	-	505	51	556	556	-	-	-	-	-	-	-	-	-	-
2f.4.2	Property taxes	-	-	-	-	-	-	382	38	420	420	-	-	-	-	-	-	-	-	-	-
2f.4.3	Health physics supplies	-	828	-	-	-	-	-	207	1,035	1,035	-	-	-	-	-	-	-	-	-	-
2f.4.4	Disposal of DAW generated	-	-	7	4	-	22	-	7	40	40	-	-	-	342	-	-	-	6,832	11	-
2f.4.5	Plant energy budget	-	-	-	-	-	-	248	37	285	285	-	-	-	-	-	-	-	-	-	-
2f.4.6	NRC Fees	-	-	-	-	-	-	462	46	508	508	-	-	-	-	-	-	-	-	-	-
2f.4.7	Emergency Planning Fees	-	-	-	-	-	-	1,492	149	1,641	-	1,641	-	-	-	-	-	-	-	-	-
2f.4.8	Site O&M Cost	-	-	-	-	-	-	126	19	145	145	-	-	-	-	-	-	-	-	-	-
2f.4.9	ISFSI Operating Costs	-	-	-	-	-	-	36	5	42	-	42	-	-	-	-	-	-	-	-	-
2f.4.10	Security Staff Cost	-	-	-	-	-	-	1,556	233	1,790	1,790	-	-	-	-	-	-	-	-	-	28,299
2f.4.11	DOC Staff Cost	-	-	-	-	-	-	4,235	635	4,870	4,870	-	-	-	-	-	-	-	-	-	47,430
2f.4.12	Utility Staff Cost	-	-	-	-	-	-	5,466	820	6,286	6,286	-	-	-	-	-	-	-	-	-	60,981
2f.4	Subtotal Period 2f Period-Dependent Costs	-	828	7	4	-	22	14,509	2,248	17,618	15,935	1,683	-	-	342	-	-	-	6,832	11	136,710
2f.0	TOTAL PERIOD 2f COST	-	828	7	4	-	22	28,272	6,202	35,335	33,653	1,683	-	-	342	-	-	-	6,832	192,106	139,830
PERIOD 2 TOTALS		12,606	81,156	31,816	18,097	-	83,722	281,648	109,294	618,338	536,202	79,256	2,880	-	807,070	1,303	1,066	-	43,319,780	1,298,122	1,845,483
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	Reactor Building	-	6,786	-	-	-	-	-	1,018	7,803	-	-	7,803	-	-	-	-	-	-	64,472	-
3b.1.1.2	Auxiliary Building	-	4,423	-	-	-	-	-	663	5,087	-	-	5,087	-	-	-	-	-	-	43,048	-
3b.1.1.3	Diesel Generator Room	-	554	-	-	-	-	-	83	637	-	-	637	-	-	-	-	-	-	6,000	-
3b.1.1.4	Off Gas Building	-	772	-	-	-	-	-	116	888	-	-	888	-	-	-	-	-	-	8,484	-
3b.1.1.5	Turbine Building	-	6,492	-	-	-	-	-	974	7,466	-	-	7,466	-	-	-	-	-	-	68,584	-
3b.1.1.6	Turbine Pedestal	-	3,474	-	-	-	-	-	521	3,995	-	-	3,995	-	-	-	-	-	-	30,829	-
3b.1.1	Totals	-	22,501	-	-	-	-	-	3,375	25,876	-	-	25,876	-	-	-	-	-	-	221,416	-
Site Closeout Activities																					
3b.1.2	Grade & landscape site	-	198	-	-	-	-	-	30	228	-	-	228	-	-	-	-	-	-	499	-
3b.1.3	Final report to NRC	-	-	-	-	-	-	208	31	239	239	-	-	-	-	-	-	-	-	-	1,560
3b.1	Subtotal Period 3b Activity Costs	-	22,699	-	-	-	-	208	3,436	26,343	239	-	26,104	-	-	-	-	-	-	221,916	1,560
Period 3b Additional Costs																					
3b.2.1	Concrete Crushing	-	845	-	-	-	-	4	127	976	-	-	976	-	-	-	-	-	-	3,936	-
3b.2	Subtotal Period 3b Additional Costs	-	845	-	-	-	-	4	127	976	-	-	976	-	-	-	-	-	-	3,936	-

Table C-1
LaSalle County Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 3b Collateral Costs																					
3b.3.1	Small tool allowance	-	240	-	-	-	-	-	36	276	-	-	276	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	240	-	-	-	-	-	36	276	-	-	276	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Insurance	-	-	-	-	-	-	660	66	726	-	726	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	998	100	1,098	-	1,098	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	5,685	-	-	-	-	-	853	6,538	-	-	6,538	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	324	49	373	-	-	373	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	253	25	279	-	279	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	3,898	390	4,288	-	4,288	-	-	-	-	-	-	-	-	-
3b.4.7	ISFSI Operating Costs	-	-	-	-	-	-	95	14	110	-	110	-	-	-	-	-	-	-	-	-
3b.4.8	Site O&M Cost	-	-	-	-	-	-	329	49	379	-	-	379	-	-	-	-	-	-	-	-
3b.4.9	Security Staff Cost	-	-	-	-	-	-	3,885	583	4,468	0	3,664	804	-	-	-	-	-	-	-	70,317
3b.4.10	DOC Staff Cost	-	-	-	-	-	-	10,124	1,519	11,642	-	-	11,642	-	-	-	-	-	-	-	110,391
3b.4.11	Utility Staff Cost	-	-	-	-	-	-	6,422	963	7,386	-	1,329	6,056	-	-	-	-	-	-	-	70,317
3b.4	Subtotal Period 3b Period-Dependent Costs	-	5,685	-	-	-	-	26,990	4,611	37,285	0	11,493	25,792	-	-	-	-	-	-	-	251,026
3b.0	TOTAL PERIOD 3b COST	-	29,469	-	-	-	-	27,201	8,210	64,880	239	11,493	53,148	-	-	-	-	-	-	225,851	252,586
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Collateral Costs																					
3c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	11,563	1,734	13,297	-	13,297	-	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	11,563	1,734	13,297	-	13,297	-	-	-	-	-	-	-	-	-
Period 3c Period-Dependent Costs																					
3c.4.1	Insurance	-	-	-	-	-	-	3,068	307	3,375	-	3,375	-	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	4,637	464	5,100	-	5,100	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	1,855	185	2,040	-	2,040	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	18,109	1,811	19,920	-	19,920	-	-	-	-	-	-	-	-	-
3c.4.6	Site O&M Cost	-	-	-	-	-	-	1,531	230	1,760	-	1,760	-	-	-	-	-	-	-	-	-
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	443	66	509	-	509	-	-	-	-	-	-	-	-	-
3c.4.8	Security Staff Cost	-	-	-	-	-	-	14,801	2,220	17,021	-	17,021	-	-	-	-	-	-	-	-	261,283
3c.4.9	Utility Staff Cost	-	-	-	-	-	-	5,504	826	6,329	-	6,329	-	-	-	-	-	-	-	-	65,417
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	49,947	6,109	56,056	-	56,056	-	-	-	-	-	-	-	-	326,700
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	61,510	7,843	69,353	-	69,353	-	-	-	-	-	-	-	-	326,700
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	750	-	-	9,123	-	1,556	11,429	11,429	-	-	-	-	-	-	2,450	482,647	-	-
3d.1.1	Totals	-	-	750	-	-	9,123	-	1,556	11,429	11,429	-	-	-	-	-	-	2,450	482,647	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	750	-	-	9,123	-	1,556	11,429	11,429	-	-	-	-	-	-	2,450	482,647	-	-
Period 3d Period-Dependent Costs																					
3d.4.1	Insurance	-	-	-	-	-	-	13	1	14	-	14	-	-	-	-	-	-	-	-	-
3d.4.2	Property taxes	-	-	-	-	-	-	19	2	21	-	21	-	-	-	-	-	-	-	-	-
3d.4.4	Emergency Planning Fees	-	-	-	-	-	-	75	7	82	-	82	-	-	-	-	-	-	-	-	-
3d.4.5	Site O&M Cost	-	-	-	-	-	-	6	1	7	-	7	-	-	-	-	-	-	-	-	-
3d.4.6	ISFSI Operating Costs	-	-	-	-	-	-	2	0	2	-	2	-	-	-	-	-	-	-	-	-
3d.4.7	Security Staff Cost	-	-	-	-	-	-	61	9	70	-	70	-	-	-	-	-	-	-	-	1,080
3d.4.8	Utility Staff Cost	-	-	-	-	-	-	23	3	26	-	26	-	-	-	-	-	-	-	-	270
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	199	24	223	-	223	-	-	-	-	-	-	-	-	1,350
3d.0	TOTAL PERIOD 3d COST	-	-	750	-	-	9,123	199	1,580	11,652	11,429	223	-	-	-	-	-	2,450	482,647	-	1,350

Table C-1
LaSalle County Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 3e - ISFSI Decontamination																					
Period 3e Direct Decommissioning Activities																					
Period 3e Additional Costs																					
3e.2.1	License Termination ISFSI	-	302	336	502	-	1,502	1,783	1,106	5,531	5,531	-	-	-	24,637	-	-	-	1,948,035	14,596	1,080
3e.2	Subtotal Period 3e Additional Costs	-	302	336	502	-	1,502	1,783	1,106	5,531	5,531	-	-	-	24,637	-	-	-	1,948,035	14,596	1,080
Period 3e Period-Dependent Costs																					
3e.4.1	Insurance	-	-	-	-	-	-	56	14	70	70	-	-	-	-	-	-	-	-	-	-
3e.4.2	Property taxes	-	-	-	-	-	-	163	41	204	204	-	-	-	-	-	-	-	-	-	-
3e.4.4	Security Staff Cost	-	-	-	-	-	-	138	35	173	173	-	-	-	-	-	-	-	-	-	2,468
3e.4.5	Utility Staff Cost	-	-	-	-	-	-	162	41	203	203	-	-	-	-	-	-	-	-	-	1,870
3e.4	Subtotal Period 3e Period-Dependent Costs	-	-	-	-	-	-	519	130	649	649	-	-	-	-	-	-	-	-	-	4,338
3e.0	TOTAL PERIOD 3e COST	-	302	336	502	-	1,502	2,303	1,236	6,180	6,180	-	-	-	24,637	-	-	-	1,948,035	14,596	5,418
PERIOD 3f - ISFSI Site Restoration																					
Period 3f Direct Decommissioning Activities																					
Period 3f Additional Costs																					
3f.2.1	Site Restoration ISFSI	-	1,344	-	-	-	-	28	206	1,577	-	-	1,577	-	-	-	-	-	-	15,775	80
3f.2	Subtotal Period 3f Additional Costs	-	1,344	-	-	-	-	28	206	1,577	-	-	1,577	-	-	-	-	-	-	15,775	80
Period 3f Collateral Costs																					
3f.3.1	Small tool allowance	-	22	-	-	-	-	-	3	25	-	-	25	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	22	-	-	-	-	-	3	25	-	-	25	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																					
3f.4.2	Property taxes	-	-	-	-	-	-	86	9	95	-	-	95	-	-	-	-	-	-	-	-
3f.4.3	Heavy equipment rental	-	109	-	-	-	-	-	16	125	-	-	125	-	-	-	-	-	-	-	-
3f.4.4	Plant energy budget	-	-	-	-	-	-	28	4	32	-	-	32	-	-	-	-	-	-	-	-
3f.4.5	Security Staff Cost	-	-	-	-	-	-	73	11	84	-	-	84	-	-	-	-	-	-	-	1,307
3f.4.6	Utility Staff Cost	-	-	-	-	-	-	70	11	81	-	-	81	-	-	-	-	-	-	-	810
3f.4	Subtotal Period 3f Period-Dependent Costs	-	109	-	-	-	-	258	51	417	-	-	417	-	-	-	-	-	-	-	2,117
3f.0	TOTAL PERIOD 3f COST	-	1,474	-	-	-	-	286	260	2,020	-	-	2,020	-	-	-	-	-	-	15,775	2,197
PERIOD 3 TOTALS		-	31,244	1,086	502	-	10,625	91,499	19,129	154,085	17,849	81,069	55,167	-	24,637	-	-	2,450	2,430,682	256,222	588,252
TOTAL COST TO DECOMMISSION		**15,858**	**115,061**	**33,043**	**19,044**	**-**	**98,715**	**513,725**	**152,234**	**947,679**	**696,880**	**191,700**	**59,099**	**-**	**832,895**	**2,303**	**1,066**	**2,450**	**45,889,560**	**1,586,172**	**3,275,863**

Table C-1
LaSalle County Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			

TOTAL COST TO DECOMMISSION WITH 19.14% CONTINGENCY:	$947,679	thousands of 2014 dollars
TOTAL NRC LICENSE TERMINATION COST IS 73.54% OR:	$696,880	thousands of 2014 dollars
SPENT FUEL MANAGEMENT COST IS 20.23% OR:	$191,700	thousands of 2014 dollars
NON-NUCLEAR DEMOLITION COST IS 6.24% OR:	$59,099	thousands of 2014 dollars
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	836,264	cubic feet
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	2,450	cubic feet
TOTAL SCRAP METAL REMOVED:	51,861	tons
TOTAL CRAFT LABOR REQUIREMENTS:	1,586,172	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
LaSalle County Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	73	11	84	84	-	-	-	-	-	-	-	-	-	545
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	-	-	-	-	-	-	112	17	129	129	-	-	-	-	-	-	-	-	-	838
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	1,927
1a.1.8	Perform detailed rad survey									a											
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	56	8	64	64	-	-	-	-	-	-	-	-	-	419
1a.1.10	End product description	-	-	-	-	-	-	56	8	64	64	-	-	-	-	-	-	-	-	-	419
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	73	11	84	84	-	-	-	-	-	-	-	-	-	545
1a.1.12	Define major work sequence	-	-	-	-	-	-	419	63	482	482	-	-	-	-	-	-	-	-	-	3,143
1a.1.13	Perform SER and EA	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	1,299
1a.1.14	Perform Site-Specific Cost Study	-	-	-	-	-	-	279	42	321	321	-	-	-	-	-	-	-	-	-	2,095
1a.1.15	Prepare/submit License Termination Plan	-	-	-	-	-	-	229	34	263	263	-	-	-	-	-	-	-	-	-	1,716
1a.1.16	Receive NRC approval of termination plan									a											
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	275	41	316	285	-	32	-	-	-	-	-	-	-	2,061
1a.1.17.2	Plant systems	-	-	-	-	-	-	233	35	268	241	-	27	-	-	-	-	-	-	-	1,746
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	28	4	32	32	-	-	-	-	-	-	-	-	-	210
1a.1.17.4	Reactor internals	-	-	-	-	-	-	397	60	456	456	-	-	-	-	-	-	-	-	-	2,975
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	363	54	418	418	-	-	-	-	-	-	-	-	-	2,724
1a.1.17.6	Sacrificial shield	-	-	-	-	-	-	28	4	32	32	-	-	-	-	-	-	-	-	-	210
1a.1.17.7	Moisture separators/reheaters	-	-	-	-	-	-	56	8	64	64	-	-	-	-	-	-	-	-	-	419
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	89	13	103	51	-	51	-	-	-	-	-	-	-	670
1a.1.17.9	Main Turbine	-	-	-	-	-	-	117	18	134	134	-	-	-	-	-	-	-	-	-	875
1a.1.17.10	Main Condensers	-	-	-	-	-	-	117	18	134	134	-	-	-	-	-	-	-	-	-	875
1a.1.17.11	Pressure suppression structure	-	-	-	-	-	-	112	17	129	129	-	-	-	-	-	-	-	-	-	838
1a.1.17.12	Drywell	-	-	-	-	-	-	89	13	103	103	-	-	-	-	-	-	-	-	-	670
1a.1.17.13	Plant structures & buildings	-	-	-	-	-	-	174	26	201	100	-	100	-	-	-	-	-	-	-	1,307
1a.1.17.14	Waste management	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	1,927
1a.1.17.15	Facility & site closeout	-	-	-	-	-	-	50	8	58	29	-	29	-	-	-	-	-	-	-	377
1a.1.17	Total	-	-	-	-	-	-	2,386	358	2,744	2,505	-	239	-	-	-	-	-	-	-	17,884
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	134	20	154	154	-	-	-	-	-	-	-	-	-	1,006
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	3,000	450	3,450	3,450	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	78	12	90	90	-	-	-	-	-	-	-	-	-	587
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,300	345	2,645	2,645	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	69	10	79	79	-	-	-	-	-	-	-	-	-	515
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	9,694	1,454	11,148	10,909	-	239	-	-	-	-	-	-	-	32,937
Period 1a Additional Costs																					
1a.2.1	ISFSI Expansion	-	-	-	-	-	-	3,150	473	3,623	-	3,623	-	-	-	-	-	-	-	-	-
1a.2	Subtotal Period 1a Additional Costs	-	-	-	-	-	-	3,150	473	3,623	-	3,623	-	-	-	-	-	-	-	-	-
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	13,105	1,966	15,071	-	15,071	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	13,105	1,966	15,071	-	15,071	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	2,050	205	2,255	2,255	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	491	-	-	-	-	-	123	614	614	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	527	-	-	-	-	-	79	606	606	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	13	7	-	39	-	12	71	71	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,623	243	1,867	1,867	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	834	83	917	917	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	2,227	223	2,450	-	2,450	-	-	-	-	-	-	-	-	-

Table C-2
LaSalle County Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 1a Period-Dependent Costs (continued)																					
1a.4.9	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	791	119	910	-	910	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	48	7	55	-	55	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	8,222	1,233	9,455	9,455	-	-	-	-	-	-	-	-	-	157,471
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	35,778	5,367	41,144	41,144	-	-	-	-	-	-	-	-	-	423,400
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,018	13	7	-	39	51,737	7,719	60,533	57,118	3,415	-	-	610	-	-	-	12,190	20	580,871
1a.0	TOTAL PERIOD 1a COST	-	1,018	13	7	-	39	77,686	11,611	90,374	68,027	22,108	239	-	610	-	-	-	12,190	20	613,808
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems	-	-	-	-	-	-	265	40	304	274	-	30	-	-	-	-	-	-	-	1,983
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	56	8	64	64	-	-	-	-	-	-	-	-	-	419
1b.1.1.3	Reactor internals	-	-	-	-	-	-	224	34	257	257	-	-	-	-	-	-	-	-	-	1,676
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	75	11	87	22	-	65	-	-	-	-	-	-	-	566
1b.1.1.5	CRD housings & NIs	-	-	-	-	-	-	56	8	64	64	-	-	-	-	-	-	-	-	-	419
1b.1.1.6	Incore instrumentation	-	-	-	-	-	-	56	8	64	64	-	-	-	-	-	-	-	-	-	419
1b.1.1.7	Removal primary containment	-	-	-	-	-	-	112	17	129	129	-	-	-	-	-	-	-	-	-	838
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	203	30	233	233	-	-	-	-	-	-	-	-	-	1,521
1b.1.1.9	Facility closeout	-	-	-	-	-	-	67	10	77	39	-	39	-	-	-	-	-	-	-	503
1b.1.1.10	Sacrificial shield	-	-	-	-	-	-	67	10	77	77	-	-	-	-	-	-	-	-	-	503
1b.1.1.11	Reinforced concrete	-	-	-	-	-	-	56	8	64	32	-	32	-	-	-	-	-	-	-	419
1b.1.1.12	Main Turbine	-	-	-	-	-	-	116	17	134	134	-	-	-	-	-	-	-	-	-	872
1b.1.1.13	Main Condensers	-	-	-	-	-	-	117	18	134	134	-	-	-	-	-	-	-	-	-	875
1b.1.1.14	Moisture separators & reheaters	-	-	-	-	-	-	112	17	129	129	-	-	-	-	-	-	-	-	-	838
1b.1.1.15	Radwaste building	-	-	-	-	-	-	153	23	175	158	-	18	-	-	-	-	-	-	-	1,144
1b.1.1.16	Reactor building	-	-	-	-	-	-	153	23	175	158	-	18	-	-	-	-	-	-	-	1,144
1b.1.1	Total	-	-	-	-	-	-	1,886	283	2,169	1,968	-	201	-	-	-	-	-	-	-	14,137
1b.1.2	Decon NSSS	805	-	-	-	-	-	-	403	1,208	1,208	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	805	-	-	-	-	-	1,886	686	3,377	3,176	-	201	-	-	-	-	-	-	1,067	14,137
Period 1b Additional Costs																					
1b.2.1	Site Characterization	-	-	-	-	-	-	2,724	817	3,542	3,542	-	-	-	-	-	-	-	-	12,779	4,547
1b.2.2	Spent Fuel Pool Isolation	-	-	-	-	-	-	7,208	1,081	8,290	8,290	-	-	-	-	-	-	-	-	-	-
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	9,933	1,899	11,831	11,831	-	-	-	-	-	-	-	-	12,779	4,547
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	883	-	-	-	-	-	-	132	1,015	1,015	-	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process decommissioning water waste	35	-	23	61	-	77	-	48	244	244	-	-	-	221	-	-	-	13,236	43	-
1b.3.4	Process decommissioning chemical flush waste	2	-	98	374	-	4,228	-	1,124	5,828	5,828	-	-	-	-	1,000	-	-	106,507	187	-
1b.3.5	Small tool allowance	-	2	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-
1b.3.6	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-
1b.3.7	Decon rig	1,500	-	-	-	-	-	-	225	1,725	1,725	-	-	-	-	-	-	-	-	-	-
1b.3.8	Spent Fuel Capital and Transfer	-	-	-	-	-	-	6,570	986	7,556	-	7,556	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	2,420	1,102	121	435	-	4,306	7,734	2,855	18,973	11,417	7,556	-	-	221	1,000	-	-	119,743	230	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	27	-	-	-	-	-	-	7	34	34	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	791	79	870	870	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	6,008	601	6,608	6,608	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	276	-	-	-	-	-	69	346	346	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	264	-	-	-	-	-	40	304	304	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	7	4	-	23	-	7	42	42	-	-	-	358	-	-	-	7,159	12	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	1,628	244	1,872	1,872	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	234	23	257	257	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	1,117	112	1,228	-	1,228	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Cost	-	-	-	-	-	-	83	12	95	95	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	397	59	456	-	456	-	-	-	-	-	-	-	-	-

Table C-2
LaSalle County Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 1b Period-Dependent Costs (continued)																					
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	24	4	28	-	28	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	4,122	618	4,741	4,741	-	-	-	-	-	-	-	-	-	78,951
1b.4.14	DOC Staff Cost	-	-	-	-	-	-	5,810	871	6,681	6,681	-	-	-	-	-	-	-	-	-	63,789
1b.4.15	Utility Staff Cost	-	-	-	-	-	-	18,007	2,701	20,708	20,708	-	-	-	-	-	-	-	-	-	213,326
1b.4	Subtotal Period 1b Period-Dependent Costs	27	540	7	4	-	23	38,219	5,448	44,268	42,556	1,712	-	-	358	-	-	-	7,159	12	356,066
1b.0	TOTAL PERIOD 1b COST	3,252	1,643	128	439	-	4,329	57,771	10,887	78,450	68,980	9,268	201	-	579	1,000	-	-	126,903	14,087	374,750
PERIOD 1 TOTALS		3,252	2,660	141	446	-	4,368	135,457	22,498	168,823	137,007	31,376	440	-	1,188	1,000	-	-	139,093	14,107	988,559
PERIOD 2a - Large Component Removal																					
Period 2a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
2a.1.1.1	Recirculation System Piping & Valves	120	100	21	30	-	157	-	131	559	559	-	-	-	1,064	-	-	-	121,654	3,377	-
2a.1.1.2	Recirculation Pumps & Motors	64	57	16	43	-	273	-	122	574	574	-	-	-	2,594	-	-	-	211,420	1,957	-
2a.1.1.3	CRDMs & NIs Removal	271	1,449	605	164	-	420	-	688	3,597	3,597	-	-	-	5,536	-	-	-	325,500	26,826	-
2a.1.1.4	Reactor Vessel Internals	244	3,409	11,066	3,558	-	23,005	371	17,892	59,544	59,544	-	-	-	1,753	1,303	1,066	-	448,975	35,575	1,555
2a.1.1.5	Reactor Vessel	180	6,595	3,061	1,805	-	5,587	371	9,102	26,700	26,700	-	-	-	18,654	-	-	-	1,914,434	35,575	1,555
2a.1.1	Totals	878	11,609	14,769	5,600	-	29,441	741	27,935	90,974	90,974	-	-	-	29,602	1,303	1,066	-	3,021,984	103,310	3,110
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	619	3,165	1,736	-	8,822	-	2,937	17,280	17,280	-	-	-	131,716	-	-	-	6,838,856	9,664	-
2a.1.3	Main Condensers	-	1,195	2,256	1,238	-	6,288	-	2,282	13,258	13,258	-	-	-	93,880	-	-	-	4,874,376	18,785	-
Cascading Costs from Clean Building Demolition																					
2a.1.4.1	Reactor Building	-	1,181	-	-	-	-	-	177	1,358	1,358	-	-	-	-	-	-	-	-	11,181	-
2a.1.4.2	Auxiliary Building	-	488	-	-	-	-	-	73	561	561	-	-	-	-	-	-	-	-	4,723	-
2a.1.4.3	IRSF Building	-	88	-	-	-	-	-	13	101	101	-	-	-	-	-	-	-	-	939	-
2a.1.4.4	Service Building	-	188	-	-	-	-	-	28	216	216	-	-	-	-	-	-	-	-	2,230	-
2a.1.4.5	Solid Radwaste Building	-	268	-	-	-	-	-	40	309	309	-	-	-	-	-	-	-	-	2,559	-
2a.1.4.6	Turbine Building	-	705	-	-	-	-	-	106	811	811	-	-	-	-	-	-	-	-	7,337	-
2a.1.4	Totals	-	2,917	-	-	-	-	-	438	3,355	3,355	-	-	-	-	-	-	-	-	28,970	-
Disposal of Plant Systems																					
2a.1.5.1	Acid & Caustic	-	20	-	-	-	-	-	3	23	-	-	23	-	-	-	-	-	-	317	-
2a.1.5.2	Auxiliary Steam	-	350	89	49	-	250	-	166	903	903	-	-	-	3,727	-	-	-	193,777	5,415	-
2a.1.5.3	CSCS Equipment Cooling	-	9	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	141	-
2a.1.5.4	Chemical Feed	-	40	-	-	-	-	-	6	46	-	-	46	-	-	-	-	-	-	638	-
2a.1.5.5	Circulating Water	-	188	-	-	-	-	-	28	216	-	-	216	-	-	-	-	-	-	3,125	-
2a.1.5.6	Circulating Water - RCA	-	250	48	24	-	122	-	101	546	546	-	-	-	1,808	-	-	-	94,406	3,771	-
2a.1.5.7	Clean Condensate Storage	-	174	-	-	-	-	-	26	201	-	-	201	-	-	-	-	-	-	2,875	-
2a.1.5.8	Clean Condensate Storage - RCA	-	77	12	6	-	28	-	28	151	151	-	-	-	415	-	-	-	21,698	1,158	-
2a.1.5.9	Condensate	-	932	510	298	-	1,515	-	708	3,963	3,963	-	-	-	22,553	-	-	-	1,174,271	15,584	-
2a.1.5.10	Condensate Booster	-	1,053	1,158	705	-	3,583	-	1,381	7,881	7,881	-	-	-	53,399	-	-	-	2,777,870	18,570	-
2a.1.5.11	Condensate Polishing Demineralizer	-	1,035	137	73	-	370	-	376	1,991	1,991	-	-	-	5,591	-	-	-	287,088	16,160	-
2a.1.5.12	Containment Combustible Gas Control	-	79	14	7	-	37	-	31	168	168	-	-	-	546	-	-	-	28,517	1,194	-
2a.1.5.13	Cycled Condensate Storage	-	620	139	84	-	428	-	289	1,560	1,560	-	-	-	6,560	-	-	-	331,736	9,928	-
2a.1.5.14	Drywell Instrument Nitrogen	-	68	14	8	-	39	-	29	158	158	-	-	-	588	-	-	-	30,320	1,076	-
2a.1.5.15	Extraction Steam	-	343	110	71	-	360	-	197	1,080	1,080	-	-	-	5,368	-	-	-	278,932	5,624	-
2a.1.5.16	Feedwater	-	592	293	183	-	932	-	438	2,439	2,439	-	-	-	13,899	-	-	-	722,425	9,857	-
2a.1.5.17	Feedwater Heater Vents & Drains	-	2,733	868	506	-	2,570	-	1,488	8,165	8,165	-	-	-	38,293	-	-	-	1,992,119	44,590	-
2a.1.5.18	Gland Steam	-	243	39	21	-	108	-	95	506	506	-	-	-	1,606	-	-	-	83,540	3,862	-
2a.1.5.19	HVAC-Machine Shop\TB Sandblast	-	38	5	3	-	17	-	15	79	79	-	-	-	258	-	-	-	13,382	605	-
2a.1.5.20	HVAC-River\Lake Screen House	-	24	-	-	-	-	-	4	28	-	-	28	-	-	-	-	-	-	422	-
2a.1.5.21	HVAC-Service Building	-	64	-	-	-	-	-	10	73	-	-	73	-	-	-	-	-	-	1,072	-
2a.1.5.22	Hydrogen & Carbon Dioxide	-	43	-	-	-	-	-	6	49	-	-	49	-	-	-	-	-	-	708	-
2a.1.5.23	Lake Makeup & Blowdown	-	254	-	-	-	-	-	38	292	-	-	292	-	-	-	-	-	-	4,257	-
2a.1.5.24	Main Steam	-	132	18	10	-	50	-	49	258	258	-	-	-	745	-	-	-	38,834	2,071	-
2a.1.5.25	Makeup Demineralizer	-	804	174	104	-	529	-	366	1,978	1,978	-	-	-	8,181	-	-	-	410,165	12,835	-
2a.1.5.26	Misc Bldgs Floor Drains	-	1,324	284	143	-	726	-	562	3,040	3,040	-	-	-	10,783	-	-	-	562,851	20,035	-
2a.1.5.27	Refrigeration	-	66	-	-	-	-	-	10	76	-	-	76	-	-	-	-	-	-	1,110	-

Table C-2
LaSalle County Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes: Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Disposal of Plant Systems (continued)																					
2a.1.5.28	Refrigeration - RCA	-	46	7	3	-	16	-	17	88	88	-	-	-	237	-	-	-	12,405	681	-
2a.1.5.29	Screen Wash	-	24	-	-	-	-	-	4	28	-	-	28	-	-	-	-	-	-	407	-
2a.1.5.30	Service Air	-	26	-	-	-	-	-	4	30	-	-	30	-	-	-	-	-	-	427	-
2a.1.5.31	Sewage Treatment	-	104	-	-	-	-	-	16	120	-	-	120	-	-	-	-	-	-	1,741	-
2a.1.5.32	Standby Gas Treatment	-	54	18	11	-	58	-	31	172	172	-	-	-	862	-	-	-	44,774	877	-
2a.1.5.33	Station Heat Recovery	-	669	254	130	-	661	-	377	2,091	2,091	-	-	-	9,845	-	-	-	512,043	10,593	-
2a.1.5.34	Switchgear Heat Removal	-	11	-	-	-	-	-	2	13	-	-	13	-	-	-	-	-	-	180	-
2a.1.5.35	Turbine Bldg Closed Cooling Water	-	533	197	105	-	534	-	302	1,671	1,671	-	-	-	7,935	-	-	-	413,833	8,605	-
2a.1.5.36	Turbine Building Equipment Drains	-	94	19	11	-	58	-	42	224	224	-	-	-	862	-	-	-	44,802	1,495	-
2a.1.5.37	Turbine Building Floor Drains	-	96	9	4	-	21	-	31	161	161	-	-	-	315	-	-	-	16,508	1,493	-
2a.1.5.38	Turbine Generator	-	278	115	76	-	384	-	188	1,041	1,041	-	-	-	5,774	-	-	-	297,530	4,607	-
2a.1.5.39	Turbine Oil	-	798	150	88	-	449	-	340	1,826	1,826	-	-	-	6,935	-	-	-	348,242	12,631	-
2a.1.5.40	Wastewater Treatment	-	153	-	-	-	-	-	23	176	-	-	176	-	-	-	-	-	-	2,499	-
2a.1.5	Totals	-	14,442	4,682	2,725	-	13,844	-	7,829	43,521	42,142	-	1,380	-	207,085	-	-	-	10,732,070	233,236	-
2a.1.6	Scaffolding in support of decommissioning	-	3,228	64	35	-	177	-	863	4,367	4,367	-	-	-	2,649	-	-	-	137,534	56,438	-
2a.1	Subtotal Period 2a Activity Costs	878	34,011	24,936	11,334	-	58,573	741	42,283	172,756	171,377	-	1,380	-	464,933	1,303	1,066	-	25,604,820	450,404	3,110
Period 2a Additional Costs																					
2a.2.1	Remedial Action Surveys	-	-	-	-	-	-	2,161	648	2,809	2,809	-	-	-	-	-	-	-	-	34,055	-
2a.2.2	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
2a.2	Subtotal Period 2a Additional Costs	-	-	-	-	-	-	2,211	656	2,866	2,866	-	-	-	-	-	-	-	-	34,055	-
Period 2a Collateral Costs																					
2a.3.1	Process decommissioning water waste	76	-	50	135	-	172	-	106	540	540	-	-	-	490	-	-	-	29,396	96	-
2a.3.3	Small tool allowance	-	482	-	-	-	-	-	72	554	498	-	55	-	-	-	-	-	-	-	-
2a.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	21,470	3,221	24,691	-	24,691	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	76	482	50	135	-	172	21,470	3,399	25,785	1,038	24,691	55	-	490	-	-	-	29,396	96	-
Period 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	88	-	-	-	-	-	-	22	110	110	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	2,001	200	2,201	2,201	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	14,797	1,480	16,277	14,649	-	1,628	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	3,027	-	-	-	-	-	757	3,784	3,784	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	3,316	-	-	-	-	-	497	3,813	3,813	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	179	97	-	550	-	170	996	996	-	-	-	8,593	-	-	-	171,862	280	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	2,527	379	2,906	2,906	-	-	-	-	-	-	-	-	-	-
2a.4.8	NRC Fees	-	-	-	-	-	-	714	71	785	785	-	-	-	-	-	-	-	-	-	-
2a.4.9	Emergency Planning Fees	-	-	-	-	-	-	3,197	320	3,517	-	3,517	-	-	-	-	-	-	-	-	-
2a.4.10	Site O&M Cost	-	-	-	-	-	-	270	41	311	311	-	-	-	-	-	-	-	-	-	-
2a.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	1,296	194	1,490	-	1,490	-	-	-	-	-	-	-	-	-
2a.4.12	ISFSI Operating Costs	-	-	-	-	-	-	78	12	90	-	90	-	-	-	-	-	-	-	-	-
2a.4.13	Security Staff Cost	-	-	-	-	-	-	11,388	1,708	13,096	13,096	-	-	-	-	-	-	-	-	-	216,134
2a.4.14	DOC Staff Cost	-	-	-	-	-	-	22,955	3,443	26,398	26,398	-	-	-	-	-	-	-	-	-	259,703
2a.4.15	Utility Staff Cost	-	-	-	-	-	-	41,275	6,191	47,466	47,466	-	-	-	-	-	-	-	-	-	483,526
2a.4	Subtotal Period 2a Period-Dependent Costs	88	6,343	179	97	-	550	100,498	15,486	123,241	116,516	5,097	1,628	-	8,593	-	-	-	171,862	280	959,363
2a.0	TOTAL PERIOD 2a COST	1,043	40,836	25,165	11,565	-	59,295	124,920	61,824	324,648	291,797	29,788	3,063	-	474,016	1,303	1,066	-	25,806,070	484,836	962,473
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b.1.1.1	Aux Diesel Bldg Floor Drains	-	9	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	147	-
2b.1.1.2	Auxiliary Diesel Generator	-	82	-	-	-	-	-	12	94	-	-	94	-	-	-	-	-	-	1,341	-
2b.1.1.3	Control Rod Drive	-	242	20	12	-	62	-	80	415	415	-	-	-	920	-	-	-	47,858	3,912	-
2b.1.1.4	Diesel Oil	-	69	-	-	-	-	-	10	80	-	-	80	-	-	-	-	-	-	1,104	-
2b.1.1.5	Domestic Water	-	30	-	-	-	-	-	5	35	-	-	35	-	-	-	-	-	-	499	-
2b.1.1.6	Domestic Water - RCA	-	45	7	3	-	17	-	17	89	89	-	-	-	255	-	-	-	13,307	670	-
2b.1.1.7	Electrical	-	611	-	-	-	-	-	92	702	-	-	702	-	-	-	-	-	-	9,872	-
2b.1.1.8	Electrical - RCA	-	5,832	1,072	690	-	3,507	-	2,545	13,646	13,646	-	-	-	52,355	-	-	-	2,718,307	89,972	-

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LaSalle County Station, Unit 2
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Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
2b.1.1.9	Fire Protection	-	254	-	-	-	-	-	38	292	-	-	292	-	-	-	-	-	-	4,263	-
2b.1.1.10	HVAC-Auxiliary Building	-	343	75	50	-	254	-	164	886	886	-	-	-	3,793	-	-	-	196,915	5,183	-
2b.1.1.11	HVAC-Control Rm\Aux Equip Area	-	44	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	729	-
2b.1.1.12	HVAC-Diesel Generator Room	-	17	-	-	-	-	-	3	19	-	-	19	-	-	-	-	-	-	284	-
2b.1.1.13	HVAC-Off Gas Building	-	80	29	19	-	99	-	51	278	278	-	-	-	1,478	-	-	-	76,733	1,283	-
2b.1.1.14	HVAC-Radwaste Building	-	127	23	15	-	77	-	56	297	297	-	-	-	1,146	-	-	-	59,487	1,937	-
2b.1.1.15	HVAC-Turbine Building	-	964	174	117	-	592	-	424	2,270	2,270	-	-	-	8,842	-	-	-	459,063	14,113	-
2b.1.1.16	High Pressure Core Spray	-	345	190	105	-	535	-	255	1,429	1,429	-	-	-	7,949	-	-	-	414,391	5,720	-
2b.1.1.17	Instrument Air	-	9	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	152	-
2b.1.1.18	Instrument Air - RCA	-	165	19	9	-	45	-	56	293	293	-	-	-	659	-	-	-	34,507	2,558	-
2b.1.1.19	Low Pressure Core Spray	-	164	88	49	-	246	-	119	666	666	-	-	-	3,664	-	-	-	191,058	2,717	-
2b.1.1.20	Nuclear Boiler	-	1,641	526	319	-	1,623	-	917	5,026	5,026	-	-	-	24,184	-	-	-	1,258,120	26,878	-
2b.1.1.21	Off Gas	-	648	149	89	-	452	-	303	1,641	1,641	-	-	-	6,743	-	-	-	350,523	10,327	-
2b.1.1.22	Primary Containment Vent & Purge	-	514	208	137	-	694	-	343	1,895	1,895	-	-	-	10,400	-	-	-	537,713	8,529	-
2b.1.1.23	Process Radiation Monitoring	-	17	1	0	-	2	-	5	25	25	-	-	-	32	-	-	-	1,669	283	-
2b.1.1.24	Process Sampling	-	61	4	3	-	13	-	20	101	101	-	-	-	201	-	-	-	10,453	1,007	-
2b.1.1.25	Radioactive Waste Disposal	-	2,859	478	271	-	1,379	-	1,148	6,136	6,136	-	-	-	21,136	-	-	-	1,069,308	45,084	-
2b.1.1.26	Radwaste Area Floor Drains	-	2	0	0	-	0	-	1	4	4	-	-	-	6	-	-	-	315	35	-
2b.1.1.27	Reactor Building Equipment Drains	-	75	11	6	-	28	-	28	146	146	-	-	-	428	-	-	-	21,778	1,178	-
2b.1.1.28	Reactor Core Isolation Cooling	-	230	37	21	-	105	-	90	483	483	-	-	-	1,564	-	-	-	81,526	3,654	-
2b.1.1.29	Reactor Recirculation	-	132	48	31	-	160	-	82	453	453	-	-	-	2,381	-	-	-	123,665	2,194	-
2b.1.1.30	Reactor Water Clean-up	481	861	87	43	-	217	-	525	2,214	2,214	-	-	-	3,219	-	-	-	168,302	20,204	-
2b.1.1.31	Residual Heat Removal	1,783	1,711	898	507	-	2,574	-	2,129	9,601	9,601	-	-	-	38,296	-	-	-	1,995,503	34,356	-
2b.1.1.32	Service Air - RCA	-	373	54	25	-	127	-	134	713	713	-	-	-	1,889	-	-	-	98,774	5,643	-
2b.1.1.33	Service Water	-	97	-	-	-	-	-	15	112	-	-	112	-	-	-	-	-	-	1,595	-
2b.1.1.34	Service Water - RCA	-	862	316	180	-	915	-	503	2,775	2,775	-	-	-	13,626	-	-	-	709,225	13,633	-
2b.1.1.35	Standby Liquid Control	-	48	8	4	-	19	-	18	97	97	-	-	-	281	-	-	-	14,698	719	-
2b.1.1	Totals	2,264	19,563	4,519	2,705	-	13,743	-	10,194	52,987	51,581	-	1,405	-	205,446	-	-	-	10,653,200	321,775	-
2b.1.2	Scaffolding in support of decommissioning	-	4,035	80	44	-	222	-	1,079	5,459	5,459	-	-	-	3,311	-	-	-	171,917	70,548	-
Decontamination of Site Buildings																					
2b.1.3.1	Reactor Building	3,073	3,176	343	278	-	1,066	-	2,673	10,608	10,608	-	-	-	16,817	-	-	-	1,040,843	94,951	-
2b.1.3.2	Auxiliary Building	1,633	760	477	224	-	1,061	-	1,353	5,508	5,508	-	-	-	15,844	-	-	-	868,933	36,938	-
2b.1.3.3	IRSF Building	92	41	2	10	-	24	-	64	233	233	-	-	-	427	-	-	-	36,063	1,976	-
2b.1.3.4	Service Building	127	48	2	14	-	34	-	86	312	312	-	-	-	593	-	-	-	50,079	2,619	-
2b.1.3.5	Solid Radwaste Building	558	445	33	44	-	138	-	435	1,654	1,654	-	-	-	2,265	-	-	-	161,333	15,232	-
2b.1.3.6	Turbine Building	2,036	1,194	130	273	-	805	-	1,572	6,010	6,010	-	-	-	13,591	-	-	-	985,774	48,088	-
2b.1.3	Totals	7,519	5,664	987	843	-	3,129	-	6,183	24,325	24,325	-	-	-	49,537	-	-	-	3,143,025	199,804	-
2b.1	Subtotal Period 2b Activity Costs	9,783	29,262	5,586	3,592	-	17,093	-	17,455	82,771	81,365	-	1,405	-	258,294	-	-	-	13,968,140	592,127	-
Period 2b Additional Costs																					
2b.2.1	License Termination Survey Planning	-	-	-	-	-	-	983	295	1,277	1,277	-	-	-	-	-	-	-	-	-	6,240
2b.2.2	Remedial Action Surveys	-	-	-	-	-	-	3,118	935	4,053	4,053	-	-	-	-	-	-	-	-	49,147	-
2b.2.3	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
2b.2.4	Underground Services Excavation	-	542	-	-	-	-	-	81	623	623	-	-	-	-	-	-	-	-	3,627	-
2b.2.5	Operational Tools and Equipment	-	-	9	13	-	189	-	50	261	261	-	-	-	5,855	-	-	-	146,375	16	-
2b.2.6	Soil Remediation	-	58	7	221	-	1,978	-	543	2,808	2,808	-	-	-	34,081	-	-	-	2,736,453	745	-
2b.2	Subtotal Period 2b Additional Costs	-	600	16	235	-	2,167	4,151	1,912	9,080	9,080	-	-	-	39,936	-	-	-	2,882,828	53,534	6,240
Period 2b Collateral Costs																					
2b.3.1	Process decommissioning water waste	124	-	84	226	-	288	-	177	900	900	-	-	-	822	-	-	-	49,290	160	-
2b.3.2	Process decommissioning chemical flush waste	10	-	433	1,646	-	2,739	-	980	5,808	5,808	-	-	-	4,394	-	-	-	468,221	822	-
2b.3.3	Small tool allowance	-	607	-	-	-	-	-	91	698	698	-	-	-	-	-	-	-	-	-	-
2b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	30,985	4,648	35,633	-	35,633	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	135	607	517	1,872	-	3,027	30,985	5,895	43,038	7,406	35,633	-	-	5,215	-	-	-	517,511	983	-
Period 2b Period-Dependent Costs																					
2b.4.1	Decon supplies	1,930	-	-	-	-	-	-	483	2,413	2,413	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	1,565	156	1,721	1,721	-	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	5,406	541	5,946	5,946	-	-	-	-	-	-	-	-	-	-
2b.4.4	Health physics supplies	-	4,113	-	-	-	-	-	1,028	5,141	5,141	-	-	-	-	-	-	-	-	-	-

Table C-2
LaSalle County Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 2b Period-Dependent Costs (continued)																					
2b.4.5	Heavy equipment rental	-	4,737	-	-	-	-	-	711	5,448	5,448	-	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	206	112	-	634	-	196	1,147	1,147	-	-	-	9,891	-	-	-	197,816	323	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	2,879	432	3,310	3,310	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	1,030	103	1,133	1,133	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	4,614	461	5,076	-	5,076	-	-	-	-	-	-	-	-	-
2b.4.10	Site O&M Cost	-	-	-	-	-	-	390	59	449	449	-	-	-	-	-	-	-	-	-	-
2b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	1,870	281	2,151	-	2,151	-	-	-	-	-	-	-	-	-
2b.4.12	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	474	71	545	545	-	-	-	-	-	-	-	-	-	-
2b.4.13	ISFSI Operating Costs	-	-	-	-	-	-	113	17	130	-	130	-	-	-	-	-	-	-	-	-
2b.4.14	Security Staff Cost	-	-	-	-	-	-	16,435	2,465	18,900	18,900	-	-	-	-	-	-	-	-	-	311,913
2b.4.15	DOC Staff Cost	-	-	-	-	-	-	31,803	4,770	36,574	36,574	-	-	-	-	-	-	-	-	-	359,994
2b.4.16	Utility Staff Cost	-	-	-	-	-	-	57,166	8,575	65,741	65,741	-	-	-	-	-	-	-	-	-	668,209
2b.4	Subtotal Period 2b Period-Dependent Costs	1,930	8,850	206	112	-	634	123,745	20,348	155,824	148,468	7,356	-	-	9,891	-	-	-	197,816	323	1,340,116
2b.0	TOTAL PERIOD 2b COST	11,848	39,320	6,324	5,810	-	22,921	158,880	45,611	290,714	246,319	42,989	1,405	-	313,335	-	-	-	17,566,290	646,966	1,346,356
PERIOD 2d - Decontamination Following Wet Fuel Storage																					
Period 2d Direct Decommissioning Activities																					
2d.1.1	Remove spent fuel racks	1,078	96	195	242	-	1,231	-	927	3,769	3,769	-	-	-	18,378	-	-	-	954,202	1,632	-
Disposal of Plant Systems																					
2d.1.2.1	Containment Monitoring	-	28	2	1	-	5	-	9	44	44	-	-	-	78	-	-	-	4,043	457	-
2d.1.2.2	Electrical - Contaminated	-	953	112	75	-	382	-	356	1,879	1,879	-	-	-	5,707	-	-	-	296,337	14,915	-
2d.1.2.3	Fire Protection - RCA	-	1,184	312	163	-	828	-	559	3,045	3,045	-	-	-	12,306	-	-	-	641,747	18,258	-
2d.1.2.4	Fuel Pool Cooling & Cleanup	-	902	297	166	-	843	-	491	2,698	2,698	-	-	-	12,562	-	-	-	653,382	14,554	-
2d.1.2.5	HVAC-Primary Containment	-	1,041	227	144	-	733	-	488	2,633	2,633	-	-	-	10,961	-	-	-	568,155	15,980	-
2d.1.2.6	Reactor Bldg Closed Cooling Water	-	409	294	154	-	782	-	350	1,988	1,988	-	-	-	11,625	-	-	-	605,888	6,817	-
2d.1.2.7	Reactor Building Floor Drains	-	8	1	0	-	1	-	2	13	13	-	-	-	21	-	-	-	1,101	123	-
2d.1.2.8	Well Water	-	107	-	-	-	-	-	16	123	-	-	123	-	-	-	-	-	-	1,732	-
2d.1.2	Totals	-	4,631	1,245	703	-	3,574	-	2,271	12,424	12,301	-	123	-	53,260	-	-	-	2,770,654	72,836	-
Decontamination of Site Buildings																					
2d.1.3.1	Reactor Building Spent Fuel Pool	309	1,161	82	401	-	1,516	-	893	4,363	4,363	-	-	-	29,927	-	-	-	1,499,988	20,237	-
2d.1.3	Totals	309	1,161	82	401	-	1,516	-	893	4,363	4,363	-	-	-	29,927	-	-	-	1,499,988	20,237	-
2d.1.4	Scaffolding in support of decommissioning	-	807	16	9	-	44	-	216	1,092	1,092	-	-	-	662	-	-	-	34,383	14,110	-
2d.1	Subtotal Period 2d Activity Costs	1,388	6,695	1,538	1,356	-	6,366	-	4,306	21,648	21,525	-	123	-	102,228	-	-	-	5,259,227	108,815	-
Period 2d Additional Costs																					
2d.2.1	Remedial Action Surveys	-	-	-	-	-	-	676	203	878	878	-	-	-	-	-	-	-	-	10,649	-
2d.2	Subtotal Period 2d Additional Costs	-	-	-	-	-	-	676	203	878	878	-	-	-	-	-	-	-	-	10,649	-
Period 2d Collateral Costs																					
2d.3.1	Process decommissioning water waste	86	-	59	158	-	201	-	123	626	626	-	-	-	572	-	-	-	34,310	111	-
2d.3.3	Small tool allowance	-	126	-	-	-	-	-	19	145	145	-	-	-	-	-	-	-	-	-	-
2d.3.4	Decommissioning Equipment Disposition	-	-	170	93	-	472	-	149	884	884	-	-	-	7,054	-	-	-	366,237	88	-
2d.3	Subtotal Period 2d Collateral Costs	86	126	228	250	-	673	-	291	1,654	1,654	-	-	-	7,626	-	-	-	400,548	200	-
Period 2d Period-Dependent Costs																					
2d.4.1	Decon supplies	55	-	-	-	-	-	-	14	69	69	-	-	-	-	-	-	-	-	-	-
2d.4.2	Insurance	-	-	-	-	-	-	339	34	373	373	-	-	-	-	-	-	-	-	-	-
2d.4.3	Property taxes	-	-	-	-	-	-	256	26	282	282	-	-	-	-	-	-	-	-	-	-
2d.4.4	Health physics supplies	-	773	-	-	-	-	-	193	966	966	-	-	-	-	-	-	-	-	-	-
2d.4.5	Heavy equipment rental	-	1,027	-	-	-	-	-	154	1,180	1,180	-	-	-	-	-	-	-	-	-	-
2d.4.6	Disposal of DAW generated	-	-	68	37	-	209	-	65	379	379	-	-	-	3,270	-	-	-	65,393	107	-
2d.4.7	Plant energy budget	-	-	-	-	-	-	333	50	383	383	-	-	-	-	-	-	-	-	-	-
2d.4.8	NRC Fees	-	-	-	-	-	-	187	19	206	206	-	-	-	-	-	-	-	-	-	-
2d.4.9	Emergency Planning Fees	-	-	-	-	-	-	1,000	100	1,100	-	1,100	-	-	-	-	-	-	-	-	-
2d.4.10	Site O&M Cost	-	-	-	-	-	-	85	13	97	97	-	-	-	-	-	-	-	-	-	-
2d.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	205	31	236	236	-	-	-	-	-	-	-	-	-	-
2d.4.12	ISFSI Operating Costs	-	-	-	-	-	-	24	4	28	-	28	-	-	-	-	-	-	-	-	-

Table C-2
LaSalle County Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 2d Period-Dependent Costs (continued)																					
2d.4.13	Security Staff Cost	-	-	-	-	-	-	1,967	295	2,262	2,262	-	-	-	-	-	-	-	-	-	35,530
2d.4.14	DOC Staff Cost	-	-	-	-	-	-	4,740	711	5,451	5,451	-	-	-	-	-	-	-	-	-	53,429
2d.4.15	Utility Staff Cost	-	-	-	-	-	-	8,980	1,347	10,327	10,327	-	-	-	-	-	-	-	-	-	102,049
2d.4	Subtotal Period 2d Period-Dependent Costs	55	1,799	68	37	-	209	18,115	3,054	23,338	22,210	1,128	-	-	3,270	-	-	-	65,393	107	191,007
2d.0	TOTAL PERIOD 2d COST	1,529	8,621	1,834	1,643	-	7,248	18,791	7,853	47,519	46,267	1,128	123	-	113,123	-	-	-	5,725,168	119,770	191,007
PERIOD 2f - License Termination																					
Period 2f Direct Decommissioning Activities																					
2f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
2f.1.2	Terminate license									a											
2f.1	Subtotal Period 2f Activity Costs	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
Period 2f Additional Costs																					
2f.2.1	License Termination Survey	-	-	-	-	-	-	14,037	4,211	18,248	18,248	-	-	-	-	-	-	-	-	218,104	3,120
2f.2	Subtotal Period 2f Additional Costs	-	-	-	-	-	-	14,037	4,211	18,248	18,248	-	-	-	-	-	-	-	-	218,104	3,120
Period 2f Collateral Costs																					
2f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
2f.3	Subtotal Period 2f Collateral Costs	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
Period 2f Period-Dependent Costs																					
2f.4.1	Insurance	-	-	-	-	-	-	505	51	556	556	-	-	-	-	-	-	-	-	-	-
2f.4.2	Property taxes	-	-	-	-	-	-	382	38	420	420	-	-	-	-	-	-	-	-	-	-
2f.4.3	Health physics supplies	-	900	-	-	-	-	-	225	1,125	1,125	-	-	-	-	-	-	-	-	-	-
2f.4.4	Disposal of DAW generated	-	-	7	4	-	22	-	7	40	40	-	-	-	342	-	-	-	6,832	11	-
2f.4.5	Plant energy budget	-	-	-	-	-	-	248	37	285	285	-	-	-	-	-	-	-	-	-	-
2f.4.6	NRC Fees	-	-	-	-	-	-	307	31	338	338	-	-	-	-	-	-	-	-	-	-
2f.4.7	Emergency Planning Fees	-	-	-	-	-	-	1,492	149	1,641	-	1,641	-	-	-	-	-	-	-	-	-
2f.4.8	Site O&M Cost	-	-	-	-	-	-	126	19	145	145	-	-	-	-	-	-	-	-	-	-
2f.4.9	ISFSI Operating Costs	-	-	-	-	-	-	36	5	42	-	42	-	-	-	-	-	-	-	-	-
2f.4.10	Security Staff Cost	-	-	-	-	-	-	1,556	233	1,790	1,790	-	-	-	-	-	-	-	-	-	28,299
2f.4.11	DOC Staff Cost	-	-	-	-	-	-	4,235	635	4,870	4,870	-	-	-	-	-	-	-	-	-	47,430
2f.4.12	Utility Staff Cost	-	-	-	-	-	-	5,466	820	6,286	6,286	-	-	-	-	-	-	-	-	-	60,981
2f.4	Subtotal Period 2f Period-Dependent Costs	-	900	7	4	-	22	14,354	2,251	17,537	15,855	1,683	-	-	342	-	-	-	6,832	11	136,710
2f.0	TOTAL PERIOD 2f COST	-	900	7	4	-	22	29,727	6,688	37,347	35,664	1,683	-	-	342	-	-	-	6,832	218,115	139,830
PERIOD 2 TOTALS		14,419	89,676	33,331	19,022	-	89,487	332,318	121,975	700,228	620,048	75,588	4,591	-	900,815	1,303	1,066	-	49,104,360	1,469,687	2,639,666
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	Reactor Building	-	6,790	-	-	-	-	-	1,018	7,808	-	-	7,808	-	-	-	-	-	-	64,458	-
3b.1.1.2	Auxiliary Building	-	4,415	-	-	-	-	-	662	5,077	-	-	5,077	-	-	-	-	-	-	42,962	-
3b.1.1.3	Capital Improvements 2009	-	1,552	-	-	-	-	-	233	1,785	-	-	1,785	-	-	-	-	-	-	20,778	-
3b.1.1.4	Capital Improvements 2014	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	54	-
3b.1.1.5	Chemical Feed Building	-	39	-	-	-	-	-	6	45	-	-	45	-	-	-	-	-	-	482	-
3b.1.1.6	Diesel Generator Room	-	554	-	-	-	-	-	83	637	-	-	637	-	-	-	-	-	-	6,000	-
3b.1.1.7	Discharge Structure	-	23	-	-	-	-	-	3	26	-	-	26	-	-	-	-	-	-	190	-
3b.1.1.8	IRSF Building	-	819	-	-	-	-	-	123	941	-	-	941	-	-	-	-	-	-	8,924	-
3b.1.1.9	Lake Screen House	-	1,295	-	-	-	-	-	194	1,489	-	-	1,489	-	-	-	-	-	-	13,877	-
3b.1.1.10	Main Access Facility	-	462	-	-	-	-	-	69	532	-	-	532	-	-	-	-	-	-	5,396	-
3b.1.1.11	Miscellaneous Yard Structures	-	2,352	-	-	-	-	-	353	2,705	-	-	2,705	-	-	-	-	-	-	27,035	-
3b.1.1.12	New Service Building	-	2,166	-	-	-	-	-	325	2,491	-	-	2,491	-	-	-	-	-	-	23,587	-
3b.1.1.13	Outfall Structure	-	9	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	113	-
3b.1.1.14	River Screen House	-	387	-	-	-	-	-	58	445	-	-	445	-	-	-	-	-	-	4,231	-
3b.1.1.15	Security Modifications 2009	-	736	-	-	-	-	-	110	846	-	-	846	-	-	-	-	-	-	3,834	-
3b.1.1.16	Security Modifications 2014	-	40	-	-	-	-	-	6	46	-	-	46	-	-	-	-	-	-	528	-
3b.1.1.17	Service Building	-	1,778	-	-	-	-	-	267	2,045	-	-	2,045	-	-	-	-	-	-	21,582	-

Table C-2
LaSalle County Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Demolition of Remaining Site Buildings (continued)																					
3b.1.1.18	Sewage Treatment Plant	-	43	-	-	-	-	-	6	49	-	-	49	-	-	-	-	-	-	591	-
3b.1.1.19	Sewage Treatment Plant Upgrades	-	320	-	-	-	-	-	48	368	-	-	368	-	-	-	-	-	-	3,346	-
3b.1.1.20	Solid Radwaste Building	-	2,428	-	-	-	-	-	364	2,792	-	-	2,792	-	-	-	-	-	-	23,167	-
3b.1.1.21	Training Center	-	1,467	-	-	-	-	-	220	1,687	-	-	1,687	-	-	-	-	-	-	16,863	-
3b.1.1.22	Turbine Building	-	6,492	-	-	-	-	-	974	7,466	-	-	7,466	-	-	-	-	-	-	68,584	-
3b.1.1.23	Turbine Pedestal	-	2,536	-	-	-	-	-	380	2,917	-	-	2,917	-	-	-	-	-	-	22,592	-
3b.1.1.24	Wastewater Treatment Plant	-	73	-	-	-	-	-	11	83	-	-	83	-	-	-	-	-	-	911	-
3b.1.1	Totals	-	36,779	-	-	-	-	-	5,517	42,296	-	-	42,296	-	-	-	-	-	-	380,083	-
Site Closeout Activities																					
3b.1.2	BackFill Site	-	861	-	-	-	-	-	129	991	-	-	991	-	-	-	-	-	-	1,535	-
3b.1.3	Grade & landscape site	-	198	-	-	-	-	-	30	228	-	-	228	-	-	-	-	-	-	499	-
3b.1.4	Final report to NRC	-	-	-	-	-	-	87	13	100	100	-	-	-	-	-	-	-	-	-	654
3b.1	Subtotal Period 3b Activity Costs	-	37,839	-	-	-	-	87	5,689	43,615	100	-	43,515	-	-	-	-	-	-	382,117	654
Period 3b Additional Costs																					
3b.2.1	Concrete Crushing	-	1,260	-	-	-	-	6	190	1,456	-	-	1,456	-	-	-	-	-	-	5,872	-
3b.2.2	Cofferdam Construction and Teardown	-	989	-	-	-	-	-	148	1,138	-	-	1,138	-	-	-	-	-	-	8,720	-
3b.2	Subtotal Period 3b Additional Costs	-	2,250	-	-	-	-	6	338	2,593	-	-	2,593	-	-	-	-	-	-	14,592	-
Period 3b Collateral Costs																					
3b.3.1	Small tool allowance	-	417	-	-	-	-	-	63	479	-	-	479	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	417	-	-	-	-	-	63	479	-	-	479	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Insurance	-	-	-	-	-	-	660	66	726	-	726	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	998	100	1,098	-	1,098	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	5,685	-	-	-	-	-	853	6,538	-	-	6,538	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	324	49	373	-	-	373	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	253	25	279	-	279	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	3,898	390	4,288	-	4,288	-	-	-	-	-	-	-	-	-
3b.4.7	ISFSI Operating Costs	-	-	-	-	-	-	95	14	110	-	110	-	-	-	-	-	-	-	-	-
3b.4.8	Site O&M Cost	-	-	-	-	-	-	329	49	379	-	-	379	-	-	-	-	-	-	-	-
3b.4.9	Security Staff Cost	-	-	-	-	-	-	3,885	583	4,468	0	3,664	804	-	-	-	-	-	-	-	70,317
3b.4.10	DOC Staff Cost	-	-	-	-	-	-	10,124	1,519	11,642	-	-	11,642	-	-	-	-	-	-	-	110,391
3b.4.11	Utility Staff Cost	-	-	-	-	-	-	6,422	963	7,386	-	1,329	6,056	-	-	-	-	-	-	-	70,317
3b.4	Subtotal Period 3b Period-Dependent Costs	-	5,685	-	-	-	-	26,990	4,611	37,285	0	11,493	25,792	-	-	-	-	-	-	-	251,026
3b.0	TOTAL PERIOD 3b COST	-	46,191	-	-	-	-	27,082	10,700	83,973	100	11,493	72,380	-	-	-	-	-	-	396,708	251,680
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Collateral Costs																					
3c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	11,563	1,734	13,297	-	13,297	-	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	11,563	1,734	13,297	-	13,297	-	-	-	-	-	-	-	-	-
Period 3c Period-Dependent Costs																					
3c.4.1	Insurance	-	-	-	-	-	-	3,068	307	3,375	-	3,375	-	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	4,637	464	5,100	-	5,100	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	1,855	185	2,040	-	2,040	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	18,109	1,811	19,920	-	19,920	-	-	-	-	-	-	-	-	-
3c.4.6	Site O&M Cost	-	-	-	-	-	-	1,531	230	1,760	-	1,760	-	-	-	-	-	-	-	-	-
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	443	66	509	-	509	-	-	-	-	-	-	-	-	-
3c.4.8	Security Staff Cost	-	-	-	-	-	-	14,801	2,220	17,021	-	17,021	-	-	-	-	-	-	-	-	261,283
3c.4.9	Utility Staff Cost	-	-	-	-	-	-	5,504	826	6,329	-	6,329	-	-	-	-	-	-	-	-	65,417
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	49,947	6,109	56,056	-	56,056	-	-	-	-	-	-	-	-	326,700
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	61,510	7,843	69,353	-	69,353	-	-	-	-	-	-	-	-	326,700

Table C-2
LaSalle County Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	750	-	-	9,123	-	1,556	11,429	11,429	-	-	-	-	-	-	2,450	482,647	-	-
3d.1.1	Totals	-	-	750	-	-	9,123	-	1,556	11,429	11,429	-	-	-	-	-	-	2,450	482,647	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	750	-	-	9,123	-	1,556	11,429	11,429	-	-	-	-	-	-	2,450	482,647	-	-
Period 3d Period-Dependent Costs																					
3d.4.1	Insurance	-	-	-	-	-	-	13	1	14	-	14	-	-	-	-	-	-	-	-	-
3d.4.2	Property taxes	-	-	-	-	-	-	19	2	21	-	21	-	-	-	-	-	-	-	-	-
3d.4.4	Emergency Planning Fees	-	-	-	-	-	-	75	7	82	-	82	-	-	-	-	-	-	-	-	-
3d.4.5	Site O&M Cost	-	-	-	-	-	-	6	1	7	-	7	-	-	-	-	-	-	-	-	-
3d.4.6	ISFSI Operating Costs	-	-	-	-	-	-	2	0	2	-	2	-	-	-	-	-	-	-	-	-
3d.4.7	Security Staff Cost	-	-	-	-	-	-	61	9	70	-	70	-	-	-	-	-	-	-	-	1,080
3d.4.8	Utility Staff Cost	-	-	-	-	-	-	23	3	26	-	26	-	-	-	-	-	-	-	-	270
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	199	24	223	-	223	-	-	-	-	-	-	-	-	1,350
3d.0	TOTAL PERIOD 3d COST	-	-	750	-	-	9,123	199	1,580	11,652	11,429	223	-	-	-	-	-	2,450	482,647	-	1,350
PERIOD 3e - ISFSI Decontamination																					
Period 3e Direct Decommissioning Activities																					
Period 3e Additional Costs																					
3e.2.1	License Termination ISFSI	-	302	336	502	-	1,502	1,783	1,106	5,531	5,531	-	-	-	24,637	-	-	-	1,948,035	14,596	1,080
3e.2	Subtotal Period 3e Additional Costs	-	302	336	502	-	1,502	1,783	1,106	5,531	5,531	-	-	-	24,637	-	-	-	1,948,035	14,596	1,080
Period 3e Period-Dependent Costs																					
3e.4.1	Insurance	-	-	-	-	-	-	56	14	70	70	-	-	-	-	-	-	-	-	-	-
3e.4.2	Property taxes	-	-	-	-	-	-	163	41	204	204	-	-	-	-	-	-	-	-	-	-
3e.4.4	Security Staff Cost	-	-	-	-	-	-	138	35	173	173	-	-	-	-	-	-	-	-	-	2,468
3e.4.5	Utility Staff Cost	-	-	-	-	-	-	162	41	203	203	-	-	-	-	-	-	-	-	-	1,870
3e.4	Subtotal Period 3e Period-Dependent Costs	-	-	-	-	-	-	519	130	649	649	-	-	-	-	-	-	-	-	-	4,338
3e.0	TOTAL PERIOD 3e COST	-	302	336	502	-	1,502	2,303	1,236	6,180	6,180	-	-	-	24,637	-	-	-	1,948,035	14,596	5,418
PERIOD 3f - ISFSI Site Restoration																					
Period 3f Direct Decommissioning Activities																					
Period 3f Additional Costs																					
3f.2.1	Site Restoration ISFSI	-	1,344	-	-	-	-	28	206	1,577	-	-	1,577	-	-	-	-	-	-	15,775	80
3f.2	Subtotal Period 3f Additional Costs	-	1,344	-	-	-	-	28	206	1,577	-	-	1,577	-	-	-	-	-	-	15,775	80
Period 3f Collateral Costs																					
3f.3.1	Small tool allowance	-	22	-	-	-	-	-	3	25	-	-	25	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	22	-	-	-	-	-	3	25	-	-	25	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																					
3f.4.2	Property taxes	-	-	-	-	-	-	86	9	95	-	-	95	-	-	-	-	-	-	-	-
3f.4.4	Security Staff Cost	-	-	-	-	-	-	73	11	84	-	-	84	-	-	-	-	-	-	-	1,307
3f.4.5	Utility Staff Cost	-	-	-	-	-	-	70	11	81	-	-	81	-	-	-	-	-	-	-	810
3f.4	Subtotal Period 3f Period-Dependent Costs	-	-	-	-	-	-	230	30	260	-	-	260	-	-	-	-	-	-	-	2,117
3f.0	TOTAL PERIOD 3f COST	-	1,366	-	-	-	-	258	239	1,862	-	-	1,862	-	-	-	-	-	-	15,775	2,197
PERIOD 3 TOTALS		-	47,858	1,086	502	-	10,625	91,351	21,599	173,021	17,710	81,069	74,242	-	24,637	-	-	2,450	2,430,682	427,079	587,346
TOTAL COST TO DECOMMISSION		**17,671**	**140,194**	**34,558**	**19,970**	**-**	**104,480**	**559,126**	**166,073**	**1,042,072**	**774,765**	**188,033**	**79,274**	**-**	**926,640**	**2,303**	**1,066**	**2,450**	**51,674,140**	**1,910,874**	**4,215,570**

Table C-2
LaSalle County Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			

TOTAL COST TO DECOMMISSION WITH 18.96% CONTINGENCY:	**$1,042,072**	**thousands of 2014 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 74.35% OR:	**$774,765**	**thousands of 2014 dollars**
SPENT FUEL MANAGEMENT COST IS 18.04% OR:	**$188,033**	**thousands of 2014 dollars**
NON-NUCLEAR DEMOLITION COST IS 7.61% OR:	**$79,274**	**thousands of 2014 dollars**
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	**930,009**	**cubic feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**2,450**	**cubic feet**
TOTAL SCRAP METAL REMOVED:	**67,341**	**tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,910,874**	**man-hours**

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

APPENDIX D

DETAILED COST ANALYSIS

DELAYED DECON

Page

LaSalle County Station, Unit 1 .....D-2

LaSalle County Station, Unit 2 .....D-12

Table D-1
LaSalle County Station, Unit 1
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	481	144	625	625	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,000
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	1,300
1a.1.9	Perform detailed rad survey									a											
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	133	20	153	153	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	End product description	-	-	-	-	-	-	133	20	153	153	-	-	-	-	-	-	-	-	-	1,000
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	200	30	230	230	-	-	-	-	-	-	-	-	-	1,500
1a.1.13	Define major work sequence	-	-	-	-	-	-	133	20	153	153	-	-	-	-	-	-	-	-	-	1,000
1a.1.14	Perform SER and EA	-	-	-	-	-	-	414	62	476	476	-	-	-	-	-	-	-	-	-	3,100
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	667	100	767	767	-	-	-	-	-	-	-	-	-	5,000
Activity Specifications																					
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	656	98	755	755	-	-	-	-	-	-	-	-	-	4,920
1a.1.16.2	Plant systems	-	-	-	-	-	-	556	83	639	639	-	-	-	-	-	-	-	-	-	4,167
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	416	62	479	479	-	-	-	-	-	-	-	-	-	3,120
1a.1.16.4	Waste management	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,000
1a.1.16.5	Facility and site dormancy	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,000
1a.1.16	Total	-	-	-	-	-	-	2,162	324	2,486	2,486	-	-	-	-	-	-	-	-	-	16,207
Detailed Work Procedures																					
1a.1.17.1	Plant systems	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	1,183
1a.1.17.2	Facility closeout & dormancy	-	-	-	-	-	-	160	24	184	184	-	-	-	-	-	-	-	-	-	1,200
1a.1.17	Total	-	-	-	-	-	-	318	48	366	366	-	-	-	-	-	-	-	-	-	2,383
1a.1.18	Procure vacuum drying system	-	-	-	-	-	-	13	2	15	15	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	5,268	862	6,131	6,131	-	-	-	-	-	-	-	-	-	35,890
Period 1a Additional Costs																					
1a.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	10,813	1,622	12,434	12,434	-	-	-	-	-	-	-	-	-	-
1a.2	Subtotal Period 1a Additional Costs	-	-	-	-	-	-	10,813	1,622	12,434	12,434	-	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	2,050	205	2,255	2,255	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	491	-	-	-	-	-	123	614	614	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	527	-	-	-	-	-	79	606	606	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	13	7	-	39	-	12	71	71	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,623	243	1,867	1,867	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	1,181	118	1,299	1,299	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	2,227	223	2,450	-	2,450	-	-	-	-	-	-	-	-	-
1a.4.9	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	791	119	910	-	910	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	48	7	55	-	55	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	610	91	701	701	-	-	-	-	-	-	-	-	-	12,264
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	35,778	5,367	41,144	41,144	-	-	-	-	-	-	-	-	-	423,400
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,018	13	7	-	39	44,472	6,612	52,160	48,746	3,415	-	-	610	-	-	-	12,190	20	435,664
1a.0	TOTAL PERIOD 1a COST	-	1,018	13	7	-	39	60,553	9,096	70,725	67,311	3,415	-	-	610	-	-	-	12,190	20	471,554

Table D-1
LaSalle County Station, Unit 1
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1b - SAFSTOR Limited DECON Activities																					
Period 1b Direct Decommissioning Activities																					
Decontamination of Site Buildings																					
1b.1.1.1	Reactor Building	3,298	-	-	-	-	-	-	1,649	4,947	4,947	-	-	-	-	-	-	-	-	49,197	-
1b.1.1.2	Auxiliary Building	365	-	-	-	-	-	-	182	547	547	-	-	-	-	-	-	-	-	5,731	-
1b.1.1.3	Off Gas Building	163	-	-	-	-	-	-	81	244	244	-	-	-	-	-	-	-	-	2,566	-
1b.1.1.4	Turbine Building	1,915	-	-	-	-	-	-	958	2,873	2,873	-	-	-	-	-	-	-	-	30,081	-
1b.1.1	Totals	5,741	-	-	-	-	-	-	2,870	8,611	8,611	-	-	-	-	-	-	-	-	87,576	-
1b.1	Subtotal Period 1b Activity Costs	5,741	-	-	-	-	-	-	2,870	8,611	8,611	-	-	-	-	-	-	-	-	87,576	-
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	883	-	-	-	-	-	-	132	1,015	1,015	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process decommissioning water waste	164	-	106	285	-	363	-	226	1,145	1,145	-	-	-	1,035	-	-	-	62,116	202	-
1b.3.4	Small tool allowance	-	94	-	-	-	-	-	14	108	108	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	1,047	94	106	285	-	363	-	373	2,268	2,268	-	-	-	1,035	-	-	-	62,116	202	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	1,459	-	-	-	-	-	-	365	1,824	1,824	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	394	39	434	434	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	2,996	300	3,295	3,295	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	522	-	-	-	-	-	130	652	652	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	131	-	-	-	-	-	20	151	151	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	18	10	-	55	-	17	99	99	-	-	-	857	-	-	-	17,148	28	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	405	61	465	465	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	172	17	189	189	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	555	56	611	-	611	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Cost	-	-	-	-	-	-	41	6	47	47	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	197	30	227	-	227	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	12	2	14	-	14	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	152	23	175	175	-	-	-	-	-	-	-	-	-	3,058
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	8,920	1,338	10,258	10,258	-	-	-	-	-	-	-	-	-	105,560
1b.4	Subtotal Period 1b Period-Dependent Costs	1,459	653	18	10	-	55	13,844	2,403	18,441	17,590	851	-	-	857	-	-	-	17,148	28	108,618
1b.0	TOTAL PERIOD 1b COST	8,246	747	124	295	-	418	13,844	5,646	29,320	28,469	851	-	-	1,893	-	-	-	79,265	87,805	108,618
PERIOD 1c - Preparations for SAFSTOR Dormancy																					
Period 1c Direct Decommissioning Activities																					
1c.1.1	Prepare support equipment for storage	-	486	-	-	-	-	-	73	559	559	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	48	-	-	-	-	-	7	55	55	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	10,874	-
1c.1.4	Secure building accesses									a											
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	78	12	89	89	-	-	-	-	-	-	-	-	-	583
1c.1	Subtotal Period 1c Activity Costs	-	534	-	-	-	-	811	312	1,657	1,657	-	-	-	-	-	-	-	-	14,574	583
Period 1c Collateral Costs																					
1c.3.1	Process decommissioning water waste	149	-	97	259	-	331	-	206	1,041	1,041	-	-	-	942	-	-	-	56,524	184	-
1c.3.3	Small tool allowance	-	4	-	-	-	-	-	1	5	5	-	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	149	4	97	259	-	331	-	206	1,046	1,046	-	-	-	942	-	-	-	56,524	184	-
Period 1c Period-Dependent Costs																					
1c.4.1	Insurance	-	-	-	-	-	-	399	40	439	439	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	3,029	303	3,331	3,331	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	191	-	-	-	-	-	48	239	239	-	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	133	-	-	-	-	-	20	153	153	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	3	2	-	10	-	3	18	18	-	-	-	154	-	-	-	3,073	5	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	409	61	471	471	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	174	17	191	191	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	561	56	618	-	618	-	-	-	-	-	-	-	-	-

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LaSalle County Station, Unit 1
Delayed DECON Decommissioning Cost Estimate
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Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes: Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 1c Period-Dependent Costs (continued)																					
1c.4.9	Site O&M Cost	-	-	-	-	-	-	42	6	48	48	-	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	199	30	229	-	229	-	-	-	-	-	-	-	-	-
1c.4.11	ISFSI Operating Costs	-	-	-	-	-	-	12	2	14	-	14	-	-	-	-	-	-	-	-	-
1c.4.12	Security Staff Cost	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	3,091
1c.4.13	Utility Staff Cost	-	-	-	-	-	-	9,018	1,353	10,371	10,371	-	-	-	-	-	-	-	-	-	106,720
1c.4	Subtotal Period 1c Period-Dependent Costs	-	324	3	2	-	10	13,996	1,962	16,297	15,436	861	-	-	154	-	-	-	3,073	5	109,811
1c.0	TOTAL PERIOD 1c COST	149	862	100	261	-	341	14,807	2,480	19,000	18,139	861	-	-	1,096	-	-	-	59,597	14,762	110,395
PERIOD 1 TOTALS		8,395	2,627	237	563	-	798	89,204	17,222	119,045	113,919	5,127	-	-	3,598	-	-	-	151,052	102,588	690,566
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	-	-	-	-	-	-	591	89	680	680	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	2,044	511	2,555	2,555	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	2,635	600	3,235	3,235	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																					
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	14,625	2,194	16,819	-	16,819	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	14,625	2,194	16,819	-	16,819	-	-	-	-	-	-	-	-	-
Period 2a Period-Dependent Costs																					
2a.4.1	Insurance	-	-	-	-	-	-	10,654	1,065	11,720	-	11,720	-	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	25,544	2,554	28,098	28,098	-	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	2,714	-	-	-	-	-	679	3,393	3,393	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	65	35	-	199	-	61	360	360	-	-	-	3,102	-	-	-	62,040	101	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	4,777	717	5,494	-	5,494	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	4,258	426	4,684	4,684	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	28,717	2,872	31,589	-	31,589	-	-	-	-	-	-	-	-	-
2a.4.8	Site O&M Cost	-	-	-	-	-	-	2,428	364	2,792	-	2,792	-	-	-	-	-	-	-	-	-
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	11,641	1,746	13,387	-	13,387	-	-	-	-	-	-	-	-	-
2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	703	105	808	-	808	-	-	-	-	-	-	-	-	-
2a.4.11	Security Staff Cost	-	-	-	-	-	-	43,509	6,526	50,035	-	50,035	-	-	-	-	-	-	-	-	817,313
2a.4.12	Utility Staff Cost	-	-	-	-	-	-	63,131	9,470	72,600	-	72,600	-	-	-	-	-	-	-	-	721,249
2a.4	Subtotal Period 2a Period-Dependent Costs	-	2,714	65	35	-	199	195,360	26,585	224,958	36,534	188,424	-	-	3,102	-	-	-	62,040	101	1,538,561
2a.0	TOTAL PERIOD 2a COST	-	2,714	65	35	-	199	212,621	29,379	245,012	39,769	205,243	-	-	3,102	-	-	-	62,040	101	1,538,561
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	-	-	-	-	-	-	141	21	162	162	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	487	122	609	609	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	628	143	771	771	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	4,250	638	4,888	-	4,888	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	4,250	638	4,888	-	4,888	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	2,319	232	2,551	-	2,551	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	1,752	175	1,927	-	1,927	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	319	-	-	-	-	-	80	398	398	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	8	4	-	23	-	7	42	42	-	-	-	362	-	-	-	7,245	12	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	569	85	655	-	655	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	968	97	1,065	1,065	-	-	-	-	-	-	-	-	-	-

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LaSalle County Station, Unit 1
Delayed DECON Decommissioning Cost Estimate
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Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes: Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 2b Period-Dependent Costs (continued)																					
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	6,844	684	7,528	-	7,528	-	-	-	-	-	-	-	-	-
2b.4.8	Site O&M Cost	-	-	-	-	-	-	579	87	665	-	665	-	-	-	-	-	-	-	-	-
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	167	25	193	-	193	-	-	-	-	-	-	-	-	-
2b.4.10	Security Staff Cost	-	-	-	-	-	-	5,593	839	6,433	-	6,433	-	-	-	-	-	-	-	-	98,743
2b.4.11	Utility Staff Cost	-	-	-	-	-	-	6,048	907	6,955	-	6,955	-	-	-	-	-	-	-	-	73,143
2b.4	Subtotal Period 2b Period-Dependent Costs	-	319	8	4	-	23	24,840	3,219	28,412	1,505	26,907	-	-	362	-	-	-	7,245	12	171,886
2b.0	TOTAL PERIOD 2b COST	-	319	8	4	-	23	29,718	3,999	34,070	2,276	31,794	-	-	362	-	-	-	7,245	12	171,886
PERIOD 2 TOTALS		-	3,033	72	39	-	222	242,338	33,378	279,082	42,045	237,037	-	-	3,464	-	-	-	69,285	113	1,710,447
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	1,300
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	614	92	706	706	-	-	-	-	-	-	-	-	-	4,600
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	133	20	153	153	-	-	-	-	-	-	-	-	-	1,000
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	1,300
3a.1.6	Define major work sequence	-	-	-	-	-	-	1,001	150	1,151	1,151	-	-	-	-	-	-	-	-	-	7,500
3a.1.7	Perform SER and EA	-	-	-	-	-	-	414	62	476	476	-	-	-	-	-	-	-	-	-	3,100
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	667	100	767	767	-	-	-	-	-	-	-	-	-	5,000
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	546	82	628	628	-	-	-	-	-	-	-	-	-	4,096
3a.1.10	Receive NRC approval of termination plan									a											
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	983	147	1,131	1,018	-	113	-	-	-	-	-	-	-	7,370
3a.1.11.2	Plant systems	-	-	-	-	-	-	556	83	639	575	-	64	-	-	-	-	-	-	-	4,167
3a.1.11.3	Reactor internals	-	-	-	-	-	-	947	142	1,089	1,089	-	-	-	-	-	-	-	-	-	7,100
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	867	130	997	997	-	-	-	-	-	-	-	-	-	6,500
3a.1.11.5	Sacrificial shield	-	-	-	-	-	-	67	10	77	77	-	-	-	-	-	-	-	-	-	500
3a.1.11.6	Moisture separators/reheaters	-	-	-	-	-	-	133	20	153	153	-	-	-	-	-	-	-	-	-	1,000
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	213	32	245	123	-	123	-	-	-	-	-	-	-	1,600
3a.1.11.8	Main Turbine	-	-	-	-	-	-	279	42	320	320	-	-	-	-	-	-	-	-	-	2,088
3a.1.11.9	Main Condensers	-	-	-	-	-	-	279	42	320	320	-	-	-	-	-	-	-	-	-	2,088
3a.1.11.10	Pressure suppression structure	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,000
3a.1.11.11	Drywell	-	-	-	-	-	-	213	32	245	245	-	-	-	-	-	-	-	-	-	1,600
3a.1.11.12	Plant structures & buildings	-	-	-	-	-	-	416	62	479	239	-	239	-	-	-	-	-	-	-	3,120
3a.1.11.13	Waste management	-	-	-	-	-	-	614	92	706	706	-	-	-	-	-	-	-	-	-	4,600
3a.1.11.14	Facility & site closeout	-	-	-	-	-	-	120	18	138	69	-	69	-	-	-	-	-	-	-	900
3a.1.11	Total	-	-	-	-	-	-	5,954	893	6,847	6,239	-	608	-	-	-	-	-	-	-	44,633
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	320	48	368	368	-	-	-	-	-	-	-	-	-	2,400
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	3,000	450	3,450	3,450	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	187	28	215	215	-	-	-	-	-	-	-	-	-	1,400
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,300	345	2,645	2,645	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	164	25	189	189	-	-	-	-	-	-	-	-	-	1,230
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	15,646	2,347	17,993	17,385	-	608	-	-	-	-	-	-	-	77,559
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	661	66	727	727	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	500	50	550	550	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	429	-	-	-	-	-	107	536	536	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	527	-	-	-	-	-	79	606	606	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	11	6	-	33	-	10	60	60	-	-	-	514	-	-	-	10,287	17	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	1,623	243	1,867	1,867	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	378	38	416	416	-	-	-	-	-	-	-	-	-	-
3a.4.8	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
3a.4.9	Security Staff Cost	-	-	-	-	-	-	3,631	545	4,176	4,176	-	-	-	-	-	-	-	-	-	65,179
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	21,866	3,280	25,146	25,146	-	-	-	-	-	-	-	-	-	258,629
3a.4	Subtotal Period 3a Period-Dependent Costs	-	956	11	6	-	33	28,825	4,443	34,273	34,273	-	-	-	514	-	-	-	10,287	17	323,807

Table D-1
LaSalle County Station, Unit 1
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
3a.0	TOTAL PERIOD 3a COST	-	956	11	6	-	33	44,471	6,790	52,266	51,658	-	608	-	514	-	-	-	10,287	17	401,366
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	631	95	726	653	-	73	-	-	-	-	-	-	-	4,733
3b.1.1.2	Reactor internals	-	-	-	-	-	-	534	80	614	614	-	-	-	-	-	-	-	-	-	4,000
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	180	27	207	52	-	155	-	-	-	-	-	-	-	1,350
3b.1.1.4	CRD housings & NIs	-	-	-	-	-	-	133	20	153	153	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.5	Incore instrumentation	-	-	-	-	-	-	133	20	153	153	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.6	Removal primary containment	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,000
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	484	73	557	557	-	-	-	-	-	-	-	-	-	3,630
3b.1.1.8	Facility closeout	-	-	-	-	-	-	160	24	184	92	-	92	-	-	-	-	-	-	-	1,200
3b.1.1.9	Sacrificial shield	-	-	-	-	-	-	160	24	184	184	-	-	-	-	-	-	-	-	-	1,200
3b.1.1.10	Reinforced concrete	-	-	-	-	-	-	133	20	153	77	-	77	-	-	-	-	-	-	-	1,000
3b.1.1.11	Main Turbine	-	-	-	-	-	-	277	42	319	319	-	-	-	-	-	-	-	-	-	2,080
3b.1.1.12	Main Condensers	-	-	-	-	-	-	279	42	320	320	-	-	-	-	-	-	-	-	-	2,088
3b.1.1.13	Moisture separators & reheaters	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,000
3b.1.1.14	Radwaste building	-	-	-	-	-	-	364	55	419	377	-	42	-	-	-	-	-	-	-	2,730
3b.1.1.15	Reactor building	-	-	-	-	-	-	364	55	419	377	-	42	-	-	-	-	-	-	-	2,730
3b.1.1	Total	-	-	-	-	-	-	4,368	655	5,023	4,542	-	480	-	-	-	-	-	-	-	32,741
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	4,368	655	5,023	4,542	-	480	-	-	-	-	-	-	-	32,741
Period 3b Additional Costs																					
3b.2.1	Site Characterization	-	-	-	-	-	-	6,502	1,951	8,453	8,453	-	-	-	-	-	-	-	-	30,500	10,852
3b.2	Subtotal Period 3b Additional Costs	-	-	-	-	-	-	6,502	1,951	8,453	8,453	-	-	-	-	-	-	-	-	30,500	10,852
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	883	-	-	-	-	-	-	132	1,015	1,015	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
3b.3.3	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	883	1,100	-	-	-	-	1,163	472	3,618	3,618	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	27	-	-	-	-	-	-	7	34	34	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	332	33	365	365	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	251	25	276	276	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	237	-	-	-	-	-	59	296	296	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	264	-	-	-	-	-	40	304	304	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	6	3	-	19	-	6	34	34	-	-	-	292	-	-	-	5,834	10	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	814	122	936	936	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	190	19	208	208	-	-	-	-	-	-	-	-	-	-
3b.4.9	Site O&M Cost	-	-	-	-	-	-	83	12	95	95	-	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	1,820	273	2,094	2,094	-	-	-	-	-	-	-	-	-	32,679
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	5,326	799	6,125	6,125	-	-	-	-	-	-	-	-	-	58,560
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	10,963	1,644	12,608	12,608	-	-	-	-	-	-	-	-	-	129,669
3b.4	Subtotal Period 3b Period-Dependent Costs	27	501	6	3	-	19	19,778	3,039	23,373	23,373	-	-	-	292	-	-	-	5,834	10	220,907
3b.0	TOTAL PERIOD 3b COST	910	1,601	6	3	-	19	31,811	6,117	40,467	39,987	-	480	-	292	-	-	-	5,834	30,510	264,500
PERIOD 3 TOTALS		910	2,557	17	9	-	52	76,282	12,907	92,734	91,645	-	1,089	-	806	-	-	-	16,121	30,526	665,866
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Recirculation System Piping & Valves	25	90	21	23	-	157	-	80	395	395	-	-	-	1,064	-	-	-	121,654	1,846	-
4a.1.1.2	Recirculation Pumps & Motors	13	51	16	41	-	273	-	95	488	488	-	-	-	2,594	-	-	-	211,420	1,136	-
4a.1.1.3	CRDMs & NIs Removal	56	1,138	605	124	-	420	-	497	2,840	2,840	-	-	-	5,536	-	-	-	325,500	18,886	-
4a.1.1.4	Reactor Vessel Internals	191	3,101	8,312	1,887	-	9,308	329	9,675	32,803	32,803	-	-	-	1,878	2,046	393	-	439,019	31,175	1,379
4a.1.1.5	Vessel & Internals GTCC Disposal	-	-	-	-	-	9,123	-	1,368	10,491	10,491	-	-	-	-	-	-	2,450	482,647	-	-

Table D-1
LaSalle County Station, Unit 1
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Nuclear Steam Supply System Removal (continued)																					
4a.1.1.6	Reactor Vessel	146	6,287	2,695	1,700	-	5,571	329	8,721	25,449	25,449	-	-	-	18,660	-	-	-	1,914,414	31,175	1,379
4a.1.1	Totals	431	10,667	11,649	3,774	-	24,852	657	20,436	72,466	72,466	-	-	-	29,733	2,046	393	2,450	3,494,654	84,218	2,758
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	547	3,165	1,736	-	8,822	-	2,919	17,190	17,190	-	-	-	131,716	-	-	-	6,838,856	8,523	-
4a.1.3	Main Condensers	-	1,070	2,256	1,238	-	6,288	-	2,251	13,102	13,102	-	-	-	93,880	-	-	-	4,874,376	16,783	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor Building	-	1,179	-	-	-	-	-	177	1,356	1,356	-	-	-	-	-	-	-	-	11,163	-
4a.1.4.2	Auxiliary Building	-	489	-	-	-	-	-	73	562	562	-	-	-	-	-	-	-	-	4,733	-
4a.1.4.3	Off Gas Building	-	85	-	-	-	-	-	13	97	97	-	-	-	-	-	-	-	-	920	-
4a.1.4.4	Turbine Building	-	705	-	-	-	-	-	106	811	811	-	-	-	-	-	-	-	-	7,337	-
4a.1.4	Totals	-	2,457	-	-	-	-	-	369	2,825	2,825	-	-	-	-	-	-	-	-	24,153	-
Disposal of Plant Systems																					
4a.1.5.1	Auxiliary Steam	-	124	29	16	-	81	-	57	307	307	-	-	-	1,201	-	-	-	62,558	1,924	-
4a.1.5.2	CSCS Equipment Cooling	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	122	-
4a.1.5.3	Circulating Water	-	208	-	-	-	-	-	31	239	-	-	239	-	-	-	-	-	-	3,464	-
4a.1.5.4	Circulating Water - RCA	-	258	66	33	-	169	-	118	644	644	-	-	-	2,504	-	-	-	130,688	3,946	-
4a.1.5.5	Clean Condensate Storage	-	99	-	-	-	-	-	15	114	-	-	114	-	-	-	-	-	-	1,677	-
4a.1.5.6	Clean Condensate Storage - RCA	-	29	4	2	-	10	-	10	55	55	-	-	-	146	-	-	-	7,618	428	-
4a.1.5.7	Condensate	-	978	550	324	-	1,644	-	759	4,254	4,254	-	-	-	24,478	-	-	-	1,274,330	16,244	-
4a.1.5.8	Condensate Booster	-	1,011	1,177	718	-	3,646	-	1,390	7,941	7,941	-	-	-	54,329	-	-	-	2,826,158	17,851	-
4a.1.5.9	Condensate Polishing Demineralizer	-	946	136	73	-	370	-	354	1,880	1,880	-	-	-	5,589	-	-	-	286,960	14,655	-
4a.1.5.10	Containment Combustible Gas Control	-	97	17	9	-	44	-	38	205	205	-	-	-	647	-	-	-	33,798	1,474	-
4a.1.5.11	Cycled Condensate Storage	-	311	55	31	-	156	-	127	680	680	-	-	-	2,327	-	-	-	121,304	4,862	-
4a.1.5.12	Drywell Instrument Nitrogen	-	71	15	8	-	41	-	31	165	165	-	-	-	620	-	-	-	31,995	1,100	-
4a.1.5.13	Extraction Steam	-	375	128	83	-	420	-	224	1,229	1,229	-	-	-	6,260	-	-	-	325,273	6,120	-
4a.1.5.14	Feedwater	-	621	315	197	-	999	-	466	2,598	2,598	-	-	-	14,903	-	-	-	774,516	10,284	-
4a.1.5.15	Feedwater Heater Vents & Drains	-	2,966	965	567	-	2,880	-	1,643	9,022	9,022	-	-	-	42,923	-	-	-	2,232,839	48,063	-
4a.1.5.16	Gland Steam	-	265	44	24	-	122	-	105	559	559	-	-	-	1,807	-	-	-	94,247	4,171	-
4a.1.5.17	HVAC-River\Lake Screen House	-	9	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	151	-
4a.1.5.18	HVAC-Service Building	-	14	-	-	-	-	-	2	16	-	-	16	-	-	-	-	-	-	221	-
4a.1.5.19	Hydrogen & Carbon Dioxide	-	126	29	15	-	79	-	56	306	306	-	-	-	1,168	-	-	-	60,856	1,940	-
4a.1.5.20	Main Steam	-	144	20	11	-	56	-	54	285	285	-	-	-	833	-	-	-	43,458	2,243	-
4a.1.5.21	Misc Bldgs Floor Drains	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	9	-
4a.1.5.22	Screen Wash	-	30	-	-	-	-	-	5	35	-	-	35	-	-	-	-	-	-	506	-
4a.1.5.23	Service Air	-	13	-	-	-	-	-	2	15	-	-	15	-	-	-	-	-	-	222	-
4a.1.5.24	Standby Gas Treatment	-	60	21	13	-	67	-	36	196	196	-	-	-	1,003	-	-	-	52,115	962	-
4a.1.5.25	Station Heat Recovery	-	289	53	27	-	137	-	116	622	622	-	-	-	2,028	-	-	-	105,836	4,428	-
4a.1.5.26	Switchgear Heat Removal	-	11	-	-	-	-	-	2	13	-	-	13	-	-	-	-	-	-	180	-
4a.1.5.27	Turbine Bldg Closed Cooling Water	-	545	206	110	-	558	-	313	1,731	1,731	-	-	-	8,298	-	-	-	432,636	8,724	-
4a.1.5.28	Turbine Building Equip Drains	-	101	22	13	-	67	-	46	249	249	-	-	-	993	-	-	-	51,593	1,596	-
4a.1.5.29	Turbine Building Floor Drains	-	39	4	2	-	10	-	13	68	68	-	-	-	146	-	-	-	7,632	606	-
4a.1.5.30	Turbine Generator	-	208	103	68	-	346	-	159	884	884	-	-	-	5,174	-	-	-	267,870	3,470	-
4a.1.5.31	Turbine Oil	-	617	138	82	-	419	-	285	1,542	1,542	-	-	-	6,488	-	-	-	324,845	9,769	-
4a.1.5	Totals	-	10,575	4,097	2,424	-	12,318	-	6,457	35,873	35,420	-	452	-	183,863	-	-	-	9,549,126	171,412	-
4a.1.6	Scaffolding in support of decommissioning	-	2,504	58	32	-	162	-	677	3,433	3,433	-	-	-	2,414	-	-	-	125,345	43,646	-
4a.1	Subtotal Period 4a Activity Costs	431	27,820	21,226	9,204	-	52,442	657	33,109	144,890	144,438	-	452	-	441,606	2,046	393	2,450	24,882,360	348,735	2,758
Period 4a Additional Costs																					
4a.2.1	Remedial Action Surveys	-	-	-	-	-	-	1,897	569	2,466	2,466	-	-	-	-	-	-	-	-	29,898	-
4a.2.2	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
4a.2.3	Operational Tools and Equipment	-	-	9	13	-	189	-	50	261	261	-	-	-	5,855	-	-	-	146,375	16	-
4a.2	Subtotal Period 4a Additional Costs	-	-	9	13	-	189	1,947	627	2,784	2,784	-	-	-	5,855	-	-	-	146,375	29,914	-
Period 4a Collateral Costs																					
4a.3.1	Process decommissioning water waste	12	-	11	30	-	38	-	21	112	112	-	-	-	109	-	-	-	6,558	21	-
4a.3.3	Small tool allowance	-	375	-	-	-	-	-	56	432	388	-	43	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	12	375	11	30	-	38	-	77	544	501	-	43	-	109	-	-	-	6,558	21	-

Table D-1
LaSalle County Station, Unit 1
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	78	-	-	-	-	-	-	20	98	98	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	962	96	1,058	1,058	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	727	73	800	720	-	80	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	2,427	-	-	-	-	-	607	3,033	3,033	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	2,944	-	-	-	-	-	442	3,386	3,386	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	142	77	-	435	-	134	788	788	-	-	-	6,797	-	-	-	135,947	222	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	2,244	337	2,580	2,580	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	878	88	966	966	-	-	-	-	-	-	-	-	-	-
4a.4.9	Site O&M Cost	-	-	-	-	-	-	240	36	276	276	-	-	-	-	-	-	-	-	-	-
4a.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	583	87	671	671	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	5,282	792	6,075	6,075	-	-	-	-	-	-	-	-	-	94,821
4a.4.12	DOC Staff Cost	-	-	-	-	-	-	18,428	2,764	21,192	21,192	-	-	-	-	-	-	-	-	-	209,366
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	32,094	4,814	36,908	36,908	-	-	-	-	-	-	-	-	-	379,286
4a.4	Subtotal Period 4a Period-Dependent Costs	78	5,371	142	77	-	435	61,438	10,290	77,830	77,750	-	80	-	6,797	-	-	-	135,947	222	683,473
4a.0	TOTAL PERIOD 4a COST	521	33,566	21,387	9,324	-	53,105	64,042	44,103	226,049	225,473	-	575	-	454,368	2,046	393	2,450	25,171,240	378,892	686,231
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
4b.1.1	Remove spent fuel racks	976	96	195	242	-	1,231	-	875	3,615	3,615	-	-	-	18,378	-	-	-	954,202	1,632	-
Disposal of Plant Systems																					
4b.1.2.1	Aux Diesel Bldg Floor Drains	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	86	-
4b.1.2.2	Auxiliary Diesel Generator	-	61	-	-	-	-	-	9	70	-	-	70	-	-	-	-	-	-	1,006	-
4b.1.2.3	Containment Monitoring	-	24	2	1	-	5	-	8	39	39	-	-	-	75	-	-	-	3,888	395	-
4b.1.2.4	Control Rod Drive	-	227	21	13	-	65	-	77	402	402	-	-	-	963	-	-	-	50,095	3,653	-
4b.1.2.5	Diesel Oil	-	51	-	-	-	-	-	8	59	-	-	59	-	-	-	-	-	-	823	-
4b.1.2.6	Electrical	-	322	-	-	-	-	-	48	371	-	-	371	-	-	-	-	-	-	5,201	-
4b.1.2.7	Electrical - Contaminated	-	773	104	69	-	352	-	302	1,600	1,600	-	-	-	5,260	-	-	-	273,105	12,036	-
4b.1.2.8	Electrical - RCA	-	5,255	985	635	-	3,225	-	2,314	12,414	12,414	-	-	-	48,150	-	-	-	2,499,995	81,135	-
4b.1.2.9	Fire Protection	-	139	-	-	-	-	-	21	160	-	-	160	-	-	-	-	-	-	2,339	-
4b.1.2.10	Fire Protection - RCA	-	760	182	95	-	485	-	344	1,867	1,867	-	-	-	7,210	-	-	-	375,999	11,689	-
4b.1.2.11	Fuel Pool Cooling & Cleanup	-	847	301	169	-	858	-	482	2,658	2,658	-	-	-	12,790	-	-	-	665,463	13,616	-
4b.1.2.12	HVAC-Auxiliary Building	-	235	54	36	-	185	-	116	626	626	-	-	-	2,759	-	-	-	143,239	3,337	-
4b.1.2.13	HVAC-Diesel Generator Room	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	127	-
4b.1.2.14	HVAC-Off Gas Building	-	23	4	3	-	15	-	10	56	56	-	-	-	227	-	-	-	11,772	332	-
4b.1.2.15	HVAC-Primary Containment	-	1,013	235	148	-	753	-	487	2,636	2,636	-	-	-	11,263	-	-	-	583,908	15,268	-
4b.1.2.16	HVAC-Radwaste Building	-	6	2	1	-	7	-	4	20	20	-	-	-	105	-	-	-	5,437	100	-
4b.1.2.17	HVAC-Turbine Building	-	868	174	117	-	592	-	400	2,151	2,151	-	-	-	8,842	-	-	-	459,063	12,212	-
4b.1.2.18	High Pressure Core Spray	-	366	200	112	-	567	-	270	1,514	1,514	-	-	-	8,429	-	-	-	439,323	6,022	-
4b.1.2.19	Instrument Air	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	94	-
4b.1.2.20	Instrument Air - RCA	-	155	18	8	-	41	-	52	274	274	-	-	-	609	-	-	-	31,863	2,413	-
4b.1.2.21	Low Pressure Core Spray	-	175	93	51	-	261	-	126	706	706	-	-	-	3,878	-	-	-	202,203	2,868	-
4b.1.2.22	Nuclear Boiler	-	1,781	604	369	-	1,876	-	1,030	5,661	5,661	-	-	-	27,962	-	-	-	1,454,480	29,004	-
4b.1.2.23	Off Gas	-	693	166	100	-	506	-	331	1,796	1,796	-	-	-	7,545	-	-	-	392,222	10,952	-
4b.1.2.24	Primary Containment Vent & Purge	-	473	219	145	-	734	-	345	1,916	1,916	-	-	-	10,959	-	-	-	569,165	7,859	-
4b.1.2.25	Process Radiation Monitoring	-	23	1	1	-	3	-	7	34	34	-	-	-	40	-	-	-	2,101	395	-
4b.1.2.26	Process Sampling	-	32	2	1	-	6	-	10	50	50	-	-	-	86	-	-	-	4,496	531	-
4b.1.2.27	Radioactive Waste Disposal	-	1,692	290	162	-	823	-	682	3,649	3,649	-	-	-	12,585	-	-	-	638,228	26,413	-
4b.1.2.28	Reactor Bldg Closed Cooling Water	-	391	291	153	-	778	-	344	1,957	1,957	-	-	-	11,570	-	-	-	602,953	6,573	-
4b.1.2.29	Reactor Building Equipment Drains	-	74	11	6	-	30	-	28	150	150	-	-	-	455	-	-	-	23,195	1,167	-
4b.1.2.30	Reactor Building Floor Drains	-	7	1	0	-	1	-	2	12	12	-	-	-	21	-	-	-	1,101	109	-
4b.1.2.31	Reactor Core Isolation Cooling	-	247	42	23	-	119	-	99	531	531	-	-	-	1,773	-	-	-	92,418	3,903	-
4b.1.2.32	Reactor Recirculation	-	46	4	2	-	10	-	15	77	77	-	-	-	148	-	-	-	7,742	738	-
4b.1.2.33	Reactor Water Clean-up	-	960	105	51	-	261	-	323	1,700	1,700	-	-	-	3,864	-	-	-	202,069	14,838	-
4b.1.2.34	Residual Heat Removal	-	1,795	932	529	-	2,689	-	1,294	7,239	7,239	-	-	-	40,005	-	-	-	2,084,289	29,708	-
4b.1.2.35	Service Air - RCA	-	269	37	17	-	87	-	95	504	504	-	-	-	1,283	-	-	-	67,085	4,079	-
4b.1.2.36	Service Water	-	57	-	-	-	-	-	9	65	-	-	65	-	-	-	-	-	-	938	-
4b.1.2.37	Service Water - RCA	-	785	286	164	-	832	-	458	2,526	2,526	-	-	-	12,398	-	-	-	645,252	12,468	-
4b.1.2.38	Standby Liquid Control	-	58	9	4	-	22	-	22	116	116	-	-	-	329	-	-	-	17,192	874	-
4b.1.2	Totals	-	20,703	5,376	3,186	-	16,189	-	10,173	55,627	54,880	-	747	-	241,581	-	-	-	12,549,340	325,300	-

Table D-1
LaSalle County Station, Unit 1
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
4b.1.3	Scaffolding in support of decommissioning	-	3,757	87	48	-	243	-	1,016	5,150	5,150	-	-	-	3,621	-	-	-	188,018	65,468	-
Decontamination of Site Buildings																					
4b.1.4.1	Reactor Building	3,002	3,635	413	608	-	2,137	-	3,077	12,872	12,872	-	-	-	37,278	-	-	-	2,247,209	99,275	-
4b.1.4.2	Auxiliary Building	336	67	4	14	-	36	-	196	654	654	-	-	-	628	-	-	-	50,818	6,145	-
4b.1.4.3	Off Gas Building	152	34	2	10	-	24	-	92	313	313	-	-	-	421	-	-	-	34,784	2,798	-
4b.1.4.4	Turbine Building	1,782	748	120	169	-	567	-	1,257	4,643	4,643	-	-	-	9,367	-	-	-	619,740	38,054	-
4b.1.4	Totals	5,272	4,484	538	801	-	2,765	-	4,622	18,483	18,483	-	-	-	47,694	-	-	-	2,952,550	146,272	-
4b.1	Subtotal Period 4b Activity Costs	6,248	29,038	6,197	4,277	-	20,427	-	16,687	82,875	82,128	-	747	-	311,274	-	-	-	16,644,110	538,673	-
Period 4b Additional Costs																					
4b.2.1	License Termination Survey Planning	-	-	-	-	-	-	983	295	1,277	1,277	-	-	-	-	-	-	-	-	-	6,240
4b.2.2	Remedial Action Surveys	-	-	-	-	-	-	3,393	1,018	4,410	4,410	-	-	-	-	-	-	-	-	53,475	-
4b.2.3	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
4b.2.4	License Termination ISFSI	-	231	336	442	-	1,502	1,700	1,053	5,264	5,264	-	-	-	24,629	-	-	-	1,947,877	9,942	5,274
4b.2.5	Underground Services Excavation	-	542	-	-	-	-	-	81	623	623	-	-	-	-	-	-	-	-	3,627	-
4b.2	Subtotal Period 4b Additional Costs	-	773	336	442	-	1,502	6,125	2,454	11,632	11,632	-	-	-	24,629	-	-	-	1,947,877	67,044	11,514
Period 4b Collateral Costs																					
4b.3.1	Process decommissioning water waste	34	-	35	93	-	119	-	64	345	345	-	-	-	339	-	-	-	20,320	66	-
4b.3.3	Small tool allowance	-	566	-	-	-	-	-	85	651	651	-	-	-	-	-	-	-	-	-	-
4b.3.4	Decommissioning Equipment Disposition	-	-	170	93	-	472	-	149	884	884	-	-	-	7,054	-	-	-	366,237	88	-
4b.3	Subtotal Period 4b Collateral Costs	34	566	204	186	-	591	-	298	1,880	1,880	-	-	-	7,392	-	-	-	386,558	154	-
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	1,584	-	-	-	-	-	-	396	1,980	1,980	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	1,701	170	1,871	1,871	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	1,285	129	1,414	1,414	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	3,875	-	-	-	-	-	969	4,843	4,843	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	5,155	-	-	-	-	-	773	5,928	5,928	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	189	102	-	580	-	179	1,051	1,051	-	-	-	9,063	-	-	-	181,258	296	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	3,132	470	3,602	3,602	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	1,553	155	1,708	1,708	-	-	-	-	-	-	-	-	-	-
4b.4.9	Site O&M Cost	-	-	-	-	-	-	424	64	488	488	-	-	-	-	-	-	-	-	-	-
4b.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	1,031	155	1,186	1,186	-	-	-	-	-	-	-	-	-	-
4b.4.11	Security Staff Cost	-	-	-	-	-	-	1,468	220	1,688	1,688	-	-	-	-	-	-	-	-	-	29,511
4b.4.12	DOC Staff Cost	-	-	-	-	-	-	20,847	3,127	23,974	23,974	-	-	-	-	-	-	-	-	-	252,189
4b.4.13	Utility Staff Cost	-	-	-	-	-	-	36,331	5,450	41,780	41,780	-	-	-	-	-	-	-	-	-	450,720
4b.4	Subtotal Period 4b Period-Dependent Costs	1,584	9,029	189	102	-	580	67,773	12,256	91,514	91,514	-	-	-	9,063	-	-	-	181,258	296	732,420
4b.0	TOTAL PERIOD 4b COST	7,866	39,407	6,926	5,007	-	23,101	73,898	31,695	187,900	187,153	-	747	-	352,359	-	-	-	19,159,800	606,167	743,934
PERIOD 4e - Delay before License Termination																					
Period 4e Period-Dependent Costs																					
4e.4.1	Insurance	-	-	-	-	-	-	982	98	1,080	1,080	-	-	-	-	-	-	-	-	-	-
4e.4.2	Property taxes	-	-	-	-	-	-	742	74	816	816	-	-	-	-	-	-	-	-	-	-
4e.4.3	Health physics supplies	-	131	-	-	-	-	-	33	164	164	-	-	-	-	-	-	-	-	-	-
4e.4.4	Disposal of DAW generated	-	-	3	2	-	9	-	3	17	17	-	-	-	148	-	-	-	2,960	5	-
4e.4.6	NRC Fees	-	-	-	-	-	-	377	38	414	414	-	-	-	-	-	-	-	-	-	-
4e.4.7	Site O&M Cost	-	-	-	-	-	-	245	37	282	282	-	-	-	-	-	-	-	-	-	-
4e.4.8	Utility Staff Cost	-	-	-	-	-	-	1,632	245	1,877	1,877	-	-	-	-	-	-	-	-	-	21,680
4e.4	Subtotal Period 4e Period-Dependent Costs	-	131	3	2	-	9	3,978	527	4,651	4,651	-	-	-	148	-	-	-	2,960	5	21,680
4e.0	TOTAL PERIOD 4e COST	-	131	3	2	-	9	3,978	527	4,651	4,651	-	-	-	148	-	-	-	2,960	5	21,680
PERIOD 4f - License Termination																					
Period 4f Direct Decommissioning Activities																					
4f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
4f.1.2	Terminate license									a											
4f.1	Subtotal Period 4f Activity Costs	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-

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Period 4f Additional Costs																					
4f.2.1	License Termination Survey	-	-	-	-	-	-	12,428	3,728	16,156	16,156	-	-	-	-	-	-	-	-	192,095	3,120
4f.2	Subtotal Period 4f Additional Costs	-	-	-	-	-	-	12,428	3,728	16,156	16,156	-	-	-	-	-	-	-	-	192,095	3,120
Period 4f Collateral Costs																					
4f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
4f.3	Subtotal Period 4f Collateral Costs	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
Period 4f Period-Dependent Costs																					
4f.4.1	Insurance	-	-	-	-	-	-	504	50	554	554	-	-	-	-	-	-	-	-	-	-
4f.4.2	Property taxes	-	-	-	-	-	-	381	38	419	419	-	-	-	-	-	-	-	-	-	-
4f.4.3	Health physics supplies	-	826	-	-	-	-	-	206	1,032	1,032	-	-	-	-	-	-	-	-	-	-
4f.4.4	Disposal of DAW generated	-	-	7	4	-	22	-	7	39	39	-	-	-	339	-	-	-	6,771	11	-
4f.4.5	Plant energy budget	-	-	-	-	-	-	247	37	284	284	-	-	-	-	-	-	-	-	-	-
4f.4.6	NRC Fees	-	-	-	-	-	-	460	46	506	506	-	-	-	-	-	-	-	-	-	-
4f.4.7	Site O&M Cost	-	-	-	-	-	-	126	19	144	144	-	-	-	-	-	-	-	-	-	-
4f.4.8	Security Staff Cost	-	-	-	-	-	-	686	103	789	789	-	-	-	-	-	-	-	-	-	11,914
4f.4.9	DOC Staff Cost	-	-	-	-	-	-	4,219	633	4,852	4,852	-	-	-	-	-	-	-	-	-	47,260
4f.4.10	Utility Staff Cost	-	-	-	-	-	-	5,177	777	5,953	5,953	-	-	-	-	-	-	-	-	-	57,586
4f.4	Subtotal Period 4f Period-Dependent Costs	-	826	7	4	-	22	11,800	1,916	14,574	14,574	-	-	-	339	-	-	-	6,771	11	116,760
4f.0	TOTAL PERIOD 4f COST	-	826	7	4	-	22	25,563	5,870	32,292	32,292	-	-	-	339	-	-	-	6,771	192,106	119,880
PERIOD 4 TOTALS		8,388	73,930	28,323	14,337	-	76,237	167,481	82,196	450,891	449,569	-	1,322	-	807,213	2,046	393	2,450	44,340,770	1,177,169	1,571,725
PERIOD 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	Reactor Building	-	6,786	-	-	-	-	-	1,018	7,803	-	-	7,803	-	-	-	-	-	-	64,472	-
5b.1.1.2	Auxiliary Building	-	4,423	-	-	-	-	-	663	5,087	-	-	5,087	-	-	-	-	-	-	43,048	-
5b.1.1.3	Diesel Generator Room	-	554	-	-	-	-	-	83	637	-	-	637	-	-	-	-	-	-	6,000	-
5b.1.1.4	Off Gas Building	-	772	-	-	-	-	-	116	888	-	-	888	-	-	-	-	-	-	8,484	-
5b.1.1.5	Turbine Building	-	6,492	-	-	-	-	-	974	7,466	-	-	7,466	-	-	-	-	-	-	68,584	-
5b.1.1.6	Turbine Pedestal	-	3,474	-	-	-	-	-	521	3,995	-	-	3,995	-	-	-	-	-	-	30,829	-
5b.1.1	Totals	-	22,501	-	-	-	-	-	3,375	25,876	-	-	25,876	-	-	-	-	-	-	221,416	-
Site Closeout Activities																					
5b.1.2	Grade & landscape site	-	198	-	-	-	-	-	30	228	-	-	228	-	-	-	-	-	-	499	-
5b.1.3	Final report to NRC	-	-	-	-	-	-	208	31	239	239	-	-	-	-	-	-	-	-	-	1,560
5b.1	Subtotal Period 5b Activity Costs	-	22,699	-	-	-	-	208	3,436	26,343	239	-	26,104	-	-	-	-	-	-	221,916	1,560
Period 5b Additional Costs																					
5b.2.1	Site Restoration ISFSI	-	655	-	-	-	-	28	102	785	-	-	785	-	-	-	-	-	-	6,995	80
5b.2.2	Concrete Crushing	-	845	-	-	-	-	4	127	976	-	-	976	-	-	-	-	-	-	3,936	-
5b.2	Subtotal Period 5b Additional Costs	-	1,500	-	-	-	-	32	230	1,761	-	-	1,761	-	-	-	-	-	-	10,930	80
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	248	-	-	-	-	-	37	285	-	-	285	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	248	-	-	-	-	-	37	285	-	-	285	-	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																					
5b.4.2	Property taxes	-	-	-	-	-	-	998	100	1,098	-	-	1,098	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	5,685	-	-	-	-	-	853	6,538	-	-	6,538	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	324	49	373	-	-	373	-	-	-	-	-	-	-	-
5b.4.5	Site O&M Cost	-	-	-	-	-	-	329	49	379	-	-	379	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	1,618	243	1,861	-	-	1,861	-	-	-	-	-	-	-	27,619
5b.4.7	DOC Staff Cost	-	-	-	-	-	-	10,124	1,519	11,642	-	-	11,642	-	-	-	-	-	-	-	110,391
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	5,084	763	5,847	-	-	5,847	-	-	-	-	-	-	-	54,154
5b.4	Subtotal Period 5b Period-Dependent Costs	-	5,685	-	-	-	-	18,477	3,574	27,737	-	-	27,737	-	-	-	-	-	-	-	192,164
5b.0	TOTAL PERIOD 5b COST	-	30,132	-	-	-	-	18,717	7,277	56,126	239	-	55,887	-	-	-	-	-	-	232,846	193,804

Table D-1
LaSalle County Station, Unit 1
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 5 TOTALS		-	30,132	-	-	-	-	18,717	7,277	56,126	239	-	55,887	-	-	-	-	-	-	232,846	193,804
TOTAL COST TO DECOMMISSION		**17,693**	**112,278**	**28,648**	**14,948**	**-**	**77,308**	**594,023**	**152,980**	**997,878**	**697,416**	**242,164**	**58,297**	**-**	**815,081**	**2,046**	**393**	**2,450**	**44,577,230**	**1,543,242**	**4,832,409**

TOTAL COST TO DECOMMISSION WITH 18.11% CONTINGENCY:	**$997,878**	**thousands of 2014 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 69.89% OR:	**$697,416**	**thousands of 2014 dollars**
SPENT FUEL MANAGEMENT COST IS 24.27% OR:	**$242,164**	**thousands of 2014 dollars**
NON-NUCLEAR DEMOLITION COST IS 5.84% OR:	**$58,297**	**thousands of 2014 dollars**
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	**817,520**	**cubic feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**2,450**	**cubic feet**
TOTAL SCRAP METAL REMOVED:	**51,861**	**tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,543,242**	**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
LaSalle County Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	481	144	625	625	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	73	11	84	84	-	-	-	-	-	-	-	-	-	545
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	-	-	-	-	-	-	112	17	129	129	-	-	-	-	-	-	-	-	-	838
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	73	11	84	84	-	-	-	-	-	-	-	-	-	545
1a.1.9	Perform detailed rad survey									a											
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	56	8	64	64	-	-	-	-	-	-	-	-	-	419
1a.1.11	End product description	-	-	-	-	-	-	56	8	64	64	-	-	-	-	-	-	-	-	-	419
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	84	13	96	96	-	-	-	-	-	-	-	-	-	629
1a.1.13	Define major work sequence	-	-	-	-	-	-	56	8	64	64	-	-	-	-	-	-	-	-	-	419
1a.1.14	Perform SER and EA	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	1,299
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	279	42	321	321	-	-	-	-	-	-	-	-	-	2,095
Activity Specifications																					
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	275	41	316	316	-	-	-	-	-	-	-	-	-	2,061
1a.1.16.2	Plant systems	-	-	-	-	-	-	233	35	268	268	-	-	-	-	-	-	-	-	-	1,746
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	174	26	201	201	-	-	-	-	-	-	-	-	-	1,307
1a.1.16.4	Waste management	-	-	-	-	-	-	112	17	129	129	-	-	-	-	-	-	-	-	-	838
1a.1.16.5	Facility and site dormancy	-	-	-	-	-	-	112	17	129	129	-	-	-	-	-	-	-	-	-	838
1a.1.16	Total	-	-	-	-	-	-	906	136	1,042	1,042	-	-	-	-	-	-	-	-	-	6,791
Detailed Work Procedures																					
1a.1.17.1	Plant systems	-	-	-	-	-	-	66	10	76	76	-	-	-	-	-	-	-	-	-	496
1a.1.17.2	Facility closeout & dormancy	-	-	-	-	-	-	67	10	77	77	-	-	-	-	-	-	-	-	-	503
1a.1.17	Total	-	-	-	-	-	-	133	20	153	153	-	-	-	-	-	-	-	-	-	999
1a.1.18	Procure vacuum drying system	-	-	-	-	-	-	6	1	6	6	-	-	-	-	-	-	-	-	-	42
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	-	-	-	-	-	-	2,487	445	2,932	2,932	-	-	-	-	-	-	-	-	-	15,038
Period 1a Additional Costs																					
1a.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	7,208	1,081	8,290	8,290	-	-	-	-	-	-	-	-	-	-
1a.2	Subtotal Period 1a Additional Costs	-	-	-	-	-	-	7,208	1,081	8,290	8,290	-	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	2,050	205	2,255	2,255	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	491	-	-	-	-	-	123	614	614	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	527	-	-	-	-	-	79	606	606	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	13	7	-	39	-	12	71	71	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,623	243	1,867	1,867	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	834	83	917	917	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	2,227	223	2,450	-	2,450	-	-	-	-	-	-	-	-	-
1a.4.9	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	791	119	910	-	910	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	48	7	55	-	55	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	8,222	1,233	9,455	9,455	-	-	-	-	-	-	-	-	-	157,471
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	35,778	5,367	41,144	41,144	-	-	-	-	-	-	-	-	-	423,400
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,018	13	7	-	39	51,737	7,719	60,533	57,118	3,415	-	-	610	-	-	-	12,190	20	580,871
1a.0	TOTAL PERIOD 1a COST	-	1,018	13	7	-	39	61,433	9,245	71,754	68,339	3,415	-	-	610	-	-	-	12,190	20	595,909

Table D-2
LaSalle County Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1b - SAFSTOR Limited DECON Activities																					
Period 1b Direct Decommissioning Activities																					
Decontamination of Site Buildings																					
1b.1.1.1	Reactor Building	3,298	-	-	-	-	-	-	1,649	4,947	4,947	-	-	-	-	-	-	-	49,197	-
1b.1.1.2	Auxiliary Building	1,619	-	-	-	-	-	-	809	2,428	2,428	-	-	-	-	-	-	-	24,021	-
1b.1.1.3	IRSF Building	78	-	-	-	-	-	-	39	117	117	-	-	-	-	-	-	-	1,210	-
1b.1.1.4	Service Building	108	-	-	-	-	-	-	54	163	163	-	-	-	-	-	-	-	1,692	-
1b.1.1.5	Solid Radwaste Building	487	-	-	-	-	-	-	244	731	731	-	-	-	-	-	-	-	7,355	-
1b.1.1.6	Turbine Building	1,739	-	-	-	-	-	-	870	2,609	2,609	-	-	-	-	-	-	-	27,018	-
1b.1.1	Totals	7,330	-	-	-	-	-	-	3,665	10,996	10,996	-	-	-	-	-	-	-	110,493	-
1b.1	Subtotal Period 1b Activity Costs	7,330	-	-	-	-	-	-	3,665	10,996	10,996	-	-	-	-	-	-	-	110,493	-
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	883	-	-	-	-	-	-	132	1,015	1,015	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process decommissioning water waste	192	-	125	335	-	426	-	265	1,343	1,343	-	-	-	1,215	-	-	-	72,882	237	-
1b.3.4	Small tool allowance	-	120	-	-	-	-	-	18	139	139	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	1,075	120	125	335	-	426	-	416	2,497	2,497	-	-	-	1,215	-	-	-	72,882	237	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	1,643	-	-	-	-	-	-	411	2,054	2,054	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	394	39	434	434	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	2,996	300	3,295	3,295	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	626	-	-	-	-	-	157	783	783	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	131	-	-	-	-	-	20	151	151	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	18	10	-	56	-	17	102	102	-	-	-	876	-	-	-	17,516	29	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	405	61	465	465	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	116	12	128	128	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	555	56	611	-	611	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Cost	-	-	-	-	-	-	41	6	47	47	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	197	30	227	-	227	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	12	2	14	-	14	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	2,050	307	2,357	2,357	-	-	-	-	-	-	-	-	-	39,260
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	8,920	1,338	10,258	10,258	-	-	-	-	-	-	-	-	-	105,560
1b.4	Subtotal Period 1b Period-Dependent Costs	1,643	757	18	10	-	56	15,686	2,754	20,925	20,074	851	-	-	876	-	-	-	17,516	29	144,820
1b.0	TOTAL PERIOD 1b COST	10,049	878	143	344	-	482	15,686	6,835	34,418	33,566	851	-	-	2,091	-	-	-	90,398	110,759	144,820
PERIOD 1c - Preparations for SAFSTOR Dormancy																					
Period 1c Direct Decommissioning Activities																					
1c.1.1	Prepare support equipment for storage	-	486	-	-	-	-	-	73	559	559	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	48	-	-	-	-	-	7	55	55	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	10,874	-
1c.1.4	Secure building accesses									a											
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	33	5	37	37	-	-	-	-	-	-	-	-	-	244
1c.1	Subtotal Period 1c Activity Costs	-	534	-	-	-	-	765	305	1,605	1,605	-	-	-	-	-	-	-	-	14,574	244
Period 1c Collateral Costs																					
1c.3.1	Process decommissioning water waste	149	-	97	259	-	331	-	206	1,041	1,041	-	-	-	942	-	-	-	56,524	184	-
1c.3.3	Small tool allowance	-	4	-	-	-	-	-	1	5	5	-	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	149	4	97	259	-	331	-	206	1,046	1,046	-	-	-	942	-	-	-	56,524	184	-
Period 1c Period-Dependent Costs																					
1c.4.1	Insurance	-	-	-	-	-	-	399	40	439	439	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	3,029	303	3,331	3,331	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	191	-	-	-	-	-	48	239	239	-	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	133	-	-	-	-	-	20	153	153	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	3	2	-	10	-	3	18	18	-	-	-	154	-	-	-	3,073	5	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	409	61	471	471	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	117	12	129	129	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	561	56	618	-	618	-	-	-	-	-	-	-	-	-

Table D-2
LaSalle County Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 1c Period-Dependent Costs (continued)																					
1c.4.9	Site O&M Cost	-	-	-	-	-	-	42	6	48	48	-	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	199	30	229	-	229	-	-	-	-	-	-	-	-	-
1c.4.11	ISFSI Operating Costs	-	-	-	-	-	-	12	2	14	-	14	-	-	-	-	-	-	-	-	-
1c.4.12	Security Staff Cost	-	-	-	-	-	-	2,072	311	2,383	2,383	-	-	-	-	-	-	-	-	-	39,691
1c.4.13	Utility Staff Cost	-	-	-	-	-	-	9,018	1,353	10,371	10,371	-	-	-	-	-	-	-	-	-	106,720
1c.4	Subtotal Period 1c Period-Dependent Costs	-	324	3	2	-	10	15,858	2,244	18,441	17,580	861	-	-	154	-	-	-	3,073	5	146,411
1c.0	TOTAL PERIOD 1c COST	149	862	100	261	-	341	16,624	2,755	21,092	20,231	861	-	-	1,096	-	-	-	59,597	14,762	146,656
PERIOD 1 TOTALS		10,197	2,758	255	613	-	862	93,743	18,836	127,264	122,137	5,127	-	-	3,796	-	-	-	162,185	125,541	887,385
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	-	-	-	-	-	-	2,622	393	3,015	3,015	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	2,039	510	2,548	2,548	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	4,661	903	5,564	5,564	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																					
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	14,625	2,194	16,819	-	16,819	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	14,625	2,194	16,819	-	16,819	-	-	-	-	-	-	-	-	-
Period 2a Period-Dependent Costs																					
2a.4.1	Insurance	-	-	-	-	-	-	10,627	1,063	11,690	10,677	1,013	-	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	25,523	2,552	28,075	28,075	-	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	2,707	-	-	-	-	-	677	3,384	3,384	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	64	35	-	198	-	61	359	359	-	-	-	3,094	-	-	-	61,879	101	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	4,765	715	5,480	2,740	2,740	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	3,901	390	4,291	4,291	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	28,642	2,864	31,506	-	31,506	-	-	-	-	-	-	-	-	-
2a.4.8	Site O&M Cost	-	-	-	-	-	-	2,421	363	2,784	2,784	-	-	-	-	-	-	-	-	-	-
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	11,610	1,742	13,352	-	13,352	-	-	-	-	-	-	-	-	-
2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	701	105	806	-	806	-	-	-	-	-	-	-	-	-
2a.4.11	Security Staff Cost	-	-	-	-	-	-	43,395	6,509	49,905	16,414	33,490	-	-	-	-	-	-	-	-	815,182
2a.4.12	Utility Staff Cost	-	-	-	-	-	-	62,966	9,445	72,411	17,607	54,804	-	-	-	-	-	-	-	-	719,369
2a.4	Subtotal Period 2a Period-Dependent Costs	-	2,707	64	35	-	198	194,552	26,486	224,042	86,331	137,711	-	-	3,094	-	-	-	61,879	101	1,534,551
2a.0	TOTAL PERIOD 2a COST	-	2,707	64	35	-	198	213,838	29,583	246,425	91,895	154,530	-	-	3,094	-	-	-	61,879	101	1,534,551
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	-	-	-	-	-	-	336	50	386	386	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	261	65	326	326	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	597	116	712	712	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	4,250	638	4,888	-	4,888	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	4,250	638	4,888	-	4,888	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	1,243	124	1,367	1,367	-	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	939	94	1,033	1,033	-	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	171	-	-	-	-	-	43	213	213	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	4	2	-	12	-	4	23	23	-	-	-	194	-	-	-	3,883	6	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	305	46	351	351	-	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	481	48	529	529	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	3,668	367	4,035	-	4,035	-	-	-	-	-	-	-	-	-
2b.4.8	Site O&M Cost	-	-	-	-	-	-	310	47	357	357	-	-	-	-	-	-	-	-	-	-

Table D-2
LaSalle County Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 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 2b Period-Dependent Costs (continued)																					
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	90	13	103	-	103	-	-	-	-	-	-	-	-	-
2b.4.10	Security Staff Cost	-	-	-	-	-	-	2,998	450	3,447	2,102	1,345	-	-	-	-	-	-	-	-	52,920
2b.4.11	Utility Staff Cost	-	-	-	-	-	-	3,241	486	3,728	2,255	1,473	-	-	-	-	-	-	-	-	39,200
2b.4	Subtotal Period 2b Period-Dependent Costs	-	171	4	2	-	12	13,275	1,721	15,185	8,229	6,956	-	-	194	-	-	-	3,883	6	92,120
2b.0	TOTAL PERIOD 2b COST	-	171	4	2	-	12	18,121	2,474	20,785	8,941	11,844	-	-	194	-	-	-	3,883	6	92,120
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	-	-	-	-	-	-	260	39	299	299	-	-	-	-	-	-	-	-	-	-
2c.1.5	Maintenance supplies	-	-	-	-	-	-	202	51	253	253	-	-	-	-	-	-	-	-	-	-
2c.1	Subtotal Period 2c Activity Costs	-	-	-	-	-	-	462	90	551	551	-	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	962	96	1,058	1,058	-	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	727	73	800	800	-	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	128	-	-	-	-	-	32	160	160	-	-	-	-	-	-	-	-	-	-
2c.4.4	Disposal of DAW generated	-	-	3	2	-	9	-	3	17	17	-	-	-	144	-	-	-	2,879	5	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	236	35	272	272	-	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	358	36	394	394	-	-	-	-	-	-	-	-	-	-
2c.4.7	Site O&M Cost	-	-	-	-	-	-	240	36	276	276	-	-	-	-	-	-	-	-	-	-
2c.4.8	Security Staff Cost	-	-	-	-	-	-	1,415	212	1,627	1,627	-	-	-	-	-	-	-	-	-	22,757
2c.4.9	Utility Staff Cost	-	-	-	-	-	-	1,518	228	1,745	1,745	-	-	-	-	-	-	-	-	-	19,359
2c.4	Subtotal Period 2c Period-Dependent Costs	-	128	3	2	-	9	5,456	751	6,349	6,349	-	-	-	144	-	-	-	2,879	5	42,116
2c.0	TOTAL PERIOD 2c COST	-	128	3	2	-	9	5,918	840	6,900	6,900	-	-	-	144	-	-	-	2,879	5	42,116
PERIOD 2 TOTALS		-	3,006	71	39	-	220	237,877	32,898	274,110	107,736	166,374	-	-	3,432	-	-	-	68,640	112	1,668,787
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	73	11	84	84	-	-	-	-	-	-	-	-	-	545
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	1,927
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	56	8	64	64	-	-	-	-	-	-	-	-	-	419
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	73	11	84	84	-	-	-	-	-	-	-	-	-	545
3a.1.6	Define major work sequence	-	-	-	-	-	-	419	63	482	482	-	-	-	-	-	-	-	-	-	3,143
3a.1.7	Perform SER and EA	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	1,299
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	279	42	321	321	-	-	-	-	-	-	-	-	-	2,095
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	229	34	263	263	-	-	-	-	-	-	-	-	-	1,716
3a.1.10	Receive NRC approval of termination plan									a											
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	412	62	474	426	-	47	-	-	-	-	-	-	-	3,088
3a.1.11.2	Plant systems	-	-	-	-	-	-	233	35	268	241	-	27	-	-	-	-	-	-	-	1,746
3a.1.11.3	Reactor internals	-	-	-	-	-	-	397	60	456	456	-	-	-	-	-	-	-	-	-	2,975
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	363	54	418	418	-	-	-	-	-	-	-	-	-	2,724
3a.1.11.5	Sacrificial shield	-	-	-	-	-	-	28	4	32	32	-	-	-	-	-	-	-	-	-	210
3a.1.11.6	Moisture separators/reheaters	-	-	-	-	-	-	56	8	64	64	-	-	-	-	-	-	-	-	-	419
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	89	13	103	51	-	51	-	-	-	-	-	-	-	670
3a.1.11.8	Main Turbine	-	-	-	-	-	-	117	18	134	134	-	-	-	-	-	-	-	-	-	875
3a.1.11.9	Main Condensers	-	-	-	-	-	-	117	18	134	134	-	-	-	-	-	-	-	-	-	875
3a.1.11.10	Pressure suppression structure	-	-	-	-	-	-	112	17	129	129	-	-	-	-	-	-	-	-	-	838
3a.1.11.11	Drywell	-	-	-	-	-	-	89	13	103	103	-	-	-	-	-	-	-	-	-	670
3a.1.11.12	Plant structures & buildings	-	-	-	-	-	-	174	26	201	100	-	100	-	-	-	-	-	-	-	1,307
3a.1.11.13	Waste management	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	1,927
3a.1.11.14	Facility & site closeout	-	-	-	-	-	-	50	8	58	29	-	29	-	-	-	-	-	-	-	377
3a.1.11	Total	-	-	-	-	-	-	2,495	374	2,869	2,614	-	255	-	-	-	-	-	-	-	18,701

Table D-2
LaSalle County Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	134	20	154	154	-	-	-	-	-	-	-	-	-	1,006
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	3,000	450	3,450	3,450	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	78	12	90	90	-	-	-	-	-	-	-	-	-	587
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,300	345	2,645	2,645	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	69	10	79	79	-	-	-	-	-	-	-	-	-	515
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	9,635	1,445	11,080	10,826	-	255	-	-	-	-	-	-	-	32,497
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	661	66	727	727	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	500	50	550	550	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	407	-	-	-	-	-	102	509	509	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	527	-	-	-	-	-	79	606	606	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	10	5	-	31	-	10	56	56	-	-	-	481	-	-	-	9,613	16	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	1,623	243	1,867	1,867	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	332	33	366	366	-	-	-	-	-	-	-	-	-	-
3a.4.8	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
3a.4.9	Security Staff Cost	-	-	-	-	-	-	311	47	358	358	-	-	-	-	-	-	-	-	-	6,257
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	16,174	2,426	18,600	18,600	-	-	-	-	-	-	-	-	-	200,229
3a.4	Subtotal Period 3a Period-Dependent Costs	-	934	10	5	-	31	19,766	3,081	23,827	23,827	-	-	-	481	-	-	-	9,613	16	206,486
3a.0	TOTAL PERIOD 3a COST	-	934	10	5	-	31	29,401	4,526	34,907	34,653	-	255	-	481	-	-	-	9,613	16	238,983
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	265	40	304	274	-	30	-	-	-	-	-	-	-	1,983
3b.1.1.2	Reactor internals	-	-	-	-	-	-	224	34	257	257	-	-	-	-	-	-	-	-	-	1,676
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	75	11	87	22	-	65	-	-	-	-	-	-	-	566
3b.1.1.4	CRD housings & NIs	-	-	-	-	-	-	56	8	64	64	-	-	-	-	-	-	-	-	-	419
3b.1.1.5	Incore instrumentation	-	-	-	-	-	-	56	8	64	64	-	-	-	-	-	-	-	-	-	419
3b.1.1.6	Removal primary containment	-	-	-	-	-	-	112	17	129	129	-	-	-	-	-	-	-	-	-	838
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	203	30	233	233	-	-	-	-	-	-	-	-	-	1,521
3b.1.1.8	Facility closeout	-	-	-	-	-	-	67	10	77	39	-	39	-	-	-	-	-	-	-	503
3b.1.1.9	Sacrificial shield	-	-	-	-	-	-	67	10	77	77	-	-	-	-	-	-	-	-	-	503
3b.1.1.10	Reinforced concrete	-	-	-	-	-	-	56	8	64	32	-	32	-	-	-	-	-	-	-	419
3b.1.1.11	Main Turbine	-	-	-	-	-	-	116	17	134	134	-	-	-	-	-	-	-	-	-	872
3b.1.1.12	Main Condensers	-	-	-	-	-	-	117	18	134	134	-	-	-	-	-	-	-	-	-	875
3b.1.1.13	Moisture separators & reheaters	-	-	-	-	-	-	112	17	129	129	-	-	-	-	-	-	-	-	-	838
3b.1.1.14	Radwaste building	-	-	-	-	-	-	153	23	175	158	-	18	-	-	-	-	-	-	-	1,144
3b.1.1.15	Reactor building	-	-	-	-	-	-	153	23	175	158	-	18	-	-	-	-	-	-	-	1,144
3b.1.1	Total	-	-	-	-	-	-	1,830	275	2,105	1,903	-	201	-	-	-	-	-	-	-	13,718
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	1,830	275	2,105	1,903	-	201	-	-	-	-	-	-	-	13,718
Period 3b Additional Costs																					
3b.2.1	Site Characterization	-	-	-	-	-	-	2,724	817	3,542	3,542	-	-	-	-	-	-	-	-	12,779	4,547
3b.2	Subtotal Period 3b Additional Costs	-	-	-	-	-	-	2,724	817	3,542	3,542	-	-	-	-	-	-	-	-	12,779	4,547
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	883	-	-	-	-	-	-	132	1,015	1,015	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
3b.3.3	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	883	1,100	-	-	-	-	1,163	472	3,618	3,618	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	27	-	-	-	-	-	-	7	34	34	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	332	33	365	365	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	251	25	276	276	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	220	-	-	-	-	-	55	275	275	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	264	-	-	-	-	-	40	304	304	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	6	3	-	17	-	5	31	31	-	-	-	266	-	-	-	5,315	9	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	814	122	936	936	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	167	17	183	183	-	-	-	-	-	-	-	-	-	-
3b.4.9	Site O&M Cost	-	-	-	-	-	-	83	12	95	95	-	-	-	-	-	-	-	-	-	-

Table D-2
LaSalle County Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 3b Period-Dependent Costs (continued)																					
3b.4.10	Security Staff Cost	-	-	-	-	-	-	156	23	179	179	-	-	-	-	-	-	-	-	-	3,137
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	3,658	549	4,207	4,207	-	-	-	-	-	-	-	-	-	42,874
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	8,109	1,216	9,325	9,325	-	-	-	-	-	-	-	-	-	100,389
3b.4	Subtotal Period 3b Period-Dependent Costs	27	484	6	3	-	17	13,568	2,105	16,210	16,210	-	-	-	266	-	-	-	5,315	9	146,400
3b.0	TOTAL PERIOD 3b COST	910	1,584	6	3	-	17	19,286	3,668	25,474	25,273	-	201	-	266	-	-	-	5,315	12,788	164,666
PERIOD 3 TOTALS		910	2,518	16	8	-	48	48,688	8,194	60,382	59,926	-	456	-	746	-	-	-	14,927	12,803	403,648
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Recirculation System Piping & Valves	25	90	21	23	-	157	-	80	395	395	-	-	-	1,064	-	-	-	121,654	1,846	-
4a.1.1.2	Recirculation Pumps & Motors	13	51	16	41	-	273	-	95	488	488	-	-	-	2,594	-	-	-	211,420	1,136	-
4a.1.1.3	CRDMs & NIs Removal	56	1,138	605	124	-	420	-	497	2,840	2,840	-	-	-	5,536	-	-	-	325,500	18,886	-
4a.1.1.4	Reactor Vessel Internals	191	3,101	8,312	1,887	-	9,386	329	9,713	32,919	32,919	-	-	-	1,878	1,753	686	-	439,019	31,175	1,379
4a.1.1.5	Vessel & Internals GTCC Disposal	-	-	-	-	-	9,123	-	1,368	10,491	10,491	-	-	-	-	-	-	2,450	482,647	-	-
4a.1.1.6	Reactor Vessel	146	6,287	2,695	1,700	-	5,571	329	8,721	25,449	25,449	-	-	-	18,660	-	-	-	1,914,414	31,175	1,379
4a.1.1	Totals	431	10,667	11,649	3,774	-	24,929	657	20,475	72,582	72,582	-	-	-	29,733	1,753	686	2,450	3,494,654	84,218	2,758
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	547	3,165	1,736	-	8,822	-	2,919	17,190	17,190	-	-	-	131,716	-	-	-	6,838,856	8,523	-
4a.1.3	Main Condensers	-	1,070	2,256	1,238	-	6,288	-	2,251	13,102	13,102	-	-	-	93,880	-	-	-	4,874,376	16,783	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor Building	-	1,181	-	-	-	-	-	177	1,358	1,358	-	-	-	-	-	-	-	-	11,181	-
4a.1.4.2	Auxiliary Building	-	488	-	-	-	-	-	73	561	561	-	-	-	-	-	-	-	-	4,723	-
4a.1.4.3	IRSF Building	-	88	-	-	-	-	-	13	101	101	-	-	-	-	-	-	-	-	939	-
4a.1.4.4	Service Building	-	188	-	-	-	-	-	28	216	216	-	-	-	-	-	-	-	-	2,230	-
4a.1.4.5	Solid Radwaste Building	-	268	-	-	-	-	-	40	309	309	-	-	-	-	-	-	-	-	2,559	-
4a.1.4.6	Turbine Building	-	705	-	-	-	-	-	106	811	811	-	-	-	-	-	-	-	-	7,337	-
4a.1.4	Totals	-	2,917	-	-	-	-	-	438	3,355	3,355	-	-	-	-	-	-	-	-	28,970	-
Disposal of Plant Systems																					
4a.1.5.1	Acid & Caustic	-	20	-	-	-	-	-	3	23	-	-	23	-	-	-	-	-	-	317	-
4a.1.5.2	Auxiliary Steam	-	350	89	49	-	250	-	166	903	903	-	-	-	3,727	-	-	-	193,777	5,415	-
4a.1.5.3	CSCS Equipment Cooling	-	9	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	141	-
4a.1.5.4	Chemical Feed	-	40	-	-	-	-	-	6	46	-	-	46	-	-	-	-	-	-	638	-
4a.1.5.5	Circulating Water	-	188	-	-	-	-	-	28	216	-	-	216	-	-	-	-	-	-	3,125	-
4a.1.5.6	Circulating Water - RCA	-	250	48	24	-	122	-	101	546	546	-	-	-	1,808	-	-	-	94,406	3,771	-
4a.1.5.7	Clean Condensate Storage	-	174	-	-	-	-	-	26	201	-	-	201	-	-	-	-	-	-	2,875	-
4a.1.5.8	Clean Condensate Storage - RCA	-	77	12	6	-	28	-	28	151	151	-	-	-	415	-	-	-	21,698	1,158	-
4a.1.5.9	Condensate	-	838	510	298	-	1,515	-	684	3,845	3,845	-	-	-	22,553	-	-	-	1,174,271	13,994	-
4a.1.5.10	Condensate Booster	-	946	1,158	705	-	3,583	-	1,354	7,746	7,746	-	-	-	53,399	-	-	-	2,777,870	16,796	-
4a.1.5.11	Condensate Polishing Demineralizer	-	938	137	73	-	370	-	352	1,870	1,870	-	-	-	5,591	-	-	-	287,088	14,495	-
4a.1.5.12	Containment Combustible Gas Control	-	79	14	7	-	37	-	31	168	168	-	-	-	546	-	-	-	28,517	1,194	-
4a.1.5.13	Cycled Condensate Storage	-	560	139	84	-	428	-	273	1,485	1,485	-	-	-	6,560	-	-	-	331,736	8,922	-
4a.1.5.14	Drywell Instrument Nitrogen	-	68	14	8	-	39	-	29	158	158	-	-	-	588	-	-	-	30,320	1,076	-
4a.1.5.15	Extraction Steam	-	308	110	71	-	360	-	189	1,038	1,038	-	-	-	5,368	-	-	-	278,932	5,043	-
4a.1.5.16	Feedwater	-	532	293	183	-	932	-	423	2,364	2,364	-	-	-	13,899	-	-	-	722,425	8,849	-
4a.1.5.17	Feedwater Heater Vents & Drains	-	2,460	868	506	-	2,570	-	1,420	7,823	7,823	-	-	-	38,293	-	-	-	1,992,119	39,957	-
4a.1.5.18	Gland Steam	-	220	39	21	-	108	-	89	477	477	-	-	-	1,606	-	-	-	83,540	3,457	-
4a.1.5.19	HVAC-Machine Shop\TB Sandblast	-	34	5	3	-	17	-	14	74	74	-	-	-	258	-	-	-	13,382	538	-
4a.1.5.20	HVAC-River\Lake Screen House	-	24	-	-	-	-	-	4	28	-	-	28	-	-	-	-	-	-	422	-
4a.1.5.21	HVAC-Service Building	-	64	-	-	-	-	-	10	73	-	-	73	-	-	-	-	-	-	1,072	-
4a.1.5.22	Hydrogen & Carbon Dioxide	-	43	-	-	-	-	-	6	49	-	-	49	-	-	-	-	-	-	708	-
4a.1.5.23	Lake Makeup & Blowdown	-	254	-	-	-	-	-	38	292	-	-	292	-	-	-	-	-	-	4,257	-
4a.1.5.24	Main Steam	-	119	18	10	-	50	-	46	242	242	-	-	-	745	-	-	-	38,834	1,853	-
4a.1.5.25	Makeup Demineralizer	-	726	174	104	-	529	-	347	1,880	1,880	-	-	-	8,181	-	-	-	410,165	11,537	-
4a.1.5.26	Misc Bldgs Floor Drains	-	1,324	284	143	-	726	-	562	3,040	3,040	-	-	-	10,783	-	-	-	562,851	20,035	-
4a.1.5.27	Refrigeration	-	66	-	-	-	-	-	10	76	-	-	76	-	-	-	-	-	-	1,110	-
4a.1.5.28	Refrigeration - RCA	-	46	7	3	-	16	-	17	88	88	-	-	-	237	-	-	-	12,405	681	-
4a.1.5.29	Screen Wash	-	24	-	-	-	-	-	4	28	-	-	28	-	-	-	-	-	-	407	-

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LaSalle County Station, Unit 2
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(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
4a.1.5.30	Service Air	-	26	-	-	-	-	-	4	30	-	-	30	-	-	-	-	-	-	427	-
4a.1.5.31	Sewage Treatment	-	104	-	-	-	-	-	16	120	-	-	120	-	-	-	-	-	-	1,741	-
4a.1.5.32	Standby Gas Treatment	-	49	18	11	-	58	-	30	166	166	-	-	-	862	-	-	-	44,774	787	-
4a.1.5.33	Station Heat Recovery	-	669	254	130	-	661	-	377	2,091	2,091	-	-	-	9,845	-	-	-	512,043	10,593	-
4a.1.5.34	Switchgear Heat Removal	-	11	-	-	-	-	-	2	13	-	-	13	-	-	-	-	-	-	180	-
4a.1.5.35	Turbine Bldg Closed Cooling Water	-	481	197	105	-	534	-	289	1,606	1,606	-	-	-	7,935	-	-	-	413,833	7,723	-
4a.1.5.36	Turbine Building Equipment Drains	-	85	19	11	-	58	-	39	212	212	-	-	-	862	-	-	-	44,802	1,338	-
4a.1.5.37	Turbine Building Floor Drains	-	86	9	4	-	21	-	28	149	149	-	-	-	315	-	-	-	16,508	1,329	-
4a.1.5.38	Turbine Generator	-	249	115	76	-	384	-	181	1,005	1,005	-	-	-	5,774	-	-	-	297,530	4,132	-
4a.1.5.39	Turbine Oil	-	721	150	88	-	449	-	321	1,730	1,730	-	-	-	6,935	-	-	-	348,242	11,349	-
4a.1.5.40	Wastewater Treatment	-	153	-	-	-	-	-	23	176	-	-	176	-	-	-	-	-	-	2,499	-
4a.1.5	Totals	-	13,414	4,682	2,725	-	13,844	-	7,571	42,236	40,857	-	1,380	-	207,085	-	-	-	10,732,070	215,940	-
4a.1.6	Scaffolding in support of decommissioning	-	2,908	64	35	-	177	-	783	3,967	3,967	-	-	-	2,649	-	-	-	137,534	50,760	-
4a.1	Subtotal Period 4a Activity Costs	431	31,523	21,816	9,507	-	54,061	657	34,437	152,432	151,053	-	1,380	-	465,064	1,753	686	2,450	26,077,490	405,194	2,758
Period 4a Additional Costs																					
4a.2.1	Remedial Action Surveys	-	-	-	-	-	-	1,908	572	2,480	2,480	-	-	-	-	-	-	-	-	30,069	-
4a.2.2	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
4a.2.3	Operational Tools and Equipment	-	-	9	13	-	189	-	50	261	261	-	-	-	5,855	-	-	-	146,375	16	-
4a.2	Subtotal Period 4a Additional Costs	-	-	9	13	-	189	1,958	630	2,798	2,798	-	-	-	5,855	-	-	-	146,375	30,085	-
Period 4a Collateral Costs																					
4a.3.1	Process decommissioning water waste	12	-	12	32	-	40	-	22	118	118	-	-	-	115	-	-	-	6,870	22	-
4a.3.3	Small tool allowance	-	431	-	-	-	-	-	65	496	446	-	50	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	12	431	12	32	-	40	-	87	614	564	-	50	-	115	-	-	-	6,870	22	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	79	-	-	-	-	-	-	20	99	99	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	971	97	1,068	1,068	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	734	73	807	726	-	81	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	2,691	-	-	-	-	-	673	3,364	3,364	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	2,972	-	-	-	-	-	446	3,418	3,418	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	153	83	-	471	-	146	853	853	-	-	-	7,359	-	-	-	147,187	240	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	2,265	340	2,604	2,604	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	615	61	676	676	-	-	-	-	-	-	-	-	-	-
4a.4.9	Site O&M Cost	-	-	-	-	-	-	242	36	279	279	-	-	-	-	-	-	-	-	-	-
4a.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	589	88	677	677	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	5,332	800	6,132	6,132	-	-	-	-	-	-	-	-	-	95,714
4a.4.12	DOC Staff Cost	-	-	-	-	-	-	18,601	2,790	21,392	21,392	-	-	-	-	-	-	-	-	-	211,337
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	32,396	4,859	37,255	37,255	-	-	-	-	-	-	-	-	-	382,857
4a.4	Subtotal Period 4a Period-Dependent Costs	79	5,663	153	83	-	471	61,745	10,430	78,624	78,544	-	81	-	7,359	-	-	-	147,187	240	689,909
4a.0	TOTAL PERIOD 4a COST	523	37,617	21,990	9,635	-	54,761	64,360	45,583	234,469	232,959	-	1,510	-	478,392	1,753	686	2,450	26,377,920	435,542	692,667
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
4b.1.1	Remove spent fuel racks	976	96	195	242	-	1,231	-	875	3,615	3,615	-	-	-	18,378	-	-	-	954,202	1,632	-
Disposal of Plant Systems																					
4b.1.2.1	Aux Diesel Bldg Floor Drains	-	9	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	147	-
4b.1.2.2	Auxiliary Diesel Generator	-	82	-	-	-	-	-	12	94	-	-	94	-	-	-	-	-	-	1,341	-
4b.1.2.3	Containment Monitoring	-	25	2	1	-	5	-	8	40	40	-	-	-	78	-	-	-	4,043	409	-
4b.1.2.4	Control Rod Drive	-	217	20	12	-	62	-	73	383	383	-	-	-	920	-	-	-	47,858	3,493	-
4b.1.2.5	Diesel Oil	-	69	-	-	-	-	-	10	80	-	-	80	-	-	-	-	-	-	1,104	-
4b.1.2.6	Domestic Water	-	30	-	-	-	-	-	5	35	-	-	35	-	-	-	-	-	-	499	-
4b.1.2.7	Domestic Water - RCA	-	45	7	3	-	17	-	17	89	89	-	-	-	255	-	-	-	13,307	670	-
4b.1.2.8	Electrical	-	611	-	-	-	-	-	92	702	-	-	702	-	-	-	-	-	-	9,872	-
4b.1.2.9	Electrical - Contaminated	-	856	112	75	-	382	-	332	1,758	1,758	-	-	-	5,707	-	-	-	296,337	13,329	-
4b.1.2.10	Electrical - RCA	-	5,832	1,072	690	-	3,507	-	2,545	13,646	13,646	-	-	-	52,355	-	-	-	2,718,307	89,972	-
4b.1.2.11	Fire Protection	-	254	-	-	-	-	-	38	292	-	-	292	-	-	-	-	-	-	4,263	-
4b.1.2.12	Fire Protection - RCA	-	1,184	312	163	-	828	-	559	3,045	3,045	-	-	-	12,306	-	-	-	641,747	18,258	-
4b.1.2.13	Fuel Pool Cooling & Cleanup	-	814	297	166	-	843	-	469	2,588	2,588	-	-	-	12,562	-	-	-	653,382	13,068	-

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Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
4b.1.2.14	HVAC-Auxiliary Building	-	308	75	50	-	254	-	156	842	842	-	-	-	3,793	-	-	-	196,915	4,533	-
4b.1.2.15	HVAC-Control Rm\Aux Equip Area	-	44	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	729	-
4b.1.2.16	HVAC-Diesel Generator Room	-	17	-	-	-	-	-	3	19	-	-	19	-	-	-	-	-	-	284	-
4b.1.2.17	HVAC-Off Gas Building	-	72	29	19	-	99	-	49	268	268	-	-	-	1,478	-	-	-	76,733	1,141	-
4b.1.2.18	HVAC-Primary Containment	-	938	227	144	-	733	-	462	2,504	2,504	-	-	-	10,961	-	-	-	568,155	14,102	-
4b.1.2.19	HVAC-Radwaste Building	-	114	23	15	-	77	-	52	281	281	-	-	-	1,146	-	-	-	59,487	1,699	-
4b.1.2.20	HVAC-Turbine Building	-	868	174	117	-	592	-	400	2,151	2,151	-	-	-	8,842	-	-	-	459,063	12,212	-
4b.1.2.21	High Pressure Core Spray	-	311	190	105	-	535	-	246	1,386	1,386	-	-	-	7,949	-	-	-	414,391	5,148	-
4b.1.2.22	Instrument Air	-	9	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	152	-
4b.1.2.23	Instrument Air - RCA	-	165	19	9	-	45	-	56	293	293	-	-	-	659	-	-	-	34,507	2,558	-
4b.1.2.24	Low Pressure Core Spray	-	148	88	49	-	246	-	115	646	646	-	-	-	3,664	-	-	-	191,058	2,446	-
4b.1.2.25	Nuclear Boiler	-	1,477	526	319	-	1,623	-	876	4,821	4,821	-	-	-	24,184	-	-	-	1,258,120	24,096	-
4b.1.2.26	Off Gas	-	584	149	89	-	452	-	287	1,561	1,561	-	-	-	6,743	-	-	-	350,523	9,243	-
4b.1.2.27	Primary Containment Vent & Purge	-	462	208	137	-	694	-	330	1,830	1,830	-	-	-	10,400	-	-	-	537,713	7,646	-
4b.1.2.28	Process Radiation Monitoring	-	15	1	0	-	2	-	4	23	23	-	-	-	32	-	-	-	1,669	254	-
4b.1.2.29	Process Sampling	-	55	4	3	-	13	-	18	93	93	-	-	-	201	-	-	-	10,453	901	-
4b.1.2.30	Radioactive Waste Disposal	-	2,585	478	271	-	1,379	-	1,080	5,793	5,793	-	-	-	21,136	-	-	-	1,069,308	40,463	-
4b.1.2.31	Radwaste Area Floor Drains	-	2	0	0	-	0	-	1	3	3	-	-	-	6	-	-	-	315	31	-
4b.1.2.32	Reactor Bldg Closed Cooling Water	-	409	294	154	-	782	-	350	1,988	1,988	-	-	-	11,625	-	-	-	605,888	6,817	-
4b.1.2.33	Reactor Building Equipment Drains	-	67	11	6	-	28	-	26	137	137	-	-	-	428	-	-	-	21,778	1,052	-
4b.1.2.34	Reactor Building Floor Drains	-	7	1	0	-	1	-	2	12	12	-	-	-	21	-	-	-	1,101	109	-
4b.1.2.35	Reactor Core Isolation Cooling	-	207	37	21	-	105	-	85	454	454	-	-	-	1,564	-	-	-	81,526	3,268	-
4b.1.2.36	Reactor Recirculation	-	119	48	31	-	160	-	79	436	436	-	-	-	2,381	-	-	-	123,665	1,970	-
4b.1.2.37	Reactor Water Clean-up	-	780	87	43	-	217	-	264	1,391	1,391	-	-	-	3,219	-	-	-	168,302	12,041	-
4b.1.2.38	Residual Heat Removal	-	1,539	898	507	-	2,574	-	1,194	6,712	6,712	-	-	-	38,296	-	-	-	1,995,503	25,652	-
4b.1.2.39	Service Air - RCA	-	373	54	25	-	127	-	134	713	713	-	-	-	1,889	-	-	-	98,774	5,643	-
4b.1.2.40	Service Water	-	97	-	-	-	-	-	15	112	-	-	112	-	-	-	-	-	-	1,595	-
4b.1.2.41	Service Water - RCA	-	862	316	180	-	915	-	503	2,775	2,775	-	-	-	13,626	-	-	-	709,225	13,633	-
4b.1.2.42	Standby Liquid Control	-	48	8	4	-	19	-	18	97	97	-	-	-	281	-	-	-	14,698	719	-
4b.1.2.43	Well Water	-	107	-	-	-	-	-	16	123	-	-	123	-	-	-	-	-	-	1,732	-
4b.1.2	Totals	-	22,816	5,763	3,408	-	17,317	-	10,988	60,291	58,763	-	1,529	-	258,706	-	-	-	13,423,850	358,295	-
4b.1.3	Scaffolding in support of decommissioning	-	4,362	95	52	-	266	-	1,174	5,950	5,950	-	-	-	3,973	-	-	-	206,301	76,140	-
Decontamination of Site Buildings																					
4b.1.4.1	Reactor Building	3,002	3,630	411	607	-	2,133	-	3,074	12,858	12,858	-	-	-	37,178	-	-	-	2,243,740	99,203	-
4b.1.4.2	Auxiliary Building	1,461	640	476	210	-	1,031	-	1,227	5,045	5,045	-	-	-	15,307	-	-	-	822,445	32,558	-
4b.1.4.3	IRSF Building	81	21	1	5	-	13	-	50	172	172	-	-	-	227	-	-	-	18,719	1,534	-
4b.1.4.4	Service Building	112	23	1	7	-	18	-	67	228	228	-	-	-	313	-	-	-	25,878	2,027	-
4b.1.4.5	Solid Radwaste Building	495	350	31	29	-	103	-	368	1,377	1,377	-	-	-	1,635	-	-	-	106,769	12,901	-
4b.1.4.6	Turbine Building	1,790	750	120	169	-	569	-	1,262	4,659	4,659	-	-	-	9,386	-	-	-	621,456	38,195	-
4b.1.4	Totals	6,941	5,414	1,040	1,028	-	3,866	-	6,049	24,338	24,338	-	-	-	64,047	-	-	-	3,839,006	186,417	-
4b.1	Subtotal Period 4b Activity Costs	7,916	32,687	7,094	4,731	-	22,680	-	19,086	94,195	92,666	-	1,529	-	345,104	-	-	-	18,423,360	622,483	-
Period 4b Additional Costs																					
4b.2.1	License Termination Survey Planning	-	-	-	-	-	-	983	295	1,277	1,277	-	-	-	-	-	-	-	-	-	6,240
4b.2.2	Remedial Action Surveys	-	-	-	-	-	-	3,418	1,025	4,443	4,443	-	-	-	-	-	-	-	-	53,874	-
4b.2.3	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
4b.2.4	License Termination ISFSI	-	231	336	442	-	1,502	1,700	1,053	5,264	5,264	-	-	-	24,629	-	-	-	1,947,877	9,942	5,274
4b.2.5	Underground Services Excavation	-	542	-	-	-	-	-	81	623	623	-	-	-	-	-	-	-	-	3,627	-
4b.2.6	Soil Remediation	-	58	7	221	-	1,978	-	543	2,808	2,808	-	-	-	34,081	-	-	-	2,736,453	745	-
4b.2	Subtotal Period 4b Additional Costs	-	832	343	663	-	3,480	6,151	3,005	14,473	14,473	-	-	-	58,710	-	-	-	4,684,331	68,187	11,514
Period 4b Collateral Costs																					
4b.3.1	Process decommissioning water waste	38	-	39	104	-	132	-	72	385	385	-	-	-	377	-	-	-	22,642	74	-
4b.3.3	Small tool allowance	-	654	-	-	-	-	-	98	752	752	-	-	-	-	-	-	-	-	-	-
4b.3.4	Decommissioning Equipment Disposition	-	-	170	93	-	472	-	149	884	884	-	-	-	7,054	-	-	-	366,237	88	-
4b.3	Subtotal Period 4b Collateral Costs	38	654	208	197	-	605	-	319	2,021	2,021	-	-	-	7,431	-	-	-	388,880	162	-
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	1,769	-	-	-	-	-	-	442	2,212	2,212	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	1,714	171	1,885	1,885	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	1,295	130	1,425	1,425	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	4,379	-	-	-	-	-	1,095	5,474	5,474	-	-	-	-	-	-	-	-	-	-

Table D-2
LaSalle County Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 4b Period-Dependent Costs (continued)																					
4b.4.5	Heavy equipment rental	-	5,193	-	-	-	-	-	779	5,972	5,972	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	213	115	-	655	-	202	1,185	1,185	-	-	-	10,221	-	-	-	204,423	333	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	3,155	473	3,629	3,629	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	1,085	109	1,194	1,194	-	-	-	-	-	-	-	-	-	-
4b.4.9	Site O&M Cost	-	-	-	-	-	-	428	64	492	492	-	-	-	-	-	-	-	-	-	-
4b.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	1,039	156	1,195	1,195	-	-	-	-	-	-	-	-	-	-
4b.4.11	Security Staff Cost	-	-	-	-	-	-	9,411	1,412	10,822	10,822	-	-	-	-	-	-	-	-	-	168,929
4b.4.12	DOC Staff Cost	-	-	-	-	-	-	31,966	4,795	36,761	36,761	-	-	-	-	-	-	-	-	-	362,183
4b.4.13	Utility Staff Cost	-	-	-	-	-	-	54,148	8,122	62,270	62,270	-	-	-	-	-	-	-	-	-	637,874
4b.4	Subtotal Period 4b Period-Dependent Costs	1,769	9,572	213	115	-	655	104,242	17,950	134,515	134,515	-	-	-	10,221	-	-	-	204,423	333	1,168,986
4b.0	TOTAL PERIOD 4b COST	9,724	43,745	7,858	5,706	-	27,420	110,392	40,359	245,204	243,676	-	1,529	-	421,466	-	-	-	23,700,990	691,165	1,180,500
PERIOD 4f - License Termination																					
Period 4f Direct Decommissioning Activities																					
4f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
4f.1.2	Terminate license									a											
4f.1	Subtotal Period 4f Activity Costs	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
Period 4f Additional Costs																					
4f.2.1	License Termination Survey	-	-	-	-	-	-	14,037	4,211	18,248	18,248	-	-	-	-	-	-	-	-	218,104	3,120
4f.2	Subtotal Period 4f Additional Costs	-	-	-	-	-	-	14,037	4,211	18,248	18,248	-	-	-	-	-	-	-	-	218,104	3,120
Period 4f Collateral Costs																					
4f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
4f.3	Subtotal Period 4f Collateral Costs	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
Period 4f Period-Dependent Costs																					
4f.4.1	Insurance	-	-	-	-	-	-	504	50	554	554	-	-	-	-	-	-	-	-	-	-
4f.4.2	Property taxes	-	-	-	-	-	-	381	38	419	419	-	-	-	-	-	-	-	-	-	-
4f.4.3	Health physics supplies	-	898	-	-	-	-	-	224	1,122	1,122	-	-	-	-	-	-	-	-	-	-
4f.4.4	Disposal of DAW generated	-	-	7	4	-	22	-	7	39	39	-	-	-	339	-	-	-	6,771	11	-
4f.4.5	Plant energy budget	-	-	-	-	-	-	247	37	284	284	-	-	-	-	-	-	-	-	-	-
4f.4.6	NRC Fees	-	-	-	-	-	-	306	31	336	336	-	-	-	-	-	-	-	-	-	-
4f.4.7	Site O&M Cost	-	-	-	-	-	-	126	19	144	144	-	-	-	-	-	-	-	-	-	-
4f.4.8	Security Staff Cost	-	-	-	-	-	-	686	103	789	789	-	-	-	-	-	-	-	-	-	11,914
4f.4.9	DOC Staff Cost	-	-	-	-	-	-	4,219	633	4,852	4,852	-	-	-	-	-	-	-	-	-	47,260
4f.4.10	Utility Staff Cost	-	-	-	-	-	-	5,177	777	5,953	5,953	-	-	-	-	-	-	-	-	-	57,586
4f.4	Subtotal Period 4f Period-Dependent Costs	-	898	7	4	-	22	11,645	1,918	14,494	14,494	-	-	-	339	-	-	-	6,771	11	116,760
4f.0	TOTAL PERIOD 4f COST	-	898	7	4	-	22	27,018	6,356	34,304	34,304	-	-	-	339	-	-	-	6,771	218,115	119,880
PERIOD 4 TOTALS		10,247	82,260	29,855	15,345	-	82,203	201,770	92,298	513,977	510,939	-	3,039	-	900,197	1,753	686	2,450	50,085,680	1,344,822	1,993,047
PERIOD 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	Reactor Building	-	6,790	-	-	-	-	-	1,018	7,808	-	-	7,808	-	-	-	-	-	-	64,458	-
5b.1.1.2	Auxiliary Building	-	4,415	-	-	-	-	-	662	5,077	-	-	5,077	-	-	-	-	-	-	42,962	-
5b.1.1.3	Capital Improvements 2009	-	1,552	-	-	-	-	-	233	1,785	-	-	1,785	-	-	-	-	-	-	20,778	-
5b.1.1.4	Capital Improvements 2014	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	54	-
5b.1.1.5	Chemical Feed Building	-	39	-	-	-	-	-	6	45	-	-	45	-	-	-	-	-	-	482	-
5b.1.1.6	Diesel Generator Room	-	554	-	-	-	-	-	83	637	-	-	637	-	-	-	-	-	-	6,000	-
5b.1.1.7	Discharge Structure	-	23	-	-	-	-	-	3	26	-	-	26	-	-	-	-	-	-	190	-
5b.1.1.8	IRSF Building	-	819	-	-	-	-	-	123	941	-	-	941	-	-	-	-	-	-	8,924	-
5b.1.1.9	Lake Screen House	-	1,295	-	-	-	-	-	194	1,489	-	-	1,489	-	-	-	-	-	-	13,877	-
5b.1.1.10	Main Access Facility	-	462	-	-	-	-	-	69	532	-	-	532	-	-	-	-	-	-	5,396	-
5b.1.1.11	Miscellaneous Yard Structures	-	2,352	-	-	-	-	-	353	2,705	-	-	2,705	-	-	-	-	-	-	27,035	-
5b.1.1.12	New Service Building	-	2,166	-	-	-	-	-	325	2,491	-	-	2,491	-	-	-	-	-	-	23,587	-
5b.1.1.13	Outfall Structure	-	9	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	113	-
5b.1.1.14	River Screen House	-	387	-	-	-	-	-	58	445	-	-	445	-	-	-	-	-	-	4,231	-
5b.1.1.15	Security Modifications 2009	-	736	-	-	-	-	-	110	846	-	-	846	-	-	-	-	-	-	3,834	-

Table D-2
LaSalle County Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Demolition of Remaining Site Buildings (continued)																					
5b.1.1.16	Security Modifications 2014	-	40	-	-	-	-	-	6	46	-	-	46	-	-	-	-	-	-	528	-
5b.1.1.17	Service Building	-	1,778	-	-	-	-	-	267	2,045	-	-	2,045	-	-	-	-	-	-	21,582	-
5b.1.1.18	Sewage Treatment Plant	-	43	-	-	-	-	-	6	49	-	-	49	-	-	-	-	-	-	591	-
5b.1.1.19	Sewage Treatment Plant Upgrades	-	320	-	-	-	-	-	48	368	-	-	368	-	-	-	-	-	-	3,346	-
5b.1.1.20	Solid Radwaste Building	-	2,428	-	-	-	-	-	364	2,792	-	-	2,792	-	-	-	-	-	-	23,167	-
5b.1.1.21	Training Center	-	1,467	-	-	-	-	-	220	1,687	-	-	1,687	-	-	-	-	-	-	16,863	-
5b.1.1.22	Turbine Building	-	6,492	-	-	-	-	-	974	7,466	-	-	7,466	-	-	-	-	-	-	68,584	-
5b.1.1.23	Turbine Pedestal	-	2,536	-	-	-	-	-	380	2,917	-	-	2,917	-	-	-	-	-	-	22,592	-
5b.1.1.24	Wastewater Treatment Plant	-	73	-	-	-	-	-	11	83	-	-	83	-	-	-	-	-	-	911	-
5b.1.1	Totals	-	36,779	-	-	-	-	-	5,517	42,296	-	-	42,296	-	-	-	-	-	-	380,083	-
Site Closeout Activities																					
5b.1.2	BackFill Site	-	861	-	-	-	-	-	129	991	-	-	991	-	-	-	-	-	-	1,535	-
5b.1.3	Grade & landscape site	-	198	-	-	-	-	-	30	228	-	-	228	-	-	-	-	-	-	499	-
5b.1.4	Final report to NRC	-	-	-	-	-	-	87	13	100	100	-	-	-	-	-	-	-	-	-	654
5b.1	Subtotal Period 5b Activity Costs	-	37,839	-	-	-	-	87	5,689	43,615	100	-	43,515	-	-	-	-	-	-	382,117	654
Period 5b Additional Costs																					
5b.2.1	Site Restoration ISFSI	-	655	-	-	-	-	28	102	785	-	-	785	-	-	-	-	-	-	6,995	80
5b.2.2	Concrete Crushing	-	1,260	-	-	-	-	6	190	1,456	-	-	1,456	-	-	-	-	-	-	5,872	-
5b.2.3	Cofferdam Construction and Teardown	-	989	-	-	-	-	-	148	1,138	-	-	1,138	-	-	-	-	-	-	8,720	-
5b.2	Subtotal Period 5b Additional Costs	-	2,905	-	-	-	-	33	441	3,379	-	-	3,379	-	-	-	-	-	-	21,586	80
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	425	-	-	-	-	-	64	488	-	-	488	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	425	-	-	-	-	-	64	488	-	-	488	-	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																					
5b.4.2	Property taxes	-	-	-	-	-	-	998	100	1,098	-	-	1,098	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	5,685	-	-	-	-	-	853	6,538	-	-	6,538	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	324	49	373	-	-	373	-	-	-	-	-	-	-	-
5b.4.5	Site O&M Cost	-	-	-	-	-	-	329	49	379	-	-	379	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	1,618	243	1,861	-	-	1,861	-	-	-	-	-	-	-	27,619
5b.4.7	DOC Staff Cost	-	-	-	-	-	-	10,124	1,519	11,642	-	-	11,642	-	-	-	-	-	-	-	110,391
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	5,084	763	5,847	-	-	5,847	-	-	-	-	-	-	-	54,154
5b.4	Subtotal Period 5b Period-Dependent Costs	-	5,685	-	-	-	-	18,477	3,574	27,737	-	-	27,737	-	-	-	-	-	-	-	192,164
5b.0	TOTAL PERIOD 5b COST	-	46,854	-	-	-	-	18,598	9,768	75,219	100	-	75,119	-	-	-	-	-	-	403,703	192,898
PERIOD 5 TOTALS		-	46,854	-	-	-	-	18,598	9,768	75,219	100	-	75,119	-	-	-	-	-	-	403,703	192,898
TOTAL COST TO DECOMMISSION		**21,354**	**137,396**	**30,197**	**16,005**	**-**	**83,333**	**600,675**	**161,994**	**1,050,952**	**800,838**	**171,500**	**78,614**	**-**	**908,171**	**1,753**	**686**	**2,450**	**50,331,430**	**1,886,981**	**5,145,764**

Table D-2
LaSalle County Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			

TOTAL COST TO DECOMMISSION WITH 18.22% CONTINGENCY:	**$1,050,952**	**thousands of 2014 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 76.2% OR:	**$800,838**	**thousands of 2014 dollars**
SPENT FUEL MANAGEMENT COST IS 16.32% OR:	**$171,500**	**thousands of 2014 dollars**
NON-NUCLEAR DEMOLITION COST IS 7.48% OR:	**$78,614**	**thousands of 2014 dollars**
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	**910,610**	**cubic feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**2,450**	**cubic feet**
TOTAL SCRAP METAL REMOVED:	**67,341**	**tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,886,981**	**man-hours**

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

APPENDIX E

DETAILED COST ANALYSIS

SAFSTOR

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Table E-1
LaSalle County Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	481	144	625	625	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,000
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	1,300
1a.1.9	Perform detailed rad survey									a											
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	133	20	153	153	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	End product description	-	-	-	-	-	-	133	20	153	153	-	-	-	-	-	-	-	-	-	1,000
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	200	30	230	230	-	-	-	-	-	-	-	-	-	1,500
1a.1.13	Define major work sequence	-	-	-	-	-	-	133	20	153	153	-	-	-	-	-	-	-	-	-	1,000
1a.1.14	Perform SER and EA	-	-	-	-	-	-	414	62	476	476	-	-	-	-	-	-	-	-	-	3,100
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	667	100	767	767	-	-	-	-	-	-	-	-	-	5,000
Activity Specifications																					
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	656	98	755	755	-	-	-	-	-	-	-	-	-	4,920
1a.1.16.2	Plant systems	-	-	-	-	-	-	556	83	639	639	-	-	-	-	-	-	-	-	-	4,167
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	416	62	479	479	-	-	-	-	-	-	-	-	-	3,120
1a.1.16.4	Waste management	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,000
1a.1.16.5	Facility and site dormancy	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,000
1a.1.16	Total	-	-	-	-	-	-	2,162	324	2,486	2,486	-	-	-	-	-	-	-	-	-	16,207
Detailed Work Procedures																					
1a.1.17.1	Plant systems	-	-	-	-	-	-	158	24	182	182	-	-	-	-	-	-	-	-	-	1,183
1a.1.17.2	Facility closeout & dormancy	-	-	-	-	-	-	160	24	184	184	-	-	-	-	-	-	-	-	-	1,200
1a.1.17	Total	-	-	-	-	-	-	318	48	366	366	-	-	-	-	-	-	-	-	-	2,383
1a.1.18	Procure vacuum drying system	-	-	-	-	-	-	13	2	15	15	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	5,268	862	6,131	6,131	-	-	-	-	-	-	-	-	-	35,890
Period 1a Additional Costs																					
1a.2.1	ISFSI Expansion	-	-	-	-	-	-	3,150	473	3,623	-	3,623	-	-	-	-	-	-	-	-	-
1a.2.2	Spent Fuel Pool Isolation	-	-	-	-	-	-	10,813	1,622	12,434	12,434	-	-	-	-	-	-	-	-	-	-
1a.2	Subtotal Period 1a Additional Costs	-	-	-	-	-	-	13,963	2,094	16,057	12,434	3,623	-	-	-	-	-	-	-	-	-
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	13,105	1,966	15,071	-	15,071	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	13,105	1,966	15,071	-	15,071	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	2,050	205	2,255	2,255	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	491	-	-	-	-	-	123	614	614	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	527	-	-	-	-	-	79	606	606	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	13	7	-	39	-	12	71	71	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,623	243	1,867	1,867	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	1,181	118	1,299	1,299	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	2,227	223	2,450	-	2,450	-	-	-	-	-	-	-	-	-
1a.4.9	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	791	119	910	-	910	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	48	7	55	-	55	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	610	91	701	701	-	-	-	-	-	-	-	-	-	12,264
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	35,778	5,367	41,144	41,144	-	-	-	-	-	-	-	-	-	423,400
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,018	13	7	-	39	44,472	6,612	52,160	48,746	3,415	-	-	610	-	-	-	12,190	20	435,664
1a.0	TOTAL PERIOD 1a COST	-	1,018	13	7	-	39	76,808	11,534	89,419	67,311	22,108	-	-	610	-	-	-	12,190	20	471,554

Table E-1
LaSalle County Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1b - SAFSTOR Limited DECON Activities																					
Period 1b Direct Decommissioning Activities																					
Decontamination of Site Buildings																					
1b.1.1.1	Reactor Building	3,298	-	-	-	-	-	-	1,649	4,947	4,947	-	-	-	-	-	-	-	49,197	-
1b.1.1.2	Auxiliary Building	365	-	-	-	-	-	-	182	547	547	-	-	-	-	-	-	-	5,731	-
1b.1.1.3	Off Gas Building	163	-	-	-	-	-	-	81	244	244	-	-	-	-	-	-	-	2,566	-
1b.1.1.4	Turbine Building	1,915	-	-	-	-	-	-	958	2,873	2,873	-	-	-	-	-	-	-	30,081	-
1b.1.1	Totals	5,741	-	-	-	-	-	-	2,870	8,611	8,611	-	-	-	-	-	-	-	87,576	-
1b.1	Subtotal Period 1b Activity Costs	5,741	-	-	-	-	-	-	2,870	8,611	8,611	-	-	-	-	-	-	-	87,576	-
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	883	-	-	-	-	-	-	132	1,015	1,015	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process decommissioning water waste	164	-	106	285	-	363	-	226	1,145	1,145	-	-	-	1,035	-	-	-	62,116	202	-
1b.3.4	Small tool allowance	-	94	-	-	-	-	-	14	108	108	-	-	-	-	-	-	-	-	-	-
1b.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	3,267	490	3,757	-	3,757	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	1,047	94	106	285	-	363	3,267	863	6,025	2,268	3,757	-	-	1,035	-	-	-	62,116	202	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	1,459	-	-	-	-	-	-	365	1,824	1,824	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	394	39	434	434	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	2,996	300	3,295	3,295	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	522	-	-	-	-	-	130	652	652	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	131	-	-	-	-	-	20	151	151	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	18	10	-	55	-	17	99	99	-	-	-	857	-	-	-	17,148	28	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	405	61	465	465	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	172	17	189	189	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	555	56	611	-	611	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Cost	-	-	-	-	-	-	41	6	47	47	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	197	30	227	-	227	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	12	2	14	-	14	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	152	23	175	175	-	-	-	-	-	-	-	-	-	3,058
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	8,920	1,338	10,258	10,258	-	-	-	-	-	-	-	-	-	105,560
1b.4	Subtotal Period 1b Period-Dependent Costs	1,459	653	18	10	-	55	13,844	2,403	18,441	17,590	851	-	-	857	-	-	-	17,148	28	108,618
1b.0	TOTAL PERIOD 1b COST	8,246	747	124	295	-	418	17,111	6,136	33,077	28,469	4,609	-	-	1,893	-	-	-	79,265	87,805	108,618
PERIOD 1c - Preparations for SAFSTOR Dormancy																					
Period 1c Direct Decommissioning Activities																					
1c.1.1	Prepare support equipment for storage	-	486	-	-	-	-	-	73	559	559	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	48	-	-	-	-	-	7	55	55	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	10,874	-
1c.1.4	Secure building accesses									a											
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	78	12	89	89	-	-	-	-	-	-	-	-	-	583
1c.1	Subtotal Period 1c Activity Costs	-	534	-	-	-	-	811	312	1,657	1,657	-	-	-	-	-	-	-	-	14,574	583
Period 1c Collateral Costs																					
1c.3.1	Process decommissioning water waste	149	-	97	259	-	331	-	206	1,041	1,041	-	-	-	942	-	-	-	56,524	184	-
1c.3.3	Small tool allowance	-	4	-	-	-	-	-	1	5	5	-	-	-	-	-	-	-	-	-	-
1c.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	3,303	495	3,799	-	3,799	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	149	4	97	259	-	331	3,303	702	4,845	1,046	3,799	-	-	942	-	-	-	56,524	184	-
Period 1c Period-Dependent Costs																					
1c.4.1	Insurance	-	-	-	-	-	-	399	40	439	439	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	3,029	303	3,331	3,331	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	191	-	-	-	-	-	48	239	239	-	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	133	-	-	-	-	-	20	153	153	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	3	2	-	10	-	3	18	18	-	-	-	154	-	-	-	3,073	5	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	409	61	471	471	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	174	17	191	191	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	561	56	618	-	618	-	-	-	-	-	-	-	-	-

Table E-1
LaSalle County Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 1c Period-Dependent Costs (continued)																					
1c.4.9	Site O&M Cost	-	-	-	-	-	-	42	6	48	48	-	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	199	30	229	-	229	-	-	-	-	-	-	-	-	-
1c.4.11	ISFSI Operating Costs	-	-	-	-	-	-	12	2	14	-	14	-	-	-	-	-	-	-	-	-
1c.4.12	Security Staff Cost	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	3,091
1c.4.13	Utility Staff Cost	-	-	-	-	-	-	9,018	1,353	10,371	10,371	-	-	-	-	-	-	-	-	-	106,720
1c.4	Subtotal Period 1c Period-Dependent Costs	-	324	3	2	-	10	13,996	1,962	16,297	15,436	861	-	-	154	-	-	-	3,073	5	109,811
1c.0	TOTAL PERIOD 1c COST	149	862	100	261	-	341	18,110	2,975	22,798	18,139	4,659	-	-	1,096	-	-	-	59,597	14,762	110,395
PERIOD 1 TOTALS		8,395	2,627	237	563	-	798	112,030	20,645	145,294	113,919	31,376	-	-	3,598	-	-	-	151,052	102,588	690,566
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	-	-	-	-	-	-	161	24	185	185	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	556	139	695	695	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	717	163	880	880	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																					
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	52,455	7,868	60,324	-	60,324	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	52,455	7,868	60,324	-	60,324	-	-	-	-	-	-	-	-	-
Period 2a Period-Dependent Costs																					
2a.4.1	Insurance	-	-	-	-	-	-	3,565	357	3,922	2,912	1,010	-	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	20,187	2,019	22,206	22,206	-	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	738	-	-	-	-	-	185	923	923	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	18	10	-	54	-	17	98	98	-	-	-	844	-	-	-	16,876	28	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	1,300	195	1,494	747	747	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	1,158	116	1,274	1,274	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	7,812	781	8,593	-	8,593	-	-	-	-	-	-	-	-	-
2a.4.8	Site O&M Cost	-	-	-	-	-	-	660	99	759	759	-	-	-	-	-	-	-	-	-	-
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	3,166	475	3,641	-	3,641	-	-	-	-	-	-	-	-	-
2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	191	29	220	-	220	-	-	-	-	-	-	-	-	-
2a.4.11	Security Staff Cost	-	-	-	-	-	-	11,835	1,775	13,610	4,477	9,134	-	-	-	-	-	-	-	-	222,322
2a.4.12	Utility Staff Cost	-	-	-	-	-	-	17,173	2,576	19,748	4,802	14,947	-	-	-	-	-	-	-	-	196,191
2a.4	Subtotal Period 2a Period-Dependent Costs	-	738	18	10	-	54	67,047	8,622	76,489	38,198	38,291	-	-	844	-	-	-	16,876	28	418,514
2a.0	TOTAL PERIOD 2a COST	-	738	18	10	-	54	120,219	16,654	137,693	39,078	98,615	-	-	844	-	-	-	16,876	28	418,514
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	-	-	-	-	-	-	571	86	657	657	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	1,975	494	2,469	2,469	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	2,546	579	3,126	3,126	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	11,563	1,734	13,297	-	13,297	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	11,563	1,734	13,297	-	13,297	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	9,404	940	10,344	10,344	-	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	7,105	710	7,815	7,815	-	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	1,292	-	-	-	-	-	323	1,615	1,615	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	31	17	-	94	-	29	170	170	-	-	-	1,469	-	-	-	29,375	48	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	2,308	346	2,654	2,654	-	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	3,924	392	4,317	4,317	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	27,749	2,775	30,524	-	30,524	-	-	-	-	-	-	-	-	-
2b.4.8	Site O&M Cost	-	-	-	-	-	-	2,346	352	2,698	2,698	-	-	-	-	-	-	-	-	-	-

Table E-1
LaSalle County Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 2b Period-Dependent Costs (continued)																					
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	679	102	781	-	781	-	-	-	-	-	-	-	-	-
2b.4.10	Security Staff Cost	-	-	-	-	-	-	22,680	3,402	26,082	15,903	10,179	-	-	-	-	-	-	-	-	400,371
2b.4.11	Utility Staff Cost	-	-	-	-	-	-	24,523	3,678	28,201	17,058	11,143	-	-	-	-	-	-	-	-	296,571
2b.4	Subtotal Period 2b Period-Dependent Costs	-	1,292	31	17	-	94	100,717	13,051	115,201	62,574	52,627	-	-	1,469	-	-	-	29,375	48	696,943
2b.0	TOTAL PERIOD 2b COST	-	1,292	31	17	-	94	114,826	15,364	131,624	65,699	65,924	-	-	1,469	-	-	-	29,375	48	696,943
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	-	-	-	-	-	-	1,308	196	1,505	1,505	-	-	-	-	-	-	-	-	-	-
2c.1.5	Maintenance supplies	-	-	-	-	-	-	4,525	1,131	5,656	5,656	-	-	-	-	-	-	-	-	-	-
2c.1	Subtotal Period 2c Activity Costs	-	-	-	-	-	-	5,833	1,327	7,161	7,161	-	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	21,543	2,154	23,697	23,697	-	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	16,277	1,628	17,904	17,904	-	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	2,867	-	-	-	-	-	717	3,584	3,584	-	-	-	-	-	-	-	-	-	-
2c.4.4	Disposal of DAW generated	-	-	67	36	-	206	-	64	374	374	-	-	-	3,223	-	-	-	64,457	105	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	5,288	793	6,081	6,081	-	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	8,264	826	9,090	9,090	-	-	-	-	-	-	-	-	-	-
2c.4.7	Site O&M Cost	-	-	-	-	-	-	5,374	806	6,180	6,180	-	-	-	-	-	-	-	-	-	-
2c.4.8	Security Staff Cost	-	-	-	-	-	-	31,680	4,752	36,432	36,432	-	-	-	-	-	-	-	-	-	509,571
2c.4.9	Utility Staff Cost	-	-	-	-	-	-	33,982	5,097	39,079	39,079	-	-	-	-	-	-	-	-	-	433,475
2c.4	Subtotal Period 2c Period-Dependent Costs	-	2,867	67	36	-	206	122,407	16,837	142,422	142,422	-	-	-	3,223	-	-	-	64,457	105	943,047
2c.0	TOTAL PERIOD 2c COST	-	2,867	67	36	-	206	128,240	18,165	149,583	149,583	-	-	-	3,223	-	-	-	64,457	105	943,047
PERIOD 2 TOTALS		-	4,897	115	62	-	355	363,286	50,183	418,899	254,360	164,539	-	-	5,535	-	-	-	110,708	181	2,058,504
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	1,300
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	614	92	706	706	-	-	-	-	-	-	-	-	-	4,600
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	133	20	153	153	-	-	-	-	-	-	-	-	-	1,000
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	1,300
3a.1.6	Define major work sequence	-	-	-	-	-	-	1,001	150	1,151	1,151	-	-	-	-	-	-	-	-	-	7,500
3a.1.7	Perform SER and EA	-	-	-	-	-	-	414	62	476	476	-	-	-	-	-	-	-	-	-	3,100
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	667	100	767	767	-	-	-	-	-	-	-	-	-	5,000
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	546	82	628	628	-	-	-	-	-	-	-	-	-	4,096
3a.1.10	Receive NRC approval of termination plan									a											
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	983	147	1,131	1,018	-	113	-	-	-	-	-	-	-	7,370
3a.1.11.2	Plant systems	-	-	-	-	-	-	556	83	639	575	-	64	-	-	-	-	-	-	-	4,167
3a.1.11.3	Reactor internals	-	-	-	-	-	-	947	142	1,089	1,089	-	-	-	-	-	-	-	-	-	7,100
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	867	130	997	997	-	-	-	-	-	-	-	-	-	6,500
3a.1.11.5	Sacrificial shield	-	-	-	-	-	-	67	10	77	77	-	-	-	-	-	-	-	-	-	500
3a.1.11.6	Moisture separators/reheaters	-	-	-	-	-	-	133	20	153	153	-	-	-	-	-	-	-	-	-	1,000
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	213	32	245	123	-	123	-	-	-	-	-	-	-	1,600
3a.1.11.8	Main Turbine	-	-	-	-	-	-	279	42	320	320	-	-	-	-	-	-	-	-	-	2,088
3a.1.11.9	Main Condensers	-	-	-	-	-	-	279	42	320	320	-	-	-	-	-	-	-	-	-	2,088
3a.1.11.10	Pressure suppression structure	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,000
3a.1.11.11	Drywell	-	-	-	-	-	-	213	32	245	245	-	-	-	-	-	-	-	-	-	1,600
3a.1.11.12	Plant structures & buildings	-	-	-	-	-	-	416	62	479	239	-	239	-	-	-	-	-	-	-	3,120
3a.1.11.13	Waste management	-	-	-	-	-	-	614	92	706	706	-	-	-	-	-	-	-	-	-	4,600
3a.1.11.14	Facility & site closeout	-	-	-	-	-	-	120	18	138	69	-	69	-	-	-	-	-	-	-	900
3a.1.11	Total	-	-	-	-	-	-	5,954	893	6,847	6,239	-	608	-	-	-	-	-	-	-	44,633

Table E-1
LaSalle County Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	320	48	368	368	-	-	-	-	-	-	-	-	-	2,400
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	3,000	450	3,450	3,450	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	187	28	215	215	-	-	-	-	-	-	-	-	-	1,400
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,300	345	2,645	2,645	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	164	25	189	189	-	-	-	-	-	-	-	-	-	1,230
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	15,646	2,347	17,993	17,385	-	608	-	-	-	-	-	-	-	77,559
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	661	66	727	727	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	500	50	550	550	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	429	-	-	-	-	-	107	536	536	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	527	-	-	-	-	-	79	606	606	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	11	6	-	33	-	10	60	60	-	-	-	514	-	-	-	10,287	17	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	1,623	243	1,867	1,867	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	378	38	416	416	-	-	-	-	-	-	-	-	-	-
3a.4.8	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
3a.4.9	Security Staff Cost	-	-	-	-	-	-	3,631	545	4,176	4,176	-	-	-	-	-	-	-	-	-	65,179
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	21,866	3,280	25,146	25,146	-	-	-	-	-	-	-	-	-	258,629
3a.4	Subtotal Period 3a Period-Dependent Costs	-	956	11	6	-	33	28,825	4,443	34,273	34,273	-	-	-	514	-	-	-	10,287	17	323,807
3a.0	TOTAL PERIOD 3a COST	-	956	11	6	-	33	44,471	6,790	52,266	51,658	-	608	-	514	-	-	-	10,287	17	401,366
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	631	95	726	653	-	73	-	-	-	-	-	-	-	4,733
3b.1.1.2	Reactor internals	-	-	-	-	-	-	534	80	614	614	-	-	-	-	-	-	-	-	-	4,000
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	180	27	207	52	-	155	-	-	-	-	-	-	-	1,350
3b.1.1.4	CRD housings & NIs	-	-	-	-	-	-	133	20	153	153	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.5	Incore instrumentation	-	-	-	-	-	-	133	20	153	153	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.6	Removal primary containment	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,000
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	484	73	557	557	-	-	-	-	-	-	-	-	-	3,630
3b.1.1.8	Facility closeout	-	-	-	-	-	-	160	24	184	92	-	92	-	-	-	-	-	-	-	1,200
3b.1.1.9	Sacrificial shield	-	-	-	-	-	-	160	24	184	184	-	-	-	-	-	-	-	-	-	1,200
3b.1.1.10	Reinforced concrete	-	-	-	-	-	-	133	20	153	77	-	77	-	-	-	-	-	-	-	1,000
3b.1.1.11	Main Turbine	-	-	-	-	-	-	277	42	319	319	-	-	-	-	-	-	-	-	-	2,080
3b.1.1.12	Main Condensers	-	-	-	-	-	-	279	42	320	320	-	-	-	-	-	-	-	-	-	2,088
3b.1.1.13	Moisture separators & reheaters	-	-	-	-	-	-	267	40	307	307	-	-	-	-	-	-	-	-	-	2,000
3b.1.1.14	Radwaste building	-	-	-	-	-	-	364	55	419	377	-	42	-	-	-	-	-	-	-	2,730
3b.1.1.15	Reactor building	-	-	-	-	-	-	364	55	419	377	-	42	-	-	-	-	-	-	-	2,730
3b.1.1	Total	-	-	-	-	-	-	4,368	655	5,023	4,542	-	480	-	-	-	-	-	-	-	32,741
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	4,368	655	5,023	4,542	-	480	-	-	-	-	-	-	-	32,741
Period 3b Additional Costs																					
3b.2.1	Site Characterization	-	-	-	-	-	-	6,502	1,951	8,453	8,453	-	-	-	-	-	-	-	-	30,500	10,852
3b.2	Subtotal Period 3b Additional Costs	-	-	-	-	-	-	6,502	1,951	8,453	8,453	-	-	-	-	-	-	-	-	30,500	10,852
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	883	-	-	-	-	-	-	132	1,015	1,015	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
3b.3.3	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	883	1,100	-	-	-	-	1,163	472	3,618	3,618	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	27	-	-	-	-	-	-	7	34	34	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	332	33	365	365	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	251	25	276	276	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	237	-	-	-	-	-	59	296	296	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	264	-	-	-	-	-	40	304	304	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	6	3	-	19	-	6	34	34	-	-	-	292	-	-	-	5,834	10	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	814	122	936	936	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	190	19	208	208	-	-	-	-	-	-	-	-	-	-
3b.4.9	Site O&M Cost	-	-	-	-	-	-	83	12	95	95	-	-	-	-	-	-	-	-	-	-

Table E-1
LaSalle County Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 3b Period-Dependent Costs (continued)																					
3b.4.10	Security Staff Cost	-	-	-	-	-	-	1,820	273	2,094	2,094	-	-	-	-	-	-	-	-	-	32,679
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	5,326	799	6,125	6,125	-	-	-	-	-	-	-	-	-	58,560
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	10,963	1,644	12,608	12,608	-	-	-	-	-	-	-	-	-	129,669
3b.4	Subtotal Period 3b Period-Dependent Costs	27	501	6	3	-	19	19,778	3,039	23,373	23,373	-	-	-	292	-	-	-	5,834	10	220,907
3b.0	TOTAL PERIOD 3b COST	910	1,601	6	3	-	19	31,811	6,117	40,467	39,987	-	480	-	292	-	-	-	5,834	30,510	264,500
PERIOD 3 TOTALS		910	2,557	17	9	-	52	76,282	12,907	92,734	91,645	-	1,089	-	806	-	-	-	16,121	30,526	665,866
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Recirculation System Piping & Valves	25	90	21	23	-	157	-	80	395	395	-	-	-	1,064	-	-	-	121,654	1,846	-
4a.1.1.2	Recirculation Pumps & Motors	13	51	16	41	-	273	-	95	488	488	-	-	-	2,594	-	-	-	211,420	1,136	-
4a.1.1.3	CRDMs & NIs Removal	56	1,138	605	124	-	420	-	497	2,840	2,840	-	-	-	5,536	-	-	-	325,500	18,886	-
4a.1.1.4	Reactor Vessel Internals	189	3,084	8,250	1,775	-	7,412	326	8,669	29,706	29,706	-	-	-	1,878	2,046	406	-	438,355	30,925	1,369
4a.1.1.5	Vessel & Internals GTCC Disposal	-	-	-	-	-	9,123	-	1,368	10,491	10,491	-	-	-	-	-	-	2,450	482,647	-	-
4a.1.1.6	Reactor Vessel	146	6,269	2,676	1,700	-	5,571	326	8,703	25,391	25,391	-	-	-	18,660	-	-	-	1,914,414	30,925	1,369
4a.1.1	Totals	429	10,632	11,568	3,662	-	22,956	653	19,412	69,311	69,311	-	-	-	29,733	2,046	406	2,450	3,493,990	83,718	2,738
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	547	3,165	1,736	-	8,822	-	2,919	17,190	17,190	-	-	-	131,716	-	-	-	6,838,856	8,523	-
4a.1.3	Main Condensers	-	1,070	2,256	1,238	-	6,288	-	2,251	13,102	13,102	-	-	-	93,880	-	-	-	4,874,376	16,783	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor Building	-	1,179	-	-	-	-	-	177	1,356	1,356	-	-	-	-	-	-	-	-	11,163	-
4a.1.4.2	Auxiliary Building	-	489	-	-	-	-	-	73	562	562	-	-	-	-	-	-	-	-	4,733	-
4a.1.4.3	Off Gas Building	-	85	-	-	-	-	-	13	97	97	-	-	-	-	-	-	-	-	920	-
4a.1.4.4	Turbine Building	-	705	-	-	-	-	-	106	811	811	-	-	-	-	-	-	-	-	7,337	-
4a.1.4	Totals	-	2,457	-	-	-	-	-	369	2,825	2,825	-	-	-	-	-	-	-	-	24,153	-
Disposal of Plant Systems																					
4a.1.5.1	Auxiliary Steam	-	124	29	16	-	81	-	57	307	307	-	-	-	1,201	-	-	-	62,558	1,924	-
4a.1.5.2	CSCS Equipment Cooling	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	122	-
4a.1.5.3	Circulating Water	-	208	-	-	-	-	-	31	239	-	-	239	-	-	-	-	-	-	3,464	-
4a.1.5.4	Circulating Water - RCA	-	258	66	33	-	169	-	118	644	644	-	-	-	2,504	-	-	-	130,688	3,946	-
4a.1.5.5	Clean Condensate Storage	-	99	-	-	-	-	-	15	114	-	-	114	-	-	-	-	-	-	1,677	-
4a.1.5.6	Clean Condensate Storage - RCA	-	29	4	2	-	10	-	10	55	55	-	-	-	146	-	-	-	7,618	428	-
4a.1.5.7	Condensate	-	978	550	324	-	1,644	-	759	4,254	4,254	-	-	-	24,478	-	-	-	1,274,330	16,244	-
4a.1.5.8	Condensate Booster	-	1,011	1,177	718	-	3,646	-	1,390	7,941	7,941	-	-	-	54,329	-	-	-	2,826,158	17,851	-
4a.1.5.9	Condensate Polishing Demineralizer	-	946	136	73	-	370	-	354	1,880	1,880	-	-	-	5,589	-	-	-	286,960	14,655	-
4a.1.5.10	Containment Combustible Gas Control	-	97	17	9	-	44	-	38	205	205	-	-	-	647	-	-	-	33,798	1,474	-
4a.1.5.11	Cycled Condensate Storage	-	311	55	31	-	156	-	127	680	680	-	-	-	2,327	-	-	-	121,304	4,862	-
4a.1.5.12	Drywell Instrument Nitrogen	-	71	15	8	-	41	-	31	165	165	-	-	-	620	-	-	-	31,995	1,100	-
4a.1.5.13	Extraction Steam	-	375	128	83	-	420	-	224	1,229	1,229	-	-	-	6,260	-	-	-	325,273	6,120	-
4a.1.5.14	Feedwater	-	621	315	197	-	999	-	466	2,598	2,598	-	-	-	14,903	-	-	-	774,516	10,284	-
4a.1.5.15	Feedwater Heater Vents & Drains	-	2,966	965	567	-	2,880	-	1,643	9,022	9,022	-	-	-	42,923	-	-	-	2,232,839	48,063	-
4a.1.5.16	Gland Steam	-	265	44	24	-	122	-	105	559	559	-	-	-	1,807	-	-	-	94,247	4,171	-
4a.1.5.17	HVAC-River\Lake Screen House	-	9	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	151	-
4a.1.5.18	HVAC-Service Building	-	14	-	-	-	-	-	2	16	-	-	16	-	-	-	-	-	-	221	-
4a.1.5.19	Hydrogen & Carbon Dioxide	-	126	29	15	-	79	-	56	306	306	-	-	-	1,168	-	-	-	60,856	1,940	-
4a.1.5.20	Main Steam	-	144	20	11	-	56	-	54	285	285	-	-	-	833	-	-	-	43,458	2,243	-
4a.1.5.21	Misc Bldgs Floor Drains	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	9	-
4a.1.5.22	Screen Wash	-	30	-	-	-	-	-	5	35	-	-	35	-	-	-	-	-	-	506	-
4a.1.5.23	Service Air	-	13	-	-	-	-	-	2	15	-	-	15	-	-	-	-	-	-	222	-
4a.1.5.24	Standby Gas Treatment	-	60	21	13	-	67	-	36	196	196	-	-	-	1,003	-	-	-	52,115	962	-
4a.1.5.25	Station Heat Recovery	-	289	53	27	-	137	-	116	622	622	-	-	-	2,028	-	-	-	105,836	4,428	-
4a.1.5.26	Switchgear Heat Removal	-	11	-	-	-	-	-	2	13	-	-	13	-	-	-	-	-	-	180	-
4a.1.5.27	Turbine Bldg Closed Cooling Water	-	545	206	110	-	558	-	313	1,731	1,731	-	-	-	8,298	-	-	-	432,636	8,724	-
4a.1.5.28	Turbine Building Equip Drains	-	101	22	13	-	67	-	46	249	249	-	-	-	993	-	-	-	51,593	1,596	-
4a.1.5.29	Turbine Building Floor Drains	-	39	4	2	-	10	-	13	68	68	-	-	-	146	-	-	-	7,632	606	-
4a.1.5.30	Turbine Generator	-	208	103	68	-	346	-	159	884	884	-	-	-	5,174	-	-	-	267,870	3,470	-
4a.1.5.31	Turbine Oil	-	617	138	82	-	419	-	285	1,542	1,542	-	-	-	6,488	-	-	-	324,845	9,769	-

Table E-1
LaSalle County Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
4a.1.5	Totals	-	10,575	4,097	2,424	-	12,318	-	6,457	35,873	35,420	-	452	-	183,863	-	-	-	9,549,126	171,412	-
4a.1.6	Scaffolding in support of decommissioning	-	2,504	58	32	-	162	-	677	3,433	3,433	-	-	-	2,414	-	-	-	125,345	43,646	-
4a.1	Subtotal Period 4a Activity Costs	429	27,785	21,144	9,092	-	50,546	653	32,085	141,735	141,282	-	452	-	441,606	2,046	406	2,450	24,881,690	348,235	2,738
Period 4a Additional Costs																					
4a.2.1	Remedial Action Surveys	-	-	-	-	-	-	1,897	569	2,466	2,466	-	-	-	-	-	-	-	-	29,898	-
4a.2.2	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
4a.2.3	Operational Tools and Equipment	-	-	9	13	-	189	-	50	261	261	-	-	-	5,855	-	-	-	146,375	16	-
4a.2	Subtotal Period 4a Additional Costs	-	-	9	13	-	189	1,947	627	2,784	2,784	-	-	-	5,855	-	-	-	146,375	29,914	-
Period 4a Collateral Costs																					
4a.3.1	Process decommissioning water waste	4	-	7	18	-	23	-	11	62	62	-	-	-	64	-	-	-	3,850	13	-
4a.3.3	Small tool allowance	-	375	-	-	-	-	-	56	431	388	-	43	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	4	375	7	18	-	23	-	67	493	450	-	43	-	64	-	-	-	3,850	13	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	78	-	-	-	-	-	-	19	97	97	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	951	95	1,046	1,046	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	719	72	791	712	-	79	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	2,417	-	-	-	-	-	604	3,021	3,021	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	2,911	-	-	-	-	-	437	3,348	3,348	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	141	76	-	434	-	134	786	786	-	-	-	6,780	-	-	-	135,610	221	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	2,218	333	2,551	2,551	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	868	87	955	955	-	-	-	-	-	-	-	-	-	-
4a.4.9	Site O&M Cost	-	-	-	-	-	-	237	36	273	273	-	-	-	-	-	-	-	-	-	-
4a.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	577	86	663	663	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	5,223	783	6,006	6,006	-	-	-	-	-	-	-	-	-	93,750
4a.4.12	DOC Staff Cost	-	-	-	-	-	-	18,220	2,733	20,953	20,953	-	-	-	-	-	-	-	-	-	207,000
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	31,731	4,760	36,491	36,491	-	-	-	-	-	-	-	-	-	375,000
4a.4	Subtotal Period 4a Period-Dependent Costs	78	5,328	141	76	-	434	60,743	10,179	76,979	76,900	-	79	-	6,780	-	-	-	135,610	221	675,750
4a.0	TOTAL PERIOD 4a COST	511	33,487	21,301	9,200	-	51,192	63,343	42,958	221,991	221,417	-	574	-	454,306	2,046	406	2,450	25,167,530	378,383	678,488
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
4b.1.1	Remove spent fuel racks	976	96	195	242	-	1,231	-	875	3,615	3,615	-	-	-	18,378	-	-	-	954,202	1,632	-
Disposal of Plant Systems																					
4b.1.2.1	Aux Diesel Bldg Floor Drains	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	86	-
4b.1.2.2	Auxiliary Diesel Generator	-	61	-	-	-	-	-	9	70	-	-	70	-	-	-	-	-	-	1,006	-
4b.1.2.3	Containment Monitoring	-	24	2	1	-	5	-	8	39	39	-	-	-	75	-	-	-	3,888	395	-
4b.1.2.4	Control Rod Drive	-	227	21	13	-	65	-	77	402	402	-	-	-	963	-	-	-	50,095	3,653	-
4b.1.2.5	Diesel Oil	-	51	-	-	-	-	-	8	59	-	-	59	-	-	-	-	-	-	823	-
4b.1.2.6	Electrical	-	322	-	-	-	-	-	48	371	-	-	371	-	-	-	-	-	-	5,201	-
4b.1.2.7	Electrical - Contaminated	-	773	104	69	-	352	-	302	1,600	1,600	-	-	-	5,260	-	-	-	273,105	12,036	-
4b.1.2.8	Electrical - RCA	-	5,255	985	635	-	3,225	-	2,314	12,414	12,414	-	-	-	48,150	-	-	-	2,499,995	81,135	-
4b.1.2.9	Fire Protection	-	139	-	-	-	-	-	21	160	-	-	160	-	-	-	-	-	-	2,339	-
4b.1.2.10	Fire Protection - RCA	-	760	182	95	-	485	-	344	1,867	1,867	-	-	-	7,210	-	-	-	375,999	11,689	-
4b.1.2.11	Fuel Pool Cooling & Cleanup	-	847	301	169	-	858	-	482	2,658	2,658	-	-	-	12,790	-	-	-	665,463	13,616	-
4b.1.2.12	HVAC-Auxiliary Building	-	235	54	36	-	185	-	116	626	626	-	-	-	2,759	-	-	-	143,239	3,337	-
4b.1.2.13	HVAC-Diesel Generator Room	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	127	-
4b.1.2.14	HVAC-Off Gas Building	-	23	4	3	-	15	-	10	56	56	-	-	-	227	-	-	-	11,772	332	-
4b.1.2.15	HVAC-Primary Containment	-	1,013	235	148	-	753	-	487	2,636	2,636	-	-	-	11,263	-	-	-	583,908	15,268	-
4b.1.2.16	HVAC-Radwaste Building	-	6	2	1	-	7	-	4	20	20	-	-	-	105	-	-	-	5,437	100	-
4b.1.2.17	HVAC-Turbine Building	-	868	174	117	-	592	-	400	2,151	2,151	-	-	-	8,842	-	-	-	459,063	12,212	-
4b.1.2.18	High Pressure Core Spray	-	366	200	112	-	567	-	270	1,514	1,514	-	-	-	8,429	-	-	-	439,323	6,022	-
4b.1.2.19	Instrument Air	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	94	-
4b.1.2.20	Instrument Air - RCA	-	155	18	8	-	41	-	52	274	274	-	-	-	609	-	-	-	31,863	2,413	-
4b.1.2.21	Low Pressure Core Spray	-	175	93	51	-	261	-	126	706	706	-	-	-	3,878	-	-	-	202,203	2,868	-
4b.1.2.22	Nuclear Boiler	-	1,781	604	369	-	1,876	-	1,030	5,661	5,661	-	-	-	27,962	-	-	-	1,454,480	29,004	-
4b.1.2.23	Off Gas	-	693	166	100	-	506	-	331	1,796	1,796	-	-	-	7,545	-	-	-	392,222	10,952	-
4b.1.2.24	Primary Containment Vent & Purge	-	473	219	145	-	734	-	345	1,916	1,916	-	-	-	10,959	-	-	-	569,165	7,859	-
4b.1.2.25	Process Radiation Monitoring	-	23	1	1	-	3	-	7	34	34	-	-	-	40	-	-	-	2,101	395	-

Table E-1
LaSalle County Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
4b.1.2.26	Process Sampling	-	32	2	1	-	6	-	10	50	50	-	-	-	86	-	-	-	4,496	531	-
4b.1.2.27	Radioactive Waste Disposal	-	1,692	290	162	-	823	-	682	3,649	3,649	-	-	-	12,585	-	-	-	638,228	26,413	-
4b.1.2.28	Reactor Bldg Closed Cooling Water	-	391	291	153	-	778	-	344	1,957	1,957	-	-	-	11,570	-	-	-	602,953	6,573	-
4b.1.2.29	Reactor Building Equipment Drains	-	74	11	6	-	30	-	28	150	150	-	-	-	455	-	-	-	23,195	1,167	-
4b.1.2.30	Reactor Building Floor Drains	-	7	1	0	-	1	-	2	12	12	-	-	-	21	-	-	-	1,101	109	-
4b.1.2.31	Reactor Core Isolation Cooling	-	247	42	23	-	119	-	99	531	531	-	-	-	1,773	-	-	-	92,418	3,903	-
4b.1.2.32	Reactor Recirculation	-	46	4	2	-	10	-	15	77	77	-	-	-	148	-	-	-	7,742	738	-
4b.1.2.33	Reactor Water Clean-up	-	960	105	51	-	261	-	323	1,700	1,700	-	-	-	3,864	-	-	-	202,069	14,838	-
4b.1.2.34	Residual Heat Removal	-	1,795	932	529	-	2,689	-	1,294	7,239	7,239	-	-	-	40,005	-	-	-	2,084,289	29,708	-
4b.1.2.35	Service Air - RCA	-	269	37	17	-	87	-	95	504	504	-	-	-	1,283	-	-	-	67,085	4,079	-
4b.1.2.36	Service Water	-	57	-	-	-	-	-	9	65	-	-	65	-	-	-	-	-	-	938	-
4b.1.2.37	Service Water - RCA	-	785	286	164	-	832	-	458	2,526	2,526	-	-	-	12,398	-	-	-	645,252	12,468	-
4b.1.2.38	Standby Liquid Control	-	58	9	4	-	22	-	22	116	116	-	-	-	329	-	-	-	17,192	874	-
4b.1.2	Totals	-	20,703	5,376	3,186	-	16,189	-	10,173	55,627	54,880	-	747	-	241,581	-	-	-	12,549,340	325,300	-
4b.1.3	Scaffolding in support of decommissioning	-	3,757	87	48	-	243	-	1,016	5,150	5,150	-	-	-	3,621	-	-	-	188,018	65,468	-
Decontamination of Site Buildings																					
4b.1.4.1	Reactor Building	3,002	3,635	404	599	-	1,831	-	2,998	12,469	12,469	-	-	-	30,252	-	-	-	2,170,184	99,260	-
4b.1.4.2	Auxiliary Building	336	67	4	14	-	36	-	196	654	654	-	-	-	628	-	-	-	50,818	6,145	-
4b.1.4.3	Off Gas Building	152	34	2	10	-	24	-	92	313	313	-	-	-	421	-	-	-	34,784	2,798	-
4b.1.4.4	Turbine Building	1,782	748	120	169	-	567	-	1,257	4,643	4,643	-	-	-	9,367	-	-	-	619,740	38,054	-
4b.1.4	Totals	5,272	4,484	530	791	-	2,459	-	4,544	18,080	18,080	-	-	-	40,667	-	-	-	2,875,526	146,256	-
4b.1	Subtotal Period 4b Activity Costs	6,248	29,038	6,188	4,267	-	20,121	-	16,608	82,471	81,725	-	747	-	304,247	-	-	-	16,567,090	538,657	-
Period 4b Additional Costs																					
4b.2.1	License Termination Survey Planning	-	-	-	-	-	-	983	295	1,277	1,277	-	-	-	-	-	-	-	-	-	6,240
4b.2.2	Remedial Action Surveys	-	-	-	-	-	-	3,393	1,018	4,410	4,410	-	-	-	-	-	-	-	-	53,475	-
4b.2.3	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
4b.2.4	License Termination ISFSI	-	302	336	502	-	1,502	2,303	1,236	6,180	6,180	-	-	-	24,637	-	-	-	1,948,035	14,596	5,418
4b.2.5	Underground Services Excavation	-	542	-	-	-	-	-	81	623	623	-	-	-	-	-	-	-	-	3,627	-
4b.2	Subtotal Period 4b Additional Costs	-	844	336	502	-	1,502	6,728	2,637	12,549	12,549	-	-	-	24,637	-	-	-	1,948,035	71,698	11,658
Period 4b Collateral Costs																					
4b.3.1	Process decommissioning water waste	13	-	22	59	-	75	-	36	206	206	-	-	-	215	-	-	-	12,892	42	-
4b.3.3	Small tool allowance	-	566	-	-	-	-	-	85	651	651	-	-	-	-	-	-	-	-	-	-
4b.3.4	Decommissioning Equipment Disposition	-	-	170	93	-	472	-	149	884	884	-	-	-	7,054	-	-	-	366,237	88	-
4b.3	Subtotal Period 4b Collateral Costs	13	566	192	152	-	548	-	270	1,741	1,741	-	-	-	7,269	-	-	-	379,129	130	-
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	1,584	-	-	-	-	-	-	396	1,980	1,980	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	1,701	170	1,871	1,871	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	1,285	129	1,414	1,414	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	3,896	-	-	-	-	-	974	4,869	4,869	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	5,155	-	-	-	-	-	773	5,928	5,928	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	189	102	-	580	-	179	1,051	1,051	-	-	-	9,063	-	-	-	181,258	296	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	3,132	470	3,602	3,602	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	1,553	155	1,708	1,708	-	-	-	-	-	-	-	-	-	-
4b.4.9	Site O&M Cost	-	-	-	-	-	-	424	64	488	488	-	-	-	-	-	-	-	-	-	-
4b.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	1,031	155	1,186	1,186	-	-	-	-	-	-	-	-	-	-
4b.4.11	Security Staff Cost	-	-	-	-	-	-	1,468	220	1,688	1,688	-	-	-	-	-	-	-	-	-	29,511
4b.4.12	DOC Staff Cost	-	-	-	-	-	-	20,847	3,127	23,974	23,974	-	-	-	-	-	-	-	-	-	252,189
4b.4.13	Utility Staff Cost	-	-	-	-	-	-	36,331	5,450	41,780	41,780	-	-	-	-	-	-	-	-	-	450,720
4b.4	Subtotal Period 4b Period-Dependent Costs	1,584	9,050	189	102	-	580	67,773	12,261	91,540	91,540	-	-	-	9,063	-	-	-	181,258	296	732,420
4b.0	TOTAL PERIOD 4b COST	7,845	39,498	6,904	5,023	-	22,752	74,501	31,777	188,302	187,555	-	747	-	345,216	-	-	-	19,075,510	610,780	744,078
PERIOD 4e - Delay before License Termination																					
Period 4e Period-Dependent Costs																					
4e.4.1	Insurance	-	-	-	-	-	-	968	97	1,064	1,064	-	-	-	-	-	-	-	-	-	-
4e.4.2	Property taxes	-	-	-	-	-	-	731	73	804	804	-	-	-	-	-	-	-	-	-	-
4e.4.3	Health physics supplies	-	129	-	-	-	-	-	32	162	162	-	-	-	-	-	-	-	-	-	-
4e.4.4	Disposal of DAW generated	-	-	3	2	-	9	-	3	17	17	-	-	-	146	-	-	-	2,917	5	-

Table E-1
LaSalle County Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 4e Period-Dependent Costs (continued)																					
4e.4.6	NRC Fees	-	-	-	-	-	-	371	37	408	408	-	-	-	-	-	-	-	-	-	-
4e.4.7	Site O&M Cost	-	-	-	-	-	-	241	36	278	278	-	-	-	-	-	-	-	-	-	-
4e.4.8	Utility Staff Cost	-	-	-	-	-	-	1,608	241	1,849	1,849	-	-	-	-	-	-	-	-	-	21,360
4e.4	Subtotal Period 4e Period-Dependent Costs	-	129	3	2	-	9	3,919	520	4,582	4,582	-	-	-	146	-	-	-	2,917	5	21,360
4e.0	TOTAL PERIOD 4e COST	-	129	3	2	-	9	3,919	520	4,582	4,582	-	-	-	146	-	-	-	2,917	5	21,360
PERIOD 4f - License Termination																					
Period 4f Direct Decommissioning Activities																					
4f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
4f.1.2	Terminate license									a											
4f.1	Subtotal Period 4f Activity Costs	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
Period 4f Additional Costs																					
4f.2.1	License Termination Survey	-	-	-	-	-	-	12,428	3,728	16,156	16,156	-	-	-	-	-	-	-	-	192,095	3,120
4f.2	Subtotal Period 4f Additional Costs	-	-	-	-	-	-	12,428	3,728	16,156	16,156	-	-	-	-	-	-	-	-	192,095	3,120
Period 4f Collateral Costs																					
4f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
4f.3	Subtotal Period 4f Collateral Costs	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
Period 4f Period-Dependent Costs																					
4f.4.1	Insurance	-	-	-	-	-	-	506	51	556	556	-	-	-	-	-	-	-	-	-	-
4f.4.2	Property taxes	-	-	-	-	-	-	382	38	420	420	-	-	-	-	-	-	-	-	-	-
4f.4.3	Health physics supplies	-	827	-	-	-	-	-	207	1,033	1,033	-	-	-	-	-	-	-	-	-	-
4f.4.4	Disposal of DAW generated	-	-	7	4	-	22	-	7	39	39	-	-	-	340	-	-	-	6,795	11	-
4f.4.5	Plant energy budget	-	-	-	-	-	-	248	37	285	285	-	-	-	-	-	-	-	-	-	-
4f.4.6	NRC Fees	-	-	-	-	-	-	462	46	508	508	-	-	-	-	-	-	-	-	-	-
4f.4.7	Site O&M Cost	-	-	-	-	-	-	126	19	145	145	-	-	-	-	-	-	-	-	-	-
4f.4.8	Security Staff Cost	-	-	-	-	-	-	689	103	792	792	-	-	-	-	-	-	-	-	-	11,957
4f.4.9	DOC Staff Cost	-	-	-	-	-	-	4,235	635	4,870	4,870	-	-	-	-	-	-	-	-	-	47,430
4f.4.10	Utility Staff Cost	-	-	-	-	-	-	5,196	779	5,975	5,975	-	-	-	-	-	-	-	-	-	57,793
4f.4	Subtotal Period 4f Period-Dependent Costs	-	827	7	4	-	22	11,843	1,922	14,624	14,624	-	-	-	340	-	-	-	6,795	11	117,180
4f.0	TOTAL PERIOD 4f COST	-	827	7	4	-	22	25,606	5,877	32,342	32,342	-	-	-	340	-	-	-	6,795	192,106	120,300
PERIOD 4 TOTALS		8,356	73,942	28,215	14,228	-	73,975	167,369	81,131	447,216	445,895	-	1,321	-	800,007	2,046	406	2,450	44,252,750	1,181,273	1,564,226
PERIOD 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	Reactor Building	-	6,786	-	-	-	-	-	1,018	7,803	-	-	7,803	-	-	-	-	-	-	64,472	-
5b.1.1.2	Auxiliary Building	-	4,423	-	-	-	-	-	663	5,087	-	-	5,087	-	-	-	-	-	-	43,048	-
5b.1.1.3	Diesel Generator Room	-	554	-	-	-	-	-	83	637	-	-	637	-	-	-	-	-	-	6,000	-
5b.1.1.4	Off Gas Building	-	772	-	-	-	-	-	116	888	-	-	888	-	-	-	-	-	-	8,484	-
5b.1.1.5	Turbine Building	-	6,492	-	-	-	-	-	974	7,466	-	-	7,466	-	-	-	-	-	-	68,584	-
5b.1.1.6	Turbine Pedestal	-	3,474	-	-	-	-	-	521	3,995	-	-	3,995	-	-	-	-	-	-	30,829	-
5b.1.1	Totals	-	22,501	-	-	-	-	-	3,375	25,876	-	-	25,876	-	-	-	-	-	-	221,416	-
Site Closeout Activities																					
5b.1.2	Grade & landscape site	-	198	-	-	-	-	-	30	228	-	-	228	-	-	-	-	-	-	499	-
5b.1.3	Final report to NRC	-	-	-	-	-	-	208	31	239	239	-	-	-	-	-	-	-	-	-	1,560
5b.1	Subtotal Period 5b Activity Costs	-	22,699	-	-	-	-	208	3,436	26,343	239	-	26,104	-	-	-	-	-	-	221,916	1,560
Period 5b Additional Costs																					
5b.2.1	Site Restoration ISFSI	-	1,344	-	-	-	-	28	206	1,577	-	-	1,577	-	-	-	-	-	-	15,775	80
5b.2.2	Concrete Crushing	-	845	-	-	-	-	4	127	976	-	-	976	-	-	-	-	-	-	3,936	-
5b.2	Subtotal Period 5b Additional Costs	-	2,189	-	-	-	-	32	333	2,553	-	-	2,553	-	-	-	-	-	-	19,711	80
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	257	-	-	-	-	-	39	296	-	-	296	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	257	-	-	-	-	-	39	296	-	-	296	-	-	-	-	-	-	-	-

Table E-1
LaSalle County Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 5b Period-Dependent Costs																					
5b.4.2	Property taxes	-	-	-	-	-	-	998	100	1,098	-	-	1,098	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	5,685	-	-	-	-	-	853	6,538	-	-	6,538	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	324	49	373	-	-	373	-	-	-	-	-	-	-	-
5b.4.5	Site O&M Cost	-	-	-	-	-	-	329	49	379	-	-	379	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	1,618	243	1,861	-	-	1,861	-	-	-	-	-	-	-	27,619
5b.4.7	DOC Staff Cost	-	-	-	-	-	-	10,124	1,519	11,642	-	-	11,642	-	-	-	-	-	-	-	110,391
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	5,084	763	5,847	-	-	5,847	-	-	-	-	-	-	-	54,154
5b.4	Subtotal Period 5b Period-Dependent Costs	-	5,685	-	-	-	-	18,477	3,574	27,737	-	-	27,737	-	-	-	-	-	-	-	192,164
5b.0	TOTAL PERIOD 5b COST	-	30,830	-	-	-	-	18,717	7,382	56,929	239	-	56,690	-	-	-	-	-	-	241,626	193,804
PERIOD 5 TOTALS		-	30,830	-	-	-	-	18,717	7,382	56,929	239	-	56,690	-	-	-	-	-	-	241,626	193,804
TOTAL COST TO DECOMMISSION		**17,661**	**114,853**	**28,584**	**14,863**	**-**	**75,179**	**737,683**	**172,249**	**1,161,072**	**906,058**	**195,915**	**59,100**	**-**	**809,947**	**2,046**	**406**	**2,450**	**44,530,630**	**1,556,194**	**5,172,966**

TOTAL COST TO DECOMMISSION WITH 17.42% CONTINGENCY:	**$1,161,072**	**thousands of 2014 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 78.04% OR:	**$906,058**	**thousands of 2014 dollars**
SPENT FUEL MANAGEMENT COST IS 16.87% OR:	**$195,915**	**thousands of 2014 dollars**
NON-NUCLEAR DEMOLITION COST IS 5.09% OR:	**$59,100**	**thousands of 2014 dollars**
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	**812,399**	**cubic feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**2,450**	**cubic feet**
TOTAL SCRAP METAL REMOVED:	**51,861**	**tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,556,194**	**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 E-2
LaSalle County Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	481	144	625	625	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	73	11	84	84	-	-	-	-	-	-	-	-	-	545
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	-	-	-	-	-	-	112	17	129	129	-	-	-	-	-	-	-	-	-	838
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	73	11	84	84	-	-	-	-	-	-	-	-	-	545
1a.1.9	Perform detailed rad survey									a											
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	56	8	64	64	-	-	-	-	-	-	-	-	-	419
1a.1.11	End product description	-	-	-	-	-	-	56	8	64	64	-	-	-	-	-	-	-	-	-	419
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	84	13	96	96	-	-	-	-	-	-	-	-	-	629
1a.1.13	Define major work sequence	-	-	-	-	-	-	56	8	64	64	-	-	-	-	-	-	-	-	-	419
1a.1.14	Perform SER and EA	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	1,299
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	279	42	321	321	-	-	-	-	-	-	-	-	-	2,095
Activity Specifications																					
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	275	41	316	316	-	-	-	-	-	-	-	-	-	2,061
1a.1.16.2	Plant systems	-	-	-	-	-	-	233	35	268	268	-	-	-	-	-	-	-	-	-	1,746
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	174	26	201	201	-	-	-	-	-	-	-	-	-	1,307
1a.1.16.4	Waste management	-	-	-	-	-	-	112	17	129	129	-	-	-	-	-	-	-	-	-	838
1a.1.16.5	Facility and site dormancy	-	-	-	-	-	-	112	17	129	129	-	-	-	-	-	-	-	-	-	838
1a.1.16	Total	-	-	-	-	-	-	906	136	1,042	1,042	-	-	-	-	-	-	-	-	-	6,791
Detailed Work Procedures																					
1a.1.17.1	Plant systems	-	-	-	-	-	-	66	10	76	76	-	-	-	-	-	-	-	-	-	496
1a.1.17.2	Facility closeout & dormancy	-	-	-	-	-	-	67	10	77	77	-	-	-	-	-	-	-	-	-	503
1a.1.17	Total	-	-	-	-	-	-	133	20	153	153	-	-	-	-	-	-	-	-	-	999
1a.1.18	Procure vacuum drying system	-	-	-	-	-	-	6	1	6	6	-	-	-	-	-	-	-	-	-	42
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	-	-	-	-	-	-	2,487	445	2,932	2,932	-	-	-	-	-	-	-	-	-	15,038
Period 1a Additional Costs																					
1a.2.1	ISFSI Expansion	-	-	-	-	-	-	3,150	473	3,623	-	3,623	-	-	-	-	-	-	-	-	-
1a.2.2	Spent Fuel Pool Isolation	-	-	-	-	-	-	7,208	1,081	8,290	8,290	-	-	-	-	-	-	-	-	-	-
1a.2	Subtotal Period 1a Additional Costs	-	-	-	-	-	-	10,358	1,554	11,912	8,290	3,623	-	-	-	-	-	-	-	-	-
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	13,105	1,966	15,071	-	15,071	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	13,105	1,966	15,071	-	15,071	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	2,050	205	2,255	2,255	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	491	-	-	-	-	-	123	614	614	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	527	-	-	-	-	-	79	606	606	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	13	7	-	39	-	12	71	71	-	-	-	610	-	-	-	12,190	20	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	1,623	243	1,867	1,867	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	834	83	917	917	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	2,227	223	2,450	-	2,450	-	-	-	-	-	-	-	-	-
1a.4.9	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	791	119	910	-	910	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	48	7	55	-	55	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	8,222	1,233	9,455	9,455	-	-	-	-	-	-	-	-	-	157,471
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	35,778	5,367	41,144	41,144	-	-	-	-	-	-	-	-	-	423,400
1a.4	Subtotal Period 1a Period-Dependent Costs	-	1,018	13	7	-	39	51,737	7,719	60,533	57,118	3,415	-	-	610	-	-	-	12,190	20	580,871
1a.0	TOTAL PERIOD 1a COST	-	1,018	13	7	-	39	77,687	11,683	90,447	68,339	22,108	-	-	610	-	-	-	12,190	20	595,909

Table E-2
LaSalle County Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
PERIOD 1b - SAFSTOR Limited DECON Activities																					
Period 1b Direct Decommissioning Activities																					
Decontamination of Site Buildings																					
1b.1.1.1	Reactor Building	3,298	-	-	-	-	-	-	1,649	4,947	4,947	-	-	-	-	-	-	-	-	49,197	-
1b.1.1.2	Auxiliary Building	1,619	-	-	-	-	-	-	809	2,428	2,428	-	-	-	-	-	-	-	-	24,021	-
1b.1.1.3	IRSF Building	78	-	-	-	-	-	-	39	117	117	-	-	-	-	-	-	-	-	1,210	-
1b.1.1.4	Service Building	108	-	-	-	-	-	-	54	163	163	-	-	-	-	-	-	-	-	1,692	-
1b.1.1.5	Solid Radwaste Building	487	-	-	-	-	-	-	244	731	731	-	-	-	-	-	-	-	-	7,355	-
1b.1.1.6	Turbine Building	1,739	-	-	-	-	-	-	870	2,609	2,609	-	-	-	-	-	-	-	-	27,018	-
1b.1.1	Totals	7,330	-	-	-	-	-	-	3,665	10,996	10,996	-	-	-	-	-	-	-	-	110,493	-
1b.1	Subtotal Period 1b Activity Costs	7,330	-	-	-	-	-	-	3,665	10,996	10,996	-	-	-	-	-	-	-	-	110,493	-
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	883	-	-	-	-	-	-	132	1,015	1,015	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process decommissioning water waste	192	-	125	335	-	426	-	265	1,343	1,343	-	-	-	1,215	-	-	-	72,882	237	-
1b.3.4	Small tool allowance	-	120	-	-	-	-	-	18	139	139	-	-	-	-	-	-	-	-	-	-
1b.3.5	Spent Fuel Capital and Transfer	-	-	-	-	-	-	3,267	490	3,757	-	3,757	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	1,075	120	125	335	-	426	3,267	906	6,254	2,497	3,757	-	-	1,215	-	-	-	72,882	237	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	1,643	-	-	-	-	-	-	411	2,054	2,054	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	394	39	434	434	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	2,996	300	3,295	3,295	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	626	-	-	-	-	-	157	783	783	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	131	-	-	-	-	-	20	151	151	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	18	10	-	56	-	17	102	102	-	-	-	876	-	-	-	17,516	29	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	405	61	465	465	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	116	12	128	128	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	555	56	611	-	611	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Cost	-	-	-	-	-	-	41	6	47	47	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	197	30	227	-	227	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	12	2	14	-	14	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	2,050	307	2,357	2,357	-	-	-	-	-	-	-	-	-	39,260
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	8,920	1,338	10,258	10,258	-	-	-	-	-	-	-	-	-	105,560
1b.4	Subtotal Period 1b Period-Dependent Costs	1,643	757	18	10	-	56	15,686	2,754	20,925	20,074	851	-	-	876	-	-	-	17,516	29	144,820
1b.0	TOTAL PERIOD 1b COST	10,049	878	143	344	-	482	18,953	7,325	38,175	33,566	4,609	-	-	2,091	-	-	-	90,398	110,759	144,820
PERIOD 1c - Preparations for SAFSTOR Dormancy																					
Period 1c Direct Decommissioning Activities																					
1c.1.1	Prepare support equipment for storage	-	486	-	-	-	-	-	73	559	559	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	48	-	-	-	-	-	7	55	55	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	10,874	-
1c.1.4	Secure building accesses									a											
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	33	5	37	37	-	-	-	-	-	-	-	-	-	244
1c.1	Subtotal Period 1c Activity Costs	-	534	-	-	-	-	765	305	1,605	1,605	-	-	-	-	-	-	-	-	14,574	244
Period 1c Collateral Costs																					
1c.3.1	Process decommissioning water waste	149	-	97	259	-	331	-	206	1,041	1,041	-	-	-	942	-	-	-	56,524	184	-
1c.3.3	Small tool allowance	-	4	-	-	-	-	-	1	5	5	-	-	-	-	-	-	-	-	-	-
1c.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	3,303	495	3,799	-	3,799	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	149	4	97	259	-	331	3,303	702	4,845	1,046	3,799	-	-	942	-	-	-	56,524	184	-
Period 1c Period-Dependent Costs																					
1c.4.1	Insurance	-	-	-	-	-	-	399	40	439	439	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	3,029	303	3,331	3,331	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	191	-	-	-	-	-	48	239	239	-	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	133	-	-	-	-	-	20	153	153	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	3	2	-	10	-	3	18	18	-	-	-	154	-	-	-	3,073	5	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	409	61	471	471	-	-	-	-	-	-	-	-	-	-

Table E-2
LaSalle County Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 1c Period-Dependent Costs (continued)																					
1c.4.7	NRC Fees	-	-	-	-	-	-	117	12	129	129	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	561	56	618	-	618	-	-	-	-	-	-	-	-	-
1c.4.9	Site O&M Cost	-	-	-	-	-	-	42	6	48	48	-	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	199	30	229	-	229	-	-	-	-	-	-	-	-	-
1c.4.11	ISFSI Operating Costs	-	-	-	-	-	-	12	2	14	-	14	-	-	-	-	-	-	-	-	-
1c.4.12	Security Staff Cost	-	-	-	-	-	-	2,072	311	2,383	2,383	-	-	-	-	-	-	-	-	-	39,691
1c.4.13	Utility Staff Cost	-	-	-	-	-	-	9,018	1,353	10,371	10,371	-	-	-	-	-	-	-	-	-	106,720
1c.4	Subtotal Period 1c Period-Dependent Costs	-	324	3	2	-	10	15,858	2,244	18,441	17,580	861	-	-	154	-	-	-	3,073	5	146,411
1c.0	TOTAL PERIOD 1c COST	149	862	100	261	-	341	19,927	3,251	24,891	20,231	4,659	-	-	1,096	-	-	-	59,597	14,762	146,656
PERIOD 1 TOTALS		10,197	2,758	255	613	-	862	116,568	22,260	153,513	122,137	31,376	-	-	3,796	-	-	-	162,185	125,541	887,385
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	-	-	-	-	-	-	715	107	822	822	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	556	139	695	695	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	1,271	246	1,517	1,517	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																					
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	52,455	7,868	60,324	-	60,324	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	52,455	7,868	60,324	-	60,324	-	-	-	-	-	-	-	-	-
Period 2a Period-Dependent Costs																					
2a.4.1	Insurance	-	-	-	-	-	-	3,563	356	3,920	2,912	1,008	-	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	20,186	2,019	22,205	22,205	-	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	738	-	-	-	-	-	185	923	923	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	18	10	-	54	-	17	98	98	-	-	-	844	-	-	-	16,876	28	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	1,300	195	1,494	747	747	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	1,064	106	1,170	1,170	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	7,812	781	8,593	-	8,593	-	-	-	-	-	-	-	-	-
2a.4.8	Site O&M Cost	-	-	-	-	-	-	660	99	759	759	-	-	-	-	-	-	-	-	-	-
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	3,166	475	3,641	-	3,641	-	-	-	-	-	-	-	-	-
2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	191	29	220	-	220	-	-	-	-	-	-	-	-	-
2a.4.11	Security Staff Cost	-	-	-	-	-	-	11,835	1,775	13,610	4,477	9,134	-	-	-	-	-	-	-	-	222,322
2a.4.12	Utility Staff Cost	-	-	-	-	-	-	17,173	2,576	19,748	4,802	14,947	-	-	-	-	-	-	-	-	196,191
2a.4	Subtotal Period 2a Period-Dependent Costs	-	738	18	10	-	54	66,950	8,613	76,382	38,093	38,289	-	-	844	-	-	-	16,876	28	418,514
2a.0	TOTAL PERIOD 2a COST	-	738	18	10	-	54	120,676	16,727	138,223	39,610	98,613	-	-	844	-	-	-	16,876	28	418,514
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	-	-	-	-	-	-	2,243	336	2,579	2,579	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	1,744	436	2,180	2,180	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	3,986	772	4,759	4,759	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	11,563	1,734	13,297	-	13,297	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	11,563	1,734	13,297	-	13,297	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	8,302	830	9,132	9,132	-	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	6,272	627	6,900	6,900	-	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	1,141	-	-	-	-	-	285	1,426	1,426	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	27	15	-	83	-	26	150	150	-	-	-	1,297	-	-	-	25,934	42	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	2,038	306	2,343	2,343	-	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	3,211	321	3,532	3,532	-	-	-	-	-	-	-	-	-	-

Table E-2
LaSalle County Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 2b Period-Dependent Costs (continued)																					
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	24,499	2,450	26,948	-	26,948	-	-	-	-	-	-	-	-	-
2b.4.8	Site O&M Cost	-	-	-	-	-	-	2,071	311	2,382	2,382	-	-	-	-	-	-	-	-	-	-
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	599	90	689	-	689	-	-	-	-	-	-	-	-	-
2b.4.10	Security Staff Cost	-	-	-	-	-	-	20,023	3,003	23,026	14,040	8,987	-	-	-	-	-	-	-	-	353,469
2b.4.11	Utility Staff Cost	-	-	-	-	-	-	21,650	3,247	24,897	15,060	9,838	-	-	-	-	-	-	-	-	261,829
2b.4	Subtotal Period 2b Period-Dependent Costs	-	1,141	27	15	-	83	88,665	11,496	101,426	54,964	46,462	-	-	1,297	-	-	-	25,934	42	615,297
2b.0	TOTAL PERIOD 2b COST	-	1,141	27	15	-	83	104,214	14,003	119,482	59,723	59,759	-	-	1,297	-	-	-	25,934	42	615,297
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	-	-	-	-	-	-	6,077	912	6,988	6,988	-	-	-	-	-	-	-	-	-	-
2c.1.5	Maintenance supplies	-	-	-	-	-	-	4,725	1,181	5,906	5,906	-	-	-	-	-	-	-	-	-	-
2c.1	Subtotal Period 2c Activity Costs	-	-	-	-	-	-	10,801	2,093	12,894	12,894	-	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	22,494	2,249	24,744	24,744	-	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	16,995	1,700	18,695	18,695	-	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	2,994	-	-	-	-	-	748	3,742	3,742	-	-	-	-	-	-	-	-	-	-
2c.4.4	Disposal of DAW generated	-	-	70	38	-	216	-	67	390	390	-	-	-	3,365	-	-	-	67,303	110	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	5,521	828	6,350	6,350	-	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	8,375	837	9,212	9,212	-	-	-	-	-	-	-	-	-	-
2c.4.7	Site O&M Cost	-	-	-	-	-	-	5,611	842	6,453	6,453	-	-	-	-	-	-	-	-	-	-
2c.4.8	Security Staff Cost	-	-	-	-	-	-	33,079	4,962	38,041	38,041	-	-	-	-	-	-	-	-	-	532,071
2c.4.9	Utility Staff Cost	-	-	-	-	-	-	35,482	5,322	40,804	40,804	-	-	-	-	-	-	-	-	-	452,615
2c.4	Subtotal Period 2c Period-Dependent Costs	-	2,994	70	38	-	216	127,558	17,556	148,431	148,431	-	-	-	3,365	-	-	-	67,303	110	984,687
2c.0	TOTAL PERIOD 2c COST	-	2,994	70	38	-	216	138,360	19,648	161,325	161,325	-	-	-	3,365	-	-	-	67,303	110	984,687
PERIOD 2 TOTALS		-	4,873	115	62	-	353	363,249	50,378	419,030	260,658	158,372	-	-	5,506	-	-	-	110,113	180	2,018,498
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	73	11	84	84	-	-	-	-	-	-	-	-	-	545
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	1,927
3a.1.3	Perform detailed rad survey									a											
3a.1.4	End product description	-	-	-	-	-	-	56	8	64	64	-	-	-	-	-	-	-	-	-	419
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	73	11	84	84	-	-	-	-	-	-	-	-	-	545
3a.1.6	Define major work sequence	-	-	-	-	-	-	419	63	482	482	-	-	-	-	-	-	-	-	-	3,143
3a.1.7	Perform SER and EA	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	1,299
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	279	42	321	321	-	-	-	-	-	-	-	-	-	2,095
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	229	34	263	263	-	-	-	-	-	-	-	-	-	1,716
3a.1.10	Receive NRC approval of termination plan									a											
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	412	62	474	426	-	47	-	-	-	-	-	-	-	3,088
3a.1.11.2	Plant systems	-	-	-	-	-	-	233	35	268	241	-	27	-	-	-	-	-	-	-	1,746
3a.1.11.3	Reactor internals	-	-	-	-	-	-	397	60	456	456	-	-	-	-	-	-	-	-	-	2,975
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	363	54	418	418	-	-	-	-	-	-	-	-	-	2,724
3a.1.11.5	Sacrificial shield	-	-	-	-	-	-	28	4	32	32	-	-	-	-	-	-	-	-	-	210
3a.1.11.6	Moisture separators/reheaters	-	-	-	-	-	-	56	8	64	64	-	-	-	-	-	-	-	-	-	419
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	89	13	103	51	-	51	-	-	-	-	-	-	-	670
3a.1.11.8	Main Turbine	-	-	-	-	-	-	117	18	134	134	-	-	-	-	-	-	-	-	-	875
3a.1.11.9	Main Condensers	-	-	-	-	-	-	117	18	134	134	-	-	-	-	-	-	-	-	-	875
3a.1.11.10	Pressure suppression structure	-	-	-	-	-	-	112	17	129	129	-	-	-	-	-	-	-	-	-	838
3a.1.11.11	Drywell	-	-	-	-	-	-	89	13	103	103	-	-	-	-	-	-	-	-	-	670
3a.1.11.12	Plant structures & buildings	-	-	-	-	-	-	174	26	201	100	-	100	-	-	-	-	-	-	-	1,307
3a.1.11.13	Waste management	-	-	-	-	-	-	257	39	296	296	-	-	-	-	-	-	-	-	-	1,927
3a.1.11.14	Facility & site closeout	-	-	-	-	-	-	50	8	58	29	-	29	-	-	-	-	-	-	-	377

Table E-2
LaSalle County Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
3a.1.11	Total	-	-	-	-	-	-	2,495	374	2,869	2,614	-	255	-	-	-	-	-	-	-	18,701
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	134	20	154	154	-	-	-	-	-	-	-	-	-	1,006
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	3,000	450	3,450	3,450	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	78	12	90	90	-	-	-	-	-	-	-	-	-	587
3a.1.15	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-	-	-	-	2,300	345	2,645	2,645	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	69	10	79	79	-	-	-	-	-	-	-	-	-	515
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	9,635	1,445	11,080	10,826	-	255	-	-	-	-	-	-	-	32,497
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	661	66	727	727	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	500	50	550	550	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	407	-	-	-	-	-	102	509	509	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	527	-	-	-	-	-	79	606	606	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	10	5	-	31	-	10	56	56	-	-	-	481	-	-	-	9,613	16	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	1,623	243	1,867	1,867	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	332	33	366	366	-	-	-	-	-	-	-	-	-	-
3a.4.8	Site O&M Cost	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-
3a.4.9	Security Staff Cost	-	-	-	-	-	-	311	47	358	358	-	-	-	-	-	-	-	-	-	6,257
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	16,174	2,426	18,600	18,600	-	-	-	-	-	-	-	-	-	200,229
3a.4	Subtotal Period 3a Period-Dependent Costs	-	934	10	5	-	31	19,766	3,081	23,827	23,827	-	-	-	481	-	-	-	9,613	16	206,486
3a.0	TOTAL PERIOD 3a COST	-	934	10	5	-	31	29,401	4,526	34,907	34,653	-	255	-	481	-	-	-	9,613	16	238,983
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	265	40	304	274	-	30	-	-	-	-	-	-	-	1,983
3b.1.1.2	Reactor internals	-	-	-	-	-	-	224	34	257	257	-	-	-	-	-	-	-	-	-	1,676
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	75	11	87	22	-	65	-	-	-	-	-	-	-	566
3b.1.1.4	CRD housings & NIs	-	-	-	-	-	-	56	8	64	64	-	-	-	-	-	-	-	-	-	419
3b.1.1.5	Incore instrumentation	-	-	-	-	-	-	56	8	64	64	-	-	-	-	-	-	-	-	-	419
3b.1.1.6	Removal primary containment	-	-	-	-	-	-	112	17	129	129	-	-	-	-	-	-	-	-	-	838
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	203	30	233	233	-	-	-	-	-	-	-	-	-	1,521
3b.1.1.8	Facility closeout	-	-	-	-	-	-	67	10	77	39	-	39	-	-	-	-	-	-	-	503
3b.1.1.9	Sacrificial shield	-	-	-	-	-	-	67	10	77	77	-	-	-	-	-	-	-	-	-	503
3b.1.1.10	Reinforced concrete	-	-	-	-	-	-	56	8	64	32	-	32	-	-	-	-	-	-	-	419
3b.1.1.11	Main Turbine	-	-	-	-	-	-	116	17	134	134	-	-	-	-	-	-	-	-	-	872
3b.1.1.12	Main Condensers	-	-	-	-	-	-	117	18	134	134	-	-	-	-	-	-	-	-	-	875
3b.1.1.13	Moisture separators & reheaters	-	-	-	-	-	-	112	17	129	129	-	-	-	-	-	-	-	-	-	838
3b.1.1.14	Radwaste building	-	-	-	-	-	-	153	23	175	158	-	18	-	-	-	-	-	-	-	1,144
3b.1.1.15	Reactor building	-	-	-	-	-	-	153	23	175	158	-	18	-	-	-	-	-	-	-	1,144
3b.1.1	Total	-	-	-	-	-	-	1,830	275	2,105	1,903	-	201	-	-	-	-	-	-	-	13,718
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	1,830	275	2,105	1,903	-	201	-	-	-	-	-	-	-	13,718
Period 3b Additional Costs																					
3b.2.1	Site Characterization	-	-	-	-	-	-	2,724	817	3,542	3,542	-	-	-	-	-	-	-	-	12,779	4,547
3b.2	Subtotal Period 3b Additional Costs	-	-	-	-	-	-	2,724	817	3,542	3,542	-	-	-	-	-	-	-	-	12,779	4,547
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	883	-	-	-	-	-	-	132	1,015	1,015	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
3b.3.3	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	883	1,100	-	-	-	-	1,163	472	3,618	3,618	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	27	-	-	-	-	-	-	7	34	34	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	332	33	365	365	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	251	25	276	276	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	220	-	-	-	-	-	55	275	275	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	264	-	-	-	-	-	40	304	304	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	6	3	-	17	-	5	31	31	-	-	-	266	-	-	-	5,315	9	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	814	122	936	936	-	-	-	-	-	-	-	-	-	-

Table E-2
LaSalle County Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 3b Period-Dependent Costs (continued)																					
3b.4.8	NRC Fees	-	-	-	-	-	-	167	17	183	183	-	-	-	-	-	-	-	-	-	-
3b.4.9	Site O&M Cost	-	-	-	-	-	-	83	12	95	95	-	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	156	23	179	179	-	-	-	-	-	-	-	-	-	3,137
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	3,658	549	4,207	4,207	-	-	-	-	-	-	-	-	-	42,874
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	8,109	1,216	9,325	9,325	-	-	-	-	-	-	-	-	-	100,389
3b.4	Subtotal Period 3b Period-Dependent Costs	27	484	6	3	-	17	13,568	2,105	16,210	16,210	-	-	-	266	-	-	-	5,315	9	146,400
3b.0	TOTAL PERIOD 3b COST	910	1,584	6	3	-	17	19,286	3,668	25,474	25,273	-	201	-	266	-	-	-	5,315	12,788	164,666
PERIOD 3 TOTALS		910	2,518	16	8	-	48	48,688	8,194	60,382	59,926	-	456	-	746	-	-	-	14,927	12,803	403,648
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Recirculation System Piping & Valves	25	90	21	23	-	157	-	80	395	395	-	-	-	1,064	-	-	-	121,654	1,846	-
4a.1.1.2	Recirculation Pumps & Motors	13	51	16	41	-	273	-	95	488	488	-	-	-	2,594	-	-	-	211,420	1,136	-
4a.1.1.3	CRDMs & NIs Removal	56	1,138	605	124	-	420	-	497	2,840	2,840	-	-	-	5,536	-	-	-	325,500	18,886	-
4a.1.1.4	Reactor Vessel Internals	189	3,084	8,250	1,775	-	7,454	326	8,690	29,769	29,769	-	-	-	1,878	2,046	406	-	438,355	30,925	1,369
4a.1.1.5	Vessel & Internals GTCC Disposal	-	-	-	-	-	9,123	-	1,368	10,491	10,491	-	-	-	-	-	-	2,450	482,647	-	-
4a.1.1.6	Reactor Vessel	146	6,269	2,676	1,700	-	5,571	326	8,703	25,391	25,391	-	-	-	18,660	-	-	-	1,914,414	30,925	1,369
4a.1.1	Totals	429	10,632	11,568	3,662	-	22,998	653	19,433	69,374	69,374	-	-	-	29,733	2,046	406	2,450	3,493,990	83,718	2,738
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	547	3,165	1,736	-	8,822	-	2,919	17,190	17,190	-	-	-	131,716	-	-	-	6,838,856	8,523	-
4a.1.3	Main Condensers	-	1,070	2,256	1,238	-	6,288	-	2,251	13,102	13,102	-	-	-	93,880	-	-	-	4,874,376	16,783	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor Building	-	1,181	-	-	-	-	-	177	1,358	1,358	-	-	-	-	-	-	-	-	11,181	-
4a.1.4.2	Auxiliary Building	-	488	-	-	-	-	-	73	561	561	-	-	-	-	-	-	-	-	4,723	-
4a.1.4.3	IRSF Building	-	88	-	-	-	-	-	13	101	101	-	-	-	-	-	-	-	-	939	-
4a.1.4.4	Service Building	-	188	-	-	-	-	-	28	216	216	-	-	-	-	-	-	-	-	2,230	-
4a.1.4.5	Solid Radwaste Building	-	268	-	-	-	-	-	40	309	309	-	-	-	-	-	-	-	-	2,559	-
4a.1.4.6	Turbine Building	-	705	-	-	-	-	-	106	811	811	-	-	-	-	-	-	-	-	7,337	-
4a.1.4	Totals	-	2,917	-	-	-	-	-	438	3,355	3,355	-	-	-	-	-	-	-	-	28,970	-
Disposal of Plant Systems																					
4a.1.5.1	Acid & Caustic	-	20	-	-	-	-	-	3	23	-	-	23	-	-	-	-	-	-	317	-
4a.1.5.2	Auxiliary Steam	-	350	89	49	-	250	-	166	903	903	-	-	-	3,727	-	-	-	193,777	5,415	-
4a.1.5.3	CSCS Equipment Cooling	-	9	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	141	-
4a.1.5.4	Chemical Feed	-	40	-	-	-	-	-	6	46	-	-	46	-	-	-	-	-	-	638	-
4a.1.5.5	Circulating Water	-	188	-	-	-	-	-	28	216	-	-	216	-	-	-	-	-	-	3,125	-
4a.1.5.6	Circulating Water - RCA	-	250	48	24	-	122	-	101	546	546	-	-	-	1,808	-	-	-	94,406	3,771	-
4a.1.5.7	Clean Condensate Storage	-	174	-	-	-	-	-	26	201	-	-	201	-	-	-	-	-	-	2,875	-
4a.1.5.8	Clean Condensate Storage - RCA	-	77	12	6	-	28	-	28	151	151	-	-	-	415	-	-	-	21,698	1,158	-
4a.1.5.9	Condensate	-	838	510	298	-	1,515	-	684	3,845	3,845	-	-	-	22,553	-	-	-	1,174,271	13,994	-
4a.1.5.10	Condensate Booster	-	946	1,158	705	-	3,583	-	1,354	7,746	7,746	-	-	-	53,399	-	-	-	2,777,870	16,796	-
4a.1.5.11	Condensate Polishing Demineralizer	-	938	137	73	-	370	-	352	1,870	1,870	-	-	-	5,591	-	-	-	287,088	14,495	-
4a.1.5.12	Containment Combustible Gas Control	-	79	14	7	-	37	-	31	168	168	-	-	-	546	-	-	-	28,517	1,194	-
4a.1.5.13	Cycled Condensate Storage	-	560	139	84	-	428	-	273	1,485	1,485	-	-	-	6,560	-	-	-	331,736	8,922	-
4a.1.5.14	Drywell Instrument Nitrogen	-	68	14	8	-	39	-	29	158	158	-	-	-	588	-	-	-	30,320	1,076	-
4a.1.5.15	Extraction Steam	-	308	110	71	-	360	-	189	1,038	1,038	-	-	-	5,368	-	-	-	278,932	5,043	-
4a.1.5.16	Feedwater	-	532	293	183	-	932	-	423	2,364	2,364	-	-	-	13,899	-	-	-	722,425	8,849	-
4a.1.5.17	Feedwater Heater Vents & Drains	-	2,460	868	506	-	2,570	-	1,420	7,823	7,823	-	-	-	38,293	-	-	-	1,992,119	39,957	-
4a.1.5.18	Gland Steam	-	220	39	21	-	108	-	89	477	477	-	-	-	1,606	-	-	-	83,540	3,457	-
4a.1.5.19	HVAC-Machine Shop\TB Sandblast	-	34	5	3	-	17	-	14	74	74	-	-	-	258	-	-	-	13,382	538	-
4a.1.5.20	HVAC-River\Lake Screen House	-	24	-	-	-	-	-	4	28	-	-	28	-	-	-	-	-	-	422	-
4a.1.5.21	HVAC-Service Building	-	64	-	-	-	-	-	10	73	-	-	73	-	-	-	-	-	-	1,072	-
4a.1.5.22	Hydrogen & Carbon Dioxide	-	43	-	-	-	-	-	6	49	-	-	49	-	-	-	-	-	-	708	-
4a.1.5.23	Lake Makeup & Blowdown	-	254	-	-	-	-	-	38	292	-	-	292	-	-	-	-	-	-	4,257	-
4a.1.5.24	Main Steam	-	119	18	10	-	50	-	46	242	242	-	-	-	745	-	-	-	38,834	1,853	-
4a.1.5.25	Makeup Demineralizer	-	726	174	104	-	529	-	347	1,880	1,880	-	-	-	8,181	-	-	-	410,165	11,537	-
4a.1.5.26	Misc Bldgs Floor Drains	-	1,324	284	143	-	726	-	562	3,040	3,040	-	-	-	10,783	-	-	-	562,851	20,035	-
4a.1.5.27	Refrigeration	-	66	-	-	-	-	-	10	76	-	-	76	-	-	-	-	-	-	1,110	-

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															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
4a.1.5.28	Refrigeration - RCA	-	46	7	3	-	16	-	17	88	88	-	-	-	237	-	-	-	12,405	681	-
4a.1.5.29	Screen Wash	-	24	-	-	-	-	-	4	28	-	-	28	-	-	-	-	-	-	407	-
4a.1.5.30	Service Air	-	26	-	-	-	-	-	4	30	-	-	30	-	-	-	-	-	-	427	-
4a.1.5.31	Sewage Treatment	-	104	-	-	-	-	-	16	120	-	-	120	-	-	-	-	-	-	1,741	-
4a.1.5.32	Standby Gas Treatment	-	49	18	11	-	58	-	30	166	166	-	-	-	862	-	-	-	44,774	787	-
4a.1.5.33	Station Heat Recovery	-	669	254	130	-	661	-	377	2,091	2,091	-	-	-	9,845	-	-	-	512,043	10,593	-
4a.1.5.34	Switchgear Heat Removal	-	11	-	-	-	-	-	2	13	-	-	13	-	-	-	-	-	-	180	-
4a.1.5.35	Turbine Bldg Closed Cooling Water	-	481	197	105	-	534	-	289	1,606	1,606	-	-	-	7,935	-	-	-	413,833	7,723	-
4a.1.5.36	Turbine Building Equipment Drains	-	85	19	11	-	58	-	39	212	212	-	-	-	862	-	-	-	44,802	1,338	-
4a.1.5.37	Turbine Building Floor Drains	-	86	9	4	-	21	-	28	149	149	-	-	-	315	-	-	-	16,508	1,329	-
4a.1.5.38	Turbine Generator	-	249	115	76	-	384	-	181	1,005	1,005	-	-	-	5,774	-	-	-	297,530	4,132	-
4a.1.5.39	Turbine Oil	-	721	150	88	-	449	-	321	1,730	1,730	-	-	-	6,935	-	-	-	348,242	11,349	-
4a.1.5.40	Wastewater Treatment	-	153	-	-	-	-	-	23	176	-	-	176	-	-	-	-	-	-	2,499	-
4a.1.5	Totals	-	13,414	4,682	2,725	-	13,844	-	7,571	42,236	40,857	-	1,380	-	207,085	-	-	-	10,732,070	215,940	-
4a.1.6	Scaffolding in support of decommissioning	-	2,908	64	35	-	177	-	783	3,967	3,967	-	-	-	2,649	-	-	-	137,534	50,760	-
4a.1	Subtotal Period 4a Activity Costs	429	31,488	21,735	9,395	-	52,130	653	33,395	149,225	147,845	-	1,380	-	465,064	2,046	406	2,450	26,076,820	404,694	2,738
Period 4a Additional Costs																					
4a.2.1	Remedial Action Surveys	-	-	-	-	-	-	1,908	572	2,480	2,480	-	-	-	-	-	-	-	-	30,069	-
4a.2.2	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
4a.2.3	Operational Tools and Equipment	-	-	9	13	-	189	-	50	261	261	-	-	-	5,855	-	-	-	146,375	16	-
4a.2	Subtotal Period 4a Additional Costs	-	-	9	13	-	189	1,958	630	2,798	2,798	-	-	-	5,855	-	-	-	146,375	30,085	-
Period 4a Collateral Costs																					
4a.3.1	Process decommissioning water waste	4	-	7	18	-	23	-	11	64	64	-	-	-	67	-	-	-	4,008	13	-
4a.3.3	Small tool allowance	-	431	-	-	-	-	-	65	495	446	-	50	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	4	431	7	18	-	23	-	76	559	510	-	50	-	67	-	-	-	4,008	13	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	78	-	-	-	-	-	-	19	97	97	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	957	96	1,052	1,052	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	723	72	795	716	-	80	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	2,678	-	-	-	-	-	670	3,348	3,348	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	2,928	-	-	-	-	-	439	3,367	3,367	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	153	83	-	470	-	145	851	851	-	-	-	7,339	-	-	-	146,784	239	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	2,231	335	2,565	2,565	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	606	61	666	666	-	-	-	-	-	-	-	-	-	-
4a.4.9	Site O&M Cost	-	-	-	-	-	-	239	36	274	274	-	-	-	-	-	-	-	-	-	-
4a.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	580	87	667	667	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	5,252	788	6,040	6,040	-	-	-	-	-	-	-	-	-	94,286
4a.4.12	DOC Staff Cost	-	-	-	-	-	-	18,324	2,749	21,072	21,072	-	-	-	-	-	-	-	-	-	208,183
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	31,912	4,787	36,699	36,699	-	-	-	-	-	-	-	-	-	377,143
4a.4	Subtotal Period 4a Period-Dependent Costs	78	5,606	153	83	-	470	60,823	10,283	77,495	77,416	-	80	-	7,339	-	-	-	146,784	239	679,611
4a.0	TOTAL PERIOD 4a COST	512	37,524	21,903	9,510	-	52,812	63,433	44,383	230,078	228,569	-	1,509	-	478,325	2,046	406	2,450	26,373,990	435,032	682,349
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
4b.1.1	Remove spent fuel racks	976	96	195	242	-	1,231	-	875	3,615	3,615	-	-	-	18,378	-	-	-	954,202	1,632	-
Disposal of Plant Systems																					
4b.1.2.1	Aux Diesel Bldg Floor Drains	-	9	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	147	-
4b.1.2.2	Auxiliary Diesel Generator	-	82	-	-	-	-	-	12	94	-	-	94	-	-	-	-	-	-	1,341	-
4b.1.2.3	Containment Monitoring	-	25	2	1	-	5	-	8	40	40	-	-	-	78	-	-	-	4,043	409	-
4b.1.2.4	Control Rod Drive	-	217	20	12	-	62	-	73	383	383	-	-	-	920	-	-	-	47,858	3,493	-
4b.1.2.5	Diesel Oil	-	69	-	-	-	-	-	10	80	-	-	80	-	-	-	-	-	-	1,104	-
4b.1.2.6	Domestic Water	-	30	-	-	-	-	-	5	35	-	-	35	-	-	-	-	-	-	499	-
4b.1.2.7	Domestic Water - RCA	-	45	7	3	-	17	-	17	89	89	-	-	-	255	-	-	-	13,307	670	-
4b.1.2.8	Electrical	-	611	-	-	-	-	-	92	702	-	-	702	-	-	-	-	-	-	9,872	-
4b.1.2.9	Electrical - Contaminated	-	856	112	75	-	382	-	332	1,758	1,758	-	-	-	5,707	-	-	-	296,337	13,329	-
4b.1.2.10	Electrical - RCA	-	5,832	1,072	690	-	3,507	-	2,545	13,646	13,646	-	-	-	52,355	-	-	-	2,718,307	89,972	-
4b.1.2.11	Fire Protection	-	254	-	-	-	-	-	38	292	-	-	292	-	-	-	-	-	-	4,263	-

Table E-2
LaSalle County Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Disposal of Plant Systems (continued)																					
4b.1.2.12	Fire Protection - RCA	-	1,184	312	163	-	828	-	559	3,045	3,045	-	-	-	12,306	-	-	-	641,747	18,258	-
4b.1.2.13	Fuel Pool Cooling & Cleanup	-	814	297	166	-	843	-	469	2,588	2,588	-	-	-	12,562	-	-	-	653,382	13,068	-
4b.1.2.14	HVAC-Auxiliary Building	-	308	75	50	-	254	-	156	842	842	-	-	-	3,793	-	-	-	196,915	4,533	-
4b.1.2.15	HVAC-Control Rm\Aux Equip Area	-	44	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	729	-
4b.1.2.16	HVAC-Diesel Generator Room	-	17	-	-	-	-	-	3	19	-	-	19	-	-	-	-	-	-	284	-
4b.1.2.17	HVAC-Off Gas Building	-	72	29	19	-	99	-	49	268	268	-	-	-	1,478	-	-	-	76,733	1,141	-
4b.1.2.18	HVAC-Primary Containment	-	938	227	144	-	733	-	462	2,504	2,504	-	-	-	10,961	-	-	-	568,155	14,102	-
4b.1.2.19	HVAC-Radwaste Building	-	114	23	15	-	77	-	52	281	281	-	-	-	1,146	-	-	-	59,487	1,699	-
4b.1.2.20	HVAC-Turbine Building	-	868	174	117	-	592	-	400	2,151	2,151	-	-	-	8,842	-	-	-	459,063	12,212	-
4b.1.2.21	High Pressure Core Spray	-	311	190	105	-	535	-	246	1,386	1,386	-	-	-	7,949	-	-	-	414,391	5,148	-
4b.1.2.22	Instrument Air	-	9	-	-	-	-	-	1	10	-	-	-	10	-	-	-	-	-	152	-
4b.1.2.23	Instrument Air - RCA	-	165	19	9	-	45	-	56	293	293	-	-	-	659	-	-	-	34,507	2,558	-
4b.1.2.24	Low Pressure Core Spray	-	148	88	49	-	246	-	115	646	646	-	-	-	3,664	-	-	-	191,058	2,446	-
4b.1.2.25	Nuclear Boiler	-	1,477	526	319	-	1,623	-	876	4,821	4,821	-	-	-	24,184	-	-	-	1,258,120	24,096	-
4b.1.2.26	Off Gas	-	584	149	89	-	452	-	287	1,561	1,561	-	-	-	6,743	-	-	-	350,523	9,243	-
4b.1.2.27	Primary Containment Vent & Purge	-	462	208	137	-	694	-	330	1,830	1,830	-	-	-	10,400	-	-	-	537,713	7,646	-
4b.1.2.28	Process Radiation Monitoring	-	15	1	0	-	2	-	4	23	23	-	-	-	32	-	-	-	1,669	254	-
4b.1.2.29	Process Sampling	-	55	4	3	-	13	-	18	93	93	-	-	-	201	-	-	-	10,453	901	-
4b.1.2.30	Radioactive Waste Disposal	-	2,585	478	271	-	1,379	-	1,080	5,793	5,793	-	-	-	21,136	-	-	-	1,069,308	40,463	-
4b.1.2.31	Radwaste Area Floor Drains	-	2	0	0	-	0	-	1	3	3	-	-	-	6	-	-	-	315	31	-
4b.1.2.32	Reactor Bldg Closed Cooling Water	-	409	294	154	-	782	-	350	1,988	1,988	-	-	-	11,625	-	-	-	605,888	6,817	-
4b.1.2.33	Reactor Building Equipment Drains	-	67	11	6	-	28	-	26	137	137	-	-	-	428	-	-	-	21,778	1,052	-
4b.1.2.34	Reactor Building Floor Drains	-	7	1	0	-	1	-	2	12	12	-	-	-	21	-	-	-	1,101	109	-
4b.1.2.35	Reactor Core Isolation Cooling	-	207	37	21	-	105	-	85	454	454	-	-	-	1,564	-	-	-	81,526	3,268	-
4b.1.2.36	Reactor Recirculation	-	119	48	31	-	160	-	79	436	436	-	-	-	2,381	-	-	-	123,665	1,970	-
4b.1.2.37	Reactor Water Clean-up	-	780	87	43	-	217	-	264	1,391	1,391	-	-	-	3,219	-	-	-	168,302	12,041	-
4b.1.2.38	Residual Heat Removal	-	1,539	898	507	-	2,574	-	1,194	6,712	6,712	-	-	-	38,296	-	-	-	1,995,503	25,652	-
4b.1.2.39	Service Air - RCA	-	373	54	25	-	127	-	134	713	713	-	-	-	1,889	-	-	-	98,774	5,643	-
4b.1.2.40	Service Water	-	97	-	-	-	-	-	15	112	-	-	112	-	-	-	-	-	-	1,595	-
4b.1.2.41	Service Water - RCA	-	862	316	180	-	915	-	503	2,775	2,775	-	-	-	13,626	-	-	-	709,225	13,633	-
4b.1.2.42	Standby Liquid Control	-	48	8	4	-	19	-	18	97	97	-	-	-	281	-	-	-	14,698	719	-
4b.1.2.43	Well Water	-	107	-	-	-	-	-	16	123	-	-	123	-	-	-	-	-	-	1,732	-
4b.1.2	Totals	-	22,816	5,763	3,408	-	17,317	-	10,988	60,291	58,763	-	1,529	-	258,706	-	-	-	13,423,850	358,295	-
4b.1.3	Scaffolding in support of decommissioning	-	4,362	95	52	-	266	-	1,174	5,950	5,950	-	-	-	3,973	-	-	-	206,301	76,140	-
Decontamination of Site Buildings																					
4b.1.4.1	Reactor Building	3,002	3,630	402	598	-	1,827	-	2,995	12,455	12,455	-	-	-	30,151	-	-	-	2,166,716	99,187	-
4b.1.4.2	Auxiliary Building	1,461	640	476	210	-	1,031	-	1,227	5,045	5,045	-	-	-	15,307	-	-	-	822,445	32,558	-
4b.1.4.3	IRSF Building	81	21	1	5	-	13	-	50	172	172	-	-	-	227	-	-	-	18,719	1,534	-
4b.1.4.4	Service Building	112	23	1	7	-	18	-	67	228	228	-	-	-	313	-	-	-	25,878	2,027	-
4b.1.4.5	Solid Radwaste Building	495	350	31	29	-	103	-	368	1,377	1,377	-	-	-	1,635	-	-	-	106,769	12,901	-
4b.1.4.6	Turbine Building	1,790	750	120	169	-	569	-	1,262	4,659	4,659	-	-	-	9,386	-	-	-	621,456	38,195	-
4b.1.4	Totals	6,941	5,414	1,032	1,019	-	3,560	-	5,970	23,935	23,935	-	-	-	57,020	-	-	-	3,761,982	186,401	-
4b.1	Subtotal Period 4b Activity Costs	7,916	32,687	7,086	4,721	-	22,374	-	19,007	93,792	92,263	-	1,529	-	338,078	-	-	-	18,346,340	622,467	-
Period 4b Additional Costs																					
4b.2.1	License Termination Survey Planning	-	-	-	-	-	-	983	295	1,277	1,277	-	-	-	-	-	-	-	-	-	6,240
4b.2.2	Remedial Action Surveys	-	-	-	-	-	-	3,418	1,025	4,443	4,443	-	-	-	-	-	-	-	-	53,874	-
4b.2.3	Asbestos Abatement	-	-	-	-	-	-	50	8	58	58	-	-	-	-	-	-	-	-	-	-
4b.2.4	License Termination ISFSI	-	302	336	502	-	1,502	2,303	1,236	6,180	6,180	-	-	-	24,637	-	-	-	1,948,035	14,596	5,418
4b.2.5	Underground Services Excavation	-	542	-	-	-	-	-	81	623	623	-	-	-	-	-	-	-	-	3,627	-
4b.2.6	Soil Remediation	-	58	7	221	-	1,978	-	543	2,808	2,808	-	-	-	34,081	-	-	-	2,736,453	745	-
4b.2	Subtotal Period 4b Additional Costs	-	902	343	723	-	3,480	6,753	3,188	15,390	15,390	-	-	-	58,717	-	-	-	4,684,488	72,841	11,658
Period 4b Collateral Costs																					
4b.3.1	Process decommissioning water waste	14	-	24	66	-	84	-	40	229	229	-	-	-	238	-	-	-	14,298	46	-
4b.3.3	Small tool allowance	-	655	-	-	-	-	-	98	753	753	-	-	-	-	-	-	-	-	-	-
4b.3.4	Decommissioning Equipment Disposition	-	-	170	93	-	472	-	149	884	884	-	-	-	7,054	-	-	-	366,237	88	-
4b.3	Subtotal Period 4b Collateral Costs	14	655	194	159	-	556	-	288	1,866	1,866	-	-	-	7,292	-	-	-	380,535	135	-
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	1,769	-	-	-	-	-	-	442	2,212	2,212	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	1,714	171	1,885	1,885	-	-	-	-	-	-	-	-	-	-

Table E-2
LaSalle County Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 4b Period-Dependent Costs (continued)																					
4b.4.3	Property taxes	-	-	-	-	-	-	1,295	130	1,425	1,425	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	4,400	-	-	-	-	-	1,100	5,500	5,500	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	5,193	-	-	-	-	-	779	5,972	5,972	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	213	115	-	655	-	202	1,185	1,185	-	-	-	10,221	-	-	-	204,423	333	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	3,155	473	3,629	3,629	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	1,085	109	1,194	1,194	-	-	-	-	-	-	-	-	-	-
4b.4.9	Site O&M Cost	-	-	-	-	-	-	428	64	492	492	-	-	-	-	-	-	-	-	-	-
4b.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	1,039	156	1,195	1,195	-	-	-	-	-	-	-	-	-	-
4b.4.11	Security Staff Cost	-	-	-	-	-	-	9,411	1,412	10,822	10,822	-	-	-	-	-	-	-	-	-	168,929
4b.4.12	DOC Staff Cost	-	-	-	-	-	-	31,966	4,795	36,761	36,761	-	-	-	-	-	-	-	-	-	362,183
4b.4.13	Utility Staff Cost	-	-	-	-	-	-	54,148	8,122	62,270	62,270	-	-	-	-	-	-	-	-	-	637,874
4b.4	Subtotal Period 4b Period-Dependent Costs	1,769	9,593	213	115	-	655	104,242	17,955	134,542	134,542	-	-	-	10,221	-	-	-	204,423	333	1,168,986
4b.0	TOTAL PERIOD 4b COST	9,700	43,837	7,835	5,718	-	27,065	110,995	40,438	245,589	244,060	-	1,529	-	414,308	-	-	-	23,615,780	695,776	1,180,644
PERIOD 4f - License Termination																					
Period 4f Direct Decommissioning Activities																					
4f.1.1	ORISE confirmatory survey	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
4f.1.2	Terminate license									a											
4f.1	Subtotal Period 4f Activity Costs	-	-	-	-	-	-	172	52	224	224	-	-	-	-	-	-	-	-	-	-
Period 4f Additional Costs																					
4f.2.1	License Termination Survey	-	-	-	-	-	-	14,037	4,211	18,248	18,248	-	-	-	-	-	-	-	-	218,104	3,120
4f.2	Subtotal Period 4f Additional Costs	-	-	-	-	-	-	14,037	4,211	18,248	18,248	-	-	-	-	-	-	-	-	218,104	3,120
Period 4f Collateral Costs																					
4f.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
4f.3	Subtotal Period 4f Collateral Costs	-	-	-	-	-	-	1,163	175	1,338	1,338	-	-	-	-	-	-	-	-	-	-
Period 4f Period-Dependent Costs																					
4f.4.1	Insurance	-	-	-	-	-	-	504	50	554	554	-	-	-	-	-	-	-	-	-	-
4f.4.2	Property taxes	-	-	-	-	-	-	381	38	419	419	-	-	-	-	-	-	-	-	-	-
4f.4.3	Health physics supplies	-	898	-	-	-	-	-	224	1,122	1,122	-	-	-	-	-	-	-	-	-	-
4f.4.4	Disposal of DAW generated	-	-	7	4	-	22	-	7	39	39	-	-	-	339	-	-	-	6,771	11	-
4f.4.5	Plant energy budget	-	-	-	-	-	-	247	37	284	284	-	-	-	-	-	-	-	-	-	-
4f.4.6	NRC Fees	-	-	-	-	-	-	306	31	336	336	-	-	-	-	-	-	-	-	-	-
4f.4.7	Site O&M Cost	-	-	-	-	-	-	126	19	144	144	-	-	-	-	-	-	-	-	-	-
4f.4.8	Security Staff Cost	-	-	-	-	-	-	686	103	789	789	-	-	-	-	-	-	-	-	-	11,914
4f.4.9	DOC Staff Cost	-	-	-	-	-	-	4,219	633	4,852	4,852	-	-	-	-	-	-	-	-	-	47,260
4f.4.10	Utility Staff Cost	-	-	-	-	-	-	5,177	777	5,953	5,953	-	-	-	-	-	-	-	-	-	57,586
4f.4	Subtotal Period 4f Period-Dependent Costs	-	898	7	4	-	22	11,645	1,918	14,494	14,494	-	-	-	339	-	-	-	6,771	11	116,760
4f.0	TOTAL PERIOD 4f COST	-	898	7	4	-	22	27,018	6,356	34,304	34,304	-	-	-	339	-	-	-	6,771	218,115	119,880
PERIOD 4 TOTALS		10,212	82,259	29,745	15,232	-	79,899	201,446	91,177	509,970	506,933	-	3,037	-	892,971	2,046	406	2,450	49,996,540	1,348,923	1,982,874
PERIOD 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	Reactor Building	-	6,790	-	-	-	-	-	1,018	7,808	-	-	7,808	-	-	-	-	-	-	64,458	-
5b.1.1.2	Auxiliary Building	-	4,415	-	-	-	-	-	662	5,077	-	-	5,077	-	-	-	-	-	-	42,962	-
5b.1.1.3	Capital Improvements 2009	-	1,552	-	-	-	-	-	233	1,785	-	-	1,785	-	-	-	-	-	-	20,778	-
5b.1.1.4	Capital Improvements 2014	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	54	-
5b.1.1.5	Chemical Feed Building	-	39	-	-	-	-	-	6	45	-	-	45	-	-	-	-	-	-	482	-
5b.1.1.6	Diesel Generator Room	-	554	-	-	-	-	-	83	637	-	-	637	-	-	-	-	-	-	6,000	-
5b.1.1.7	Discharge Structure	-	23	-	-	-	-	-	3	26	-	-	26	-	-	-	-	-	-	190	-
5b.1.1.8	IRSF Building	-	819	-	-	-	-	-	123	941	-	-	941	-	-	-	-	-	-	8,924	-
5b.1.1.9	Lake Screen House	-	1,295	-	-	-	-	-	194	1,489	-	-	1,489	-	-	-	-	-	-	13,877	-
5b.1.1.10	Main Access Facility	-	462	-	-	-	-	-	69	532	-	-	532	-	-	-	-	-	-	5,396	-
5b.1.1.11	Miscellaneous Yard Structures	-	2,352	-	-	-	-	-	353	2,705	-	-	2,705	-	-	-	-	-	-	27,035	-
5b.1.1.12	New Service Building	-	2,166	-	-	-	-	-	325	2,491	-	-	2,491	-	-	-	-	-	-	23,587	-
5b.1.1.13	Outfall Structure	-	9	-	-	-	-	-	1	11	-	-	11	-	-	-	-	-	-	113	-

Table E-2
LaSalle County Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Demolition of Remaining Site Buildings (continued)																					
5b.1.1.14	River Screen House	-	387	-	-	-	-	-	58	445	-	-	445	-	-	-	-	-	-	4,231	-
5b.1.1.15	Security Modifications 2009	-	736	-	-	-	-	-	110	846	-	-	846	-	-	-	-	-	-	3,834	-
5b.1.1.16	Security Modifications 2014	-	40	-	-	-	-	-	6	46	-	-	46	-	-	-	-	-	-	528	-
5b.1.1.17	Service Building	-	1,778	-	-	-	-	-	267	2,045	-	-	2,045	-	-	-	-	-	-	21,582	-
5b.1.1.18	Sewage Treatment Plant	-	43	-	-	-	-	-	6	49	-	-	49	-	-	-	-	-	-	591	-
5b.1.1.19	Sewage Treatment Plant Upgrades	-	320	-	-	-	-	-	48	368	-	-	368	-	-	-	-	-	-	3,346	-
5b.1.1.20	Solid Radwaste Building	-	2,428	-	-	-	-	-	364	2,792	-	-	2,792	-	-	-	-	-	-	23,167	-
5b.1.1.21	Training Center	-	1,467	-	-	-	-	-	220	1,687	-	-	1,687	-	-	-	-	-	-	16,863	-
5b.1.1.22	Turbine Building	-	6,492	-	-	-	-	-	974	7,466	-	-	7,466	-	-	-	-	-	-	68,584	-
5b.1.1.23	Turbine Pedestal	-	2,536	-	-	-	-	-	380	2,917	-	-	2,917	-	-	-	-	-	-	22,592	-
5b.1.1.24	Wastewater Treatment Plant	-	73	-	-	-	-	-	11	83	-	-	83	-	-	-	-	-	-	911	-
5b.1.1	Totals	-	36,779	-	-	-	-	-	5,517	42,296	-	-	42,296	-	-	-	-	-	-	380,083	-
Site Closeout Activities																					
5b.1.2	BackFill Site	-	861	-	-	-	-	-	129	991	-	-	991	-	-	-	-	-	-	1,535	-
5b.1.3	Grade & landscape site	-	198	-	-	-	-	-	30	228	-	-	228	-	-	-	-	-	-	499	-
5b.1.4	Final report to NRC	-	-	-	-	-	-	87	13	100	100	-	-	-	-	-	-	-	-	-	654
5b.1	Subtotal Period 5b Activity Costs	-	37,839	-	-	-	-	87	5,689	43,615	100	-	43,515	-	-	-	-	-	-	382,117	654
Period 5b Additional Costs																					
5b.2.1	Site Restoration ISFSI	-	1,344	-	-	-	-	28	206	1,577	-	-	1,577	-	-	-	-	-	-	15,775	80
5b.2.2	Concrete Crushing	-	1,260	-	-	-	-	6	190	1,456	-	-	1,456	-	-	-	-	-	-	5,872	-
5b.2.3	Cofferdam Construction and Teardown	-	989	-	-	-	-	-	148	1,138	-	-	1,138	-	-	-	-	-	-	8,720	-
5b.2	Subtotal Period 5b Additional Costs	-	3,594	-	-	-	-	33	544	4,171	-	-	4,171	-	-	-	-	-	-	30,367	80
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	435	-	-	-	-	-	65	500	-	-	500	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	435	-	-	-	-	-	65	500	-	-	500	-	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																					
5b.4.2	Property taxes	-	-	-	-	-	-	998	100	1,098	-	-	1,098	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	5,685	-	-	-	-	-	853	6,538	-	-	6,538	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	324	49	373	-	-	373	-	-	-	-	-	-	-	-
5b.4.5	Site O&M Cost	-	-	-	-	-	-	329	49	379	-	-	379	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	1,618	243	1,861	-	-	1,861	-	-	-	-	-	-	-	27,619
5b.4.7	DOC Staff Cost	-	-	-	-	-	-	10,124	1,519	11,642	-	-	11,642	-	-	-	-	-	-	-	110,391
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	5,084	763	5,847	-	-	5,847	-	-	-	-	-	-	-	54,154
5b.4	Subtotal Period 5b Period-Dependent Costs	-	5,685	-	-	-	-	18,477	3,574	27,737	-	-	27,737	-	-	-	-	-	-	-	192,164
5b.0	TOTAL PERIOD 5b COST	-	47,552	-	-	-	-	18,598	9,873	76,023	100	-	75,922	-	-	-	-	-	-	412,483	192,898
PERIOD 5 TOTALS		-	47,552	-	-	-	-	18,598	9,873	76,023	100	-	75,922	-	-	-	-	-	-	412,483	192,898
TOTAL COST TO DECOMMISSION		**21,319**	**139,960**	**30,131**	**15,915**	**-**	**81,162**	**748,549**	**181,882**	**1,218,918**	**949,754**	**189,748**	**79,416**	**-**	**903,019**	**2,046**	**406**	**2,450**	**50,283,770**	**1,899,930**	**5,485,303**

Table E-2
LaSalle County Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2014 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			

TOTAL COST TO DECOMMISSION WITH 17.54% CONTINGENCY:	**$1,218,918**	**thousands of 2014 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 77.92% OR:	**$949,754**	**thousands of 2014 dollars**
SPENT FUEL MANAGEMENT COST IS 15.57% OR:	**$189,747**	**thousands of 2014 dollars**
NON-NUCLEAR DEMOLITION COST IS 6.52% OR:	**$79,416**	**thousands of 2014 dollars**
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):	**905,471**	**cubic feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**2,450**	**cubic feet**
TOTAL SCRAP METAL REMOVED:	**67,341**	**tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,899,930**	**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 F

ISFSI DECOMMISSIONING

Page

DECON and SAFSTOR Alternative F-2

Delayed DECON Alternative F-3

Table F-1
LaSalle County Station
ISFSI Decommissioning Cost Estimate
DECON and SAFSTOR Decommissioning Alternatives
(thousands of 2014 dollars)

Activity Description	Removal Costs	Packaging Costs	Transport Costs	LLRW Disposal Costs	Other Costs	Total Costs	Burial Volume Class A (cubic feet)	Craft Manhours	Oversight and Contractor Manhours
Decommissioning Contractor									
Planning (characterization, specs and procedures)	-	-	-	-	530	530	-	-	1,384
Decontamination (activated HSM disposition)	603	672	1,003	3,005	19	5,302	49,274	6,365	-
License Termination (radiological surveys)	-	-	-	-	2,634	2,634	-	22,827	-
Subtotal	**603**	**672**	**1,003**	**3,005**	**3,183**	**8,466**	**49,274**	**29,192**	**1,384**
Supporting Costs									
NRC and NRC Contractor Fees and Costs	-	-	-	-	384	384	-	-	776
Insurance	-	-	-	-	112	112	-	-	-
Property Taxes	-	-	-	-	326	326	-	-	-
Security Staff Cost	-	-	-	-	276	276	-	-	4,937
Oversight Staff Cost	-	-	-	-	324	324	-	-	3,740
Subtotal	**-**	**-**	**-**	**-**	**1,422**	**1,422**	**-**	**-**	**9,453**
Total (w/o contingency)	**603**	**672**	**1,003**	**3,005**	**4,606**	**9,889**	**49,274**	**29,192**	**10,837**
Total (w/25% contingency)						**12,361**			

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

Table F-2
LaSalle County Station
ISFSI Decommissioning Cost Estimate
Delayed DECON Decommissioning Alternative
(thousands of 2014 dollars)

Activity Description	Removal Costs	Packaging Costs	Transport Costs	LLRW Disposal Costs	Other Costs	Total Costs	Burial Volume Class A (cubic feet)	Craft Manhours	Oversight and Contractor Manhours
Decommissioning Contractor									
Planning (characterization, specs and procedures)	-	-	-	-	293	293	-	-	1,096
Decontamination (activated HSM disposition)	463	672	884	3,004	19	5,041	49,258	5,239	-
License Termination (radiological surveys)	-	-	-	-	1,666	1,666	-	14,645	-
Subtotal	**463**	**672**	**884**	**3,004**	**1,978**	**6,999**	**49,258**	**19,884**	**1,096**
Supporting Costs									
NRC and NRC Contractor Fees and Costs	-	-	-	-	384	384	-	-	776
Insurance	-	-	-	-	112	112	-	-	-
Property Taxes	-	-	-	-	326	326	-	-	-
Security Staff Cost	-	-	-	-	276	276	-	-	4,937
Oversight Staff Cost	-	-	-	-	324	324	-	-	3,740
Subtotal	**-**	**-**	**-**	**-**	**1,422**	**1,422**	**-**	**-**	**9,453**
Total (w/o contingency)	**463**	**672**	**884**	**3,004**	**3,400**	**8,422**	**49,258**	**19,884**	**10,549**
Total (w/25% contingency)						**10,527**			

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