

10 CFR 50.75(f)(1)

RS-09-157

November 16, 2009

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

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

Subject: Submittal of Byron Station Site-Specific SAFSTOR Decommissioning Cost Estimate

Reference: Letter from Keith R. Jury (Exelon Generation Company) to U.S. NRC, "Decommissioning Funding Assurance Plan," dated July 29, 2009

In the referenced letter, Exelon Generation Company, LLC (EGC) committed to provide a site-specific SAFSTOR Decommissioning Cost Estimate (DCE) for Byron Station, Units 1 and 2. The DCE is provided as Attachment 1, and, in accordance with 10 CFR 50.75(b)(1), is greater than the amount specified in 10 CFR 50.75(c) for both Unit 1 and Unit 2. The DCE has been performed assuming that Byron Station, Units 1 and 2 are granted license extension, since it is intended to reflect the most likely decommissioning scenario for Byron Station. However, this determination of the minimum funding requirement does not credit the additional 20-year license renewal period.

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

The costs presented in Attachment 2 occur 20 years earlier than those in the Attachment 1 DCE to model the current license expiration date. No credit is taken for license renewal. The cash flow analysis assumes a 2% annual real rate of return on trust fund dollars until plant shutdown and on remaining trust fund dollars through the decommissioning period. The site-specific estimate is based on a period of safe storage specifically described in the Attachment 1 DCE. The Attachment 1 DCE presents the results in 2009 dollars. These results are escalated to October 31, 2009 by using the latest site-specific escalation factor, which is re-calculated on an annual basis.

For Byron Station Units 1 and 2, the decommissioning funding assurance is provided by the prepayment method, coupled with an external trust fund, in accordance with 10 CFR 50.75(e)(1)(i). There are no additional amounts to be collected from ratepayers for Byron Station, nor are there any contracts relied upon to pursuant to 10 CFR 50.75(e)(1)(v).

Per the referenced letter, EGC will perform a calculation of radiological decommissioning funding assurance as of December 31, 2009 based on this site-specific SAFSTOR estimate. If this calculation does not show adequate decommissioning funding assurance, EGC will obtain approval from the EGC Board of Directors for, and establish an additional funding assurance mechanism by April 1, 2010.

There are no new regulatory commitments contained in this letter.

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

Respectfully,

A handwritten signature in black ink, appearing to read "Patrick R. Simpson", with a long horizontal flourish extending to the right.

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

- Attachments: 1. Byron Station, Units 1 and 2, Decommissioning Cost Estimate
2. Byron Station, Units 1 and 2, Radiological Decommissioning Projected SAFSTOR Cash Flow

ATTACHMENT 1

**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 2009

APPROVALS

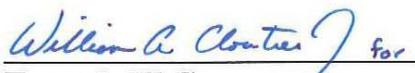
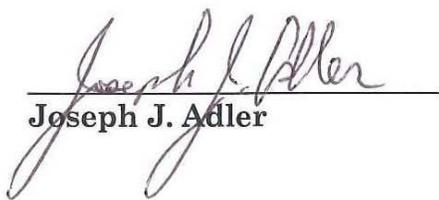
Project Manager	 _____ William A. Cloutier, Jr.	<u>09/14/2009</u> Date
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Quality Assurance Manager	 _____ Joseph J. Adler	<u>9/14/09</u> Date

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REVISION LOG

No.	CRA No.	Date	Item Revised	Reason for Revision
0		09-14-2009		Original Issue

EXECUTIVE SUMMARY

This report presents estimates of the cost to decommission the Byron Nuclear Power Station (Byron) for the identified decommissioning scenarios following a scheduled cessation of plant operations. The analysis relies upon site-specific, technical information, developed in an evaluation in 2004,^[1] and updated to reflect current assumptions pertaining to the disposition of the nuclear units and relevant industry experience in undertaking such projects. Additionally, the plant systems inventory was completely regenerated from the station's site-specific database. The updated estimates are designed to provide Exelon Generation Company LLC (Exelon) with sufficient information to assess its financial obligations, as they pertain to the eventual decommissioning of the nuclear station.

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

The estimates are based on numerous fundamental assumptions, including regulatory requirements, project contingencies, low-level radioactive waste disposal practices, high-level radioactive waste management options, and site restoration requirements. The estimates incorporate a minimum cooling period of approximately five and one-half years for the spent fuel 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 the ISFSI to await transfer to a DOE facility (the fuel is assumed to remain in the storage pool for the Delayed DECON scenario and transferred directly from the pool to DOE). The estimates also include the dismantling of non-essential structures and limited restoration of the site.

Alternatives and Regulations

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

¹ "Decommissioning Cost Analysis for the Byron Nuclear Power Station," Document No. E16-1455-012, Rev. 0, TLG Services, Inc., January 2005

² U.S. Code of Federal Regulations, Title 10, Parts 30, 40, 50, 51, 70 and 72 "General Requirements for Decommissioning Nuclear Facilities," Nuclear Regulatory Commission, Federal Register Volume 53,

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

DECON is defined as "the alternative in which the equipment, structures, and portions of a facility and site containing radioactive contaminants are removed or decontaminated to a level that permits the property to be released for unrestricted use shortly after cessation of operations."^[3]

SAFSTOR is defined as "the alternative in which the nuclear facility is placed and maintained in a condition that allows the nuclear facility to be safely stored and subsequently decontaminated (deferred decontamination) to levels that permit release for unrestricted use."^[4] Decommissioning is to be completed within 60 years, although longer time periods will be considered when necessary to protect public health and safety.

ENTOMB is defined as "the alternative in which radioactive contaminants are encased in a structurally long-lived material, such as concrete; the entombed structure is appropriately maintained and continued surveillance is carried out until the radioactive material decays to a level permitting unrestricted release of the property."^[5] As with the SAFSTOR alternative, decommissioning is currently required to be completed within 60 years.

The 60-year restriction has limited the practicality for the ENTOMB alternative at commercial reactors that generate significant amounts of long-lived radioactive material. In 1997, the Commission directed its staff to re-evaluate this alternative and identify the technical requirements and regulatory actions that would be necessary for entombment to become a viable option. The resulting evaluation provided several recommendations, however, rulemaking has been deferred based upon several factors (e.g., no licensee has committed to pursuing the entombment option, the unresolved issues associated with the disposition of greater-than-Class C material (GTCC), and the NRC's current

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

³ Ibid. Page FR24022, Column 3

⁴ Ibid.

⁵ Ibid. Page FR24023, Column 2

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]

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 2062. 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 2062).

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

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.

Methodology

The methodology used to develop the estimates described within this document follows the basic approach originally presented in the cost estimating guidelines ^[8] developed by the Atomic Industrial Forum (now Nuclear Energy Institute). This reference describes a unit factor method for determining decommissioning activity costs. The unit factors used in this analysis incorporate site-specific costs and the latest available information on worker productivity in decommissioning.

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."^[9] The cost elements in the estimates are based on ideal conditions; therefore, the types of unforeseeable events that are almost certain to occur in decommissioning, based on industry experience, are addressed through a percentage contingency applied on a line-item basis. This contingency factor is a nearly universal element in all large-

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

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

scale construction and demolition projects. It should be noted that contingency, as used in this analysis, does not account for price escalation and inflation in the cost of decommissioning over the remaining operating life of the station.

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

Low-Level Radioactive Waste Disposal

The contaminated and activated material generated in the decontamination and dismantling of a commercial nuclear reactor is classified as low-level (radioactive) waste, although not all of the material is suitable for “shallow-land” disposal. With the passage of the “Low-Level Radioactive Waste Policy Act” in 1980,^[10] and its Amendments of 1985,^[11] the states became ultimately responsible for the disposition of low-level radioactive waste generated within their own borders.

Until recently, there were two facilities available to Exelon for the disposal of low-level radioactive waste generated by Byron. As of July 1, 2008, however, the facility in Barnwell, South Carolina was closed to generators outside the Atlantic Compact (comprised of the states of Connecticut, New Jersey and South Carolina). This leaves the facility in Clive, Utah, operated by EnergySolutions, as the only available destination for low-level radioactive waste requiring controlled disposal.

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

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.

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

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

A significant portion of the metallic waste generated during decommissioning may only be potentially contaminated by radioactive materials. This waste can be surveyed on site or shipped off site to licensed facilities for further analysis, for processing and/or for conditioning/recovery. Reduction in the volume of low-level radioactive waste requiring disposal in a licensed low-level radioactive waste disposal facility can be accomplished through a variety of methods, including analyses and surveys or decontamination to eliminate the portion of waste that does not require disposal as radioactive waste, compaction, incineration or metal melt. The estimates reflect the savings from waste recovery/volume reduction.

High-Level Radioactive Waste Management

Congress passed the “Nuclear Waste Policy Act”^[12] (NWPA) in 1982, assigning the responsibility for disposal of the spent nuclear fuel created by the commercial nuclear generating plants to the DOE. Two permanent disposal facilities were envisioned, as well as an interim storage facility. To recover the cost, the legislation created a Nuclear Waste Fund through which money is collected from the sale of electricity generated by the power plants. The NWPA, along with the individual disposal contracts with the utilities, specified that the DOE was to begin accepting spent fuel by January 31, 1998.

Since the original legislation, the DOE has announced several delays in the program schedule. By January 1998, the DOE had failed to initiate the disposal of spent nuclear fuel and high level waste, as required by the NWPA and the utility contracts. As a result, utilities initiated legal action against the DOE. While legal actions continue, the DOE has no plans to receive spent fuel prior to completing the construction of its geologic repository.

Operation of DOE’s yet-to-be constructed repository is contingent upon the review and approval of the facility’s license application by the NRC and the successful resolution of pending litigation. The DOE submitted its license application to the NRC on June 3, 2008, seeking authorization to construct the repository at Yucca Mountain, Nevada. The NRC formally docketed the DOE’s license application on September 8, 2008, triggering a three-year deadline, with a possible one-year extension, set by Congress for the NRC to decide on whether to authorize construction.

¹² “Nuclear Waste Policy Act of 1982 and Amendments,” U.S. Department of Energy’s Office of Civilian Radioactive Management, 1982

Construction, if adequately funded, could take five to six years after the DOE receives authorization to proceed. For purposes of this analysis, Exelon has assumed that DOE would begin to receive commercial spent fuel in 2018.

Once the repository is operational, fuel acceptance will be prioritized and spent fuel assemblies will need to meet certain acceptance criteria, including heat output. These conditions require that the fuel discharged upon the cessation of operations be actively cooled and stored for a minimum period at the generating site prior to transfer (a minimum of five years as defined in 10CFR§961 for standard fuel). As such, the NRC requires that licensees establish a program to manage and provide funding for the management of all irradiated fuel at the reactor until title of the fuel is transferred to the Secretary of Energy, pursuant to 10CFR§50.54(bb).¹³ This funding requirement is fulfilled through inclusion of certain cost elements in the decommissioning estimates, for example, associated with the isolation and continued operation of the plant's fuel storage pool and/or ISFSI.

At shutdown, the plant's storage pool is expected to contain freshly discharged assemblies (from the most recent refueling cycles) as well as the final reactor cores. In the DECON and SAFSTOR scenarios the assemblies are packaged into multipurpose canisters for transfer to an existing ISFSI. A five and one-half year cooling period following the cessation of Unit 2 operations is provided for the final core to meet the conditions for dry storage.

Once the storage pool is emptied, the fuel handling building can be either decontaminated and dismantled or prepared for long-term storage. The ISFSI, which can be operated under the station's general license, will be expanded to accommodate the dry storage casks needed to off-load the wet storage pool. In the Delayed DECON scenario, the storage pool remains operational and used for the interim storage of the fuel. No additional dry storage capacity is assumed to be constructed for decommissioning. The transfer of spent fuel to DOE is performed first from the storage pool and is completed from the ISFSI.

The DOE's generator allocation/receipt schedules are based upon the oldest fuel receiving the highest priority. With a large fleet of reactors, Exelon is able to re-assign allocations between its units to minimize on-site storage costs. Assuming spent fuel from the older units is given priority and with a maximum rate of transfer of 3,000 metric tons of uranium (MTU)/year, the assemblies residing in the Byron storage pool at the time of shutdown would be scheduled for pickup in the years 2057 through 2062 (assuming the cessation of plant operations in 2044 and

¹³ U.S. Code of Federal Regulations, Title 10, Part 50, "Domestic Licensing of Production and Utilization Facilities," Subpart 54 (bb), "Conditions of Licenses"

2046 for Units 1 and 2, respectively). This equates to 92 multi-purpose canisters (at 32 assemblies per canister), in addition to the 34 on the pad from operations.

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, contrary to its contractual obligation, the DOE has not performed.

Site Restoration

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

Summary

The costs to decommission 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.

**SUMMARY OF DECOMMISSIONING COST ELEMENTS
DECON
(thousands of 2009 dollars)**

Cost Element	Unit 1	Unit 2	Total
Decontamination	13,495	20,267	33,761
Removal	101,779	140,577	242,355
Packaging	15,566	14,027	29,594
Transportation	11,230	9,271	20,501
Waste Disposal	60,756	58,722	119,478
Off-site Waste Processing	3,959	4,044	8,002
Program Management ^[1]	270,064	320,213	590,277
Spent Fuel Pool Isolation	0	11,143	11,143
Spent Fuel Management ^[2]	76,838	86,598	163,436
Insurance and Regulatory Fees	12,357	10,476	22,834
Energy	6,029	6,290	12,320
Characterization and Licensing Surveys	16,792	14,659	31,452
Property Taxes	24,861	23,752	48,613
Miscellaneous Equipment	6,307	6,579	12,886
Site O&M	2,688	2,399	5,087
Total ^[3]	622,721	729,017	1,351,738

Cost Element			
NRC License Termination	448,221	521,395	969,616
Spent Fuel Management	108,376	118,136	226,513
Site Restoration	66,124	89,486	155,609
Total ^[3]	622,721	729,017	1,351,738

^[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

**SUMMARY OF DECOMMISSIONING COST ELEMENTS
DELAYED DECON**
(thousands of 2009 dollars)

Cost Element	Unit 1	Unit 2	Total
Decontamination	11,759	17,304	29,063
Removal	100,477	138,090	238,567
Packaging	12,021	10,475	22,496
Transportation	9,958	7,755	17,713
Waste Disposal	42,207	39,128	81,335
Off-site Waste Processing	4,467	4,919	9,386
Program Management ^[1]	325,510	363,716	689,226
Spent Fuel Pool Isolation	0	11,143	11,143
Spent Fuel Management ^[2]	24,955	27,878	52,833
Insurance and Regulatory Fees	17,808	15,425	33,232
Energy	9,864	10,089	19,953
Characterization and Licensing Surveys	18,262	16,129	34,391
Property Taxes	29,836	28,729	58,566
Miscellaneous Equipment	10,020	10,203	20,223
Site O&M	3,987	3,698	7,685
Total ^[3]	621,131	704,681	1,325,812

Cost Element			
NRC License Termination	420,024	500,309	920,333
Spent Fuel Management	133,669	113,664	247,333
Site Restoration	67,438	90,708	158,146
Total ^[3]	621,131	704,681	1,325,812

^[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

**SUMMARY OF DECOMMISSIONING COST ELEMENTS
SAFSTOR
(thousands of 2009 dollars)**

Cost Element	Unit 1	Unit 2	Total
Decontamination	11,611	17,044	28,655
Removal	104,294	141,956	246,250
Packaging	11,916	10,337	22,253
Transportation	9,695	7,335	17,030
Waste Disposal	40,477	37,125	77,601
Off-site Waste Processing	4,543	4,992	9,535
Program Management ^[1]	368,123	411,270	779,393
Spent Fuel Pool Isolation	0	11,143	11,143
Spent Fuel Management ^[2]	75,159	84,919	160,078
Insurance and Regulatory Fees	35,666	32,819	68,485
Energy	12,550	12,773	25,323
Characterization and Licensing Surveys	18,262	16,129	34,391
Property Taxes	48,939	47,832	96,771
Miscellaneous Equipment	15,653	16,237	31,890
Site O&M	8,981	8,691	17,672
Total ^[3]	765,867	860,604	1,626,471

Cost Element			
NRC License Termination	588,038	638,996	1,227,034
Spent Fuel Management	110,342	130,850	241,192
Site Restoration	67,487	90,758	158,245
Total ^[3]	765,867	860,604	1,626,471

^[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

1. INTRODUCTION

This report presents estimates of the cost to decommission the Byron Nuclear Power Station (Byron), for the scenarios described in Section 2, following a scheduled cessation of plant operations. The analysis relies upon site-specific, technical information from an earlier evaluation prepared in 2004,^[1] updated to reflect current assumptions pertaining to the disposition of the nuclear units and relevant industry experience in undertaking such projects. The current estimates are designed to provide Exelon Generation Company LLC (Exelon), with sufficient information to assess their financial obligations, as they pertain to the eventual decommissioning of the nuclear units. It is not a detailed engineering document, but a financial analysis prepared in advance of the detailed engineering that will be required to carry out the decommissioning

1.1 OBJECTIVES OF STUDY

The objectives of this study are to prepare comprehensive estimates of the cost to decommission 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 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 3,587 Megawatts thermal

(MWth). The corresponding electrical output is approximately 1,242 megawatts electric (MWe) for both Units 1 and 2.

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

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

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 new amendments allow for greater public participation and better define the transition process from operations to decommissioning.

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

1.3.1 Nuclear Waste Policy Act

Congress passed the “Nuclear Waste Policy Act”^[7] (NWPA) in 1982, assigning the responsibility for disposal of the spent nuclear fuel created by the commercial nuclear generating plants to the DOE. Two permanent disposal facilities were envisioned, as well as an interim storage facility. To recover the cost, the legislation created a Nuclear Waste Fund through which money is collected from the sale of electricity generated by the power plants. NWPA, along with the individual disposal contracts with the utilities, specified that the DOE was to begin accepting spent fuel by January 31, 1998.

Since the original legislation, the DOE has announced several delays in the program schedule. By January 1998, the DOE had failed to initiate the disposal of spent nuclear fuel and high level waste, as required by the NWPA and utility contracts. Delays continue and, as a result, generators have initiated legal action against the DOE in an attempt to resolve the impasse.^[8]

Operation of DOE's yet-to-be constructed repository is contingent upon the review and approval of the facility's license application by the NRC and the successful resolution of pending litigation. The DOE submitted its license application to the NRC on June 3, 2008, seeking authorization to construct the repository at Yucca Mountain, Nevada. The NRC formally docketed the DOE's license application on September 8, 2008, triggering a three-year deadline, with a possible one-year extension, set by Congress for the NRC to decide on whether to authorize construction.

Construction, if adequately funded, could take five to six years after the DOE receives authorization to proceed. For purposes of this analysis, Exelon has assumed that DOE would begin to receive commercial spent fuel in 2018.

Once the repository is operational, fuel acceptance will be prioritized and spent fuel assemblies will need to meet certain acceptance criteria, including heat output. These conditions require that the fuel discharged upon the cessation of operations be actively cooled and stored for a minimum period at the generating site prior to transfer (five years as defined in 10CFR§961 for standard fuel). As such, the NRC requires that licensees establish a program to manage and provide funding for the management of all irradiated fuel at the reactor until title of the fuel is transferred to the Secretary of Energy, pursuant to 10CFR§50.54(bb).^[9] This funding requirement is fulfilled through inclusion of certain cost elements in the decommissioning estimate, for example, associated with the isolation and continued operation of the spent fuel pool and ISFSI.

At shutdown, the fuel storage pool is expected to contain freshly discharged assemblies (from the most recent refueling cycles) as well as the final reactor core. Over the next five and one-half years (from the cessation of Unit 2 operations) the assemblies are packaged into multipurpose canisters for transfer to the ISFSI. It is assumed that this period provides the necessary cooling for the final core to meet on site storage system requirements for decay heat.

An independent spent fuel storage installation (ISFSI) has been constructed to support plant operations. It is expected that this facility will also be available to support decommissioning operations. In two of the scenarios evaluated, the ISFSI is expanded to accommodate the inventory of spent fuel residing in the plant's storage pool at the conclusion of the required cooling period. Once emptied, the fuel handling building can be either decontaminated and dismantled or prepared for long-term storage.

In the Delayed DECON scenario, the storage pool remains operational and is used for the interim storage of the fuel, concurrent with the ISFSI operations.

The DOE's generator allocation/receipt schedules are based upon the oldest fuel receiving the highest priority. For purposes of this analysis, the acceptance of commercial spent fuel by the DOE is expected to begin in 2018. Given this scenario and an anticipated rate of transfer, spent fuel is projected to remain at the Byron site for approximately 16 years after the cessation of operations at Unit 2. Consequently, costs are included within the analysis for the continued operation of the storage pool and the expansion of the ISFSI, as required, and for the long-term caretaking of the spent fuel at the site until the year 2062.

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, contrary to its contractual obligation, the DOE has not performed.

1.3.2 Low-Level Radioactive Waste Acts

The contaminated and activated material generated in the decontamination and dismantling of a commercial nuclear reactor is classified as low-level (radioactive) waste, although not all of the material is suitable for "shallow-land" disposal. Congress passed the "Low-Level Radioactive Waste Policy Act" in 1980,^[10] declaring the states as being ultimately responsible for the disposition of low-level radioactive waste generated within their own borders. The federal law encouraged the formation of regional groups or compacts to implement this objective safely, efficiently, and economically, and set a target date of 1986 for implementation. After little progress, the "Low-Level Radioactive Waste Policy Amendments Act of 1985,"^[11] extended the implementation schedule, with specific milestones and stiff sanctions for non-compliance. However, to date, no new compact facilities have been successfully sited, licensed, and constructed.

Until recently, there were two facilities available to Exelon for the disposal of low-level radioactive waste generated by Byron. As of July 1,

2008, however, the facility in Barnwell, South Carolina was closed to generators outside the Atlantic Compact (comprised of the states of Connecticut, New Jersey and South Carolina). This leaves the facility in Clive, Utah, operated by EnergySolutions, as the only available destination for low-level radioactive waste requiring controlled disposal.

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

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.

A significant portion of the metallic waste generated during decommissioning may only be potentially contaminated by radioactive materials. This waste can be surveyed on site or shipped off site to licensed facilities for further analysis, for processing and/or for conditioning/recovery. Reduction in the volume of low-level radioactive waste requiring disposal in a licensed low-level radioactive waste disposal facility can be accomplished through a variety of methods, including analyses and surveys or decontamination to eliminate the portion of waste that does not require disposal as radioactive waste, compaction, incineration or metal melt. The estimates reflect the savings from waste recovery/volume reduction.

1.3.3 Radiological Criteria for License Termination

In 1997, the NRC published Subpart E, "Radiological Criteria for License Termination,"^[12] 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).^[13] An additional limit of 4 millirem per year, as defined in 40 CFR §141.16, is applied to drinking water.^[14]

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)^[15] 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 2062. 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 2062).
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 deactivation and closure. During the first phase, notification is to be provided to the NRC certifying the permanent cessation of operations and the removal of fuel from the reactor vessel. The licensee would then be prohibited from reactor operation.

The second phase encompasses activities during the storage period or during major decommissioning activities, or a combination of the two. The third phase pertains to the activities involved in license termination. The decommissioning estimates developed for 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 to cease operations, provides a description of the licensee's planned decommissioning activities, a timetable, and the associated financial requirements of the intended decommissioning program. Upon receipt of the PSDAR, the NRC will make the document available to the public for comment in a local meeting to be held in the vicinity of the reactor site. Ninety days following submittal and NRC receipt of the PSDAR, the licensee may begin to perform major decommissioning activities under a modified 10 CFR §50.59 procedure, i.e., without specific NRC approval. Major activities are defined as any activity that results in permanent removal of major radioactive components, permanently modifies the structure of the containment, or results in dismantling components (for shipment) containing GTCC, as defined by 10 CFR §61. Major components are further defined as comprising the reactor vessel and internals, large bore reactor 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 2057 and to be completed by the end of the year 2062.

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 in the decontamination and dismantling to a central processing area. Material certified to be free of contamination is released for unrestricted disposition (e.g., as scrap, recycle, or general disposal). Contaminated material is characterized and segregated for additional off-site processing (disassembly, chemical cleaning, volume reduction, and waste treatment), and/or packaged for controlled disposal at a low-level radioactive waste disposal facility.

Incorporated into the LTP is the Final Survey Plan. This plan identifies the radiological surveys to be performed once the decontamination activities are completed and is developed using the guidance provided in the “Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM).”^[16] This document incorporates the statistical approaches to survey design and data interpretation used by the EPA. It also identifies commercially available instrumentation and procedures for conducting radiological surveys. Use of this guidance ensures that the surveys are conducted in a manner that provides a high degree of confidence that applicable NRC criteria are satisfied. Once the survey is complete, the results are provided to the NRC in a format that can be verified. The NRC then reviews and evaluates the information, performs an independent confirmation of radiological site conditions, and makes a determination on final termination of the license.

The NRC will terminate the operating license 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 facility is suitable for release.

2.1.3 Period 3 - Site Restoration

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

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

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

restored and the plant area graded as required to prevent ponding and inhibit the refloating of subsurface materials.

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 termination of the §50 operating license. Assuming the DOE starts accepting fuel in 2018, transfer of spent fuel from Byron is anticipated to begin in 2057 and continue through the year 2062.

At the conclusion of the spent fuel transfer process, the ISFSI will be decommissioned. The Commission will terminate the §72 license when it determines that the remediation of the ISFSI has been performed in accordance with an ISFSI license termination plan and that the final radiation survey and associated documentation demonstrate that the facility is suitable for release. Once the requirements are satisfied, the NRC can terminate the license for the ISFSI.

The assumed design for the ISFSI is based upon the use of a multi-purpose canister and a concrete overpack for pad storage. For purposes of this cost analysis, it is assumed that once the inner canisters containing the spent fuel assemblies have been removed, any required decontamination performed, 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 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. 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, contaminated systems with decontamination as required for future maintenance and inspection.
- Preparing lighting and alarm systems whose continued use is required; de-energizing portions of fire protection, electric power, and HVAC systems whose continued use is not required.
- Cleaning of the loose surface contamination from building access pathways.
- Performing an interim radiation survey of plant, posting warning signs where appropriate.
- Erecting physical barriers and/or securing all access to radioactive or contaminated areas, except as required for inspection and maintenance.
- Installing security and surveillance monitoring equipment and relocating security fence around secured structures, as required.

2.2.2 Period 2 - Dormancy

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

An environmental surveillance program is carried out during the dormancy period to ensure that releases of radioactive material to the environment are prevented and/or detected and controlled. Appropriate

emergency procedures are established and initiated for potential releases that exceed prescribed limits. The environmental surveillance program constitutes an abbreviated version of the program in effect during normal plant operations.

Security during the dormancy period is conducted primarily to prevent unauthorized entry and to protect the public from the consequences of 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), 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 2004. 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,"^[17] and the DOE "Decommissioning Handbook."^[18] 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.^[19]

This analysis reflects lessons learned from TLG's involvement in the Shippingport Station Decommissioning Project, completed in 1989, as well as the decommissioning of the Cintichem reactor, hot cells, and associated facilities, completed in 1997. In addition, the planning and engineering for the Pathfinder, Shoreham, Rancho Seco, Trojan, Yankee Rowe, Big Rock Point, Maine Yankee, Humboldt Bay-3, Oyster Creek, Connecticut Yankee, and San

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

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

Work Difficulty Factors

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

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

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

Scheduling Program Durations

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

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

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

3.3 PLANT INVENTORY

The basis for any site-specific decommissioning estimate is the plant inventory. The inventory dictates the decontamination, removal, packaging, transport and disposal requirements and the associated performance cost. Material disposition requirements impact the project schedule and are reflected in the level of management needed to support the project. Consequently, it is important to delineate the inventory of material and components to be dispositioned during decommissioning, which in most instances is a subset of the total quantity of material placed during construction. In addition, the plant inventory needs to be defined in units that are compatible with the intended removal methods. For example, while sample panels may contain hundreds of subassemblies, the panels are removed in bulk. The disposition cost may be based upon the total weight of the panel and the lifting devices required rather than by disassembly of the individual components. In contrast to plant operations, the most important parameter in decommissioning can be the component's mass or materials of construction and not its design performance.

3.3.1 Plant Systems

Plant system inventories were regenerated for purposes of this analysis from a plant data base, piping and instrument drawings and from other available information. Where new information was not available, the basis for the previous estimate was reviewed and, once validated, used to supplement the new inventory.

3.3.2 Plant Structures

Structure inventories for the major power block structures relied upon the data from the 2004 study. A site inspection conducted in 2009 identified new buildings and security improvements at the site since the previous study was performed. These structures and site improvements were incorporated into the current estimate.

3.4 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.
- Some program management and support costs, particularly costs associated with the more senior positions, can be avoided with two reactors undergoing decommissioning simultaneously. As a result, the estimate is based on a "lead" unit that includes these senior positions, and a "second" unit that excludes these positions. The designation as lead is based on the unit undertaking the most complex tasks (for instance vessel segmentation) or performing tasks for the first time.
- The final radiological survey schedule is also affected by a two-unit decommissioning schedule. It would be considered impractical to try to complete the final status survey of Unit 1, while Unit 2 still has ongoing radiological remediation work and waste handling in process. As such, the transfer of the spent fuel from the storage 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.

3.5 FINANCIAL COMPONENTS OF THE COST MODEL

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

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

3.5.1 Contingency

The activity- and period-dependent costs are combined to develop the total decommissioning cost. A contingency is then applied on a line-item basis, using one or more of the contingency types listed in the AIF/NESP-036 study. "Contingencies" are defined in the American Association of Cost Engineers "Project and Cost Engineers' Handbook"^[20] as "specific provision for unforeseeable elements of cost within the defined project scope; particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur." The cost elements in this analysis are based upon ideal conditions and maximum efficiency; therefore, consistent with industry practice, a contingency factor has been applied. In the AIF/NESP-036 study, the types of unforeseeable events that are likely to occur in decommissioning are discussed and

guidelines are provided for percentage contingency in each category. It should be noted that contingency, as used in this analysis, does not account for price escalation and inflation in the cost of decommissioning over the remaining operating life of the station.

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

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

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

Contingency funds are an integral part of the total cost to complete the decommissioning process. Exclusion of this component puts at risk a

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

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

The contingency values are applied to the appropriate components of the estimates on a line item basis. A composite value is then reported at the end of each estimate. For example, the composite contingency values reported for the DECON alternative are 18.2% and 18.1% for Units 1 and 2, respectively. Values for the other alternatives are delineated within the detailed cost tables in Appendices D and E.

3.5.2 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

are revisited periodically and addressed through repeated revisions or updates of the base estimate.

3.6 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.

3.6.1 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 fulfilled through inclusion of certain high-level waste cost elements within the estimate, as described below.

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

In 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 2018, fuel is projected to be removed from the Byron site by the year 2062. 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. The DOE submitted its license application to the NRC on June 3, 2008, seeking authorization to construct the repository at Yucca Mountain, Nevada. The NRC formally docketed the DOE's license application on September 8, 2008, triggering a three-year deadline, with a possible one-year extension, set by Congress for the NRC to decide on whether to grant a construction authorization.

Construction, if adequately funded, could take five to six years after the DOE receives authorization to proceed. As such, the spent fuel management plan described in this section is predicated upon the DOE initiating the pickup of commercial fuel in the year 2018.

Spent Fuel Management Model

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

The DOE's repository program assumes that spent fuel will be accepted for disposal from the nation's commercial nuclear plants in the order (the "queue") in which it was removed from service ("oldest fuel first").^[21] 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.^[22]

ISFSIs are constructed as necessary to maintain full-core discharge capability at the individual sites. Once the DOE begins repository operations, queue allocations are used to ship spent fuel from Exelon's operating sites. Spent fuel shipments are then made from decommissioning sites in the order of retirement.

Canister Design

The design and capacity of the ISFSI is based upon a vertical cask system, with a 32-fuel assemblies capacity, is assumed for future cask acquisitions. A unit cost of \$500,000 is used for pricing the internal multi-purpose canister (MPC), with an additional cost of \$250,000 for the concrete storage module. 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 \$763,000 and \$88,000 are used for operation and maintenance of each spent fuel pool and the ISFSI, respectively.

ISFSI Design Considerations

A multi-purpose (storage and transport) dry shielded storage canister with a vertical, reinforced concrete storage module is used as a basis for the cost analysis. The final core off load from each unit, equivalent to 14 modules, are assumed to have some level of neutron-induced activation as a result of the long-term storage of the fuel (i.e., to levels exceeding free-release limits). The cost of the disposition of this material, as well as the demolition of the ISFSI facility, is included in the estimate.

3.6.2 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, the DOE has indicated it will accept this waste for disposal at the future high-level waste repository.^[23] However, the DOE has not been forthcoming with an acceptance criteria or disposition schedule for this material, and numerous questions remain as to the ultimate disposal cost and waste form requirements. As such, for purposes of this study, the GTCC has been packaged and disposed of as high-level waste, at a cost equivalent to that envisioned for the spent fuel. It is not anticipated that the DOE would accept this waste prior to completing the transfer of spent fuel. Therefore, until such time the DOE is ready to accept GTCC waste, it is reasonable to assume that this material would remain in storage at the 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.

3.6.3 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.

3.6.4 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.

3.6.5 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.^[24] 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.^[25]

3.6.6 Low-Level Radioactive Waste Disposal

To the greatest extent practical, metallic material generated in the decontamination and dismantling processes is treated to reduce the total volume requiring controlled disposal. The treated material, meeting the regulatory and/or site release criterion, is released as scrap, requiring no further cost consideration. Conditioning and recovery of the waste stream is performed off site at a licensed processing center.

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

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

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

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

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.

3.6.7 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.

3.7 ASSUMPTIONS

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

3.7.1 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.

3.7.2 Labor Costs

The craft labor required to decontaminate and dismantle the nuclear units will be acquired through standard site contracting practices. The current cost of labor at the site is used as an estimating basis. Costs for site administration, operations, construction, and maintenance personnel are based upon average salary information provided by Exelon or from comparable industry information.

Exelon will hire a Decommissioning Operations Contractor (DOC) to manage the decommissioning. The owner will provide site security, radiological health and safety, quality assurance and overall site administration during the decommissioning and demolition phases. Contract personnel will provide engineering services (e.g., for preparing the activity specifications, work procedures, activation, and structural analyses) under the direction of Exelon.

3.7.3 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., ¹³⁷Cs, ⁹⁰Sr, 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.^[26] 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^[27] and CR-0672,^[28] and benchmarked to the long-lived values from CR-3474.

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

Activation of the reactor building structures is confined to the biological shield. More extensive activation (at very low levels) of the interior structures within containment has been detected at several reactors and the owners have elected to dispose of the affected material at a controlled facility rather than reuse the material as fill on site or send it to a landfill. The ultimate disposition of the material removed from the reactor building will depend upon the site release criteria selected, as well as the designated end use for the site.

3.7.4 General

Transition Activities

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

- Drain and collect fuel oils, lubricating oils, and transformer oils for recycle and/or sale.
- Drain and collect acids, caustics, and other chemical stores for recycle and/or sale.

- Processes operating waste inventories, i.e., the estimates do not address the disposition of any legacy wastes; the disposal of operating wastes during this initial period is not considered a decommissioning expense.

Scrap and Salvage

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

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

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

Energy

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

Insurance

Costs for continuing coverage (nuclear liability and property insurance) following cessation of plant operations and during decommissioning are included and based upon current operating premiums. Reductions in premiums, throughout the decommissioning process, are based upon the guidance and the limits for coverage defined in the NRC's proposed rulemaking "Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors."^[29] NRC's financial protection requirements are based on various reactor (and spent fuel) configurations.

Taxes

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

3.8 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 2009 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, 2009 dollars)**

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2044	9,133	1,439	180	7	2,355	13,114
2045	56,857	9,987	1,238	1,475	15,141	84,699
2046	63,860	21,836	1,374	21,149	17,336	125,555
2047	56,336	21,543	964	22,529	12,966	114,338
2048	42,156	11,429	796	2,575	3,372	60,328
2049	42,041	11,397	794	2,568	3,363	60,163
2050	14,800	3,810	261	849	2,061	21,781
2051	1,458	94	0	7	1,423	2,981
2052	2,474	133	9	8	1,460	4,084
2053	23,533	2,845	181	22	1,965	28,546
2054	17,176	7,302	106	0	1,297	25,881
2055	17,176	7,302	106	0	1,297	25,881
2056	4,983	1,400	20	0	1,377	7,782
2057	2,191	323	0	0	1,392	3,906
2058	2,514	1,294	0	0	1,392	5,200
2059	2,514	1,294	0	0	1,392	5,200
2060	2,520	1,294	0	0	1,396	5,209
2061	2,514	1,294	0	0	1,392	5,200
2062	2,514	1,323	0	0	2,350	6,188
2063	1,636	1,088	0	112	13,849	16,685
Total	368,388	108,428	6,029	51,301	88,575	622,721

**TABLE 3.1b
BYRON NUCLEAR POWER STATION, UNIT 2
DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2009 dollars)**

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2046	7,362	1,427	162	6	2,087	11,045
2047	49,529	10,778	1,221	1,215	17,534	80,276
2048	64,318	22,563	1,395	17,906	22,063	128,245
2049	66,160	22,460	967	19,648	11,207	120,442
2050	60,711	13,811	794	3,608	3,867	82,791
2051	60,711	13,811	794	3,608	3,867	82,791
2052	48,602	8,109	544	3,226	3,723	64,203
2053	27,409	4,030	181	22	1,781	33,424
2054	22,154	10,841	106	0	1,298	34,398
2055	22,154	10,841	106	0	1,298	34,398
2056	5,938	2,079	20	0	1,378	9,415
2057	2,191	323	0	0	1,392	3,906
2058	2,514	1,294	0	0	1,392	5,200
2059	2,514	1,294	0	0	1,392	5,200
2060	2,520	1,294	0	0	1,396	5,209
2061	2,514	1,294	0	0	1,392	5,200
2062	2,514	1,323	0	0	2,350	6,188
2063	1,636	1,088	0	112	13,849	16,685
Total	451,453	128,659	6,290	49,351	93,264	729,017

**TABLE 3.2a
BYRON NUCLEAR POWER STATION, UNIT 1
DELAYED DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2009 dollars)**

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2044	7,059	187	180	7	440	7,873
2045	43,018	2,722	1,059	357	4,711	51,867
2046	11,154	1,995	490	533	6,649	20,821
2047	5,018	259	212	27	2,643	8,159
2048	5,031	260	212	27	2,650	8,181
2049	5,018	259	212	27	2,643	8,159
2050	5,018	259	212	27	2,643	8,159
2051	5,018	259	212	27	2,643	8,159
2052	5,031	260	212	27	2,650	8,181
2053	5,018	259	212	27	2,643	8,159
2054	5,018	259	212	27	2,643	8,159
2055	5,018	259	212	27	2,643	8,159
2056	5,031	260	212	27	2,650	8,181
2057	5,449	1,553	212	27	2,643	9,884
2058	6,743	5,434	212	27	2,643	15,059
2059	4,945	2,845	158	27	2,018	9,992
2060	3,181	256	106	26	1,414	4,983
2061	3,352	794	106	26	1,410	5,688
2062	3,707	1,552	108	26	1,409	6,803
2063	40,898	1,516	1,059	36	1,321	44,830
2064	55,045	11,322	1,035	10,272	13,486	91,160
2065	49,158	15,047	970	17,289	15,821	98,286
2066	32,939	4,674	794	2,099	3,104	43,610
2067	32,939	4,674	794	2,099	3,104	43,610
2068	2,841	332	41	116	1,012	4,342
2069	16,767	723	140	23	1,456	19,109
2070	16,433	6,819	115	3	800	24,170
2071	15,613	7,393	106	0	706	23,818
2072	8,897	4,213	60	0	402	13,573
Total	410,353	76,651	9,864	33,260	91,003	621,131

**TABLE 3.2b
BYRON NUCLEAR POWER STATION, UNIT 2
DELAYED DECON ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2009 dollars)**

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2046	6,969	169	162	7	358	7,664
2047	48,137	2,813	1,059	360	4,276	56,645
2048	15,339	2,514	505	823	18,185	37,365
2049	5,877	262	212	27	2,685	9,062
2050	5,877	262	212	27	2,685	9,062
2051	5,877	262	212	27	2,685	9,062
2052	5,893	263	212	27	2,692	9,087
2053	5,877	262	212	27	2,685	9,062
2054	5,877	262	212	27	2,685	9,062
2055	5,877	262	212	27	2,685	9,062
2056	5,893	263	212	27	2,692	9,087
2057	5,877	262	212	27	2,685	9,062
2058	5,877	262	212	27	2,685	9,062
2059	6,740	2,850	212	27	2,685	12,512
2060	7,618	5,438	212	27	2,692	15,987
2061	5,925	3,818	167	27	2,137	12,073
2062	3,604	1,551	106	26	1,386	6,673
2063	4,193	424	239	27	1,214	6,098
2064	27,345	2,037	1,061	34	1,706	32,184
2065	48,745	12,487	1,025	10,208	11,672	84,137
2066	54,727	13,164	941	11,952	11,887	92,670
2067	50,211	5,573	794	2,914	2,997	62,489
2068	50,348	5,588	796	2,922	3,006	62,660
2069	35,623	2,737	410	1,010	1,997	41,777
2070	21,292	10,032	116	3	779	32,222
2071	20,591	10,932	106	0	707	32,335
2072	11,790	6,259	61	0	405	18,515
Total	478,002	91,008	10,089	30,633	94,950	704,681

**TABLE 3.3a
BYRON NUCLEAR POWER STATION, UNIT 1
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2009 dollars)**

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2044	7,452	1,359	180	7	2,355	11,352
2045	45,333	9,626	1,059	357	14,066	70,440
2046	12,346	8,610	490	533	7,817	29,796
2047	5,658	6,725	212	27	4,383	17,004
2048	5,673	6,743	212	27	4,395	17,051
2049	5,658	6,725	212	27	4,383	17,004
2050	3,894	2,382	141	26	2,387	8,830
2051	3,030	254	106	26	1,410	4,826
2052	3,038	255	106	26	1,414	4,839
2053	3,030	254	106	26	1,410	4,826
2054	3,030	254	106	26	1,410	4,826
2055	3,030	254	106	26	1,410	4,826
2056	3,038	255	106	26	1,414	4,839
2057	3,138	578	106	26	1,410	5,257
2058	3,461	1,548	106	26	1,410	6,551
2059	3,461	1,548	106	26	1,410	6,551
2060	3,469	1,549	106	26	1,414	6,564
2061	3,461	1,548	106	26	1,410	6,551
2062	3,458	1,548	106	26	1,409	6,548
2063	1,992	252	106	26	1,218	3,594
2064	1,998	253	106	26	1,221	3,604
2065	1,992	252	106	26	1,218	3,594
2066	1,992	252	106	26	1,218	3,594
2067	1,992	252	106	26	1,218	3,594
2068	1,998	253	106	26	1,221	3,604
2069	1,992	252	106	26	1,218	3,594
2070	1,992	252	106	26	1,218	3,594
2071	1,992	252	106	26	1,218	3,594
2072	1,998	253	106	26	1,221	3,604
2073	1,992	252	106	26	1,218	3,594

TABLE 3.3a (continued)
BYRON NUCLEAR POWER STATION, UNIT 1
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2009 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2074	1,992	252	106	26	1,218	3,594
2075	1,992	252	106	26	1,218	3,594
2076	1,998	253	106	26	1,221	3,604
2077	1,992	252	106	26	1,218	3,594
2078	1,992	252	106	26	1,218	3,594
2079	1,992	252	106	26	1,218	3,594
2080	1,998	253	106	26	1,221	3,604
2081	1,992	252	106	26	1,218	3,594
2082	1,992	252	106	26	1,218	3,594
2083	1,992	252	106	26	1,218	3,594
2084	1,998	253	106	26	1,221	3,604
2085	1,992	252	106	26	1,218	3,594
2086	1,992	252	106	26	1,218	3,594
2087	1,992	252	106	26	1,218	3,594
2088	1,998	253	106	26	1,221	3,604
2089	1,992	252	106	26	1,218	3,594
2090	1,992	252	106	26	1,218	3,594
2091	1,992	252	106	26	1,218	3,594
2092	1,998	253	106	26	1,221	3,604
2093	1,992	252	106	26	1,218	3,594
2094	1,992	252	106	26	1,218	3,594
2095	1,992	252	106	26	1,218	3,594
2096	1,998	253	106	26	1,221	3,604
2097	8,858	475	276	28	1,231	10,867
2098	43,490	2,197	1,059	37	2,569	49,352
2099	53,952	13,527	1,023	12,949	15,356	96,808
2100	45,185	12,653	927	12,726	12,857	84,347
2101	32,950	4,635	794	1,966	3,109	43,454
2102	28,076	3,938	672	1,665	2,769	37,121
2103	1,182	94	0	7	894	2,176

TABLE 3.3a (continued)
BYRON NUCLEAR POWER STATION, UNIT 1
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2009 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2104	21,410	2,057	177	24	1,503	25,171
2105	15,910	7,438	106	0	706	24,160
2106	15,910	7,438	106	0	706	24,160
2107	4,926	2,303	33	0	219	7,480
Total	464,295	117,349	12,550	31,605	140,068	765,867

**TABLE 3.3b
BYRON NUCLEAR POWER STATION, UNIT 2
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES**
(thousands, 2009 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2046	7,398	1,360	162	7	2,087	11,014
2047	50,892	10,446	1,059	360	13,817	76,574
2048	18,725	10,148	505	823	19,431	49,632
2049	9,706	8,238	212	27	4,581	22,764
2050	9,706	8,238	212	27	4,581	22,764
2051	9,706	8,238	212	27	4,581	22,764
2052	5,465	3,013	143	27	2,493	11,140
2053	3,215	258	106	26	1,386	4,991
2054	3,215	258	106	26	1,386	4,991
2055	3,215	258	106	26	1,386	4,991
2056	3,224	258	106	26	1,390	5,005
2057	3,323	581	106	26	1,386	5,422
2058	3,646	1,551	106	26	1,386	6,716
2059	3,646	1,551	106	26	1,386	6,716
2060	3,655	1,552	106	26	1,390	6,730
2061	3,646	1,551	106	26	1,386	6,716
2062	3,643	1,551	106	26	1,386	6,712
2063	1,970	255	106	26	1,206	3,562
2064	1,975	255	106	26	1,209	3,572
2065	1,970	255	106	26	1,206	3,562
2066	1,970	255	106	26	1,206	3,562
2067	1,970	255	106	26	1,206	3,562
2068	1,975	255	106	26	1,209	3,572
2069	1,970	255	106	26	1,206	3,562
2070	1,970	255	106	26	1,206	3,562
2071	1,970	255	106	26	1,206	3,562
2072	1,975	255	106	26	1,209	3,572
2073	1,970	255	106	26	1,206	3,562
2074	1,970	255	106	26	1,206	3,562

TABLE 3.3b (continued)
BYRON NUCLEAR POWER STATION, UNIT 2
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2009 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2075	1,970	255	106	26	1,206	3,562
2076	1,975	255	106	26	1,209	3,572
2077	1,970	255	106	26	1,206	3,562
2078	1,970	255	106	26	1,206	3,562
2079	1,970	255	106	26	1,206	3,562
2080	1,975	255	106	26	1,209	3,572
2081	1,970	255	106	26	1,206	3,562
2082	1,970	255	106	26	1,206	3,562
2083	1,970	255	106	26	1,206	3,562
2084	1,975	255	106	26	1,209	3,572
2085	1,970	255	106	26	1,206	3,562
2086	1,970	255	106	26	1,206	3,562
2087	1,970	255	106	26	1,206	3,562
2088	1,975	255	106	26	1,209	3,572
2089	1,970	255	106	26	1,206	3,562
2090	1,970	255	106	26	1,206	3,562
2091	1,970	255	106	26	1,206	3,562
2092	1,975	255	106	26	1,209	3,572
2093	1,970	255	106	26	1,206	3,562
2094	1,970	255	106	26	1,206	3,562
2095	1,970	255	106	26	1,206	3,562
2096	1,975	255	106	26	1,209	3,572
2097	1,970	255	106	26	1,206	3,562
2098	11,215	725	471	29	1,224	13,664
2099	29,299	2,958	1,059	35	2,434	35,784
2100	53,037	15,268	1,012	12,634	14,475	96,425
2101	52,596	10,342	886	7,803	8,573	80,199
2102	50,293	5,488	794	2,741	2,944	62,259
2103	50,293	5,488	794	2,741	2,944	62,259
2104	28,823	3,248	242	249	1,477	34,039

TABLE 3.3b (continued)
BYRON NUCLEAR POWER STATION, UNIT 2
SAFSTOR ALTERNATIVE
SCHEDULE OF TOTAL ANNUAL EXPENDITURES
(thousands, 2009 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2105	20,888	10,976	106	0	707	32,677
2106	20,888	10,976	106	0	707	32,677
2107	6,524	3,428	33	0	221	10,206
Total	538,870	136,868	12,773	28,702	143,390	860,604

4. SCHEDULE ESTIMATE

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

A schedule or sequence of activities is presented in Figure 4.1 for the DECON decommissioning alternative. The schedule is also representative of the work activities identified in the delayed dismantling scenarios, absent any spent fuel constraints. The scheduling sequence assumes that fuel is removed from the spent fuel pool within the first 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 2003" computer software.^[30]

4.1 SCHEDULE ESTIMATE ASSUMPTIONS

The schedule reflects the results of a precedence network developed for the site decommissioning activities, i.e., a PERT (Program Evaluation and Review Technique) Software Package. The work activity durations used in the precedence network reflect the actual man-hour estimates from the cost 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. Decontamination and dismantling of the storage pool are initiated once the transfer of spent fuel to the ISFSI is complete.
- All work (except vessel and internals removal) is performed during an 8-hour workday, 5 days per week, with no overtime. There are eleven paid holidays per year.
- Reactor and internals removal activities are performed by using separate crews for different activities working on different shifts, with a corresponding backshift charge for the second shift.
- Multiple crews work parallel activities to the maximum extent possible, consistent with optimum efficiency, adequate access for cutting, removal

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

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

4.2 PROJECT SCHEDULE

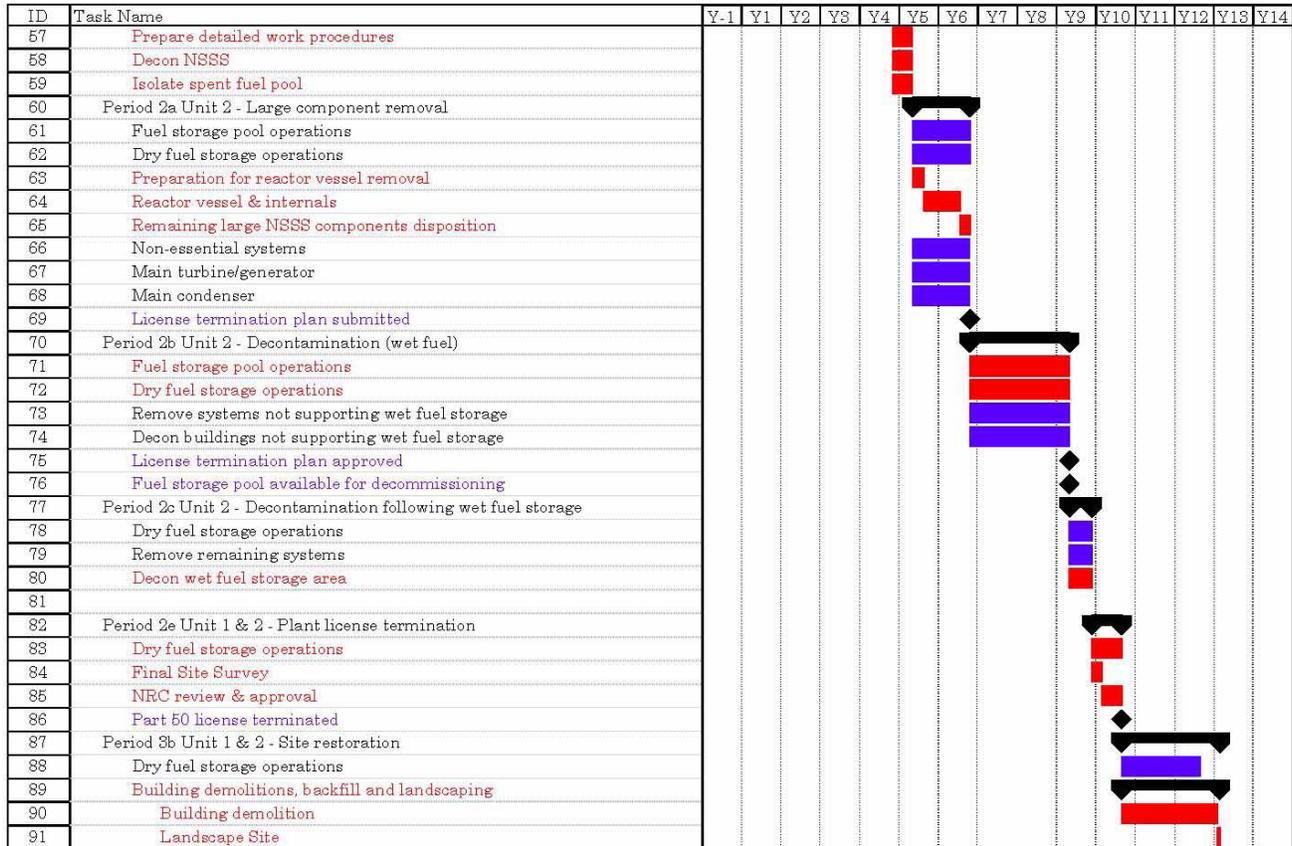
The period-dependent costs presented in the detailed cost tables are based upon the durations developed in the schedule for decommissioning Byron. Durations are established between several milestones in each project period; these durations are used to establish a critical path for the entire project. 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**

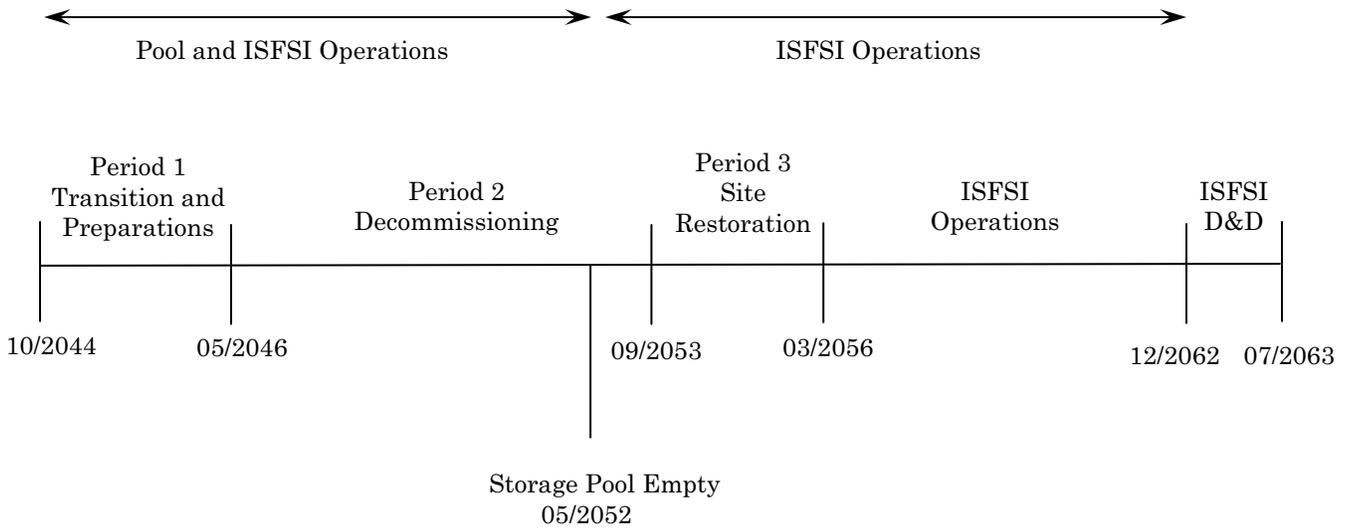


**FIGURE 4.1
DECON ACTIVITY SCHEDULE
(continued)**

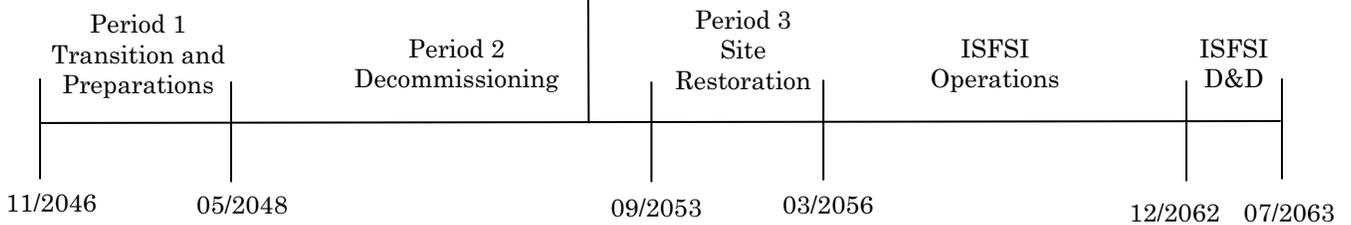


**FIGURE 4.2
DECOMMISSIONING TIMELINE
DECON
(not to scale)**

Unit 1
(Shutdown October 31, 2044)

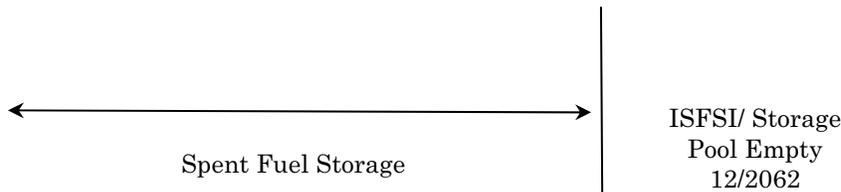
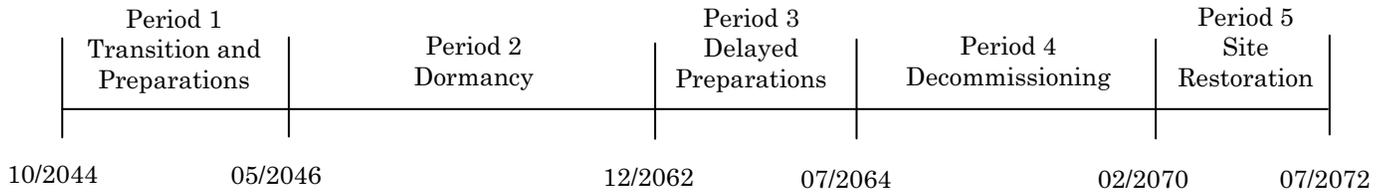


Unit 2
(Shutdown November 06, 2046)

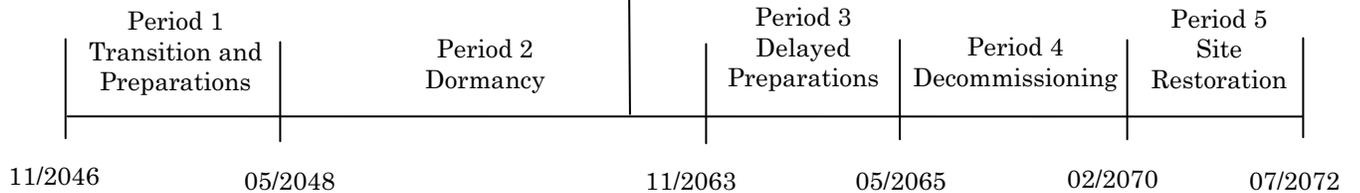


**FIGURE 4.3
DECOMMISSIONING TIMELINE
DELAYED DECON
(not to scale)**

Unit 1
(Shutdown October 31, 2044)

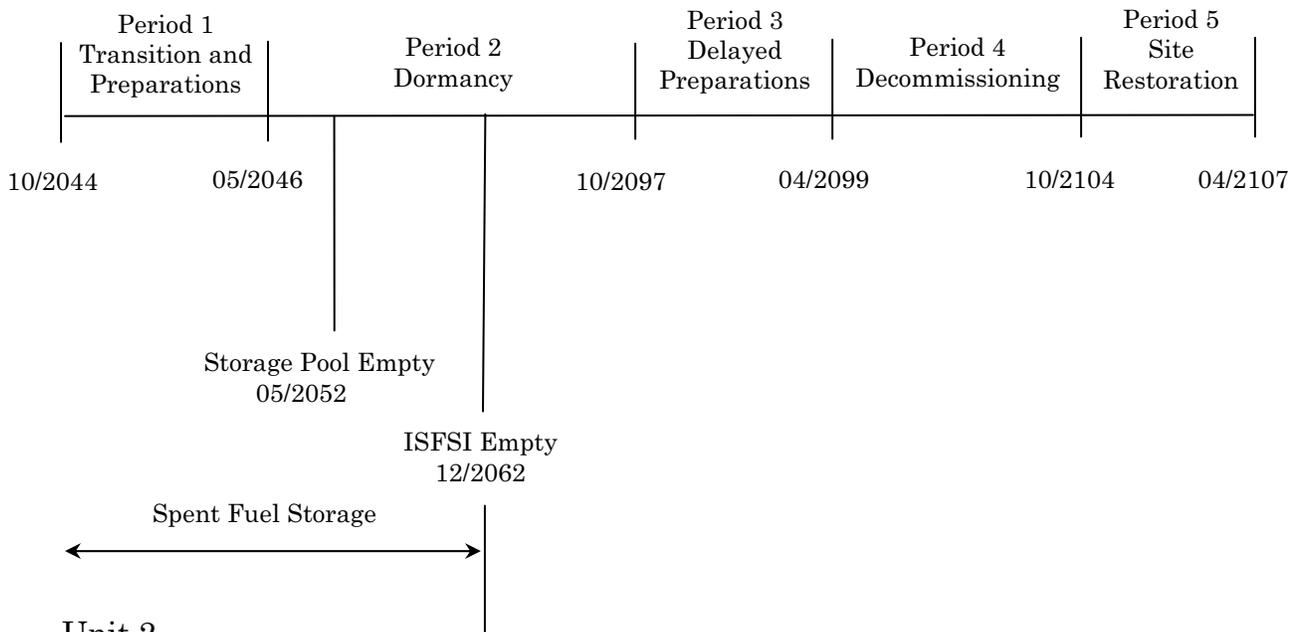


Unit 2
(Shutdown November 06, 2046)

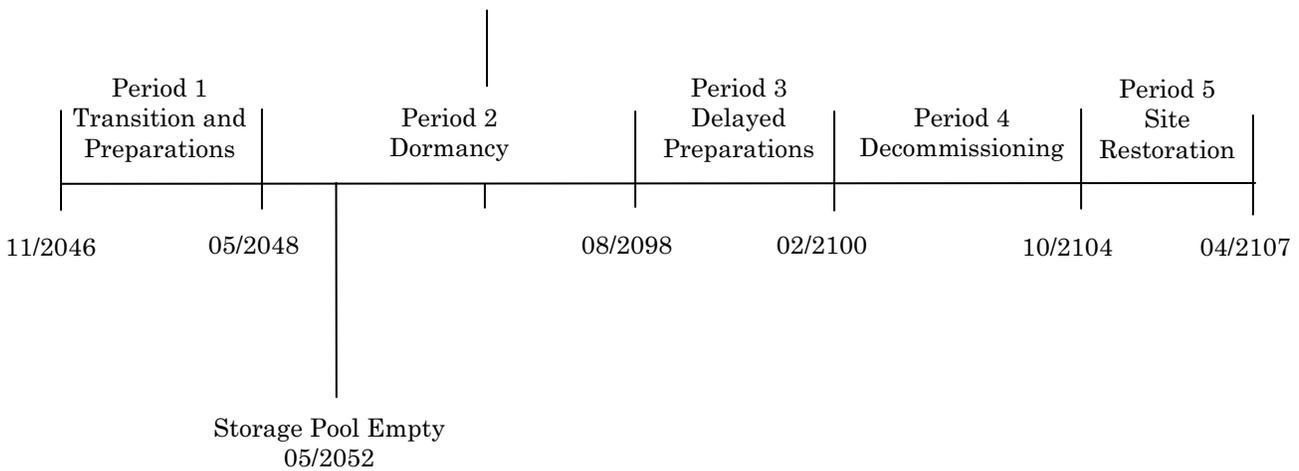


**FIGURE 4.4
DECOMMISSIONING TIMELINE
SAFSTOR
(not to scale)**

Unit 1
(Shutdown October 31, 2044)



Unit 2
(Shutdown November 06, 2046)



5. RADIOACTIVE WASTES

The objectives of the decommissioning process are the removal of all radioactive material from the site that would restrict its future use and the termination of the NRC license(s). This currently requires the remediation of all radioactive material at the site in excess of applicable legal limits. Under the Atomic Energy Act,^[31] the NRC is responsible for protecting the public from sources of ionizing radiation. Title 10 of the Code of Federal Regulations delineates the production, utilization, and disposal of radioactive materials and processes. In particular, §71 defines radioactive material as it pertains to packaging and transportation and §61 specifies its disposition.

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

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

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

No process system containing/handling radioactive substances at shutdown is presumed to meet material release criteria by decay alone, i.e., systems radioactive at shutdown will still be radioactive over the time period during which the decommissioning is accomplished, due to the presence of long-lived radionuclides.

While the dose rates decrease with time, radionuclides such as ^{137}Cs will still control the disposition requirements.

The waste material generated in the decontamination and dismantling of Byron is primarily generated during Period 2 of the DECON alternative and Period 4 of the deferred alternatives. Material that is considered potentially contaminated when removed from the radiologically controlled area is sent to processing facilities in Tennessee for conditioning and disposal. Heavily contaminated components and activated materials are routed for controlled disposal. The disposal volumes reported in the tables reflect the savings resulting from reprocessing and recycling.

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

Since the EnergySolutions facility is not able to accept the higher activity waste (Class B and C) generated in the decontamination of the reactor vessel and segmentation of the components closest to the core, the cost of disposal of this material at a yet-to-be determined facility are based upon Exelon's previously negotiated cost of disposal at the Barnwell site.

**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)	EnergySolutions	A	222,339	20,932,728
	Barnwell	B	8,007	997,337
	Barnwell	C	918	96,896
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC	1,010	208,292
Processed/Conditioned (off-site recycling center)	Recycling Vendors	A	378,839	14,650,380
Total ^[2]			611,113	36,885,633
Scrap Metal				267,118,000

^[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)	EnergySolutions	A	186,367	16,600,261
	Barnwell	B	6,260	803,190
	Barnwell	C	918	96,896
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC	1,010	208,292
Processed/Conditioned (off-site recycling center)	Recycling Vendors	A	441,235	17,211,193
Total ^[2]			635,790	34,919,832
Scrap Metal				267,298,000

^[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)	EnergySolutions	A	206,908	16,786,199
	Barnwell	B	5,258	692,576
	Barnwell	C	939	95,516
Greater than Class C (geologic repository)	Spent Fuel Equivalent	GTCC	1,010	208,292
Processed/Conditioned (off-site recycling center)	Recycling Vendors	A	444,712	17,485,754
Total ^[2]			658,828	35,268,337
Scrap Metal				267,298,000

^[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 2004. 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 remains in the storage pool in the Delayed-DECON alternative.

The cost projected to promptly decommission (DECON) Byron is estimated to be \$1,351.7 million. The majority of this cost (approximately 71.7%) is associated with the physical decontamination and dismantling of the nuclear units so that the licenses can be terminated. Another 16.8% is associated with the management, interim storage, and eventual transfer of the spent fuel. The remaining 11.5% is for the demolition of the designated structures and limited restoration of the site.

The primary cost contributors, identified in Tables 6.1 through 6.3, are either labor-related or associated with the management and disposition of the radioactive waste. Program management is the largest single contributor to the overall cost. The magnitude of the expense is a function of both the size of the organization required to manage the decommissioning, as well as the duration of the program. It is assumed, for purposes of this analysis, that 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 under a separate license provides additional flexibility in the event the DOE is not able to meet the current timetable for completing the transfer of assemblies to an off-site facility and minimizes the associated caretaking expenses.

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

A significant portion of the metallic waste is designated for additional processing and treatment at an off-site facility. Processing reduces the volume of material requiring controlled disposal through such techniques and processes as survey and sorting, decontamination, and volume reduction. The material that cannot be unconditionally released is packaged for controlled disposal at one of the currently operating facilities. The cost identified in the summary table for processing is all-inclusive, incorporating the ultimate disposition of the material.

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

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

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

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

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

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

**TABLE 6.1
SUMMARY OF DECOMMISSIONING COST ELEMENTS
DECON**
(thousands of 2009 dollars)

Cost Element	Total	Percentage
Decontamination	33,761	2.5
Removal	242,355	17.9
Packaging	29,594	2.2
Transportation	20,501	1.5
Waste Disposal	119,478	8.8
Off-site Waste Processing	8,002	0.6
Program Management ^[1]	590,277	43.7
Spent Fuel Pool Isolation	11,143	0.8
Spent Fuel Management ^[2]	163,436	12.1
Insurance and Regulatory Fees	22,834	1.7
Energy	12,320	0.9
Characterization and Licensing Surveys	31,452	2.3
Property Taxes	48,613	3.6
Miscellaneous Equipment	12,886	1.0
Site O&M	5,087	0.4
Total ^[3]	1,351,738	100.0

Cost Element	Total	Percentage
NRC License Termination	969,616	71.7
Spent Fuel Management	226,513	16.8
Site Restoration	155,609	11.5
Total ^[3]		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**
(thousands of 2009 dollars)

Cost Element	Total	Percentage
Decontamination	29,063	2.2
Removal	238,567	18.0
Packaging	22,496	1.7
Transportation	17,713	1.3
Waste Disposal	81,335	6.1
Off-site Waste Processing	9,386	0.7
Program Management ^[1]	689,226	52.0
Spent Fuel Pool Isolation	11,143	0.8
Spent Fuel Management ^[2]	52,833	4.0
Insurance and Regulatory Fees	33,232	2.5
Energy	19,953	1.5
Characterization and Licensing Surveys	34,391	2.6
Property Taxes	58,566	4.4
Miscellaneous Equipment	20,223	1.5
Site O&M	7,685	0.6
Total ^[3]	1,325,812	100.0

Cost Element	Total	Percentage
NRC License Termination	920,333	69.4
Spent Fuel Management	247,333	18.7
Site Restoration	158,146	11.9
Total ^[3]		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**
(thousands of 2009 dollars)

Cost Element	Total	Percentage
Decontamination	28,655	1.8
Removal	246,250	15.1
Packaging	22,253	1.4
Transportation	17,030	1.0
Waste Disposal	77,601	4.8
Off-site Waste Processing	9,535	0.6
Program Management ^[1]	779,393	47.9
Spent Fuel Pool Isolation	11,143	0.7
Spent Fuel Management ^[2]	160,078	9.8
Insurance and Regulatory Fees	68,485	4.2
Energy	25,323	1.6
Characterization and Licensing Surveys	34,391	2.1
Property Taxes	96,771	5.9
Miscellaneous Equipment	31,890	2.0
Site O&M	17,672	1.1
Total ^[3]	1,626,471	100.0

Cost Element	Total	Percentage
NRC License Termination	1,227,034	75.4
Spent Fuel Management	241,192	14.8
Site Restoration	158,245	9.7
Total ^[3]		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

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APPENDIX A
UNIT COST FACTOR DEVELOPMENT

**APPENDIX A
UNIT COST FACTOR DEVELOPMENT**

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

1. SCOPE

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

2. CALCULATIONS

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

Duration adjustment(s):

+ Respiratory protection adjustment (50% of critical duration) 128

+ Radiation/ALARA adjustment (37% 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	49.58	1668.42
Craftsmen	2.00	11.217	59.41	1332.80
Foreman	1.00	11.217	63.69	714.41
General Foreman	0.25	11.217	64.84	181.83
Fire Watch	0.05	11.217	49.58	27.81
Health Physics Technician	1.00	11.217	51.42	576.78
Total labor cost				\$4,502.05

4. EQUIPMENT & CONSUMABLES COSTS

Equipment Costs	none
Consumables/Materials Costs	
<ul style="list-style-type: none"> • Blotting paper 50 @ \$0.52/sq ft {1} • Plastic sheets/bags 50 @ \$0.39/sq ft {2} • Gas torch consumables 1 @ \$9.10 x 1 /hr {3} 	<p>\$26.00</p> <p>\$19.50</p> <p>\$9.10</p>
Subtotal cost of equipment and materials	\$54.60
Overhead & profit on equipment and materials @ 16.25 %	\$8.87
Total costs, equipment & material	\$63.47

TOTAL COST:

Removal of contaminated heat exchanger <3000 pounds:	\$4,565.52
Total labor cost:	\$4,502.05
Total equipment/material costs:	\$63.47
Total craft labor man-hours required per unit:	81.88

5. NOTES AND REFERENCES

- Work difficulty factors were developed in conjunction with the Atomic Industrial Forum's (now NEI) program to standardize nuclear decommissioning cost estimates and are delineated in Volume 1, Chapter 5 of the "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," AIF/NESP-036, May 1986.
- References for equipment & consumables costs:
 1. www.mcmaster.com online catalog - Spill Control (7193T88)
 2. R.S. Means (2009) 01 56 13.60-0200, page 20
 3. R.S. Means (2009) 01 54 33.40-6360, page 658
- 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	0.53
Removal of clean pipe 0.25 to 2 inches diameter, \$/linear foot	5.71
Removal of clean pipe >2 to 4 inches diameter, \$/linear foot	8.08
Removal of clean pipe >4 to 8 inches diameter, \$/linear foot	15.49
Removal of clean pipe >8 to 14 inches diameter, \$/linear foot	30.16
Removal of clean pipe >14 to 20 inches diameter, \$/linear foot	39.10
Removal of clean pipe >20 to 36 inches diameter, \$/linear foot	57.56
Removal of clean pipe >36 inches diameter, \$/linear foot	68.44
Removal of clean valve >2 to 4 inches	103.46
Removal of clean valve >4 to 8 inches	154.89
Removal of clean valve >8 to 14 inches	301.57
Removal of clean valve >14 to 20 inches	391.05
Removal of clean valve >20 to 36 inches	575.58
Removal of clean valve >36 inches	684.35
Removal of clean pipe hanger for small bore piping	33.83
Removal of clean pipe hanger for large bore piping	124.83
Removal of clean pump, <300 pound	259.08
Removal of clean pump, 300-1000 pound	714.59
Removal of clean pump, 1000-10,000 pound	2,848.15
Removal of clean pump, >10,000 pound	5,500.79
Removal of clean pump motor, 300-1000 pound	301.00
Removal of clean pump motor, 1000-10,000 pound	1,186.77
Removal of clean pump motor, >10,000 pound	2,670.24
Removal of clean heat exchanger <3000 pound	1,526.87
Removal of clean heat exchanger >3000 pound	3,833.21
Removal of clean feedwater heater/deaerator	10,823.57
Removal of clean moisture separator/reheater	22,275.78
Removal of clean tank, <300 gallons	333.53
Removal of clean tank, 300-3000 gallon	1,055.77
Removal of clean tank, >3000 gallons, \$/square foot surface area	8.74

APPENDIX B

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

Unit Cost Factor	Cost/Unit
Removal of clean electrical equipment, <300 pound	142.34
Removal of clean electrical equipment, 300-1000 pound	490.07
Removal of clean electrical equipment, 1000-10,000 pound	980.14
Removal of clean electrical equipment, >10,000 pound	2,323.47
Removal of clean electrical transformer < 30 tons	1,613.62
Removal of clean electrical transformer > 30 tons	4,646.93
Removal of clean standby diesel generator, <100 kW	1,648.17
Removal of clean standby diesel generator, 100 kW to 1 MW	3,678.82
Removal of clean standby diesel generator, >1 MW	7,615.89
Removal of clean electrical cable tray, \$/linear foot	13.24
Removal of clean electrical conduit, \$/linear foot	5.78
Removal of clean mechanical equipment, <300 pound	142.34
Removal of clean mechanical equipment, 300-1000 pound	490.07
Removal of clean mechanical equipment, 1000-10,000 pound	980.14
Removal of clean mechanical equipment, >10,000 pound	2,323.47
Removal of clean HVAC equipment, <300 pound	172.12
Removal of clean HVAC equipment, 300-1000 pound	588.85
Removal of clean HVAC equipment, 1000-10,000 pound	1,173.58
Removal of clean HVAC equipment, >10,000 pound	2,323.47
Removal of clean HVAC ductwork, \$/pound	0.56
Removal of contaminated instrument and sampling tubing, \$/linear foot	1.64
Removal of contaminated pipe 0.25 to 2 inches diameter, \$/linear foot	23.00
Removal of contaminated pipe >2 to 4 inches diameter, \$/linear foot	39.35
Removal of contaminated pipe >4 to 8 inches diameter, \$/linear foot	61.60
Removal of contaminated pipe >8 to 14 inches diameter, \$/linear foot	121.41
Removal of contaminated pipe >14 to 20 inches diameter, \$/linear foot	145.75
Removal of contaminated pipe >20 to 36 inches diameter, \$/linear foot	201.70
Removal of contaminated pipe >36 inches diameter, \$/linear foot	238.43
Removal of contaminated valve >2 to 4 inches	469.60
Removal of contaminated valve >4 to 8 inches	561.54

APPENDIX B

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

Unit Cost Factor	Cost/Unit
Removal of contaminated valve >8 to 14 inches	1,161.22
Removal of contaminated valve >14 to 20 inches	1,474.93
Removal of contaminated valve >20 to 36 inches	1,964.14
Removal of contaminated valve >36 inches	2,331.38
Removal of contaminated pipe hanger for small bore piping	153.30
Removal of contaminated pipe hanger for large bore piping	514.71
Removal of contaminated pump, <300 pound	999.58
Removal of contaminated pump, 300-1000 pound	2,300.95
Removal of contaminated pump, 1000-10,000 pound	7,550.63
Removal of contaminated pump, >10,000 pound	18,387.13
Removal of contaminated pump motor, 300-1000 pound	982.18
Removal of contaminated pump motor, 1000-10,000 pound	3,076.84
Removal of contaminated pump motor, >10,000 pound	6,907.88
Removal of contaminated heat exchanger <3000 pound	4,565.52
Removal of contaminated heat exchanger >3000 pound	13,230.07
Removal of contaminated tank, <300 gallons	1,663.46
Removal of contaminated tank, >300 gallons, \$/square foot	32.22
Removal of contaminated electrical equipment, <300 pound	777.90
Removal of contaminated electrical equipment, 300-1000 pound	1,880.72
Removal of contaminated electrical equipment, 1000-10,000 pound	3,622.51
Removal of contaminated electrical equipment, >10,000 pound	7,096.37
Removal of contaminated electrical cable tray, \$/linear foot	37.48
Removal of contaminated electrical conduit, \$/linear foot	18.33
Removal of contaminated mechanical equipment, <300 pound	865.36
Removal of contaminated mechanical equipment, 300-1000 pound	2,076.85
Removal of contaminated mechanical equipment, 1000-10,000 pound	3,993.74
Removal of contaminated mechanical equipment, >10,000 pound	7,096.37
Removal of contaminated HVAC equipment, <300 pound	865.36
Removal of contaminated HVAC equipment, 300-1000 pound	2,076.85
Removal of contaminated HVAC equipment, 1000-10,000 pound	3,993.74

APPENDIX B

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

Unit Cost Factor	Cost/Unit
Removal of contaminated HVAC equipment, >10,000 pound	7,096.37
Removal of contaminated HVAC ductwork, \$/pound	2.24
Removal/plasma arc cut of contaminated thin metal components, \$/linear in.	4.14
Additional decontamination of surface by washing, \$/square foot	8.72
Additional decontamination of surfaces by hydrolasing, \$/square foot	35.95
Decontamination rig hook up and flush, \$/ 250 foot length	7,294.00
Chemical flush of components/systems, \$/gallon	15.15
Removal of clean standard reinforced concrete, \$/cubic yard	139.10
Removal of grade slab concrete, \$/cubic yard	189.47
Removal of clean concrete floors, \$/cubic yard	362.61
Removal of sections of clean concrete floors, \$/cubic yard	1,090.16
Removal of clean heavily rein concrete w/#9 rebar, \$/cubic yard	236.32
Removal of contaminated heavily rein concrete w/#9 rebar, \$/cubic yard	2,177.81
Removal of clean heavily rein concrete w/#18 rebar, \$/cubic yard	298.70
Removal of contaminated heavily rein concrete w/#18 rebar, \$/cubic yard	2,880.30
Removal heavily rein concrete w/#18 rebar & steel embedments, \$/cubic yard	463.41
Removal of below-grade suspended floors, \$/cubic yard	362.61
Removal of clean monolithic concrete structures, \$/cubic yard	921.99
Removal of contaminated monolithic concrete structures, \$/cubic yard	2,168.42
Removal of clean foundation concrete, \$/cubic yard	722.53
Removal of contaminated foundation concrete, \$/cubic yard	2,019.76
Explosive demolition of bulk concrete, \$/cubic yard	30.96
Removal of clean hollow masonry block wall, \$/cubic yard	102.57
Removal of contaminated hollow masonry block wall, \$/cubic yard	339.31
Removal of clean solid masonry block wall, \$/cubic yard	102.57
Removal of contaminated solid masonry block wall, \$/cubic yard	339.31
Backfill of below-grade voids, \$/cubic yard	21.91
Removal of subterranean tunnels/voids, \$/linear foot	116.60
Placement of concrete for below-grade voids, \$/cubic yard	129.61
Excavation of clean material, \$/cubic yard	2.87

APPENDIX B

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

Unit Cost Factor	Cost/Unit
Excavation of contaminated material, \$/cubic yard	39.98
Removal of clean concrete rubble (tipping fee included), \$/cubic yard	22.39
Removal of contaminated concrete rubble, \$/cubic yard	25.54
Removal of building by volume, \$/cubic foot	0.30
Removal of clean building metal siding, \$/square foot	1.25
Removal of contaminated building metal siding, \$/square foot	4.30
Removal of standard asphalt roofing, \$/square foot	2.50
Removal of transite panels, \$/square foot	2.23
Scarifying contaminated concrete surfaces (drill & spall), \$/square foot	12.96
Scabbling contaminated concrete floors, \$/square foot	8.13
Scabbling contaminated concrete walls, \$/square foot	21.63
Scabbling contaminated ceilings, \$/square foot	74.39
Scabbling structural steel, \$/square foot	6.59
Removal of clean overhead crane/monorail < 10 ton capacity	677.14
Removal of contaminated overhead crane/monorail < 10 ton capacity	1,896.33
Removal of clean overhead crane/monorail >10-50 ton capacity	1,625.13
Removal of contaminated overhead crane/monorail >10-50 ton capacity	4,550.39
Removal of polar crane > 50 ton capacity	6,778.59
Removal of gantry crane > 50 ton capacity	29,043.29
Removal of structural steel, \$/pound	0.22
Removal of clean steel floor grating, \$/square foot	4.67
Removal of contaminated steel floor grating, \$/square foot	13.54
Removal of clean free standing steel liner, \$/square foot	13.10
Removal of contaminated free standing steel liner, \$/square foot	37.73
Removal of clean concrete-anchored steel liner, \$/square foot	6.55
Removal of contaminated concrete-anchored steel liner, \$/square foot	43.94
Placement of scaffolding in clean areas, \$/square foot	17.02
Placement of scaffolding in contaminated areas, \$/square foot	27.95
Landscaping with topsoil, \$/acre	18,899.01
Cost of CPC B-88 LSA box & preparation for use	2,034.80

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	1,683.27
Cost of CPC B-12V 12 gauge LSA box & preparation for use	1,519.56
Cost of CPC B-144 LSA box & preparation for use	8,836.80
Cost of LSA drum & preparation for use	180.73
Cost of cask liner for CNSI 14 195 cask	257.57
Cost of cask liner for CNSI 8 120A cask (resins)	7,454.81
Cost of cask liner for CNSI 8 120A cask (filters)	7,928.96
Decontamination of surfaces with vacuuming, \$/square foot	0.81

**APPENDIX C
DETAILED COST ANALYSIS
DECON**

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Byron Nuclear Power Station, Unit 1	C-2
Byron Nuclear Power Station, Unit 2	C-12

Table C-1
Byron Nuclear Power Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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	-	-	-	-	-	-	153	23	176	176	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	236	35	271	271	-	-	-	-	-	-	-	-	-	2,000
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	543	81	624	624	-	-	-	-	-	-	-	-	-	4,600
1a.1.8	Perform detailed rad survey	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	1,000
1a.1.10	End product description	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	153	23	176	176	-	-	-	-	-	-	-	-	-	1,300
1a.1.12	Define major work sequence	-	-	-	-	-	-	885	133	1,018	1,018	-	-	-	-	-	-	-	-	-	7,500
1a.1.13	Perform SER and EA	-	-	-	-	-	-	366	55	421	421	-	-	-	-	-	-	-	-	-	3,100
1a.1.14	Perform Site-Specific Cost Study	-	-	-	-	-	-	590	89	679	679	-	-	-	-	-	-	-	-	-	5,000
1a.1.15	Prepare/submit License Termination Plan	-	-	-	-	-	-	483	73	556	556	-	-	-	-	-	-	-	-	-	4,096
1a.1.16	Receive NRC approval of termination plan	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	581	87	668	601	-	67	-	-	-	-	-	-	-	4,920
1a.1.17.2	Plant systems	-	-	-	-	-	-	492	74	565	509	-	57	-	-	-	-	-	-	-	4,167
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	59	9	68	68	-	-	-	-	-	-	-	-	-	500
1a.1.17.4	Reactor internals	-	-	-	-	-	-	838	126	964	964	-	-	-	-	-	-	-	-	-	7,100
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	767	115	882	882	-	-	-	-	-	-	-	-	-	6,500
1a.1.17.6	Biological shield	-	-	-	-	-	-	59	9	68	68	-	-	-	-	-	-	-	-	-	500
1a.1.17.7	Steam generators	-	-	-	-	-	-	368	55	423	423	-	-	-	-	-	-	-	-	-	3,120
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	189	28	217	109	-	109	-	-	-	-	-	-	-	1,600
1a.1.17.9	Main Turbine	-	-	-	-	-	-	47	7	54	-	-	54	-	-	-	-	-	-	-	400
1a.1.17.10	Main Condensers	-	-	-	-	-	-	47	7	54	-	-	54	-	-	-	-	-	-	-	400
1a.1.17.11	Plant structures & buildings	-	-	-	-	-	-	368	55	423	212	-	212	-	-	-	-	-	-	-	3,120
1a.1.17.12	Waste management	-	-	-	-	-	-	543	81	624	624	-	-	-	-	-	-	-	-	-	4,600
1a.1.17.13	Facility & site closeout	-	-	-	-	-	-	106	16	122	61	-	61	-	-	-	-	-	-	-	900
1a.1.17	Total	-	-	-	-	-	-	4,464	670	5,134	4,520	-	613	-	-	-	-	-	-	-	37,827
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	283	42	326	326	-	-	-	-	-	-	-	-	-	2,400
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	2,800	420	3,220	3,220	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	1,400
1a.1.21	Rigging/Cont. Cntrl Envlp/ooling/etc.	-	-	-	-	-	-	2,200	330	2,530	2,530	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	145	22	167	167	-	-	-	-	-	-	-	-	-	1,230
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	13,704	2,056	15,759	15,146	-	613	-	-	-	-	-	-	-	73,753
Period 1a Additional Costs																					
1a.2.1	ISFSI Expansion	-	-	-	-	-	-	9,800	1,470	11,270	-	11,270	-	-	-	-	-	-	-	-	-
1a.2	Subtotal Period 1a Additional Costs	-	-	-	-	-	-	9,800	1,470	11,270	-	11,270	-	-	-	-	-	-	-	-	-
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	8,000	1,200	9,200	-	9,200	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	8,000	1,200	9,200	-	9,200	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	769	77	846	846	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	414	-	-	-	-	-	104	518	518	-	-	-	-	-	-	-	-	-	-

Table C-1
Byron Nuclear Power Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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.4.4	Heavy equipment rental	-	414	-	-	-	-	-	62	476	476	-	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	2	1	-	34	-	9	45	45	-	-	-	610	-	-	-	-	12,190	3	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	921	138	1,059	1,059	-	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	706	71	776	776	-	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	306	31	337	-	337	-	-	-	-	-	-	-	-	-	-
1a.4.9	Site O&M Costs	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	381	57	438	-	438	-	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	44	7	51	51	51	-	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	470	71	541	541	-	-	-	-	-	-	-	-	-	-	12,264
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	31,082	4,662	35,745	35,745	-	-	-	-	-	-	-	-	-	-	423,400
1a.4	Subtotal Period 1a Period-Dependent Costs	-	828	2	1	-	34	34,805	5,306	40,975	40,149	826	-	-	610	-	-	-	-	12,190	3	435,664
1a.0	TOTAL PERIOD 1a COST	-	828	2	1	-	34	66,308	10,032	77,204	55,295	21,296	613	-	610	-	-	-	-	12,190	3	509,417
PERIOD 1b - Decommissioning Preparations																						
Period 1b Direct Decommissioning Activities																						
Detailed Work Procedures																						
1b.1.1.1	Plant systems	-	-	-	-	-	-	559	84	642	578	-	64	-	-	-	-	-	-	-	-	4,733
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.3	Reactor internals	-	-	-	-	-	-	295	44	339	339	-	-	-	-	-	-	-	-	-	-	2,500
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	159	24	183	46	-	137	-	-	-	-	-	-	-	-	1,350
1b.1.1.5	CRD cooling assembly	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.6	CRD housings & ICI tubes	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.7	Incore instrumentation	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	428	64	493	493	-	-	-	-	-	-	-	-	-	-	3,630
1b.1.1.9	Facility closeout	-	-	-	-	-	-	142	21	163	81	-	81	-	-	-	-	-	-	-	-	1,200
1b.1.1.10	Missile shields	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	-	450
1b.1.1.11	Biological shield	-	-	-	-	-	-	142	21	163	163	-	-	-	-	-	-	-	-	-	-	1,200
1b.1.1.12	Steam generators	-	-	-	-	-	-	543	81	624	624	-	-	-	-	-	-	-	-	-	-	4,600
1b.1.1.13	Reinforced concrete	-	-	-	-	-	-	118	18	136	68	-	68	-	-	-	-	-	-	-	-	1,000
1b.1.1.14	Main Turbine	-	-	-	-	-	-	184	28	212	-	-	212	-	-	-	-	-	-	-	-	1,560
1b.1.1.15	Main Condensers	-	-	-	-	-	-	184	28	212	-	-	212	-	-	-	-	-	-	-	-	1,560
1b.1.1.16	Auxiliary building	-	-	-	-	-	-	322	48	370	333	-	37	-	-	-	-	-	-	-	-	2,730
1b.1.1.17	Reactor building	-	-	-	-	-	-	322	48	370	333	-	37	-	-	-	-	-	-	-	-	2,730
1b.1.1	Total	-	-	-	-	-	-	3,923	588	4,511	3,663	-	848	-	-	-	-	-	-	-	-	33,243
1b.1.2	Decon primary loop	614	-	-	-	-	-	-	307	921	921	-	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	614	-	-	-	-	-	3,923	896	5,433	4,584	-	848	-	-	-	-	-	-	-	1,067	33,243
Period 1b Additional Costs																						
1b.2.1	Site Characterization	-	-	-	-	-	-	6,341	1,902	8,243	8,243	-	-	-	-	-	-	-	-	-	30,500	10,852
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	6,341	1,902	8,243	8,243	-	-	-	-	-	-	-	-	-	30,500	10,852
Period 1b Collateral Costs																						
1b.3.1	Decon equipment	797	-	-	-	-	-	-	120	917	917	-	-	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,130	169	1,299	1,299	-	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process liquid waste	57	-	79	371	-	3,379	-	937	4,823	4,823	-	-	-	375	889	-	-	-	121,195	246	-
1b.3.4	Small tool allowance	-	2	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-	-
1b.3.5	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-	-
1b.3.6	Decon rig	1,400	-	-	-	-	-	-	210	1,610	1,610	-	-	-	-	-	-	-	-	-	-	-
1b.3.7	Spent Fuel Capital and Transfer	-	-	-	-	-	-	4,000	600	4,600	4,600	4,600	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	2,254	1,102	79	371	-	3,379	5,130	2,201	14,516	9,916	4,600	-	-	375	889	-	-	-	121,195	246	-

Table C-1
Byron Nuclear Power Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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																						
1b.4.1	Decon supplies	24	-	-	-	-	-	-	6	31	31	-	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	386	-	424	424	-	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	4,927	493	5,420	5,420	-	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	233	-	-	-	-	-	58	292	292	-	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	207	-	-	-	-	-	31	238	238	-	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	1	0	-	20	-	5	27	27	-	-	-	358	-	-	-	-	7,159	2	-
1b.4.7	Plant energy budget	-	-	-	-	-	923	-	138	1,061	1,061	-	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	354	-	35	389	389	-	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	154	-	15	169	-	169	-	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Costs	-	-	-	-	-	63	-	9	72	72	-	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	191	-	29	220	-	220	-	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	22	-	3	25	-	25	-	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	236	-	35	271	271	-	-	-	-	-	-	-	-	-	-	6,149
1b.4.14	DOC Staff Cost	-	-	-	-	-	5,217	-	783	5,999	5,999	-	-	-	-	-	-	-	-	-	-	63,789
1b.4.15	Utility Staff Cost	-	-	-	-	-	15,652	-	2,348	17,999	17,999	-	-	-	-	-	-	-	-	-	-	213,326
1b.4	Subtotal Period 1b Period-Dependent Costs	24	441	1	0	-	20	28,123	4,028	32,638	32,224	414	-	-	358	-	-	-	-	7,159	2	283,263
1b.0	TOTAL PERIOD 1b COST	2,893	1,543	80	372	-	3,399	43,517	9,027	60,830	54,967	5,014	848	-	733	889	-	-	-	128,354	31,815	327,358
PERIOD 1 TOTALS		2,893	2,371	81	372	-	3,433	109,825	19,059	138,034	110,262	26,310	1,462	-	1,342	889	-	-	-	140,544	31,818	836,775
PERIOD 2a - Large Component Removal																						
Period 2a Direct Decommissioning Activities																						
Nuclear Steam Supply System Removal																						
2a.1.1.1	Reactor Coolant Piping	181	154	31	37	-	331	-	220	955	955	-	-	-	1,677	-	-	-	-	202,809	5,830	-
2a.1.1.2	Pressurizer Relief Tank	32	29	6	7	-	60	-	40	174	174	-	-	-	329	-	-	-	-	36,553	1,072	-
2a.1.1.3	Reactor Coolant Pumps & Motors	103	106	91	180	-	1,272	-	432	2,184	2,184	-	-	-	4,796	-	-	-	-	780,540	4,291	100
2a.1.1.4	Pressurizer	48	59	394	96	-	412	-	196	1,205	1,205	-	-	-	3,033	-	-	-	-	252,826	2,482	938
2a.1.1.5	Steam Generators	387	4,096	2,982	2,549	667	4,349	-	3,085	18,115	18,115	-	-	45,513	17,817	-	-	-	-	4,035,428	23,233	2,125
2a.1.1.6	Retired Steam Generator Units	-	-	1,475	2,644	580	3,416	-	1,485	9,600	9,600	-	-	39,289	14,064	-	-	-	-	3,041,432	10,800	1,500
2a.1.1.7	CRDMs/ICIs/Service Structure Removal	161	91	194	45	-	102	-	155	747	747	-	-	-	3,881	-	-	-	-	86,025	4,285	-
2a.1.1.8	Reactor Vessel Internals	125	2,193	4,483	876	-	8,058	233	7,111	23,078	23,078	-	-	-	1,377	903	459	-	-	326,029	26,933	1,209
2a.1.1.9	Reactor Vessel	95	4,162	1,498	675	-	7,844	233	7,669	22,176	22,176	-	-	-	6,606	2,254	-	-	-	978,589	26,933	1,209
2a.1.1	Totals	1,132	10,889	11,154	7,110	1,247	25,843	466	20,393	78,234	78,234	-	-	84,802	53,580	3,156	459	-	-	9,740,230	105,861	7,082
Removal of Major Equipment																						
2a.1.2	Main Turbine/Generator	-	578	378	30	203	284	-	288	1,762	1,762	-	-	-	5,088	2,833	-	-	-	686,663	10,223	-
2a.1.3	Main Condensers	-	1,163	166	58	143	211	-	390	2,131	2,131	-	-	-	6,756	1,992	-	-	-	482,702	20,428	-
Cascading Costs from Clean Building Demolition																						
2a.1.4.1	Reactor	-	1,076	-	-	-	-	-	161	1,237	1,237	-	-	-	-	-	-	-	-	-	-	12,130
2a.1.4.2	Auxiliary Building	-	-	-	-	-	-	-	89	683	683	-	-	-	-	-	-	-	-	-	-	6,810
2a.1.4.3	Refueling Water Storage Tank	-	104	-	-	-	-	-	16	120	120	-	-	-	-	-	-	-	-	-	-	1,299
2a.1.4	Totals	-	1,773	-	-	-	-	-	266	2,039	2,039	-	-	-	-	-	-	-	-	-	-	20,238
Disposal of Plant Systems																						
2a.1.5.1	Auxiliary Feedwater	-	69	-	-	-	-	-	10	79	-	-	79	-	-	-	-	-	-	-	-	1,244
2a.1.5.2	Auxiliary Steam	-	61	-	-	-	-	-	9	71	-	-	71	-	-	-	-	-	-	-	-	1,126
2a.1.5.3	Auxiliary Steam RCA	-	122	6	5	9	21	-	38	200	200	-	-	448	197	-	-	-	-	35,862	1,946	-
2a.1.5.4	Boric Acid Processing	451	492	51	39	57	182	-	414	1,686	1,686	-	-	2,981	2,231	-	-	-	-	275,609	15,951	-
2a.1.5.5	CO2 & H2	-	23	-	-	-	-	-	3	26	-	-	-	-	-	-	-	-	-	-	-	419
2a.1.5.6	CO2 & H2 RCA	-	35	1	1	1	5	-	11	55	55	-	-	67	50	-	-	-	-	7,168	575	-
2a.1.5.7	Chemical Feed	-	51	-	-	-	-	-	8	58	-	-	58	-	-	-	-	-	-	-	-	934
2a.1.5.8	Chilled Water	-	63	-	-	-	-	-	9	72	-	-	72	-	-	-	-	-	-	-	-	1,142

Table C-1
Byron Nuclear Power Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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.1.5.9	Circulating Water	-	279	-	-	-	-	-	42	321	-	-	321	-	-	-	-	-	-	-	5,150	-
2a.1.5.10	Condensate	-	331	-	-	-	-	-	50	381	-	-	381	-	-	-	-	-	-	-	6,023	-
2a.1.5.11	Condensate Booster	-	299	-	-	-	-	-	45	344	-	-	344	-	-	-	-	-	-	-	5,428	-
2a.1.5.12	Condensate Cleanup	-	58	-	-	-	-	-	9	67	-	-	67	-	-	-	-	-	-	-	1,060	-
2a.1.5.13	Containment Spray	-	233	17	18	49	57	-	84	458	458	-	-	2,566	543	-	-	-	-	152,670	3,755	-
2a.1.5.14	Diesel Fuel Oil	-	90	-	-	-	-	-	13	103	-	-	103	-	-	-	-	-	-	-	1,615	-
2a.1.5.15	Essential Service Water	-	208	-	-	-	-	-	31	239	-	-	239	-	-	-	-	-	-	-	3,837	-
2a.1.5.16	Extraction Steam	-	167	-	-	-	-	-	25	192	-	-	192	-	-	-	-	-	-	-	3,089	-
2a.1.5.17	Feedwater	-	278	-	-	-	-	-	42	320	-	-	320	-	-	-	-	-	-	-	5,142	-
2a.1.5.18	Feedwater Drains	-	668	-	-	-	-	-	100	768	-	-	768	-	-	-	-	-	-	-	12,366	-
2a.1.5.19	Gland Steam	-	50	-	-	-	-	-	8	58	-	-	58	-	-	-	-	-	-	-	932	-
2a.1.5.20	Gland Water	-	44	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	-	828	-
2a.1.5.21	Main Steam	-	284	-	-	-	-	-	43	326	-	-	326	-	-	-	-	-	-	-	5,216	-
2a.1.5.22	Main Steam RCA	-	46	4	4	9	16	-	18	97	97	-	-	468	148	-	-	-	-	32,263	745	-
2a.1.5.23	Nitrogen	-	3	0	0	1	0	-	1	5	5	-	-	49	2	-	-	-	-	2,118	49	-
2a.1.5.24	Non-Essential Service Water	-	157	-	-	-	-	-	23	180	-	-	180	-	-	-	-	-	-	-	2,916	-
2a.1.5.25	Non-Essential Service Water RCA	-	86	8	8	17	30	-	34	182	182	-	-	897	287	-	-	-	-	62,152	1,308	-
2a.1.5.26	Off Gas	-	566	27	28	71	101	-	184	976	976	-	-	3,698	953	-	-	-	-	235,620	9,534	-
2a.1.5.27	Process Radiation Monitoring	-	41	1	1	1	2	-	11	57	57	-	-	75	19	-	-	-	-	4,792	748	-
2a.1.5.28	Process Sampling	-	120	2	3	9	8	-	34	176	176	-	-	466	76	-	-	-	-	25,755	2,166	-
2a.1.5.29	Station Air	-	27	-	-	-	-	-	4	31	-	-	-	-	-	-	-	-	-	-	498	-
2a.1.5.30	Station Heating	-	96	-	-	-	-	-	14	111	-	-	111	-	-	-	-	-	-	-	1,771	-
2a.1.5.31	Switchgear Heat Removal	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	-	139	-
2a.1.5.32	Turbine Bldg Equip Drains	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	-	17	-
2a.1.5.33	Turbine Generator	-	50	-	-	-	-	-	8	58	-	-	58	-	-	-	-	-	-	-	901	-
2a.1.5.34	Turbine Oil	-	77	-	-	-	-	-	12	88	-	-	88	-	-	-	-	-	-	-	1,399	-
2a.1.5.35	Waste Oil Sumps	-	26	-	-	-	-	-	4	30	-	-	30	-	-	-	-	-	-	-	483	-
2a.1.5	Totals	451	5,208	116	106	224	423	-	1,348	7,876	3,893	-	3,984	11,715	4,504	-	-	-	-	834,009	100,448	-
2a.1.6	Scaffolding in support of decommissioning	-	980	6	1	6	2	-	247	1,243	1,243	-	-	306	19	-	-	-	-	15,459	18,871	-
2a.1	Subtotal Period 2a Activity Costs	1,584	20,592	11,820	7,306	1,823	26,763	466	22,933	93,285	89,302	-	3,984	108,666	62,929	3,156	459	-	-	11,759,060	276,069	7,082
Period 2a Collateral Costs																						
2a.3.1	Process liquid waste	206	-	94	434	-	449	-	290	1,473	1,473	-	-	-	1,518	-	-	-	-	96,822	296	-
2a.3.2	Small tool allowance	-	243	-	-	-	-	-	36	279	251	-	28	-	-	-	-	-	-	-	-	-
2a.3.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	11,000	1,650	12,650	-	12,650	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	206	243	94	434	-	449	11,000	1,976	14,402	1,724	12,650	28	1,518	-	-	-	-	-	96,822	296	-
Period 2a Period-Dependent Costs																						
2a.4.1	Decon supplies	72	-	-	-	-	-	-	18	90	90	-	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	493	49	542	542	-	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	9,808	981	10,788	9,710	1,079	-	-	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	1,685	-	-	-	-	-	421	2,106	2,106	-	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	2,568	-	-	-	-	-	385	2,953	2,953	-	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	11	4	-	219	-	57	291	291	-	-	3,928	-	-	-	-	-	78,550	18	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	1,287	193	1,480	1,480	-	-	-	-	-	-	-	-	-	-	-
2a.4.8	NRC Fees	-	-	-	-	-	-	968	97	1,065	1,065	-	-	-	-	-	-	-	-	-	-	-
2a.4.9	Emergency Planning Fees	-	-	-	-	-	-	147	15	162	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.10	Site O&M Costs	-	-	-	-	-	-	184	28	211	211	-	-	-	-	-	-	-	-	-	-	-
2a.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	561	84	645	-	645	-	-	-	-	-	-	-	-	-	-
2a.4.12	ISFSI Operating Costs	-	-	-	-	-	-	65	10	74	-	74	-	-	-	-	-	-	-	-	-	-
2a.4.13	Security Staff Costs	-	-	-	-	-	-	648	97	745	745	-	-	-	-	-	-	-	-	-	-	16,877
2a.4.14	DOC Staff Cost	-	-	-	-	-	-	18,869	2,830	21,699	21,699	-	-	-	-	-	-	-	-	-	-	233,211
2a.4.15	Utility Staff Cost	-	-	-	-	-	-	32,405	4,861	37,265	37,265	-	-	-	-	-	-	-	-	-	-	434,203
2a.4	Subtotal Period 2a Period-Dependent Costs	72	4,253	11	4	-	219	65,432	10,125	80,116	78,157	881	1,079	-	3,928	-	-	-	-	78,550	18	684,291

Table C-1
Byron Nuclear Power Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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.0	TOTAL PERIOD 2a COST	1,861	25,087	11,925	7,744	1,823	27,431	76,898	35,034	187,804	169,183	13,531	5,090	108,666	68,374	3,156	459	-	11,934,440	276,383	691,373
PERIOD 2b - Site Decontamination																					
Disposal of Plant Systems																					
2b.1.2.1	Chemical & Volume Control	817	1,101	71	50	17	302	-	777	3,136	3,136	-	-	868	2,895	-	-	-	291,539	31,015	-
2b.1.2.2	Chilled Water RCA	-	282	20	23	64	72	-	104	565	565	-	-	3,376	680	-	-	-	198,114	4,761	-
2b.1.2.3	Component Cooling RCA	-	604	42	43	110	152	-	216	1,167	1,167	-	-	5,759	1,439	-	-	-	362,801	9,740	-
2b.1.2.4	Electrical	-	2,682	-	-	-	-	-	402	3,085	-	-	3,085	-	-	-	-	-	-	48,490	-
2b.1.2.5	Electrical - Contaminated	-	1,136	14	24	122	18	-	312	1,626	1,626	-	-	6,385	170	-	-	-	274,560	19,147	-
2b.1.2.6	Electrical - RCA	-	1,706	38	64	318	47	-	499	2,673	2,673	-	-	16,677	444	-	-	-	717,088	29,114	-
2b.1.2.7	Emergency Diesel Generator	-	113	-	-	-	-	-	17	130	-	-	130	-	-	-	-	-	-	2,066	-
2b.1.2.8	Essential Service Water RCA	-	271	21	24	72	74	-	103	565	565	-	-	3,797	699	-	-	-	216,933	4,447	-
2b.1.2.9	Fire Protection	-	108	-	-	-	-	-	16	124	-	-	124	-	-	-	-	-	-	1,984	-
2b.1.2.10	Fire Protection RCA	-	165	8	6	10	29	-	52	269	269	-	-	500	274	-	-	-	44,875	2,593	-
2b.1.2.11	HVAC-Auxiliary Building	-	494	11	18	91	15	-	145	775	775	-	-	4,772	143	-	-	-	206,582	8,219	-
2b.1.2.12	HVAC-Diesel Generator Room	-	38	-	-	-	-	-	6	44	-	-	44	-	-	-	-	-	-	682	-
2b.1.2.13	HVAC-Miscellaneous	-	37	-	-	-	-	-	5	42	-	-	42	-	-	-	-	-	-	656	-
2b.1.2.14	HVAC-Primary Containment	-	598	22	39	194	29	-	194	1,076	1,076	-	-	10,145	270	-	-	-	436,230	9,906	-
2b.1.2.15	HVAC-Turbine Building	-	164	-	-	-	-	-	25	188	-	-	188	-	-	-	-	-	-	3,177	-
2b.1.2.16	Instrument Air Supply	-	41	-	-	-	-	-	6	47	-	-	47	-	-	-	-	-	-	760	-
2b.1.2.17	Instrument Air Supply RCA	-	67	4	3	2	15	-	22	112	112	-	-	86	143	-	-	-	16,339	1,082	-
2b.1.2.18	Miscellaneous Drains	-	39	2	2	3	7	-	12	65	65	-	-	176	69	-	-	-	13,320	655	-
2b.1.2.19	Primary Containment Purge	-	275	22	26	87	70	-	105	586	586	-	-	4,544	664	-	-	-	244,109	4,845	-
2b.1.2.20	Primary Water	-	60	2	1	2	7	-	17	90	90	-	-	90	69	-	-	-	9,849	1,024	-
2b.1.2.21	Radioactive Waste Disposal	427	906	61	46	53	231	-	519	2,244	2,244	-	-	2,795	2,520	-	-	-	309,487	22,364	-
2b.1.2.22	Reactor Building Equipment Drains	82	97	8	6	2	34	-	76	304	304	-	-	82	330	-	-	-	32,558	2,742	-
2b.1.2.23	Reactor Building Floor Drains	18	45	3	2	1	11	-	24	104	104	-	-	76	102	-	-	-	12,182	1,034	-
2b.1.2.24	Reactor Coolant	-	170	10	7	2	40	-	55	284	284	-	-	101	378	-	-	-	38,001	2,806	-
2b.1.2.25	Residual Heat Removal	143	191	16	15	17	76	-	144	601	601	-	-	867	716	-	-	-	99,415	4,227	-
2b.1.2.26	Safety Injection	-	866	63	60	128	236	-	310	1,663	1,663	-	-	6,698	2,507	-	-	-	472,191	15,122	-
2b.1.2.27	Station Air RCA	-	33	2	1	1	7	-	10	54	54	-	-	39	69	-	-	-	7,800	525	-
2b.1.2.28	Station Heating RCA	-	109	7	7	15	25	-	38	201	201	-	-	789	238	-	-	-	53,393	1,772	-
2b.1.2.29	Waste Oil Sumps RCA	-	7	1	0	0	2	-	2	12	12	-	-	13	20	-	-	-	2,296	93	-
2b.1.2	Totals	1,487	12,405	448	468	1,310	1,501	-	4,213	21,832	18,171	-	3,660	68,636	14,839	-	-	-	4,059,664	235,048	-
2b.1.3	Scaffolding in support of decommissioning	-	1,470	9	2	10	3	-	371	1,865	1,865	-	-	458	29	-	-	-	23,188	28,306	-
Decontamination of Site Buildings																					
2b.1.4.1	Reactor	1,947	1,478	195	205	134	786	-	1,610	6,355	6,355	-	-	7,022	9,990	-	-	-	1,229,614	57,952	-
2b.1.4.2	Auxiliary Building	196	123	10	11	17	23	-	140	519	519	-	-	866	426	-	-	-	76,820	5,405	-
2b.1.4.3	Refueling Water Storage Tank	354	422	5	6	22	9	-	290	1,108	1,108	-	-	1,146	142	-	-	-	60,367	13,578	-
2b.1.4	Totals	2,498	2,022	210	222	172	819	-	2,039	7,983	7,983	-	-	9,034	10,558	-	-	-	1,366,802	76,935	-
2b.1	Subtotal Period 2b Activity Costs	3,984	15,898	667	692	1,492	2,323	-	6,623	31,679	28,019	-	3,660	78,128	25,425	-	-	-	5,449,654	340,289	-
Period 2b Additional Costs																					
2b.2.1	License Termination Survey Planning	-	-	-	-	-	-	940	282	1,222	1,222	-	-	-	-	-	-	-	-	-	6,240
2b.2.2	Soil Remediation	-	17	0	52	-	143	-	48	260	260	-	-	-	2,730	-	-	-	207,480	99	-
2b.2	Subtotal Period 2b Additional Costs	-	17	0	52	-	143	940	330	1,482	1,482	-	-	-	2,730	-	-	-	207,480	99	6,240
Period 2b Collateral Costs																					
2b.3.1	Process liquid waste	206	-	151	706	-	922	-	455	2,440	2,440	-	-	-	2,433	-	-	-	198,741	474	-
2b.3.2	Small tool allowance	-	308	-	-	-	-	-	46	354	354	-	-	-	-	-	-	-	-	-	-
2b.3.3	Decommissioning Equipment Disposition	-	-	119	34	127	40	-	46	365	365	-	-	6,000	373	-	-	-	303,507	88	-
2b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	19,000	2,850	21,850	-	21,850	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	206	308	271	740	127	962	19,000	3,397	25,010	3,160	21,850	-	6,000	2,807	-	-	-	502,248	563	-

Table C-1
Byron Nuclear Power Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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																					
2b.4.1	Decon supplies	696	-	-	-	-	-	-	174	870	870	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	847	85	932	932	-	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	1,264	126	1,390	1,390	-	-	-	-	-	-	-	-	-	-
2b.4.4	Health physics supplies	-	2,296	-	-	-	-	-	574	2,870	2,870	-	-	-	-	-	-	-	-	-	-
2b.4.5	Heavy equipment rental	-	4,377	-	-	-	-	-	657	5,034	5,034	-	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	14	5	-	277	-	72	369	369	-	-	-	4,970	-	-	-	99,407	23	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	1,746	262	2,008	2,008	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	1,664	166	1,831	1,831	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	253	25	278	-	278	-	-	-	-	-	-	-	-	-
2b.4.10	Site O&M Costs	-	-	-	-	-	-	316	47	363	363	-	-	-	-	-	-	-	-	-	-
2b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	964	145	1,109	-	1,109	-	-	-	-	-	-	-	-	-
2b.4.12	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	484	73	557	557	-	-	-	-	-	-	-	-	-	-
2b.4.13	ISFSI Operating Costs	-	-	-	-	-	-	111	17	128	-	128	-	-	-	-	-	-	-	-	-
2b.4.14	Security Staff Cost	-	-	-	-	-	-	1,113	167	1,280	1,280	-	-	-	-	-	-	-	-	-	29,009
2b.4.15	DOC Staff Cost	-	-	-	-	-	-	23,989	3,598	27,587	27,587	-	-	-	-	-	-	-	-	-	306,436
2b.4.16	Utility Staff Cost	-	-	-	-	-	-	41,185	6,178	47,363	47,363	-	-	-	-	-	-	-	-	-	569,887
2b.4	Subtotal Period 2b Period-Dependent Costs	696	6,673	14	5	-	277	73,936	12,365	93,967	92,453	1,514	-	-	4,970	-	-	-	99,407	23	905,331
2b.0	TOTAL PERIOD 2b COST	4,887	22,895	952	1,489	1,619	3,706	93,876	22,715	152,138	125,113	23,364	3,660	84,128	35,932	-	-	-	6,258,789	340,974	911,571
PERIOD 2d - Delay before License Termination																					
Period 2d Period-Dependent Costs																					
2d.4.1	Insurance	-	-	-	-	-	-	882	88	970	970	-	-	-	-	-	-	-	-	-	-
2d.4.2	Property taxes	-	-	-	-	-	-	1,316	132	1,447	1,447	-	-	-	-	-	-	-	-	-	-
2d.4.3	Health physics supplies	-	197	-	-	-	-	-	49	246	246	-	-	-	-	-	-	-	-	-	-
2d.4.4	Disposal of DAW generated	-	-	1	0	-	15	-	4	19	19	-	-	-	262	-	-	-	5,249	1	-
2d.4.5	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2d.4.6	NRC Fees	-	-	-	-	-	-	480	48	528	528	-	-	-	-	-	-	-	-	-	-
2d.4.7	Emergency Planning Fees	-	-	-	-	-	-	263	26	289	-	289	-	-	-	-	-	-	-	-	-
2d.4.8	Site O&M Costs	-	-	-	-	-	-	329	49	378	378	-	-	-	-	-	-	-	-	-	-
2d.4.9	ISFSI Operating Costs	-	-	-	-	-	-	116	17	133	-	133	-	-	-	-	-	-	-	-	-
2d.4.10	Security Staff Cost	-	-	-	-	-	-	632	95	727	727	-	-	-	-	-	-	-	-	-	16,474
2d.4.11	Utility Staff Cost	-	-	-	-	-	-	2,705	406	3,111	3,111	-	-	-	-	-	-	-	-	-	38,440
2d.4	Subtotal Period 2d Period-Dependent Costs	-	197	1	0	-	15	6,723	914	7,850	7,427	422	-	-	262	-	-	-	5,249	1	54,914
2d.0	TOTAL PERIOD 2d COST	-	197	1	0	-	15	6,723	914	7,850	7,427	422	-	-	262	-	-	-	5,249	1	54,914
PERIOD 2e - License Termination																					
Period 2e Direct Decommissioning Activities																					
2e.1.1	ORISE confirmatory survey	-	-	-	-	-	-	151	45	197	197	-	-	-	-	-	-	-	-	-	-
2e.1.2	Terminate license	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
2e.1	Subtotal Period 2e Activity Costs	-	-	-	-	-	-	151	45	197	197	-	-	-	-	-	-	-	-	-	-
Period 2e Additional Costs																					
2e.2.1	License Termination Survey	-	-	-	-	-	-	5,485	1,646	7,131	7,131	-	-	-	-	-	-	-	-	-	91,793
2e.2	Subtotal Period 2e Additional Costs	-	-	-	-	-	-	5,485	1,646	7,131	7,131	-	-	-	-	-	-	-	-	-	91,793
Period 2e Collateral Costs																					
2e.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,130	169	1,299	1,299	-	-	-	-	-	-	-	-	-	-
2e.3	Subtotal Period 2e Collateral Costs	-	-	-	-	-	-	1,130	169	1,299	1,299	-	-	-	-	-	-	-	-	-	-
Period 2e Period-Dependent Costs																					
2e.4.1	Insurance	-	-	-	-	-	-	228	23	251	251	-	-	-	-	-	-	-	-	-	-
2e.4.2	Property taxes	-	-	-	-	-	-	376	38	414	414	-	-	-	-	-	-	-	-	-	-

Table C-1
Byron Nuclear Power Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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.4.3	Health physics supplies	-	598	-	-	-	-	-	149	747	747	-	-	-	-	-	-	-	-	-	-	-
2e.4.4	Disposal of DAW generated	-	-	1	0	-	19	-	5	25	25	-	-	-	337	-	-	-	-	6,734	2	-
2e.4.5	Plant energy budget	-	-	-	-	-	-	139	21	160	160	-	-	-	-	-	-	-	-	-	-	-
2e.4.6	NRC Fees	-	-	-	-	-	-	532	53	585	585	-	-	-	-	-	-	-	-	-	-	-
2e.4.7	Emergency Planning Fees	-	-	-	-	-	-	75	8	83	-	83	-	-	-	-	-	-	-	-	-	-
2e.4.8	Site O&M Costs	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-	-
2e.4.9	ISFSI Operating Costs	-	-	-	-	-	-	33	5	38	-	38	-	-	-	-	-	-	-	-	-	-
2e.4.10	Security Staff Cost	-	-	-	-	-	-	1,214	182	1,396	1,396	-	-	-	-	-	-	-	-	-	-	27,893
2e.4.11	DOC Staff Cost	-	-	-	-	-	-	3,801	570	4,371	4,371	-	-	-	-	-	-	-	-	-	-	46,750
2e.4.12	Utility Staff Cost	-	-	-	-	-	-	4,795	719	5,514	5,514	-	-	-	-	-	-	-	-	-	-	60,107
2e.4	Subtotal Period 2e Period-Dependent Costs	-	598	1	0	-	19	11,287	1,787	13,691	13,570	121	-	-	337	-	-	-	-	6,734	2	134,750
2e.0	TOTAL PERIOD 2e COST	-	598	1	0	-	19	18,053	3,647	22,318	22,197	121	-	-	337	-	-	-	-	6,734	91,795	137,870
PERIOD 2 TOTALS		6,748	48,776	12,879	9,233	3,442	31,171	195,550	62,311	370,110	323,920	37,439	8,751	192,795	104,906	3,156	459	-	18,205,210	709,152	1,795,729	
PERIOD 3b - Site Restoration																						
Period 3b Direct Decommissioning Activities																						
Demolition of Remaining Site Buildings																						
3b.1.1.1	Reactor	-	6,217	-	-	-	-	-	933	7,149	-	-	7,149	-	-	-	-	-	-	-	69,541	-
3b.1.1.2	Auxiliary Building	-	5,342	-	-	-	-	-	801	6,143	-	-	6,143	-	-	-	-	-	-	-	61,287	-
3b.1.1.3	Old Steam Generator Storage Facility	-	417	-	-	-	-	-	63	479	-	-	479	-	-	-	-	-	-	-	4,868	-
3b.1.1.4	Refueling Water Storage Tank	-	936	-	-	-	-	-	140	1,077	-	-	1,077	-	-	-	-	-	-	-	11,688	-
3b.1.1.5	Turbine Building	-	5,246	-	-	-	-	-	787	6,033	-	-	6,033	-	-	-	-	-	-	-	70,347	-
3b.1.1.6	Turbine Pedestal	-	1,250	-	-	-	-	-	187	1,437	-	-	1,437	-	-	-	-	-	-	-	12,628	-
3b.1.1	Totals	-	19,408	-	-	-	-	-	2,911	22,319	-	-	22,319	-	-	-	-	-	-	-	230,359	-
Site Closeout Activities																						
3b.1.2	Grade & landscape site	-	267	-	-	-	-	-	40	307	-	-	307	-	-	-	-	-	-	-	869	-
3b.1.3	Final report to NRC	-	-	-	-	-	-	184	28	212	212	-	-	-	-	-	-	-	-	-	-	1,560
3b.1	Subtotal Period 3b Activity Costs	-	19,675	-	-	-	-	184	2,979	22,838	212	-	22,626	-	-	-	-	-	-	-	231,228	1,560
Period 3b Additional Costs																						
3b.2.1	Concrete Crushing	-	574	-	-	-	-	3	87	664	-	-	664	-	-	-	-	-	-	-	2,798	-
3b.2.2	Hyperbolic Cooling Tower	-	3,461	-	-	-	-	-	519	3,980	-	-	3,980	-	-	-	-	-	-	-	18,598	-
3b.2	Subtotal Period 3b Additional Costs	-	4,035	-	-	-	-	3	606	4,644	-	-	4,644	-	-	-	-	-	-	-	21,396	-
Period 3b Collateral Costs																						
3b.3.1	Small tool allowance	-	241	-	-	-	-	-	36	277	-	-	277	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	241	-	-	-	-	-	36	277	-	-	277	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																						
3b.4.1	Insurance	-	-	-	-	-	-	751	75	826	-	826	-	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	1,239	124	1,363	-	1,363	-	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	6,137	-	-	-	-	-	921	7,057	-	-	7,057	-	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	-	34	268	(0)	52	210	-	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	228	24	268	-	268	-	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	248	25	273	-	273	-	-	-	-	-	-	-	-	-	-
3b.4.7	ISFSI Operating Costs	-	-	-	-	-	-	109	16	125	-	125	-	-	-	-	-	-	-	-	-	-
3b.4.8	Site O&M Cost	-	-	-	-	-	-	310	46	356	-	356	-	-	-	-	-	-	-	-	-	-
3b.4.9	Security Staff Cost	-	-	-	-	-	-	3,821	573	4,394	0	3,603	791	-	-	-	-	-	-	-	-	87,294
3b.4.10	DOC Staff Cost	-	-	-	-	-	-	11,650	1,748	13,398	-	-	13,398	-	-	-	-	-	-	-	-	137,043
3b.4.11	Utility Staff Cost	-	-	-	-	-	-	7,035	1,055	8,090	(0)	1,537	6,553	-	-	-	-	-	-	-	-	87,294
3b.4	Subtotal Period 3b Period-Dependent Costs	-	6,137	-	-	-	-	25,634	4,642	36,413	(0)	8,048	28,365	-	-	-	-	-	-	-	-	311,630

Table C-1
Byron Nuclear Power Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
3b.0	TOTAL PERIOD 3b COST	-	30,087	-	-	-	-	25,822	8,262	64,171	212	8,048	55,912	-	-	-	-	-	-	252,623	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	-	-	-	-	-	-	7,875	1,181	9,056	-	9,056	-	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	7,875	1,181	9,056	-	9,056	-	-	-	-	-	-	-	-	-
Period 3c Period-Dependent Costs																					
3c.4.1	Insurance	-	-	-	-	-	-	2,063	206	2,269	-	2,269	-	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	3,403	340	3,744	-	3,744	-	-	-	-	-	-	-	-	-
3c.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	1,269	127	1,396	-	1,396	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	681	68	749	-	749	-	-	-	-	-	-	-	-	-
3c.4.6	Site O&M Costs	-	-	-	-	-	-	851	128	978	-	978	-	-	-	-	-	-	-	-	-
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	299	45	344	-	344	-	-	-	-	-	-	-	-	-
3c.4.8	Security Staff Cost	-	-	-	-	-	-	8,657	1,299	9,956	-	9,956	-	-	-	-	-	-	-	-	191,777
3c.4.9	Utility Staff Cost	-	-	-	-	-	-	3,679	552	4,231	-	4,231	-	-	-	-	-	-	-	-	48,015
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	20,903	2,765	23,667	-	23,667	-	-	-	-	-	-	-	-	239,792
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	28,778	3,946	32,724	-	32,724	-	-	-	-	-	-	-	-	239,792
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	375	-	-	-	11,665	1,787	13,827	13,827	-	-	-	-	-	-	505	104,146	-	-
3d.1.1	Totals	-	-	375	-	-	-	11,665	1,787	13,827	13,827	-	-	-	-	-	-	505	104,146	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	375	-	-	-	11,665	1,787	13,827	13,827	-	-	-	-	-	-	505	104,146	-	-
Period 3d Period-Dependent Costs																					
3d.4.1	Insurance	-	-	-	-	-	-	12	1	13	-	13	-	-	-	-	-	-	-	-	-
3d.4.2	Property taxes	-	-	-	-	-	-	19	2	21	-	21	-	-	-	-	-	-	-	-	-
3d.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3d.4.4	NRC ISFSI Fees	-	-	-	-	-	-	7	1	8	-	8	-	-	-	-	-	-	-	-	-
3d.4.5	Emergency Planning Fees	-	-	-	-	-	-	4	0	4	-	4	-	-	-	-	-	-	-	-	-
3d.4.6	Site O&M Costs	-	-	-	-	-	-	5	1	6	-	6	-	-	-	-	-	-	-	-	-
3d.4.7	ISFSI Operating Costs	-	-	-	-	-	-	2	0	2	-	2	-	-	-	-	-	-	-	-	-
3d.4.8	Security Staff Cost	-	-	-	-	-	-	49	7	56	-	56	-	-	-	-	-	-	-	-	1,080
3d.4.9	Utility Staff Cost	-	-	-	-	-	-	21	3	24	-	24	-	-	-	-	-	-	-	-	270
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	118	16	133	-	133	-	-	-	-	-	-	-	-	1,350
3d.0	TOTAL PERIOD 3d COST	-	-	375	-	-	-	11,665	1,803	13,960	13,827	133	-	-	-	-	-	505	104,146	-	1,350
PERIOD 3e - ISFSI Decontamination																					
Period 3e Direct Decommissioning Activities																					
Period 3e Additional Costs																					
3e.2.1	ISFSI License Termination	-	38	1	23	-	90	727	143	1,021	-	1,021	-	-	1,705	-	-	-	142,596	2,873	1,280
3e.2	Subtotal Period 3e Additional Costs	-	38	1	23	-	90	727	143	1,021	-	1,021	-	-	1,705	-	-	-	142,596	2,873	1,280
Period 3e Collateral Costs																					
3e.3.1	Small tool allowance	-	0	-	-	-	-	-	0	1	-	1	-	-	-	-	-	-	-	-	-

Table C-1
Byron Nuclear Power Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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				
3e.3	Subtotal Period 3e Collateral Costs	-	0	-	-	-	-	-	0	1	-	1	-	-	-	-	-	-	-	-	-	-
Period 3e Period-Dependent Costs																						
3e.4.1	Insurance	-	-	-	-	-	-	99	10	109	-	109	-	-	-	-	-	-	-	-	-	
3e.4.2	Property taxes	-	-	-	-	-	-	163	16	179	-	179	-	-	-	-	-	-	-	-	-	
3e.4.3	Heavy equipment rental	-	219	-	-	-	-	-	33	251	-	251	-	-	-	-	-	-	-	-	-	
3e.4.4	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3e.4.5	Site O&M Costs	-	-	-	-	-	-	41	6	47	-	47	-	-	-	-	-	-	-	-	-	
3e.4.6	Security Staff Cost	-	-	-	-	-	-	110	16	126	-	126	-	-	-	-	-	-	-	-	2,468	
3e.4.7	Utility Staff Cost	-	-	-	-	-	-	147	22	169	-	169	-	-	-	-	-	-	-	-	1,870	
3e.4	Subtotal Period 3e Period-Dependent Costs	-	219	-	-	-	-	559	104	882	-	882	-	-	-	-	-	-	-	-	4,338	
3e.0	TOTAL PERIOD 3e COST	-	257	1	23	-	90	1,286	247	1,903	-	1,903	-	-	1,705	-	-	-	142,596	2,873	5,618	
PERIOD 3f - ISFSI Site Restoration																						
Period 3f Direct Decommissioning Activities																						
Period 3f Additional Costs																						
3f.2.1	ISFSI Demolition and Site Restoration	-	1,227	-	-	-	-	24	188	1,439	-	1,439	-	-	-	-	-	-	-	-	17,085	80
3f.2	Subtotal Period 3f Additional Costs	-	1,227	-	-	-	-	24	188	1,439	-	1,439	-	-	-	-	-	-	-	-	17,085	80
Period 3f Collateral Costs																						
3f.3.1	Small tool allowance	-	16	-	-	-	-	-	2	18	-	18	-	-	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	16	-	-	-	-	-	2	18	-	18	-	-	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																						
3f.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.2	Property taxes	-	-	-	-	-	-	86	9	95	-	95	-	-	-	-	-	-	-	-	-	-
3f.4.3	Heavy equipment rental	-	89	-	-	-	-	-	13	103	-	103	-	-	-	-	-	-	-	-	-	-
3f.4.4	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.5	Site O&M Costs	-	-	-	-	-	-	22	3	25	-	25	-	-	-	-	-	-	-	-	-	-
3f.4.6	Security Staff Cost	-	-	-	-	-	-	58	9	67	-	67	-	-	-	-	-	-	-	-	-	1,307
3f.4.7	Utility Staff Cost	-	-	-	-	-	-	64	10	73	-	73	-	-	-	-	-	-	-	-	-	810
3f.4	Subtotal Period 3f Period-Dependent Costs	-	89	-	-	-	-	229	44	362	-	362	-	-	-	-	-	-	-	-	-	2,117
3f.0	TOTAL PERIOD 3f COST	-	1,332	-	-	-	-	253	234	1,820	-	1,820	-	-	-	-	-	-	-	-	17,085	2,197
PERIOD 3 TOTALS																						
TOTAL COST TO DECOMMISSION		9,641	82,823	13,336	9,628	3,442	46,358	361,632	95,861	622,721	448,221	108,376	66,124	192,795	107,953	4,045	459	505	18,592,490	1,013,551	3,194,652	

Table C-1
Byron Nuclear Power Station, Unit 1
DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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 18.19% CONTINGENCY:					\$622,721	thousands of 2009 dollars															
TOTAL NRC LICENSE TERMINATION COST IS 71.98% OR:					\$448,221	thousands of 2009 dollars															
SPENT FUEL MANAGEMENT COST IS 17.4% OR:					\$108,376	thousands of 2009 dollars															
NON-NUCLEAR DEMOLITION COST IS 10.62% OR:					\$66,124	thousands of 2009 dollars															
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):					112,458	cubic feet															
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:					505	cubic feet															
TOTAL SCRAP METAL REMOVED:					58,878	tons															
TOTAL CRAFT LABOR REQUIREMENTS:					1,013,551	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 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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	-	-	-	-	-	-	66	10	76	76	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	101	15	116	116	-	-	-	-	-	-	-	-	-	856
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	232	35	267	267	-	-	-	-	-	-	-	-	-	1,969
1a.1.8	Perform detailed rad survey	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	51	8	58	58	-	-	-	-	-	-	-	-	-	428
1a.1.10	End product description	-	-	-	-	-	-	51	8	58	58	-	-	-	-	-	-	-	-	-	428
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	66	10	76	76	-	-	-	-	-	-	-	-	-	556
1a.1.12	Define major work sequence	-	-	-	-	-	-	379	57	436	436	-	-	-	-	-	-	-	-	-	3,210
1a.1.13	Perform SER and EA	-	-	-	-	-	-	157	23	180	180	-	-	-	-	-	-	-	-	-	1,327
1a.1.14	Perform Site-Specific Cost Study	-	-	-	-	-	-	253	38	290	290	-	-	-	-	-	-	-	-	-	2,140
1a.1.15	Prepare/submit License Termination Plan	-	-	-	-	-	-	207	31	238	238	-	-	-	-	-	-	-	-	-	1,753
1a.1.16	Receive NRC approval of termination plan	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	249	37	286	257	-	29	-	-	-	-	-	-	-	2,106
1a.1.17.2	Plant systems	-	-	-	-	-	-	210	32	242	218	-	24	-	-	-	-	-	-	-	1,783
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	25	4	29	29	-	-	-	-	-	-	-	-	-	214
1a.1.17.4	Reactor internals	-	-	-	-	-	-	359	54	412	412	-	-	-	-	-	-	-	-	-	3,039
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	328	49	378	378	-	-	-	-	-	-	-	-	-	2,782
1a.1.17.6	Biological shield	-	-	-	-	-	-	25	4	29	29	-	-	-	-	-	-	-	-	-	214
1a.1.17.7	Steam generators	-	-	-	-	-	-	158	24	181	181	-	-	-	-	-	-	-	-	-	1,335
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	81	12	93	46	-	46	-	-	-	-	-	-	-	685
1a.1.17.9	Main Turbine	-	-	-	-	-	-	20	3	23	-	-	23	-	-	-	-	-	-	-	171
1a.1.17.10	Main Condensers	-	-	-	-	-	-	20	3	23	-	-	23	-	-	-	-	-	-	-	171
1a.1.17.11	Plant structures & buildings	-	-	-	-	-	-	158	24	181	91	-	91	-	-	-	-	-	-	-	1,335
1a.1.17.12	Waste management	-	-	-	-	-	-	232	35	267	267	-	-	-	-	-	-	-	-	-	1,969
1a.1.17.13	Facility & site closeout	-	-	-	-	-	-	45	7	52	26	-	26	-	-	-	-	-	-	-	385
1a.1.17	Total	-	-	-	-	-	-	1,911	287	2,197	1,935	-	262	-	-	-	-	-	-	-	16,190
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	121	18	139	139	-	-	-	-	-	-	-	-	-	1,027
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	2,800	420	3,220	3,220	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	71	11	81	81	-	-	-	-	-	-	-	-	-	599
1a.1.21	Rigging/Cont. Cntrl Envlp/tooling/etc.	-	-	-	-	-	-	2,200	330	2,530	2,530	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	62	9	71	71	-	-	-	-	-	-	-	-	-	526
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	8,725	1,309	10,034	9,771	-	262	-	-	-	-	-	-	-	31,566
Period 1a Additional Costs																					
1a.2.1	ISFSI Expansion	-	-	-	-	-	-	9,800	1,470	11,270	-	11,270	-	-	-	-	-	-	-	-	-
1a.2	Subtotal Period 1a Additional Costs	-	-	-	-	-	-	9,800	1,470	11,270	-	11,270	-	-	-	-	-	-	-	-	-
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	9,000	1,350	10,350	-	10,350	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	9,000	1,350	10,350	-	10,350	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	769	77	846	846	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	390	-	-	-	-	-	98	488	488	-	-	-	-	-	-	-	-	-	-

Table C-2
Byron Nuclear Power Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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.4.4	Heavy equipment rental	-	414	-	-	-	-	-	62	476	476	-	-	-	-	-	-	-	-	-	-	
1a.4.5	Disposal of DAW generated	-	-	2	1	-	32	-	8	42	42	-	-	-	565	-	-	-	-	11,299	3	
1a.4.6	Plant energy budget	-	-	-	-	-	-	921	138	1,059	1,059	-	-	-	-	-	-	-	-	-	-	
1a.4.7	NRC Fees	-	-	-	-	-	-	471	47	518	518	-	-	-	-	-	-	-	-	-	-	
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	306	31	337	-	337	-	-	-	-	-	-	-	-	-	
1a.4.9	Site O&M Costs	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-	
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	381	57	438	-	438	-	-	-	-	-	-	-	-	-	
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	44	7	51	-	51	-	-	-	-	-	-	-	-	-	
1a.4.12	Security Staff Cost	-	-	-	-	-	-	6,424	964	7,387	7,387	-	-	-	-	-	-	-	-	-	157,471	
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	24,828	3,724	28,552	28,552	-	-	-	-	-	-	-	-	-	346,229	
1a.4	Subtotal Period 1a Period-Dependent Costs	-	804	2	1	-	32	34,269	5,231	40,337	39,511	826	-	-	565	-	-	-	-	11,299	3	503,700
1a.0	TOTAL PERIOD 1a COST	-	804	2	1	-	32	61,794	9,359	71,991	49,283	22,446	262	-	565	-	-	-	-	11,299	3	535,266
PERIOD 1b - Decommissioning Preparations																						
Period 1b Direct Decommissioning Activities																						
Detailed Work Procedures																						
1b.1.1.1	Plant systems	-	-	-	-	-	-	239	36	275	247	-	27	-	-	-	-	-	-	-	-	2,026
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	51	8	58	58	-	-	-	-	-	-	-	-	-	-	428
1b.1.1.3	Reactor internals	-	-	-	-	-	-	126	19	145	145	-	-	-	-	-	-	-	-	-	-	1,070
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	68	10	78	20	-	59	-	-	-	-	-	-	-	-	578
1b.1.1.5	CRD cooling assembly	-	-	-	-	-	-	51	8	58	58	-	-	-	-	-	-	-	-	-	-	428
1b.1.1.6	CRD housings & ICI tubes	-	-	-	-	-	-	51	8	58	58	-	-	-	-	-	-	-	-	-	-	428
1b.1.1.7	Incore instrumentation	-	-	-	-	-	-	51	8	58	58	-	-	-	-	-	-	-	-	-	-	428
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	183	28	211	211	-	-	-	-	-	-	-	-	-	-	1,554
1b.1.1.9	Facility closeout	-	-	-	-	-	-	61	9	70	35	-	35	-	-	-	-	-	-	-	-	514
1b.1.1.10	Missile shields	-	-	-	-	-	-	23	3	26	26	-	-	-	-	-	-	-	-	-	-	193
1b.1.1.11	Biological shield	-	-	-	-	-	-	61	9	70	70	-	-	-	-	-	-	-	-	-	-	514
1b.1.1.12	Steam generators	-	-	-	-	-	-	232	35	267	267	-	-	-	-	-	-	-	-	-	-	1,969
1b.1.1.13	Reinforced concrete	-	-	-	-	-	-	51	8	58	29	-	29	-	-	-	-	-	-	-	-	428
1b.1.1.14	Main Turbine	-	-	-	-	-	-	79	12	91	-	-	91	-	-	-	-	-	-	-	-	668
1b.1.1.15	Main Condensers	-	-	-	-	-	-	79	12	91	-	-	91	-	-	-	-	-	-	-	-	668
1b.1.1.16	Auxiliary building	-	-	-	-	-	-	138	21	159	143	-	16	-	-	-	-	-	-	-	-	1,168
1b.1.1.17	Reactor building	-	-	-	-	-	-	138	21	159	143	-	16	-	-	-	-	-	-	-	-	1,168
1b.1.1	Total	-	-	-	-	-	-	1,679	252	1,931	1,568	-	363	-	-	-	-	-	-	-	-	14,228
1b.1.2	Decon primary loop	567	-	-	-	-	-	-	283	850	850	-	-	-	-	-	-	-	-	-	1,067	-
1b.1	Subtotal Period 1b Activity Costs	567	-	-	-	-	-	1,679	535	2,781	2,418	-	363	-	-	-	-	-	-	-	1,067	14,228
Period 1b Additional Costs																						
1b.2.1	Site Characterization	-	-	-	-	-	-	2,711	813	3,525	3,525	-	-	-	-	-	-	-	-	-	13,042	4,640
1b.2.2	Spent Fuel Pool Isolation	-	-	-	-	-	-	9,690	1,453	11,143	11,143	-	-	-	-	-	-	-	-	-	-	-
1b.2	Subtotal Period 1b Additional Costs	-	-	-	-	-	-	12,401	2,267	14,668	14,668	-	-	-	-	-	-	-	-	-	13,042	4,640
Period 1b Collateral Costs																						
1b.3.1	Decon equipment	797	-	-	-	-	-	-	120	917	917	-	-	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,130	169	1,299	1,299	-	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process liquid waste	56	-	73	345	-	3,070	-	855	4,400	4,400	-	-	-	371	806	-	-	-	111,694	229	-
1b.3.4	Small tool allowance	-	2	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-	-
1b.3.5	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-	-
1b.3.6	Decon rig	1,400	-	-	-	-	-	-	210	1,610	1,610	-	-	-	-	-	-	-	-	-	-	-
1b.3.7	Spent Fuel Capital and Transfer	-	-	-	-	-	-	5,000	750	5,750	5,750	5,750	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	2,254	1,102	73	345	-	3,070	6,130	2,269	15,243	9,493	5,750	-	-	371	806	-	-	-	111,694	229	-

Table C-2
Byron Nuclear Power Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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																					
1b.4.1	Decon supplies	24	-	-	-	-	-	-	6	31	31	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	386	-	424	424	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	4,927	493	5,420	5,420	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	215	-	-	-	-	-	54	269	269	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	207	-	-	-	-	-	31	238	238	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	1	0	-	18	-	5	24	24	-	-	-	325	-	-	-	6,507	1	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	923	138	1,061	1,061	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	236	24	260	260	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	154	15	169	-	169	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Costs	-	-	-	-	-	-	63	9	72	72	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	191	29	220	-	220	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	22	3	25	-	25	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	3,221	483	3,704	3,704	-	-	-	-	-	-	-	-	-	78,951
1b.4.14	DOC Staff Cost	-	-	-	-	-	-	3,689	553	4,242	4,242	-	-	-	-	-	-	-	-	-	47,057
1b.4.15	Utility Staff Cost	-	-	-	-	-	-	12,448	1,867	14,315	14,315	-	-	-	-	-	-	-	-	-	173,589
1b.4	Subtotal Period 1b Period-Dependent Costs	24	423	1	0	-	18	26,259	3,749	30,475	-	414	-	-	325	-	-	-	6,507	1	299,597
1b.0	TOTAL PERIOD 1b COST	2,845	1,525	74	346	-	3,088	46,469	8,821	63,167	56,640	6,164	363	-	697	806	-	-	118,201	14,340	318,465
PERIOD 1 TOTALS		2,845	2,328	76	346	-	3,120	108,263	18,180	135,158	105,923	28,610	626	-	1,262	806	-	-	129,500	14,342	853,731
PERIOD 2a - Large Component Removal																					
Period 2a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
2a.1.1.1	Reactor Coolant Piping	171	145	30	36	-	317	-	209	908	908	-	-	-	1,606	-	-	-	194,222	5,503	-
2a.1.1.2	Pressurizer Relief Tank	32	29	6	7	-	60	-	40	174	174	-	-	-	329	-	-	-	36,553	1,072	-
2a.1.1.3	Reactor Coolant Pumps & Motors	103	106	91	180	-	1,272	-	432	2,184	2,184	-	-	-	4,796	-	-	-	780,540	4,291	100
2a.1.1.4	Pressurizer	48	59	394	96	-	412	-	196	1,205	1,205	-	-	-	3,033	-	-	-	252,826	2,482	938
2a.1.1.5	Steam Generators	387	4,096	2,185	2,399	580	3,416	-	2,737	15,800	15,800	-	-	39,289	14,436	-	-	-	3,278,518	23,233	2,125
2a.1.1.6	CRDMs/ICIs/Service Structure Removal	161	91	194	45	-	102	-	155	747	747	-	-	-	3,881	-	-	-	86,025	4,285	-
2a.1.1.7	Reactor Vessel Internals	125	2,193	4,483	876	-	8,060	233	7,112	23,082	23,082	-	-	-	1,377	903	459	-	326,029	26,933	1,209
2a.1.1.8	Reactor Vessel	95	4,162	1,498	675	-	7,847	233	7,670	22,179	22,179	-	-	-	6,606	2,254	-	-	978,589	26,933	1,209
2a.1.1	Totals	1,122	10,881	8,881	4,314	580	21,485	466	18,550	66,279	66,279	-	-	39,289	36,065	3,156	459	-	5,933,302	94,734	5,582
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator	-	578	378	30	203	284	-	288	1,762	1,762	-	-	5,088	2,833	-	-	-	686,663	10,223	-
2a.1.3	Main Condensers	-	1,163	166	58	143	211	-	390	2,131	2,131	-	-	6,756	1,992	-	-	-	482,702	20,428	-
Cascading Costs from Clean Building Demolition																					
2a.1.4.1	Reactor	-	1,076	-	-	-	-	-	161	1,237	1,237	-	-	-	-	-	-	-	-	12,130	-
2a.1.4.2	Auxiliary Building	-	602	-	-	-	-	-	90	692	692	-	-	-	-	-	-	-	-	6,896	-
2a.1.4.3	Radwaste/Service Building	-	391	-	-	-	-	-	59	450	450	-	-	-	-	-	-	-	-	5,060	-
2a.1.4.4	Refueling Water Storage Tank	-	104	-	-	-	-	-	16	120	120	-	-	-	-	-	-	-	-	1,299	-
2a.1.4.5	Fuel Handling Building	-	309	-	-	-	-	-	46	355	355	-	-	-	-	-	-	-	-	3,690	-
2a.1.4	Totals	-	2,481	-	-	-	-	-	372	2,853	2,853	-	-	-	-	-	-	-	-	29,074	-
Disposal of Plant Systems																					
2a.1.5.1	Auxiliary Feedwater	-	63	-	-	-	-	-	9	72	-	-	72	-	-	-	-	-	-	1,143	-
2a.1.5.2	Auxiliary Steam	-	115	-	-	-	-	-	17	132	-	-	132	-	-	-	-	-	-	2,107	-
2a.1.5.3	Auxiliary Steam RCA	-	326	16	15	33	59	-	105	554	554	-	-	-	-	-	-	-	-	-	-
2a.1.5.4	Boric Acid Processing	424	464	35	26	20	145	-	375	1,490	1,490	-	-	1,717	562	-	-	-	120,095	5,268	-
2a.1.5.5	CO2 & H2	-	16	-	-	-	-	-	2	18	-	-	-	1,071	1,516	-	-	-	166,316	14,426	-
2a.1.5.6	CO2 & H2 RCA	-	31	2	2	3	6	-	10	54	54	-	-	18	-	-	-	-	-	289	-
2a.1.5.7	Chemical Feed	-	145	-	-	-	-	-	22	167	-	-	167	-	-	-	-	-	12,266	482	-

Table C-2
Byron Nuclear Power Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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.1.5.8	Chilled Water	-	80	-	-	-	-	-	12	92	-	-	92	-	-	-	-	-	-	-	1,454	-
2a.1.5.9	Circulating Water	-	525	-	-	-	-	-	79	604	-	-	604	-	-	-	-	-	-	-	9,669	-
2a.1.5.10	Condensate	-	293	-	-	-	-	-	44	337	-	-	337	-	-	-	-	-	-	-	5,317	-
2a.1.5.11	Condensate Booster	-	293	-	-	-	-	-	44	336	-	-	336	-	-	-	-	-	-	-	5,314	-
2a.1.5.12	Condensate Cleanup	-	160	-	-	-	-	-	24	184	-	-	184	-	-	-	-	-	-	-	3,000	-
2a.1.5.13	Containment Spray	-	229	16	17	49	56	-	83	450	450	-	-	2,569	527	-	-	-	-	151,430	3,698	-
2a.1.5.14	Diesel Fuel Oil	-	158	-	-	-	-	-	24	182	-	-	182	-	-	-	-	-	-	-	2,848	-
2a.1.5.15	Essential Service Water	-	274	-	-	-	-	-	41	315	-	-	315	-	-	-	-	-	-	-	5,049	-
2a.1.5.16	Extraction Steam	-	196	-	-	-	-	-	29	226	-	-	226	-	-	-	-	-	-	-	3,637	-
2a.1.5.17	Feedwater	-	267	-	-	-	-	-	40	307	-	-	307	-	-	-	-	-	-	-	4,925	-
2a.1.5.18	Feedwater Drains	-	633	-	-	-	-	-	95	728	-	-	728	-	-	-	-	-	-	-	11,719	-
2a.1.5.19	Gland Steam	-	33	-	-	-	-	-	5	38	-	-	38	-	-	-	-	-	-	-	616	-
2a.1.5.20	Gland Water	-	24	-	-	-	-	-	4	28	-	-	28	-	-	-	-	-	-	-	458	-
2a.1.5.21	Main Steam	-	271	-	-	-	-	-	41	312	-	-	312	-	-	-	-	-	-	-	4,979	-
2a.1.5.22	Main Steam RCA	-	76	4	5	13	17	-	27	142	142	-	-	670	162	-	-	-	-	41,728	1,256	-
2a.1.5.23	Make-up Demineralizer	-	137	-	-	-	-	-	21	158	-	-	158	-	-	-	-	-	-	-	2,595	-
2a.1.5.24	Nitrogen	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	-	18	-
2a.1.5.25	Non-Essential Service Water	-	318	-	-	-	-	-	48	366	-	-	366	-	-	-	-	-	-	-	5,903	-
2a.1.5.26	Non-Essential Service Water RCA	-	163	18	20	50	70	-	71	391	391	-	-	2,611	658	-	-	-	-	165,090	2,562	-
2a.1.5.27	Off Gas	-	668	35	37	96	128	-	222	1,186	1,186	-	-	5,026	1,212	-	-	-	-	312,797	11,268	-
2a.1.5.28	Potable Water	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	-	75	-
2a.1.5.29	Process Radiation Monitoring	-	66	1	1	1	3	-	18	90	90	-	-	75	33	-	-	-	-	5,961	1,214	-
2a.1.5.30	Process Sampling	-	145	3	3	9	9	-	41	210	210	-	-	466	89	-	-	-	-	26,924	2,632	-
2a.1.5.31	Sewage Treatment Plant	-	85	-	-	-	-	-	13	98	-	-	98	-	-	-	-	-	-	-	1,579	-
2a.1.5.32	Station Air	-	38	-	-	-	-	-	6	44	-	-	44	-	-	-	-	-	-	-	705	-
2a.1.5.33	Station Heating	-	130	-	-	-	-	-	19	149	-	-	149	-	-	-	-	-	-	-	2,391	-
2a.1.5.34	Steam Humidification	-	6	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	-	115	-
2a.1.5.35	Switchgear Heat Removal	-	29	-	-	-	-	-	4	33	-	-	33	-	-	-	-	-	-	-	519	-
2a.1.5.36	Turbine Bldg Equip Drains	-	67	-	-	-	-	-	10	77	-	-	77	-	-	-	-	-	-	-	1,235	-
2a.1.5.37	Turbine Bldg Floor Drains	-	115	-	-	-	-	-	17	133	-	-	133	-	-	-	-	-	-	-	2,117	-
2a.1.5.38	Turbine Oil	-	73	-	-	-	-	-	11	84	-	-	84	-	-	-	-	-	-	-	1,359	-
2a.1.5.39	Turbine-Generator Auxiliaries	-	49	-	-	-	-	-	7	57	-	-	57	-	-	-	-	-	-	-	884	-
2a.1.5.40	Waste Oil Sumps	-	28	-	-	-	-	-	4	32	-	-	32	-	-	-	-	-	-	-	517	-
2a.1.5.41	Well Water	-	69	-	-	-	-	-	10	79	-	-	79	-	-	-	-	-	-	-	1,247	-
2a.1.5	Totals	424	6,866	130	126	274	494	-	1,655	9,970	4,568	-	5,402	14,375	4,820	-	-	-	-	1,002,607	129,248	-
2a.1.6	Scaffolding in support of decommissioning	-	1,419	9	2	10	3	-	358	1,802	1,802	-	-	473	29	-	-	-	-	23,936	27,326	-
2a.1	Subtotal Period 2a Activity Costs	1,546	23,388	9,564	4,531	1,211	22,477	466	21,615	84,797	79,394	-	5,402	65,980	45,739	3,156	459	-	-	8,129,210	311,032	5,582
Period 2a Collateral Costs																						
2a.3.1	Process liquid waste	146	-	74	342	-	379	-	226	1,168	1,168	-	-	-	1,193	-	-	-	-	81,635	233	-
2a.3.2	Small tool allowance	-	283	-	-	-	-	-	42	326	293	-	33	-	-	-	-	-	-	-	-	-
2a.3.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	13,000	1,950	14,950	-	14,950	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	146	283	74	342	-	379	13,000	2,219	16,443	1,461	14,950	33	-	1,193	-	-	-	-	81,635	233	-
Period 2a Period-Dependent Costs																						
2a.4.1	Decon supplies	72	-	-	-	-	-	-	18	90	90	-	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	493	49	542	-	-	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	9,808	981	10,788	9,710	-	1,079	-	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	1,819	-	-	-	-	-	455	2,274	2,274	-	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	2,568	-	-	-	-	-	385	2,953	2,953	-	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	11	4	-	219	-	57	291	291	-	-	-	3,925	-	-	-	-	78,509	18	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	1,287	193	1,480	1,480	-	-	-	-	-	-	-	-	-	-	-
2a.4.8	NRC Fees	-	-	-	-	-	-	663	66	729	729	-	-	-	-	-	-	-	-	-	-	-
2a.4.9	Emergency Planning Fees	-	-	-	-	-	-	147	15	162	-	162	-	-	-	-	-	-	-	-	-	-

Table C-2
Byron Nuclear Power Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet				
Period 2a Period-Dependent Costs (continued)																						
2a.4.10	Site O&M Costs	-	-	-	-	-	-	184	28	211	211	-	-	-	-	-	-	-	-	-	-	
2a.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	561	84	645	-	645	-	-	-	-	-	-	-	-	-	
2a.4.12	ISFSI Operating Costs	-	-	-	-	-	-	65	10	74	-	74	-	-	-	-	-	-	-	-	-	
2a.4.13	Security Staff Cost	-	-	-	-	-	-	8,008	1,201	9,210	9,210	-	-	-	-	-	-	-	-	-	194,087	
2a.4.14	DOC Staff Cost	-	-	-	-	-	-	18,869	2,830	21,699	21,699	-	-	-	-	-	-	-	-	-	233,211	
2a.4.15	Utility Staff Cost	-	-	-	-	-	-	32,405	4,861	37,265	37,265	-	-	-	-	-	-	-	-	-	434,203	
2a.4	Subtotal Period 2a Period-Dependent Costs	72	4,387	11	4	-	219	72,488	11,232	88,413	86,453	881	1,079	-	3,925	-	-	-	-	78,509	18	861,501
2a.0	TOTAL PERIOD 2a COST	1,764	28,058	9,649	4,877	1,211	23,075	85,954	35,066	189,653	167,308	15,831	6,514	65,980	50,857	3,156	459	-	8,289,355	311,283	867,083	
PERIOD 2b - Site Decontamination																						
Period 2b Direct Decommissioning Activities																						
Disposal of Plant Systems																						
2b.1.1.1	Chemical & Volume Control	763	1,052	68	49	17	291	-	734	2,973	2,973	-	-	909	2,787	-	-	-	283,146	29,248	-	
2b.1.1.2	Chilled Water RCA	-	592	46	43	71	191	-	218	1,161	1,161	-	-	3,736	1,808	-	-	-	313,840	9,257	-	
2b.1.1.3	Component Cooling	-	627	44	47	121	160	-	226	1,225	1,225	-	-	6,342	1,513	-	-	-	393,115	10,143	-	
2b.1.1.4	Electrical	-	3,669	-	-	-	-	-	550	4,220	-	-	4,220	-	-	-	-	-	-	-	66,259	
2b.1.1.5	Electrical - Contaminated	-	1,727	20	34	172	25	-	471	2,451	2,451	-	-	9,033	240	-	-	-	388,394	28,801	-	
2b.1.1.6	Electrical - RCA	-	2,236	47	78	389	57	-	648	3,455	3,455	-	-	20,387	542	-	-	-	876,577	37,570	-	
2b.1.1.7	Emergency Diesel Generator	-	83	-	-	-	-	-	13	96	-	-	96	-	-	-	-	-	-	-	1,514	
2b.1.1.8	Essential Service Water RCA	-	303	38	45	129	140	-	141	796	796	-	-	6,764	1,325	-	-	-	393,573	5,007	-	
2b.1.1.9	Fire Protection	-	271	-	-	-	-	-	41	311	-	-	311	-	-	-	-	-	-	-	4,983	
2b.1.1.10	Fire Protection RCA	-	476	35	35	76	137	-	173	933	933	-	-	3,961	1,298	-	-	-	277,242	7,443	-	
2b.1.1.11	HVAC-Auxiliary Building	-	538	12	20	102	15	-	158	846	846	-	-	5,365	141	-	-	-	230,495	9,018	-	
2b.1.1.12	HVAC-Control Room HVAC	-	7	-	-	-	-	-	1	8	-	-	8	-	-	-	-	-	-	-	127	
2b.1.1.13	HVAC-Diesel Generator Room	-	38	-	-	-	-	-	6	44	-	-	44	-	-	-	-	-	-	-	686	
2b.1.1.14	HVAC-Laboratory	-	17	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	-	315	
2b.1.1.15	HVAC-Machine Shop	-	16	-	-	-	-	-	2	18	-	-	18	-	-	-	-	-	-	-	297	
2b.1.1.16	HVAC-Primary Containment	-	598	22	39	194	29	-	194	1,076	1,076	-	-	10,145	270	-	-	-	436,230	9,906	-	
2b.1.1.17	HVAC-Pumphouse	-	15	-	-	-	-	-	2	18	-	-	18	-	-	-	-	-	-	-	275	
2b.1.1.18	HVAC-Radwaste	-	309	7	12	60	9	-	91	489	489	-	-	3,160	84	-	-	-	135,891	5,013	-	
2b.1.1.19	HVAC-Turbine Building	-	163	-	-	-	-	-	24	187	-	-	187	-	-	-	-	-	-	-	3,158	
2b.1.1.20	Instrument Air Supply	-	64	-	-	-	-	-	10	73	-	-	73	-	-	-	-	-	-	-	1,197	
2b.1.1.21	Instrument Air Supply RCA	-	220	9	7	8	32	-	66	342	342	-	-	437	306	-	-	-	45,151	3,581	-	
2b.1.1.22	Miscellaneous Drains	-	73	3	3	7	13	-	23	123	123	-	-	377	121	-	-	-	26,209	1,242	-	
2b.1.1.23	Primary Containment Purge	-	290	23	26	85	73	-	110	607	607	-	-	4,466	687	-	-	-	242,950	5,082	-	
2b.1.1.24	Primary Water	-	799	58	54	144	181	-	281	1,517	1,517	-	-	7,569	2,154	-	-	-	460,483	14,115	-	
2b.1.1.25	Radioactive Waste Disposal	2,388	2,674	206	154	106	861	-	2,137	8,527	8,527	-	-	5,558	8,877	-	-	-	955,683	82,599	-	
2b.1.1.26	Reactor Bldg Equipment Drains	102	106	10	8	3	47	-	92	368	368	-	-	170	446	-	-	-	46,524	2,908	-	
2b.1.1.27	Reactor Building Floor Drains	18	40	2	2	1	10	-	22	95	95	-	-	75	92	-	-	-	11,255	942	-	
2b.1.1.28	Reactor Coolant	-	162	9	6	2	37	-	52	268	268	-	-	104	351	-	-	-	35,666	2,678	-	
2b.1.1.29	Residual Heat Removal	133	185	15	14	16	74	-	137	574	574	-	-	849	696	-	-	-	96,896	3,992	-	
2b.1.1.30	Safety Injection	-	841	62	58	126	228	-	301	1,616	1,616	-	-	6,576	2,428	-	-	-	460,194	14,716	-	
2b.1.1.31	Station Air RCA	-	51	3	2	1	12	-	17	87	87	-	-	69	115	-	-	-	13,089	822	-	
2b.1.1.32	Station Heating RCA	-	223	14	13	26	56	-	77	410	410	-	-	1,372	529	-	-	-	103,157	3,574	-	
2b.1.1.33	Waste Oil Sumps RCA	-	23	1	1	1	4	-	7	38	38	-	-	78	38	-	-	-	6,630	363	-	
2b.1.1.34	Waste Water Treatment	-	78	-	-	-	-	-	12	90	-	-	90	-	-	-	-	-	-	-	1,464	
2b.1.1	Totals	3,403	18,570	754	751	1,861	2,682	-	7,039	35,060	29,975	-	5,085	97,501	26,849	-	-	-	6,232,380	368,293	-	
2b.1.2	Scaffolding in support of decommissioning	-	1,773	12	3	13	4	-	448	2,252	2,252	-	-	591	37	-	-	-	29,920	34,158	-	
Decontamination of Site Buildings																						
2b.1.3.1	Reactor	1,947	1,478	195	205	134	786	-	1,610	6,355	6,355	-	-	7,022	9,990	-	-	-	1,229,614	57,952	-	
2b.1.3.2	Auxiliary Building	231	150	13	15	17	33	-	167	626	626	-	-	866	613	-	-	-	95,474	6,417	-	

Table C-2
Byron Nuclear Power Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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)																					
2b.1.3.3	Radwaste/Service Building	152	69	11	12	6	29	-	104	383	383	-	-	322	540	-	-	-	66,201	3,701	-
2b.1.3.4	Refueling Water Storage Tank	354	422	5	6	22	9	-	290	1,108	1,108	-	-	1,146	142	-	-	-	60,367	13,578	-
2b.1.3	Totals	2,684	2,119	224	238	179	858	-	2,171	8,473	8,473	-	-	9,356	11,284	-	-	-	1,451,657	81,647	-
2b.1	Subtotal Period 2b Activity Costs	6,087	22,462	990	991	2,052	3,543	-	9,658	45,785	40,700	-	5,085	107,449	38,170	-	-	-	7,713,957	484,098	-
Period 2b Collateral Costs																					
2b.3.1	Process liquid waste	287	-	237	1,110	-	1,507	-	711	3,852	3,852	-	-	-	3,817	-	-	-	324,682	744	-
2b.3.2	Small tool allowance	-	437	-	-	-	-	-	66	503	503	-	-	-	-	-	-	-	-	-	-
2b.3.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	23,000	3,450	26,450	-	26,450	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	287	437	237	1,110	-	1,507	23,000	4,226	30,805	4,355	26,450	-	-	3,817	-	-	-	324,682	744	-
Period 2b Period-Dependent Costs																					
2b.4.1	Decon supplies	764	-	-	-	-	-	-	191	955	955	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	847	85	932	932	-	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	1,264	126	1,390	1,390	-	-	-	-	-	-	-	-	-	-
2b.4.4	Health physics supplies	-	2,919	-	-	-	-	-	730	3,649	3,649	-	-	-	-	-	-	-	-	-	-
2b.4.5	Heavy equipment rental	-	4,377	-	-	-	-	-	657	5,034	5,034	-	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	19	7	-	362	-	93	481	481	-	-	-	6,483	-	-	-	129,660	30	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	1,746	262	2,008	2,008	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	1,558	156	1,714	1,714	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	253	25	278	-	278	-	-	-	-	-	-	-	-	-
2b.4.10	Site O&M Costs	-	-	-	-	-	-	316	47	363	363	-	-	-	-	-	-	-	-	-	-
2b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	1,733	260	1,992	-	1,992	-	-	-	-	-	-	-	-	-
2b.4.12	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	484	73	557	557	-	-	-	-	-	-	-	-	-	-
2b.4.13	ISFSI Operating Costs	-	-	-	-	-	-	111	17	128	-	128	-	-	-	-	-	-	-	-	-
2b.4.14	Security Staff Cost	-	-	-	-	-	-	13,765	2,065	15,830	15,830	-	-	-	-	-	-	-	-	-	333,599
2b.4.15	DOC Staff Cost	-	-	-	-	-	-	31,199	4,680	35,879	35,879	-	-	-	-	-	-	-	-	-	385,023
2b.4.16	Utility Staff Cost	-	-	-	-	-	-	53,549	8,032	61,581	61,581	-	-	-	-	-	-	-	-	-	714,666
2b.4	Subtotal Period 2b Period-Dependent Costs	764	7,296	19	7	-	362	106,824	17,498	132,770	130,372	2,398	-	-	6,483	-	-	-	129,660	30	1,433,287
2b.0	TOTAL PERIOD 2b COST	7,139	30,196	1,246	2,109	2,052	5,412	129,824	31,383	209,360	175,427	28,848	5,085	107,449	48,470	-	-	-	8,168,299	484,872	1,433,287
PERIOD 2c - Decontamination Following Wet Fuel Storage																					
Period 2c Direct Decommissioning Activities																					
2c.1.1	Remove spent fuel racks	1,093	106	305	93	-	590	-	765	2,951	2,951	-	-	-	5,572	-	-	-	499,920	2,174	-
Disposal of Plant Systems																					
2c.1.2.1	Fuel Handling Bldg Equip Drains	-	161	10	8	14	38	-	54	286	286	-	-	738	397	-	-	-	62,254	2,688	-
2c.1.2.2	Fuel Handling Bldg Equip Drains (Unit 1)	-	29	1	1	5	-	-	9	46	46	-	-	37	49	-	-	-	5,918	475	-
2c.1.2.3	Fuel Handling Bldg Floor Drains	-	165	11	8	10	41	-	55	290	290	-	-	524	409	-	-	-	56,293	2,736	-
2c.1.2.4	Fuel Handling Bldg Floor Drains (Unit 1)	-	115	7	5	9	24	-	37	197	197	-	-	465	245	-	-	-	39,201	1,954	-
2c.1.2.5	Fuel Pool Cooling & Cleanup	-	219	15	13	9	67	-	77	407	407	-	-	830	635	-	-	-	90,354	3,663	-
2c.1.2.6	Fuel Pool Cooling & Cleanup (Unit 1)	-	203	14	12	15	61	-	71	377	377	-	-	805	578	-	-	-	84,182	3,417	-
2c.1.2.7	HVAC-Miscellaneous	-	97	-	-	-	-	-	14	111	111	-	111	-	-	-	-	-	-	1,769	-
2c.1.2	Totals	-	988	58	49	65	236	-	319	1,715	1,604	-	111	3,400	2,314	-	-	-	338,202	16,702	-
Decontamination of Site Buildings																					
2c.1.3.1	Fuel Handling Building	1,012	1,174	20	24	59	43	-	825	3,157	3,157	-	-	3,097	736	-	-	-	198,355	38,107	-
2c.1.3	Totals	1,012	1,174	20	24	59	43	-	825	3,157	3,157	-	-	3,097	736	-	-	-	198,355	38,107	-
2c.1.4	Scaffolding in support of decommissioning	-	355	2	1	3	1	-	90	450	450	-	-	118	7	-	-	-	5,984	6,832	-
2c.1	Subtotal Period 2c Activity Costs	2,105	2,621	386	166	127	870	-	1,998	8,273	8,162	-	111	6,615	8,629	-	-	-	1,042,461	63,814	-

Table C-2
Byron Nuclear Power Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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 Additional Costs																						
2c.2.1	License Termination Survey Planning	-	-	-	-	-	-	940	282	1,222	1,222	-	-	-	-	-	-	-	-	-	6,240	
2c.2	Subtotal Period 2c Additional Costs	-	-	-	-	-	-	940	282	1,222	1,222	-	-	-	-	-	-	-	-	-	6,240	
Period 2c Collateral Costs																						
2c.3.1	Process liquid waste	188	-	80	366	-	358	-	246	1,238	1,238	-	-	-	1,287	-	-	-	-	77,203	251	-
2c.3.2	Small tool allowance	-	75	-	-	-	-	-	11	87	87	-	-	-	-	-	-	-	-	-	-	-
2c.3.3	Decommissioning Equipment Disposition	-	-	119	34	127	40	-	46	365	365	-	-	6,000	373	-	-	-	-	303,507	88	-
2c.3	Subtotal Period 2c Collateral Costs	188	75	199	400	127	398	-	303	1,690	1,690	-	-	6,000	1,660	-	-	-	-	380,710	339	-
Period 2c Period-Dependent Costs																						
2c.4.1	Decon supplies	152	-	-	-	-	-	-	38	191	191	-	-	-	-	-	-	-	-	-	-	-
2c.4.2	Insurance	-	-	-	-	-	-	206	21	227	227	-	-	-	-	-	-	-	-	-	-	-
2c.4.3	Property taxes	-	-	-	-	-	-	308	31	339	339	-	-	-	-	-	-	-	-	-	-	-
2c.4.4	Health physics supplies	-	478	-	-	-	-	-	120	598	598	-	-	-	-	-	-	-	-	-	-	-
2c.4.5	Heavy equipment rental	-	1,067	-	-	-	-	-	160	1,227	1,227	-	-	-	-	-	-	-	-	-	-	-
2c.4.6	Disposal of DAW generated	-	-	4	2	-	82	-	21	109	109	-	-	-	1,467	-	-	-	-	29,339	7	-
2c.4.7	Plant energy budget	-	-	-	-	-	-	227	34	261	261	-	-	-	-	-	-	-	-	-	-	-
2c.4.8	NRC Fees	-	-	-	-	-	-	387	39	426	426	-	-	-	-	-	-	-	-	-	-	-
2c.4.9	Emergency Planning Fees	-	-	-	-	-	-	62	6	68	-	68	-	-	-	-	-	-	-	-	-	-
2c.4.10	Site O&M Costs	-	-	-	-	-	-	77	12	89	89	-	-	-	-	-	-	-	-	-	-	-
2c.4.11	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	236	35	272	272	-	-	-	-	-	-	-	-	-	-	-
2c.4.12	ISFSI Operating Costs	-	-	-	-	-	-	27	4	31	-	31	-	-	-	-	-	-	-	-	-	-
2c.4.13	Security Staff Cost	-	-	-	-	-	-	1,875	281	2,157	2,157	-	-	-	-	-	-	-	-	-	-	42,750
2c.4.14	DOC Staff Cost	-	-	-	-	-	-	5,254	788	6,043	6,043	-	-	-	-	-	-	-	-	-	-	64,286
2c.4.15	Utility Staff Cost	-	-	-	-	-	-	9,604	1,441	11,045	11,045	-	-	-	-	-	-	-	-	-	-	122,786
2c.4	Subtotal Period 2c Period-Dependent Costs	152	1,545	4	2	-	82	18,264	3,030	23,080	22,981	99	-	-	1,467	-	-	-	-	29,339	7	229,821
2c.0	TOTAL PERIOD 2c COST	2,445	4,242	589	567	253	1,350	19,204	5,614	34,266	34,056	99	111	12,615	11,756	-	-	-	-	1,452,510	64,160	236,061
PERIOD 2e - License Termination																						
Period 2e Direct Decommissioning Activities																						
2e.1.1	ORISE confirmatory survey	-	-	-	-	-	-	151	45	197	197	-	-	-	-	-	-	-	-	-	-	-
2e.1.2	Terminate license	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-
2e.1	Subtotal Period 2e Activity Costs	-	-	-	-	-	-	151	45	197	197	-	-	-	-	-	-	-	-	-	-	-
Period 2e Additional Costs																						
2e.2.1	License Termination Survey	-	-	-	-	-	-	7,473	2,242	9,716	9,716	-	-	-	-	-	-	-	-	-	128,636	3,120
2e.2	Subtotal Period 2e Additional Costs	-	-	-	-	-	-	7,473	2,242	9,716	9,716	-	-	-	-	-	-	-	-	-	128,636	3,120
Period 2e Collateral Costs																						
2e.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,130	169	1,299	1,299	-	-	-	-	-	-	-	-	-	-	-
2e.3	Subtotal Period 2e Collateral Costs	-	-	-	-	-	-	1,130	169	1,299	1,299	-	-	-	-	-	-	-	-	-	-	-
Period 2e Period-Dependent Costs																						
2e.4.1	Insurance	-	-	-	-	-	-	228	23	251	251	-	-	-	-	-	-	-	-	-	-	-
2e.4.2	Property taxes	-	-	-	-	-	-	376	38	414	414	-	-	-	-	-	-	-	-	-	-	-
2e.4.3	Health physics supplies	-	739	-	-	-	-	-	185	924	924	-	-	-	-	-	-	-	-	-	-	-
2e.4.4	Disposal of DAW generated	-	-	1	0	-	19	-	5	25	25	-	-	-	337	-	-	-	-	6,734	2	-
2e.4.5	Plant energy budget	-	-	-	-	-	-	139	21	160	160	-	-	-	-	-	-	-	-	-	-	-
2e.4.6	NRC Fees	-	-	-	-	-	-	355	35	390	390	-	-	-	-	-	-	-	-	-	-	-
2e.4.7	Emergency Planning Fees	-	-	-	-	-	-	75	8	83	-	83	-	-	-	-	-	-	-	-	-	-
2e.4.8	Site O&M Costs	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-	-
2e.4.9	ISFSI Operating Costs	-	-	-	-	-	-	33	5	38	-	38	-	-	-	-	-	-	-	-	-	-
2e.4.10	Security Staff Cost	-	-	-	-	-	-	1,214	182	1,396	1,396	-	-	-	-	-	-	-	-	-	-	27,893
2e.4.11	DOC Staff Cost	-	-	-	-	-	-	3,801	570	4,371	4,371	-	-	-	-	-	-	-	-	-	-	46,750

Table C-2
Byron Nuclear Power Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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.4.12	Utility Staff Cost	-	-	-	-	-	-	4,795	719	5,514	5,514	-	-	-	-	-	-	-	-	-	60,107	
2e.4	Subtotal Period 2e Period-Dependent Costs	-	739	1	0	-	19	11,110	1,804	13,674	13,553	121	-	-	337	-	-	-	-	6,734	2	134,750
2e.0	TOTAL PERIOD 2e COST	-	739	1	0	-	19	19,865	4,261	24,886	24,765	121	-	-	337	-	-	-	-	6,734	128,638	137,870
PERIOD 2 TOTALS		11,348	63,235	11,485	7,553	3,516	29,855	254,847	76,324	458,164	401,555	44,899	11,709	186,044	111,419	3,156	459	-	17,916,900	988,953	2,674,302	
PERIOD 3b - Site Restoration																						
Period 3b Direct Decommissioning Activities																						
Demolition of Remaining Site Buildings																						
3b.1.1.1	Reactor	-	6,217	-	-	-	-	-	933	7,149	-	-	7,149	-	-	-	-	-	-	-	69,541	-
3b.1.1.2	Aux Feedwater-Steam Tunnel/Penetr. Area	-	644	-	-	-	-	-	97	741	-	-	741	-	-	-	-	-	-	-	5,185	-
3b.1.1.3	Auxiliary Building	-	5,417	-	-	-	-	-	813	6,230	-	-	6,230	-	-	-	-	-	-	-	62,063	-
3b.1.1.4	Berms, Settling Ponds, and Drying Beds	-	130	-	-	-	-	-	19	149	-	-	149	-	-	-	-	-	-	-	1,631	-
3b.1.1.5	Circulating Water Pumphouse	-	931	-	-	-	-	-	140	1,071	-	-	1,071	-	-	-	-	-	-	-	11,861	-
3b.1.1.6	Essential Service Cooling Tower	-	427	-	-	-	-	-	64	491	-	-	491	-	-	-	-	-	-	-	5,067	-
3b.1.1.7	Make-up Demineralizer Area	-	1,558	-	-	-	-	-	234	1,792	-	-	1,792	-	-	-	-	-	-	-	20,770	-
3b.1.1.8	Miscellaneous Site Structures	-	1,649	-	-	-	-	-	247	1,897	-	-	1,897	-	-	-	-	-	-	-	20,544	-
3b.1.1.9	Radwaste/Service Building	-	3,579	-	-	-	-	-	537	4,116	-	-	4,116	-	-	-	-	-	-	-	45,688	-
3b.1.1.10	Receiving Building	-	166	-	-	-	-	-	25	190	-	-	190	-	-	-	-	-	-	-	2,293	-
3b.1.1.11	Refueling Water Storage Tank	-	936	-	-	-	-	-	140	1,077	-	-	1,077	-	-	-	-	-	-	-	11,688	-
3b.1.1.12	River Screen House	-	524	-	-	-	-	-	79	603	-	-	603	-	-	-	-	-	-	-	8,869	-
3b.1.1.13	Security Modifications	-	975	-	-	-	-	-	146	1,121	-	-	1,121	-	-	-	-	-	-	-	8,636	-
3b.1.1.14	Turbine Building	-	5,246	-	-	-	-	-	787	6,033	-	-	6,033	-	-	-	-	-	-	-	70,347	-
3b.1.1.15	Turbine Pedestal	-	1,250	-	-	-	-	-	187	1,437	-	-	1,437	-	-	-	-	-	-	-	12,628	-
3b.1.1.16	Yard Inventory	-	1,876	-	-	-	-	-	281	2,158	-	-	2,158	-	-	-	-	-	-	-	20,610	-
3b.1.1.17	Fuel Handling Building	-	2,781	-	-	-	-	-	417	3,198	-	-	3,198	-	-	-	-	-	-	-	33,246	-
3b.1.1	Totals	-	34,307	-	-	-	-	-	5,146	39,453	-	-	39,453	-	-	-	-	-	-	-	407,670	-
Site Closeout Activities																						
3b.1.2	BackFill Site	-	3,308	-	-	-	-	-	496	3,804	-	-	3,804	-	-	-	-	-	-	-	9,059	-
3b.1.3	Grade & landscape site	-	267	-	-	-	-	-	40	307	-	-	307	-	-	-	-	-	-	-	869	-
3b.1.4	Final report to NRC	-	-	-	-	-	-	79	12	91	91	-	-	-	-	-	-	-	-	-	-	668
3b.1	Subtotal Period 3b Activity Costs	-	37,882	-	-	-	-	79	5,694	43,655	91	-	43,565	-	-	-	-	-	-	-	417,598	668
Period 3b Additional Costs																						
3b.2.1	Concrete Crushing	-	935	-	-	-	-	5	141	1,081	-	-	1,081	-	-	-	-	-	-	-	4,554	-
3b.2.2	Hyberbolic Cooling Tower	-	2,769	-	-	-	-	-	415	3,184	-	-	3,184	-	-	-	-	-	-	-	18,598	-
3b.2.3	Cofferdam Construction and Teardown	-	409	-	-	-	-	-	61	470	-	-	470	-	-	-	-	-	-	-	3,996	-
3b.2	Subtotal Period 3b Additional Costs	-	4,112	-	-	-	-	5	618	4,735	-	-	4,735	-	-	-	-	-	-	-	27,148	-
Period 3b Collateral Costs																						
3b.3.1	Small tool allowance	-	423	-	-	-	-	-	63	486	-	-	486	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	423	-	-	-	-	-	63	486	-	-	486	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																						
3b.4.1	Insurance	-	-	-	-	-	-	751	75	826	-	826	-	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	1,239	124	1,363	-	1,363	-	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	6,137	-	-	-	-	-	921	7,057	-	-	7,057	-	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	-	34	262	-	-	262	-	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	228	24	268	(0)	52	268	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	248	25	273	-	-	273	-	-	-	-	-	-	-	-	-
3b.4.7	ISFSI Operating Costs	-	-	-	-	-	-	109	16	125	-	-	125	-	-	-	-	-	-	-	-	-
3b.4.8	Site O&M Cost	-	-	-	-	-	-	310	46	356	-	-	356	-	-	-	-	-	-	-	-	-

Table C-2
Byron Nuclear Power Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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.4.9	Security Staff Cost	-	-	-	-	-	-	3,821	573	4,394	0	3,603	791	-	-	-	-	-	-	-	87,294
3b.4.10	DOC Staff Cost	-	-	-	-	-	-	11,650	1,748	13,398	-	-	13,398	-	-	-	-	-	-	-	137,043
3b.4.11	Utility Staff Cost	-	-	-	-	-	-	7,035	1,055	8,090	(0)	1,537	6,553	-	-	-	-	-	-	-	87,294
3b.4	Subtotal Period 3b Period-Dependent Costs	-	6,137	-	-	-	-	25,634	4,642	36,413	(0)	8,048	28,365	-	-	-	-	-	-	-	311,630
3b.0	TOTAL PERIOD 3b COST	-	48,554	-	-	-	-	25,718	11,017	85,289	91	8,048	77,150	-	-	-	-	-	-	444,746	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	-	-	-	-	-	-	7,875	1,181	9,056	-	9,056	-	-	-	-	-	-	-	-	-
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	7,875	1,181	9,056	-	9,056	-	-	-	-	-	-	-	-	-
Period 3c Period-Dependent Costs																					
3c.4.1	Insurance	-	-	-	-	-	-	2,063	206	2,269	-	2,269	-	-	-	-	-	-	-	-	-
3c.4.2	Property taxes	-	-	-	-	-	-	3,403	340	3,744	-	3,744	-	-	-	-	-	-	-	-	-
3c.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	1,269	127	1,396	-	1,396	-	-	-	-	-	-	-	-	-
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	681	68	749	-	749	-	-	-	-	-	-	-	-	-
3c.4.6	Site O&M Costs	-	-	-	-	-	-	851	128	978	-	978	-	-	-	-	-	-	-	-	-
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	299	45	344	-	344	-	-	-	-	-	-	-	-	-
3c.4.8	Security Staff Cost	-	-	-	-	-	-	8,657	1,299	9,956	-	9,956	-	-	-	-	-	-	-	-	191,777
3c.4.9	Utility Staff Cost	-	-	-	-	-	-	3,679	552	4,231	-	4,231	-	-	-	-	-	-	-	-	48,015
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	20,903	2,765	23,667	-	23,667	-	-	-	-	-	-	-	-	239,792
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	28,778	3,946	32,724	-	32,724	-	-	-	-	-	-	-	-	239,792
PERIOD 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	375	-	-	11,665	-	1,787	13,827	13,827	-	-	-	-	-	-	505	104,146	-	-
3d.1.1	Totals	-	-	375	-	-	11,665	-	1,787	13,827	13,827	-	-	-	-	-	-	505	104,146	-	-
3d.1	Subtotal Period 3d Activity Costs	-	-	375	-	-	11,665	-	1,787	13,827	13,827	-	-	-	-	-	-	505	104,146	-	-
Period 3d Period-Dependent Costs																					
3d.4.1	Insurance	-	-	-	-	-	-	12	1	13	-	13	-	-	-	-	-	-	-	-	-
3d.4.2	Property taxes	-	-	-	-	-	-	19	2	21	-	21	-	-	-	-	-	-	-	-	-
3d.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3d.4.4	NRC ISFSI Fees	-	-	-	-	-	-	7	1	8	-	8	-	-	-	-	-	-	-	-	-
3d.4.5	Emergency Planning Fees	-	-	-	-	-	-	4	0	4	-	4	-	-	-	-	-	-	-	-	-
3d.4.6	Site O&M Costs	-	-	-	-	-	-	5	1	6	-	6	-	-	-	-	-	-	-	-	-
3d.4.7	ISFSI Operating Costs	-	-	-	-	-	-	2	0	2	-	2	-	-	-	-	-	-	-	-	-
3d.4.8	Security Staff Cost	-	-	-	-	-	-	49	7	56	-	56	-	-	-	-	-	-	-	-	1,080
3d.4.9	Utility Staff Cost	-	-	-	-	-	-	21	3	24	-	24	-	-	-	-	-	-	-	-	270
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	118	16	133	-	133	-	-	-	-	-	-	-	-	1,350
3d.0	TOTAL PERIOD 3d COST	-	-	375	-	-	11,665	118	1,803	13,960	13,827	133	-	-	-	-	-	505	104,146	-	1,350

Table C-2
Byron Nuclear Power Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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	ISFSI License Termination	-	38	1	23	-	90	727	143	1,021	-	1,021	-	-	1,705	-	-	-	-	142,596	2,873	1,280
3e.2	Subtotal Period 3e Additional Costs	-	38	1	23	-	90	727	143	1,021	-	1,021	-	-	1,705	-	-	-	-	142,596	2,873	1,280
Period 3e Collateral Costs																						
3e.3.1	Small tool allowance	-	0	-	-	-	-	-	0	1	-	1	-	-	-	-	-	-	-	-	-	-
3e.3	Subtotal Period 3e Collateral Costs	-	0	-	-	-	-	-	0	1	-	1	-	-	-	-	-	-	-	-	-	-
Period 3e Period-Dependent Costs																						
3e.4.1	Insurance	-	-	-	-	-	-	99	10	109	-	109	-	-	-	-	-	-	-	-	-	-
3e.4.2	Property taxes	-	-	-	-	-	-	163	16	179	-	179	-	-	-	-	-	-	-	-	-	-
3e.4.3	Heavy equipment rental	-	219	-	-	-	-	-	33	251	-	251	-	-	-	-	-	-	-	-	-	-
3e.4.4	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3e.4.5	Site O&M Costs	-	-	-	-	-	-	41	6	47	-	47	-	-	-	-	-	-	-	-	-	-
3e.4.6	Security Staff Cost	-	-	-	-	-	-	110	16	126	-	126	-	-	-	-	-	-	-	-	-	2,468
3e.4.7	Utility Staff Cost	-	-	-	-	-	-	147	22	169	-	169	-	-	-	-	-	-	-	-	-	1,870
3e.4	Subtotal Period 3e Period-Dependent Costs	-	219	-	-	-	-	559	104	882	-	882	-	-	-	-	-	-	-	-	-	4,338
3e.0	TOTAL PERIOD 3e COST	-	257	1	23	-	90	1,286	247	1,903	-	1,903	-	-	1,705	-	-	-	-	142,596	2,873	5,618
PERIOD 3f - ISFSI Site Restoration																						
Period 3f Direct Decommissioning Activities																						
Period 3f Additional Costs																						
3f.2.1	ISFSI Demolition and Site Restoration	-	1,227	-	-	-	-	24	188	1,439	-	1,439	-	-	-	-	-	-	-	-	17,085	80
3f.2	Subtotal Period 3f Additional Costs	-	1,227	-	-	-	-	24	188	1,439	-	1,439	-	-	-	-	-	-	-	-	17,085	80
Period 3f Collateral Costs																						
3f.3.1	Small tool allowance	-	16	-	-	-	-	-	2	18	-	18	-	-	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	16	-	-	-	-	-	2	18	-	18	-	-	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																						
3f.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.2	Property taxes	-	-	-	-	-	-	86	9	95	-	95	-	-	-	-	-	-	-	-	-	-
3f.4.3	Heavy equipment rental	-	89	-	-	-	-	-	13	103	-	103	-	-	-	-	-	-	-	-	-	-
3f.4.4	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.5	Site O&M Costs	-	-	-	-	-	-	22	3	25	-	25	-	-	-	-	-	-	-	-	-	-
3f.4.6	Security Staff Cost	-	-	-	-	-	-	58	9	67	-	67	-	-	-	-	-	-	-	-	-	1,307
3f.4.7	Utility Staff Cost	-	-	-	-	-	-	64	10	73	-	73	-	-	-	-	-	-	-	-	-	810
3f.4	Subtotal Period 3f Period-Dependent Costs	-	89	-	-	-	-	229	44	362	-	362	-	-	-	-	-	-	-	-	-	2,117
3f.0	TOTAL PERIOD 3f COST	-	1,332	-	-	-	-	253	234	1,820	-	1,820	-	-	-	-	-	-	-	-	17,085	2,197
PERIOD 3 TOTALS																						
TOTAL COST TO DECOMMISSION																						
		14,193	115,706	11,937	7,923	3,516	44,729	419,263	111,750	729,017	521,395	118,136	89,486	186,044	114,386	3,962	459	505	18,293,140	1,467,999	4,089,289	

Table C-2
Byron Nuclear Power Station, Unit 2
DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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 18.1% CONTINGENCY:					\$729,017	thousands of 2009 dollars															
TOTAL NRC LICENSE TERMINATION COST IS 71.52% OR:					\$521,395	thousands of 2009 dollars															
SPENT FUEL MANAGEMENT COST IS 16.2% OR:					\$118,136	thousands of 2009 dollars															
NON-NUCLEAR DEMOLITION COST IS 12.27% OR:					\$89,486	thousands of 2009 dollars															
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):					118,807	cubic feet															
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:					505	cubic feet															
TOTAL SCRAP METAL REMOVED:					74,681	tons															
TOTAL CRAFT LABOR REQUIREMENTS:					1,467,999	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 1	D-2
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Table D-1
Byron Nuclear Power Station, Unit 1
Delayed DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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	-	-	-	-	-	-	398	119	517	517	-	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	153	23	176	176	-	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	236	35	271	271	-	-	-	-	-	-	-	-	-	-	2,000
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	153	23	176	176	-	-	-	-	-	-	-	-	-	-	1,300
1a.1.9	Perform detailed rad survey	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	End product description	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	-	1,000
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	177	27	204	204	-	-	-	-	-	-	-	-	-	-	1,500
1a.1.13	Define major work sequence	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	-	1,000
1a.1.14	Perform SER and EA	-	-	-	-	-	-	366	55	421	421	-	-	-	-	-	-	-	-	-	-	3,100
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	590	89	679	679	-	-	-	-	-	-	-	-	-	-	5,000
Activity Specifications																						
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	581	87	668	668	-	-	-	-	-	-	-	-	-	-	4,920
1a.1.16.2	Plant systems	-	-	-	-	-	-	492	74	565	565	-	-	-	-	-	-	-	-	-	-	4,167
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	368	55	423	423	-	-	-	-	-	-	-	-	-	-	3,120
1a.1.16.4	Waste management	-	-	-	-	-	-	236	35	271	271	-	-	-	-	-	-	-	-	-	-	2,000
1a.1.16.5	Facility and site dormancy	-	-	-	-	-	-	236	35	271	271	-	-	-	-	-	-	-	-	-	-	2,000
1a.1.16	Total	-	-	-	-	-	-	1,913	287	2,199	2,199	-	-	-	-	-	-	-	-	-	-	16,207
Detailed Work Procedures																						
1a.1.17.1	Plant systems	-	-	-	-	-	-	140	21	161	161	-	-	-	-	-	-	-	-	-	-	1,183
1a.1.17.2	Facility closeout & dormancy	-	-	-	-	-	-	142	21	163	163	-	-	-	-	-	-	-	-	-	-	1,200
1a.1.17	Total	-	-	-	-	-	-	281	42	323	323	-	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	4,633	755	5,388	5,388	-	-	-	-	-	-	-	-	-	-	35,890
Period 1a Period-Dependent Costs																						
1a.4.1	Insurance	-	-	-	-	-	-	769	77	846	846	-	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	414	-	-	-	-	-	104	518	518	-	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	414	-	-	-	-	-	62	476	476	-	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	-	2	1	-	-	-	9	45	-	-	-	-	-	-	-	-	-	-	-
1a.4.6	Plant energy budget	-	-	-	-	-	34	-	-	45	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	921	138	1,059	1,059	-	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	706	71	776	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.9	Site O&M Costs	-	-	-	-	-	-	306	31	337	-	337	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	381	57	438	-	438	-	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	44	7	51	-	51	-	-	-	-	-	-	-	-	-	-
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	458	69	527	527	-	-	-	-	-	-	-	-	-	-	12,264
1a.4	Subtotal Period 1a Period-Dependent Costs	-	828	2	1	-	34	31,082	4,662	35,745	35,745	826	-	-	-	-	-	-	-	-	-	423,400
1a.0	TOTAL PERIOD 1a COST	-	828	2	1	-	34	39,426	6,059	46,349	45,523	826	-	-	610	-	-	-	-	12,190	3	471,554

Table D-1
Byron Nuclear Power Station, Unit 1
Delayed DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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	1,924	-	-	-	-	-	-	962	2,886	2,886	-	-	-	-	-	-	-	-	-	33,093	-
1b.1.1.2	Auxiliary Building	191	-	-	-	-	-	-	95	286	286	-	-	-	-	-	-	-	-	-	3,289	-
1b.1.1.3	Refueling Water Storage Tank	314	-	-	-	-	-	-	157	471	471	-	-	-	-	-	-	-	-	-	5,322	-
1b.1.1	Totals	2,429	-	-	-	-	-	-	1,214	3,643	3,643	-	-	-	-	-	-	-	-	-	41,705	-
1b.1	Subtotal Period 1b Activity Costs	2,429	-	-	-	-	-	-	1,214	3,643	3,643	-	-	-	-	-	-	-	-	-	41,705	-
Period 1b Collateral Costs																						
1b.3.1	Decon equipment	797	-	-	-	-	-	-	120	917	917	-	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process liquid waste	184	-	78	357	-	349	-	241	1,210	1,210	-	-	-	-	-	-	-	-	-	75,307	245
1b.3.3	Small tool allowance	-	39	-	-	-	-	-	6	44	44	-	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	982	39	78	357	-	349	-	366	2,172	2,172	-	-	-	-	-	-	-	-	-	75,307	245
Period 1b Period-Dependent Costs																						
1b.4.1	Decon supplies	561	-	-	-	-	-	-	140	702	702	-	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	192	19	211	211	-	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	2,452	245	2,697	2,697	-	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	264	-	-	-	-	-	66	331	331	-	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	103	-	-	-	-	-	15	119	119	-	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	1	1	-	29	-	7	38	38	-	-	-	-	-	-	-	-	-	10,338	2
1b.4.7	Plant energy budget	-	-	-	-	-	-	229	34	264	264	-	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	176	18	194	194	-	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	76	8	84	-	84	-	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Costs	-	-	-	-	-	-	31	5	36	36	-	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	95	14	109	-	109	-	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	11	2	13	-	13	-	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	114	17	131	131	-	-	-	-	-	-	-	-	-	-	-
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	7,749	1,162	8,912	8,912	-	-	-	-	-	-	-	-	-	-	3,058
1b.4	Subtotal Period 1b Period-Dependent Costs	561	368	1	1	-	29	11,126	1,753	13,839	13,633	206	-	-	-	-	-	-	-	-	10,338	2
1b.0	TOTAL PERIOD 1b COST	3,972	406	79	358	-	378	11,126	3,334	19,654	19,448	206	-	-	-	-	-	-	-	-	85,645	41,952
PERIOD 1c - Preparations for SAFSTOR Dormancy																						
Period 1c Direct Decommissioning Activities																						
1c.1.1	Prepare support equipment for storage	-	431	-	-	-	-	-	65	496	496	-	-	-	-	-	-	-	-	-	-	3,000
1c.1.2	Install containment pressure equal. lines	-	42	-	-	-	-	-	6	48	48	-	-	-	-	-	-	-	-	-	-	700
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	-	-	13,416
1c.1.4	Secure building accesses	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	69	10	79	79	-	-	-	-	-	-	-	-	-	-	583
1c.1	Subtotal Period 1c Activity Costs	-	473	-	-	-	-	802	301	1,575	1,575	-	-	-	-	-	-	-	-	-	-	17,116
Period 1c Collateral Costs																						
1c.3.1	Process liquid waste	150	-	64	292	-	285	-	197	988	988	-	-	-	-	-	-	-	-	-	61,469	200
1c.3.2	Small tool allowance	-	4	-	-	-	-	-	1	4	4	-	-	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	150	4	64	292	-	285	-	197	992	992	-	-	-	-	-	-	-	-	-	61,469	200
Period 1c Period-Dependent Costs																						
1c.4.1	Insurance	-	-	-	-	-	-	192	19	211	211	-	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	2,452	245	2,697	2,697	-	-	-	-	-	-	-	-	-	-	-

Table D-1
Byron Nuclear Power Station, Unit 1
Delayed DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet				
Period 1c Period-Dependent Costs (continued)																					
1c.4.3	Health physics supplies	-	145	-	-	-	-	-	36	181	181	-	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	103	-	-	-	-	-	15	119	119	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	0	0	-	6	-	2	8	8	-	-	-	107	-	-	-	2,132	0	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	229	34	264	264	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	176	18	194	194	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	76	8	84	-	84	-	-	-	-	-	-	-	-	-
1c.4.9	Site O&M Costs	-	-	-	-	-	-	31	5	36	36	-	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	95	14	109	-	109	-	-	-	-	-	-	-	-	-
1c.4.11	ISFSI Operating Costs	-	-	-	-	-	-	11	2	13	-	13	-	-	-	-	-	-	-	-	-
1c.4.12	Security Staff Cost	-	-	-	-	-	-	114	17	131	131	-	-	-	-	-	-	-	-	-	3,058
1c.4.13	Utility Staff Cost	-	-	-	-	-	-	2,147	322	2,468	2,468	-	-	-	-	-	-	-	-	-	27,040
1c.4	Subtotal Period 1c Period-Dependent Costs	-	248	0	0	-	6	5,523	737	6,514	6,309	206	-	-	107	-	-	-	2,132	0	30,098
1c.0	TOTAL PERIOD 1c COST	150	724	64	292	-	291	6,325	1,235	9,082	8,876	206	-	-	1,131	-	-	-	63,601	17,316	30,681
PERIOD 1 TOTALS		4,122	1,958	145	650	-	703	56,876	10,628	75,085	73,847	1,238	-	-	3,513	-	-	-	161,436	59,271	610,852
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	-	-	-	-	-	-	57	8	65	65	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	1,656	414	2,070	2,070	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	1,712	422	2,135	2,135	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																					
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	10,500	1,575	12,075	-	12,075	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	10,500	1,575	12,075	-	12,075	-	-	-	-	-	-	-	-	-
Period 2a Period-Dependent Costs																					
2a.4.1	Insurance	-	-	-	-	-	-	4,412	441	4,853	-	4,853	-	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	15,682	1,568	17,251	-	17,251	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	1,054	-	-	-	-	-	264	1,318	1,318	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	15	5	-	282	-	73	374	374	-	-	-	5,047	-	-	-	100,942	23	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	2,425	364	2,789	-	2,789	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	2,654	265	2,920	2,920	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	1,316	132	1,448	-	1,448	-	-	-	-	-	-	-	-	-
2a.4.8	Site O&M Costs	-	-	-	-	-	-	1,645	247	1,892	-	1,892	-	-	-	-	-	-	-	-	-
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	5,021	753	5,774	-	5,774	-	-	-	-	-	-	-	-	-
2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	579	87	666	-	666	-	-	-	-	-	-	-	-	-
2a.4.11	Security Staff Cost	-	-	-	-	-	-	25,170	3,775	28,945	-	28,945	-	-	-	-	-	-	-	-	619,545
2a.4.12	Utility Staff Cost	-	-	-	-	-	-	32,266	4,840	37,106	-	37,106	-	-	-	-	-	-	-	-	414,037
2a.4	Subtotal Period 2a Period-Dependent Costs	-	1,054	15	5	-	282	91,172	12,809	105,337	4,612	100,725	-	-	5,047	-	-	-	100,942	23	1,033,583
2a.0	TOTAL PERIOD 2a COST	-	1,054	15	5	-	282	103,384	14,806	119,546	6,747	112,800	-	-	5,047	-	-	-	100,942	23	1,033,583
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	-	-	-	-	-	-	15	2	17	17	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	441	110	551	551	-	-	-	-	-	-	-	-	-	-

Table D-1
Byron Nuclear Power Station, Unit 1
Delayed DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet					
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	456	112	568	568	-	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																						
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,125	319	2,444	-	2,444	-	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	2,125	319	2,444	-	2,444	-	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																						
2b.4.1	Insurance	-	-	-	-	-	-	1,062	106	1,168	-	1,168	-	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	1,752	175	1,927	-	1,927	-	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	269	-	-	-	-	-	67	336	336	-	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	4	1	-	74	-	19	98	98	-	-	1,322	-	-	-	-	26,445	6	-	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	323	48	371	-	371	-	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	707	71	777	777	-	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	350	35	385	-	385	-	-	-	-	-	-	-	-	-	-
2b.4.8	Site O&M Costs	-	-	-	-	-	-	438	66	504	-	504	-	-	-	-	-	-	-	-	-	-
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	154	23	177	-	177	-	-	-	-	-	-	-	-	-	-
2b.4.10	Security Staff Cost	-	-	-	-	-	-	4,350	652	5,002	-	5,002	-	-	-	-	-	-	-	-	-	98,743
2b.4.11	Utility Staff Cost	-	-	-	-	-	-	5,313	797	6,110	-	6,110	-	-	-	-	-	-	-	-	-	73,143
2b.4	Subtotal Period 2b Period-Dependent Costs	-	269	4	1	-	74	14,450	2,060	16,858	1,212	15,646	-	1,322	-	-	-	-	26,445	6	171,886	
2b.0	TOTAL PERIOD 2b COST	-	269	4	1	-	74	17,031	2,491	19,870	1,780	18,090	-	1,322	-	-	-	-	26,445	6	171,886	
PERIOD 2 TOTALS		-	1,323	18	7	-	355	120,415	17,298	139,416	8,527	130,890	-	6,369	-	-	-	-	127,387	29	1,205,468	
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																						
Period 3a Direct Decommissioning Activities																						
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	153	23	176	176	-	-	-	-	-	-	-	-	-	-	1,300
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	543	81	624	624	-	-	-	-	-	-	-	-	-	-	4,600
3a.1.3	Perform detailed rad survey	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-
3a.1.4	End product description	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	-	1,000
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	153	23	176	176	-	-	-	-	-	-	-	-	-	-	1,300
3a.1.6	Define major work sequence	-	-	-	-	-	-	885	133	1,018	1,018	-	-	-	-	-	-	-	-	-	-	7,500
3a.1.7	Perform SER and EA	-	-	-	-	-	-	366	55	421	421	-	-	-	-	-	-	-	-	-	-	3,100
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	590	89	679	679	-	-	-	-	-	-	-	-	-	-	5,000
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	483	73	556	556	-	-	-	-	-	-	-	-	-	-	4,096
3a.1.10	Receive NRC approval of termination plan	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-
Activity Specifications																						
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	870	130	1,000	900	-	100	-	-	-	-	-	-	-	-	7,370
3a.1.11.2	Plant systems	-	-	-	-	-	-	492	74	565	509	-	57	-	-	-	-	-	-	-	-	4,167
3a.1.11.3	Reactor internals	-	-	-	-	-	-	838	126	964	964	-	-	-	-	-	-	-	-	-	-	7,100
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	767	115	882	882	-	-	-	-	-	-	-	-	-	-	6,500
3a.1.11.5	Biological shield	-	-	-	-	-	-	59	9	68	68	-	-	-	-	-	-	-	-	-	-	500
3a.1.11.6	Steam generators	-	-	-	-	-	-	368	55	423	423	-	-	-	-	-	-	-	-	-	-	3,120
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	189	28	217	109	-	109	-	-	-	-	-	-	-	-	1,600
3a.1.11.8	Main Turbine	-	-	-	-	-	-	47	7	54	-	-	54	-	-	-	-	-	-	-	-	400
3a.1.11.9	Main Condensers	-	-	-	-	-	-	47	7	54	-	-	54	-	-	-	-	-	-	-	-	400
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	368	55	423	212	-	212	-	-	-	-	-	-	-	-	3,120
3a.1.11.11	Waste management	-	-	-	-	-	-	543	81	624	624	-	-	-	-	-	-	-	-	-	-	4,600
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-	106	16	122	61	-	61	-	-	-	-	-	-	-	-	900
3a.1.11	Total	-	-	-	-	-	-	4,694	704	5,398	4,752	-	646	-	-	-	-	-	-	-	-	39,777
Planning & Site Preparations																						
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	283	42	326	326	-	-	-	-	-	-	-	-	-	-	2,400
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	2,800	420	3,220	3,220	-	-	-	-	-	-	-	-	-	-	-

Table D-1
Byron Nuclear Power Station, Unit 1
Delayed DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet					
3a.1.14	Design water clean-up system	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	-	1,400
3a.1.15	Rigging/Cont. Cntrl Envlp/ooling/etc.	-	-	-	-	-	-	2,200	330	2,530	2,530	-	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	145	22	167	167	-	-	-	-	-	-	-	-	-	-	1,230
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	13,580	2,037	15,617	14,970	-	646	-	-	-	-	-	-	-	-	72,703
Period 3a Period-Dependent Costs																						
3a.4.1	Insurance	-	-	-	-	-	-	303	30	333	333	-	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	500	50	550	550	-	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	363	-	-	-	-	-	91	454	454	-	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	414	-	-	-	-	-	62	476	476	-	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	1	1	-	-	29	7	38	38	-	-	-	516	-	-	-	-	10,311	2	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	921	138	1,059	1,059	-	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	249	25	274	274	-	-	-	-	-	-	-	-	-	-	-
3a.4.8	Site O&M Costs	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-	-
3a.4.9	Security Staff Cost	-	-	-	-	-	-	2,963	444	3,408	3,408	-	-	-	-	-	-	-	-	-	-	69,350
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	19,481	2,922	22,403	22,403	-	-	-	-	-	-	-	-	-	-	260,714
3a.4	Subtotal Period 3a Period-Dependent Costs	-	777	1	1	-	-	29	24,541	3,789	29,138	-	-	-	516	-	-	-	-	10,311	2	330,064
3a.0	TOTAL PERIOD 3a COST	-	777	1	1	-	-	29	38,121	5,826	44,754	-	646	-	516	-	-	-	-	10,311	2	402,767
PERIOD 3b - Decommissioning Preparations																						
Period 3b Direct Decommissioning Activities																						
Detailed Work Procedures																						
3b.1.1.1	Plant systems	-	-	-	-	-	-	559	84	642	578	-	64	-	-	-	-	-	-	-	-	4,733
3b.1.1.2	Reactor internals	-	-	-	-	-	-	295	44	339	339	-	-	-	-	-	-	-	-	-	-	2,500
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	159	24	183	46	-	137	-	-	-	-	-	-	-	-	1,350
3b.1.1.4	CRD cooling assembly	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.5	CRD housings & ICI tubes	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.6	Incore instrumentation	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	428	64	493	493	-	-	-	-	-	-	-	-	-	-	3,630
3b.1.1.8	Facility closeout	-	-	-	-	-	-	142	21	163	81	-	81	-	-	-	-	-	-	-	-	1,200
3b.1.1.9	Missile shields	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	-	450
3b.1.1.10	Biological shield	-	-	-	-	-	-	142	21	163	163	-	-	-	-	-	-	-	-	-	-	1,200
3b.1.1.11	Steam generators	-	-	-	-	-	-	543	81	624	624	-	-	-	-	-	-	-	-	-	-	4,600
3b.1.1.12	Reinforced concrete	-	-	-	-	-	-	118	18	136	68	-	68	-	-	-	-	-	-	-	-	1,000
3b.1.1.13	Main Turbine	-	-	-	-	-	-	184	28	212	-	-	212	-	-	-	-	-	-	-	-	1,560
3b.1.1.14	Main Condensers	-	-	-	-	-	-	184	28	212	-	-	212	-	-	-	-	-	-	-	-	1,560
3b.1.1.15	Auxiliary building	-	-	-	-	-	-	322	48	370	333	-	37	-	-	-	-	-	-	-	-	2,730
3b.1.1.16	Reactor building	-	-	-	-	-	-	322	48	370	333	-	37	-	-	-	-	-	-	-	-	2,730
3b.1.1	Total	-	-	-	-	-	-	3,805	571	4,376	3,527	-	848	-	-	-	-	-	-	-	-	32,243
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	3,805	571	4,376	3,527	-	848	-	-	-	-	-	-	-	-	32,243
Period 3b Additional Costs																						
3b.2.1	Site Characterization	-	-	-	-	-	-	6,341	1,902	8,243	8,243	-	-	-	-	-	-	-	-	-	30,500	10,852
3b.2	Subtotal Period 3b Additional Costs	-	-	-	-	-	-	6,341	1,902	8,243	8,243	-	-	-	-	-	-	-	-	-	30,500	10,852
Period 3b Collateral Costs																						
3b.3.1	Decon equipment	797	-	-	-	-	-	-	120	917	917	-	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,130	169	1,299	1,299	-	-	-	-	-	-	-	-	-	-	-
3b.3.3	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	797	1,100	-	-	-	-	1,130	454	3,482	3,482	-	-	-	-	-	-	-	-	-	-	-

Table D-1
Byron Nuclear Power Station, Unit 1
Delayed DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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																						
3b.4.1	Decon supplies	24	-	-	-	-	-	-	6	31	31	-	-	-	-	-	-	-	-	-	-	
3b.4.2	Insurance	-	-	-	-	-	-	168	17	185	185	-	-	-	-	-	-	-	-	-	-	
3b.4.3	Property taxes	-	-	-	-	-	-	251	25	276	276	-	-	-	-	-	-	-	-	-	-	
3b.4.4	Health physics supplies	-	201	-	-	-	-	-	50	251	251	-	-	-	-	-	-	-	-	-	-	
3b.4.5	Heavy equipment rental	-	207	-	-	-	-	-	31	238	238	-	-	-	-	-	-	-	-	-	-	
3b.4.6	Disposal of DAW generated	-	-	1	0	-	16	-	4	22	22	-	-	-	292	-	-	-	-	5,846	1	
3b.4.7	Plant energy budget	-	-	-	-	-	-	462	69	531	531	-	-	-	-	-	-	-	-	-	-	
3b.4.8	NRC Fees	-	-	-	-	-	-	125	12	137	137	-	-	-	-	-	-	-	-	-	-	
3b.4.9	Site O&M Costs	-	-	-	-	-	-	63	9	72	72	-	-	-	-	-	-	-	-	-	-	
3b.4.10	Security Staff Cost	-	-	-	-	-	-	1,486	223	1,708	1,708	-	-	-	-	-	-	-	-	-	34,770	
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	4,781	717	5,498	5,498	-	-	-	-	-	-	-	-	-	58,560	
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	9,767	1,465	11,232	11,232	-	-	-	-	-	-	-	-	-	130,714	
3b.4	Subtotal Period 3b Period-Dependent Costs	24	408	1	0	-	16	17,102	2,630	20,181	20,181	-	-	-	292	-	-	-	-	5,846	1	224,044
3b.0	TOTAL PERIOD 3b COST	822	1,508	1	0	-	16	28,377	5,557	36,281	35,433	-	848	-	292	-	-	-	-	5,846	30,501	267,139
PERIOD 3 TOTALS		822	2,284	2	1	-	45	66,498	11,382	81,035	79,540	-	1,495	-	808	-	-	-	-	16,157	30,504	669,906
PERIOD 4a - Large Component Removal																						
Period 4a Direct Decommissioning Activities																						
Nuclear Steam Supply System Removal																						
4a.1.1.1	Reactor Coolant Piping	40	138	31	28	-	331	-	144	712	712	-	-	-	1,677	-	-	-	-	202,809	3,153	-
4a.1.1.2	Pressurizer Relief Tank	7	26	6	5	-	60	-	26	131	131	-	-	-	329	-	-	-	-	36,553	596	-
4a.1.1.3	Reactor Coolant Pumps & Motors	25	94	53	168	-	1,272	-	384	1,996	1,996	-	-	-	4,796	-	-	-	-	780,540	2,726	80
4a.1.1.4	Pressurizer	11	59	345	94	-	412	-	172	1,093	1,093	-	-	-	3,033	-	-	-	-	252,826	1,527	750
4a.1.1.5	Steam Generators	85	4,096	2,098	2,506	667	4,349	-	2,839	16,640	16,640	-	-	-	45,513	17,359	-	-	-	3,811,289	20,508	1,500
4a.1.1.6	Retired Steam Generator Units	-	-	1,426	2,644	580	3,416	-	1,480	9,546	9,546	-	-	-	39,289	14,064	-	-	-	3,041,432	10,800	1,500
4a.1.1.7	CRDMs/ICIs/Service Structure Removal	35	89	194	34	-	102	-	90	543	543	-	-	-	3,881	-	-	-	-	86,025	2,135	-
4a.1.1.8	Reactor Vessel Internals	69	2,029	3,483	555	-	4,878	208	5,036	16,258	16,258	-	-	-	1,710	876	459	-	-	325,944	23,633	1,077
4a.1.1.9	Vessel & Internals GTCC Disposal	-	-	-	-	-	11,665	-	1,750	13,414	13,414	-	-	-	-	-	-	505	-	104,146	-	-
4a.1.1.10	Reactor Vessel	85	3,998	1,314	675	-	3,107	208	5,123	14,510	14,510	-	-	-	6,606	2,254	-	-	-	978,589	23,633	1,077
4a.1.1	Totals	357	10,529	8,951	6,708	1,247	29,591	415	17,045	74,844	74,844	-	-	-	84,802	53,456	3,130	459	505	9,620,152	88,712	5,985
Removal of Major Equipment																						
4a.1.2	Main Turbine/Generator	-	510	256	32	214	-	-	190	1,201	1,201	-	-	-	5,355	-	-	-	-	455,213	9,016	-
4a.1.3	Main Condensers	-	1,042	133	27	150	-	-	300	1,653	1,653	-	-	-	7,111	-	-	-	-	320,000	18,250	-
Cascading Costs from Clean Building Demolition																						
4a.1.4.1	Reactor	-	1,076	-	-	-	-	-	161	1,237	1,237	-	-	-	-	-	-	-	-	-	12,130	-
4a.1.4.2	Auxiliary Building	-	594	-	-	-	-	-	89	683	683	-	-	-	-	-	-	-	-	-	6,810	-
4a.1.4.3	Refueling Water Storage Tank	-	104	-	-	-	-	-	16	120	120	-	-	-	-	-	-	-	-	-	1,299	-
4a.1.4	Totals	-	1,773	-	-	-	-	-	266	2,039	2,039	-	-	-	-	-	-	-	-	-	20,238	-
Disposal of Plant Systems																						
4a.1.5.1	Auxiliary Feedwater	-	69	-	-	-	-	-	10	79	-	-	79	-	-	-	-	-	-	-	1,244	-
4a.1.5.2	Auxiliary Steam	-	61	-	-	-	-	-	9	71	-	-	71	-	-	-	-	-	-	-	1,126	-
4a.1.5.3	Auxiliary Steam RCA	-	122	2	3	16	-	-	34	176	176	-	-	-	835	-	-	-	-	33,900	1,935	-
4a.1.5.4	Boric Acid Processing	-	444	32	31	86	99	-	157	850	850	-	-	-	4,531	1,193	-	-	-	268,274	7,890	-
4a.1.5.5	CO2 & H2	-	23	-	-	-	-	-	3	26	-	-	-	-	26	-	-	-	-	-	419	-
4a.1.5.6	CO2 & H2 RCA	-	35	0	1	3	-	-	9	48	48	-	-	-	164	-	-	-	-	6,658	572	-
4a.1.5.7	Chemical Feed	-	51	-	-	-	-	-	8	58	-	-	-	-	58	-	-	-	-	-	934	-
4a.1.5.8	Chilled Water	-	63	-	-	-	-	-	9	72	-	-	-	-	72	-	-	-	-	-	1,142	-
4a.1.5.9	Circulating Water	-	279	-	-	-	-	-	42	321	-	-	-	-	321	-	-	-	-	-	5,150	-
4a.1.5.10	Condensate	-	331	-	-	-	-	-	50	381	-	-	-	-	381	-	-	-	-	-	6,023	-

Table D-1
Byron Nuclear Power Station, Unit 1
Delayed DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet					
Disposal of Plant Systems (continued)																						
4a.1.5.11	Condensate Booster	-	299	-	-	-	-	-	45	344	-	-	344	-	-	-	-	-	-	-	5,428	-
4a.1.5.12	Condensate Cleanup	-	58	-	-	-	-	-	9	67	-	-	67	-	-	-	-	-	-	-	1,060	-
4a.1.5.13	Containment Spray	-	233	7	12	69	-	-	71	392	392	-	-	3,629	-	-	-	-	-	147,367	3,729	-
4a.1.5.14	Diesel Fuel Oil	-	90	-	-	-	-	-	13	103	-	-	103	-	-	-	-	-	-	-	1,615	-
4a.1.5.15	Essential Service Water	-	208	-	-	-	-	-	31	239	-	-	239	-	-	-	-	-	-	-	3,837	-
4a.1.5.16	Extraction Steam	-	167	-	-	-	-	-	25	192	-	-	192	-	-	-	-	-	-	-	3,089	-
4a.1.5.17	Feedwater	-	278	-	-	-	-	-	42	320	-	-	320	-	-	-	-	-	-	-	5,142	-
4a.1.5.18	Feedwater Drains	-	668	-	-	-	-	-	100	768	-	-	768	-	-	-	-	-	-	-	12,366	-
4a.1.5.19	Gland Steam	-	50	-	-	-	-	-	8	58	-	-	58	-	-	-	-	-	-	-	932	-
4a.1.5.20	Gland Water	-	44	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	-	828	-
4a.1.5.21	Main Steam	-	284	-	-	-	-	-	43	326	-	-	326	-	-	-	-	-	-	-	5,216	-
4a.1.5.22	Main Steam RCA	-	46	1	3	15	-	-	14	79	79	-	-	760	-	-	-	-	-	30,853	739	-
4a.1.5.23	Nitrogen	-	3	0	0	1	-	-	1	5	5	-	-	52	-	-	-	-	-	2,102	49	-
4a.1.5.24	Non-Essential Service Water	-	157	-	-	-	-	-	23	180	-	-	180	-	-	-	-	-	-	-	2,916	-
4a.1.5.25	Non-Essential Service Water RCA	-	86	3	5	28	-	-	27	148	148	-	-	1,462	-	-	-	-	-	59,354	1,295	-
4a.1.5.26	Off Gas	-	512	10	19	106	-	-	148	795	795	-	-	5,572	-	-	-	-	-	226,266	8,494	-
4a.1.5.27	Process Radiation Monitoring	-	37	0	0	2	-	-	10	49	49	-	-	113	-	-	-	-	-	4,587	666	-
4a.1.5.28	Process Sampling	-	107	1	2	12	-	-	29	151	151	-	-	616	-	-	-	-	-	25,019	1,927	-
4a.1.5.29	Station Air	-	27	-	-	-	-	-	4	31	-	-	31	-	-	-	-	-	-	-	498	-
4a.1.5.30	Station Heating	-	96	-	-	-	-	-	14	111	-	-	111	-	-	-	-	-	-	-	1,771	-
4a.1.5.31	Switchgear Heat Removal	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	-	139	-
4a.1.5.32	Turbine Bldg Equip Drains	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	-	17	-
4a.1.5.33	Turbine Generator	-	50	-	-	-	-	-	8	58	-	-	58	-	-	-	-	-	-	-	901	-
4a.1.5.34	Turbine Oil	-	77	-	-	-	-	-	12	88	-	-	88	-	-	-	-	-	-	-	1,399	-
4a.1.5.35	Waste Oil Sumps	-	26	-	-	-	-	-	4	30	-	-	30	-	-	-	-	-	-	-	483	-
4a.1.5	Totals	-	5,090	56	75	338	99	-	1,019	6,678	2,694	-	3,984	17,732	1,193	-	-	-	-	804,381	90,969	-
4a.1.6	Scaffolding in support of decommissioning	-	941	6	1	6	2	-	237	1,194	1,194	-	-	306	19	-	-	-	-	15,459	18,101	-
4a.1	Subtotal Period 4a Activity Costs	357	19,885	9,401	6,844	1,956	29,693	415	19,058	87,609	83,625	-	3,984	115,307	54,668	3,130	459	505	11,215,210	245,285	5,985	-
Period 4a Collateral Costs																						
4a.3.1	Process liquid waste	76	-	34	154	-	150	-	102	516	516	-	-	-	-	539	-	-	-	32,357	105	-
4a.3.2	Small tool allowance	-	210	-	-	-	-	-	32	242	218	-	24	-	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	76	210	34	154	-	150	-	134	757	733	-	24	-	539	-	-	-	-	32,357	105	-
Period 4a Period-Dependent Costs																						
4a.4.1	Decon supplies	65	-	-	-	-	-	-	16	81	81	-	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	448	45	493	493	-	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	668	67	735	661	-	73	-	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	-	-	-	-	-	-	371	1,855	1,855	-	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	2,333	-	-	-	-	-	350	2,683	2,683	-	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	9	3	-	177	-	46	235	235	-	-	-	3,170	-	-	-	-	63,404	15	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	1,169	175	1,345	1,345	-	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	880	88	968	968	-	-	-	-	-	-	-	-	-	-	-
4a.4.9	Site O&M Costs	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	-	-
4a.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	512	77	589	589	-	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	2,367	355	2,722	2,722	-	-	-	-	-	-	-	-	-	-	61,683
4a.4.12	DOC Staff Cost	-	-	-	-	-	-	15,170	2,275	17,445	17,445	-	-	-	-	-	-	-	-	-	-	190,432
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	24,665	3,700	28,365	28,365	-	-	-	-	-	-	-	-	-	-	335,716
4a.4	Subtotal Period 4a Period-Dependent Costs	65	3,817	9	3	-	177	46,047	7,590	57,708	57,635	-	73	-	3,170	-	-	-	-	63,404	15	587,831
4a.0	TOTAL PERIOD 4a COST	498	23,913	9,444	7,001	1,956	30,020	46,462	26,781	146,075	141,993	-	4,081	115,307	58,377	3,130	459	505	11,310,970	245,405	593,816	-

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															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet				
PERIOD 4b - Site Decontamination																						
Disposal of Plant Systems																						
4b.1.2.1	Chemical & Volume Control	-	1,000	62	46	33	255	-	332	1,728	1,728	-	-	1,744	2,431	-	-	-	-	287,102	16,313	-
4b.1.2.2	Chilled Water RCA	-	282	8	16	90	-	-	87	484	484	-	-	4,716	-	-	-	-	-	191,536	4,732	-
4b.1.2.3	Component Cooling RCA	-	604	15	29	164	-	-	181	994	994	-	-	8,589	-	-	-	-	-	348,801	9,675	-
4b.1.2.4	Electrical	-	2,682	-	-	-	-	-	402	3,085	-	-	3,085	-	-	-	-	-	-	-	48,490	-
4b.1.2.5	Electrical - Contaminated	-	1,028	12	23	128	-	-	281	1,471	1,471	-	-	6,722	-	-	-	-	-	272,965	17,115	-
4b.1.2.6	Electrical - RCA	-	1,706	32	59	335	-	-	489	2,621	2,621	-	-	17,555	-	-	-	-	-	712,922	29,098	-
4b.1.2.7	Emergency Diesel Generator	-	113	-	-	-	-	-	17	130	-	-	130	-	-	-	-	-	-	-	2,066	-
4b.1.2.8	Essential Service Water RCA	-	271	9	17	99	-	-	86	482	482	-	-	5,177	-	-	-	-	-	210,230	4,418	-
4b.1.2.9	Fire Protection	-	108	-	-	-	-	-	16	124	-	-	124	-	-	-	-	-	-	-	1,984	-
4b.1.2.10	Fire Protection RCA	-	168	2	4	20	-	-	46	240	240	-	-	1,069	-	-	-	-	-	43,397	2,628	-
4b.1.2.11	HVAC-Auxiliary Building	-	445	9	17	96	-	-	129	697	697	-	-	5,054	-	-	-	-	-	205,243	7,162	-
4b.1.2.12	HVAC-Diesel Generator Room	-	38	-	-	-	-	-	6	44	-	-	44	-	-	-	-	-	-	-	682	-
4b.1.2.13	HVAC-Miscellaneous	-	37	-	-	-	-	-	5	42	-	-	42	-	-	-	-	-	-	-	656	-
4b.1.2.14	HVAC-Primary Containment	-	539	19	36	204	-	-	173	970	970	-	-	10,679	-	-	-	-	-	433,695	8,624	-
4b.1.2.15	HVAC-Turbine Building	-	164	-	-	-	-	-	25	188	-	-	188	-	-	-	-	-	-	-	3,177	-
4b.1.2.16	Instrument Air Supply	-	41	-	-	-	-	-	6	47	-	-	47	-	-	-	-	-	-	-	760	-
4b.1.2.17	Instrument Air Supply RCA	-	67	1	1	7	-	-	18	94	94	-	-	366	-	-	-	-	-	14,869	1,073	-
4b.1.2.18	Miscellaneous Drains	-	35	1	1	6	-	-	10	52	52	-	-	312	-	-	-	-	-	12,666	584	-
4b.1.2.19	Primary Containment Purge	-	247	10	20	112	-	-	82	471	471	-	-	5,850	-	-	-	-	-	237,590	4,312	-
4b.1.2.20	Primary Water	-	54	1	1	3	4	-	15	79	79	-	-	143	42	-	-	-	-	9,560	915	-
4b.1.2.21	Radioactive Waste Disposal	-	817	45	39	81	154	-	265	1,400	1,400	-	-	4,235	1,622	-	-	-	-	302,491	14,169	-
4b.1.2.22	Reactor Building Equipment Drains	-	88	7	5	3	29	-	31	164	164	-	-	183	277	-	-	-	-	32,048	1,435	-
4b.1.2.23	Reactor Building Floor Drains	-	41	2	2	2	8	-	13	68	68	-	-	130	74	-	-	-	-	11,914	678	-
4b.1.2.24	Reactor Coolant	-	155	9	6	4	34	-	50	257	257	-	-	208	324	-	-	-	-	37,451	2,506	-
4b.1.2.25	Residual Heat Removal	-	172	11	12	28	44	-	61	328	328	-	-	1,453	418	-	-	-	-	96,526	2,924	-
4b.1.2.26	Safety Injection	-	783	37	47	175	103	-	259	1,404	1,404	-	-	9,181	1,028	-	-	-	-	460,142	13,528	-
4b.1.2.27	Station Air RCA	-	33	0	1	3	-	-	9	46	46	-	-	175	-	-	-	-	-	7,089	521	-
4b.1.2.28	Station Heating RCA	-	109	2	4	24	-	-	32	171	171	-	-	1,256	-	-	-	-	-	51,005	1,759	-
4b.1.2.29	Waste Oil Sumps RCA	-	7	0	0	1	-	-	2	10	10	-	-	52	-	-	-	-	-	2,098	92	-
4b.1.2	Totals	-	11,832	293	386	1,619	632	-	3,128	17,891	14,231	-	3,660	84,848	6,216	-	-	-	-	3,981,341	202,075	-
4b.1.3	Scaffolding in support of decommissioning	-	1,411	9	2	10	3	-	356	1,791	1,791	-	-	458	29	-	-	-	-	23,188	27,151	-
Decontamination of Site Buildings																						
4b.1.4.1	Reactor	1,748	1,236	177	192	134	604	-	1,401	5,491	5,491	-	-	7,022	8,897	-	-	-	-	1,144,531	50,361	-
4b.1.4.2	Auxiliary Building	175	93	6	7	17	13	-	118	428	428	-	-	866	228	-	-	-	-	57,032	4,547	-
4b.1.4.3	Refueling Water Storage Tank	315	366	4	5	22	6	-	255	973	973	-	-	1,146	87	-	-	-	-	54,853	11,906	-
4b.1.4	Totals	2,238	1,695	187	204	172	623	-	1,774	6,893	6,893	-	-	9,034	9,212	-	-	-	-	1,256,416	66,815	-
4b.1	Subtotal Period 4b Activity Costs	2,238	14,938	490	591	1,802	1,258	-	5,258	26,575	22,914	-	3,660	94,341	15,456	-	-	-	-	5,260,945	296,041	-
Period 4b Additional Costs																						
4b.2.1	License Termination Survey Planning	-	-	-	-	-	-	940	282	1,222	1,222	-	-	-	-	-	-	-	-	-	-	6,240
4b.2.2	ISFSI License Termination	-	33	0	23	-	89	626	128	899	-	899	-	-	1,689	-	-	-	-	142,287	1,585	1,280
4b.2.3	Soil Remediation	-	17	0	52	-	143	-	48	260	260	-	-	-	2,730	-	-	-	-	207,480	99	-
4b.2	Subtotal Period 4b Additional Costs	-	50	1	75	-	232	1,566	458	2,381	1,482	899	-	-	4,419	-	-	-	-	349,767	1,684	7,520
Period 4b Collateral Costs																						
4b.3.1	Process liquid waste	92	-	41	186	-	182	-	123	623	623	-	-	-	652	-	-	-	-	39,118	127	-
4b.3.2	Small tool allowance	-	268	-	-	-	-	-	40	309	309	-	-	-	-	-	-	-	-	-	-	-
4b.3.3	Decommissioning Equipment Disposition	-	-	119	34	127	40	-	46	365	365	-	-	6,000	373	-	-	-	-	303,507	88	-
4b.3	Subtotal Period 4b Collateral Costs	92	268	160	219	127	221	-	209	1,297	1,297	-	-	6,000	1,025	-	-	-	-	342,625	215	-

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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			GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet				
Period 4e Period-Dependent Costs (continued)																					
4e.4.8	Security Staff Cost	-	-	-	-	-	-	532	80	612	612	-	-	-	-	-	-	-	-	-	11,786
4e.4.9	DOC Staff Cost	-	-	-	-	-	-	3,801	570	4,371	4,371	-	-	-	-	-	-	-	-	-	46,750
4e.4.10	Utility Staff Cost	-	-	-	-	-	-	4,551	683	5,234	5,234	-	-	-	-	-	-	-	-	-	56,964
4e.4	Subtotal Period 4e Period-Dependent Costs	-	597	1	0	-	19	10,024	1,612	12,253	12,253	-	-	-	335	-	-	-	6,698	2	115,500
4e.0	TOTAL PERIOD 4e COST	-	597	1	0	-	19	16,791	3,473	20,880	20,880	-	-	-	335	-	-	-	6,698	91,795	118,620
PERIOD 4 TOTALS		3,485	45,661	10,108	7,891	3,885	31,998	118,215	45,297	266,540	257,899	899	7,742	215,647	84,052	3,130	459	505	17,359,780	635,160	1,370,556
PERIOD 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	Reactor	-	6,217	-	-	-	-	-	933	7,149	-	-	7,149	-	-	-	-	-	-	-	69,541
5b.1.1.2	Auxiliary Building	-	5,342	-	-	-	-	-	801	6,143	-	-	6,143	-	-	-	-	-	-	-	61,287
5b.1.1.3	Old Steam Generator Storage Facility	-	417	-	-	-	-	-	63	479	-	-	479	-	-	-	-	-	-	-	4,868
5b.1.1.4	Refueling Water Storage Tank	-	936	-	-	-	-	-	140	1,077	-	-	1,077	-	-	-	-	-	-	-	11,688
5b.1.1.5	Turbine Building	-	5,246	-	-	-	-	-	787	6,033	-	-	6,033	-	-	-	-	-	-	-	70,347
5b.1.1.6	Turbine Pedestal	-	1,250	-	-	-	-	-	187	1,437	-	-	1,437	-	-	-	-	-	-	-	12,628
5b.1.1	Totals	-	19,408	-	-	-	-	-	2,911	22,319	-	-	22,319	-	-	-	-	-	-	-	230,359
Site Closeout Activities																					
5b.1.2	Grade & landscape site	-	267	-	-	-	-	-	40	307	-	-	307	-	-	-	-	-	-	-	869
5b.1.3	Final report to NRC	-	-	-	-	-	-	184	28	212	212	-	-	-	-	-	-	-	-	-	1,560
5b.1	Subtotal Period 5b Activity Costs	-	19,675	-	-	-	-	184	2,979	22,838	212	-	22,626	-	-	-	-	-	-	-	231,228
Period 5b Additional Costs																					
5b.2.1	Hyperbolic Cooling Tower	-	3,461	-	-	-	-	-	519	3,980	-	-	3,980	-	-	-	-	-	-	-	18,598
5b.2.2	Concrete Crushing	-	574	-	-	-	-	3	87	664	-	-	664	-	-	-	-	-	-	-	2,798
5b.2.3	ISFSI Demolition and Site Restoration	-	534	-	-	-	-	24	84	642	-	642	-	-	-	-	-	-	-	-	6,183
5b.2	Subtotal Period 5b Additional Costs	-	4,569	-	-	-	-	27	689	5,286	-	642	4,644	-	-	-	-	-	-	-	27,579
Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	247	-	-	-	-	-	37	284	-	-	284	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	247	-	-	-	-	-	37	284	-	-	284	-	-	-	-	-	-	-	-
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	-	6,137	-	-	-	-	-	921	7,057	-	-	7,057	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	228	34	262	-	-	262	-	-	-	-	-	-	-	-
5b.4.5	Site O&M Cost	-	-	-	-	-	-	310	46	356	-	-	356	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	1,582	237	1,819	-	-	1,819	-	-	-	-	-	-	-	34,287
5b.4.7	DOC Staff Cost	-	-	-	-	-	-	11,650	1,748	13,398	-	-	13,398	-	-	-	-	-	-	-	137,043
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	5,559	834	6,392	-	-	6,392	-	-	-	-	-	-	-	67,229
5b.4	Subtotal Period 5b Period-Dependent Costs	-	6,137	-	-	-	-	20,567	3,944	30,648	-	-	30,648	-	-	-	-	-	-	-	238,558
5b.0	TOTAL PERIOD 5b COST	-	30,628	-	-	-	-	20,779	7,649	59,055	212	642	58,201	-	-	-	-	-	-	258,806	240,198
PERIOD 5 TOTALS		-	30,628	-	-	-	-	20,779	7,649	59,055	212	642	58,201	-	-	-	-	-	-	258,806	240,198
TOTAL COST TO DECOMMISSION		8,429	81,855	10,274	8,549	3,885	33,101	382,783	92,254	621,131	420,024	133,669	67,438	215,647	94,742	3,130	459	505	17,664,760	983,770	4,096,980

Table D-1
Byron Nuclear Power Station, Unit 1
Delayed DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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 17.44% CONTINGENCY:						\$621,131	thousands of 2009 dollars														
TOTAL NRC LICENSE TERMINATION COST IS 67.62% OR:						\$420,024	thousands of 2009 dollars														
SPENT FUEL MANAGEMENT COST IS 21.52% OR:						\$133,669	thousands of 2009 dollars														
NON-NUCLEAR DEMOLITION COST IS 10.86% OR:						\$67,438	thousands of 2009 dollars														
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):						98,330	cubic feet														
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:						505	cubic feet														
TOTAL SCRAP METAL REMOVED:						58,942	tons														
TOTAL CRAFT LABOR REQUIREMENTS:						983,770	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 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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	-	-	-	-	-	-	398	119	517	517	-	-	-	-	-	-	-	-	-	-	
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	66	10	76	76	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	101	15	116	116	-	-	-	-	-	-	-	-	-	856	
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	66	10	76	76	-	-	-	-	-	-	-	-	-	556	
1a.1.9	Perform detailed rad survey	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	51	8	58	58	-	-	-	-	-	-	-	-	-	428	
1a.1.11	End product description	-	-	-	-	-	-	51	8	58	58	-	-	-	-	-	-	-	-	-	428	
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	76	11	87	87	-	-	-	-	-	-	-	-	-	642	
1a.1.13	Define major work sequence	-	-	-	-	-	-	51	8	58	58	-	-	-	-	-	-	-	-	-	428	
1a.1.14	Perform SER and EA	-	-	-	-	-	-	157	23	180	180	-	-	-	-	-	-	-	-	-	1,327	
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	253	38	290	290	-	-	-	-	-	-	-	-	-	2,140	
Activity Specifications																						
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	249	37	286	286	-	-	-	-	-	-	-	-	-	2,106	
1a.1.16.2	Plant systems	-	-	-	-	-	-	210	32	242	242	-	-	-	-	-	-	-	-	-	1,783	
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	158	24	181	181	-	-	-	-	-	-	-	-	-	1,335	
1a.1.16.4	Waste management	-	-	-	-	-	-	101	15	116	116	-	-	-	-	-	-	-	-	-	856	
1a.1.16.5	Facility and site dormancy	-	-	-	-	-	-	101	15	116	116	-	-	-	-	-	-	-	-	-	856	
1a.1.16	Total	-	-	-	-	-	-	819	123	941	941	-	-	-	-	-	-	-	-	-	6,936	
Detailed Work Procedures																						
1a.1.17.1	Plant systems	-	-	-	-	-	-	60	9	69	69	-	-	-	-	-	-	-	-	-	506	
1a.1.17.2	Facility closeout & dormancy	-	-	-	-	-	-	61	9	70	70	-	-	-	-	-	-	-	-	-	514	
1a.1.17	Total	-	-	-	-	-	-	120	18	138	138	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	2,211	391	2,602	2,602	-	-	-	-	-	-	-	-	-	15,361	
Period 1a Period-Dependent Costs																						
1a.4.1	Insurance	-	-	-	-	-	-	769	77	846	846	-	-	-	-	-	-	-	-	-	-	
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1a.4.3	Health physics supplies	-	414	-	-	-	-	-	104	518	518	-	-	-	-	-	-	-	-	-	-	
1a.4.4	Heavy equipment rental	-	414	-	-	-	-	-	62	476	476	-	-	-	-	-	-	-	-	-	-	
1a.4.5	Disposal of DAW generated	-	-	2	1	-	34	-	9	45	45	-	-	-	610	-	-	-	-	12,190	3	
1a.4.6	Plant energy budget	-	-	-	-	-	-	921	138	1,059	1,059	-	-	-	-	-	-	-	-	-	-	
1a.4.7	NRC Fees	-	-	-	-	-	-	471	47	518	518	-	-	-	-	-	-	-	-	-	-	
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	306	31	337	-	337	-	-	-	-	-	-	-	-	-	
1a.4.9	Site O&M Costs	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-	
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	381	57	438	-	438	-	-	-	-	-	-	-	-	-	
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	44	7	51	-	51	-	-	-	-	-	-	-	-	-	
1a.4.12	Security Staff Cost	-	-	-	-	-	-	6,241	936	7,177	7,177	-	-	-	-	-	-	-	-	-	157,471	
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	31,082	4,662	35,745	35,745	-	-	-	-	-	-	-	-	-	423,400	
1a.4	Subtotal Period 1a Period-Dependent Costs	-	828	2	1	-	34	40,340	6,148	47,353	46,527	826	-	-	610	-	-	-	-	12,190	3	580,871
1a.0	TOTAL PERIOD 1a COST	-	828	2	1	-	34	42,551	6,539	49,955	49,129	826	-	-	610	-	-	-	-	12,190	3	596,232

Table D-2
Byron Nuclear Power Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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	1,924	-	-	-	-	-	-	962	2,886	2,886	-	-	-	-	-	-	-	-	-	33,093	-
1b.1.1.2	Auxiliary Building	222	-	-	-	-	-	-	111	333	333	-	-	-	-	-	-	-	-	-	3,830	-
1b.1.1.3	Radwaste/Service Building	145	-	-	-	-	-	-	72	217	217	-	-	-	-	-	-	-	-	-	2,506	-
1b.1.1.4	Refueling Water Storage Tank	314	-	-	-	-	-	-	157	471	471	-	-	-	-	-	-	-	-	-	5,322	-
1b.1.1.5	Fuel Handling Building	899	-	-	-	-	-	-	449	1,348	1,348	-	-	-	-	-	-	-	-	-	15,238	-
1b.1.1	Totals	3,504	-	-	-	-	-	-	1,752	5,255	5,255	-	-	-	-	-	-	-	-	-	59,990	-
1b.1	Subtotal Period 1b Activity Costs	3,504	-	-	-	-	-	-	1,752	5,255	5,255	-	-	-	-	-	-	-	-	-	59,990	-
Period 1b Collateral Costs																						
1b.3.1	Decon equipment	797	-	-	-	-	-	-	120	917	917	-	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process liquid waste	205	-	87	398	-	389	-	268	1,347	1,347	-	-	-	1,398	-	-	-	-	-	83,853	272
1b.3.3	Small tool allowance	-	56	-	-	-	-	-	8	65	65	-	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	1,003	56	87	398	-	389	-	396	2,329	2,329	-	-	-	1,398	-	-	-	-	-	83,853	272
Period 1b Period-Dependent Costs																						
1b.4.1	Decon supplies	734	-	-	-	-	-	-	184	918	918	-	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	192	19	211	211	-	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	2,452	245	2,697	2,697	-	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	335	-	-	-	-	-	84	418	418	-	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	103	-	-	-	-	-	15	119	119	-	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	2	1	-	33	-	8	43	43	-	-	-	585	-	-	-	-	-	11,700	3
1b.4.7	Plant energy budget	-	-	-	-	-	-	229	34	264	264	-	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	117	12	129	129	-	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	76	8	84	-	84	-	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Costs	-	-	-	-	-	-	31	5	36	36	-	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	95	14	109	-	109	-	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	11	2	13	-	13	-	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	1,556	233	1,789	1,789	-	-	-	-	-	-	-	-	-	-	39,260
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	7,749	1,162	8,912	8,912	-	-	-	-	-	-	-	-	-	-	105,560
1b.4	Subtotal Period 1b Period-Dependent Costs	734	438	2	1	-	33	12,509	2,026	15,742	15,536	206	-	-	585	-	-	-	-	-	11,700	3
1b.0	TOTAL PERIOD 1b COST	5,240	494	89	399	-	422	12,509	4,174	23,326	23,120	206	-	-	1,983	-	-	-	-	-	95,552	60,265
PERIOD 1c - Preparations for SAFSTOR Dormancy																						
Period 1c Direct Decommissioning Activities																						
1c.1.1	Prepare support equipment for storage	-	431	-	-	-	-	-	65	496	496	-	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	42	-	-	-	-	-	6	48	48	-	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	-	13,416	-
1c.1.4	Secure building accesses	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	29	4	34	34	-	-	-	-	-	-	-	-	-	-	250
1c.1	Subtotal Period 1c Activity Costs	-	473	-	-	-	-	762	295	1,530	1,530	-	-	-	-	-	-	-	-	-	17,116	250
Period 1c Additional Costs																						
1c.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	9,690	1,453	11,143	11,143	-	-	-	-	-	-	-	-	-	-	-
1c.2	Subtotal Period 1c Additional Costs	-	-	-	-	-	-	9,690	1,453	11,143	11,143	-	-	-	-	-	-	-	-	-	-	-

Table D-2
Byron Nuclear Power Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet				
Period 1c Collateral Costs																					
1c.3.1	Process liquid waste	251	-	106	487	-	476	-	328	1,649	1,649	-	-	-	-	-	-	-	102,618	333	-
1c.3.2	Small tool allowance	-	4	-	-	-	-	-	1	4	4	-	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	251	4	106	487	-	476	-	329	1,653	1,653	-	-	-	-	-	-	-	102,618	333	-
Period 1c Period-Dependent Costs																					
1c.4.1	Insurance	-	-	-	-	-	-	192	19	211	211	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	2,452	245	2,697	2,697	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	145	-	-	-	-	-	36	182	182	-	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	103	-	-	-	-	-	15	119	119	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	0	0	-	6	-	2	8	8	-	-	-	107	-	-	-	2,132	0	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	229	34	264	264	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	117	12	129	129	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	76	8	84	-	84	-	-	-	-	-	-	-	-	-
1c.4.9	Site O&M Costs	-	-	-	-	-	-	31	5	36	36	-	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	95	14	109	-	109	-	-	-	-	-	-	-	-	-
1c.4.11	ISFSI Operating Costs	-	-	-	-	-	-	11	2	13	-	13	-	-	-	-	-	-	-	-	-
1c.4.12	Security Staff Cost	-	-	-	-	-	-	1,556	233	1,789	1,789	-	-	-	-	-	-	-	-	-	39,260
1c.4.13	Utility Staff Cost	-	-	-	-	-	-	2,147	322	2,468	2,468	-	-	-	-	-	-	-	-	-	27,040
1c.4	Subtotal Period 1c Period-Dependent Costs	-	249	0	0	-	6	6,906	947	8,109	7,903	206	-	-	107	-	-	-	2,132	0	66,300
1c.0	TOTAL PERIOD 1c COST	251	725	107	487	-	482	17,358	3,025	22,435	22,229	206	-	-	1,817	-	-	-	104,751	17,450	66,550
PERIOD 1 TOTALS		5,491	2,047	197	886	-	938	72,418	13,738	95,716	94,478	1,238	-	-	4,409	-	-	-	212,493	77,717	807,602
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	-	-	-	-	-	-	192	29	220	220	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	1,665	416	2,081	2,081	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	1,856	445	2,301	2,301	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																					
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	12,500	1,875	14,375	-	14,375	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	12,500	1,875	14,375	-	14,375	-	-	-	-	-	-	-	-	-
Period 2a Period-Dependent Costs																					
2a.4.1	Insurance	-	-	-	-	-	-	4,436	444	4,879	4,273	606	-	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	15,718	1,572	17,290	7,279	10,011	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	1,061	-	-	-	-	-	265	1,327	1,327	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	15	5	-	283	-	73	376	1,402	-	-	5,077	-	-	-	-	101,533	23	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	2,438	366	2,804	1,402	1,402	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	2,367	237	2,604	2,604	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	1,324	132	1,456	-	1,456	-	-	-	-	-	-	-	-	-
2a.4.8	Site O&M Costs	-	-	-	-	-	-	1,654	248	1,902	1,902	-	-	-	-	-	-	-	-	-	-
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	5,844	877	6,721	-	6,721	-	-	-	-	-	-	-	-	-
2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	582	87	669	-	669	-	-	-	-	-	-	-	-	-
2a.4.11	Security Staff Cost	-	-	-	-	-	-	34,590	5,189	39,779	37	39,741	-	-	-	-	-	-	-	-	851,336
2a.4.12	Utility Staff Cost	-	-	-	-	-	-	32,968	4,945	37,913	8,300	29,613	-	-	-	-	-	-	-	-	420,144
2a.4	Subtotal Period 2a Period-Dependent Costs	-	1,061	15	5	-	283	101,921	14,434	117,720	27,500	90,219	-	-	5,077	-	-	-	101,533	23	1,271,480
2a.0	TOTAL PERIOD 2a COST	-	1,061	15	5	-	283	116,277	16,754	134,396	29,802	104,594	-	-	5,077	-	-	-	101,533	23	1,271,480

Table D-2
Byron Nuclear Power Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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 - 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	-	-	-	-	-	-	21	3	24	24	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	178	45	223	223	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	199	48	247	247	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,125	319	2,444	-	2,444	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	2,125	319	2,444	-	2,444	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	430	43	473	458	15	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	709	71	780	780	-	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	109	-	-	-	-	-	27	136	136	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	2	1	-	30	-	8	40	40	-	-	-	535	-	-	-	10,702	2	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	131	20	150	150	-	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	254	25	279	279	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	142	14	156	-	156	-	-	-	-	-	-	-	-	-
2b.4.8	Site O&M Costs	-	-	-	-	-	-	177	27	204	204	-	-	-	-	-	-	-	-	-	-
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	62	9	72	-	72	-	-	-	-	-	-	-	-	-
2b.4.10	Security Staff Cost	-	-	-	-	-	-	1,760	264	2,024	4	2,020	-	-	-	-	-	-	-	-	39,960
2b.4.11	Utility Staff Cost	-	-	-	-	-	-	2,150	323	2,473	889	1,583	-	-	-	-	-	-	-	-	29,600
2b.4	Subtotal Period 2b Period-Dependent Costs	-	109	2	1	-	30	5,815	830	6,787	2,940	3,846	-	-	535	-	-	-	10,702	2	69,560
2b.0	TOTAL PERIOD 2b COST	-	109	2	1	-	30	8,139	1,197	9,477	3,187	6,290	-	-	535	-	-	-	10,702	2	69,560
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	-	-	-	-	-	-	12	2	14	14	-	-	-	-	-	-	-	-	-	-
2c.1.5	Maintenance supplies	-	-	-	-	-	-	108	27	136	136	-	-	-	-	-	-	-	-	-	-
2c.1	Subtotal Period 2c Activity Costs	-	-	-	-	-	-	121	29	150	150	-	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	253	25	278	278	-	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	431	43	474	474	-	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	63	-	-	-	-	-	16	78	78	-	-	-	-	-	-	-	-	-	-
2c.4.4	Disposal of DAW generated	-	-	1	0	-	18	-	5	24	24	-	-	319	-	-	-	-	6,383	1	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	79	12	91	91	-	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	147	15	162	162	-	-	-	-	-	-	-	-	-	-
2c.4.7	Site O&M Costs	-	-	-	-	-	-	108	16	124	124	-	-	-	-	-	-	-	-	-	-
2c.4.8	Security Staff Cost	-	-	-	-	-	-	2	0	2	-	-	-	-	-	-	-	-	-	-	-
2c.4.9	Utility Staff Cost	-	-	-	-	-	-	470	71	541	541	-	-	-	-	-	-	-	-	-	7,200
2c.4	Subtotal Period 2c Period-Dependent Costs	-	63	1	0	-	18	1,491	202	1,775	1,775	-	-	319	-	-	-	-	6,383	1	7,200
2c.0	TOTAL PERIOD 2c COST	-	63	1	0	-	18	1,612	231	1,925	1,925	-	-	319	-	-	-	-	6,383	1	7,200
PERIOD 2 TOTALS																					
-																					

Table D-2
Byron Nuclear Power Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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	-	-	-	-	-	-	66	10	76	76	-	-	-	-	-	-	-	-	-	556	
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	232	35	267	267	-	-	-	-	-	-	-	-	-	1,969	
3a.1.3	Perform detailed rad survey	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	
3a.1.4	End product description	-	-	-	-	-	-	51	8	58	58	-	-	-	-	-	-	-	-	-	428	
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	66	10	76	76	-	-	-	-	-	-	-	-	-	556	
3a.1.6	Define major work sequence	-	-	-	-	-	-	379	57	436	436	-	-	-	-	-	-	-	-	-	3,210	
3a.1.7	Perform SER and EA	-	-	-	-	-	-	157	23	180	180	-	-	-	-	-	-	-	-	-	1,327	
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	253	38	290	290	-	-	-	-	-	-	-	-	-	2,140	
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	207	31	238	238	-	-	-	-	-	-	-	-	-	1,753	
3a.1.10	Receive NRC approval of termination plan	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	
Activity Specifications																						
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	372	56	428	385	-	43	-	-	-	-	-	-	-	3,154	
3a.1.11.2	Plant systems	-	-	-	-	-	-	210	32	242	218	-	24	-	-	-	-	-	-	-	1,783	
3a.1.11.3	Reactor internals	-	-	-	-	-	-	359	54	412	412	-	-	-	-	-	-	-	-	-	3,039	
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	328	49	378	378	-	-	-	-	-	-	-	-	-	2,782	
3a.1.11.5	Biological shield	-	-	-	-	-	-	25	4	29	29	-	-	-	-	-	-	-	-	-	214	
3a.1.11.6	Steam generators	-	-	-	-	-	-	158	24	181	181	-	-	-	-	-	-	-	-	-	1,335	
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	81	12	93	46	-	46	-	-	-	-	-	-	-	685	
3a.1.11.8	Main Turbine	-	-	-	-	-	-	20	3	23	-	-	23	-	-	-	-	-	-	-	171	
3a.1.11.9	Main Condensers	-	-	-	-	-	-	20	3	23	-	-	23	-	-	-	-	-	-	-	171	
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	158	24	181	91	-	91	-	-	-	-	-	-	-	1,335	
3a.1.11.11	Waste management	-	-	-	-	-	-	232	35	267	267	-	-	-	-	-	-	-	-	-	1,969	
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-	45	7	52	26	-	26	-	-	-	-	-	-	-	385	
3a.1.11	Total	-	-	-	-	-	-	2,009	301	2,310	2,034	-	277	-	-	-	-	-	-	-	17,024	
Planning & Site Preparations																						
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	121	18	139	139	-	-	-	-	-	-	-	-	-	1,027	
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	2,800	420	3,220	3,220	-	-	-	-	-	-	-	-	-	-	
3a.1.14	Design water clean-up system	-	-	-	-	-	-	71	11	81	81	-	-	-	-	-	-	-	-	-	599	
3a.1.15	Rigging/Cont. Cntrl Envlp/tooling/etc.	-	-	-	-	-	-	2,200	330	2,530	2,530	-	-	-	-	-	-	-	-	-	-	
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	62	9	71	71	-	-	-	-	-	-	-	-	-	526	
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	8,672	1,301	9,973	9,696	-	277	-	-	-	-	-	-	-	31,117	
Period 3a Period-Dependent Costs																						
3a.4.1	Insurance	-	-	-	-	-	-	303	30	333	333	-	-	-	-	-	-	-	-	-	-	
3a.4.2	Property taxes	-	-	-	-	-	-	500	50	550	550	-	-	-	-	-	-	-	-	-	-	
3a.4.3	Health physics supplies	-	-	-	-	-	-	-	86	430	430	-	-	-	-	-	-	-	-	-	-	
3a.4.4	Heavy equipment rental	-	344	-	-	-	-	-	62	476	476	-	-	-	-	-	-	-	-	-	-	
3a.4.5	Disposal of DAW generated	-	-	1	1	-	-	27	-	96	96	-	-	-	-	-	-	-	-	-	-	
3a.4.6	Plant energy budget	-	-	-	-	-	-	921	138	1,059	1,059	-	-	-	-	-	-	-	-	9,613	2	
3a.4.7	NRC Fees	-	-	-	-	-	-	214	21	236	236	-	-	-	-	-	-	-	-	-	-	
3a.4.8	Site O&M Costs	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-	
3a.4.9	Security Staff Cost	-	-	-	-	-	-	235	35	270	270	-	-	-	-	-	-	-	-	-	6,257	
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	14,259	2,139	16,398	16,398	-	-	-	-	-	-	-	-	-	200,229	
3a.4	Subtotal Period 3a Period-Dependent Costs	-	757	1	1	-	27	16,557	2,588	19,931	19,931	-	-	-	481	-	-	-	-	9,613	2	206,486
3a.0	TOTAL PERIOD 3a COST	-	757	1	1	-	27	25,229	3,888	29,904	29,627	-	277	-	481	-	-	-	-	9,613	2	237,603

Table D-2
Byron Nuclear Power Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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 - Decommissioning Preparations																							
Period 3b Direct Decommissioning Activities																							
Detailed Work Procedures																							
3b.1.1.1	Plant systems	-	-	-	-	-	-	239	36	275	247	-	27	-	-	-	-	-	-	-	-	2,026	
3b.1.1.2	Reactor internals	-	-	-	-	-	-	126	19	145	145	-	-	-	-	-	-	-	-	-	-	1,070	
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	68	10	78	20	-	59	-	-	-	-	-	-	-	-	578	
3b.1.1.4	CRD cooling assembly	-	-	-	-	-	-	51	8	58	58	-	-	-	-	-	-	-	-	-	-	428	
3b.1.1.5	CRD housings & ICI tubes	-	-	-	-	-	-	51	8	58	58	-	-	-	-	-	-	-	-	-	-	428	
3b.1.1.6	Incore instrumentation	-	-	-	-	-	-	51	8	58	58	-	-	-	-	-	-	-	-	-	-	428	
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	183	28	211	211	-	-	-	-	-	-	-	-	-	-	1,554	
3b.1.1.8	Facility closeout	-	-	-	-	-	-	61	9	70	35	-	35	-	-	-	-	-	-	-	-	514	
3b.1.1.9	Missile shields	-	-	-	-	-	-	23	3	26	26	-	-	-	-	-	-	-	-	-	-	193	
3b.1.1.10	Biological shield	-	-	-	-	-	-	61	9	70	70	-	-	-	-	-	-	-	-	-	-	514	
3b.1.1.11	Steam generators	-	-	-	-	-	-	232	35	267	267	-	-	-	-	-	-	-	-	-	-	1,969	
3b.1.1.12	Reinforced concrete	-	-	-	-	-	-	51	8	58	29	-	29	-	-	-	-	-	-	-	-	428	
3b.1.1.13	Main Turbine	-	-	-	-	-	-	79	12	91	-	-	91	-	-	-	-	-	-	-	-	668	
3b.1.1.14	Main Condensers	-	-	-	-	-	-	79	12	91	-	-	91	-	-	-	-	-	-	-	-	668	
3b.1.1.15	Auxiliary building	-	-	-	-	-	-	138	21	159	143	-	16	-	-	-	-	-	-	-	-	1,168	
3b.1.1.16	Reactor building	-	-	-	-	-	-	138	21	159	143	-	16	-	-	-	-	-	-	-	-	1,168	
3b.1.1	Total	-	-	-	-	-	-	1,629	244	1,873	1,510	-	363	-	-	-	-	-	-	-	-	13,800	
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	1,629	244	1,873	1,510	-	363	-	-	-	-	-	-	-	-	13,800	
Period 3b Additional Costs																							
3b.2.1	Site Characterization	-	-	-	-	-	-	2,711	813	3,525	3,525	-	-	-	-	-	-	-	-	-	13,042	4,640	
3b.2	Subtotal Period 3b Additional Costs	-	-	-	-	-	-	2,711	813	3,525	3,525	-	-	-	-	-	-	-	-	-	13,042	4,640	
Period 3b Collateral Costs																							
3b.3.1	Decon equipment	797	-	-	-	-	-	-	120	917	917	-	-	-	-	-	-	-	-	-	-	-	
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,130	169	1,299	1,299	-	-	-	-	-	-	-	-	-	-	-	
3b.3.3	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-	-	
3b.3	Subtotal Period 3b Collateral Costs	797	1,100	-	-	-	-	1,130	454	3,482	3,482	-	-	-	-	-	-	-	-	-	-	-	
Period 3b Period-Dependent Costs																							
3b.4.1	Decon supplies	24	-	-	-	-	-	-	6	31	31	-	-	-	-	-	-	-	-	-	-	-	
3b.4.2	Insurance	-	-	-	-	-	-	168	17	185	185	-	-	-	-	-	-	-	-	-	-	-	
3b.4.3	Property taxes	-	-	-	-	-	-	251	25	276	276	-	-	-	-	-	-	-	-	-	-	-	
3b.4.4	Health physics supplies	-	-	-	-	-	-	-	46	232	232	-	-	-	-	-	-	-	-	-	-	-	
3b.4.5	Heavy equipment rental	-	186	-	-	-	-	-	31	238	238	-	-	-	-	-	-	-	-	-	-	-	
3b.4.6	Disposal of DAW generated	-	-	1	0	-	15	-	4	20	20	-	-	-	-	-	-	-	-	-	5,315	1	
3b.4.7	Plant energy budget	-	-	-	-	-	-	462	69	531	531	-	-	-	-	-	-	-	-	-	-	-	
3b.4.8	NRC Fees	-	-	-	-	-	-	107	11	118	118	-	-	-	-	-	-	-	-	-	-	-	
3b.4.9	Site O&M Costs	-	-	-	-	-	-	63	9	72	72	-	-	-	-	-	-	-	-	-	-	-	
3b.4.10	Security Staff Cost	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	-	3,137	
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	3,296	494	3,790	3,790	-	-	-	-	-	-	-	-	-	-	42,874	
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	7,149	1,072	8,222	8,222	-	-	-	-	-	-	-	-	-	-	100,389	
3b.4	Subtotal Period 3b Period-Dependent Costs	24	393	1	0	-	15	11,613	1,803	13,850	13,850	-	-	-	-	-	-	-	-	-	5,315	1	146,400
3b.0	TOTAL PERIOD 3b COST	822	1,493	1	0	-	15	17,083	3,315	22,729	22,366	-	363	-	266	-	-	-	-	5,315	13,043	164,840	
PERIOD 3 TOTALS		822	2,251	2	1	-	42	42,312	7,203	52,632	51,993	-	640	-	746	-	-	-	-	14,927	13,045	402,442	

Table D-2
Byron Nuclear Power Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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	38	131	30	26	-	317	-	138	679	679	-	-	-	1,606	-	-	-	194,222	2,979	-
4a.1.1.2	Pressurizer Relief Tank	7	26	6	5	-	60	-	26	131	131	-	-	-	329	-	-	-	36,553	596	-
4a.1.1.3	Reactor Coolant Pumps & Motors	25	94	53	168	-	1,272	-	384	1,996	1,996	-	-	-	4,796	-	-	-	780,540	2,726	80
4a.1.1.4	Pressurizer	11	59	345	94	-	412	-	172	1,093	1,093	-	-	-	3,033	-	-	-	252,826	1,527	750
4a.1.1.5	Steam Generators	85	4,096	1,426	2,363	580	3,416	-	2,505	14,471	14,471	-	-	39,289	14,436	-	-	-	3,096,232	20,508	1,500
4a.1.1.6	CRDMs/CIs/Service Structure Removal	35	89	194	34	-	102	-	90	543	543	-	-	-	3,881	-	-	-	86,025	2,135	-
4a.1.1.7	Reactor Vessel Internals	69	2,029	3,483	555	-	4,946	208	5,070	16,360	16,360	-	-	-	1,710	876	459	-	325,944	23,633	1,077
4a.1.1.8	Vessel & Internals GTCC Disposal	-	-	-	-	-	11,665	-	1,750	13,414	13,414	-	-	-	-	-	-	505	104,146	-	-
4a.1.1.9	Reactor Vessel	85	3,998	1,314	675	-	3,129	208	5,134	14,544	14,544	-	-	-	6,606	2,254	-	-	978,589	23,633	1,077
4a.1.1	Totals	355	10,521	6,852	3,921	580	25,318	415	15,268	63,231	63,231	-	-	39,289	36,398	3,130	459	505	5,855,076	77,738	4,485
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	510	256	32	214	-	-	190	1,201	1,201	-	-	5,355	-	-	-	-	455,213	9,016	-
4a.1.3	Main Condensers	-	1,042	133	27	150	-	-	300	1,653	1,653	-	-	7,111	-	-	-	-	320,000	18,250	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor	-	1,076	-	-	-	-	-	161	1,237	1,237	-	-	-	-	-	-	-	-	12,130	-
4a.1.4.2	Auxiliary Building	-	602	-	-	-	-	-	90	692	692	-	-	-	-	-	-	-	-	6,896	-
4a.1.4.3	Radwaste/Service Building	-	391	-	-	-	-	-	59	450	450	-	-	-	-	-	-	-	-	5,060	-
4a.1.4.4	Refueling Water Storage Tank	-	104	-	-	-	-	-	16	120	120	-	-	-	-	-	-	-	-	1,299	-
4a.1.4.5	Fuel Handling Building	-	309	-	-	-	-	-	46	355	355	-	-	-	-	-	-	-	-	3,690	-
4a.1.4	Totals	-	2,481	-	-	-	-	-	372	2,853	2,853	-	-	-	-	-	-	-	-	29,074	-
Disposal of Plant Systems																					
4a.1.5.1	Auxiliary Feedwater	-	224	3	6	36	-	-	63	331	331	-	-	1,866	-	-	-	-	75,766	3,747	-
4a.1.5.2	Auxiliary Steam	-	115	-	-	-	-	-	17	132	-	-	132	-	-	-	-	-	-	2,107	-
4a.1.5.3	Auxiliary Steam RCA	-	326	-	10	54	-	-	92	486	486	-	-	2,822	-	-	-	-	114,583	5,241	-
4a.1.5.4	Boric Acid Processing	-	421	27	23	34	106	-	143	755	755	-	-	1,794	1,076	-	-	-	162,827	6,970	-
4a.1.5.5	CO2 & H2	-	16	-	-	-	-	-	2	18	-	-	18	-	-	-	-	-	-	289	-
4a.1.5.6	CO2 & H2 RCA	-	31	1	1	5	-	-	9	46	46	-	-	287	-	-	-	-	11,664	478	-
4a.1.5.7	Chemical Feed	-	145	-	-	-	-	-	22	167	-	-	167	-	-	-	-	-	-	2,663	-
4a.1.5.8	Chilled Water	-	80	-	-	-	-	-	12	92	-	-	92	-	-	-	-	-	-	1,454	-
4a.1.5.9	Circulating Water	-	525	-	-	-	-	-	79	604	-	-	604	-	-	-	-	-	-	9,669	-
4a.1.5.10	Condensate	-	293	-	-	-	-	-	44	337	-	-	337	-	-	-	-	-	-	5,317	-
4a.1.5.11	Condensate Booster	-	293	-	-	-	-	-	44	336	-	-	336	-	-	-	-	-	-	5,314	-
4a.1.5.12	Condensate Cleanup	-	160	-	-	-	-	-	24	184	-	-	184	-	-	-	-	-	-	3,000	-
4a.1.5.13	Containment Spray	-	229	6	12	69	-	-	70	386	386	-	-	3,602	-	-	-	-	146,289	3,673	-
4a.1.5.14	Diesel Fuel Oil	-	158	-	-	-	-	-	24	182	-	-	182	-	-	-	-	-	-	2,848	-
4a.1.5.15	Essential Service Water	-	274	-	-	-	-	-	41	315	-	-	315	-	-	-	-	-	-	5,049	-
4a.1.5.16	Extraction Steam	-	196	-	-	-	-	-	29	226	-	-	226	-	-	-	-	-	-	3,637	-
4a.1.5.17	Feedwater	-	267	-	-	-	-	-	40	307	-	-	307	-	-	-	-	-	-	4,925	-
4a.1.5.18	Feedwater Drains	-	633	-	-	-	-	-	95	728	-	-	728	-	-	-	-	-	-	11,719	-
4a.1.5.19	Gland Steam	-	33	-	-	-	-	-	5	38	-	-	38	-	-	-	-	-	-	616	-
4a.1.5.20	Gland Water	-	24	-	-	-	-	-	4	28	-	-	28	-	-	-	-	-	-	458	-
4a.1.5.21	Main Steam	-	271	-	-	-	-	-	41	312	-	-	312	-	-	-	-	-	-	4,979	-
4a.1.5.22	Main Steam RCA	-	76	-	3	19	-	-	23	123	123	-	-	990	-	-	-	-	40,190	1,250	-
4a.1.5.23	Make-up Demineralizer	-	137	-	-	-	-	-	21	158	-	-	158	-	-	-	-	-	-	2,595	-
4a.1.5.24	Nitrogen	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	18	-
4a.1.5.25	Non-Essential Service Water	-	318	-	-	-	-	-	48	366	-	-	366	-	-	-	-	-	-	5,903	-
4a.1.5.26	Non-Essential Service Water RCA	-	163	7	13	75	-	-	55	313	313	-	-	3,909	-	-	-	-	158,755	2,535	-
4a.1.5.27	Off Gas	-	605	13	25	141	-	-	177	962	962	-	-	7,411	-	-	-	-	300,945	10,038	-
4a.1.5.28	Potable Water	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	75	-

Table D-2
Byron Nuclear Power Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet				
Disposal of Plant Systems (continued)																					
4a.1.5.29	Process Radiation Monitoring	-	59	0	0	3	-	-	15	77	77	-	-	138	-	-	-	-	5,613	1,086	-
4a.1.5.30	Process Sampling	-	129	1	2	12	-	-	35	179	179	-	-	641	-	-	-	-	26,045	2,347	-
4a.1.5.31	Sewage Treatment Plant	-	85	-	-	-	-	-	13	98	-	-	98	-	-	-	-	-	-	1,579	-
4a.1.5.32	Station Air	-	38	-	-	-	-	-	6	44	-	-	44	-	-	-	-	-	-	705	-
4a.1.5.33	Station Heating	-	130	-	-	-	-	-	19	149	-	-	149	-	-	-	-	-	-	2,391	-
4a.1.5.34	Steam Humidification	-	6	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	115	-
4a.1.5.35	Switchgear Heat Removal	-	29	-	-	-	-	-	4	33	-	-	33	-	-	-	-	-	-	519	-
4a.1.5.36	Turbine Bldg Equip Drains	-	67	-	-	-	-	-	10	77	-	-	77	-	-	-	-	-	-	1,235	-
4a.1.5.37	Turbine Bldg Floor Drains	-	115	-	-	-	-	-	17	133	-	-	133	-	-	-	-	-	-	2,117	-
4a.1.5.38	Turbine Oil	-	73	-	-	-	-	-	11	84	-	-	84	-	-	-	-	-	-	1,359	-
4a.1.5.39	Turbine-Generator Auxiliaries	-	49	-	-	-	-	-	7	57	-	-	57	-	-	-	-	-	-	884	-
4a.1.5.40	Waste Oil Sumps	-	28	-	-	-	-	-	4	32	-	-	32	-	-	-	-	-	-	517	-
4a.1.5.41	Well Water	-	69	-	-	-	-	-	10	79	-	-	79	-	-	-	-	-	-	1,247	-
4a.1.5	Totals	-	6,898	66	96	448	106	-	1,376	8,989	3,659	-	5,330	23,460	1,076	-	-	-	1,042,678	122,666	-
4a.1.6	Scaffolding in support of decommissioning	-	1,358	9	2	10	3	-	343	1,726	1,726	-	-	473	29	-	-	-	23,936	26,134	-
4a.1	Subtotal Period 4a Activity Costs	355	22,811	7,316	4,077	1,402	25,427	415	17,850	79,653	74,324	-	5,330	75,688	37,503	3,130	459	505	7,696,903	282,877	4,485
Period 4a Collateral Costs																					
4a.3.1	Process liquid waste	80	-	35	160	-	157	-	107	539	539	-	-	-	-	-	-	-	33,788	110	-
4a.3.2	Small tool allowance	-	254	-	-	-	-	-	38	292	263	-	29	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	80	254	35	160	-	157	-	145	831	801	-	29	-	-	-	-	-	33,788	110	-
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	65	-	-	-	-	-	-	16	81	81	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	448	45	493	493	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	668	67	735	661	-	73	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	1,633	-	-	-	-	-	408	2,041	2,041	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	2,333	-	-	-	-	-	350	2,683	2,683	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	9	4	-	183	-	47	243	243	-	-	-	-	-	-	-	3,279	65,590	15
4a.4.7	Plant energy budget	-	-	-	-	-	-	1,169	175	1,345	1,345	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	603	60	663	663	-	-	-	-	-	-	-	-	-	-
4a.4.9	Site O&M Costs	-	-	-	-	-	-	167	25	192	192	-	-	-	-	-	-	-	-	-	-
4a.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	512	77	589	589	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	3,754	563	4,317	4,317	-	-	-	-	-	-	-	-	-	87,143
4a.4.12	DOC Staff Cost	-	-	-	-	-	-	15,423	2,313	17,736	17,736	-	-	-	-	-	-	-	-	-	192,411
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	26,027	3,904	29,931	29,931	-	-	-	-	-	-	-	-	-	348,571
4a.4	Subtotal Period 4a Period-Dependent Costs	65	3,966	9	4	-	183	48,771	8,051	61,049	60,976	-	73	-	-	-	-	-	65,590	15	628,126
4a.0	TOTAL PERIOD 4a COST	499	27,031	7,360	4,241	1,402	25,767	49,186	26,046	141,533	136,101	-	5,432	75,688	41,346	3,130	459	505	7,796,281	283,002	632,610
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
4b.1.1	Remove spent fuel racks	990	106	305	93	-	590	-	713	2,796	2,796	-	-	-	-	-	-	-	499,920	2,174	-
Disposal of Plant Systems																					
4b.1.2.1	Chemical & Volume Control	-	954	59	44	34	243	-	317	1,652	1,652	-	-	1,783	2,322	-	-	-	278,742	15,645	-
4b.1.2.2	Chilled Water RCA	-	592	13	25	139	-	-	174	943	943	-	-	7,293	-	-	-	-	296,176	9,173	-
4b.1.2.3	Component Cooling	-	627	17	31	178	-	-	190	1,043	1,043	-	-	9,319	-	-	-	-	378,439	10,075	-
4b.1.2.4	Electrical	-	3,669	-	-	-	-	-	550	4,220	-	-	4,220	-	-	-	-	-	-	66,259	-
4b.1.2.5	Electrical - Contaminated	-	1,564	-	32	181	-	-	425	2,219	2,219	-	-	9,508	-	-	-	-	386,137	25,754	-
4b.1.2.6	Electrical - RCA	-	2,236	39	72	410	-	-	635	3,392	3,392	-	-	21,460	-	-	-	-	871,483	37,551	-
4b.1.2.7	Emergency Diesel Generator	-	83	-	-	-	-	-	13	96	-	-	96	-	-	-	-	-	-	1,514	-
4b.1.2.8	Essential Service Water RCA	-	303	17	32	179	-	-	109	639	639	-	-	9,380	-	-	-	-	380,930	4,955	-

Table D-2
Byron Nuclear Power Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet					
Disposal of Plant Systems (continued)																						
4b.1.2.9	Fire Protection	-	271	-	-	-	-	-	41	311	-	-	311	-	-	-	-	-	-	-	4,983	-
4b.1.2.10	Fire Protection RCA	-	476	12	22	124	-	-	142	776	776	-	-	6,516	-	-	-	-	-	264,606	7,384	-
4b.1.2.11	Fuel Handling Bldg Equip Drains	-	146	7	7	20	23	-	47	249	249	-	-	1,027	221	-	-	-	-	60,829	2,404	-
4b.1.2.12	Fuel Handling Bldg Floor Drains	-	149	7	7	16	25	-	48	252	252	-	-	830	238	-	-	-	-	54,723	2,441	-
4b.1.2.13	Fuel Handling Bldg Floor Drains (Unit 1)	-	103	4	4	13	11	-	32	168	168	-	-	703	109	-	-	-	-	37,980	1,740	-
4b.1.2.14	Fuel Handling Bldg Equip Drains (Unit 1)	-	26	1	1	1	4	-	8	41	41	-	-	67	34	-	-	-	-	5,758	424	-
4b.1.2.15	Fuel Pool Cooling & Cleanup	-	199	11	11	24	43	-	67	355	355	-	-	1,275	406	-	-	-	-	88,160	3,272	-
4b.1.2.16	Fuel Pool Cooling & Cleanup (Unit 1)	-	184	10	10	23	38	-	62	327	327	-	-	1,226	361	-	-	-	-	82,110	3,050	-
4b.1.2.17	HVAC-Auxiliary Building	-	485	10	19	108	-	-	141	762	762	-	-	5,643	-	-	-	-	-	229,172	7,876	-
4b.1.2.18	HVAC-Control Room HVAC	-	7	-	-	-	-	-	1	8	-	-	-	8	-	-	-	-	-	-	127	-
4b.1.2.19	HVAC-Diesel Generator Room	-	38	-	-	-	-	-	6	44	-	-	-	44	-	-	-	-	-	-	686	-
4b.1.2.20	HVAC-Laboratory	-	17	-	-	-	-	-	3	20	-	-	-	20	-	-	-	-	-	-	315	-
4b.1.2.21	HVAC-Machine Shop	-	16	-	-	-	-	-	2	18	-	-	-	18	-	-	-	-	-	-	297	-
4b.1.2.22	HVAC-Miscellaneous	-	97	-	-	-	-	-	14	111	-	-	-	111	-	-	-	-	-	-	1,769	-
4b.1.2.23	HVAC-Primary Containment	-	539	19	36	204	-	-	173	970	970	-	-	10,679	-	-	-	-	-	433,695	8,624	-
4b.1.2.24	HVAC-Pumphouse	-	15	-	-	-	-	-	2	18	-	-	-	18	-	-	-	-	-	-	275	-
4b.1.2.25	HVAC-Radwaste	-	279	6	11	63	-	-	82	441	441	-	-	3,327	-	-	-	-	-	135,102	4,323	-
4b.1.2.26	HVAC-Turbine Building	-	163	-	-	-	-	-	24	187	-	-	-	187	-	-	-	-	-	-	3,158	-
4b.1.2.27	Instrument Air Supply	-	64	-	-	-	-	-	10	73	-	-	-	73	-	-	-	-	-	-	1,197	-
4b.1.2.28	Instrument Air Supply RCA	-	220	2	3	20	-	-	59	304	304	-	-	1,035	-	-	-	-	-	42,036	3,563	-
4b.1.2.29	Miscellaneous Drains	-	66	1	2	12	-	-	19	100	100	-	-	617	-	-	-	-	-	25,043	1,104	-
4b.1.2.30	Primary Containment Purge	-	261	10	20	111	-	-	86	488	488	-	-	5,816	-	-	-	-	-	236,197	4,524	-
4b.1.2.31	Primary Water	-	722	31	43	187	61	-	233	1,278	1,278	-	-	9,803	667	-	-	-	-	449,848	12,651	-
4b.1.2.32	Radioactive Waste Disposal	-	2,431	164	134	181	652	-	834	4,396	4,396	-	-	9,461	6,530	-	-	-	-	936,736	39,735	-
4b.1.2.33	Reactor Bldg Equipment Drains	-	96	8	7	7	37	-	36	191	191	-	-	356	350	-	-	-	-	45,614	1,581	-
4b.1.2.34	Reactor Building Floor Drains	-	36	2	2	2	7	-	12	60	60	-	-	125	66	-	-	-	-	11,009	597	-
4b.1.2.35	Reactor Coolant	-	147	8	6	4	32	-	47	243	243	-	-	206	299	-	-	-	-	35,137	2,391	-
4b.1.2.36	Residual Heat Removal	-	167	10	12	27	43	-	59	318	318	-	-	1,421	405	-	-	-	-	94,061	2,834	-
4b.1.2.37	Safety Injection	-	760	36	46	172	98	-	251	1,362	1,362	-	-	9,001	979	-	-	-	-	448,431	13,165	-
4b.1.2.38	Station Air RCA	-	51	1	1	6	-	-	14	72	72	-	-	293	-	-	-	-	-	11,919	815	-
4b.1.2.39	Station Heating RCA	-	223	4	8	46	-	-	64	346	346	-	-	2,412	-	-	-	-	-	97,961	3,548	-
4b.1.2.40	Waste Oil Sumps RCA	-	23	0	1	3	-	-	6	33	33	-	-	154	-	-	-	-	-	6,246	361	-
4b.1.2.41	Waste Water Treatment	-	78	-	-	-	-	-	12	90	-	-	-	90	-	-	-	-	-	-	1,464	-
4b.1.2	Totals	-	18,585	524	648	2,495	1,316	-	5,047	28,616	23,420	-	-	5,196	130,736	12,987	-	-	-	6,424,277	313,605	-
4b.1.3	Scaffolding in support of decommissioning	-	2,037	14	3	15	5	-	515	2,589	2,589	-	-	710	44	-	-	-	-	35,904	39,201	-
Decontamination of Site Buildings																						
4b.1.4.1	Reactor	1,748	1,236	177	192	134	604	-	1,401	5,491	5,491	-	-	7,022	8,897	-	-	-	-	1,144,531	50,361	-
4b.1.4.2	Auxiliary Building	205	105	8	9	17	18	-	138	499	499	-	-	866	322	-	-	-	-	66,374	5,241	-
4b.1.4.3	Radwaste/Service Building	134	42	6	6	6	15	-	84	293	293	-	-	322	278	-	-	-	-	40,041	2,960	-
4b.1.4.4	Refueling Water Storage Tank	315	366	4	5	22	6	-	255	973	973	-	-	1,146	87	-	-	-	-	54,853	11,906	-
4b.1.4.5	Fuel Handling Building	904	1,006	14	17	59	26	-	723	2,749	2,749	-	-	3,097	411	-	-	-	-	165,835	33,340	-
4b.1.4	Totals	3,306	2,755	209	229	238	669	-	2,600	10,006	10,006	-	-	12,453	9,994	-	-	-	-	1,471,635	103,808	-
4b.1	Subtotal Period 4b Activity Costs	4,296	23,483	1,052	973	2,748	2,579	-	8,875	44,007	38,811	-	-	5,196	143,899	28,597	-	-	-	8,431,736	458,788	-
Period 4b Additional Costs																						
4b.2.1	License Termination Survey Planning	-	-	-	-	-	-	940	282	1,222	1,222	-	-	-	-	-	-	-	-	-	-	6,240
4b.2.2	ISFSI License Termination	-	33	0	23	-	89	626	128	899	-	899	-	-	1,689	-	-	-	-	142,287	1,585	1,280
4b.2	Subtotal Period 4b Additional Costs	-	33	0	23	-	89	1,566	410	2,122	1,222	899	-	-	1,689	-	-	-	-	142,287	1,585	7,520
Period 4b Collateral Costs																						
4b.3.1	Process liquid waste	228	-	100	460	-	449	-	305	1,542	1,542	-	-	-	1,614	-	-	-	-	96,845	315	-
4b.3.2	Small tool allowance	-	431	-	-	-	-	-	65	495	495	-	-	-	-	-	-	-	-	-	-	-
4b.3.3	Decommissioning Equipment Disposition	-	-	119	34	127	40	-	46	365	365	-	-	6,000	373	-	-	-	-	303,507	88	-

Table D-2
Byron Nuclear Power Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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.3	Subtotal Period 4b Collateral Costs	228	431	220	493	127	489	-	416	2,403	2,403	-	-	6,000	1,988	-	-	-	400,352	403	-
Period 4b	Period-Dependent Costs																				
4b.4.1	Decon supplies	851	-	-	-	-	-	-	213	1,064	1,064	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	886	89	975	975	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	1,322	132	1,455	1,455	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	2,835	-	-	-	-	-	709	3,543	3,543	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	4,581	-	-	-	-	-	687	5,269	5,269	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	19	7	-	367	-	95	488	488	-	-	6,584	-	-	-	-	131,682	30	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	1,827	274	2,101	2,101	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	1,193	119	1,312	1,312	-	-	-	-	-	-	-	-	-	-
4b.4.9	Site O&M Costs	-	-	-	-	-	-	331	50	380	380	-	-	-	-	-	-	-	-	-	-
4b.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	1,014	152	1,166	1,166	-	-	-	-	-	-	-	-	-	-
4b.4.11	Security Staff Cost	-	-	-	-	-	-	7,432	1,115	8,546	8,546	-	-	-	-	-	-	-	-	-	172,500
4b.4.12	DOC Staff Cost	-	-	-	-	-	-	29,760	4,464	34,224	34,224	-	-	-	-	-	-	-	-	-	369,840
4b.4.13	Utility Staff Cost	-	-	-	-	-	-	48,980	7,347	56,327	56,327	-	-	-	-	-	-	-	-	-	651,360
4b.4	Subtotal Period 4b Period-Dependent Costs	851	7,416	19	7	-	367	92,744	15,445	116,850	116,850	-	-	6,584	-	-	-	-	131,682	30	1,193,700
4b.0	TOTAL PERIOD 4b COST	5,375	31,363	1,291	1,496	2,875	3,524	94,311	25,146	165,381	159,286	899	5,196	149,899	38,858	-	-	-	9,106,056	460,806	1,201,220
PERIOD 4e - License Termination																					
Period 4e	Direct Decommissioning Activities																				
4e.1.1	ORISE confirmatory survey	-	-	-	-	-	-	151	45	197	197	-	-	-	-	-	-	-	-	-	-
4e.1.2	Terminate license	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
4e.1	Subtotal Period 4e Activity Costs	-	-	-	-	-	-	151	45	197	197	-	-	-	-	-	-	-	-	-	-
Period 4e	Additional Costs																				
4e.2.1	License Termination Survey	-	-	-	-	-	-	7,473	2,242	9,716	9,716	-	-	-	-	-	-	-	-	128,636	3,120
4e.2	Subtotal Period 4e Additional Costs	-	-	-	-	-	-	7,473	2,242	9,716	9,716	-	-	-	-	-	-	-	-	128,636	3,120
Period 4e	Collateral Costs																				
4e.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,130	169	1,299	1,299	-	-	-	-	-	-	-	-	-	-
4e.3	Subtotal Period 4e Collateral Costs	-	-	-	-	-	-	1,130	169	1,299	1,299	-	-	-	-	-	-	-	-	-	-
Period 4e	Period-Dependent Costs																				
4e.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4e.4.2	Property taxes	-	-	-	-	-	-	376	38	414	414	-	-	-	-	-	-	-	-	-	-
4e.4.3	Health physics supplies	-	738	-	-	-	-	-	185	923	923	-	-	-	-	-	-	-	-	-	-
4e.4.4	Disposal of DAW generated	-	-	1	0	-	19	-	5	25	25	-	-	335	-	-	-	-	6,698	2	-
4e.4.5	Plant energy budget	-	-	-	-	-	-	139	21	160	160	-	-	-	-	-	-	-	-	-	-
4e.4.6	NRC Fees	-	-	-	-	-	-	355	35	390	390	-	-	-	-	-	-	-	-	-	-
4e.4.7	Site O&M Costs	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-
4e.4.8	Security Staff Cost	-	-	-	-	-	-	532	80	612	612	-	-	-	-	-	-	-	-	-	11,786
4e.4.9	DOC Staff Cost	-	-	-	-	-	-	3,801	570	4,371	4,371	-	-	-	-	-	-	-	-	-	46,750
4e.4.10	Utility Staff Cost	-	-	-	-	-	-	4,551	683	5,234	5,234	-	-	-	-	-	-	-	-	-	56,964
4e.4	Subtotal Period 4e Period-Dependent Costs	-	738	1	0	-	19	9,847	1,630	12,235	12,235	-	-	335	-	-	-	-	6,698	2	115,500
4e.0	TOTAL PERIOD 4e COST	-	738	1	0	-	19	18,602	4,087	23,447	23,447	-	-	-	335	-	-	-	6,698	128,638	118,620
PERIOD 4 TOTALS		5,874	59,132	8,652	5,738	4,277	29,310	162,099	55,279	330,361	318,834	899	10,628	225,587	80,539	3,130	459	505	16,909,030	872,445	1,952,450

Table D-2
Byron Nuclear Power Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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	-	6,217	-	-	-	-	-	933	7,149	-	-	7,149	-	-	-	-	-	-	-	69,541	-
5b.1.1.2	Aux Feedwater-Steam Tunnel/Penetr. Area	-	644	-	-	-	-	-	97	741	-	-	741	-	-	-	-	-	-	-	5,185	-
5b.1.1.3	Auxiliary Building	-	5,417	-	-	-	-	-	813	6,230	-	-	6,230	-	-	-	-	-	-	-	62,063	-
5b.1.1.4	Berms, Settling Ponds, and Drying Beds	-	130	-	-	-	-	-	19	149	-	-	149	-	-	-	-	-	-	-	1,631	-
5b.1.1.5	Circulating Water Pumphouse	-	931	-	-	-	-	-	140	1,071	-	-	1,071	-	-	-	-	-	-	-	11,861	-
5b.1.1.6	Essential Service Cooling Tower	-	427	-	-	-	-	-	64	491	-	-	491	-	-	-	-	-	-	-	5,067	-
5b.1.1.7	Make-up Demineralizer Area	-	1,558	-	-	-	-	-	234	1,792	-	-	1,792	-	-	-	-	-	-	-	20,770	-
5b.1.1.8	Miscellaneous Site Structures	-	1,649	-	-	-	-	-	247	1,897	-	-	1,897	-	-	-	-	-	-	-	20,544	-
5b.1.1.9	Radwaste/Service Building	-	3,579	-	-	-	-	-	537	4,116	-	-	4,116	-	-	-	-	-	-	-	45,688	-
5b.1.1.10	Receiving Building	-	166	-	-	-	-	-	25	190	-	-	190	-	-	-	-	-	-	-	2,293	-
5b.1.1.11	Refueling Water Storage Tank	-	936	-	-	-	-	-	140	1,077	-	-	1,077	-	-	-	-	-	-	-	11,688	-
5b.1.1.12	River Screen House	-	524	-	-	-	-	-	79	603	-	-	603	-	-	-	-	-	-	-	5,869	-
5b.1.1.13	Security Modifications	-	975	-	-	-	-	-	146	1,121	-	-	1,121	-	-	-	-	-	-	-	8,636	-
5b.1.1.14	Turbine Building	-	5,246	-	-	-	-	-	787	6,033	-	-	6,033	-	-	-	-	-	-	-	70,347	-
5b.1.1.15	Turbine Pedestal	-	1,250	-	-	-	-	-	187	1,437	-	-	1,437	-	-	-	-	-	-	-	12,628	-
5b.1.1.16	Yard Inventory	-	1,876	-	-	-	-	-	281	2,158	-	-	2,158	-	-	-	-	-	-	-	20,610	-
5b.1.1.17	Fuel Handling Building	-	2,781	-	-	-	-	-	417	3,198	-	-	3,198	-	-	-	-	-	-	-	33,246	-
5b.1.1	Totals	-	34,307	-	-	-	-	-	5,146	39,453	-	-	39,453	-	-	-	-	-	-	-	407,670	-
Site Closeout Activities																						
5b.1.2	Backfill Site	-	3,308	-	-	-	-	-	496	3,804	-	-	3,804	-	-	-	-	-	-	-	9,059	-
5b.1.3	Grade & landscape site	-	267	-	-	-	-	-	40	307	-	-	307	-	-	-	-	-	-	-	869	-
5b.1.4	Final report to NRC	-	-	-	-	-	-	79	12	91	91	-	-	-	-	-	-	-	-	-	-	668
5b.1	Subtotal Period 5b Activity Costs	-	37,882	-	-	-	-	79	5,694	43,655	91	-	43,565	-	-	-	-	-	-	-	417,598	668
Period 5b Additional Costs																						
5b.2.1	Hyperbolic Cooling Tower	-	2,769	-	-	-	-	-	415	3,184	-	-	3,184	-	-	-	-	-	-	-	18,598	-
5b.2.2	ISFSI Demolition and Site Restoration	-	534	-	-	-	-	24	84	642	-	642	-	-	-	-	-	-	-	-	6,183	80
5b.2.3	Cofferdam Construction and Teardown	-	409	-	-	-	-	-	61	470	-	-	470	-	-	-	-	-	-	-	3,996	-
5b.2.4	Concrete Crushing	-	935	-	-	-	-	5	141	1,081	-	-	1,081	-	-	-	-	-	-	-	4,554	-
5b.2	Subtotal Period 5b Additional Costs	-	4,647	-	-	-	-	29	701	5,377	-	642	4,735	-	-	-	-	-	-	-	33,331	80
Period 5b Collateral Costs																						
5b.3.1	Small tool allowance	-	429	-	-	-	-	-	64	493	-	-	493	-	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	429	-	-	-	-	-	64	493	-	-	493	-	-	-	-	-	-	-	-	-
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	-	6,137	-	-	-	-	-	921	7,057	-	-	7,057	-	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	-	228	34	262	-	262	-	-	-	-	-	-	-	-	-
5b.4.5	Site O&M Cost	-	-	-	-	-	-	310	46	356	-	-	356	-	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	1,582	237	1,819	-	-	1,819	-	-	-	-	-	-	-	-	34,287
5b.4.7	DOC Staff Cost	-	-	-	-	-	-	11,650	1,748	13,398	-	-	13,398	-	-	-	-	-	-	-	-	137,043
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	5,559	834	6,392	-	-	6,392	-	-	-	-	-	-	-	-	67,229
5b.4	Subtotal Period 5b Period-Dependent Costs	-	6,137	-	-	-	-	20,567	3,944	30,648	-	-	30,648	-	-	-	-	-	-	-	-	238,558
5b.0	TOTAL PERIOD 5b COST	-	49,094	-	-	-	-	20,675	10,404	80,173	91	642	79,440	-	-	-	-	-	-	-	450,929	239,306
PERIOD 5 TOTALS																						
		-	49,094	-	-	-	-	20,675	10,404	80,173	91	642	79,440	-	-	-	-	-	-	-	450,929	239,306
TOTAL COST TO DECOMMISSION		12,187	113,757	8,868	6,631	4,277	30,621	423,533	104,806	704,681	500,309	113,664	90,708	225,587	91,625	3,130	459	505	17,255,070	1,414,165	4,750,040	

Table D-2
Byron Nuclear Power Station, Unit 2
Delayed DECON Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site		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 Mt. Lbs.	Utility and Contractor Manhours
						Processing Costs	Disposal Costs								Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet		
	TOTAL COST TO DECOMMISSION WITH 17.47% CONTINGENCY:				\$704,661	thousands of 2009 dollars													
	TOTAL NRC LICENSE TERMINATION COST IS 71% OR:				\$500,309	thousands of 2009 dollars													
	SPENT FUEL MANAGEMENT COST IS 16.13% OR:				\$113,664	thousands of 2009 dollars													
	NON-NUCLEAR DEMOLITION COST IS 12.87% OR:				\$90,708	thousands of 2009 dollars													
	TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):				95,215	cubic feet													
	TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:				505	cubic feet													
	TOTAL SCRAP METAL REMOVED:				74,707	tons													
	TOTAL CRAFT LABOR REQUIREMENTS:				1,414,165	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.
 - - - - - 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 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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	-	-	-	-	-	-	398	119	517	517	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	153	23	176	176	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	236	35	271	271	-	-	-	-	-	-	-	-	-	2,000
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	153	23	176	176	-	-	-	-	-	-	-	-	-	1,300
1a.1.9	Perform detailed rad survey	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	End product description	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	1,000
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	177	27	204	204	-	-	-	-	-	-	-	-	-	1,500
1a.1.13	Define major work sequence	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	1,000
1a.1.14	Perform SER and EA	-	-	-	-	-	-	366	55	421	421	-	-	-	-	-	-	-	-	-	3,100
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	590	89	679	679	-	-	-	-	-	-	-	-	-	5,000
Activity Specifications																					
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	581	87	668	668	-	-	-	-	-	-	-	-	-	4,920
1a.1.16.2	Plant systems	-	-	-	-	-	-	492	74	565	565	-	-	-	-	-	-	-	-	-	4,167
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	368	55	423	423	-	-	-	-	-	-	-	-	-	3,120
1a.1.16.4	Waste management	-	-	-	-	-	-	236	35	271	271	-	-	-	-	-	-	-	-	-	2,000
1a.1.16.5	Facility and site dormancy	-	-	-	-	-	-	236	35	271	271	-	-	-	-	-	-	-	-	-	2,000
1a.1.16	Total	-	-	-	-	-	-	1,913	287	2,199	2,199	-	-	-	-	-	-	-	-	-	16,207
Detailed Work Procedures																					
1a.1.17.1	Plant systems	-	-	-	-	-	-	140	21	161	161	-	-	-	-	-	-	-	-	-	1,183
1a.1.17.2	Facility closeout & dormancy	-	-	-	-	-	-	142	21	163	163	-	-	-	-	-	-	-	-	-	1,200
1a.1.17	Total	-	-	-	-	-	-	281	42	323	323	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	4,633	755	5,388	5,388	-	-	-	-	-	-	-	-	-	35,890
Period 1a Additional Costs																					
1a.2.1	ISFSI Expansion	-	-	-	-	-	-	9,800	1,470	11,270	-	11,270	-	-	-	-	-	-	-	-	-
1a.2	Subtotal Period 1a Additional Costs	-	-	-	-	-	-	9,800	1,470	11,270	-	11,270	-	-	-	-	-	-	-	-	-
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	8,000	1,200	9,200	-	9,200	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	8,000	1,200	9,200	-	9,200	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	769	77	846	846	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	-	-	-	-	-	-	-	104	518	518	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	414	-	-	-	-	-	62	476	476	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	414	-	-	-	-	-	9	45	45	-	-	-	-	-	-	-	-	-	-
1a.4.6	Plant energy budget	-	-	2	1	-	34	-	921	138	1,059	1,059	-	-	610	-	-	-	-	12,190	3
1a.4.7	NRC Fees	-	-	-	-	-	-	706	71	776	776	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	306	31	337	-	337	-	-	-	-	-	-	-	-	-

Table E-1
Byron Nuclear Power Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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 Costs	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-	-	
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	381	57	438	-	438	-	-	-	-	-	-	-	-	-	-	
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	44	7	51	-	51	-	-	-	-	-	-	-	-	-	-	
1a.4.12	Security Staff Cost	-	-	-	-	-	-	470	71	541	-	541	-	-	-	-	-	-	-	-	-	12,264	
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	31,082	4,662	35,745	-	35,745	-	-	-	-	-	-	-	-	-	423,400	
1a.4	Subtotal Period 1a Period-Dependent Costs	-	828	2	1	-	34	34,805	5,306	40,975	40,149	826	-	-	610	-	-	-	-	12,190	3	435,664	
1a.0	TOTAL PERIOD 1a COST	-	828	2	1	-	34	57,238	8,731	66,833	45,537	21,296	-	-	610	-	-	-	-	12,190	3	471,554	
PERIOD 1b - SAFSTOR Limited DECON Activities																							
Period 1b Direct Decommissioning Activities																							
Decontamination of Site Buildings																							
1b.1.1.1	Reactor	1,924	-	-	-	-	-	-	962	2,886	2,886	-	-	-	-	-	-	-	-	-	-	33,093	-
1b.1.1.2	Auxiliary Building	191	-	-	-	-	-	-	95	286	286	-	-	-	-	-	-	-	-	-	-	3,289	-
1b.1.1.3	Refueling Water Storage Tank	314	-	-	-	-	-	-	157	471	471	-	-	-	-	-	-	-	-	-	-	5,322	-
1b.1.1	Totals	2,429	-	-	-	-	-	-	1,214	3,643	3,643	-	-	-	-	-	-	-	-	-	-	41,705	-
1b.1	Subtotal Period 1b Activity Costs	2,429	-	-	-	-	-	-	1,214	3,643	3,643	-	-	-	-	-	-	-	-	-	-	41,705	-
Period 1b Collateral Costs																							
1b.3.1	Decon equipment	797	-	-	-	-	-	-	120	917	917	-	-	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process liquid waste	184	-	78	357	-	349	-	241	1,210	1,210	-	-	-	1,255	-	-	-	-	-	75,307	245	-
1b.3.3	Small tool allowance	-	39	-	-	-	-	-	6	44	44	-	-	-	-	-	-	-	-	-	-	-	-
1b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,000	300	2,300	-	2,300	-	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	982	39	78	357	-	349	2,000	666	4,472	2,172	2,300	-	-	1,255	-	-	-	-	-	75,307	245	-
Period 1b Period-Dependent Costs																							
1b.4.1	Decon supplies	561	-	-	-	-	-	-	140	702	702	-	-	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	192	19	211	211	-	-	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	2,452	245	2,697	2,697	-	-	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	264	-	-	-	-	-	66	331	331	-	-	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	103	-	-	-	-	-	15	119	119	-	-	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	1	1	-	29	-	7	38	38	-	-	-	517	-	-	-	-	-	10,338	2	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	229	34	264	264	-	-	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	176	18	194	194	-	-	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	76	8	84	-	84	-	-	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Costs	-	-	-	-	-	-	31	5	36	36	-	-	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	95	14	109	-	109	-	-	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	11	2	13	-	13	-	-	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	117	18	135	135	-	-	-	-	-	-	-	-	-	-	-	-
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	7,749	1,162	8,912	8,912	-	-	-	-	-	-	-	-	-	-	-	3,058
1b.4	Subtotal Period 1b Period-Dependent Costs	561	368	1	1	-	29	11,129	1,754	13,842	13,637	206	-	-	517	-	-	-	-	-	10,338	2	105,560
1b.0	TOTAL PERIOD 1b COST	3,972	406	79	358	-	378	13,129	3,635	21,957	19,451	2,506	-	-	1,772	-	-	-	-	85,645	41,952	108,618	-
PERIOD 1c - Preparations for SAFSTOR Dormancy																							
Period 1c Direct Decommissioning Activities																							
1c.1.1	Prepare support equipment for storage	-	431	-	-	-	-	-	65	496	496	-	-	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	42	-	-	-	-	-	6	48	48	-	-	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	-	-	13,416	-
1c.1.4	Secure building accesses	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-	-
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	69	10	79	79	-	-	-	-	-	-	-	-	-	-	-	583

Table E-1
Byron Nuclear Power Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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				
1c.1	Subtotal Period 1c Activity Costs	-	473	-	-	-	-	802	301	1,575	1,575	-	-	-	-	-	-	-	-	17,116	583	
Period 1c Collateral Costs																						
1c.3.1	Process liquid waste	150	-	64	292	-	285	-	197	988	988	-	-	-	-	-	-	-	-	61,469	200	-
1c.3.2	Small tool allowance	-	4	-	-	-	-	-	1	4	4	-	-	-	-	-	-	-	-	-	-	-
1c.3.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,000	300	2,300	-	2,300	-	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	150	4	64	292	-	285	2,000	497	3,292	992	2,300	-	-	-	-	-	-	-	61,469	200	-
Period 1c Period-Dependent Costs																						
1c.4.1	Insurance	-	-	-	-	-	-	192	19	211	211	-	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	2,452	245	2,697	2,697	-	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	145	-	-	-	-	-	36	181	181	-	-	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	103	-	-	-	-	-	15	119	119	-	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	0	0	-	6	-	2	8	8	-	-	-	107	-	-	-	-	2,132	0	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	229	34	264	264	-	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	176	18	194	194	-	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	76	8	84	-	84	-	-	-	-	-	-	-	-	-	-
1c.4.9	Site O&M Costs	-	-	-	-	-	-	31	5	36	36	-	-	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	95	14	109	-	109	-	-	-	-	-	-	-	-	-	-
1c.4.11	ISFSI Operating Costs	-	-	-	-	-	-	11	2	13	-	13	-	-	-	-	-	-	-	-	-	-
1c.4.12	Security Staff Cost	-	-	-	-	-	-	117	18	135	135	-	-	-	-	-	-	-	-	-	-	3,058
1c.4.13	Utility Staff Cost	-	-	-	-	-	-	2,147	322	2,468	2,468	-	-	-	-	-	-	-	-	-	-	27,040
1c.4	Subtotal Period 1c Period-Dependent Costs	-	248	0	0	-	6	5,526	737	6,518	6,312	206	-	-	107	-	-	-	-	2,132	0	30,098
1c.0	TOTAL PERIOD 1c COST	150	724	64	292	-	291	8,328	1,536	11,385	8,879	2,506	-	-	1,131	-	-	-	-	63,601	17,316	30,681
PERIOD 1 TOTALS		4,122	1,958	145	650	-	703	78,694	13,901	100,175	73,868	26,308	-	-	3,513	-	-	-	-	161,436	59,271	610,852
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	-	-	-	-	-	-	17	3	20	20	-	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	503	126	629	629	-	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	520	128	649	649	-	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																						
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	30,000	4,500	34,500	-	34,500	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	30,000	4,500	34,500	-	34,500	-	-	-	-	-	-	-	-	-	-
Period 2a Period-Dependent Costs																						
2a.4.1	Insurance	-	-	-	-	-	-	1,341	134	1,475	1,291	183	-	-	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	11,097	1,110	12,207	2,200	10,007	-	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	324	-	-	-	-	-	81	405	405	-	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	4	2	-	86	-	22	114	114	-	-	1,540	-	-	-	-	-	30,799	7	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	737	111	847	424	424	-	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	807	40	847	887	-	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	400	40	440	-	440	-	-	-	-	-	-	-	-	-	-
2a.4.8	Site O&M Costs	-	-	-	-	-	-	500	75	575	575	-	-	-	-	-	-	-	-	-	-	-
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	1,526	229	1,755	-	1,755	-	-	-	-	-	-	-	-	-	-
2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	176	26	202	-	202	-	-	-	-	-	-	-	-	-	-
2a.4.11	Security Staff Cost	-	-	-	-	-	-	1,527	229	1,756	-	1,756	-	-	-	-	-	-	-	-	-	110,285
2a.4.12	Utility Staff Cost	-	-	-	-	-	-	10,654	1,598	12,252	4,321	7,930	-	-	-	-	-	-	-	-	-	136,750
2a.4	Subtotal Period 2a Period-Dependent Costs	-	324	4	2	-	86	28,764	3,735	32,915	10,218	22,698	-	-	1,540	-	-	-	-	30,799	7	247,034

Table E-1
Byron Nuclear Power Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet				
2a.0	TOTAL PERIOD 2a COST	-	324	4	2	-	86	59,284	8,364	68,064	10,866	57,198	-	-	1,540	-	-	-	30,799	7	247,034
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	-	-	-	-	-	-	54	8	63	63	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	1,593	398	1,992	1,992	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	1,648	407	2,054	2,054	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	7,875	1,181	9,056	-	9,056	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	7,875	1,181	9,056	-	9,056	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	3,840	384	4,224	4,090	134	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	6,334	633	6,968	6,968	-	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	964	-	-	-	-	-	241	1,205	1,205	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	14	5	-	266	-	69	353	353	-	-	4,765	-	-	-	-	95,304	22	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	1,167	175	1,342	1,342	-	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	2,554	255	2,810	2,810	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	1,267	127	1,394	-	1,394	-	-	-	-	-	-	-	-	-
2b.4.8	Site O&M Costs	-	-	-	-	-	-	1,583	238	1,821	1,821	-	-	-	-	-	-	-	-	-	-
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	557	84	641	-	641	-	-	-	-	-	-	-	-	-
2b.4.10	Security Staff Cost	-	-	-	-	-	-	16,113	2,417	18,530	11,529	7,000	-	-	-	-	-	-	-	-	356,940
2b.4.11	Utility Staff Cost	-	-	-	-	-	-	17,249	2,587	19,837	13,686	6,151	-	-	-	-	-	-	-	-	239,282
2b.4	Subtotal Period 2b Period-Dependent Costs	-	964	14	5	-	266	50,665	7,210	59,123	43,804	15,320	-	4,765	-	-	-	-	95,304	22	596,222
2b.0	TOTAL PERIOD 2b COST	-	964	14	5	-	266	60,188	8,797	70,234	45,858	24,376	-	-	4,765	-	-	-	95,304	22	596,222
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	-	-	-	-	-	-	150	22	172	172	-	-	-	-	-	-	-	-	-	-
2c.1.5	Maintenance supplies	-	-	-	-	-	-	4,381	1,095	5,476	5,476	-	-	-	-	-	-	-	-	-	-
2c.1	Subtotal Period 2c Activity Costs	-	-	-	-	-	-	4,530	1,118	5,648	5,648	-	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	10,221	1,022	11,243	11,243	-	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	17,413	1,741	19,154	19,154	-	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	2,589	-	-	-	-	-	647	3,236	3,236	-	-	-	-	-	-	-	-	-	-
2c.4.4	Disposal of DAW generated	-	-	37	14	-	725	-	187	963	963	-	-	12,988	-	-	-	-	259,756	60	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	3,208	481	3,689	3,689	-	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	6,359	636	6,995	6,995	-	-	-	-	-	-	-	-	-	-
2c.4.7	Site O&M Costs	-	-	-	-	-	-	4,353	653	5,006	5,006	-	-	-	-	-	-	-	-	-	-
2c.4.8	Security Staff Cost	-	-	-	-	-	-	27,561	4,134	31,695	31,695	-	-	-	-	-	-	-	-	-	545,143
2c.4.9	Utility Staff Cost	-	-	-	-	-	-	32,716	4,907	37,623	37,623	-	-	-	-	-	-	-	-	-	463,735
2c.4	Subtotal Period 2c Period-Dependent Costs	-	2,589	37	14	-	725	101,831	14,409	119,606	119,606	-	-	12,988	-	-	-	-	259,756	60	1,008,878
2c.0	TOTAL PERIOD 2c COST	-	2,589	37	14	-	725	106,361	15,527	125,253	125,253	-	-	-	12,988	-	-	-	259,756	60	1,008,878
PERIOD 2 TOTALS																					
		-	3,877	55	21	-	1,077	225,834	32,688	263,552	181,978	81,574	-	-	19,293	-	-	-	385,859	89	1,852,134

Table E-1
Byron Nuclear Power Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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	-	-	-	-	-	-	153	23	176	176	-	-	-	-	-	-	-	-	-	1,300
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	543	81	624	624	-	-	-	-	-	-	-	-	-	4,600
3a.1.3	Perform detailed rad survey	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
3a.1.4	End product description	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	1,000
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	153	23	176	176	-	-	-	-	-	-	-	-	-	1,300
3a.1.6	Define major work sequence	-	-	-	-	-	-	885	133	1,018	1,018	-	-	-	-	-	-	-	-	-	7,500
3a.1.7	Perform SER and EA	-	-	-	-	-	-	366	55	421	421	-	-	-	-	-	-	-	-	-	3,100
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	590	89	679	679	-	-	-	-	-	-	-	-	-	5,000
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	483	73	556	556	-	-	-	-	-	-	-	-	-	4,096
3a.1.10	Receive NRC approval of termination plan	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	870	130	1,000	900	-	100	-	-	-	-	-	-	-	7,370
3a.1.11.2	Plant systems	-	-	-	-	-	-	492	74	565	509	-	57	-	-	-	-	-	-	-	4,167
3a.1.11.3	Reactor internals	-	-	-	-	-	-	838	126	964	964	-	-	-	-	-	-	-	-	-	7,100
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	767	115	882	882	-	-	-	-	-	-	-	-	-	6,500
3a.1.11.5	Biological shield	-	-	-	-	-	-	59	9	68	68	-	-	-	-	-	-	-	-	-	500
3a.1.11.6	Steam generators	-	-	-	-	-	-	368	55	423	423	-	-	-	-	-	-	-	-	-	3,120
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	189	28	217	109	-	109	-	-	-	-	-	-	-	1,600
3a.1.11.8	Main Turbine	-	-	-	-	-	-	47	7	54	-	-	54	-	-	-	-	-	-	-	400
3a.1.11.9	Main Condensers	-	-	-	-	-	-	47	7	54	-	-	54	-	-	-	-	-	-	-	400
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	368	55	423	212	-	212	-	-	-	-	-	-	-	3,120
3a.1.11.11	Waste management	-	-	-	-	-	-	543	81	624	624	-	-	-	-	-	-	-	-	-	4,600
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-	106	16	122	61	-	61	-	-	-	-	-	-	-	900
3a.1.11	Total	-	-	-	-	-	-	4,694	704	5,398	4,752	-	646	-	-	-	-	-	-	-	39,777
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	283	42	326	326	-	-	-	-	-	-	-	-	-	2,400
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	2,800	420	3,220	3,220	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	165	25	190	190	-	-	-	-	-	-	-	-	-	1,400
3a.1.15	Rigging/Cont. Cntrl Envips/tooling/etc.	-	-	-	-	-	-	2,200	330	2,530	2,530	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	145	22	167	167	-	-	-	-	-	-	-	-	-	1,230
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	13,580	2,037	15,617	14,970	-	646	-	-	-	-	-	-	-	72,703
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	293	29	323	323	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	500	50	550	550	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	-	-	-	-	-	-	91	453	453	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	362	-	-	-	-	-	62	476	476	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	1	1	-	-	-	-	7	38	-	-	-	-	-	-	-	-	-	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	921	138	1,059	1,059	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	249	25	274	274	-	-	-	-	-	-	-	-	-	-
3a.4.8	Site O&M Costs	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-
3a.4.9	Security Staff Cost	-	-	-	-	-	-	2,882	432	3,315	3,315	-	-	-	-	-	-	-	-	-	65,179
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	19,293	2,894	22,187	22,187	-	-	-	-	-	-	-	-	-	258,629
3a.4	Subtotal Period 3a Period-Dependent Costs	-	776	1	1	-	29	24,263	3,747	28,816	28,816	-	-	-	514	-	-	-	10,287	2	323,807
3a.0	TOTAL PERIOD 3a COST	-	776	1	1	-	29	37,842	5,784	44,433	43,787	-	646	-	514	-	-	-	10,287	2	396,510

Table E-1
Byron Nuclear Power Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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 - Decommissioning Preparations																						
Period 3b Direct Decommissioning Activities																						
Detailed Work Procedures																						
3b.1.1.1	Plant systems	-	-	-	-	-	-	559	84	642	578	-	64	-	-	-	-	-	-	-	-	4,733
3b.1.1.2	Reactor internals	-	-	-	-	-	-	295	44	339	339	-	-	-	-	-	-	-	-	-	-	2,500
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	159	24	183	46	-	137	-	-	-	-	-	-	-	-	1,350
3b.1.1.4	CRD cooling assembly	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.5	CRD housings & ICI tubes	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.6	Incore instrumentation	-	-	-	-	-	-	118	18	136	136	-	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	428	64	493	493	-	-	-	-	-	-	-	-	-	-	3,630
3b.1.1.8	Facility closeout	-	-	-	-	-	-	142	21	163	81	-	81	-	-	-	-	-	-	-	-	1,200
3b.1.1.9	Missile shields	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	-	450
3b.1.1.10	Biological shield	-	-	-	-	-	-	142	21	163	163	-	-	-	-	-	-	-	-	-	-	1,200
3b.1.1.11	Steam generators	-	-	-	-	-	-	543	81	624	624	-	-	-	-	-	-	-	-	-	-	4,600
3b.1.1.12	Reinforced concrete	-	-	-	-	-	-	118	18	136	68	-	68	-	-	-	-	-	-	-	-	1,000
3b.1.1.13	Main Turbine	-	-	-	-	-	-	184	28	212	-	-	212	-	-	-	-	-	-	-	-	1,560
3b.1.1.14	Main Condensers	-	-	-	-	-	-	184	28	212	-	-	212	-	-	-	-	-	-	-	-	1,560
3b.1.1.15	Auxiliary building	-	-	-	-	-	-	322	48	370	333	-	37	-	-	-	-	-	-	-	-	2,730
3b.1.1.16	Reactor building	-	-	-	-	-	-	322	48	370	333	-	37	-	-	-	-	-	-	-	-	2,730
3b.1.1	Total	-	-	-	-	-	-	3,805	571	4,376	3,527	-	848	-	-	-	-	-	-	-	-	32,243
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	3,805	571	4,376	3,527	-	848	-	-	-	-	-	-	-	-	32,243
Period 3b Additional Costs																						
3b.2.1	Site Characterization	-	-	-	-	-	-	6,341	1,902	8,243	8,243	-	-	-	-	-	-	-	-	-	30,500	10,852
3b.2	Subtotal Period 3b Additional Costs	-	-	-	-	-	-	6,341	1,902	8,243	8,243	-	-	-	-	-	-	-	-	-	30,500	10,852
Period 3b Collateral Costs																						
3b.3.1	Decon equipment	797	-	-	-	-	-	-	120	917	917	-	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,130	169	1,299	1,299	-	-	-	-	-	-	-	-	-	-	-
3b.3.3	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	797	1,100	-	-	-	-	1,130	454	3,482	3,482	-	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																						
3b.4.1	Decon supplies	24	-	-	-	-	-	-	6	31	31	-	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	168	17	185	185	-	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	251	25	276	276	-	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	-	-	-	-	-	-	50	250	250	-	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	200	-	-	-	-	-	31	238	238	-	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	1	0	-	16	-	4	22	22	-	-	-	-	-	-	-	-	-	5,834	1
3b.4.7	Plant energy budget	-	-	-	-	-	-	462	69	531	531	-	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	125	12	137	137	-	-	-	-	-	-	-	-	-	-	-
3b.4.9	Site O&M Costs	-	-	-	-	-	-	63	9	72	72	-	-	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	1,445	217	1,662	1,662	-	-	-	-	-	-	-	-	-	-	32,679
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	4,781	717	5,498	5,498	-	-	-	-	-	-	-	-	-	-	58,560
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	9,673	1,451	11,124	11,124	-	-	-	-	-	-	-	-	-	-	129,669
3b.4	Subtotal Period 3b Period-Dependent Costs	24	408	1	0	-	16	16,967	2,609	20,025	20,025	-	-	-	-	-	-	-	-	5,834	1	220,907
3b.0	TOTAL PERIOD 3b COST	822	1,508	1	0	-	16	28,242	5,536	36,125	35,277	-	848	-	292	-	-	-	-	5,834	30,501	264,002
PERIOD 3 TOTALS		822	2,283	2	1	-	45	66,084	11,321	80,558	79,063	-	1,495	-	806	-	-	-	-	16,121	30,504	660,512

Table E-1
Byron Nuclear Power Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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	40	138	31	20	44	165	-	109	547	547	-	-	838	838	-	-	-	194,479	3,153	-
4a.1.1.2	Pressurizer Relief Tank	7	26	6	4	9	30	-	20	102	102	-	-	165	165	-	-	-	36,553	596	-
4a.1.1.3	Reactor Coolant Pumps & Motors	25	94	53	168	-	1,272	-	384	1,996	1,996	-	-	-	4,796	-	-	-	780,540	2,726	80
4a.1.1.4	Pressurizer	11	59	345	94	-	412	-	172	1,093	1,093	-	-	-	3,033	-	-	-	252,826	1,527	750
4a.1.1.5	Steam Generators	85	4,096	2,098	2,506	667	4,349	-	2,839	16,640	16,640	-	-	45,513	17,359	-	-	-	3,811,289	20,508	1,500
4a.1.1.6	Retired Steam Generator Units	-	-	1,426	2,644	580	3,416	-	1,480	9,546	9,546	-	-	39,289	14,064	-	-	-	3,041,432	10,800	1,500
4a.1.1.7	CRDMs/Clis/Service Structure Removal	35	89	191	32	13	63	-	81	505	505	-	-	753	2,947	-	-	-	81,666	2,134	-
4a.1.1.8	Reactor Vessel Internals	67	2,001	3,441	515	-	3,709	203	4,409	14,346	14,346	-	-	-	2,211	376	470	-	325,254	23,067	1,055
4a.1.1.9	Vessel & Internals GTCC Disposal	-	-	-	-	-	11,665	-	1,750	13,414	13,414	-	-	-	-	-	-	505	104,146	-	-
4a.1.1.10	Reactor Vessel	81	3,970	1,280	655	-	2,976	203	5,020	14,184	14,184	-	-	-	6,672	2,254	-	-	979,179	23,067	1,055
4a.1.1	Totals	351	10,473	8,871	6,636	1,312	28,058	406	16,264	72,372	72,372	-	-	86,558	52,085	2,629	470	505	9,607,363	87,577	5,939
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	510	256	32	214	-	-	190	1,201	1,201	-	-	5,355	-	-	-	-	455,213	9,016	-
4a.1.3	Main Condensers	-	1,042	133	27	150	-	-	300	1,653	1,653	-	-	7,111	-	-	-	-	320,000	18,250	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor	-	1,076	-	-	-	-	-	161	1,237	1,237	-	-	-	-	-	-	-	-	12,130	-
4a.1.4.2	Auxiliary Building	-	594	-	-	-	-	-	89	683	683	-	-	-	-	-	-	-	-	6,810	-
4a.1.4.3	Refueling Water Storage Tank	-	104	-	-	-	-	-	16	120	120	-	-	-	-	-	-	-	-	1,299	-
4a.1.4	Totals	-	1,773	-	-	-	-	-	266	2,039	2,039	-	-	-	-	-	-	-	-	20,238	-
Disposal of Plant Systems																					
4a.1.5.1	Auxiliary Feedwater	-	69	-	-	-	-	-	10	79	-	-	79	-	-	-	-	-	-	1,244	-
4a.1.5.2	Auxiliary Steam	-	61	-	-	-	-	-	9	71	-	-	71	-	-	-	-	-	-	1,126	-
4a.1.5.3	Auxiliary Steam RCA	-	122	2	3	16	-	-	34	176	176	-	-	835	-	-	-	-	33,900	1,935	-
4a.1.5.4	Boric Acid Processing	-	444	32	31	86	99	-	157	850	850	-	-	4,531	1,193	-	-	-	268,274	7,890	-
4a.1.5.5	CO2 & H2	-	23	-	-	-	-	-	3	26	-	-	26	-	-	-	-	-	-	419	-
4a.1.5.6	CO2 & H2 RCA	-	35	0	1	3	-	-	9	48	48	-	-	164	-	-	-	-	6,658	572	-
4a.1.5.7	Chemical Feed	-	51	-	-	-	-	-	8	58	-	-	58	-	-	-	-	-	-	934	-
4a.1.5.8	Chilled Water	-	63	-	-	-	-	-	9	72	-	-	72	-	-	-	-	-	-	1,142	-
4a.1.5.9	Circulating Water	-	279	-	-	-	-	-	42	321	-	-	321	-	-	-	-	-	-	5,150	-
4a.1.5.10	Condensate	-	331	-	-	-	-	-	50	381	-	-	381	-	-	-	-	-	-	6,023	-
4a.1.5.11	Condensate Booster	-	299	-	-	-	-	-	45	344	-	-	344	-	-	-	-	-	-	5,428	-
4a.1.5.12	Condensate Cleanup	-	58	-	-	-	-	-	9	67	-	-	67	-	-	-	-	-	-	1,060	-
4a.1.5.13	Containment Spray	-	233	7	12	69	-	-	71	392	392	-	-	3,629	-	-	-	-	147,367	3,729	-
4a.1.5.14	Diesel Fuel Oil	-	90	-	-	-	-	-	13	103	-	-	103	-	-	-	-	-	-	1,615	-
4a.1.5.15	Essential Service Water	-	208	-	-	-	-	-	31	239	-	-	239	-	-	-	-	-	-	3,837	-
4a.1.5.16	Extraction Steam	-	167	-	-	-	-	-	25	192	-	-	192	-	-	-	-	-	-	3,089	-
4a.1.5.17	Feedwater	-	278	-	-	-	-	-	42	320	-	-	320	-	-	-	-	-	-	5,142	-
4a.1.5.18	Feedwater Drains	-	668	-	-	-	-	-	100	768	-	-	768	-	-	-	-	-	-	12,366	-
4a.1.5.19	Gland Steam	-	50	-	-	-	-	-	8	58	-	-	58	-	-	-	-	-	-	932	-
4a.1.5.20	Gland Water	-	44	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	828	-
4a.1.5.21	Main Steam	-	284	-	-	-	-	-	43	326	-	-	326	-	-	-	-	-	-	5,216	-
4a.1.5.22	Main Steam RCA	-	46	1	3	15	-	-	14	79	79	-	-	760	-	-	-	-	30,853	739	-
4a.1.5.23	Nitrogen	-	3	0	0	1	-	-	1	5	5	-	-	52	-	-	-	-	2,102	49	-
4a.1.5.24	Non-Essential Service Water	-	157	-	-	-	-	-	23	180	-	-	180	-	-	-	-	-	-	2,916	-
4a.1.5.25	Non-Essential Service Water RCA	-	86	3	5	28	-	-	27	148	148	-	-	1,462	-	-	-	-	59,354	1,295	-
4a.1.5.26	Off Gas	-	512	10	19	106	-	-	148	795	795	-	-	5,572	-	-	-	-	226,266	8,494	-
4a.1.5.27	Process Radiation Monitoring	-	37	0	0	2	-	-	10	49	49	-	-	113	-	-	-	-	4,587	666	-
4a.1.5.28	Process Sampling	-	107	1	2	12	-	-	29	151	151	-	-	616	-	-	-	-	25,019	1,927	-
4a.1.5.29	Station Air	-	27	-	-	-	-	-	4	31	-	-	31	-	-	-	-	-	-	498	-

Table E-1
Byron Nuclear Power Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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	Station Heating	-	96	-	-	-	-	-	14	111	-	-	111	-	-	-	-	-	-	-	1,771	-
4a.1.5.31	Switchgear Heat Removal	-	8	-	-	-	-	-	1	9	-	-	9	-	-	-	-	-	-	-	139	-
4a.1.5.32	Turbine Bldg Equip Drains	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	-	17	-
4a.1.5.33	Turbine Generator	-	50	-	-	-	-	-	8	58	-	-	58	-	-	-	-	-	-	-	901	-
4a.1.5.34	Turbine Oil	-	77	-	-	-	-	-	12	88	-	-	88	-	-	-	-	-	-	-	1,399	-
4a.1.5.35	Waste Oil Sumps	-	26	-	-	-	-	-	4	30	-	-	30	-	-	-	-	-	-	-	483	-
4a.1.5	Totals	-	5,090	56	75	338	99	-	1,019	6,678	2,694	-	3,984	17,732	1,193	-	-	-	-	804,381	90,969	-
4a.1.6	Scaffolding in support of decommissioning	-	941	6	1	6	2	-	237	1,194	1,194	-	-	306	19	-	-	-	-	15,459	18,101	-
4a.1	Subtotal Period 4a Activity Costs	351	19,829	9,322	6,771	2,022	28,160	406	18,276	85,137	81,153	-	3,984	117,063	53,297	2,629	470	505	11,202,420	244,150	5,939	-
Period 4a Collateral Costs																						
4a.3.1	Process liquid waste	35	-	17	79	-	77	-	50	258	258	-	-	-	276	-	-	-	-	16,564	54	-
4a.3.2	Small tool allowance	-	209	-	-	-	-	-	31	241	217	-	24	-	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	35	209	17	79	-	77	-	82	498	474	-	24	-	276	-	-	-	-	16,564	54	-
Period 4a Period-Dependent Costs																						
4a.4.1	Decon supplies	63	-	-	-	-	-	-	16	79	79	-	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	437	44	480	480	-	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	652	65	717	645	-	72	-	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	1,465	-	-	-	-	-	366	1,832	1,832	-	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	2,276	-	-	-	-	-	341	2,617	2,617	-	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	9	3	-	175	-	45	232	232	-	-	3,134	-	-	-	-	-	62,685	14	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	1,140	171	1,311	1,311	-	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	858	86	944	944	-	-	-	-	-	-	-	-	-	-	-
4a.4.9	Site O&M Costs	-	-	-	-	-	-	163	24	187	187	-	-	-	-	-	-	-	-	-	-	-
4a.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	500	75	574	574	-	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	2,217	333	2,550	2,550	-	-	-	-	-	-	-	-	-	-	57,773
4a.4.12	DOC Staff Cost	-	-	-	-	-	-	14,773	2,216	16,989	16,989	-	-	-	-	-	-	-	-	-	-	185,558
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	23,931	3,590	27,521	27,521	-	-	-	-	-	-	-	-	-	-	326,264
4a.4	Subtotal Period 4a Period-Dependent Costs	63	3,741	9	3	-	175	44,671	7,372	56,035	55,963	-	72	-	3,134	-	-	-	-	62,685	14	569,595
4a.0	TOTAL PERIOD 4a COST	449	23,780	9,348	6,853	2,022	28,411	45,077	25,730	141,670	137,591	-	4,079	117,063	56,707	2,629	470	505	11,281,670	244,219	575,535	-
PERIOD 4b - Site Decontamination																						
Disposal of Plant Systems																						
4b.1.2.1	Chemical & Volume Control	-	1,000	62	46	33	255	-	332	1,728	1,728	-	-	1,744	2,431	-	-	-	-	287,102	16,313	-
4b.1.2.2	Chilled Water RCA	-	282	8	16	90	-	-	87	484	484	-	-	4,716	-	-	-	-	-	191,536	4,732	-
4b.1.2.3	Component Cooling RCA	-	604	15	29	164	-	-	181	994	994	-	-	8,589	-	-	-	-	-	348,801	9,675	-
4b.1.2.4	Electrical	-	2,682	-	-	-	-	-	402	3,085	-	-	3,085	-	-	-	-	-	-	-	48,490	-
4b.1.2.5	Electrical - Contaminated	-	1,028	12	23	128	-	-	281	1,471	1,471	-	-	6,722	-	-	-	-	-	272,965	17,115	-
4b.1.2.6	Electrical - RCA	-	1,706	32	59	335	-	-	489	2,621	2,621	-	-	17,555	-	-	-	-	-	712,922	29,098	-
4b.1.2.7	Emergency Diesel Generator	-	-	-	-	-	-	-	17	130	-	-	130	-	-	-	-	-	-	-	2,066	-
4b.1.2.8	Essential Service Water RCA	-	271	9	17	99	-	-	86	482	482	-	-	5,177	-	-	-	-	-	210,230	4,418	-
4b.1.2.9	Fire Protection	-	108	-	-	-	-	-	16	124	-	-	124	-	-	-	-	-	-	-	1,984	-
4b.1.2.10	Fire Protection RCA	-	168	2	4	20	-	-	46	240	240	-	-	1,069	-	-	-	-	-	43,397	2,628	-
4b.1.2.11	HVAC-Auxiliary Building	-	445	9	17	96	-	-	129	697	697	-	-	5,054	-	-	-	-	-	205,243	7,162	-
4b.1.2.12	HVAC-Diesel Generator Room	-	38	-	-	-	-	-	5	42	-	-	44	-	-	-	-	-	-	-	682	-
4b.1.2.13	HVAC-Miscellaneous	-	37	-	-	-	-	-	5	42	-	-	42	-	-	-	-	-	-	-	656	-
4b.1.2.14	HVAC-Primary Containment	-	539	19	36	204	-	-	173	970	970	-	-	10,679	-	-	-	-	-	433,695	8,624	-
4b.1.2.15	HVAC-Turbine Building	-	164	-	-	-	-	-	25	188	-	-	188	-	-	-	-	-	-	-	3,177	-
4b.1.2.16	Instrument Air Supply	-	41	-	-	-	-	-	6	47	-	-	47	-	-	-	-	-	-	-	760	-
4b.1.2.17	Instrument Air Supply RCA	-	67	1	1	7	-	-	18	94	94	-	-	366	-	-	-	-	-	14,869	1,073	-
4b.1.2.18	Miscellaneous Drains	-	35	1	1	6	-	-	10	52	52	-	-	312	-	-	-	-	-	12,666	584	-

Table E-1
Byron Nuclear Power Station, Unit 1
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(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet				
Disposal of Plant Systems (continued)																					
4b.1.2.19	Primary Containment Purge	-	247	10	20	112	-	-	82	471	471	-	-	5,850	-	-	-	-	237,590	4,312	-
4b.1.2.20	Primary Water	-	54	1	1	3	4	-	15	79	79	-	-	143	42	-	-	-	9,560	915	-
4b.1.2.21	Radioactive Waste Disposal	-	817	45	39	81	154	-	265	1,400	1,400	-	-	4,235	1,622	-	-	-	302,491	14,169	-
4b.1.2.22	Reactor Building Equipment Drains	-	88	7	5	3	29	-	31	164	164	-	-	183	277	-	-	-	32,048	1,435	-
4b.1.2.23	Reactor Building Floor Drains	-	41	2	2	2	8	-	13	68	68	-	-	130	74	-	-	-	11,914	678	-
4b.1.2.24	Reactor Coolant	-	155	9	6	4	34	-	50	257	257	-	-	208	324	-	-	-	37,451	2,506	-
4b.1.2.25	Residual Heat Removal	-	172	11	12	28	44	-	61	328	328	-	-	1,453	418	-	-	-	96,526	2,924	-
4b.1.2.26	Safety Injection	-	783	37	47	175	103	-	259	1,404	1,404	-	-	9,181	1,028	-	-	-	460,142	13,528	-
4b.1.2.27	Station Air RCA	-	33	0	1	3	-	-	9	46	46	-	-	175	-	-	-	-	7,089	521	-
4b.1.2.28	Station Heating RCA	-	109	2	4	24	-	-	32	171	171	-	-	1,256	-	-	-	-	51,005	1,759	-
4b.1.2.29	Waste Oil Sumps RCA	-	7	0	0	1	-	-	2	10	10	-	-	52	-	-	-	-	2,098	92	-
4b.1.2	Totals	-	11,832	293	386	1,619	632	-	3,128	17,891	14,231	-	3,660	84,848	6,216	-	-	-	3,981,341	202,075	-
4b.1.3	Scaffolding in support of decommissioning	-	1,411	9	2	10	3	-	356	1,791	1,791	-	-	458	29	-	-	-	23,188	27,151	-
Decontamination of Site Buildings																					
4b.1.4.1	Reactor	1,748	1,236	171	191	134	455	-	1,363	5,297	5,297	-	-	7,022	8,433	-	-	-	1,122,399	50,351	-
4b.1.4.2	Auxiliary Building	175	93	6	7	17	13	-	118	428	428	-	-	866	228	-	-	-	57,032	4,547	-
4b.1.4.3	Refueling Water Storage Tank	315	366	4	5	22	6	-	255	973	973	-	-	1,146	87	-	-	-	54,853	11,906	-
4b.1.4	Totals	2,238	1,695	181	203	172	474	-	1,736	6,698	6,698	-	-	9,034	8,748	-	-	-	1,234,285	66,804	-
4b.1	Subtotal Period 4b Activity Costs	2,238	14,938	483	591	1,802	1,109	-	5,220	26,381	22,720	-	3,660	94,341	14,993	-	-	-	5,238,813	296,030	-
Period 4b Additional Costs																					
4b.2.1	License Termination Survey Planning	-	-	-	-	-	-	940	282	1,222	1,222	-	-	-	-	-	-	-	-	-	6,240
4b.2.2	ISFSI License Termination	-	38	1	23	-	90	727	144	1,022	-	1,022	-	-	1,705	-	-	-	142,596	2,873	1,260
4b.2.3	Soil Remediation	-	17	0	52	-	143	-	48	260	260	-	-	-	2,730	-	-	-	207,480	99	-
4b.2	Subtotal Period 4b Additional Costs	-	54	1	75	-	233	1,667	474	2,504	1,482	1,022	-	-	4,435	-	-	-	350,076	2,972	7,520
Period 4b Collateral Costs																					
4b.3.1	Process liquid waste	42	-	21	96	-	94	-	61	313	313	-	-	-	336	-	-	-	20,172	66	-
4b.3.2	Small tool allowance	-	268	-	-	-	-	-	40	309	309	-	-	-	-	-	-	-	-	-	-
4b.3.3	Decommissioning Equipment Disposition	-	-	119	34	127	40	-	46	365	365	-	-	6,000	373	-	-	-	303,507	88	-
4b.3	Subtotal Period 4b Collateral Costs	42	268	140	129	127	133	-	147	987	987	-	-	6,000	710	-	-	-	323,679	154	-
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	657	-	-	-	-	-	-	164	821	821	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	743	74	818	818	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	1,109	111	1,220	1,220	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	1,963	-	-	-	-	-	491	2,454	2,454	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	3,841	-	-	-	-	-	576	4,418	4,418	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	12	5	-	241	-	62	320	320	-	-	-	4,311	-	-	-	86,211	20	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	1,532	230	1,762	1,762	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	1,461	146	1,607	1,607	-	-	-	-	-	-	-	-	-	-
4b.4.9	Site O&M Costs	-	-	-	-	-	-	277	42	319	319	-	-	-	-	-	-	-	-	-	-
4b.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	850	126	978	978	-	-	-	-	-	-	-	-	-	-
4b.4.11	Security Staff Cost	-	-	-	-	-	-	977	147	1,123	1,123	-	-	-	-	-	-	-	-	-	25,457
4b.4.12	DOC Staff Cost	-	-	-	-	-	-	16,451	2,468	18,919	18,919	-	-	-	-	-	-	-	-	-	217,543
4b.4.13	Utility Staff Cost	-	-	-	-	-	-	27,655	4,148	31,803	31,803	-	-	-	-	-	-	-	-	-	388,800
4b.4	Subtotal Period 4b Period-Dependent Costs	657	5,804	12	5	-	241	51,055	8,786	66,560	66,560	-	-	-	4,311	-	-	-	86,211	20	631,800
4b.0	TOTAL PERIOD 4b COST	2,937	21,065	637	800	1,929	1,716	52,722	14,627	96,432	91,750	1,022	3,660	100,341	24,448	-	-	-	5,998,779	299,176	639,320

Table E-1
Byron Nuclear Power Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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 4d - Delay before License Termination																						
Period 4d Period-Dependent Costs																						
4d.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4d.4.2	Property taxes	-	-	-	-	-	-	616	62	678	678	-	-	-	-	-	-	-	-	-	-	
4d.4.3	Health physics supplies	-	92	-	-	-	-	-	23	115	115	-	-	-	-	-	-	-	-	-	-	
4d.4.4	Disposal of DAW generated	-	-	0	0	-	7	-	2	9	9	-	-	-	123	-	-	-	-	2,458	1	
4d.4.5	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4d.4.6	NRC Fees	-	-	-	-	-	-	225	22	247	247	-	-	-	-	-	-	-	-	-	-	
4d.4.7	Site O&M Costs	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	-	
4d.4.8	Utility Staff Cost	-	-	-	-	-	-	1,267	190	1,457	1,457	-	-	-	-	-	-	-	-	-	18,000	
4d.4	Subtotal Period 4d Period-Dependent Costs	-	92	0	0	-	7	2,262	322	2,683	2,683	-	-	-	123	-	-	-	-	2,458	1	18,000
4d.0	TOTAL PERIOD 4d COST	-	92	0	0	-	7	2,262	322	2,683	2,683	-	-	-	123	-	-	-	-	2,458	1	18,000
PERIOD 4e - License Termination																						
Period 4e Direct Decommissioning Activities																						
4e.1.1	ORISE confirmatory survey	-	-	-	-	-	-	151	45	197	197	-	-	-	-	-	-	-	-	-	-	
4e.1.2	Terminate license	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	
4e.1	Subtotal Period 4e Activity Costs	-	-	-	-	-	-	151	45	197	197	-	-	-	-	-	-	-	-	-	-	
Period 4e Additional Costs																						
4e.2.1	License Termination Survey	-	-	-	-	-	-	5,485	1,646	7,131	7,131	-	-	-	-	-	-	-	-	-	91,793	3,120
4e.2	Subtotal Period 4e Additional Costs	-	-	-	-	-	-	5,485	1,646	7,131	7,131	-	-	-	-	-	-	-	-	-	91,793	3,120
Period 4e Collateral Costs																						
4e.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,130	169	1,299	1,299	-	-	-	-	-	-	-	-	-	-	-
4e.3	Subtotal Period 4e Collateral Costs	-	-	-	-	-	-	1,130	169	1,299	1,299	-	-	-	-	-	-	-	-	-	-	-
Period 4e Period-Dependent Costs																						
4e.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4e.4.2	Property taxes	-	-	-	-	-	-	376	38	414	414	-	-	-	-	-	-	-	-	-	-	
4e.4.3	Health physics supplies	-	597	-	-	-	-	-	149	746	746	-	-	-	-	-	-	-	-	-	-	
4e.4.4	Disposal of DAW generated	-	-	1	0	-	19	-	5	25	25	-	-	-	335	-	-	-	-	6,698	2	
4e.4.5	Plant energy budget	-	-	-	-	-	-	139	21	160	160	-	-	-	-	-	-	-	-	-	-	
4e.4.6	NRC Fees	-	-	-	-	-	-	532	53	585	585	-	-	-	-	-	-	-	-	-	-	
4e.4.7	Site O&M Costs	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-	
4e.4.8	Security Staff Cost	-	-	-	-	-	-	544	82	625	625	-	-	-	-	-	-	-	-	-	-	
4e.4.9	DOC Staff Cost	-	-	-	-	-	-	3,801	570	4,371	4,371	-	-	-	-	-	-	-	-	-	46,750	
4e.4.10	Utility Staff Cost	-	-	-	-	-	-	4,551	683	5,234	5,234	-	-	-	-	-	-	-	-	-	56,964	
4e.4	Subtotal Period 4e Period-Dependent Costs	-	597	1	0	-	19	10,036	1,614	12,267	12,267	-	-	-	335	-	-	-	-	6,698	2	115,500
4e.0	TOTAL PERIOD 4e COST	-	597	1	0	-	19	16,803	3,474	20,894	20,894	-	-	-	335	-	-	-	-	6,698	91,795	118,620
PERIOD 4 TOTALS		3,386	45,533	9,986	7,654	3,950	30,152	116,864	44,153	261,679	252,917	1,022	7,740	217,404	81,613	2,629	470	505	17,289,600	635,189	1,351,475	
PERIOD 5b - Site Restoration																						
Period 5b Direct Decommissioning Activities																						
Demolition of Remaining Site Buildings																						
5b.1.1.1	Reactor	-	6,217	-	-	-	-	-	933	7,149	-	-	7,149	-	-	-	-	-	-	-	69,541	-
5b.1.1.2	Auxiliary Building	-	5,342	-	-	-	-	-	801	6,143	-	-	6,143	-	-	-	-	-	-	-	61,287	-
5b.1.1.3	Old Steam Generator Storage Facility	-	417	-	-	-	-	-	63	479	-	-	479	-	-	-	-	-	-	-	4,868	-
5b.1.1.4	Refueling Water Storage Tank	-	936	-	-	-	-	-	140	1,077	-	-	1,077	-	-	-	-	-	-	-	11,688	-
5b.1.1.5	Turbine Building	-	5,246	-	-	-	-	-	787	6,033	-	-	6,033	-	-	-	-	-	-	-	70,347	-

Table E-1
Byron Nuclear Power Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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.1.1.6	Turbine Pedestal	-	1,250	-	-	-	-	-	187	1,437	-	-	1,437	-	-	-	-	-	-	-	12,628	-
5b.1.1	Totals	-	19,408	-	-	-	-	-	2,911	22,319	-	-	22,319	-	-	-	-	-	-	-	230,359	-
Site Closeout Activities																						
5b.1.2	Grade & landscape site	-	267	-	-	-	-	-	40	307	-	-	307	-	-	-	-	-	-	-	869	-
5b.1.3	Final report to NRC	-	-	-	-	-	-	184	28	212	212	-	-	-	-	-	-	-	-	-	-	1,560
5b.1	Subtotal Period 5b Activity Costs	-	19,675	-	-	-	-	184	2,979	22,838	212	-	22,626	-	-	-	-	-	-	-	231,228	1,560
Period 5b Additional Costs																						
5b.2.1	Hyperbolic Cooling Tower	-	3,461	-	-	-	-	-	519	3,980	-	-	3,980	-	-	-	-	-	-	-	18,598	-
5b.2.2	ISFSI Demolition and Site Restoration	-	1,227	-	-	-	-	24	188	1,439	-	1,439	-	-	-	-	-	-	-	-	17,085	80
5b.2.3	Concrete Crushing	-	574	-	-	-	-	3	87	664	-	-	664	-	-	-	-	-	-	-	2,798	-
5b.2	Subtotal Period 5b Additional Costs	-	5,262	-	-	-	-	27	793	6,083	-	1,439	4,644	-	-	-	-	-	-	-	38,481	80
Period 5b Collateral Costs																						
5b.3.1	Small tool allowance	-	257	-	-	-	-	-	39	295	-	-	295	-	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	257	-	-	-	-	-	39	295	-	-	295	-	-	-	-	-	-	-	-	-
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	-	6,137	-	-	-	-	-	921	7,057	-	-	7,057	-	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	228	34	262	-	-	262	-	-	-	-	-	-	-	-	-
5b.4.5	Site O&M Cost	-	-	-	-	-	-	310	46	356	-	-	356	-	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	1,616	242	1,859	-	-	1,859	-	-	-	-	-	-	-	-	34,287
5b.4.7	DOC Staff Cost	-	-	-	-	-	-	11,650	1,748	13,398	-	-	13,398	-	-	-	-	-	-	-	-	137,043
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	5,559	834	6,392	-	-	6,392	-	-	-	-	-	-	-	-	67,229
5b.4	Subtotal Period 5b Period-Dependent Costs	-	6,137	-	-	-	-	20,602	3,949	30,687	-	-	30,687	-	-	-	-	-	-	-	-	238,558
5b.0	TOTAL PERIOD 5b COST	-	31,330	-	-	-	-	20,813	7,760	59,903	212	1,439	58,252	-	-	-	-	-	-	-	269,709	240,198
PERIOD 5 TOTALS		-	31,330	-	-	-	-	20,813	7,760	59,903	212	1,439	58,252	-	-	-	-	-	-	-	269,709	240,198
TOTAL COST TO DECOMMISSION		8,331	84,983	10,189	8,326	3,950	31,977	508,289	109,822	765,867	588,038	110,342	67,487	217,404	105,225	2,629	470	505	17,853,020	994,761	4,715,171	

Table E-1
Byron Nuclear Power Station, Unit 1
SAFSTOR Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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 16.74% CONTINGENCY:						\$765,867	thousands of 2009 dollars														
TOTAL NRC LICENSE TERMINATION COST IS 76.78% OR:						\$588,038	thousands of 2009 dollars														
SPENT FUEL MANAGEMENT COST IS 14.41% OR:						\$110,342	thousands of 2009 dollars														
NON-NUCLEAR DEMOLITION COST IS 8.81% OR:						\$67,487	thousands of 2009 dollars														
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):						108,323	cubic feet														
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:						505	cubic feet														
TOTAL SCRAP METAL REMOVED:						58,942	tons														
TOTAL CRAFT LABOR REQUIREMENTS:						994,761	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 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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	-	-	-	-	-	-	398	119	517	517	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	66	10	76	76	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	101	15	116	116	-	-	-	-	-	-	-	-	-	856
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	66	10	76	76	-	-	-	-	-	-	-	-	-	556
1a.1.9	Perform detailed rad survey	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	51	8	58	58	-	-	-	-	-	-	-	-	-	428
1a.1.11	End product description	-	-	-	-	-	-	51	8	58	58	-	-	-	-	-	-	-	-	-	428
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	76	11	87	87	-	-	-	-	-	-	-	-	-	642
1a.1.13	Define major work sequence	-	-	-	-	-	-	51	8	58	58	-	-	-	-	-	-	-	-	-	428
1a.1.14	Perform SER and EA	-	-	-	-	-	-	157	23	180	180	-	-	-	-	-	-	-	-	-	1,327
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	253	38	290	290	-	-	-	-	-	-	-	-	-	2,140
Activity Specifications																					
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	249	37	286	286	-	-	-	-	-	-	-	-	-	2,106
1a.1.16.2	Plant systems	-	-	-	-	-	-	210	32	242	242	-	-	-	-	-	-	-	-	-	1,783
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	158	24	181	181	-	-	-	-	-	-	-	-	-	1,335
1a.1.16.4	Waste management	-	-	-	-	-	-	101	15	116	116	-	-	-	-	-	-	-	-	-	856
1a.1.16.5	Facility and site dormancy	-	-	-	-	-	-	101	15	116	116	-	-	-	-	-	-	-	-	-	856
1a.1.16	Total	-	-	-	-	-	-	819	123	941	941	-	-	-	-	-	-	-	-	-	6,936
Detailed Work Procedures																					
1a.1.17.1	Plant systems	-	-	-	-	-	-	60	9	69	69	-	-	-	-	-	-	-	-	-	506
1a.1.17.2	Facility closeout & dormancy	-	-	-	-	-	-	61	9	70	70	-	-	-	-	-	-	-	-	-	514
1a.1.17	Total	-	-	-	-	-	-	120	18	138	138	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	2,211	391	2,602	2,602	-	-	-	-	-	-	-	-	-	15,361
Period 1a Additional Costs																					
1a.2.1	ISFSI Expansion	-	-	-	-	-	-	9,800	1,470	11,270	-	11,270	-	-	-	-	-	-	-	-	-
1a.2	Subtotal Period 1a Additional Costs	-	-	-	-	-	-	9,800	1,470	11,270	-	11,270	-	-	-	-	-	-	-	-	-
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	9,000	1,350	10,350	-	10,350	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	9,000	1,350	10,350	-	10,350	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	769	77	846	846	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	-	-	-	-	-	-	-	104	518	518	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	414	-	-	-	-	-	62	476	476	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	414	-	-	-	-	-	9	45	45	-	-	-	-	-	-	-	-	-	-
1a.4.6	Plant energy budget	-	-	2	1	-	34	-	921	138	1,059	1,059	-	-	610	-	-	-	-	12,190	3
1a.4.7	NRC Fees	-	-	-	-	-	-	471	47	518	518	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	306	31	337	-	337	-	-	-	-	-	-	-	-	-

Table E-2
Byron Nuclear Power Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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 Costs	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-	
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	381	57	438	-	438	-	-	-	-	-	-	-	-	-	
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	44	7	51	-	51	-	-	-	-	-	-	-	-	-	
1a.4.12	Security Staff Cost	-	-	-	-	-	-	6,424	964	7,387	7,387	-	-	-	-	-	-	-	-	-	157,471	
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	31,082	4,662	35,745	35,745	-	-	-	-	-	-	-	-	-	423,400	
1a.4	Subtotal Period 1a Period-Dependent Costs	-	828	2	1	-	34	40,523	6,176	47,563	46,738	826	-	-	610	-	-	-	12,190	3	580,871	
1a.0	TOTAL PERIOD 1a COST	-	828	2	1	-	34	61,534	9,387	71,785	49,339	22,446	-	-	610	-	-	-	12,190	3	596,232	
PERIOD 1b - SAFSTOR Limited DECON Activities																						
Period 1b Direct Decommissioning Activities																						
Decontamination of Site Buildings																						
1b.1.1.1	Reactor	1,924	-	-	-	-	-	-	962	2,886	2,886	-	-	-	-	-	-	-	-	-	33,093	-
1b.1.1.2	Auxiliary Building	222	-	-	-	-	-	-	111	333	333	-	-	-	-	-	-	-	-	-	3,830	-
1b.1.1.3	Radwaste/Service Building	145	-	-	-	-	-	-	72	217	217	-	-	-	-	-	-	-	-	-	2,506	-
1b.1.1.4	Refueling Water Storage Tank	314	-	-	-	-	-	-	157	471	471	-	-	-	-	-	-	-	-	-	5,322	-
1b.1.1.5	Fuel Handling Building	899	-	-	-	-	-	-	449	1,348	1,348	-	-	-	-	-	-	-	-	-	15,238	-
1b.1.1	Totals	3,504	-	-	-	-	-	-	1,752	5,255	5,255	-	-	-	-	-	-	-	-	-	59,990	-
1b.1	Subtotal Period 1b Activity Costs	3,504	-	-	-	-	-	-	1,752	5,255	5,255	-	-	-	-	-	-	-	-	-	59,990	-
Period 1b Collateral Costs																						
1b.3.1	Decon equipment	797	-	-	-	-	-	-	120	917	917	-	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process liquid waste	205	-	87	398	-	389	-	268	1,347	1,347	-	-	-	1,398	-	-	-	-	-	83,853	272
1b.3.3	Small tool allowance	-	56	-	-	-	-	-	8	65	65	-	-	-	-	-	-	-	-	-	-	-
1b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,000	300	2,300	-	2,300	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	1,003	56	87	398	-	389	2,000	696	4,629	2,329	2,300	-	-	1,398	-	-	-	-	-	83,853	272
Period 1b Period-Dependent Costs																						
1b.4.1	Decon supplies	734	-	-	-	-	-	-	184	918	918	-	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	192	19	211	211	-	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	2,452	245	2,697	2,697	-	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	335	-	-	-	-	-	84	418	418	-	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	103	-	-	-	-	-	15	119	119	-	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	2	1	-	33	-	8	43	43	-	-	585	-	-	-	-	-	-	11,700	3
1b.4.7	Plant energy budget	-	-	-	-	-	-	229	34	264	264	-	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	117	12	129	129	-	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	76	8	84	-	84	-	-	-	-	-	-	-	-	-	-
1b.4.10	Site O&M Costs	-	-	-	-	-	-	31	5	36	36	-	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	95	14	109	-	109	-	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	11	2	13	-	13	-	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	1,602	240	1,842	1,842	-	-	-	-	-	-	-	-	-	-	39,260
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	7,749	1,162	8,912	8,912	-	-	-	-	-	-	-	-	-	-	105,560
1b.4	Subtotal Period 1b Period-Dependent Costs	734	438	2	1	-	33	12,555	2,032	15,794	15,588	206	-	585	-	-	-	-	11,700	3	144,820	
1b.0	TOTAL PERIOD 1b COST	5,240	494	89	399	-	422	14,555	4,481	25,678	23,173	2,506	-	-	1,983	-	-	-	95,552	60,265	144,820	
PERIOD 1c - Preparations for SAFSTOR Dormancy																						
Period 1c Direct Decommissioning Activities																						
1c.1.1	Prepare support equipment for storage	-	431	-	-	-	-	-	65	496	496	-	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	42	-	-	-	-	-	6	48	48	-	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	-	13,416	-

Table E-2
Byron Nuclear Power Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 2a Period-Dependent Costs (continued)																					
2a.4.8	Site O&M Costs	-	-	-	-	-	-	500	75	575	575	-	-	-	-	-	-	-	-	-	-
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	2,294	344	2,639	-	2,639	-	-	-	-	-	-	-	-	-
2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	176	26	202	-	202	-	-	-	-	-	-	-	-	-
2a.4.11	Security Staff Cost	-	-	-	-	-	-	11,410	1,712	13,122	3,559	9,563	-	-	-	-	-	-	-	-	277,507
2a.4.12	Utility Staff Cost	-	-	-	-	-	-	13,086	1,963	15,049	4,281	10,768	-	-	-	-	-	-	-	-	165,218
2a.4	Subtotal Period 2a Period-Dependent Costs	-	333	4	2	-	87	41,757	5,692	47,875	13,649	34,226	-	-	1,556	-	-	-	31,128	7	442,725
2a.0	TOTAL PERIOD 2a COST	-	333	4	2	-	87	79,318	11,376	91,120	14,344	76,776	-	-	1,556	-	-	-	31,128	7	442,725
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	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	1,340	335	1,675	1,675	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	1,494	358	1,852	1,852	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	7,875	1,181	9,056	-	9,056	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	7,875	1,181	9,056	-	9,056	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	3,229	323	3,552	3,439	113	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	5,327	533	5,859	5,859	-	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	818	-	-	-	-	-	204	1,022	1,022	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	12	4	-	224	-	58	298	298	-	-	-	4,019	-	-	-	80,388	18	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	981	147	1,128	1,128	-	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	1,905	191	2,096	2,096	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	1,065	107	1,172	-	1,172	-	-	-	-	-	-	-	-	-
2b.4.8	Site O&M Costs	-	-	-	-	-	-	1,332	200	1,531	1,531	-	-	-	-	-	-	-	-	-	-
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	469	70	539	-	539	-	-	-	-	-	-	-	-	-
2b.4.10	Security Staff Cost	-	-	-	-	-	-	13,550	2,032	15,582	9,479	6,103	-	-	-	-	-	-	-	-	300,163
2b.4.11	Utility Staff Cost	-	-	-	-	-	-	16,152	2,423	18,574	11,401	7,173	-	-	-	-	-	-	-	-	222,343
2b.4	Subtotal Period 2b Period-Dependent Costs	-	818	12	4	-	224	44,009	6,287	51,354	36,255	15,099	-	-	4,019	-	-	-	80,388	18	522,506
2b.0	TOTAL PERIOD 2b COST	-	818	12	4	-	224	53,378	7,827	62,262	38,107	24,155	-	-	4,019	-	-	-	80,388	18	522,506
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	-	-	-	-	-	-	516	77	593	593	-	-	-	-	-	-	-	-	-	-
2c.1.5	Maintenance supplies	-	-	-	-	-	-	4,480	1,120	5,601	5,601	-	-	-	-	-	-	-	-	-	-
2c.1	Subtotal Period 2c Activity Costs	-	-	-	-	-	-	4,996	1,197	6,194	6,194	-	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	10,454	1,045	11,500	11,500	-	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	17,810	1,781	19,591	19,591	-	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	2,647	-	-	-	-	-	652	3,308	3,308	-	-	-	-	-	-	-	-	-	-
2c.4.4	Disposal of DAW generated	-	-	38	14	-	741	-	191	985	985	-	-	-	13,281	-	-	-	265,627	61	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	3,281	492	3,773	3,773	-	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	6,080	608	6,688	6,688	-	-	-	-	-	-	-	-	-	-

Table E-2
Byron Nuclear Power Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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 Period-Dependent Costs (continued)																						
2c.4.7	Site O&M Costs	-	-	-	-	-	-	4,452	668	5,120	5,120	-	-	-	-	-	-	-	-	-	-	-
2c.4.8	Security Staff Cost	-	-	-	-	-	-	27,561	4,134	31,695	31,695	-	-	-	-	-	-	-	-	-	-	544,933
2c.4.9	Utility Staff Cost	-	-	-	-	-	-	33,149	4,972	38,122	38,122	-	-	-	-	-	-	-	-	-	-	469,847
2c.4	Subtotal Period 2c Period-Dependent Costs	-	2,647	38	14	-	741	102,788	14,554	120,783	120,783	-	-	-	-	-	-	-	-	265,627	61	1,014,780
2c.0	TOTAL PERIOD 2c COST	-	2,647	38	14	-	741	107,785	15,751	126,976	126,976	-	-	-	-	-	-	-	-	265,627	61	1,014,780
PERIOD 2 TOTALS		-	3,797	54	20	-	1,052	240,481	34,954	280,359	179,428	100,931	-	-	-	-	-	-	-	377,143	87	1,980,010
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																						
Period 3a Direct Decommissioning Activities																						
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	66	10	76	76	-	-	-	-	-	-	-	-	-	-	556
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	232	35	267	267	-	-	-	-	-	-	-	-	-	-	1,969
3a.1.3	Perform detailed rad survey	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-
3a.1.4	End product description	-	-	-	-	-	-	51	8	58	58	-	-	-	-	-	-	-	-	-	-	428
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	66	10	76	76	-	-	-	-	-	-	-	-	-	-	556
3a.1.6	Define major work sequence	-	-	-	-	-	-	379	57	436	436	-	-	-	-	-	-	-	-	-	-	3,210
3a.1.7	Perform SER and EA	-	-	-	-	-	-	157	23	180	180	-	-	-	-	-	-	-	-	-	-	1,327
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	253	38	290	290	-	-	-	-	-	-	-	-	-	-	2,140
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	207	31	238	238	-	-	-	-	-	-	-	-	-	-	1,753
3a.1.10	Receive NRC approval of termination plan	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-
Activity Specifications																						
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	372	56	428	385	-	43	-	-	-	-	-	-	-	-	3,154
3a.1.11.2	Plant systems	-	-	-	-	-	-	210	32	242	218	-	24	-	-	-	-	-	-	-	-	1,783
3a.1.11.3	Reactor internals	-	-	-	-	-	-	359	54	412	412	-	-	-	-	-	-	-	-	-	-	3,039
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	328	49	378	378	-	-	-	-	-	-	-	-	-	-	2,782
3a.1.11.5	Biological shield	-	-	-	-	-	-	25	4	29	29	-	-	-	-	-	-	-	-	-	-	214
3a.1.11.6	Steam generators	-	-	-	-	-	-	158	24	181	181	-	-	-	-	-	-	-	-	-	-	1,335
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	81	12	93	46	-	46	-	-	-	-	-	-	-	-	685
3a.1.11.8	Main Turbine	-	-	-	-	-	-	20	3	23	-	-	23	-	-	-	-	-	-	-	-	171
3a.1.11.9	Main Condensers	-	-	-	-	-	-	20	3	23	-	-	23	-	-	-	-	-	-	-	-	171
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	158	24	181	91	-	91	-	-	-	-	-	-	-	-	1,335
3a.1.11.11	Waste management	-	-	-	-	-	-	232	35	267	267	-	-	-	-	-	-	-	-	-	-	1,969
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-	45	7	52	26	-	26	-	-	-	-	-	-	-	-	385
3a.1.11	Total	-	-	-	-	-	-	2,009	301	2,310	2,034	-	277	-	-	-	-	-	-	-	-	17,024
Planning & Site Preparations																						
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	121	18	139	139	-	-	-	-	-	-	-	-	-	-	1,027
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	2,800	420	3,220	3,220	-	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	71	11	81	81	-	-	-	-	-	-	-	-	-	-	599
3a.1.15	Rigging/Cont. Contri Envlps/tooling/etc.	-	-	-	-	-	-	2,200	330	2,530	2,530	-	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	62	9	71	71	-	-	-	-	-	-	-	-	-	-	526
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	8,672	1,301	9,973	9,696	-	277	-	-	-	-	-	-	-	-	31,117
Period 3a Period-Dependent Costs																						
3a.4.1	Insurance	-	-	-	-	-	-	293	29	323	323	-	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	500	50	550	550	-	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	-	-	-	-	-	-	86	430	430	-	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	344	-	-	-	-	-	62	476	476	-	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	414	-	-	-	-	-	7	36	36	-	-	-	-	-	-	-	-	-	-	-
3a.4.6	Plant energy budget	-	-	1	1	-	27	-	-	-	-	-	-	-	-	-	-	-	-	9,613	2	-
3a.4.7	NRC Fees	-	-	-	-	-	-	921	138	1,059	1,059	-	-	-	-	-	-	-	-	-	-	-
3a.4.7	Site O&M Costs	-	-	-	-	-	-	214	21	236	236	-	-	-	-	-	-	-	-	-	-	-
3a.4.8	Site O&M Costs	-	-	-	-	-	-	125	19	144	144	-	-	-	-	-	-	-	-	-	-	-

Table E-2
Byron Nuclear Power Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours		
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet						
Period 3a	Period-Dependent Costs (continued)																						
3a.4.9	Security Staff Cost	-	-	-	-	-	-	240	36	276	276	-	-	-	-	-	-	-	-	-	-	-	6,257
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	14,259	2,139	16,398	16,398	-	-	-	-	-	-	-	-	-	-	-	200,229
3a.4	Subtotal Period 3a Period-Dependent Costs	-	757	1	1	-	27	16,552	2,587	19,926	19,926	-	-	-	-	481	-	-	-	-	9,613	2	206,486
3a.0	TOTAL PERIOD 3a COST	-	757	1	1	-	27	25,224	3,888	29,899	29,622	-	277	-	481	-	-	-	-	9,613	2	237,603	
PERIOD 3b - Decommissioning Preparations																							
Period 3b Direct Decommissioning Activities																							
Detailed Work Procedures																							
3b.1.1.1	Plant systems	-	-	-	-	-	-	239	36	275	247	-	27	-	-	-	-	-	-	-	-	-	2,026
3b.1.1.2	Reactor internals	-	-	-	-	-	-	126	19	145	145	-	-	-	-	-	-	-	-	-	-	-	1,070
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	68	10	78	20	-	59	-	-	-	-	-	-	-	-	-	578
3b.1.1.4	CRD cooling assembly	-	-	-	-	-	-	51	8	58	58	-	-	-	-	-	-	-	-	-	-	-	428
3b.1.1.5	CRD housings & ICI tubes	-	-	-	-	-	-	51	8	58	58	-	-	-	-	-	-	-	-	-	-	-	428
3b.1.1.6	Incore instrumentation	-	-	-	-	-	-	51	8	58	58	-	-	-	-	-	-	-	-	-	-	-	428
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	183	28	211	211	-	-	-	-	-	-	-	-	-	-	-	1,554
3b.1.1.8	Facility closeout	-	-	-	-	-	-	61	9	70	35	-	35	-	-	-	-	-	-	-	-	-	514
3b.1.1.9	Missile shields	-	-	-	-	-	-	23	3	26	26	-	-	-	-	-	-	-	-	-	-	-	193
3b.1.1.10	Biological shield	-	-	-	-	-	-	61	9	70	70	-	-	-	-	-	-	-	-	-	-	-	514
3b.1.1.11	Steam generators	-	-	-	-	-	-	232	35	267	267	-	-	-	-	-	-	-	-	-	-	-	1,969
3b.1.1.12	Reinforced concrete	-	-	-	-	-	-	51	8	58	29	-	29	-	-	-	-	-	-	-	-	-	428
3b.1.1.13	Main Turbine	-	-	-	-	-	-	79	12	91	-	-	91	-	-	-	-	-	-	-	-	-	668
3b.1.1.14	Main Condensers	-	-	-	-	-	-	79	12	91	-	-	91	-	-	-	-	-	-	-	-	-	668
3b.1.1.15	Auxiliary building	-	-	-	-	-	-	138	21	159	143	-	16	-	-	-	-	-	-	-	-	-	1,168
3b.1.1.16	Reactor building	-	-	-	-	-	-	138	21	159	143	-	16	-	-	-	-	-	-	-	-	-	1,168
3b.1.1	Total	-	-	-	-	-	-	1,629	244	1,873	1,510	-	363	-	-	-	-	-	-	-	-	-	13,800
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	1,629	244	1,873	1,510	-	363	-	-	-	-	-	-	-	-	-	13,800
Period 3b Additional Costs																							
3b.2.1	Site Characterization	-	-	-	-	-	-	2,711	813	3,525	3,525	-	-	-	-	-	-	-	-	-	-	13,042	4,640
3b.2	Subtotal Period 3b Additional Costs	-	-	-	-	-	-	2,711	813	3,525	3,525	-	-	-	-	-	-	-	-	-	-	13,042	4,640
Period 3b Collateral Costs																							
3b.3.1	Decon equipment	797	-	-	-	-	-	-	120	917	917	-	-	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,130	169	1,299	1,299	-	-	-	-	-	-	-	-	-	-	-	-
3b.3.3	Pipe cutting equipment	-	1,100	-	-	-	-	-	165	1,265	1,265	-	-	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	797	1,100	-	-	-	-	1,130	454	3,482	3,482	-	-	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																							
3b.4.1	Decon supplies	25	-	-	-	-	-	-	6	31	31	-	-	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	169	17	186	186	-	-	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	252	25	277	277	-	-	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	187	-	-	-	-	-	47	234	234	-	-	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	209	-	-	-	-	-	31	240	240	-	-	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	-	1	0	-	15	4	20	20	-	-	-	267	-	-	-	-	5,344	1	-	
3b.4.7	Plant energy budget	-	-	-	-	-	-	464	70	534	534	-	-	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	108	11	119	119	-	-	-	-	-	-	-	-	-	-	-	-
3b.4.9	Site O&M Costs	-	-	-	-	-	-	63	9	72	72	-	-	-	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	121	18	139	139	-	-	-	-	-	-	-	-	-	-	-	3,154
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	3,314	497	3,811	3,811	-	-	-	-	-	-	-	-	-	-	-	43,109
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	7,188	1,078	8,267	8,267	-	-	-	-	-	-	-	-	-	-	-	100,937
3b.4	Subtotal Period 3b Period-Dependent Costs	25	395	1	0	-	15	11,679	1,813	13,928	13,928	-	-	-	267	-	-	-	-	5,344	1	147,200	

Table E-2
Byron Nuclear Power Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet				
3b.0	TOTAL PERIOD 3b COST	822	1,495	1	0	-	15	17,149	3,325	22,807	22,444	-	363	-	267	-	-	-	5,344	13,043	165,640
PERIOD 3 TOTALS		822	2,253	2	1	-	42	42,373	7,213	52,706	52,066	-	640	-	748	-	-	-	14,956	13,045	403,242
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Reactor Coolant Piping	38	131	30	19	42	158	-	103	521	521	-	-	803	803	-	-	-	186,244	2,979	-
4a.1.1.2	Pressurizer Relief Tank	7	26	6	4	9	30	-	20	102	102	-	-	165	165	-	-	-	36,553	596	-
4a.1.1.3	Reactor Coolant Pumps & Motors	25	94	53	168	-	1,272	-	384	1,996	1,996	-	-	-	4,796	-	-	-	780,540	2,726	80
4a.1.1.4	Pressurizer	11	59	345	94	-	412	-	172	1,093	1,093	-	-	-	3,033	-	-	-	252,826	1,527	750
4a.1.1.5	Steam Generators	85	4,096	1,426	2,363	580	3,416	-	2,505	14,471	14,471	-	-	39,289	14,436	-	-	-	3,096,232	20,508	1,500
4a.1.1.6	CRDMs/ICIs/Service Structure Removal	35	89	191	32	13	63	-	81	505	505	-	-	753	2,947	-	-	-	81,666	2,134	-
4a.1.1.7	Reactor Vessel Internals	67	2,001	3,441	515	-	3,719	203	4,413	14,360	14,360	-	-	-	2,211	376	470	-	325,254	23,067	1,055
4a.1.1.8	Vessel & Internals GTCC Disposal	-	-	-	-	-	11,665	-	1,750	13,414	13,414	-	-	-	-	-	-	505	-	104,146	-
4a.1.1.9	Reactor Vessel	81	3,970	1,280	655	-	2,978	203	5,021	14,188	14,188	-	-	-	6,672	2,254	-	-	979,179	23,067	1,055
4a.1.1	Totals	348	10,465	6,772	3,849	644	23,714	406	14,450	60,649	60,649	-	-	41,010	35,062	2,629	470	505	5,842,640	76,603	4,439
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	510	256	32	214	-	-	190	1,201	1,201	-	-	5,355	-	-	-	-	455,213	9,016	-
4a.1.3	Main Condensers	-	1,042	133	27	150	-	-	300	1,653	1,653	-	-	7,111	-	-	-	-	320,000	18,250	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor	-	1,076	-	-	-	-	-	161	1,237	1,237	-	-	-	-	-	-	-	-	12,130	-
4a.1.4.2	Auxiliary Building	-	602	-	-	-	-	-	90	692	692	-	-	-	-	-	-	-	-	6,896	-
4a.1.4.3	Radwaste/Service Building	-	391	-	-	-	-	-	59	450	450	-	-	-	-	-	-	-	-	5,060	-
4a.1.4.4	Refueling Water Storage Tank	-	104	-	-	-	-	-	16	120	120	-	-	-	-	-	-	-	-	1,299	-
4a.1.4.5	Fuel Handling Building	-	309	-	-	-	-	-	46	355	355	-	-	-	-	-	-	-	-	3,690	-
4a.1.4	Totals	-	2,481	-	-	-	-	-	372	2,853	2,853	-	-	-	-	-	-	-	-	29,074	-
Disposal of Plant Systems																					
4a.1.5.1	Auxiliary Feedwater	-	224	3	6	36	-	-	63	331	331	-	-	1,866	-	-	-	-	75,766	3,747	-
4a.1.5.2	Auxiliary Steam	-	115	-	-	-	-	-	17	132	-	-	132	-	-	-	-	-	-	2,107	-
4a.1.5.3	Auxiliary Steam RCA	-	326	-	10	54	-	-	92	486	486	-	-	2,822	-	-	-	-	114,583	5,241	-
4a.1.5.4	Boric Acid Processing	-	421	27	23	34	106	-	143	755	755	-	-	1,794	1,076	-	-	-	162,827	6,970	-
4a.1.5.5	CO2 & H2	-	16	-	-	-	-	-	2	18	-	-	18	-	-	-	-	-	-	289	-
4a.1.5.6	CO2 & H2 RCA	-	31	1	1	5	-	-	9	46	46	-	-	287	-	-	-	-	11,664	478	-
4a.1.5.7	Chemical Feed	-	145	-	-	-	-	-	22	167	-	-	167	-	-	-	-	-	-	2,663	-
4a.1.5.8	Chilled Water	-	80	-	-	-	-	-	12	92	-	-	92	-	-	-	-	-	-	1,454	-
4a.1.5.9	Circulating Water	-	525	-	-	-	-	-	79	604	-	-	604	-	-	-	-	-	-	9,669	-
4a.1.5.10	Condensate	-	293	-	-	-	-	-	44	337	-	-	337	-	-	-	-	-	-	5,317	-
4a.1.5.11	Condensate Booster	-	293	-	-	-	-	-	44	336	-	-	336	-	-	-	-	-	-	5,314	-
4a.1.5.12	Condensate Cleanup	-	160	-	-	-	-	-	24	184	-	-	184	-	-	-	-	-	-	3,000	-
4a.1.5.13	Containment Spray	-	229	-	-	-	-	-	70	386	-	-	386	-	3,602	-	-	-	-	146,289	3,673
4a.1.5.14	Diesel Fuel Oil	-	158	6	12	69	-	-	24	182	386	-	-	182	-	-	-	-	-	3,673	-
4a.1.5.15	Essential Service Water	-	274	-	-	-	-	-	41	315	-	-	315	-	-	-	-	-	-	5,049	-
4a.1.5.16	Extraction Steam	-	196	-	-	-	-	-	29	226	-	-	226	-	-	-	-	-	-	3,637	-
4a.1.5.17	Feedwater	-	267	-	-	-	-	-	40	307	-	-	307	-	-	-	-	-	-	4,925	-
4a.1.5.18	Feedwater Drains	-	633	-	-	-	-	-	95	728	-	-	728	-	-	-	-	-	-	11,719	-
4a.1.5.19	Gland Steam	-	160	-	-	-	-	-	5	38	-	-	38	-	-	-	-	-	-	616	-
4a.1.5.20	Gland Steam	-	24	-	-	-	-	-	4	28	-	-	28	-	-	-	-	-	-	458	-
4a.1.5.21	Main Steam	-	271	-	-	-	-	-	41	312	-	-	312	-	-	-	-	-	-	4,979	-
4a.1.5.22	Main Steam RCA	-	76	-	3	19	-	-	23	123	123	-	-	990	-	-	-	-	40,190	1,250	-
4a.1.5.23	Make-up Demineralizer	-	137	-	-	-	-	-	21	158	-	-	158	-	-	-	-	-	-	2,595	-
4a.1.5.24	Nitrogen	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	18	-

Table E-2
Byron Nuclear Power Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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.1.5.25	Non-Essential Service Water	-	318	-	-	-	-	-	48	366	-	-	366	-	-	-	-	-	-	-	5,903	-
4a.1.5.26	Non-Essential Service Water RCA	-	163	7	13	75	-	-	55	313	313	-	-	3,909	-	-	-	-	-	158,755	2,535	-
4a.1.5.27	Off Gas	-	605	13	25	141	-	-	177	962	962	-	-	7,411	-	-	-	-	-	300,945	10,038	-
4a.1.5.28	Potable Water	-	4	-	-	-	-	-	1	5	-	-	5	-	-	-	-	-	-	-	75	-
4a.1.5.29	Process Radiation Monitoring	-	59	0	0	3	-	-	15	77	77	-	-	138	-	-	-	-	-	5,613	1,086	-
4a.1.5.30	Process Sampling	-	129	1	2	12	-	-	35	179	179	-	-	641	-	-	-	-	-	26,045	2,347	-
4a.1.5.31	Sewage Treatment Plant	-	85	-	-	-	-	-	13	98	-	-	98	-	-	-	-	-	-	-	1,579	-
4a.1.5.32	Station Air	-	38	-	-	-	-	-	6	44	-	-	44	-	-	-	-	-	-	-	705	-
4a.1.5.33	Station Heating	-	130	-	-	-	-	-	19	149	-	-	149	-	-	-	-	-	-	-	2,391	-
4a.1.5.34	Steam Humidification	-	6	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	-	115	-
4a.1.5.35	Switchgear Heat Removal	-	29	-	-	-	-	-	4	33	-	-	33	-	-	-	-	-	-	-	519	-
4a.1.5.36	Turbine Bldg Equip Drains	-	67	-	-	-	-	-	10	77	-	-	77	-	-	-	-	-	-	-	1,235	-
4a.1.5.37	Turbine Bldg Floor Drains	-	115	-	-	-	-	-	17	133	-	-	133	-	-	-	-	-	-	-	2,117	-
4a.1.5.38	Turbine Oil	-	73	-	-	-	-	-	11	84	-	-	84	-	-	-	-	-	-	-	1,359	-
4a.1.5.39	Turbine-Generator Auxiliaries	-	49	-	-	-	-	-	7	57	-	-	57	-	-	-	-	-	-	-	884	-
4a.1.5.40	Waste Oil Sumps	-	28	-	-	-	-	-	4	32	-	-	32	-	-	-	-	-	-	-	517	-
4a.1.5.41	Well Water	-	69	-	-	-	-	-	10	79	-	-	79	-	-	-	-	-	-	-	1,247	-
4a.1.5	Totals	-	6,898	66	96	448	106	-	1,376	8,989	3,659	-	5,330	23,460	1,076	-	-	-	-	1,042,678	122,666	-
4a.1.6	Scaffolding in support of decommissioning	-	1,358	9	2	10	3	-	343	1,726	1,726	-	-	473	29	-	-	-	-	23,936	26,134	-
4a.1	Subtotal Period 4a Activity Costs	348	22,755	7,236	4,006	1,466	23,823	406	17,031	77,071	71,741	-	5,330	77,409	36,168	2,629	470	505	7,684,466	281,743	4,439	-
Period 4a Collateral Costs																						
4a.3.1	Process liquid waste	37	-	18	82	-	80	-	52	269	269	-	-	-	-	-	-	-	-	17,264	56	-
4a.3.2	Small tool allowance	-	253	-	-	-	-	-	38	291	262	-	29	-	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	37	253	18	82	-	80	-	90	560	530	-	29	-	288	-	-	-	-	17,264	56	-
Period 4a Period-Dependent Costs																						
4a.4.1	Decon supplies	64	-	-	-	-	-	-	16	80	80	-	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	440	44	484	484	-	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	657	66	723	651	-	72	-	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	1,619	-	-	-	-	-	405	2,024	2,024	-	-	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	2,295	-	-	-	-	-	344	2,639	2,639	-	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	9	3	-	181	-	47	241	241	-	-	-	3,251	-	-	-	-	65,015	15	-
4a.4.7	Plant energy budget	-	-	-	-	-	-	1,150	173	1,323	1,323	-	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	593	59	652	652	-	-	-	-	-	-	-	-	-	-	-
4a.4.9	Site O&M Costs	-	-	-	-	-	-	164	25	189	189	-	-	-	-	-	-	-	-	-	-	-
4a.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	504	76	579	579	-	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	2,245	337	2,581	2,581	-	-	-	-	-	-	-	-	-	-	58,505
4a.4.12	DOC Staff Cost	-	-	-	-	-	-	15,170	2,275	17,445	17,445	-	-	-	-	-	-	-	-	-	-	189,257
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	25,600	3,840	29,440	29,440	-	-	-	-	-	-	-	-	-	-	342,857
4a.4	Subtotal Period 4a Period-Dependent Costs	64	3,914	9	3	-	181	46,523	7,706	58,401	58,329	-	72	-	3,251	-	-	-	-	65,015	15	590,619
4a.0	TOTAL PERIOD 4a COST	449	26,922	7,263	4,091	1,466	24,085	46,929	24,827	136,032	130,601	-	5,431	77,409	39,707	2,629	470	505	7,766,745	281,814	595,059	-
PERIOD 4b - Site Decontamination																						
Period 4b Direct Decommissioning Activities																						
4b.1.1	Remove spent fuel racks	990	106	305	93	-	590	-	713	2,796	2,796	-	-	-	5,572	-	-	-	-	499,920	2,174	-
Disposal of Plant Systems																						
4b.1.2.1	Chemical & Volume Control	-	954	59	44	34	243	-	317	1,652	1,652	-	-	1,783	2,322	-	-	-	-	278,742	15,645	-
4b.1.2.2	Chilled Water RCA	-	592	13	25	139	-	-	174	943	943	-	-	7,293	-	-	-	-	-	296,176	9,173	-
4b.1.2.3	Component Cooling	-	627	17	31	178	-	-	190	1,043	1,043	-	-	9,319	-	-	-	-	-	378,439	10,075	-
4b.1.2.4	Electrical	-	3,669	-	-	-	-	-	550	4,220	-	-	4,220	-	-	-	-	-	-	-	66,259	-

Table E-2
Byron Nuclear Power Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet				
Disposal of Plant Systems (continued)																					
4b.1.2.5	Electrical - Contaminated	-	1,564	17	32	181	-	-	425	2,219	2,219	-	-	9,508	-	-	-	-	386,137	25,754	-
4b.1.2.6	Electrical - RCA	-	2,236	39	72	410	-	-	635	3,392	3,392	-	-	21,460	-	-	-	-	871,483	37,551	-
4b.1.2.7	Emergency Diesel Generator	-	83	-	-	-	-	-	13	96	-	-	96	-	-	-	-	-	-	1,514	-
4b.1.2.8	Essential Service Water RCA	-	303	17	32	179	-	-	109	639	639	-	-	9,380	-	-	-	-	380,930	4,955	-
4b.1.2.9	Fire Protection	-	271	-	-	-	-	-	41	311	-	-	311	-	-	-	-	-	-	4,983	-
4b.1.2.10	Fire Protection RCA	-	476	12	22	124	-	-	142	776	776	-	-	6,516	-	-	-	-	264,606	7,384	-
4b.1.2.11	Fuel Handling Bldg Equip Drains	-	146	7	7	20	23	-	47	249	249	-	-	1,027	221	-	-	-	60,829	2,404	-
4b.1.2.12	Fuel Handling Bldg Equip Drains (Unit 1)	-	26	1	1	1	4	-	8	41	41	-	-	67	34	-	-	-	37,980	4,224	-
4b.1.2.13	Fuel Handling Bldg Floor Drains	-	149	7	7	16	25	-	48	252	252	-	-	830	238	-	-	-	54,723	2,441	-
4b.1.2.14	Fuel Handling Bldg Floor Drains (Unit 1)	-	103	4	4	13	11	-	32	168	168	-	-	703	109	-	-	-	37,980	1,740	-
4b.1.2.15	Fuel Pool Cooling & Cleanup	-	199	11	11	24	43	-	67	355	355	-	-	1,275	406	-	-	-	88,160	3,272	-
4b.1.2.16	Fuel Pool Cooling & Cleanup (Unit 1)	-	184	10	10	23	38	-	62	327	327	-	-	1,226	361	-	-	-	82,110	3,050	-
4b.1.2.17	HVAC-Auxiliary Building	-	485	10	19	108	-	-	141	762	762	-	-	5,643	-	-	-	-	229,172	7,876	-
4b.1.2.18	HVAC-Control Room HVAC	-	7	-	-	-	-	-	1	8	-	-	8	-	-	-	-	-	-	127	-
4b.1.2.19	HVAC-Diesel Generator Room	-	38	-	-	-	-	-	6	44	-	-	44	-	-	-	-	-	-	686	-
4b.1.2.20	HVAC-Laboratory	-	17	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	315	-
4b.1.2.21	HVAC-Machine Shop	-	16	-	-	-	-	-	2	18	-	-	18	-	-	-	-	-	-	297	-
4b.1.2.22	HVAC-Miscellaneous	-	97	-	-	-	-	-	14	111	-	-	111	-	-	-	-	-	-	1,769	-
4b.1.2.23	HVAC-Primary Containment	-	539	19	36	204	-	-	173	970	970	-	-	10,679	-	-	-	-	433,695	8,624	-
4b.1.2.24	HVAC-Pumphouse	-	15	-	-	-	-	-	2	18	-	-	18	-	-	-	-	-	-	275	-
4b.1.2.25	HVAC-Radwaste	-	279	6	11	63	-	-	82	441	441	-	-	3,327	-	-	-	-	135,102	4,323	-
4b.1.2.26	HVAC-Turbine Building	-	163	-	-	-	-	-	24	187	-	-	187	-	-	-	-	-	-	3,158	-
4b.1.2.27	Instrument Air Supply	-	64	-	-	-	-	-	10	73	-	-	73	-	-	-	-	-	-	1,197	-
4b.1.2.28	Instrument Air Supply RCA	-	220	2	3	20	-	-	59	304	304	-	-	1,035	-	-	-	-	42,036	3,563	-
4b.1.2.29	Miscellaneous Drains	-	66	1	2	12	-	-	19	100	100	-	-	617	-	-	-	-	25,043	1,104	-
4b.1.2.30	Primary Containment Purge	-	261	10	20	111	-	-	86	488	488	-	-	5,816	-	-	-	-	236,197	4,524	-
4b.1.2.31	Primary Water	-	722	31	43	187	61	-	233	1,278	1,278	-	-	9,803	667	-	-	-	449,848	12,651	-
4b.1.2.32	Radioactive Waste Disposal	-	2,431	164	134	181	652	-	834	4,396	4,396	-	-	9,461	6,530	-	-	-	936,736	39,735	-
4b.1.2.33	Reactor Bldg Equipment Drains	-	96	8	7	7	37	-	36	191	191	-	-	356	350	-	-	-	45,614	1,581	-
4b.1.2.34	Reactor Building Floor Drains	-	36	2	2	2	7	-	12	60	60	-	-	125	66	-	-	-	11,009	597	-
4b.1.2.35	Reactor Coolant	-	147	8	6	4	32	-	47	243	243	-	-	206	299	-	-	-	35,137	2,391	-
4b.1.2.36	Residual Heat Removal	-	167	10	12	27	43	-	59	318	318	-	-	1,421	405	-	-	-	94,061	2,834	-
4b.1.2.37	Safety Injection	-	760	36	46	172	98	-	251	1,362	1,362	-	-	9,001	979	-	-	-	448,431	13,165	-
4b.1.2.38	Station Air RCA	-	51	1	1	6	-	-	14	72	72	-	-	293	-	-	-	-	11,919	815	-
4b.1.2.39	Station Heating RCA	-	223	4	8	46	-	-	64	346	346	-	-	2,412	-	-	-	-	97,961	3,548	-
4b.1.2.40	Waste Oil Sumps RCA	-	23	0	1	3	-	-	6	33	33	-	-	154	-	-	-	-	6,246	361	-
4b.1.2.41	Waste Water Treatment	-	78	-	-	-	-	-	12	90	-	-	90	-	-	-	-	-	-	1,464	-
4b.1.2	Totals	-	18,585	524	648	2,495	1,316	-	5,047	28,616	23,420	-	5,196	130,736	12,987	-	-	-	6,424,277	313,605	-
4b.1.3	Scaffolding in support of decommissioning	-	2,037	14	3	15	5	-	515	2,589	2,589	-	-	710	44	-	-	-	35,904	39,201	-
Decontamination of Site Buildings																					
4b.1.4.1	Reactor	1,748	1,236	171	191	134	455	-	1,363	5,297	5,297	-	-	7,022	8,433	-	-	-	1,122,399	50,351	-
4b.1.4.2	Auxiliary Building	205	105	8	9	17	18	-	138	496	496	-	-	866	322	-	-	-	66,374	5,241	-
4b.1.4.3	Radwaste/Service Building	134	42	6	6	6	15	-	84	293	293	-	-	322	278	-	-	-	40,041	2,960	-
4b.1.4.4	Refueling Water Storage Tank	315	366	4	5	22	6	-	255	973	973	-	-	1,146	87	-	-	-	54,853	11,906	-
4b.1.4.5	Fuel Handling Building	904	1,006	14	17	59	26	-	723	2,749	2,749	-	-	3,097	411	-	-	-	165,835	33,340	-
4b.1.4	Totals	3,306	2,755	203	228	238	520	-	2,562	9,812	9,812	-	-	12,453	9,531	-	-	-	1,449,503	103,797	-
4b.1	Subtotal Period 4b Activity Costs	4,296	23,483	1,046	972	2,748	2,430	-	8,837	43,813	38,617	-	5,196	143,899	28,134	-	-	-	8,409,604	458,777	-
Period 4b Additional Costs																					
4b.2.1	License Termination Survey Planning	-	-	-	-	-	-	940	282	1,222	1,222	-	-	-	-	-	-	-	-	-	6,240
4b.2.2	ISFSI License Termination	-	38	1	23	-	90	727	144	1,022	-	1,022	-	-	-	-	-	-	142,596	2,873	1,280
4b.2	Subtotal Period 4b Additional Costs	-	38	1	23	-	90	1,667	426	2,244	1,222	1,022	-	-	-	-	-	-	142,596	2,873	7,520

Table E-2
Byron Nuclear Power Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet					
Period 4b Collateral Costs																						
4b.3.1	Process liquid waste	104	-	52	237	-	232	-	151	775	775	-	-	-	-	832	-	-	-	49,896	162	-
4b.3.2	Small tool allowance	-	431	-	-	-	-	-	65	495	495	-	-	-	-	-	-	-	-	-	-	-
4b.3.3	Decommissioning Equipment Disposition	-	-	119	34	127	40	-	46	365	365	-	-	-	6,000	373	-	-	-	303,507	88	-
4b.3	Subtotal Period 4b Collateral Costs	104	431	171	270	127	271	-	261	1,636	1,636	-	-	-	6,000	1,205	-	-	-	353,402	250	-
Period 4b Period-Dependent Costs																						
4b.4.1	Decon supplies	851	-	-	-	-	-	-	213	1,064	1,064	-	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	886	89	975	975	-	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	1,322	132	1,455	1,455	-	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	2,839	-	-	-	-	-	710	3,549	3,549	-	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	4,581	-	-	-	-	-	687	5,269	5,269	-	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	19	7	-	367	-	95	488	488	-	-	-	6,584	-	-	-	-	131,682	30	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	1,827	274	2,101	2,101	-	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	1,193	119	1,312	1,312	-	-	-	-	-	-	-	-	-	-	-
4b.4.9	Site O&M Costs	-	-	-	-	-	-	331	50	380	380	-	-	-	-	-	-	-	-	-	-	-
4b.4.10	Liquid Radwaste Processing Equipment/Services	-	-	-	-	-	-	1,014	152	1,166	1,166	-	-	-	-	-	-	-	-	-	-	-
4b.4.11	Security Staff Cost	-	-	-	-	-	-	7,628	1,144	8,772	8,772	-	-	-	-	-	-	-	-	-	-	172,500
4b.4.12	DOC Staff Cost	-	-	-	-	-	-	29,760	4,464	34,224	34,224	-	-	-	-	-	-	-	-	-	-	369,840
4b.4.13	Utility Staff Cost	-	-	-	-	-	-	48,980	7,347	56,327	56,327	-	-	-	-	-	-	-	-	-	-	651,360
4b.4	Subtotal Period 4b Period-Dependent Costs	851	7,420	19	7	-	367	-	92,941	15,476	117,081	-	-	-	6,584	-	-	-	-	131,682	30	1,193,700
4b.0	TOTAL PERIOD 4b COST	5,251	31,372	1,237	1,273	2,875	3,158	94,608	25,000	164,774	158,556	1,022	5,196	149,899	37,628	-	-	-	-	9,037,285	461,930	1,201,220
PERIOD 4e - License Termination																						
Period 4e Direct Decommissioning Activities																						
4e.1.1	ORISE confirmatory survey	-	-	-	-	-	-	151	45	197	197	-	-	-	-	-	-	-	-	-	-	-
4e.1.2	Terminate license	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-
4e.1	Subtotal Period 4e Activity Costs	-	-	-	-	-	-	151	45	197	197	-	-	-	-	-	-	-	-	-	-	-
Period 4e Additional Costs																						
4e.2.1	License Termination Survey	-	-	-	-	-	-	7,473	2,242	9,716	9,716	-	-	-	-	-	-	-	-	-	128,636	3,120
4e.2	Subtotal Period 4e Additional Costs	-	-	-	-	-	-	7,473	2,242	9,716	9,716	-	-	-	-	-	-	-	-	-	128,636	3,120
Period 4e Collateral Costs																						
4e.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,130	169	1,299	1,299	-	-	-	-	-	-	-	-	-	-	-
4e.3	Subtotal Period 4e Collateral Costs	-	-	-	-	-	-	1,130	169	1,299	1,299	-	-	-	-	-	-	-	-	-	-	-
Period 4e Period-Dependent Costs																						
4e.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4e.4.2	Property taxes	-	-	-	-	-	-	376	38	414	414	-	-	-	-	-	-	-	-	-	-	-
4e.4.3	Health physics supplies	-	738	-	-	-	-	-	185	923	923	-	-	-	-	-	-	-	-	-	-	-
4e.4.4	Disposal of DAW generated	-	-	1	0	-	19	-	5	25	25	-	-	-	335	-	-	-	-	6,698	2	-
4e.4.5	Plant energy budget	-	-	-	-	-	-	139	21	160	160	-	-	-	-	-	-	-	-	-	-	-
4e.4.6	NRC Fees	-	-	-	-	-	-	355	35	390	390	-	-	-	-	-	-	-	-	-	-	-
4e.4.7	Site O&M Costs	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	-	-
4e.4.8	Security Staff Cost	-	-	-	-	-	-	544	82	625	625	-	-	-	-	-	-	-	-	-	-	11,786
4e.4.9	DOC Staff Cost	-	-	-	-	-	-	3,801	570	4,371	4,371	-	-	-	-	-	-	-	-	-	-	46,750
4e.4.10	Utility Staff Cost	-	-	-	-	-	-	4,551	683	5,234	5,234	-	-	-	-	-	-	-	-	-	-	56,964
4e.4	Subtotal Period 4e Period-Dependent Costs	-	738	1	0	-	19	9,859	1,632	12,249	12,249	-	-	-	335	-	-	-	-	6,698	2	115,500
4e.0	TOTAL PERIOD 4e COST	-	738	1	0	-	19	18,614	4,089	23,461	23,461	-	-	-	335	-	-	-	-	6,698	128,638	118,620
PERIOD 4 TOTALS		5,700	59,032	8,501	5,364	4,341	27,262	160,152	53,916	324,267	312,618	1,022	10,627	227,308	77,669	2,629	470	505	16,810,730	872,381	1,914,899	

Table E-2
Byron Nuclear Power Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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	-	6,217	-	-	-	-	-	933	7,149	-	-	7,149	-	-	-	-	-	-	-	69,541	-
5b.1.1.2	Aux Feedwater-Steam Tunnel/Penetr. Area	-	644	-	-	-	-	-	97	741	-	-	741	-	-	-	-	-	-	-	5,185	-
5b.1.1.3	Auxiliary Building	-	5,417	-	-	-	-	-	813	6,230	-	-	6,230	-	-	-	-	-	-	-	62,063	-
5b.1.1.4	Berms, Settling Ponds, and Drying Beds	-	130	-	-	-	-	-	19	149	-	-	149	-	-	-	-	-	-	-	1,631	-
5b.1.1.5	Circulating Water Pumphouse	-	931	-	-	-	-	-	140	1,071	-	-	1,071	-	-	-	-	-	-	-	11,861	-
5b.1.1.6	Essential Service Cooling Tower	-	427	-	-	-	-	-	64	491	-	-	491	-	-	-	-	-	-	-	5,067	-
5b.1.1.7	Make-up Demineralizer Area	-	1,558	-	-	-	-	-	234	1,792	-	-	1,792	-	-	-	-	-	-	-	20,770	-
5b.1.1.8	Miscellaneous Site Structures	-	1,649	-	-	-	-	-	247	1,897	-	-	1,897	-	-	-	-	-	-	-	20,544	-
5b.1.1.9	Radwaste/Service Building	-	3,579	-	-	-	-	-	537	4,116	-	-	4,116	-	-	-	-	-	-	-	45,688	-
5b.1.1.10	Receiving Building	-	166	-	-	-	-	-	25	190	-	-	190	-	-	-	-	-	-	-	2,293	-
5b.1.1.11	Refueling Water Storage Tank	-	936	-	-	-	-	-	140	1,077	-	-	1,077	-	-	-	-	-	-	-	11,688	-
5b.1.1.12	River Screen House	-	524	-	-	-	-	-	79	603	-	-	603	-	-	-	-	-	-	-	5,869	-
5b.1.1.13	Security Modifications	-	975	-	-	-	-	-	146	1,121	-	-	1,121	-	-	-	-	-	-	-	8,636	-
5b.1.1.14	Turbine Building	-	5,246	-	-	-	-	-	787	6,033	-	-	6,033	-	-	-	-	-	-	-	70,347	-
5b.1.1.15	Turbine Pedestal	-	1,250	-	-	-	-	-	187	1,437	-	-	1,437	-	-	-	-	-	-	-	12,628	-
5b.1.1.16	Yard Inventory	-	1,876	-	-	-	-	-	281	2,158	-	-	2,158	-	-	-	-	-	-	-	20,610	-
5b.1.1.17	Fuel Handling Building	-	2,781	-	-	-	-	-	417	3,198	-	-	3,198	-	-	-	-	-	-	-	33,246	-
5b.1.1	Totals	-	34,307	-	-	-	-	-	5,146	39,453	-	-	39,453	-	-	-	-	-	-	-	407,670	-
Site Closeout Activities																						
5b.1.2	Backfill Site	-	3,308	-	-	-	-	-	496	3,804	-	-	3,804	-	-	-	-	-	-	-	9,059	-
5b.1.3	Grade & landscape site	-	267	-	-	-	-	-	40	307	-	-	307	-	-	-	-	-	-	-	869	-
5b.1.4	Final report to NRC	-	-	-	-	-	-	79	12	91	91	-	-	-	-	-	-	-	-	-	-	668
5b.1	Subtotal Period 5b Activity Costs	-	37,882	-	-	-	-	79	5,694	43,655	91	-	43,565	-	-	-	-	-	-	-	417,598	668
Period 5b Additional Costs																						
5b.2.1	Hyperbolic Cooling Tower	-	2,769	-	-	-	-	-	415	3,184	-	-	3,184	-	-	-	-	-	-	-	18,598	-
5b.2.2	ISFSI Demolition and Site Restoration	-	1,227	-	-	-	-	24	188	1,439	-	1,439	-	-	-	-	-	-	-	-	17,085	80
5b.2.3	Cofferdam Construction and Teardown	-	409	-	-	-	-	-	61	470	-	-	470	-	-	-	-	-	-	-	3,996	-
5b.2.4	Concrete Crushing	-	935	-	-	-	-	5	141	1,081	-	-	1,081	-	-	-	-	-	-	-	4,554	-
5b.2	Subtotal Period 5b Additional Costs	-	5,339	-	-	-	-	29	805	6,174	-	1,439	4,735	-	-	-	-	-	-	-	44,233	80
Period 5b Collateral Costs																						
5b.3.1	Small tool allowance	-	439	-	-	-	-	-	66	505	-	-	505	-	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	439	-	-	-	-	-	66	505	-	-	505	-	-	-	-	-	-	-	-	-
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	-	6,137	-	-	-	-	-	921	7,057	-	-	7,057	-	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	-	228	34	262	-	262	-	-	-	-	-	-	-	-	-
5b.4.5	Site O&M Cost	-	-	-	-	-	-	-	310	46	356	-	356	-	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	-	1,616	242	1,859	-	1,859	-	-	-	-	-	-	-	-	34,287
5b.4.7	DOC Staff Cost	-	-	-	-	-	-	-	11,650	1,748	13,398	-	13,398	-	-	-	-	-	-	-	-	137,043
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	-	5,559	834	6,392	-	6,392	-	-	-	-	-	-	-	-	67,229
5b.4	Subtotal Period 5b Period-Dependent Costs	-	6,137	-	-	-	-	20,602	3,949	30,687	-	-	30,687	-	-	-	-	-	-	-	-	238,558
5b.0	TOTAL PERIOD 5b COST	-	49,797	-	-	-	-	20,710	10,514	81,021	91	1,439	79,491	-	-	-	-	-	-	-	461,831	239,306
PERIOD 5 TOTALS																						
		-	49,797	-	-	-	-	20,710	10,514	81,021	91	1,439	79,491	-	-	-	-	-	-	-	461,831	239,306
TOTAL COST TO DECOMMISSION		12,014	116,926	8,754	6,272	4,341	29,293	559,208	123,797	860,604	638,996	130,850	90,758	227,308	101,683	2,629	470	505	17,415,320	1,425,062	5,345,059	

Table E-2
Byron Nuclear Power Station, Unit 2
SAFSTOR Decommissioning Cost Estimate
(thousands of 2009 dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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 16.8% CONTINGENCY:		\$860,604	thousands of 2009 dollars																		
TOTAL NRC LICENSE TERMINATION COST IS 74.25% OR:		\$638,996	thousands of 2009 dollars																		
SPENT FUEL MANAGEMENT COST IS 15.2% OR:		\$130,850	thousands of 2009 dollars																		
NON-NUCLEAR DEMOLITION COST IS 10.55% OR:		\$90,758	thousands of 2009 dollars																		
TOTAL LOW-LEVEL RADIOACTIVE WASTE VOLUME BURIED (EXCLUDING GTCC):		104,782	cubic feet																		
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:		505	cubic feet																		
TOTAL SCRAP METAL REMOVED:		74,707	tons																		
TOTAL CRAFT LABOR REQUIREMENTS:		1,425,062	man-hours																		

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

ATTACHMENT 2

**Byron Station, Units 1 and 2
Radiological Decommissioning Projected SAFSTOR Cash Flow
(dollars, thousands)**

Year	Byron Unit 1 Radiological Decommissioning Cost (October 31, 2009 dollars)	Byron Unit 2 Radiological Decommissioning Cost (October 31, 2009 dollars)
2024	\$7,735	\$0
2025	\$51,055	\$0
2026	\$16,900	\$7,570
2027	\$2,715	\$56,030
2028	\$2,722	\$33,550
2029	\$2,715	\$3,584
2030	\$3,321	\$3,584
2031	\$3,618	\$3,584
2032	\$3,627	\$3,588
2033	\$3,618	\$3,575
2034	\$3,618	\$3,575
2035	\$3,618	\$3,575
2036	\$3,627	\$3,584
2037	\$3,618	\$3,575
2038	\$3,618	\$3,575
2039	\$3,618	\$3,575
2040	\$3,627	\$3,584
2041	\$3,618	\$3,575
2042	\$3,617	\$3,575
2043	\$3,594	\$3,562
2044	\$3,604	\$3,572
2045	\$3,594	\$3,562
2046	\$3,594	\$3,562
2047	\$3,594	\$3,562
2048	\$3,604	\$3,572
2049	\$3,594	\$3,562
2050	\$3,594	\$3,562
2051	\$3,594	\$3,562
2052	\$3,604	\$3,572
2053	\$3,594	\$3,562
2054	\$3,594	\$3,562
2055	\$3,594	\$3,562
2056	\$3,604	\$3,572
2057	\$3,594	\$3,562
2058	\$3,594	\$3,562
2059	\$3,594	\$3,562
2060	\$3,604	\$3,572
2061	\$3,594	\$3,562
2062	\$3,594	\$3,562

ATTACHMENT 2

**Byron Station Units 1 and 2
Radiological Decommissioning Projected SAFSTOR Cash Flow (continued)
(dollars, thousands)**

Year	Byron Unit 1 Radiological Decommissioning Cost (October 31, 2009 dollars)	Byron Unit 2 Radiological Decommissioning Cost (October 31, 2009 dollars)
2063	\$3,594	\$3,562
2064	\$3,604	\$3,572
2065	\$3,594	\$3,562
2066	\$3,594	\$3,562
2067	\$3,594	\$3,562
2068	\$3,604	\$3,572
2069	\$3,594	\$3,562
2070	\$3,594	\$3,562
2071	\$3,594	\$3,562
2072	\$3,604	\$3,572
2073	\$3,594	\$3,562
2074	\$3,594	\$3,562
2075	\$3,594	\$3,562
2076	\$3,604	\$3,572
2077	\$10,752	\$3,562
2078	\$48,519	\$13,558
2079	\$94,144	\$35,337
2080	\$81,599	\$92,706
2081	\$41,344	\$77,074
2082	\$35,335	\$59,910
2083	\$2,176	\$59,910
2084	\$21,081	\$28,391
2085	\$85	\$37
2086	\$85	\$37
2087	\$26	\$11
Total	\$588,038	\$638,996