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July 28, 2009  
L-09-187

10 CFR 50.75

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

**SUBJECT:**

Beaver Valley Power Station Unit No. 1  
Docket No. 50-334, License No. DPR-66  
Supplemental Information for the Beaver Valley Power Station Unit No. 1  
Decommissioning Funding Report

Pursuant to 10 CFR 50.75(f)(1), on March 27, 2009, the FirstEnergy Nuclear Operating Company (FENOC), on behalf of the subsidiaries of the FirstEnergy Corp., submitted the biennial Decommissioning Funding Reports for the Beaver Valley Power Station Unit Nos. 1 and 2, the Davis-Besse Nuclear Power Station, and the Perry Nuclear Power Plant (Agencywide Documents Access and Management System [ADAMS] Accession No. ML090970287). On June 4, 2009, a teleconference was held between the NRC and FENOC staffs to discuss, in part, the status of the Beaver Valley Power Station Unit No. 1 decommissioning funding. FENOC received a letter from the Nuclear Regulatory Commission (NRC) dated June 18, 2009 (ADAMS Accession No. ML091690470) indicating that the NRC believes that there is a shortfall in the decommissioning funding for Beaver Valley Power Station Unit No. 1. A teleconference was conducted between the NRC and FENOC staffs on July 1, 2009 to discuss the issue. As a result of the teleconference, FENOC received a letter from the NRC dated July 8, 2009 (ADAMS Accession No. ML091870757) which required FENOC to submit a response concerning the Beaver Valley Power Station Unit No. 1 decommissioning funding by July 31, 2009.

Attachment 1 provides the Beaver Valley Power Station Unit No. 1 decommissioning funding status as of the end of 2008 that was contained in the FENOC March 27, 2009 letter (ADAMS Accession No. ML090970287) with additional information related to a SAFSTOR analysis and the use of a present value calculation. Though FENOC indicated in the March 27, 2009 letter that a shortfall existed when using the formula method, information was presented indicating that when a site-specific SAFSTOR analysis combined with an existing FirstEnergy Corp. Parental Guaranty is used, the decommissioning funding for Beaver Valley Power Station Unit No. 1 is considered adequate.

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During the June 4, 2009 teleconference with the NRC staff, FENOC reiterated its position that when a SAFSTOR analysis is used in combination with an existing FirstEnergy Corp. Parental Guaranty, the decommissioning funding for Beaver Valley Power Station Unit No. 1 is considered adequate. During the teleconference, the NRC indicated that three criterion need to be satisfied in order to use a SAFSTOR analysis. The criteria are:

- The value of the SAFSTOR decommissioning funding needs to be greater than the NRC minimum decommissioning funding value,
- The analysis needs to be provided to the NRC for review, and
- The analysis needs to include data for each year of the analysis.

Attachment 2 provides a copy of the Beaver Valley Power Station Unit No. 1 site-specific SAFSTOR analysis. The attachment also contains copies of the supporting Beaver Valley Power Station Unit No. 1 site-specific decommissioning analyses. The first criterion is satisfied since the site-specific SAFSTOR analysis indicates that the required decommissioning funding in 2008 dollars is \$584,454,000, which is greater than the NRC minimum funding amount of \$396,954,000. The second criterion is satisfied by the submission, for NRC review, of the Beaver Valley Power Station Unit No. 1 site-specific SAFSTOR analysis contained in Attachment 2 of this submittal. The third criterion is satisfied because the attached analysis includes information for each year of the option. Based on the contents of Attachment 2, the Beaver Valley Power Station Unit No. 1 site-specific SAFSTOR analysis combined with an existing FirstEnergy Corp. Parental Guaranty, the decommissioning funding for Beaver Valley Power Station Unit No. 1 provides reasonable assurance that adequate funds will be available consistent with the use of a combination of methods that should be acceptable to the NRC staff pursuant to 10 CFR 50.75(e)(1)(vi).

The present value method used to calculate the required amount of prepaid funds and Guaranty is consistent with the methodology used in the NRC safety evaluations that approved: 1) the transfer of the Millstone Nuclear Power Station, Unit Nos. 1, 2, and 3 to Dominion Nuclear Connecticut, Inc., dated March 9, 2001 (ADAMS Accession No. ML010160314); 2) the transfer of the operating licenses for the Nine Mile Point Nuclear Station, Unit Nos. 1 and 2 to Nine Mile Point Nuclear Station, LLC, dated June 22, 2001 (ADAMS Accession Number ML011520030); and 3) the transfer of the operating licenses for the Beaver Valley Nuclear Power Station Unit Nos. 1 and 2, the Davis-Besse Nuclear Power Station, and the Perry Nuclear Power Plant, to the extent held by select subsidiaries of the FirstEnergy Corp., to the FirstEnergy Nuclear Generation Corp., dated December 16, 2005 (ADAMS Accession Number ML053460182).

In accordance with 10 CFR 50.75(e)(1)(vi), there is reasonable assurance that adequate decommissioning funding will be provided at the end of the current operating license for Beaver Valley Power Station Unit No. 1. The current "prepaid" amount required under the SAFSTOR analysis is assured through a combination of current

prepaid trust fund balances (approximately \$201 million) and a Parent Guaranty (\$80 million) that will be reviewed annually and adjusted, if necessary, to assure the then-current required prepaid amount is satisfied through the combination of trust balances and Guaranty amount. This annual assessment and adjustment is required under Condition (2) to the NRC's Order dated December 16, 2005, which approved the transfer of licenses to FirstEnergy Nuclear Generation Corp. (FENGenCo) (ADAMS Accession No. ML053460182). In order to provide further assurance that these annual adjustments will be implemented in a manner satisfactory to the NRC staff, FENOC also proposes to implement an amendment to paragraph 8 of the existing Guaranty to provide as follows:

The guarantor agrees to submit revised financial statements, financial test data, and a special auditor's report and reconciling schedule to the NRC annually within 90 days of the close of the parent guarantor's fiscal year. In addition, within the same 90 day period, FENGenCo will annually calculate the amount of decommissioning funding assurance required using the prepayment method as compared with the value of decommissioning trust fund assets available. The Guarantor will increase or decrease the Guaranty amount to cover the difference in value and provide Notice to NRC, in the guarantor's annual submission, if any change is made to the Guaranty amount as a result of the annual assessment. If the NRC disagrees with the amount of increase or decrease in the guaranty amount made in the annual assessment, upon Notice issued by NRC to FENGenCo, FENGenCo shall promptly provide alternative additional assurance in a form and amount to be approved by the NRC.

FENOC intends to implement this amendment by October 1, 2009. This activity is considered a regulatory commitment and is contained in Attachment 3 which lists regulatory commitments.

In addition, FENOC is in the process of updating the Beaver Valley Power Station Unit Nos. 1 and 2 decommissioning study. Completion of this study is anticipated in the fourth quarter of 2009. Based upon the results of this study, and other factors, FENOC will further evaluate the decommissioning funding assurance for the Beaver Valley Power Station Unit No. 1 at the end of 2009 or early 2010. Thereafter, the FirstEnergy Corp. Parental Guaranty may be adjusted as required to ensure that adequate decommissioning funding for the Beaver Valley Power Station Unit No. 1 is assured.

Beaver Valley Power Station Unit No. 1  
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If there are any questions, or if additional information is required, please contact Mr. Thomas A. Lentz, Manager – Fleet Licensing, at (330) 761-6071.

Sincerely,

Joseph J. Hagan



Attachments

1. Decommissioning Funding Status Report – Beaver Valley Power Station, Unit No. 1
2. SAFSTOR Analysis for the Beaver Valley Power Station, Unit No. 1
3. Regulatory Commitment List

cc: NRC Region I Administrator  
NRC Resident Inspector  
NRR Project Manager  
Director BRP/DEP  
Site BRP/DEP Representative

Decommissioning Funding Status Report – Beaver Valley Power Station, Unit No. 1  
Page 1 of 3

This report reflects FirstEnergy Corp.'s consolidated share of ownership interest in Beaver Valley Power Station, Unit No. 1, as of December 31, 2008.

1. The minimum decommissioning fund estimate, pursuant to 10 CFR 50.75(b) and (c) (see Schedule 1):

FirstEnergy Nuclear Generation Corp. (FENGenCo)	\$396,953,480
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2. The amount accumulated in external trust funds at December 31, 2008:

FENGenCo	\$201,268,744
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3. A schedule of the annual amounts over the number of years remaining to be collected from ratepayers:

Amount Remaining	\$0
Number of years to Collect	0

4. The assumptions used regarding rates of escalation in decommissioning costs, rates of earnings on decommissioning funds, and rates of other factors used in funding projections:

Consolidated Ownership Interest in Unit	100%
"Real" Rate of Return through Dismantlement	2.00%
Year of Final Dismantlement	2035
Year of License Termination	2016

5. There are no contracts upon which the owners/licensees are relying pursuant to 10 CFR 50.75(e)(1)(v).
6. There has been no modification to the current method of providing decommissioning funding assurance since the last submitted report.
7. There have been no material changes to the applicable trust agreement(s) since the last submitted report.
8. FENOC recognizes that a shortfall exists when the existing trust balances and assumed earnings are compared with the NRC formula amount calculated in Item 1, above. FENOC developed a site-specific analysis using a SAFSTOR approach, which is provided as Attachment 2. This analysis utilized an escalation rate of 3.4880%, a 2% real rate of return, and an estimated final year of dismantlement of

2078. The analysis establishes a minimum estimate of prepaid decommissioning funds to be required in the amount of \$279,856,000. Assurance of this amount is provided through a combination of methods using the current prepaid trust fund balances and an existing Parental Guaranty in the amount of \$80 million, which must be adjusted annually, if necessary.

9. Present Value (PV) calculation (SAFSTOR Analysis):

Total Estimated Costs (\$2008)	\$584,454,000
Total Costs for SAFSTOR Analysis (2016-2078)	\$3,182,172,000
PV of funds required to provide financial assurance	\$279,856,000
Less Trust balance as of December 31, 2008	- \$201,268,744
Less FirstEnergy Corp. Parental Guaranty	- \$80,000,000
Total Excess	\$1,412,744

10. The PV method used to calculate the required amount of prepaid funds and Guaranty is consistent with the methodology used in the NRC safety evaluations that approved: 1) the transfer of the Millstone Nuclear Power Station, Unit Nos. 1, 2, and 3 to Dominion Nuclear Connecticut, Inc., dated March 9, 2001 (ADAMS Accession No. ML010160314); 2) the transfer of the operating licenses for the Nine Mile Point Nuclear Station, Unit Nos. 1 and 2 to Nine Mile Point Nuclear Station, LLC, dated June 22, 2001 (ADAMS Accession Number ML011520030); and 3) the transfer of the operating licenses for the Beaver Valley Nuclear Power Station Unit Nos. 1 and 2, the Davis-Besse Nuclear Power Station, and the Perry Nuclear Power Plant, to the extent held by select subsidiaries of the FirstEnergy Corp., to the FirstEnergy Nuclear Generation Corp., dated December 16, 2005 (ADAMS Accession Number ML053460182).

**Schedule 1**  
**FIRSTENERGY CORP.**  
 Calculation of Minimum Financial Assurance Amount  
 December 31, 2008  
**BEAVER VALLEY POWER STATION, UNIT NO. 1**

**Pennsylvania Regions**

Labor (L) = Northeast  
 Energy (E) = National  
 Waste Burial (B) = South Carolina

**For PWR Unit**

	Adjustment Factor	Ratio	Escalation Factor
L =	2.370	0.65	1.541
E =	1.816	0.13	0.236
B =	9.872	0.22	2.172

PWR Escalation Factor = 3.949

Base Amount for PWR between 1200 MWt and 3400 MWt =  $(\$75m + 0.0088P)$   
 (P = power level in megawatts thermal = 2,900)

$(\$75 + 0.0088(2,900))$  million = \$100,520,000

Escalated Amount for unit =  
 $100,520,000 \times 3.949 =$  **\$396,953,480**

<u>Owner/Licensee</u>	<u>Ownership</u>	
FirstEnergy Nuclear Generation Corp.	100.00%	<b>\$396,953,480</b>

Attachment 2  
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SAFSTOR Analysis for the Beaver Valley Power Station, Unit No. 1  
Page 1 of 5

SAFSTOR Analysis (\$ Thousands)

3.4880% Effective Escalation Rate included in the Cash Flows  
2.0000% NRC allowed Rate of Return  
5.4880% Earnings Rate of Return

<b>BALANCE REQUIRED</b>	<b>279,856</b>	<b>Trust Fund Balance</b>	<b>201,269</b>	<b>Shortfall</b>	<b>(78,587)</b>
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	Year	Earnings	NRC License Termination Cost Escalated \$	Balance
1	2009	15,358	-	295,214
2	2010	16,201	-	311,416
3	2011	17,091	-	328,506
4	2012	18,028	-	346,535
5	2013	19,018	-	365,553
6	2014	20,062	-	385,614
7	2015	21,163	-	406,777
8	2016	22,324	(36,200)	392,901
9	2017	21,562	(60,756)	353,708
10	2018	19,411	(25,844)	347,275
11	2019	19,058	(26,505)	339,829
12	2020	18,650	(27,264)	331,214
13	2021	18,177	(18,506)	330,885
14	2022	18,159	(6,131)	342,913
15	2023	18,819	(6,343)	355,389
16	2024	19,504	(6,580)	368,313
17	2025	20,213	(6,791)	381,735
18	2026	20,950	(7,028)	395,657
19	2027	21,714	(7,273)	410,097
20	2028	22,506	(7,547)	425,057
21	2029	23,327	(7,790)	440,593
22	2030	24,180	(8,062)	456,711
23	2031	25,064	(8,343)	473,432
24	2032	25,982	(8,655)	490,759
25	2033	26,933	(8,933)	508,759
26	2034	27,921	(9,245)	527,435
27	2035	28,946	(9,569)	546,812
28	2036	30,009	(9,932)	566,889
29	2037	31,111	(10,253)	587,747
30	2038	32,256	(10,612)	609,390
31	2039	33,443	(10,987)	631,847
32	2040	34,676	(11,405)	655,118
33	2041	35,953	(11,777)	679,295
34	2042	37,280	(12,192)	704,383
35	2043	38,657	(12,623)	730,416
36	2044	40,085	(13,105)	757,396
37	2045	41,566	(13,534)	785,428
38	2046	43,104	(14,012)	814,520
39	2047	44,701	(14,510)	844,711

Attachment 2  
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40	2048	46,358	(15,065)	876,004
41	2049	48,075	(15,559)	908,520
42	2050	49,860	(16,113)	942,267
43	2051	51,712	(16,685)	977,294
44	2052	53,634	(17,324)	1,013,603
45	2053	55,627	(17,895)	1,051,335
46	2054	57,697	(18,532)	1,090,500
47	2055	59,847	(19,194)	1,131,153
48	2056	62,078	(19,930)	1,173,300
49	2057	64,391	(20,577)	1,217,114
50	2058	66,795	(17,220)	1,266,689
51	2059	69,516	(17,833)	1,318,372
52	2060	72,352	(18,517)	1,372,207
53	2061	75,307	(19,128)	1,428,386
54	2062	78,390	(19,809)	1,486,966
55	2063	81,605	(20,516)	1,548,055
56	2064	84,957	(21,305)	1,611,707
57	2065	88,450	(22,008)	1,678,150
58	2066	92,097	(22,793)	1,747,453
59	2067	95,900	(23,609)	1,819,744
60	2068	99,868	(24,518)	1,895,094
61	2069	104,003	(189,838)	1,809,258
62	2070	99,292	(407,675)	1,500,875
63	2071	82,368	(659,167)	924,076
64	2072	50,713	(319,861)	654,928
65	2073	35,942	(311,311)	379,559
66	2074	20,830	(23,070)	377,320
67	2075	20,707	(148,347)	249,680
68	2076	13,702	(135,446)	127,937
69	2077	7,021	(133,128)	1,830
70	2078	100	(1,893)	38

(3,182,172)

SAFSTOR Analysis Cash Flows (Escalated \$) (\$ Thousands)

	Cost Escalated \$ (1)	NRC License Termination Cost (2) 75.74%	Spent Fuel Management (2) 18.87%	Site Restoration (2) 5.39%
2016	47,796	36,200	9,021	2,575
2017	80,218	60,756	15,141	4,321
2018	34,123	25,844	6,441	1,838
2019	34,995	26,505	6,605	1,885
2020	35,998	27,264	6,795	1,939
2021	24,434	18,506	4,612	1,316
2022	8,095	6,131	1,528	436
2023	8,375	6,343	1,581	451
2024	8,688	6,580	1,640	468
2025	8,967	6,791	1,692	483
2026	9,279	7,028	1,751	500
2027	9,603	7,273	1,813	517
2028	9,964	7,547	1,881	537
2029	10,286	7,790	1,941	554
2030	10,645	8,062	2,009	573
2031	11,015	8,343	2,079	593
2032	11,428	8,655	2,157	616
2033	11,795	8,933	2,226	635
2034	12,206	9,245	2,304	658
2035	12,634	9,569	2,385	681
2036	13,113	9,932	2,475	706
2037	13,537	10,253	2,555	729
2038	14,012	10,612	2,645	755
2039	14,506	10,987	2,738	781
2040	15,058	11,405	2,842	811
2041	15,549	11,777	2,935	838
2042	16,097	12,192	3,038	867
2043	16,667	12,623	3,146	898
2044	17,303	13,105	3,266	932
2045	17,869	13,534	3,373	963
2046	18,501	14,012	3,492	997
2047	19,158	14,510	3,616	1,032
2048	19,891	15,065	3,754	1,072
2049	20,543	15,559	3,877	1,107
2050	21,274	16,113	4,015	1,146
2051	22,030	16,685	4,158	1,187
2052	22,874	17,324	4,317	1,232
2053	23,627	17,895	4,460	1,273
2054	24,469	18,532	4,618	1,318
2055	25,342	19,194	4,783	1,365
2056	26,315	19,930	4,967	1,418

2057	27,169	20,577	5,128	1,464
2058	22,736	17,220	4,291	1,225
2059	23,546	17,833	4,444	1,268
2060	24,449	18,517	4,615	1,317
2061	25,255	19,128	4,767	1,361
2062	26,155	19,809	4,937	1,409
2063	27,088	20,516	5,113	1,459
2064	28,130	21,305	5,309	1,515
2065	29,058	22,008	5,485	1,565
2066	30,095	22,793	5,680	1,621
2067	31,172	23,609	5,884	1,679
2068	32,372	24,518	6,110	1,744
2069	250,651	189,838	47,310	13,503
2070	538,269	407,675	101,597	28,997
2071	870,324	659,167	164,271	46,886
2072	422,325	319,861	79,713	22,751
2073	411,036	311,311	77,582	22,143
2074	30,460	23,070	5,749	1,641
2075	195,868	148,347	36,969	10,552
2076	178,834	135,446	33,754	9,634
2077	175,774	133,128	33,177	9,469
2078	2,499	1,893	472	135
	4,201,544	3,182,172	793,028	226,343

- (1) Refer to Pages 19-20 of 22 of the *FINANCIAL ESCALATION ANALYSIS for the DECOMMISSIONING OF BEAVER VALLEY POWER STATION*, October 2005, which is attached.
- (2) Due to mathematical rounding performed by the EXCEL Spreadsheet, some of the values may be different if hand calculations are performed.

SAFSTOR Analysis Summary (\$ Thousands)

	NRC Formula Method	Site- Specific Costs 2005\$ (1)	% of Total	Cost Escalation Rate	Site- Specific Costs Escalated to 2008\$
<b>SAFSTOR</b>					
NRC License Termination Cost	396,954	527,327	75.74%	3.4880%	584,454 (2)
Spent Fuel Management		131,415	18.87%		131,415
Site Restoration		<u>37,508</u>	5.39%		<u>37,508</u>
<b>Total</b>		<b>696,250</b>			<b>753,377</b>

<b>SUMMARY</b>	
Balance Required	279,856
Trust Fund Balance	<u>201,269</u>
Shortfall/(Excess)	78,587
<b>Current Parental Guaranty</b>	<b>80,000</b>

(1) Refer to Page xv of xv of the DECOMMISSIONING COST ANALYSIS for the BEAVER VALLEY POWER STATION, August 2005, which is attached.  
 (2) 2005 Site-Specific SAFSTOR cost escalated to 2008 exceeds the NRC Formula.

Attachment 2  
L-09-187

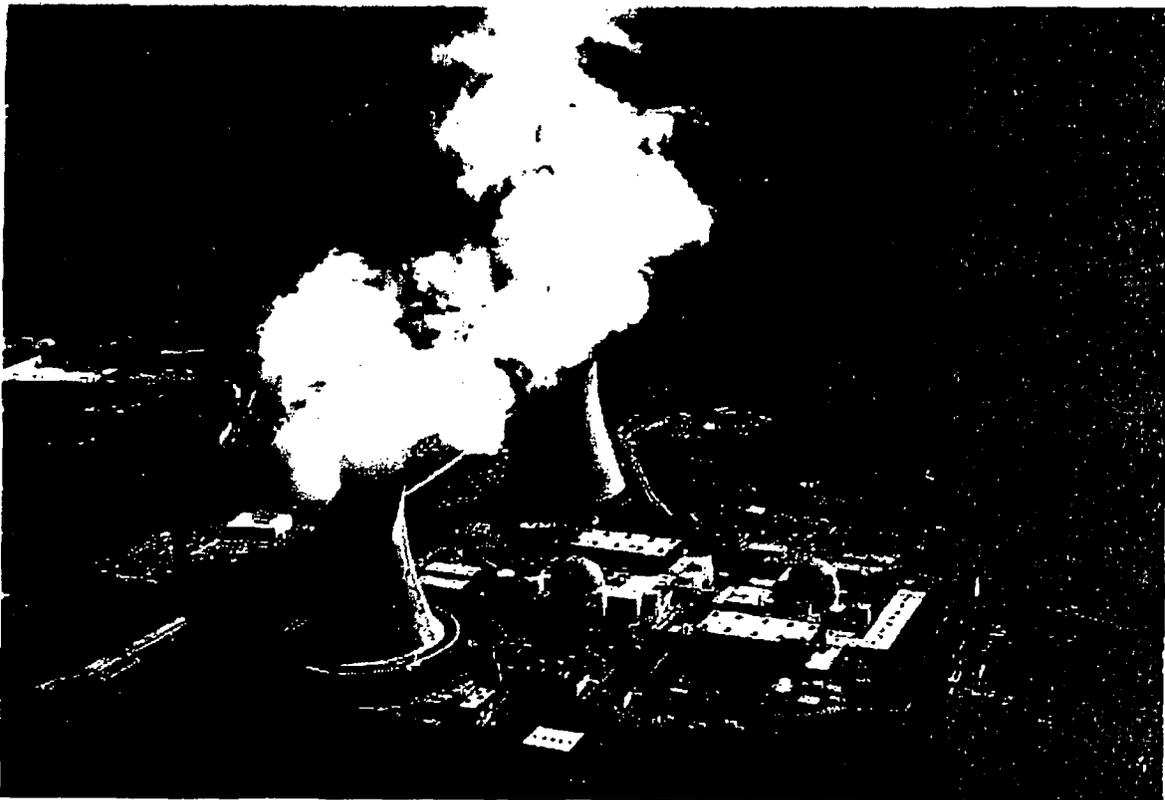
*DECOMMISSIONING COST ANALYSIS for  
the BEAVER VALLEY POWER STATION*

(142 Pages excluding this page)

**DECOMMISSIONING COST ANALYSIS**

for the

**BEAVER VALLEY POWER STATION**



*prepared for*

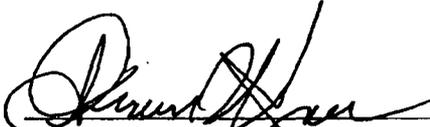
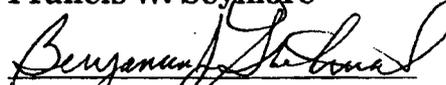
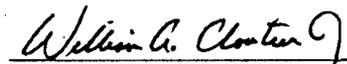
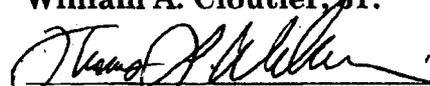
**FirstEnergy Corporation**

*prepared by*

**TLG Services, Inc.**  
Bridgewater, Connecticut

**August 2005**

APPROVALS

Project Manager	 Francis W. Seymore	<u>8/31/05</u> Date
Project Engineer	 Benjamin J. Stochmal	<u>8/31/05</u> Date
Technical Manager	 William A. Cloutier, Jr.	<u>08/31/05</u> Date
Quality Assurance Manager	 Thomas L. Williamson	<u>8/31/05</u> Date

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**REVISION LOG**

No.	CRA No.	Date	Item Revised	Reason for Revision
0		8-31-05		Original Issue

## EXECUTIVE SUMMARY

This report presents estimates of the cost to decommission the Beaver Valley Power Station (Beaver Valley) for the identified decommissioning scenarios following the scheduled cessation of plant operations. The analysis relies upon site-specific, technical information, originally developed in an evaluation for the Duquesne Light Company (the prior operator of Beaver Valley) in 1997<sup>[1]</sup> to reflect current assumptions pertaining to the disposition of the nuclear units and relevant industry experience in undertaking such projects. The updated estimates are designed to provide the FirstEnergy Company (FirstEnergy) 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 the plant's storage pool and/or in an independent spent fuel storage installation (ISFSI) until such time that it can be transferred to a U.S. Department of Energy (DOE) facility. Consequently, the estimates also include those costs to manage and subsequently decommission these storage facilities.

The 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 5½ years for the spent fuel that resides in the storage pool when operations cease. In the scenarios evaluated, any residual fuel remaining in the pool after the 5½-year period is relocated to the ISFSI to await transfer to a DOE facility. The estimates also include the dismantling of non-essential structures and limited restoration of the site.

### Alternatives and Regulations

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

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<sup>1</sup> "Decommissioning Cost Study for the Beaver Valley Power Station," Document No. D04-1241-002, TLG Services, Inc., October 1997.

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

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."<sup>[3]</sup>

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."<sup>[4]</sup> 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."<sup>[5]</sup> As with the SAFSTOR alternative, decommissioning is currently required to be completed within 60 years.

The 60-year restriction has limited the practicality for the ENTOMB alternative at commercial reactors that generate significant amounts of long-lived radioactive material. In 1997, the Commission directed its staff to re-evaluate this alternative and identify the technical requirements and regulatory actions that would be necessary for entombment to become a viable option. The resulting evaluation provided several recommendations, however, rulemaking has been deferred pending the completion of additional research studies, e.g., on engineered barriers.

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.<sup>[6]</sup> The amendments allow for greater

<sup>3</sup> Ibid. Page FR24022, Column 3.

<sup>4</sup> Ibid.

<sup>5</sup> Ibid. Page FR24023, Column 2.

<sup>6</sup> U.S. Code of Federal Regulations, Title 10, Parts 2, 50, and 51, "Decommissioning of Nuclear Power Reactors," Nuclear Regulatory Commission, Federal Register Volume 61, (p 39278 et

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.

### Decommissioning Scenarios

Two decommissioning scenarios are evaluated for the two nuclear units. The scenarios selected are representative of alternatives available to the owner and are defined as follows:

1. **DECON:** The operating licenses for Units 1 and 2 currently expire in January 2016 and May 2027, respectively. Given the large offset in shutdown dates, Unit 1 is assumed to be placed into a SAFSTOR mode until after Unit 2 has completed operations and begun field decommissioning activities. Unit 1 then follows in the decommissioning sequence until the final site survey and license termination. This sequence was developed so as to minimize the total duration of the physical dismantling processes. Any residual spent fuel is transferred to the existing site ISFSI so as to facilitate decontamination and dismantling activities within the fuel handling building. Spent fuel storage operations continue at the site until the transfer of the fuel to the DOE is complete, assumed to be in the year 2053.
2. **SAFSTOR:** Both units are placed into safe-storage in the second scenario. However, decommissioning is deferred beyond the fuel storage period to the maximum extent possible; termination of the licenses would conclude within the maximum required 60-year period. Spent fuel remaining in the spent fuel storage pool after a minimum cooling period of 5½ years is transferred to the existing site ISFSI for interim storage. As with the first scenario, decommissioning activities at the two units are sequenced and integrated so as to minimize the total duration of the physical dismantling processes.

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seq.), July 29, 1996.

### Methodology

The methodology used to develop the estimate described within this document follows the basic approach originally presented in the cost estimating guidelines<sup>7</sup> developed by the Atomic Industrial Forum (now Nuclear Energy Institute). This reference describes a unit factor method for determining decommissioning activity costs. The unit factors used in this analysis incorporate site-specific costs and the latest available information on worker productivity in decommissioning.

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

### Contingency

Consistent with cost estimating practice, contingencies are applied to the decontamination and dismantling costs developed as "specific provision for unforeseeable elements of cost within the defined project scope, particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur."<sup>8</sup> The cost elements in the estimates are based on ideal conditions; therefore, the types of unforeseeable events that are almost certain to occur in decommissioning, based on industry experience, are addressed through a percentage contingency applied on a line-item basis. This contingency factor is a nearly universal element in all large-scale construction and demolition projects. It should be noted that contingency, as used in this analysis, does not account for price escalation and inflation in the cost of decommissioning over the remaining operating life of the station.

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

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<sup>7</sup> T.S. LaGuardia et al., "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," AIF/NESP-036, May 1986.

<sup>8</sup> Project and Cost Engineers' Handbook, Second Edition, American Association of Cost Engineers, Marcel Dekker, Inc., New York, New York, p. 239.

### Low-Level Radioactive Waste Disposal

The contaminated and activated material generated in the decontamination and dismantling of a commercial nuclear reactor is classified as low-level (radioactive) waste, although not all of the material is suitable for "shallow-land" disposal. With the passage of the "Low-Level Radioactive Waste Policy Act" in 1980,<sup>[9]</sup> and its Amendments of 1985,<sup>[10]</sup> the states became ultimately responsible for the disposition of low-level radioactive waste generated within their own borders.

Beaver Valley is currently able to access the disposal facility in Barnwell, South Carolina. However, in June 2000, South Carolina formally joined with Connecticut and New Jersey to form the Atlantic Compact. The legislation provides for South Carolina to gradually limit access to the Barnwell facility, with only Atlantic Compact members having access to the facility after mid-year 2008. With the closing of one of the two currently accessible commercial disposal sites, it is reasonable to assume that additional disposal capacity will be available to support reactor decommissioning, particularly for the isolation of the more highly radioactive material that is not suitable for disposal elsewhere. For estimating purposes, and as a proxy for future disposal facilities, waste disposal costs are estimated using available pricing schedules for the currently operating facilities, i.e., at Barnwell and the Envirocare facility in Utah.

### High-Level Radioactive Waste Management

Congress passed the "Nuclear Waste Policy Act"<sup>[11]</sup> (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 have initiated legal action against the DOE. While

<sup>9</sup> "Low-Level Radioactive Waste Policy Act of 1980," Public Law 96-573, 1980.

<sup>10</sup> "Low-Level Radioactive Waste Policy Amendments Act of 1985," Public Law 99-240, 1986.

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

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, the successful resolution of pending litigation, and the development of a national transportation system. For comparison, the Private Fuel Storage consortium submitted an application for an interim storage facility in 1997. The Atomic Safety and Licensing Board only recently recommended that an operating license be granted for the facility, after nearly eight years. With a more technically complex and politically sensitive application for permanent disposal, it is not unreasonable to expect that the NRC's approval to construct the repository at Yucca Mountain would require at least as long a review period. Construction would therefore begin sometime around the year 2010, at the earliest. The DOE has no plans for receiving spent fuel from commercial nuclear plant sites prior to this date and startup operations may be phased in, creating additional delays. For estimating purposes, FirstEnergy has assumed that the high-level waste repository, or some interim storage facility, will be fully operational by 2015. This timetable is consistent with the findings of an evaluation issued to Congress by the Government Accounting Office.<sup>[12]</sup>

The NRC requires that licensees establish a program to manage and provide funding for the caretaking of all irradiated fuel at the reactor site until title of the fuel is transferred to the DOE.<sup>[13]</sup> The fuel will be stored in the storage pool and/or an ISFSI located on the Beaver Valley site until the DOE has completed the transfer.

The ISFSI, which is independently licensed and operated, will be operational prior to the cessation of plant operations. For the DECON and SAFSTOR scenarios, the facility is expanded to accommodate the inventory of spent fuel residing in the plant's storage pools at the conclusion of the required cooling period. Once emptied, the fuel handling buildings can be either decontaminated and dismantled or prepared for long-term storage.

The DOE's generator allocation/receipt schedules are based upon the oldest fuel receiving the highest priority. Given this scenario and an anticipated rate of transfer, spent fuel is projected to remain at the site for approximately 26 years after the cessation of Unit 2 operations. Consequently, costs are included within the

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<sup>12</sup> "Technical, Schedule, and Cost Uncertainties of the Yucca Mountain Repository Project," GAO-02-191, December 2001.

<sup>13</sup> "Domestic Licensing of Production and Utilization Facilities," U.S. Code of Federal Regulations, Title 10, Part 50.54 (bb).

estimates for the long-term caretaking of the spent fuel at the Beaver Valley site until the year 2053.

### Site Restoration

The efficient removal of the contaminated materials at the site may result in damage to many of the site structures. Blasting, coring, drilling, and the other decontamination activities will substantially damage power block structures, potentially weakening the footings and structural supports. Prompt 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 Beaver Valley were evaluated for two decommissioning scenarios, i.e. 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 NRC 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 and D. Cost summaries for the various scenarios are provided at the end of this section for the major cost components.

**SUMMARY OF DECOMMISSIONING COST ELEMENTS**  
**SAFSTOR/DECON**  
(thousands of 2005 dollars)

<b>Activity</b>	<b>Unit 1</b>	<b>Unit 2</b>	<b>Total</b>
Decontamination	13,282	11,002	24,284
Removal	87,255	93,005	180,260
Packaging	13,202	13,572	26,773
Transportation	7,427	7,461	14,888
Waste Disposal	46,781	52,740	99,521
Off-site Waste Processing	14,883	17,447	32,330
Program Management [1]	260,576	206,371	466,947
Spent Fuel Pool Isolation	9,900	6,600	16,501
Spent Fuel Management	95,909	78,481	174,390
Insurance and Regulatory Fees	24,226	16,426	40,652
Energy	5,486	4,172	9,658
Characterization and Licensing Surveys	10,633	9,171	19,804
Property Taxes	40,246	29,503	69,749
Miscellaneous Equipment	8,935	5,903	14,839
<b>Total [2]</b>	<b>638,742</b>	<b>551,854</b>	<b>1,190,596</b>
NRC License Termination	376,746	366,801	743,548
Spent Fuel Management	208,238	139,677	347,914
Site Restoration	53,758	45,376	99,134

[1] Includes engineering and security

[2] Columns may not add due to rounding

**SUMMARY OF DECOMMISSIONING COST ELEMENTS  
SAFSTOR**

(thousands of 2005 dollars)

<b>Activity</b>	<b>Unit 1</b>	<b>Unit 2</b>	<b>Total</b>
Decontamination	11,235	12,042	23,277
Removal	76,156	103,930	180,086
Packaging	10,288	10,347	20,635
Transportation	5,440	5,660	11,100
Waste Disposal	38,000	39,432	77,432
Off-site Waste Processing	16,263	17,767	34,030
Program Management [1]	299,203	286,871	586,074
Spent Fuel Pool Isolation	9,900	6,600	16,501
Spent Fuel Management	92,768	75,323	168,090
Insurance and Regulatory Fees	41,000	34,112	75,112
Energy	8,024	7,651	15,675
Characterization and Licensing Surveys	10,633	10,633	21,266
Property Taxes	58,764	48,021	106,785
Miscellaneous Equipment	18,574	19,461	38,035
<b>Total [2]</b>	<b>696,250</b>	<b>677,849</b>	<b>1,374,098</b>
<b>NRC License Termination</b>	<b>527,327</b>	<b>515,187</b>	<b>1,042,513</b>
<b>Spent Fuel Management</b>	<b>131,415</b>	<b>94,386</b>	<b>225,801</b>
<b>Site Restoration</b>	<b>37,508</b>	<b>68,276</b>	<b>105,783</b>

[1] Includes engineering and security

[2] Columns may not add due to rounding

## **1. INTRODUCTION**

This report presents estimates of the cost to decommission the Beaver Valley Power Station (Beaver Valley), for the scenarios described in Section 2, following a scheduled cessation of plant operations. The analysis is designed to provide the FirstEnergy Corporation (FirstEnergy) with sufficient information to assess its financial obligations, as they pertain to the eventual decommissioning of the nuclear station. It is not a detailed engineering document, but a financial analysis prepared in advance of the detailed engineering that will be required to carry out the decommissioning.

### **1.1 OBJECTIVES OF STUDY**

The objectives of this study are to prepare comprehensive estimates of the cost to decommission Beaver Valley, to provide a sequence or schedule for the associated activities, and to develop waste stream projections from the decontamination and dismantling activities. For the purposes of this study, the shutdown of the two units is assumed to be on January 29, 2016 and May 27, 2027, respectively, the current operating licenses' expiration date.

### **1.2 SITE DESCRIPTION**

The Beaver Valley Power Station is located on the south bend of the Ohio River in Beaver County, 25 miles northwest of Pittsburgh, PA. The station is comprised of two essentially identical pressurized water reactors with supporting facilities.

The Nuclear Steam Supply System (NSSS) for each unit consists of a pressurized water reactor system designed by Westinghouse Electric Corporation. The Reactor Coolant System is comprised of the reactor vessel and three heat transfer loops, each containing a vertical shell and U-tube steam generator, and a vertical centrifugal reactor coolant pump. In addition, the system includes an electrically heated pressurizer, a pressurizer relief tank, and interconnecting piping and valves. The design reactor thermal power level is 2,689 megawatts thermal. The corresponding net electrical output is approximately 821 and 831 megawatts electric, respectively, for Units 1 and 2. The NSSS system is housed within the Reactor Building, which is a heavily reinforced concrete, steel-lined vessel with a flat base mat, cylindrical walls, and a hemispherical dome.

Heat produced in the reactor is converted to electrical energy by the Steam and Power Conversion System. A turbine-generator system converts the thermal energy of steam produced in the steam generators into mechanical shaft power and then into electrical energy. The turbine consists of a high-pressure double flow turbine element, four moisture separator/reheater assemblies, and two double-flow low-pressure turbine elements, all aligned in tandem. The generator is a hydrogen-cooled, rotor-arch-stator unit, driven at 1,800 rpm and rated as 1,026 MVA. The turbines are operated in a closed feedwater cycle which condenses the steam; the heated feedwater is returned to the steam generators. Heat rejected in the main condensers is removed by the Circulating Water System (CWS).

The CWS provides the cooling water for the main condenser of the turbine generator unit. It is a closed-loop system consisting of cooling tower pumps, a pumphouse, circulating water and blowdown piping, main condenser vacuum priming system, mechanical tube cleaning system, and a natural draft cooling tower. Makeup water is supplied to the closed loop CWS by discharging the plant service water into the circulating water condenser discharge lines.

### **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.<sup>[1]</sup>\* 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,"<sup>[2]</sup> which provided additional guidance to the licensees of nuclear facilities on the financial methods acceptable to the NRC staff for complying with the requirements of the rule. The regulatory guide addressed the funding requirements and provided guidance on the content and form of the financial assurance mechanisms indicated in the rule.

The rule defined three decommissioning alternatives as being acceptable to the NRC: DECON, SAFSTOR, and ENTOMB. The DECON alternative assumes that any contaminated or activated portion of the plant's systems,

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

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.<sup>[3]</sup> 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.<sup>[4]</sup> However, the NRC 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 revisions to the general requirements for decommissioning nuclear power plants in 1996.<sup>[5]</sup> 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 an application to the NRC to terminate the license, which will include a License Termination Plan (LTP).

#### 1.3.1 Nuclear Waste Policy Act

Congress passed the Nuclear Waste Policy Act<sup>(6)</sup> (NWPA) in 1982, assigning the responsibility for disposal of the spent nuclear fuel created by the commercial nuclear generating plants to the U.S. Department of Energy (DOE). Two permanent disposal facilities and an interim storage facility were envisioned. 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.

After pursuing a national site selection process, the NWPA was amended in 1987 to designate Yucca Mountain, Nevada, as the only site to be evaluated for geologic disposal of high-level waste. Also in 1987, the DOE announced a five-year delay (1998 to 2003) in the opening date for the repository. Two years later, in 1989, an additional seven-year delay was announced, primarily due to problems in obtaining the permits necessary from the state of Nevada to perform the required characterization of the site. In 2005, the DOE stated that operations at the repository would not begin before 2012 due to delays in the license application.

Generators have responded to this impasse by initiating legal action against the DOE and constructing supplemental storage as a means of maintaining necessary fuel storage operating margins. In an August 2000 ruling,<sup>[7]</sup> the U.S. Court of Appeals for the Federal Circuit reaffirmed the utility position that DOE had breached its contractual obligation. The DOE continues to maintain that its delayed performance is unavoidable because it does not have an operational repository and does not have authority to provide storage in the interim. Consequently the DOE has no plans to receive spent fuel from the commercial reactors until the repository is operational.

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 Title 10 of the Code of Federal Regulations (10 CFR), §50.54 (bb).<sup>[8]</sup> This funding requirement is fulfilled through inclusion of certain high-level waste cost elements in the decommissioning estimates, as identified in Section 3.

FirstEnergy expects to construct an independent spent fuel storage installation (ISFSI) on the Beaver Valley site prior to final plant shutdown to support plant operations. It is expected that this facility will be available to support decommissioning operations. In the scenarios evaluated, the ISFSI is expanded to accommodate the inventory of spent fuel residing in the plant's storage pools at the conclusion of the required cooling period. Once emptied, the fuel handling buildings can be either decontaminated and dismantled or prepared for long-term storage.

For estimating purposes, the DOE is assumed to initiate spent fuel receipt from commercial generators in the year 2015. The DOE's generator allocation/receipt schedules are based upon the oldest fuel receiving the highest priority. Given this scenario and an anticipated rate of transfer, spent fuel is projected to remain at the Beaver Valley site for approximately 26 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 2053.

### 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,<sup>[9]</sup> 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,"<sup>[10]</sup> 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.

Beaver Valley is currently able to access the disposal facility in Barnwell, South Carolina. However, in June 2000, South Carolina formally joined with Connecticut and New Jersey to form the Atlantic Compact. The legislation provides for South Carolina to gradually limit access to the Barnwell facility, with only Atlantic Compact members having access to the facility after mid-year 2008. With the closing of one of the two currently accessible commercial disposal sites, it is reasonable to assume that additional disposal capacity will be available to support reactor decommissioning, particularly for the isolation of the more highly radioactive material that is not suitable for disposal elsewhere. For estimating purposes, and as a proxy for future disposal facilities, waste disposal costs are estimated using available pricing schedules for the currently operating facilities, i.e., at Barnwell and the Envirocare facility in Utah.

### 1.3.3 Radiological Criteria for License Termination

In 1997, the NRC published Subpart E, "Radiological Criteria for License Termination,"<sup>[11]</sup> 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 Beaver Valley 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).<sup>[12]</sup> An additional limit of 4 millirem per year, as defined in 40 CFR §141.16, is applied to drinking water.<sup>[13]</sup>

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)<sup>[14]</sup> 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 Beaver Valley utilizing 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.

Two decommissioning scenarios were evaluated for the two nuclear units. The scenarios selected are representative of alternatives available to the owner and are defined as follows:

1. **DECON:** The operating licenses for Units 1 and 2 currently expire in January 2016 and May 2027, respectively. The first scenario assumes that decommissioning activities at the two units are sequenced and integrated so as to minimize the total duration of the physical dismantling processes. Any residual spent fuel is transferred to the ISFSI so as to facilitate decontamination and dismantling activities within the fuel handling building. Spent fuel storage operations continue at the site until the transfer of the fuel to the DOE is complete, assumed to be in the year 2053.
2. **SAFSTOR:** The units are placed into safe-storage in the second scenario. However, decommissioning is deferred beyond the fuel storage period to the maximum extent possible; termination of the licenses would conclude within the maximum required 60-year period. Spent fuel remaining in the spent fuel storage pool after a minimum cooling period of 5½ years is transferred to the ISFSI for interim storage. As with the first scenario, decommissioning activities at the two units are sequenced and integrated so as to minimize the total duration of the physical dismantling processes.

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

The conceptual approach that the NRC has described in its regulations divides decommissioning into three phases. The initial phase commences with the effective date of permanent cessation of operations and involves the transition of both plant and licensee from reactor operations (i.e., power production) to facility 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 Beaver Valley are also divided into phases or periods; however, demarcation of the phases is based upon major milestones within the project or significant changes in the projected expenditures.

## **2.1 DECON**

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

### **2.1.1 Period 1 - Preparations**

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

#### **Engineering and Planning**

The PSDAR, required within two years of the notice to cease operations, provides a description of the licensee's planned decommissioning activities, a timetable, and the associated financial requirements of the intended decommissioning program. Upon receipt

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

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

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

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

- Initial characterization of the site and surrounding environs. This includes radiation surveys of work areas, major components (including the reactor vessel and its internals), internal piping, and primary shield cores.
- Expansion of the existing ISFSI for the interim storage of spent fuel in the fuel storage pool.
- Isolation of the spent fuel storage pools and fuel handling systems, such that decommissioning operations can commence on the balance of the plant. Decommissioning operations are scheduled around the fuel handling area to optimize the overall project schedule. The fuel is transferred to the DOE or 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 pools remain operational for approximately 5½ years following the cessation of plant operations.
- Specification of transport and disposal requirements for activated materials and/or hazardous materials, including shielding and waste stabilization.
- Development of procedures for occupational exposure control, control and release of liquid and gaseous effluent, processing of radwaste (including dry-active waste, resins, filter media, metallic and non-metallic components generated in decommissioning), site security and emergency programs, and industrial safety.

#### 2.1.2 Period 2 - Decommissioning Operations

This period includes the physical decommissioning activities associated with the removal and disposal of contaminated and activated components and structures, including the successful termination of the 10 CFR §50 operating licenses. 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 buildings to support the segmentation of the reactor vessel internals and component extraction.
- Design and fabrication of temporary and permanent shielding to support removal and transportation activities, construction of contamination control envelopes, and the procurement of specialty tooling.
- Procurement (lease or purchase) of shipping canisters, cask liners, and industrial packages.
- Decontamination of components and piping systems as required to control (minimize) worker exposure.
- Removal of piping and components no longer essential to support decommissioning operations.
- 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 neutron shield tank, 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 grout. Steel shielding will be 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 DOE and ISFSI pad for interim storage.

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

via the approved LTP, 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)."<sup>15]</sup> This document incorporates the statistical approaches to survey design and data interpretation used by the EPA. It also identifies state-of-the-art, commercially available instrumentation and procedures for conducting radiological surveys. Use of this guidance ensures that the surveys are conducted in a manner that provides a high degree of confidence that applicable NRC criteria are satisfied. Once the survey is complete, the results are provided to the NRC in a format that can be verified. The NRC then reviews and evaluates the information, performs an independent confirmation of radiological site conditions, and makes a determination on final termination of the license.

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

### 2.1.3 Period 3 - Site Restoration

Following completion of decommissioning operations, site restoration activities will begin. Efficient removal of the contaminated materials and verification that residual radionuclide concentrations are below the NRC limits will result in substantial damage to many of the structures. Although performed in a controlled, safe manner, blasting, coring, drilling, scarification (surface removal), and the other decontamination activities will substantially degrade power block structures including the reactor 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 a separate and independent license (10 CFR §72) following the termination of the §50 operating licenses. Assuming the DOE starts accepting fuel in 2015, transfer of spent fuel from Beaver Valley is anticipated to begin in 2015 and continue through the year 2053.

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

The assumed design for the ISFSI is based upon the use of a multi-purpose canister and a concrete overpack for pad storage. For purposes of this cost analysis, it is assumed that once the inner canisters

containing the spent fuel assemblies have been removed, any required decontamination performed, and the license for the facility terminated, the modules can be dismantled using conventional techniques for the demolition of reinforced concrete. The concrete storage pad will then be removed, and the area graded and landscaped to conform to the surrounding environment.

## **2.2 SAFSTOR**

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

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

### **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 buildings so that safe-storage operations may commence on the balance of the plant. This activity

may be carried out by plant personnel in accordance with existing operating technical specifications. Activities are scheduled around the fuel handling systems to the greatest extent possible.

- Draining and de-energizing of the non-contaminated systems not required to support continued site operations or maintenance.
- Disposing of contaminated filter elements and resin beds not required for processing wastes from layup activities for future operations.
- Draining of the reactor vessel, with the internals left in place and the vessel head secured.
- Draining and de-energizing non-essential, contaminated systems with decontamination as required for future maintenance and inspection.
- Preparing lighting and alarm systems whose continued use is required; de-energizing portions of fire protection, electric power, and HVAC systems whose continued use is not required.
- Cleaning of the loose surface contamination from building access pathways.
- Performing an interim radiation survey of plant, posting warning signs where appropriate.
- Erecting physical barriers and/or securing all access to radioactive or contaminated areas, except as required for inspection and maintenance.
- Installing security and surveillance monitoring equipment and relocating security fence around secured structures, as required.

#### 2.2.2 Period 2 - Dormancy

The second phase identified by the NRC in its rule addresses licensed activities during a storage period and is applicable to the dormancy phases of the deferred decommissioning alternatives. Dormancy activities include a 24-hour security force, preventive and corrective

maintenance on security systems, area lighting, general building maintenance, heating and ventilation of buildings, routine radiological inspections of contaminated structures, maintenance of structural integrity, and a site environmental and radiation monitoring program. Resident maintenance personnel perform equipment maintenance, inspection activities, routine services to maintain safe conditions, adequate lighting, heating, and ventilation, and periodic preventive maintenance on essential site services.

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

Security during the dormancy period is conducted primarily to prevent unauthorized entry and to protect the public from the consequences of its own actions. The security fence, sensors, alarms, and other surveillance equipment provide security. Fire and radiation alarms are also monitored and maintained. While remote surveillance is an option, it does not offer the immediate response time of a physical presence.

The transfer of the spent fuel to a DOE facility continues during this period until complete.

Given the offset in the final shutdown dates for Units 1 and 2, their dormancy lengths will not be the same length; Unit 2 will be in dormancy for eleven years less than Unit 1, to allow synchronization of the decommissioning activities and thereby reduce total decommissioning costs.

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

### 2.2.3 Periods 3 and 4 - Delayed Decommissioning

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

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

Variations in the length of the dormancy period are expected to have little effect upon the quantities of radioactive wastes generated from system and structure removal operations. Given the levels of radioactivity and spectrum of radionuclides expected from thirty to forty 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 SAFSTOR alternative incorporate reduced ALARA controls due to SAFSTOR's lower occupational exposure potential.

Although the initial radiation levels due to  $^{60}\text{Co}$  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  $^{94}\text{Nb}$ ,  $^{59}\text{Ni}$ , and  $^{63}\text{Ni}$ . 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 ( $^{152}\text{Eu}$  and  $^{154}\text{Eu}$ ). Decontamination will require controlled removal and disposal. It is assumed that radioactive corrosion products on inner surfaces of piping and components will not have decayed to levels that will permit unrestricted use or allow conventional removal. These systems and components will be surveyed as they are removed and disposed of in accordance with the existing radioactive release criteria.

#### 2.2.4 Period 5 - Site Restoration

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

### **3. COST ESTIMATE**

The cost estimates prepared for decommissioning Beaver Valley 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 originally developed in an evaluation prepared for Duquesne Light Company (the former operator of Beaver Valley) in 1997<sup>[16]</sup>. 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,"<sup>[17]</sup> and the DOE "Decommissioning Handbook."<sup>[18]</sup> 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.<sup>[19]</sup>

This report also meets the requirements for layout and level of detail as set forth in Regulatory Guide 1.202, "Standard Format and Content of Decommissioning Cost Estimates for Nuclear Power Reactors" <sup>[20]</sup>

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, Saxton, Humboldt Bay-3, Oyster Creek, Connecticut Yankee, and San Onofre-1 nuclear units have provided additional insight into the process, the regulatory aspects, and the technical challenges of decommissioning commercial nuclear units.

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

#### Work Difficulty Factors

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

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

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

#### Scheduling Program Durations

The unit factors, adjusted by the WDFs as described above, are applied against the inventory of materials to be removed in the radiologically controlled areas. The resulting man-hours, or crew-hours, are used in the development of the decommissioning program schedule, using resource

loading and event sequencing considerations. The scheduling of conventional removal and dismantling activities are based upon productivity information available from the "Building Construction Cost Data" publication.

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

### **3.3 FINANCIAL COMPONENTS OF THE COST MODEL**

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

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

#### **3.3.1 Contingency**

The activity- and period-dependent costs are combined to develop the total decommissioning cost. A contingency is then applied on a line-item basis, using one or more of the contingency types listed in the AIF/NESP-036 study. "Contingencies" are defined in the American Association of Cost Engineers "Project and Cost Engineers' Handbook<sup>[21]</sup> 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 17.16% and 17.98% for Units 1 and 2, respectively. Values for the SAFSTOR alternative are delineated within the detailed cost tables in Appendix D.

### 3.3.2 Financial Risk

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

- Transition activities and costs: ancillary expenses associated with eliminating 50% to 80% of the site labor force shortly after the cessation of plant operations, added cost for worker separation packages throughout the decommissioning program, national or company-mandated retraining, and retention incentives for key personnel.
- Delays in approval of the decommissioning plan due to intervention, public participation in local community meetings, legal challenges, and national and local hearings.
- Changes in the project work scope from the baseline estimate, involving the discovery of unexpected levels of contaminants, contamination in places not previously expected, contaminated soil previously undiscovered (either radioactive or hazardous material contamination), variations in plant inventory or configuration not indicated by the as-built drawings.
- Regulatory changes, e.g., affecting worker health and safety, site release criteria, waste transportation, and disposal.
- Policy decisions altering national commitments, e.g., in the ability to accommodate certain waste forms for disposition, or in the

timetable for such, e.g., the start and rate of acceptance of spent fuel by the DOE.

- Pricing changes for basic inputs, such as labor, energy, materials, and burial. Some of these inputs may vary slightly, e.g. -10% to +20%; burial could vary from -50% to +200% or more.

It has been TLG's experience that the results of a risk analysis, when compared with the base case estimate for decommissioning, indicate that the chances of the base decommissioning estimate's being too high is a low probability, and the chances that the estimate is too low is a higher probability. This is mostly due to the pricing uncertainty for low-level radioactive waste burial, and to a lesser extent due to schedule increases from changes in plant conditions and to pricing variations in the cost of labor (both craft and staff). This cost study, however, does not add any additional cost to the estimate for financial risk, since there is insufficient historical data from which to project future liabilities. Consequently, the areas of uncertainty or risk are revisited periodically and addressed through repeated revisions or updates of the base estimate.

### 3.4 SITE-SPECIFIC CONSIDERATIONS

There are a number of site-specific considerations that affect the method for dismantling and removal of equipment from the site and the degree of restoration required. The cost impact of the considerations identified below is included in this cost study.

#### 3.4.1 Spent Fuel Management

The cost to dispose of spent fuel generated from plant operations is not reflected within the estimates to decommission the Beaver Valley 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 2015 and will proceed on an oldest fuel first basis. 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 both 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 2015, fuel is projected to be removed from the Beaver Valley site by the year 2053.

Operation and maintenance costs for the storage facilities are included within the estimates and address the cost for staffing the facilities, as well as security, insurance, and licensing fees. The estimates include the costs to purchase, 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. For comparison, the Private Fuel Storage consortium submitted an application for an interim storage facility in 1997. The Atomic Safety and Licensing Board only recently recommended that an operating license be granted for the facility, after nearly eight years. With a more technically complex and politically sensitive application for permanent disposal, it is not unreasonable to expect that NRC approval to construct the repository at Yucca Mountain will require at least as long a review period. Construction would therefore begin sometime around the year 2010, at the earliest. Therefore, the spent fuel management plan described in this section is predicated upon the DOE initiating the pickup of commercial fuel in the year 2015. This timetable is consistent with the findings of an evaluation issued to Congress by the Government Accounting Office.<sup>[22]</sup>

### Spent Fuel Management Model

The FirstEnergy nuclear fleet consists of 4 units at 3 sites in Ohio and Pennsylvania. The ability to complete the decommissioning of these units, particularly for the DECON alternative, 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").<sup>[23]</sup> A spent fuel management model developed by FirstEnergy was used to determine when the DOE would provide allocations in the queue for removal of spent fuel from the individual sites. Repository operations were based upon annual industry-wide acceptance rates of 400 MTU/year for year 1, 600 MTU/ year for year 2, 1200 MTU/year for year 3, 2000 MTU/year for year 4, and 3000 MTU/year for year 5 and beyond.<sup>[24]</sup>

ISFSIs are constructed as necessary to maintain full-core discharge capability at the individual sites; all FirstEnergy sites will construct ISFSIs during plant operations, prior to license expiration and decommissioning activities.

### Canister Design

A multi-purpose storage canister (similar to the HOLTEC HI-STORM system), with a 32-fuel assemblies capacity, is assumed for future cask acquisitions. A unit cost of \$420,000 is used for pricing the internal multi-purpose canister (MPC), with an additional cost of \$330,000 for the concrete overpack. The DOE is assumed to provide the MPC for fuel transferred directly from the pool to the DOE at no cost to the owner.

### Canister Loading and Transfer

An average cost of \$300,000 is used for the labor to load, seal and transport the spent fuel from the pool to the ISFSI pad, based upon industry experience. For estimating purposes, \$100,000 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 \$630,576 and \$75,353 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 overpack is used as a basis for the cost analyses. Approximately 50% of the overpacks are assumed to have some level of neutron-induced activation as a result of the long-term storage of the fuel, i.e., to levels exceeding free-release limits. Approximately 10% of the concrete and steel is assumed to be removed from the overpacks for controlled disposal. The cost to dispose of this material, as well as the demolition of the ISFSI facility, is included in the estimates.

#### 3.4.2 Reactor Vessel and Internal Components

The NSSS (reactor vessel and reactor 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.<sup>[25]</sup> 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 Beaver Valley 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 Beaver Valley 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.

It is expected that Beaver Valley Unit 1 will replace its reactor vessel closure head. This original closure head will be stored on site, within a concrete protective structure. The cost for transportation and disposal of this original closure head has been included in this analysis.

### 3.4.3 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.

Beaver Valley Unit 1 is expected to replace its original set of steam generators; this original set will be stored on site, 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.

#### 3.4.4 Main Turbine and Condenser

The main turbine will be dismantled using conventional maintenance procedures. The turbine rotors and shafts will be removed to a laydown area. The lower turbine casings will be removed from their anchors by controlled demolition. The main condensers will also be disassembled and moved to a laydown area. 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.

#### 3.4.5 Transportation Methods

Contaminated piping, components, and structural material other than the highly activated reactor vessel and internal components will qualify as LSA-I, II or III or Surface Contaminated Object, SCO-I or II, as described in Title 49.<sup>[26]</sup> The contaminated material will be packaged in Industrial Packages (IP 1, 2, or 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 vessel and internal components, will be by shielded truck cask. Cask shipments may exceed 95,000 pounds, including vessel segment(s), supplementary shielding, cask tie-downs, and tractor-trailer. The maximum level of activity per shipment assumed

permissible was based upon the license limits of the available shielded transport casks. The segmentation scheme for the vessel and internal segments is designed to meet these limits.

The transport of large intact components, e.g., large heat exchangers and other oversized components will be by a combination of truck, rail, and/or multi-wheeled transporter.

The low-level radioactive waste requiring controlled disposal will be sent to one of two currently available burial facilities. Transportation costs are based upon the mileage to the Envirocare facility in Clive, Utah. Memphis, Tennessee, is used as the destination for off-site processing. Transportation costs are estimated using published tariffs from Tri-State Motor Transit.<sup>[27]</sup>

#### 3.4.6 Low-Level Radioactive Waste Disposal

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

Material requiring controlled disposal is packaged and transported to the Envirocare facility in Clive, Utah. Since Envirocare is currently unable to receive Class B and C waste, Barnwell rates are used as a proxy. Surcharges are added for the highly-activated components, e.g., generated in the segmentation of the reactor vessel.

#### 3.4.7 Secondary Side Systems Survey and Release

System components including piping, pumps, valves, heat exchangers, tankage, etc that come into contact with water from the secondary side of the main steam generators are assumed to be suspect and must be 100% surveyed prior to release as clean material. This survey will be conducted off site by GTS Duratek or other vendor using the State of Tennessee's Green is Clean criteria. Shipping costs to Tennessee, and survey costs of \$0.60 per pound have been included in these estimates.

#### 3.4.8 Site Conditions Following Decommissioning

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

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

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

### 3.5 ASSUMPTIONS

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

#### 3.5.1 Estimating Basis

The study follows the principles of ALARA through the use of work duration adjustment factors. These factors address the impact of activities such as radiological protection instruction, mock-up training, and the use of respiratory protection and protective clothing. The factors lengthen a task's duration, increasing costs and lengthening the overall schedule. ALARA planning is considered in the costs for engineering and planning, and in the development of activity specifications and detailed procedures. Changes to worker exposure limits may impact the decommissioning cost and project schedule.

### 3.5.2 Labor Costs

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

FirstEnergy 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 FirstEnergy.

### 3.5.3 Design Conditions

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

The curie contents of the vessel and internals at final shutdown are derived from those listed in NUREG/CR-3474.<sup>[28]</sup> Actual estimates are derived from the curie/gram values contained therein and adjusted for the different mass of the Beaver Valley components, projected operating life, and different periods of decay. Additional short-lived isotopes were derived from CR-0130<sup>[29]</sup> and CR-0672,<sup>[30]</sup> 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 neutron shield tank and surrounding 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.

#### 3.5.4 General

##### Buried Piping

Yard piping that is potentially contaminated will be excavated and the piping removed for survey and disposal. Clean yard piping that is less than one foot in diameter will be abandoned in place; all other yard piping will be either excavated or backfilled to prevent future surface subsidence.

##### Transition Activities

Existing warehouses will be cleared of non-essential material and remain for use by FirstEnergy and its subcontractors during the decommissioning program, after which the warehouses will be demolished. 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.
- Process operating waste inventories, i.e., the estimates do not address the disposition of any legacy wastes; the disposal of operating wastes during this initial period is not considered a decommissioning expense.

### Scrap and Salvage

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

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

Furniture, tools, mobile equipment such as forklifts, trucks, bulldozers, and other property owned by FirstEnergy 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."<sup>[31]</sup> NRC's financial protection requirements are based on various reactor (and spent fuel) configurations.

#### Taxes

Property taxes are included for all decommissioning periods with the exception of the transition phase.

#### 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.

Road and parking lot surfaces will be broken up and the asphalt material disposed of in a local construction debris landfill.

### **3.6 COST ESTIMATE SUMMARY**

A schedule of expenditures for each scenario is provided in Tables 3.1 and 3.2. Decommissioning costs are reported in the year of projected expenditure; however, the values are provided in thousands of 2005 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 and D, along with the schedules discussed in Section 4.

**TABLE 3.1a**  
**SCHEDULE OF ANNUAL EXPENDITURES**  
**UNIT 1 SAFSTOR (Integrated with Unit 2 DECON)**  
(thousands, 2005 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2016	24,702	1,399	655	30	3,274	30,060
2017	28,984	21,249	464	8,886	5,200	64,782
2018	9,385	12,679	141	32	2,673	24,911
2019	9,385	12,679	141	32	2,673	24,911
2020	9,411	12,714	142	32	2,680	24,979
2021	6,266	7,457	111	32	2,347	16,214
2022	2,088	460	71	32	1,911	4,562
2023	2,088	460	71	32	1,911	4,562
2024	2,093	461	71	32	1,917	4,574
2025	2,088	460	71	32	1,911	4,562
2026	2,088	460	71	32	1,911	4,562
2027	2,088	460	71	32	1,911	4,562
2028	12,715	883	430	32	2,191	16,252
2029	25,965	4,311	705	1,454	2,622	35,057
2030	45,833	14,584	672	20,794	5,668	87,551
2031	38,297	7,657	577	10,036	4,136	60,702
2032	34,654	4,233	532	4,713	3,386	47,518
2033	28,632	3,196	323	2,207	2,875	37,232
2034	17,018	8,453	86	7	2,208	27,773
2035	15,179	10,208	71	0	2,143	27,600
2036	3,273	1,775	11	0	1,859	6,918
2037	974	148	0	0	1,798	2,920
2038	974	148	0	0	1,798	2,920
2039	974	148	0	0	1,798	2,920
2040	977	149	0	0	1,803	2,928
2041	974	148	0	0	1,798	2,920
2042	974	148	0	0	1,798	2,920
2043	974	148	0	0	1,798	2,920
2044	977	149	0	0	1,803	2,928
2045	974	148	0	0	1,798	2,920
2046	974	148	0	0	1,798	2,920
2047	974	148	0	0	1,798	2,920
2048	977	149	0	0	1,803	2,928
2049	974	148	0	0	1,798	2,920
2050	974	148	0	0	1,798	2,920

**TABLE 3.1a (continued)**  
**SCHEDULE OF ANNUAL EXPENDITURES**  
**UNIT 1 SAFSTOR (Integrated with Unit 2 DECON)**  
(thousands, 2005 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2051	974	148	0	0	1,798	2,920
2052	977	149	0	0	1,803	2,928
2053	974	148	0	0	1,798	2,920
2054	974	148	0	0	1,798	2,920
2055	974	148	0	0	1,798	2,920
2056	977	149	0	0	1,803	2,928
2057	973	470	0	3	14,576	16,022
2058	798	1,439	0	408	1,783	4,426
	343,503	131,109	5,486	48,894	109,751	638,742

**TABLE 3.1b**  
**SCHEDULE OF ANNUAL EXPENDITURES**  
**DECON, UNIT 2**  
(thousands, 2005 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2027	25,074	4,658	424	19	2,459	32,636
2028	45,843	14,752	1,068	8,313	5,408	75,383
2029	49,700	20,497	672	25,566	6,532	102,967
2030	39,315	17,775	590	13,119	5,049	75,848
2031	31,736	15,787	530	4,034	3,967	56,055
2032	30,745	14,836	511	4,046	3,941	54,079
2033	18,694	3,087	207	1,902	2,951	26,842
2034	14,524	5,371	86	7	2,209	22,197
2035	13,419	6,268	71	0	2,143	21,901
2036	2,980	1,110	11	0	1,859	5,960
2037	964	115	0	0	1,798	2,877
2038	964	115	0	0	1,798	2,877
2039	964	115	0	0	1,798	2,877
2040	966	116	0	0	1,803	2,885
2041	964	115	0	0	1,798	2,877
2042	964	115	0	0	1,798	2,877
2043	964	115	0	0	1,798	2,877
2044	966	116	0	0	1,803	2,885
2045	964	115	0	0	1,798	2,877
2046	964	115	0	0	1,798	2,877
2047	964	115	0	0	1,798	2,877
2048	966	116	0	0	1,803	2,885
2049	964	115	0	0	1,798	2,877
2050	964	115	0	0	1,798	2,877
2051	964	115	0	0	1,798	2,877
2052	966	116	0	0	1,803	2,885
2053	964	115	0	0	1,798	2,877
2054	964	115	0	0	1,798	2,877
2055	964	115	0	0	1,798	2,877
2056	966	116	0	0	1,803	2,885
2057	963	440	0	3	14,576	15,982
2058	798	1,439	0	408	1,783	4,426
	293,075	108,330	4,172	57,418	88,859	551,854

**TABLE 3.2a**  
**SCHEDULE OF ANNUAL EXPENDITURES**  
**SAFSTOR, UNIT 1**  
(thousands, 2005 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2016	26,571	1,399	644	30	3,796	32,439
2017	29,073	19,473	456	4,088	4,860	57,951
2018	9,385	12,679	139	32	3,236	25,472
2019	9,385	12,679	139	32	3,236	25,472
2020	9,411	12,714	139	32	3,245	25,542
2021	6,130	7,430	109	32	2,855	16,558
2022	1,770	398	70	32	2,345	4,615
2023	1,770	398	70	32	2,345	4,615
2024	1,775	399	70	32	2,352	4,627
2025	1,770	398	70	32	2,345	4,615
2026	1,770	398	70	32	2,345	4,615
2027	1,770	398	70	32	2,345	4,615
2028	1,775	399	70	32	2,352	4,627
2029	1,770	398	70	32	2,345	4,615
2030	1,770	398	70	32	2,345	4,615
2031	1,770	398	70	32	2,345	4,615
2032	1,775	399	70	32	2,352	4,627
2033	1,770	398	70	32	2,345	4,615
2034	1,770	398	70	32	2,345	4,615
2035	1,770	398	70	32	2,345	4,615
2036	1,775	399	70	32	2,352	4,627
2037	1,770	398	70	32	2,345	4,615
2038	1,770	398	70	32	2,345	4,615
2039	1,770	398	70	32	2,345	4,615
2040	1,775	399	70	32	2,352	4,627
2041	1,770	398	70	32	2,345	4,615
2042	1,770	398	70	32	2,345	4,615
2043	1,770	398	70	32	2,345	4,615
2044	1,775	399	70	32	2,352	4,627
2045	1,770	398	70	32	2,345	4,615
2046	1,770	398	70	32	2,345	4,615
2047	1,770	398	70	32	2,345	4,615
2048	1,775	399	70	32	2,352	4,627
2049	1,770	398	70	32	2,345	4,615
2050	1,770	398	70	32	2,345	4,615

**TABLE 3.2a (continued)**  
**SCHEDULE OF ANNUAL EXPENDITURES**  
**SAFSTOR, UNIT 1**  
(thousands, 2005 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2051	1,770	398	70	32	2,345	4,615
2052	1,775	399	70	32	2,352	4,627
2053	1,770	398	70	32	2,345	4,615
2054	1,770	398	70	32	2,345	4,615
2055	1,770	398	70	32	2,345	4,615
2056	1,775	399	70	32	2,352	4,627
2057	1,768	397	70	32	2,345	4,612
2058	1,187	259	70	32	2,183	3,730
2059	1,187	259	70	32	2,183	3,730
2060	1,190	260	70	32	2,189	3,741
2061	1,187	259	70	32	2,183	3,730
2062	1,187	259	70	32	2,183	3,730
2063	1,187	259	70	32	2,183	3,730
2064	1,190	260	70	32	2,189	3,741
2065	1,187	259	70	32	2,183	3,730
2066	1,187	259	70	32	2,183	3,730
2067	1,187	259	70	32	2,183	3,730
2068	1,190	260	70	32	2,189	3,741
2069	20,900	987	549	32	2,201	24,670
2070	36,162	7,377	686	6,325	6,095	56,645
2071	42,810	14,353	642	20,757	14,784	93,346
2072	27,383	4,214	523	4,433	3,626	40,178
2073	25,641	3,942	488	4,143	3,500	37,715
2074	861	80	0	8	1,770	2,718
2075	12,656	1,455	94	25	1,842	16,073
2076	10,833	4,794	75	2	1,502	17,206
2077	10,189	5,002	70	0	1,467	16,727
2078	140	69	1	0	20	229
	354,356	125,826	8,024	41,494	166,550	696,250

**TABLE 3.2b**  
**SCHEDULE OF ANNUAL EXPENDITURES**  
**SAFSTOR, UNIT 2**  
(thousands, 2005 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2027	13,859	2,425	417	19	2,459	19,180
2028	28,611	13,614	638	4,110	5,158	52,131
2029	5,197	10,019	139	32	3,246	18,634
2030	5,197	10,019	139	32	3,246	18,634
2031	5,197	10,019	139	32	3,246	18,634
2032	4,859	9,045	132	32	3,162	17,231
2033	1,813	394	70	32	2,355	4,664
2034	1,813	394	70	32	2,355	4,664
2035	1,813	394	70	32	2,355	4,664
2036	1,818	395	70	32	2,361	4,676
2037	1,813	394	70	32	2,355	4,664
2038	1,813	394	70	32	2,355	4,664
2039	1,813	394	70	32	2,355	4,664
2040	1,818	395	70	32	2,361	4,676
2041	1,813	394	70	32	2,355	4,664
2042	1,813	394	70	32	2,355	4,664
2043	1,813	394	70	32	2,355	4,664
2044	1,818	395	70	32	2,361	4,676
2045	1,813	394	70	32	2,355	4,664
2046	1,813	394	70	32	2,355	4,664
2047	1,813	394	70	32	2,355	4,664
2048	1,818	395	70	32	2,361	4,676
2049	1,813	394	70	32	2,355	4,664
2050	1,813	394	70	32	2,355	4,664
2051	1,813	394	70	32	2,355	4,664
2052	1,818	395	70	32	2,361	4,676
2053	1,813	394	70	32	2,355	4,664
2054	1,813	394	70	32	2,355	4,664
2055	1,813	394	70	32	2,355	4,664
2056	1,818	395	70	32	2,361	4,676
2057	1,811	393	70	32	2,355	4,661
2058	1,236	275	70	32	2,193	3,807
2059	1,236	275	70	32	2,193	3,807
2060	1,240	276	70	32	2,199	3,817
2061	1,236	275	70	32	2,193	3,807

**TABLE 3.2b (continued)**  
**SCHEDULE OF ANNUAL EXPENDITURES**  
**SAFSTOR, UNIT 2**  
(thousands, 2005 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2062	1,236	275	70	32	2,193	3,807
2063	1,236	275	70	32	2,193	3,807
2064	1,240	276	70	32	2,199	3,817
2065	1,236	275	70	32	2,193	3,807
2066	1,236	275	70	32	2,193	3,807
2067	1,236	275	70	32	2,193	3,807
2068	1,240	276	70	32	2,199	3,817
2069	2,858	352	121	32	2,194	5,558
2070	21,530	1,579	695	32	2,210	26,046
2071	38,647	11,723	675	14,303	10,505	75,853
2072	41,197	10,949	602	15,685	10,873	79,306
2073	33,747	3,979	521	3,847	3,442	45,536
2074	33,747	3,979	521	3,847	3,442	45,536
2075	26,715	2,705	262	1,255	2,378	33,315
2076	18,747	11,181	75	2	1,503	31,508
2077	18,306	11,900	70	0	1,467	31,743
2078	251	163	1	0	20	435
	357,627	126,533	7,651	44,429	141,609	677,849

## **4. SCHEDULE ESTIMATE**

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

A schedule or sequence of activities is presented in Figure 4.1 for the DECON decommissioning alternative. The schedule is also representative of the work activities identified in the delayed dismantling scenarios, absent any spent fuel constraints. The scheduling sequence assumes that fuel is removed from the spent fuel pool within the first 5½ years after operations cease. The key activities listed in the schedule do not reflect a one-to-one correspondence with those activities in the cost tables, but reflect dividing some activities for clarity and combining others for convenience. The schedule was prepared using the "Microsoft Project 2002" computer software.<sup>[32]</sup>

### **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 decommissioning schedule:

- The fuel handling buildings are isolated until such time that all spent fuel has been discharged from the spent fuel pools to the DOE or to the ISFSI. Decontamination and dismantling of the storage pools are initiated once the transfer of spent fuel to the ISFSI or DOE is complete.
- All work (except vessel and internals removal) is performed during an 8-hour workday, 5 days per week, with no overtime. There are eleven paid holidays per year.
- Reactor and internals removal activities are performed by using separate crews for different activities working on different shifts, with a corresponding backshift charge for the second shift.

- Multiple crews work parallel activities to the maximum extent possible, consistent with optimum efficiency, adequate access for cutting, removal and laydown space, and with the stringent safety measures necessary during demolition of heavy components and structures.
- For plant systems removal, the systems with the longest removal durations in areas on the critical path are considered to determine the duration of the activity.

#### **4.2 PROJECT SCHEDULE**

The period-dependent costs presented in the detailed cost tables are based upon the durations developed in the schedule for decommissioning Beaver Valley. 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 buildings for final decontamination.

Project timelines are provided in Figures 4.2 and 4.3. Milestone dates are based on shutdown dates for Unit 1 and 2 of January 29, 2016 and May 27, 2027, respectively.

FIGURE 4.1  
ACTIVITY SCHEDULE

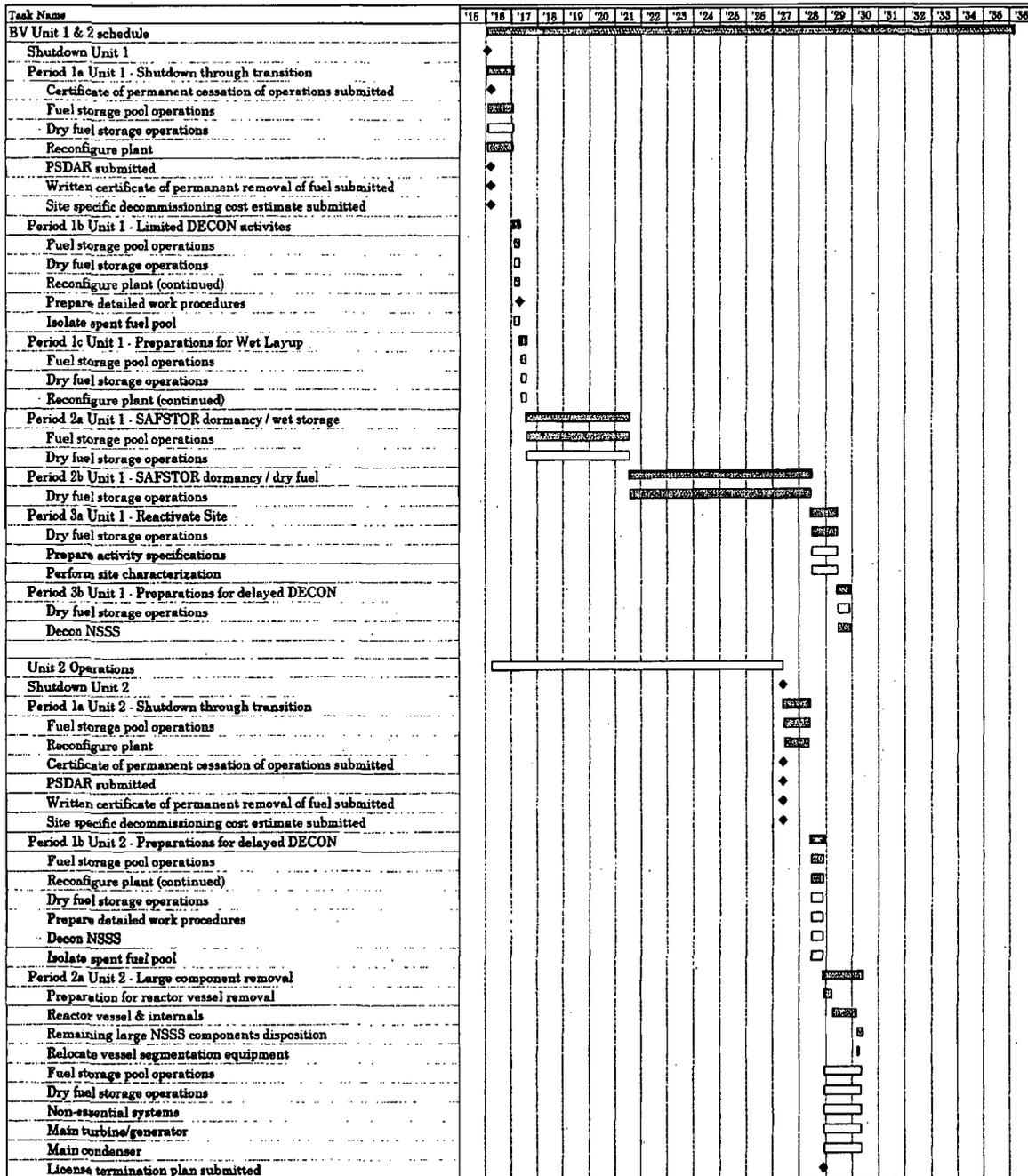
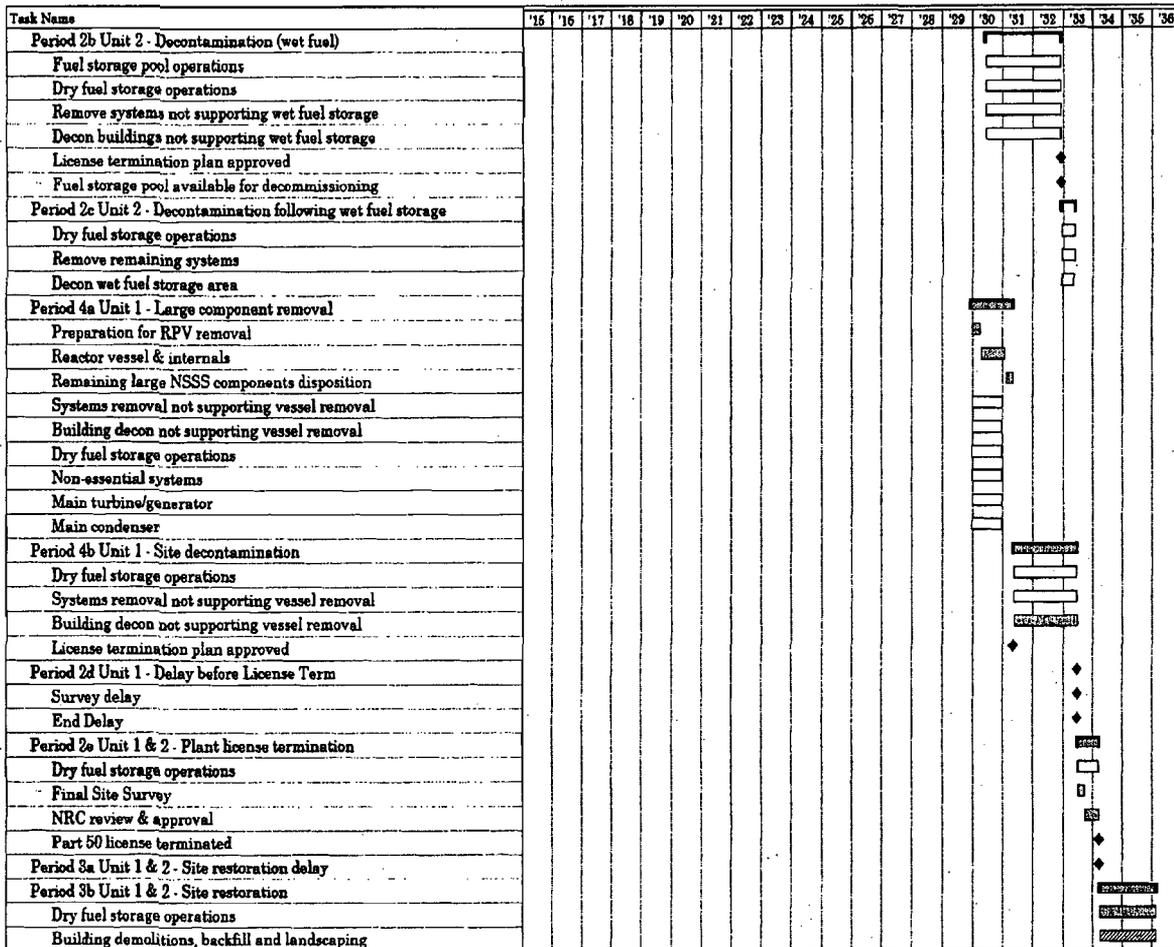


FIGURE 4.1

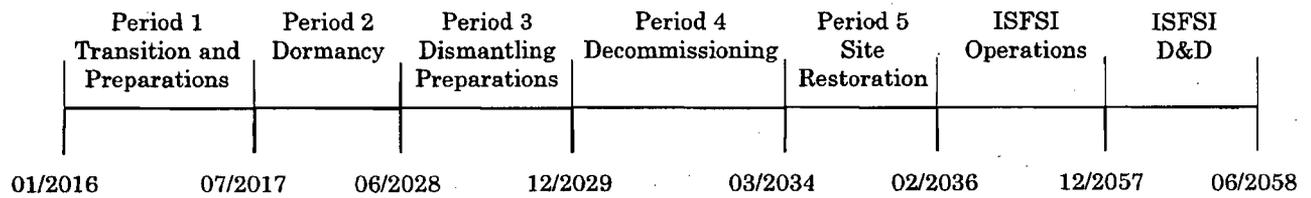
ACTIVITY SCHEDULE (continued)



**FIGURE 4.2  
DECOMMISSIONING TIMELINE  
SAFSTOR/DECON**

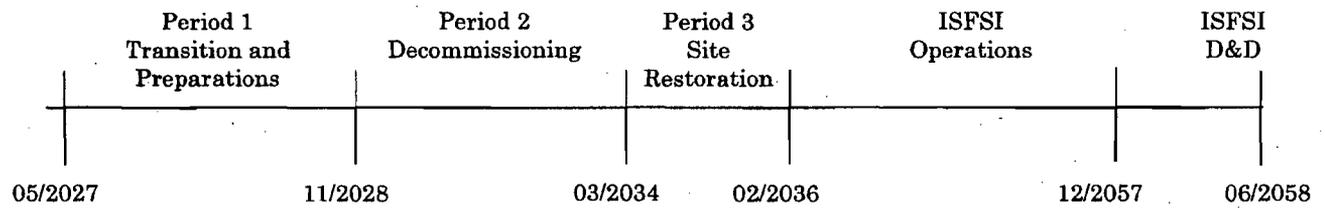
**Unit 1**

(Shutdown January 29, 2016)



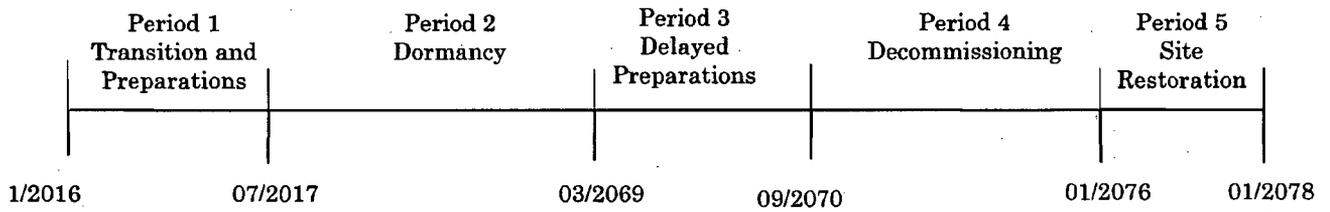
**Unit 2**

(Shutdown May 27, 2027)

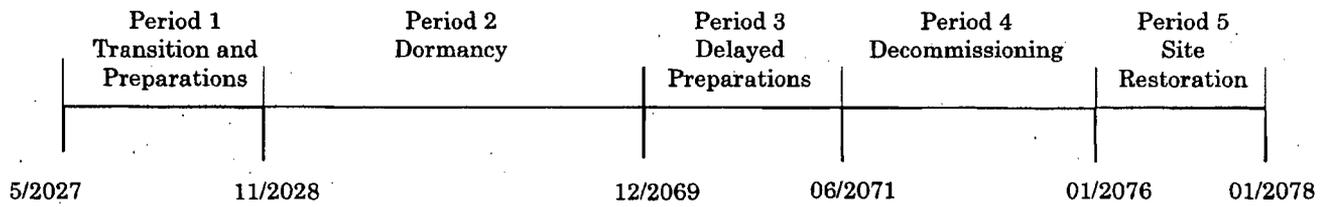


**FIGURE 4.3  
DECOMMISSIONING TIMELINE  
SAFSTOR**

**Unit 1**  
(Shutdown January 29, 2016)



**Unit 2**  
(Shutdown May 27, 2027)



## 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,<sup>[33]</sup> 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 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 Appendix C and D and summarized in Tables 5.1 and 5.2. 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  $^{137}\text{Cs}$  will still control the disposition requirements.

The waste material generated in the decontamination and dismantling of Beaver Valley is primarily generated during Period 2 of the DECON alternative and Period 4 of the SAFSTOR alternative. 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.

For purposes of constructing the analysis, the rate schedule for the Barnwell facility was used as a proxy for the higher activity waste. This schedule was used to estimate the disposal fees for most plant components and all activated concrete unsuitable for processing or recovery. An average disposal rate of approximately \$221.00 per cubic foot (based upon an average waste density of 85 pounds per cubic foot) was used, with additional surcharges for activity, dose rate, and/or handling added as appropriate for the particular package.

The remaining volume of contaminated metallic and concrete debris is processed and conditioned at a Duratek facility. The contaminated metallic waste stream includes the lower activity components such as miscellaneous steel, metal siding, scaffolding, and structural steel. Metals are recycled at a unit rate of \$3.20 per pound. Concrete, soil, asbestos and other bulk debris are disposed of at a rate of \$66.00 per cubic foot. Dry active wastes, e.g., cloth, paper and plastics, are sent to the Duratek facility for processing from the site at \$64.00 per cubic foot, at an assumed density of 20 pounds per cubic foot.

TABLE 5.1  
DECOMMISSIONING WASTE SUMMARY  
DECON

	Class <sup>1</sup>	Waste Volume (cubic feet)	Weight (pounds)
Low-Level Radioactive Waste			
Containerized	A	88,019	9,386,413
Bulk	A	64,094	4,188,227
	B	20,787	2,991,941
	C	689	80,827
Geologic Repository (Greater-than Class C)			
	>C	978	221,307
Total <sup>2</sup>		174,567	16,868,715
Processed Waste (Off-Site)			19,591,668
Scrap Metal			182,642,000

<sup>1</sup> Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55

<sup>2</sup> Columns may not add due to rounding.

TABLE 5.2  
DECOMMISSIONING WASTE SUMMARY  
SAFSTOR

	Class <sup>1</sup>	Waste Volume (cubic feet)	Weight (pounds)
Low-Level Radioactive Waste			
Containerized	A	73,448	7,885,876
Bulk	A	79,154	3,186,523
	B	14,078	1,638,761
	C	835	80,647
Geologic Repository (Greater-than Class C)			
	>C	978	221,307
Total <sup>2</sup>		168,493	13,013,114
Processed Waste (Off-Site)			20,824,024
Scrap Metal			183,854,000

<sup>1</sup> Waste is classified according to the requirements as delineated in Title 10 CFR, Part 61.55

<sup>2</sup> Columns may not add due to rounding.

## 6. RESULTS

The analysis to estimate the costs to decommission Beaver Valley relied upon the site-specific, technical information developed for a previous analysis prepared in 1997. While not an engineering study, the estimates provide FirstEnergy with sufficient information to assess their financial obligations, as they pertain to the eventual decommissioning of the nuclear station.

The estimates described in this report are based on numerous fundamental assumptions, including regulatory requirements, project contingencies, low-level radioactive waste disposal practices, high-level radioactive waste management options, and site restoration requirements. The decommissioning scenarios assume continued operation of the plant's spent fuel pools for a minimum of 5½ years following the cessation of operations for continued cooling of the assemblies. An ISFSI will be used to safeguard the spent fuel, once sufficiently cooled, until such time that the DOE can complete the transfer of the assemblies to its repository.

The cost projected to promptly decommission (DECON) Beaver Valley is estimated to be \$1.191 billion. The majority of this cost (approximately 62.5%) is associated with the physical decontamination and dismantling of the nuclear units so that the licenses can be terminated. Another 29.2% is associated with the management, interim storage, and eventual transfer of the spent fuel. The remaining 8.3% is for the demolition of the designated structures and limited restoration of the site.

The primary cost contributors, identified in Tables 6.1 and 6.2, 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 FirstEnergy 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 licenses are terminated, the staff is substantially reduced for the conventional demolition and restoration of the site, and the long-term care of the spent fuel (for the DECON alternative).

As described in this report, the spent fuel pools will remain operational for a minimum of 5½ years following the cessation of operations. The pools will be isolated and independent spent fuel islands created. This will allow

decommissioning operations to proceed in and around the pool areas. Over the 5½-year period, the spent fuel will be packaged into transportable steel canisters for loading into a DOE-provided transport cask. 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 radioactive material, including concrete and structural steel, is at the Envirocare facility. Select reactor vessel components, i.e. highly-activated components, requiring additional isolation from the environment, are packaged for geologic disposal. The cost of geologic disposal is based upon a cost equivalent for spent fuel.

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

Removal costs reflect the labor-intensive nature of the decommissioning process, as well as the management controls required to ensure a safe and successful program. Decontamination and packaging costs also have a large labor component that is based upon prevailing 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**  
**SAFSTOR/DECON**  
(thousands of 2005 dollars)

<b>Work Category</b>	<b>Cost</b>	<b>%</b>
Decontamination	24,284	2.0
Removal	180,260	15.1
Packaging	26,773	2.2
Transportation	14,888	1.3
Waste Disposal	99,521	8.4
Off-site Waste Processing	32,330	2.7
Program Management <sup>[1]</sup>	466,947	39.2
Spent Fuel Pool Isolation	16,501	1.4
Spent Fuel Management	174,390	14.6
Insurance and Regulatory Fees	40,652	3.4
Energy	9,658	0.8
Characterization and Licensing Surveys	19,804	1.7
Property Taxes	69,749	5.9
Miscellaneous Equipment	14,839	1.2
<b>Total <sup>[2]</sup></b>	<b>1,190,596</b>	<b>100.0</b>
NRC License Termination	743,548	62.5
Spent Fuel Management	347,914	29.2
Site Restoration	99,134	8.3

<sup>[1]</sup> Includes engineering and security

<sup>[2]</sup> Columns may not add due to rounding

**TABLE 6.2**  
**SUMMARY OF DECOMMISSIONING COST ELEMENTS**  
**SAFSTOR**  
(thousands of 2005 dollars)

<b>Work Category</b>	<b>Cost</b>	<b>%</b>
Decontamination	23,277	1.7
Removal	180,086	13.1
Packaging	20,635	1.5
Transportation	11,100	0.8
Waste Disposal	77,432	5.6
Off-site Waste Processing	34,030	2.5
Program Management <sup>(1)</sup>	586,074	42.7
Spent Fuel Pool Isolation	16,501	1.2
Spent Fuel Management	168,090	12.2
Insurance and Regulatory Fees	75,112	5.5
Energy	15,675	1.1
Characterization and Licensing Surveys	21,266	1.5
Property Taxes	106,785	7.8
Miscellaneous Equipment	38,035	2.8
<b>Total <sup>(2)</sup></b>	<b>1,374,098</b>	<b>100.0</b>
NRC License Termination	1,042,513	75.9
Spent Fuel Management	225,801	16.4
Site Restoration	105,783	7.7

<sup>(1)</sup> Includes engineering and security

<sup>(2)</sup> Columns may not add due to rounding

## 7. REFERENCES

1. U.S. Code of Federal Regulations, Title 10, Parts 30, 40, 50, 51, 70 and 72, "General Requirements for Decommissioning Nuclear Facilities," Nuclear Regulatory Commission, Federal Register Volume 53, Number 123 (p 24018 et seq.), June 27, 1988.
2. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.159, "Assuring the Availability of Funds for Decommissioning Nuclear Reactors," October 2003.
3. U.S. Code of Federal Regulations, Title 10, Part 20, Subpart E, "Radiological Criteria for License Termination."
4. U.S. Code of Federal Regulations, Title 10, Parts 20 and 50, "Entombment Options for Power Reactors," Advanced Notice of Proposed Rulemaking, Federal Register Volume 66, Number 200, October 16, 2001.
5. U.S. Code of Federal Regulations, Title 10, Parts 2, 50 and 51, "Decommissioning of Nuclear Power Reactors," Nuclear Regulatory Commission, Federal Register Volume 61 (p 39278 et seq.), July 29, 1996.
6. "Nuclear Waste Policy Act of 1982 and Amendments," U.S. Department of Energy's Office of Civilian Radioactive Management, 1982.
7. Maine Yankee Atomic Power Company, Connecticut Yankee Atomic Power Company, and Yankee Atomic Power Company v. United States, U.S. Court of Appeals for the Federal Circuit decision, Docket No. 99-5138, -5139, -5140, August 31, 2000.
8. U.S. Code of Federal Regulations, Title 10, Part 50, "Domestic Licensing of Production and Utilization Facilities," Subpart 54 (bb), "Conditions of Licenses."
9. "Low-Level Radioactive Waste Policy," Public Law 96-573, 1980.
10. "Low-Level Radioactive Waste Policy Amendments Act of 1985," Public Law 99-240, January 15, 1986.
11. U.S. Code of Federal Regulations, Title 10, Part 20, Subpart E, "Radiological Criteria for License Termination," Federal Register, Volume 62, Number 139 (p 39058 et seq.), July 21, 1997.

**7. REFERENCES**  
(continued)

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## **7. REFERENCES**

(continued)

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25. "Strategy for Management and Disposal of Greater-Than-Class C Low-Level Radioactive Waste," Federal Register Volume 60, Number 48 (p 13424 et seq.), March 1995.
26. U.S. Department of Transportation, Title 49 of the Code of Federal Regulations, "Transportation," Parts 173 through 178, 1996.
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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 (40% of critical duration)	<u>102</u>
Adjusted work duration	485

+ Protective clothing adjustment (30% of adjusted duration)	<u>146</u>
Productive work duration	631

+ Work break adjustment (8.33 % of productive duration)	<u>53</u>
---	-----------

Total work duration (minutes) 684

**\*\*\* Total duration = 11.400 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	11.400	\$40.73	\$1392.97
Craftsmen	2.00	11.400	\$49.93	\$1138.40
Foreman	1.00	11.400	\$51.87	\$591.32
General Foreman	0.25	11.400	\$53.92	\$153.67
Fire Watch	0.05	11.400	\$40.73	\$23.22
Health Physics Technician	1.00	11.400	\$40.08	<u>\$456.91</u>
Total labor cost				\$3756.49

4. EQUIPMENT & CONSUMABLES COSTS

Equipment Costs	none
Consumables/Materials Costs	
-Blotting paper 50 @ \$0.43 sq ft {2}	\$21.00
-Plastic sheets/bags 50 @ \$0.10/sq ft {3}	\$5.00
-Gas torch consumables 1 @ \$7.67/hr x 1 hr {1}	<u>\$7.67</u>
Subtotal cost of equipment and materials	\$34.17
Overhead & profit on equipment and materials @ 16.25 %	<u>\$5.55</u>
Total costs, equipment & material	\$39.72

TOTAL COST:

Removal of contaminated heat exchanger <3000 pounds:	\$3,796.21
Total labor cost:	\$3,756.49
Total equipment/material costs:	\$39.72
Total craft labor man-hours required per unit:	83.220

**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](http://www.mcmaster.com) online catalog
  2. R.S. Means (2004) Section 01540-800-0200, page 015-5
  3. R.S. Means (2004) Section 01590-400-6360, page 015-13
- Material and consumable costs were adjusted using the regional indices for Pittsburgh, Pennsylvania.

**APPENDIX B**

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

APPENDIX B

UNIT COST FACTOR LISTING  
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit(\$)
Removal of clean instrument and sampling tubing, \$/linear foot	0.44
Removal of clean pipe 0.25 to 2 inches diameter, \$/linear foot	4.69
Removal of clean pipe >2 to 4 inches diameter, \$/linear foot	6.63
Removal of clean pipe >4 to 8 inches diameter, \$/linear foot	12.80
Removal of clean pipe >8 to 14 inches diameter, \$/linear foot	24.89
Removal of clean pipe >14 to 20 inches diameter, \$/linear foot	32.28
Removal of clean pipe >20 to 36 inches diameter, \$/linear foot	47.52
Removal of clean pipe >36 inches diameter, \$/linear foot	56.49
Removal of clean valves >2 to 4 inches	84.83
Removal of clean valves >4 to 8 inches	127.99
Removal of clean valves >8 to 14 inches	248.94
Removal of clean valves >14 to 20 inches	322.82
Removal of clean valves >20 to 36 inches	475.16
Removal of clean valves >36 inches	564.92
Removal of clean pipe hangers for small bore piping	27.82
Removal of clean pipe hangers for large bore piping	102.60
Removal of clean pumps, <300 pound	214.17
Removal of clean pumps, 300-1000 pound	592.91
Removal of clean pumps, 1000-10,000 pound	2,359.05
Removal of clean pumps, >10,000 pound	4,556.36
Removal of clean pump motors, 300-1000 pound	249.74
Removal of clean pump motors, 1000-10,000 pound	982.95
Removal of clean pump motors, >10,000 pound	2,211.65
Removal of clean heat exchanger <3000 pound	1,263.04
Removal of clean heat exchanger >3000 pound	3,171.13

APPENDIX B  
(continued)

Unit Cost Factor	Cost/Unit(\$)
Removal of clean feedwater heater/deaerator	8,965.59
Removal of clean moisture separator/reheater	18,466.50
Removal of clean tanks, <300 gallons	275.71
Removal of clean tanks, 300-3000 gallon	872.65
Removal of clean tanks, >3000 gallons, \$/square foot surface area	7.25
Removal of clean electrical equipment, <300 pound	117.64
Removal of clean electrical equipment, 300-1000 pound	406.59
Removal of clean electrical equipment, 1000-10,000 pound	813.18
Removal of clean electrical equipment, >10,000 pound	1,924.03
Removal of clean electrical transformers < 30 tons	1,336.21
Removal of clean electrical transformers > 30 tons	3,848.06
Removal of clean standby diesel-generator, <100 kW	1,364.83
Removal of clean standby diesel-generator, 100 kW to 1 MW	3,046.37
Removal of clean standby diesel-generator, >1 MW	6,306.61
Removal of clean electrical cable tray, \$/linear foot	10.94
Removal of clean electrical conduit, \$/linear foot	4.78
Removal of clean mechanical equipment, <300 pound	117.64
Removal of clean mechanical equipment, 300-1000 pound	406.59
Removal of clean mechanical equipment, 1000-10,000 pound	813.18
Removal of clean mechanical equipment, >10,000 pound	1,924.03
Removal of clean HVAC equipment, <300 pound	117.64
Removal of clean HVAC equipment, 300-1000 pound	406.59
Removal of clean HVAC equipment, 1000-10,000 pound	813.18
Removal of clean HVAC equipment, >10,000 pound	1,924.03
Removal of clean HVAC ductwork, \$/pound	0.46

APPENDIX B  
(continued)

Unit Cost Factor	Cost/Unit(\$)
Removal of contaminated instrument and sampling tubing, \$/linear foot	1.34
Removal of contaminated pipe 0.25 to 2 inches diameter, \$/linear foot	17.89
Removal of contaminated pipe >2 to 4 inches diameter, \$/linear foot	31.28
Removal of contaminated pipe >4 to 8 inches diameter, \$/linear foot	48.79
Removal of contaminated pipe >8 to 14 inches diameter, \$/linear foot	97.59
Removal of contaminated pipe >14 to 20 inches diameter, \$/linear foot	118.31
Removal of contaminated pipe >20 to 36 inches diameter, \$/linear foot	164.90
Removal of contaminated pipe >36 inches diameter, \$/linear foot	195.34
Removal of contaminated valves >2 to 4 inches	384.26
Removal of contaminated valves >4 to 8 inches	455.78
Removal of contaminated valves >8 to 14 inches	945.13
Removal of contaminated valves >14 to 20 inches	1,210.07
Removal of contaminated valves >20 to 36 inches	1,618.19
Removal of contaminated valves >36 inches	1,922.63
Removal of contaminated pipe hangers for small bore piping	92.48
Removal of contaminated pipe hangers for large bore piping	307.74
Removal of contaminated pumps, <300 pound	811.22
Removal of contaminated pumps, 300-1000 pound	1,894.40
Removal of contaminated pumps, 1000-10,000 pound	6,282.00
Removal of contaminated pumps, >10,000 pound	15,284.59
Removal of contaminated pump motors, 300-1000 pound	794.11
Removal of contaminated pump motors, 1000-10,000 pound	2,535.74
Removal of contaminated pump motors, >10,000 pound	5,699.89
Removal of contaminated heat exchanger <3000 pound	3,796.21
Removal of contaminated heat exchanger >3000 pound	10,946.25

APPENDIX B  
(continued)

Unit Cost Factor	Cost/Unit(\$)
Removal of contaminated tanks, <300 gallons	1,354.70
Removal of contaminated tanks, >300 gallons, \$/square foot	27.01
Removal of contaminated electrical equipment, <300 pound	639.23
Removal of contaminated electrical equipment, 300-1000 pound	1,544.46
Removal of contaminated electrical equipment, 1000-10,000 pound	2,970.53
Removal of contaminated electrical equipment, >10,000 pound	5,778.80
Removal of contaminated electrical cable tray, \$/linear foot	30.78
Removal of contaminated electrical conduit, \$/linear foot	13.71
Removal of contaminated mechanical equipment, <300 pound	707.22
Removal of contaminated mechanical equipment, 300-1000 pound	1,705.54
Removal of contaminated mechanical equipment, 1000-10,000 pound	3,279.74
Removal of contaminated mechanical equipment, >10,000 pound	5,778.80
Removal of contaminated HVAC equipment, <300 pound	707.22
Removal of contaminated HVAC equipment, 300-1000 pound	1,705.54
Removal of contaminated HVAC equipment, 1000-10,000 pound	3,279.74
Removal of contaminated HVAC equipment, >10,000 pound	5,778.80
Removal of contaminated HVAC ductwork, \$/pound	1.85
Removal/plasma arc cut of contaminated thin metal components, \$/linear in.	3.40
Additional decontamination of surface by washing, \$/square foot	7.04
Additional decontamination of surfaces by hydrolasing, \$/square foot	30.42
Decontamination rig hook-up and flush	6,039.23
Chemical flush of components/systems, \$/gallon	11.45
Removal of clean standard reinforced concrete, \$/cubic yard	111.71
Removal of grade slab concrete, \$/cubic yard	153.48
Removal of clean concrete floors, \$/cubic yard	290.87

APPENDIX B  
(continued)

Unit Cost Factor	Cost/Unit(\$)
Removal of sections of clean concrete floors, \$/cubic yard	867.95
Removal of clean heavily rein concrete w/#9 rebar, \$/cubic yard	189.72
Removal of contaminated heavily rein concrete w/#9 rebar, \$/cubic yard	1,755.60
Removal of clean heavily rein concrete w/#18 rebar, \$/cubic yard	239.94
Removal of contaminated heavily rein concrete w/#18 rebar, \$/cubic yard	2,323.71
Removal heavily rein concrete w/#18 rebar & steel embedments, \$/cu yd	369.84
Removal of below-grade suspended floors, \$/cubic yard	290.87
Removal of clean monolithic concrete structures, \$/cubic yard	734.85
Removal of contaminated monolithic concrete structures, \$/cubic yard	1,756.60
Removal of clean foundation concrete, \$/cubic yard	575.14
Removal of contaminated foundation concrete, \$/cubic yard	1,635.09
Explosive demolition of bulk concrete, \$/cubic yard	25.69
Removal of clean hollow masonry block wall, \$/cubic yard	82.41
Removal of contaminated hollow masonry block wall, \$/cubic yard	274.86
Removal of clean solid masonry block wall, \$/cubic yard	82.41
Removal of contaminated solid masonry block wall, \$/cubic yard	274.86
Backfill of below-grade voids, \$/cubic yard	14.64
Removal of subterranean tunnels/voids, \$/linear foot	93.24
Placement of concrete for below-grade voids, \$/cubic yard	94.31
Excavation of clean material, \$/cubic yard	2.15
Excavation of contaminated material, \$/cubic yard	31.82
Removal of clean concrete rubble (tipping fee included), \$/cubic yard	87.80
Removal of contaminated concrete rubble, \$/cubic yard	21.36
Removal of building by volume, \$/cubic foot	0.25
Removal of clean building metal siding, \$/square foot	1.03

APPENDIX B  
(continued)

Unit Cost Factor	Cost/Unit(\$)
Removal of contaminated building metal siding, \$/square foot	3.54
Removal of standard asphalt roofing, \$/square foot	5.60
Removal of transite panels, \$/square foot	2.02
Scarifying contaminated concrete surfaces (drill & spall)	11.67
Scabbling contaminated concrete floors, \$/square foot	6.92
Scabbling contaminated concrete walls, \$/square foot	7.60
Scabbling contaminated ceilings, \$/square foot	68.44
Scabbling structural steel, \$/square foot	5.81
Removal of clean overhead cranes/monorails < 10 ton capacity	563.11
Removal of contaminated overhead cranes/monorails < 10 ton capacity	1,578.75
Removal of clean overhead cranes/monorails >10-50 ton capacity	1,351.46
Removal of contaminated overhead cranes/monorails >10-50 ton capacity	3,786.88
Removal of polar cranes > 50 ton capacity, each	5,622.16
Removal of gantry cranes > 50 ton capacity, each	24,050.32
Removal of structural steel, \$/pound	0.33
Removal of clean steel floor grating, \$/square foot	3.90
Removal of contaminated steel floor grating, \$/square foot	11.35
Removal of clean free-standing steel liner, \$/square foot	10.87
Removal of contaminated free-standing steel liner, \$/square foot	31.38
Removal of clean concrete-anchored steel liner, \$/square foot	5.43
Removal of contaminated concrete-anchored steel liner, \$/square foot	36.31
Placement of scaffolding in clean areas, \$/square foot	13.00
Placement of scaffolding in contaminated areas, \$/square foot	22.48
Landscaping with topsoil, \$/acre	17,376.50
Cost of CPC B-88 LSA box & preparation for use	1,100.82

APPENDIX B  
(continued)

Unit Cost Factor	Cost/Unit(\$)
Cost of CPC B-25 LSA box & preparation for use	877.21
Cost of CPC B-12V 12 gauge LSA box & preparation for use	754.04
Cost of CPC B-144 LSA box & preparation for use	4,194.07
Cost of LSA drum & preparation for use	118.56
Cost of cask liner for CNSI 14-195 cask	8,698.17
Cost of cask liner for CNSI 8-120A cask (resins)	6,098.62
Cost of cask liner for CNSI 8-120A cask (filters)	6,098.62
Decontamination of surfaces with vacuuming, \$/square foot	0.61

**APPENDIX C  
DETAILED COST ANALYSES  
SAFSTOR/DECON**

	<u>Page</u>
Beaver Valley Power Station, Unit 1 .....	C-2
Beaver Valley Power Station, Unit 2 .....	C-15

Table C-1  
Beaver Valley Power Station, Unit 1  
SAFSTOR (Integrated with Unit 2 DECON) Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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	-	-	-	-	-	-	391	117	509	509	-	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	49	7	56	56	-	-	-	-	-	-	-	-	-	-	556
1a.1.3	Notification of Cessation of Operations	-	-	-	-	-	-	-	-	a	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.4	Remove fuel & source material	-	-	-	-	-	-	-	-	n/a	n/a	-	-	-	-	-	-	-	-	-	-	-
1a.1.5	Notification of Permanent Defueling	-	-	-	-	-	-	-	-	a	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.6	Deactivate plant systems & process waste	-	-	-	-	-	-	-	-	a	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.7	Prepare and submit PSDAR	-	-	-	-	-	-	75	11	87	87	-	-	-	-	-	-	-	-	-	-	856
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	49	7	56	56	-	-	-	-	-	-	-	-	-	-	556
1a.1.9	Perform detailed rad survey	-	-	-	-	-	-	-	-	a	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	38	6	43	43	-	-	-	-	-	-	-	-	-	-	428
1a.1.11	End product description	-	-	-	-	-	-	38	6	43	43	-	-	-	-	-	-	-	-	-	-	428
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	56	8	65	65	-	-	-	-	-	-	-	-	-	-	642
1a.1.13	Define major work sequence	-	-	-	-	-	-	38	6	43	43	-	-	-	-	-	-	-	-	-	-	428
1a.1.14	Perform SER and EA	-	-	-	-	-	-	117	18	134	134	-	-	-	-	-	-	-	-	-	-	1,327
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	188	28	217	217	-	-	-	-	-	-	-	-	-	-	2,140
Activity Specifications																						
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	185	28	213	213	-	-	-	-	-	-	-	-	-	-	2,106
1a.1.16.2	Decontamination Flush of NSSS	-	-	-	-	-	-	19	3	22	22	-	-	-	-	-	-	-	-	-	-	214
1a.1.16.3	Plant systems	-	-	-	-	-	-	157	24	180	180	-	-	-	-	-	-	-	-	-	-	1,783
1a.1.16.4	Plant structures and buildings	-	-	-	-	-	-	118	18	135	135	-	-	-	-	-	-	-	-	-	-	1,335
1a.1.16.5	Waste management	-	-	-	-	-	-	75	11	87	87	-	-	-	-	-	-	-	-	-	-	856
1a.1.16.6	Facility and site dormancy	-	-	-	-	-	-	75	11	87	87	-	-	-	-	-	-	-	-	-	-	856
1a.1.16.8	Total	-	-	-	-	-	-	629	94	724	724	-	-	-	-	-	-	-	-	-	-	7,150
Detailed Work Procedures																						
1a.1.17.1	Decontamination Flush of NSSS	-	-	-	-	-	-	38	6	43	43	-	-	-	-	-	-	-	-	-	-	428
1a.1.17.2	Plant systems	-	-	-	-	-	-	45	7	51	51	-	-	-	-	-	-	-	-	-	-	506
1a.1.17.3	Facility closeout & dormancy	-	-	-	-	-	-	45	7	52	52	-	-	-	-	-	-	-	-	-	-	514
1a.1.17	Total	-	-	-	-	-	-	127	19	147	147	-	-	-	-	-	-	-	-	-	-	1,448
1a.1.18	Procure vacuum drying system	-	-	-	-	-	-	4	1	4	4	-	-	-	-	-	-	-	-	-	-	43
1a.1.19	Drain/de-energize non-cont. systems	-	-	-	-	-	-	-	-	a	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.20	Drain & dry NSSS	-	-	-	-	-	-	-	-	a	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.21	Drain/de-energize contaminated systems	-	-	-	-	-	-	-	-	a	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.22	Decon/secure contaminated systems	-	-	-	-	-	-	-	-	a	a	-	-	-	-	-	-	-	-	-	-	-
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	1,800	329	2,128	2,128	-	-	-	-	-	-	-	-	-	-	16,003
Period 1a Collateral Costs																						
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	823	123	946	-	946	-	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	823	123	946	-	946	-	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																						
1a.4.1	Insurance	-	-	-	-	-	-	1,157	116	1,272	1,272	-	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	860	86	946	946	-	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	-	-	-	-	-	-	62	311	311	-	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	249	-	-	-	-	-	49	378	378	-	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	328	-	-	-	-	-	8	44	44	-	-	-	-	-	-	-	-	-	-	-
1a.4.6	Plant energy budget	-	-	6	4	-	26	-	-	-	-	-	-	403	-	-	-	-	8,081	99	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	613	92	705	705	-	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	284	26	291	291	-	-	-	-	-	-	-	-	-	-	-
1a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	224	22	247	-	247	-	-	-	-	-	-	-	-	-	-
1a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	628	94	723	-	-	723	-	-	-	-	-	-	-	-	-
1a.4.11	Security Staff Cost	-	-	-	-	-	-	38	6	43	-	43	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	674	101	775	775	-	-	-	-	-	-	-	-	-	-	27,040

Table C-1  
Beaver Valley Power Station, Unit 1  
SAFSTOR (Integrated with Unit 2 DECON) Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			GYCC 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 1a Period-Dependent Costs (continued)																						
1a.4.12	Utility Staff Cost	-	-	-	-	-	-	20,490	3,074	23,564	23,564	-	-	-	-	-	-	-	-	-	436,800	
1a.4	Subtotal Period 1a Period-Dependent Costs	-	577	6	4	-	26	24,948	3,736	29,298	28,285	1,013	-	-	-	403	-	-	-	8,081	99	463,840
1a.0	TOTAL PERIOD 1a COST	-	577	6	4	-	26	27,570	4,188	32,372	30,413	1,959	-	-	-	403	-	-	-	8,081	99	479,843
PERIOD 1b - SAFSTOR Limited DECON Activities																						
Period 1b Direct Decommissioning Activities																						
1b.1.1	Decon primary loop	912	-	-	-	-	-	-	456	1,369	1,369	-	-	-	-	-	-	-	-	-	1,067	-
Decontamination of Site Buildings																						
1b.1.2.1	Reactor Building	854	-	-	-	-	-	-	427	1,280	1,280	-	-	-	-	-	-	-	-	-	18,743	-
1b.1.2.2	Auxiliary Building	266	-	-	-	-	-	-	133	399	399	-	-	-	-	-	-	-	-	-	6,054	-
1b.1.2.3	Fuel and Decon Building	426	-	-	-	-	-	-	213	638	638	-	-	-	-	-	-	-	-	-	8,280	-
1b.1.2.4	Main Steam, Cable Vault, Safeguards	66	-	-	-	-	-	-	33	99	99	-	-	-	-	-	-	-	-	-	1,503	-
1b.1.2.5	Service Building, Whrse & Control Area	99	-	-	-	-	-	-	49	148	148	-	-	-	-	-	-	-	-	-	2,243	-
1b.1.2.6	Solid Waste & Coolant Recovery Storage	84	-	-	-	-	-	-	42	126	126	-	-	-	-	-	-	-	-	-	1,716	-
1b.1.2.7	Turbine Building	333	-	-	-	-	-	-	166	499	499	-	-	-	-	-	-	-	-	-	7,570	-
1b.1.2	Totals	2,127	-	-	-	-	-	-	1,063	3,190	3,190	-	-	-	-	-	-	-	-	-	46,107	-
1b.1	Subtotal Period 1b Activity Costs	3,039	-	-	-	-	-	-	1,520	4,559	4,559	-	-	-	-	-	-	-	-	-	47,174	-
Period 1b Additional Costs																						
1b.2.1	Mixed Waste	-	-	133	22	634	-	-	112	901	901	-	-	-	-	-	-	-	-	-	-	-
1b.2	Subtotal Period 1b Additional Costs	-	-	133	22	634	-	-	112	901	901	-	-	-	-	-	-	-	-	-	-	-
Period 1b Collateral Costs																						
1b.3.1	Decon equipment	710	-	-	-	-	-	-	107	817	817	-	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process liquid waste	285	-	461	1,244	5,096	-	-	1,649	8,735	8,735	-	-	-	-	6,058	-	-	-	938,461	483	-
1b.3.3	Small tool allowance	-	36	-	-	-	-	-	5	41	41	-	-	-	-	-	-	-	-	-	-	-
1b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,880	432	3,312	-	3,312	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	995	36	461	1,244	5,096	2,880	-	2,193	12,905	9,593	3,312	-	-	-	6,058	-	-	-	938,461	483	-
Period 1b Period-Dependent Costs																						
1b.4.1	Decon supplies	688	-	-	-	-	-	-	172	860	860	-	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	289	29	318	318	-	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	215	21	236	236	-	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	225	-	-	-	-	-	56	282	282	-	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	82	-	-	-	-	-	12	94	94	-	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	10	7	-	42	-	12	70	70	-	-	-	651	-	-	-	-	13,047	160	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	153	23	176	176	-	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	86	7	73	73	-	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	56	6	62	-	62	-	-	-	-	-	-	-	-	-	-
1b.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	157	24	181	-	181	-	-	-	-	-	-	-	-	-	-
1b.4.11	ISFSI Operating Costs	-	-	-	-	-	-	9	1	11	-	11	-	-	-	-	-	-	-	-	-	-
1b.4.12	Security Staff Cost	-	-	-	-	-	-	168	25	194	-	194	-	-	-	-	-	-	-	-	-	6,780
1b.4.13	Utility Staff Cost	-	-	-	-	-	-	5,123	768	5,891	5,891	-	-	-	-	-	-	-	-	-	-	109,200
1b.4	Subtotal Period 1b Period-Dependent Costs	688	307	10	7	-	42	6,237	1,157	8,448	8,195	253	-	-	-	651	-	-	-	13,047	160	115,960
1b.0	TOTAL PERIOD 1b COST	4,723	343	604	1,273	634	5,138	9,117	4,982	26,813	23,248	3,565	-	-	-	651	6,058	-	-	951,508	47,816	115,960
PERIOD 1c - Preparations for SAFSTOR Dormancy																						
Period 1c Direct Decommissioning Activities																						
1c.1.1	Prepare support equipment for storage	-	409	-	-	-	-	-	61	471	471	-	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	37	-	-	-	-	-	5	42	42	-	-	-	-	-	-	-	-	-	700	-

Table C-1  
Beaver Valley Power Station, Unit 1  
SAFSTOR (Integrated with Unit 2 DECON) Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burlal / 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.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	-	13,663	-
1c.1.4	Secure building accesses	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	22	3	25	25	-	-	-	-	-	-	-	-	-	-	250
1c.1	Subtotal Period 1c Activity Costs	-	446	-	-	-	-	755	290	1,491	1,491	-	-	-	-	-	-	-	-	-	17,363	250
Period 1c Additional Costs																						
1c.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	8,609	1,291	9,900	9,900	-	-	-	-	-	-	-	-	-	-	-
1c.2	Subtotal Period 1c Additional Costs	-	-	-	-	-	-	8,609	1,291	9,900	9,900	-	-	-	-	-	-	-	-	-	-	-
Period 1c Collateral Costs																						
1c.3.1	Process liquid waste	290	-	106	498	-	1,368	-	572	2,835	2,835	-	-	-	-	-	1,998	-	-	251,911	393	-
1c.3.2	Small tool allowance	-	3	-	-	-	-	-	0	4	4	-	-	-	-	-	-	-	-	-	-	-
1c.3.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,880	432	3,312	-	3,312	-	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	290	3	106	498	-	1,368	2,880	1,005	6,151	2,839	3,312	-	-	-	-	1,998	-	-	251,911	393	-
Period 1c Period-Dependent Costs																						
1c.4.1	Insurance	-	-	-	-	-	-	289	29	318	318	-	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	215	21	236	236	-	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	123	-	-	-	-	-	31	154	154	-	-	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	82	-	-	-	-	-	12	94	94	-	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	2	1	-	6	-	2	11	11	-	-	-	101	-	-	-	-	2,020	25	-
1c.4.6	Plant energy budget	-	-	-	-	-	-	153	23	176	176	-	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	86	7	73	73	-	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	56	6	62	-	-	-	-	-	-	-	-	-	-	-	-
1c.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	157	24	181	-	181	-	-	-	-	-	-	-	-	-	-
1c.4.10	ISFSI Operating Costs	-	-	-	-	-	-	9	1	11	-	11	-	-	-	-	-	-	-	-	-	-
1c.4.11	Security Staff Cost	-	-	-	-	-	-	168	25	194	-	194	-	-	-	-	-	-	-	-	-	6,780
1c.4.12	Utility Staff Cost	-	-	-	-	-	-	5,123	768	5,891	5,891	-	-	-	-	-	-	-	-	-	-	109,200
1c.4	Subtotal Period 1c Period-Dependent Costs	-	205	2	1	-	6	6,237	949	7,400	7,147	253	-	-	101	-	-	-	-	2,020	25	115,960
1c.0	TOTAL PERIOD 1c COST	290	654	108	499	-	1,374	18,481	3,536	24,942	21,378	3,565	-	-	101	1,998	-	-	-	253,931	17,780	116,210
PERIOD 1 TOTALS		5,013	1,575	718	1,776	634	6,538	55,168	12,705	84,127	75,039	9,088	-	-	1,155	8,057	-	-	-	1,213,520	65,696	712,013
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	-	-	-	-	-	-	282	42	325	325	-	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	503	126	629	629	-	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	786	168	954	954	-	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																						
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	57,681	8,652	66,333	-	66,333	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	57,681	8,652	66,333	-	66,333	-	-	-	-	-	-	-	-	-	-
Period 2a Period-Dependent Costs																						
2a.4.1	Insurance	-	-	-	-	-	-	1,591	159	1,750	-	1,750	-	-	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	3,452	345	3,798	-	3,798	-	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	250	-	-	-	-	-	63	313	313	-	-	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	24	16	-	104	-	31	175	175	-	-	-	1,620	-	-	-	-	32,458	398	-
2a.4.5	Plant energy budget	-	-	-	-	-	-	493	74	567	-	567	-	-	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	837	94	1,031	1,031	-	-	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	901	90	991	-	991	-	-	-	-	-	-	-	-	-	-
2a.4.8	Spent Fuel Pool O&M	-	-	-	-	-	-	2,524	379	2,903	-	2,903	-	-	-	-	-	-	-	-	-	-

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Beaver Valley Power Station, Unit 1  
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(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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 2a Period-Dependent Costs (continued)																					
2a.4.9	ISFSI Operating Costs	-	-	-	-	-	-	151	23	173	-	173	-	-	-	-	-	-	-	-	-
2a.4.10	Security Staff Cost	-	-	-	-	-	-	2,446	367	2,813	-	2,813	-	-	-	-	-	-	-	-	98,163
2a.4.11	Utility Staff Cost	-	-	-	-	-	-	15,637	2,345	17,982	-	17,982	-	-	-	-	-	-	-	-	332,083
2a.4	Subtotal Period 2a Period-Dependent Costs	-	250	24	16	-	104	28,131	3,969	32,494	1,519	30,976	-	-	-	1,620	-	-	32,456	398	430,246
2a.0	TOTAL PERIOD 2a COST	-	250	24	16	-	104	86,597	12,789	99,781	2,473	97,308	-	-	-	1,620	-	-	32,456	398	430,246
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	-	-	-	-	-	-	484	73	557	557	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	863	216	1,079	1,079	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	1,347	288	1,636	1,636	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	1,600	240	1,840	-	1,840	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	1,600	240	1,840	-	1,840	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-	-	-	-	-	-	2,728	273	3,001	-	3,001	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	5,920	592	6,512	-	6,512	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	429	-	-	-	-	-	107	536	536	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	41	28	-	178	-	53	300	300	-	-	-	2,777	-	-	-	55,655	682	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	422	83	486	-	486	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	1,807	161	1,768	1,768	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	686	69	755	-	755	-	-	-	-	-	-	-	-	-
2b.4.8	Fixed Costs - Site	-	-	-	-	-	-	599	90	689	-	689	-	-	-	-	-	-	-	-	-
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	259	39	297	-	297	-	-	-	-	-	-	-	-	-
2b.4.10	Security Staff Cost	-	-	-	-	-	-	446	67	513	-	513	-	-	-	-	-	-	-	-	17,907
2b.4.11	Utility Staff Cost	-	-	-	-	-	-	11,304	1,696	12,999	-	12,999	-	-	-	-	-	-	-	-	229,641
2b.4	Subtotal Period 2b Period-Dependent Costs	-	429	41	28	-	178	23,972	3,209	27,857	2,605	25,253	-	-	2,777	-	-	-	55,655	682	247,548
2b.0	TOTAL PERIOD 2b COST	-	429	41	28	-	178	26,920	3,737	31,333	4,240	27,093	-	-	2,777	-	-	-	55,655	682	247,548
PERIOD 2 TOTALS																					
-	-	-	679	68	45	-	281	113,517	16,526	131,114	6,713	124,401	-	-	4,397	-	-	-	88,112	1,080	677,794
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	49	7	56	56	-	-	-	-	-	-	-	-	-	556
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	1,969
3a.1.3	Perform detailed rad survey	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
3a.1.4	End product description	-	-	-	-	-	-	38	6	43	43	-	-	-	-	-	-	-	-	-	428
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	49	7	56	56	-	-	-	-	-	-	-	-	-	556
3a.1.6	Define major work sequence	-	-	-	-	-	-	262	42	325	325	-	-	-	-	-	-	-	-	-	3,210
3a.1.7	Perform SER and EA	-	-	-	-	-	-	117	18	134	134	-	-	-	-	-	-	-	-	-	1,327
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	188	28	217	217	-	-	-	-	-	-	-	-	-	2,140
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	1,753
3a.1.10	Receive NRC approval of termination plan	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	278	42	319	267	-	32	-	-	-	-	-	-	-	3,154
3a.1.11.2	Plant systems	-	-	-	-	-	-	157	24	180	162	-	18	-	-	-	-	-	-	-	1,783

Table C-1  
Beaver Valley Power Station, Unit 1  
SAFSTOR (Integrated with Unit 2 DECON) Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Activity Specifications (continued)																					
3a.1.11.3	Reactor internals	-	-	-	-	-	-	267	40	308	308	-	-	-	-	-	-	-	-	-	3,039
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	245	37	282	282	-	-	-	-	-	-	-	-	-	2,782
3a.1.11.5	Biological shield	-	-	-	-	-	-	19	3	22	22	-	-	-	-	-	-	-	-	-	214
3a.1.11.6	Steam generators	-	-	-	-	-	-	118	18	135	135	-	-	-	-	-	-	-	-	-	1,335
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	60	9	69	35	-	35	-	-	-	-	-	-	-	685
3a.1.11.8	Main Turbine	-	-	-	-	-	-	15	2	17	-	-	17	-	-	-	-	-	-	-	171
3a.1.11.9	Main Condensers	-	-	-	-	-	-	15	2	17	-	-	17	-	-	-	-	-	-	-	171
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	118	18	135	68	-	68	-	-	-	-	-	-	-	1,335
3a.1.11.11	Waste management	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	1,969
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-	34	5	39	19	-	19	-	-	-	-	-	-	-	385
3a.1.11	Total	-	-	-	-	-	-	1,498	225	1,723	1,517	-	206	-	-	-	-	-	-	-	17,024
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	90	14	104	104	-	-	-	-	-	-	-	-	-	1,027
3a.1.13	Plant prep. & temp. svocs	-	-	-	-	-	-	2,419	363	2,782	2,782	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	599
3a.1.15	Rigging/Cont. Critl Envtps/cooling/etc.	-	-	-	-	-	-	2,048	307	2,355	2,355	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	46	7	53	53	-	-	-	-	-	-	-	-	-	526
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	7,205	1,061	8,266	8,060	-	206	-	-	-	-	-	-	-	31,117
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance	-	-	-	-	-	-	399	40	439	439	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	867	87	953	953	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	251	-	-	-	-	-	63	314	314	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	331	-	-	-	-	-	50	381	381	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	6	4	-	26	-	8	44	44	-	-	-	407	-	-	-	8,147	100	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	618	93	711	711	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	267	27	293	293	-	-	-	-	-	-	-	-	-	-
3a.4.8	Emergency Planning Fees	-	-	-	-	-	-	100	10	111	-	111	-	-	-	-	-	-	-	-	-
3a.4.9	Fixed Costs - Site	-	-	-	-	-	-	492	74	566	566	-	-	-	-	-	-	-	-	-	-
3a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	38	8	44	-	44	-	-	-	-	-	-	-	-	-
3a.4.11	Security Staff Cost	-	-	-	-	-	-	405	61	466	466	-	-	-	-	-	-	-	-	-	16,253
3a.4.12	Utility Staff Cost	-	-	-	-	-	-	11,116	1,667	12,784	12,784	-	-	-	-	-	-	-	-	-	240,647
3a.4	Subtotal Period 3a Period-Dependent Costs	-	582	6	4	-	26	14,303	2,184	17,105	16,951	154	-	-	407	-	-	-	8,147	100	256,900
3a.0	TOTAL PERIOD 3a COST	-	582	6	4	-	26	21,508	3,265	25,391	25,031	154	206	-	407	-	-	-	8,147	100	288,017
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	178	27	205	185	-	21	-	-	-	-	-	-	-	2,026
3b.1.1.2	Reactor internals	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	1,070
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	51	8	58	15	-	44	-	-	-	-	-	-	-	578
3b.1.1.4	CRD cooling assembly	-	-	-	-	-	-	38	6	43	43	-	-	-	-	-	-	-	-	-	428
3b.1.1.5	CRD housings & ICI tubes	-	-	-	-	-	-	38	6	43	43	-	-	-	-	-	-	-	-	-	428
3b.1.1.6	Incore instrumentation	-	-	-	-	-	-	38	6	43	43	-	-	-	-	-	-	-	-	-	428
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	137	21	157	157	-	-	-	-	-	-	-	-	-	1,554
3b.1.1.8	Facility closeout	-	-	-	-	-	-	45	7	52	26	-	26	-	-	-	-	-	-	-	514
3b.1.1.9	Missile shields	-	-	-	-	-	-	17	3	19	19	-	-	-	-	-	-	-	-	-	193
3b.1.1.10	Biological shield	-	-	-	-	-	-	45	7	52	52	-	-	-	-	-	-	-	-	-	514
3b.1.1.11	Steam generators	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	1,969
3b.1.1.12	Reinforced concrete	-	-	-	-	-	-	38	6	43	22	-	22	-	-	-	-	-	-	-	428
3b.1.1.13	Main Turbine	-	-	-	-	-	-	59	9	68	-	-	68	-	-	-	-	-	-	-	668
3b.1.1.14	Main Condensers	-	-	-	-	-	-	59	9	68	-	-	68	-	-	-	-	-	-	-	668
3b.1.1.15	Auxiliary building	-	-	-	-	-	-	103	15	118	106	-	12	-	-	-	-	-	-	-	1,168

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Beaver Valley Power Station, Unit 1  
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(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Detailed Work Procedures (continued)																					
3b.1.1.16	Reactor building	-	-	-	-	-	-	103	15	118	106	-	12	-	-	-	-	-	-	-	1,168
3b.1.1	Total	-	-	-	-	-	-	1,214	182	1,397	1,126	-	271	-	-	-	-	-	-	-	13,800
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	1,214	182	1,397	1,126	-	271	-	-	-	-	-	-	-	13,800
Period 3b Additional Costs																					
3b.2.1	Site Characterization	-	-	-	-	-	-	836	251	1,087	1,087	-	-	-	-	-	-	-	-	-	-
3b.2.2	Cofferdam Construction and Teardown	-	182	-	-	-	-	-	27	209	209	-	-	-	-	-	-	-	-	2,223	-
3b.2	Subtotal Period 3b Additional Costs	-	182	-	-	-	-	836	278	1,296	1,296	-	-	-	-	-	-	-	-	2,223	-
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	710	-	-	-	-	-	-	107	817	817	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,105	166	1,271	1,271	-	-	-	-	-	-	-	-	-	-
3b.3.3	Small tool allowance	-	1	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-
3b.3.4	Pipe cutting equipment	-	957	-	-	-	-	-	143	1,100	1,100	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	710	958	-	-	-	-	1,105	416	3,189	3,189	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	21	-	-	-	-	-	-	5	27	27	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	195	19	214	214	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	423	42	465	465	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	130	-	-	-	-	-	33	163	163	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	161	-	-	-	-	-	24	186	186	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	3	2	-	13	-	4	21	21	-	-	-	198	-	-	-	-	3,974	49
3b.4.7	Plant energy budget	-	-	-	-	-	-	302	45	347	347	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	130	13	143	143	-	-	-	-	-	-	-	-	-	-
3b.4.9	Emergency Planning Fees	-	-	-	-	-	-	49	5	54	-	54	-	-	-	-	-	-	-	-	-
3b.4.10	Fixed Costs - Site	-	-	-	-	-	-	240	36	276	276	-	-	-	-	-	-	-	-	-	-
3b.4.11	ISFSI Operating Costs	-	-	-	-	-	-	18	3	21	-	21	-	-	-	-	-	-	-	-	-
3b.4.12	Security Staff Cost	-	-	-	-	-	-	197	30	227	227	-	-	-	-	-	-	-	-	-	7,927
3b.4.13	DOC Staff Cost	-	-	-	-	-	-	2,963	444	3,407	3,407	-	-	-	-	-	-	-	-	-	46,026
3b.4.14	Utility Staff Cost	-	-	-	-	-	-	5,642	846	6,488	6,488	-	-	-	-	-	-	-	-	-	122,487
3b.4	Subtotal Period 3b Period-Dependent Costs	21	292	3	2	-	13	10,159	1,550	12,040	11,964	75	-	198	-	-	-	-	-	3,974	49
3b.0	TOTAL PERIOD 3b COST	732	1,432	3	2	-	13	13,314	2,426	17,821	17,575	75	271	198	-	-	-	-	-	3,974	2,271
PERIOD 3 TOTALS		732	2,014	9	6	-	39	34,822	5,691	43,313	42,606	229	477	605	-	-	-	-	-	12,121	2,371
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Reactor Coolant Piping	25	100	14	23	-	372	-	135	669	669	-	-	-	1,183	-	-	-	-	143,095	2,791
4a.1.1.2	Pressurizer Relief Tank	5	18	3	5	-	77	-	27	135	135	-	-	-	265	-	-	-	-	29,424	507
4a.1.1.3	Reactor Coolant Pumps & Motors	10	58	29	82	51	1,436	-	401	2,068	2,068	-	-	177	2,275	-	-	-	-	595,000	1,749
4a.1.1.4	Pressurizer	7	52	402	383	-	184	-	160	1,188	1,188	-	-	-	1,913	-	-	-	-	181,953	1,801
4a.1.1.5	Steam Generators	56	1,932	1,870	889	2,667	1,143	-	1,517	10,074	10,074	-	-	12,400	11,910	-	-	-	-	2,323,333	19,209
4a.1.1.6	CRDMs/ClCs/Service Structure Removal	27	78	101	38	-	189	-	95	526	526	-	-	-	3,310	-	-	-	-	72,844	2,154
4a.1.1.7	Reactor Vessel Internals	59	1,832	5,333	605	-	2,505	191	4,169	14,693	14,693	-	-	-	1,985	125	344	-	-	253,492	25,000
4a.1.1.8	Reactor Vessel	76	3,467	1,242	936	-	7,204	191	6,813	19,928	19,928	-	-	-	10,925	-	-	-	-	1,380,241	25,000
4a.1.1	Totals	264	7,538	8,995	2,958	2,719	13,109	382	13,318	49,282	49,282	-	-	12,577	33,766	2,128	344	-	-	4,979,382	78,209
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	265	167	19	265	191	-	173	1,081	1,081	-	-	2,600	2,889	-	-	-	-	509,970	5,622
4a.1.3	Main Condensers	-	1,376	89	75	274	167	-	447	2,428	2,428	-	-	5,071	2,536	-	-	-	-	481,749	29,694

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																Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet						
Cascading Costs from Clean Building Demolition																								
4a.1.4.1	Reactor Building	-	502	-	-	-	-	-	75	577	577	-	-	-	-	-	-	-	-	-	-	7,157	-	
4a.1.4.2	Auxiliary Building	-	79	-	-	-	-	-	12	90	90	-	-	-	-	-	-	-	-	-	-	1,244	-	
4a.1.4.3	Fuel and Decon Building	-	87	-	-	-	-	-	13	100	100	-	-	-	-	-	-	-	-	-	-	1,340	-	
4a.1.4.4	Main Steam, Cable Vault, Safeguards	-	40	-	-	-	-	-	6	46	46	-	-	-	-	-	-	-	-	-	-	638	-	
4a.1.4.5	Solid Waste & Coolant Recovery Storage	-	33	-	-	-	-	-	5	37	37	-	-	-	-	-	-	-	-	-	-	523	-	
4a.1.4	Totals	-	740	-	-	-	-	-	111	851	851	-	-	-	-	-	-	-	-	-	-	10,901	-	
Disposal of Plant Systems																								
4a.1.5.1	Area Ventilation Systems - Auxiliary Bld	-	151	3	9	98	21	-	59	342	342	-	-	2,020	89	-	-	-	-	-	-	89,992	3,048	-
4a.1.5.2	Area Ventilation Systems - Control Area	-	22	-	-	-	-	-	3	25	-	-	25	-	-	-	-	-	-	-	-	520	-	-
4a.1.5.3	Area Ventilation Systems - Cooling	-	183	4	11	127	19	-	72	415	415	-	-	2,597	82	-	-	-	-	-	-	112,835	3,690	-
4a.1.5.4	Auxiliary Boiler	-	208	-	-	-	-	-	31	240	-	-	240	-	-	-	-	-	-	-	-	4,858	-	-
4a.1.5.5	Auxiliary Steam and Condensate	-	83	-	-	-	-	-	13	96	-	-	96	-	-	-	-	-	-	-	-	2,030	-	-
4a.1.5.6	Auxiliary Steam and Condensate - RCA	-	148	2	6	80	-	-	50	286	286	-	-	1,649	-	-	-	-	-	-	-	66,954	3,052	-
4a.1.5.7	Building Services Hot Water Heating	-	79	-	-	-	-	-	12	90	-	-	90	-	-	-	-	-	-	-	-	1,887	-	-
4a.1.5.8	Building Services Hot Water Htg - RCA	-	138	1	4	51	-	-	43	237	237	-	-	1,056	-	-	-	-	-	-	-	42,875	2,843	-
4a.1.5.9	Building and Yard Drains	-	34	-	-	-	-	-	5	40	-	-	40	-	-	-	-	-	-	-	-	831	-	-
4a.1.5.10	Building and Yard Drains - RCA	-	49	0	1	13	-	-	14	78	78	-	-	272	-	-	-	-	-	-	-	11,037	1,073	-
4a.1.5.11	Chilled Water	-	179	-	-	-	-	-	27	206	-	-	206	-	-	-	-	-	-	-	-	4,330	-	-
4a.1.5.12	Chilled Water - RCA	-	404	6	17	239	-	-	140	805	805	-	-	4,898	-	-	-	-	-	-	-	198,897	8,361	-
4a.1.5.13	Compressed Air	-	48	-	-	-	-	-	7	56	-	-	56	-	-	-	-	-	-	-	-	1,188	-	-
4a.1.5.14	Condensate	-	352	-	-	-	-	-	53	405	-	-	405	-	-	-	-	-	-	-	-	8,371	-	-
4a.1.5.15	Containment Vacuum & Leakage Monitoring	-	49	1	2	8	19	-	19	99	99	-	-	171	82	-	-	-	-	-	-	14,294	1,077	-
4a.1.5.16	Domestic Water	-	36	-	-	-	-	-	5	41	-	-	41	-	-	-	-	-	-	-	-	880	-	-
4a.1.5.17	Domestic Water - RCA	-	30	0	1	11	-	-	9	51	51	-	-	221	-	-	-	-	-	-	-	8,958	613	-
4a.1.5.18	Electrical - Contaminated	-	258	3	8	97	12	-	84	461	461	-	-	1,984	53	-	-	-	-	-	-	85,288	5,575	-
4a.1.5.19	Extraction Steam	-	205	-	-	-	-	-	31	235	-	-	235	-	-	-	-	-	-	-	-	4,999	-	-
4a.1.5.20	Heater Drains	-	271	-	-	-	-	-	41	311	-	-	311	-	-	-	-	-	-	-	-	6,560	-	-
4a.1.5.21	Incore Instrumentation	-	11	1	1	1	8	-	5	27	27	-	-	10	36	-	-	-	-	-	-	3,660	229	-
4a.1.5.22	Loose Parts Monitoring	-	0	-	-	-	-	-	-	0	-	-	0	-	-	-	-	-	-	-	-	3	-	-
4a.1.5.23	Main Generator and Main Transformer	-	64	-	-	-	-	-	10	73	-	-	73	-	-	-	-	-	-	-	-	1,509	-	-
4a.1.5.24	Main Steam	-	128	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	-	-	3,013	-	-
4a.1.5.25	Main Steam - RCA	-	261	7	19	271	-	-	108	667	667	-	-	5,551	-	-	-	-	-	-	-	225,448	5,521	-
4a.1.5.26	Main Turbine and Condenser	-	324	-	-	-	-	-	49	373	-	-	373	-	-	-	-	-	-	-	-	7,821	-	-
4a.1.5.27	Main Turbine and Condenser - RCA	-	12	-	0	2	-	-	3	17	17	-	-	40	-	-	-	-	-	-	-	1,620	266	-
4a.1.5.28	Miscellaneous	-	22	-	-	-	-	-	3	25	-	-	25	-	-	-	-	-	-	-	-	495	-	-
4a.1.5.29	Plant Process Control	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	-	-	23	-	-
4a.1.5.30	Post Accident Sampling - RCA	-	144	1	2	33	-	-	41	221	221	-	-	880	-	-	-	-	-	-	-	27,634	3,137	-
4a.1.5.31	Post DBA Hydrogen Control	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	-	-	47	-	-
4a.1.5.32	Post DBA Hydrogen Control - RCA	-	39	1	2	21	-	-	13	76	76	-	-	438	-	-	-	-	-	-	-	17,780	820	-
4a.1.5.33	Primary Access Facility	-	3	-	-	-	-	-	0	3	-	-	3	-	-	-	-	-	-	-	-	79	-	-
4a.1.5.34	Reactor Control & Protection	-	1	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	13	-	-
4a.1.5.35	Reactor Coolant	-	166	11	19	28	196	-	99	520	520	-	-	594	848	-	-	-	-	-	-	99,639	3,642	-
4a.1.5.36	Reactor Excore Instrumentation	-	0	-	-	-	-	-	-	0	-	-	0	-	-	-	-	-	-	-	-	3	-	-
4a.1.5.37	Reactor Plant Sample	-	103	5	6	13	57	-	43	227	227	-	-	272	246	-	-	-	-	-	-	33,092	2,143	-
4a.1.5.38	Safety Injection - RCA	-	562	16	46	652	-	-	247	1,522	1,522	-	-	13,370	-	-	-	-	-	-	-	542,951	12,039	-
4a.1.5.39	Service Water	-	351	-	-	-	-	-	53	403	-	-	403	-	-	-	-	-	-	-	-	8,434	-	-
4a.1.5.40	Service Water - RCA	-	578	24	70	997	-	-	307	1,977	1,977	-	-	20,450	-	-	-	-	-	-	-	830,486	12,686	-
4a.1.5.41	Simulator Building	-	0	-	-	-	-	-	-	0	-	-	0	-	-	-	-	-	-	-	-	3	-	-
4a.1.5.42	Station Service - 4KV	-	125	-	-	-	-	-	19	143	-	-	143	-	-	-	-	-	-	-	-	2,881	-	-
4a.1.5.43	Steam Generator Blowdown	-	818	38	77	545	450	-	414	2,340	2,340	-	-	11,174	1,968	-	-	-	-	-	-	626,733	17,893	-
4a.1.5.44	Steam Generator Feedwater	-	250	-	-	-	-	-	38	288	-	-	288	-	-	-	-	-	-	-	-	5,950	-	-
4a.1.5.45	Steam Generator Feedwater - RCA	-	205	6	18	256	-	-	93	578	578	-	-	5,252	-	-	-	-	-	-	-	213,288	4,356	-
4a.1.5.46	Supplementary Leak Collection & Release	-	68	2	3	31	13	-	25	140	140	-	-	637	54	-	-	-	-	-	-	30,681	1,448	-
4a.1.5.47	Turbine Plant Comp Cooling Water - RCA	-	17	0	0	6	-	-	5	29	29	-	-	128	-	-	-	-	-	-	-	5,214	356	-
4a.1.5.48	Turbine Plant Component Cooling Water	-	216	-	-	-	-	-	32	248	-	-	248	-	-	-	-	-	-	-	-	5,228	-	-
4a.1.5.49	Turbine Plant Sample	-	31	-	-	-	-	-	5	36	-	-	36	-	-	-	-	-	-	-	-	767	-	-

Table C-1  
Beaver Valley Power Station, Unit 1  
SAFSTOR (Integrated with Unit 2 DECON) Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Burial Volumes			Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours	
																Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet				
4a.1.5	Totals	-	7,427	133	320	3,580	795	-	2,350	14,606	11,117	-	3,489	73,464	3,457	-	-	-	3,289,357	166,397	-	
4a.1.6	Scaffolding in support of decommissioning	-	861	9	4	39	2	-	223	1,137	1,137	-	-	720	36	-	-	-	35,993	21,528	-	
4a.1	Subtotal Period 4a Activity Costs	264	18,205	9,393	3,376	6,877	14,265	382	16,623	69,385	65,895	-	3,489	94,432	42,684	2,128	344	-	9,296,451	312,352	2,264	
Period 4a Additional Costs																						
4a.2.1	Curie Surcharge	-	-	-	-	-	222	-	55	277	277	-	-	-	-	-	-	-	-	-	-	
4a.2	Subtotal Period 4a Additional Costs	-	-	-	-	-	222	-	55	277	277	-	-	-	-	-	-	-	-	-	-	
Period 4a Collateral Costs																						
4a.3.1	Process liquid waste	41	-	19	88	-	243	-	97	488	488	-	-	-	-	-	-	-	355	-	44,737	70
4a.3.2	Small tool allowance	-	229	-	-	-	-	-	34	263	237	-	26	-	-	-	-	-	-	-	-	
4a.3	Subtotal Period 4a Collateral Costs	41	229	19	88	-	243	-	131	751	725	-	26	-	-	-	-	-	355	-	44,737	70
Period 4a Period-Dependent Costs																						
4a.4.1	Decon supplies	61	-	-	-	-	-	-	15	76	76	-	-	-	-	-	-	-	-	-	-	
4a.4.2	Insurance	-	-	-	-	-	-	556	56	612	612	-	-	-	-	-	-	-	-	-	-	
4a.4.3	Property taxes	-	-	-	-	-	-	1,207	121	1,327	1,195	-	133	-	-	-	-	-	-	-	-	
4a.4.4	Health physics supplies	-	1,419	-	-	-	-	-	355	1,773	1,773	-	-	-	-	-	-	-	-	-	-	
4a.4.5	Heavy equipment rental	-	2,245	-	-	-	-	-	337	2,582	2,582	-	-	-	-	-	-	-	-	-	-	
4a.4.6	Disposal of DAW generated	-	-	68	46	-	291	-	86	492	492	-	-	-	4,548	-	-	-	91,132	1,117	-	
4a.4.7	Plant energy budget	-	-	-	-	-	818	-	123	941	941	-	-	-	-	-	-	-	-	-	-	
4a.4.8	NRC Fees	-	-	-	-	-	459	-	46	504	504	-	-	-	-	-	-	-	-	-	-	
4a.4.9	Emergency Planning Fees	-	-	-	-	-	140	-	14	154	154	154	-	-	-	-	-	-	-	-	-	
4a.4.10	Fixed Costs - Site	-	-	-	-	-	696	-	103	799	788	-	-	-	-	-	-	-	-	-	-	
4a.4.11	Radwaste Processing Equipment/Services	-	-	-	-	-	259	-	39	298	298	-	-	-	-	-	-	-	-	-	-	
4a.4.12	ISFSI Operating Costs	-	-	-	-	-	53	-	8	61	61	61	-	-	-	-	-	-	-	-	-	
4a.4.13	Security Staff Cost	-	-	-	-	-	2,564	-	365	2,949	2,949	-	-	-	-	-	-	-	-	-	102,830	
4a.4.14	DOC Staff Cost	-	-	-	-	-	14,051	-	2,108	16,159	16,159	-	-	-	-	-	-	-	-	-	221,820	
4a.4.15	Utility Staff Cost	-	-	-	-	-	20,385	-	3,058	23,442	23,442	-	-	-	-	-	-	-	-	-	432,306	
4a.4	Subtotal Period 4a Period-Dependent Costs	61	3,864	68	46	-	291	41,177	6,852	52,159	51,811	215	133	-	4,548	-	-	-	91,132	1,117	757,156	
4a.0	TOTAL PERIOD 4a COST	366	22,098	9,460	3,510	6,877	15,021	41,559	23,661	122,572	118,709	215	3,648	94,432	47,232	2,483	344	-	9,432,320	313,538	759,420	
PERIOD 4b - Site Decontamination																						
Period 4b Direct Decommissioning Activities																						
4b.1.1	Remove spent fuel racks	431	48	98	54	-	161	-	286	1,077	1,077	-	-	-	2,438	-	-	-	243,750	1,184	-	
Disposal of Plant Systems																						
4b.1.2.1	Area Ventilation Systems - Containment	-	338	9	23	284	40	-	142	836	836	-	-	5,823	173	-	-	-	251,996	6,676	-	
4b.1.2.2	Area Ventilation Systems - Miscellaneous	-	142	-	-	-	-	-	21	164	164	-	164	-	-	-	-	-	-	3,556	-	
4b.1.2.3	Boron Recovery & Primary Grade Water	-	198	7	10	39	87	-	79	420	420	-	-	793	375	-	-	-	85,525	4,280	-	
4b.1.2.4	Chemical & Volume Control	-	544	24	35	98	330	-	241	1,272	1,272	-	-	2,005	1,473	-	-	-	208,361	11,730	-	
4b.1.2.5	Circulating Water	-	399	-	-	-	-	-	60	458	458	-	458	-	-	-	-	-	-	9,646	-	
4b.1.2.6	Compressed Air - RCA	-	256	3	8	107	-	-	81	454	454	-	-	2,199	-	-	-	-	89,320	5,287	-	
4b.1.2.7	Containment	-	13	1	2	12	13	-	9	50	50	-	-	237	56	-	-	-	14,681	276	-	
4b.1.2.8	Containment Depressurization	-	107	-	-	-	-	-	16	123	123	-	123	-	-	-	-	-	-	2,334	-	
4b.1.2.9	Containment Depressurization - RCA	-	483	27	79	1,113	-	-	302	2,003	2,003	-	-	22,839	-	-	-	-	927,485	10,291	-	
4b.1.2.10	Electrical - Clean	-	1,978	-	-	-	-	-	297	2,275	2,275	-	2,275	-	-	-	-	-	-	45,230	-	
4b.1.2.11	Electrical - RCA	-	1,644	22	64	811	-	-	560	3,201	3,201	-	-	18,693	-	-	-	-	759,119	34,914	-	
4b.1.2.12	Fire Protection	-	3	-	-	-	-	-	0	3	3	-	3	-	-	-	-	-	-	75	-	
4b.1.2.13	Fuel Pool Area Ventilation Syst Aux Bldg	-	69	2	5	55	11	-	29	171	171	-	-	1,138	46	-	-	-	50,341	1,396	-	
4b.1.2.14	Fuel Pool Compressed Air RCA	-	67	1	2	30	-	-	22	122	122	-	-	823	-	-	-	-	25,284	1,397	-	
4b.1.2.15	Fuel Pool Cooling & Purification	-	312	17	28	66	279	-	164	866	866	-	-	1,360	1,196	-	-	-	162,473	6,789	-	
4b.1.2.16	Fuel Pool Electrical - RCA	-	410	6	16	227	-	-	139	797	797	-	-	4,650	-	-	-	-	188,843	8,702	-	
4b.1.2.17	Fuel Pool Electrical-Contam	-	21	-	-	-	-	-	3	24	24	-	24	-	-	-	-	-	-	488	-	

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Beaver Valley Power Station, Unit 1  
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(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Burial Volumes Class B Cu. Feet	Burial Volumes Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Disposal of Plant Systems (continued)																					
4b.1.2.18	Fuel Pool Fire Protection	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	-	18
4b.1.2.19	Fuel Transfer System & Tools	-	57	2	4	14	35	-	28	138	138	-	-	293	148	-	-	-	25,152	1,268	-
4b.1.2.20	Gaseous Waste Disposal	-	373	10	18	120	115	-	144	781	781	-	-	2,463	509	-	-	-	144,419	8,098	-
4b.1.2.21	Liquid Waste Disposal	-	88	4	5	17	50	-	33	178	178	-	-	349	268	-	-	-	33,310	1,482	-
4b.1.2.22	Prim Comp & Ntm Shld Tnk Cing Wtr - RCA	-	1,057	39	113	1,603	-	-	526	3,339	3,339	-	-	32,904	-	-	-	-	1,336,230	22,579	-
4b.1.2.23	Radiation Monitoring	-	108	6	7	13	67	-	47	247	247	-	-	258	286	-	-	-	36,055	2,221	-
4b.1.2.24	Reactor Plant Vents & Drains	-	319	9	13	40	115	-	117	612	612	-	-	618	505	-	-	-	77,281	6,823	-
4b.1.2.25	Residual Heat Removal	-	296	38	84	186	599	-	265	1,448	1,448	-	-	3,821	2,570	-	-	-	385,589	6,557	-
4b.1.2.26	Sewage Treatment	-	16	-	-	-	-	-	2	19	-	-	19	-	-	-	-	-	-	390	-
4b.1.2.27	Solid Waste Disposal	-	157	7	10	41	89	-	70	375	375	-	-	842	411	-	-	-	68,401	3,350	-
4b.1.2	Totals	-	9,437	234	506	4,976	1,829	-	3,395	20,377	17,311	-	3,067	102,106	8,016	-	-	-	4,849,865	205,851	-
4b.1.3	Scaffolding in support of decommissioning	-	1,291	13	5	58	4	-	334	1,706	1,706	-	-	1,080	54	-	-	-	53,990	32,292	-
Decontamination of Site Buildings																					
4b.1.4.1	Reactor Building	828	650	31	66	202	146	-	657	2,580	2,580	-	-	4,136	2,257	-	-	-	389,163	30,538	-
4b.1.4.2	Auxiliary Building	269	148	19	40	35	104	-	211	826	826	-	-	713	1,592	-	-	-	186,864	8,653	-
4b.1.4.3	Fuel and Decon Building	408	458	7	14	93	23	-	341	1,344	1,344	-	-	1,915	361	-	-	-	113,178	17,703	-
4b.1.4.4	Main Steam, Cable Vault, Safeguards	66	29	4	9	6	22	-	49	185	185	-	-	125	340	-	-	-	38,952	1,996	-
4b.1.4.5	Service Building, Wrmse & Control Area	100	38	6	13	-	37	-	71	266	266	-	-	-	556	-	-	-	55,614	2,866	-
4b.1.4.6	Solid Waste & Coolant Recovery Storage	81	51	5	10	40	20	-	66	273	273	-	-	830	306	-	-	-	63,925	2,658	-
4b.1.4.7	Turbine Building	320	40	4	9	20	20	-	180	592	592	-	-	412	309	-	-	-	47,108	7,944	-
4b.1.4	Totals	2,072	1,415	77	161	396	373	-	1,574	6,067	6,067	-	-	8,130	5,721	-	-	-	894,803	72,378	-
4b.1	Subtotal Period 4b Activity Costs	2,503	12,190	423	726	5,430	2,366	-	5,590	29,227	26,161	-	3,067	111,316	16,229	-	-	-	6,042,408	311,805	-
Period 4b Collateral Costs																					
4b.3.1	Process liquid waste	59	-	29	133	-	367	-	144	732	732	-	-	-	-	536	-	-	67,530	105	-
4b.3.2	Small tool allowance	-	237	-	-	-	-	-	35	272	272	-	-	-	-	-	-	-	-	-	-
4b.3.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	93	14	107	-	107	-	-	-	-	-	-	-	-	-
4b.3	Subtotal Period 4b Collateral Costs	59	237	29	133	-	367	93	194	1,111	1,004	107	-	-	-	536	-	-	67,530	105	-
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	770	-	-	-	-	-	-	193	963	963	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	849	85	934	934	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	1,842	184	2,026	2,026	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	1,601	-	-	-	-	-	400	2,001	2,001	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	3,449	-	-	-	-	-	517	3,966	3,966	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	72	49	-	307	-	91	519	519	-	-	-	4,804	-	-	-	96,273	1,180	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	886	148	1,133	1,133	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	700	70	770	770	-	-	-	-	-	-	-	-	-	-
4b.4.9	Emergency Planning Fees	-	-	-	-	-	-	214	21	235	-	235	-	-	-	-	-	-	-	-	-
4b.4.10	Fixed Costs - Site	-	-	-	-	-	-	1,046	157	1,203	1,203	-	-	-	-	-	-	-	-	-	-
4b.4.11	Radwaste Processing Equipment/Services	-	-	-	-	-	-	792	119	911	911	-	-	-	-	-	-	-	-	-	-
4b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	80	12	93	-	93	-	-	-	-	-	-	-	-	-
4b.4.13	Security Staff Cost	-	-	-	-	-	-	3,137	471	3,608	3,608	-	-	-	-	-	-	-	-	-	125,914
4b.4.14	DOC Staff Cost	-	-	-	-	-	-	20,676	3,101	23,777	23,777	-	-	-	-	-	-	-	-	-	325,371
4b.4.15	Utility Staff Cost	-	-	-	-	-	-	25,035	3,755	28,790	28,790	-	-	-	-	-	-	-	-	-	524,829
4b.4	Subtotal Period 4b Period-Dependent Costs	770	5,050	72	49	-	307	55,357	9,325	70,929	70,602	327	-	-	4,804	-	-	-	96,273	1,180	976,114
4b.0	TOTAL PERIOD 4b COST	3,333	17,476	523	908	5,430	3,040	55,450	15,108	101,268	97,766	435	3,067	111,316	21,033	536	-	-	6,206,211	313,090	976,114
PERIOD 4e - License Termination																					
Period 4e Direct Decommissioning Activities																					
4e.1.1	ORISE confirmatory survey	-	-	-	-	-	-	125	37	162	162	-	-	-	-	-	-	-	-	-	-
4e.1.2	Terminate license	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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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	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
4e.1	Subtotal Period 4e Activity Costs	-	-	-	-	-	-	125	37	162	162	-	-	-	-	-	-	-	-	-	-
Period 4e Additional Costs																					
4e.2.1	License Termination Survey	-	-	-	-	-	-	6,094	1,828	7,923	7,923	-	-	-	-	-	-	-	-	122,933	-
4e.2	Subtotal Period 4e Additional Costs	-	-	-	-	-	-	6,094	1,828	7,923	7,923	-	-	-	-	-	-	-	-	122,933	-
Period 4e Collateral Costs																					
4e.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,105	166	1,271	1,271	-	-	-	-	-	-	-	-	-	-
4e.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	173	26	199	-	199	-	-	-	-	-	-	-	-	-
4e.3	Subtotal Period 4e Collateral Costs	-	-	-	-	-	-	1,278	192	1,470	1,271	199	-	-	-	-	-	-	-	-	-
Period 4e Period-Dependent Costs																					
4e.4.1	Insurance	-	-	-	-	-	-	280	28	308	308	-	-	-	-	-	-	-	-	-	-
4e.4.2	Property taxes	-	-	-	-	-	-	652	65	717	717	-	-	-	-	-	-	-	-	-	-
4e.4.3	Health physics supplies	-	610	-	-	-	-	-	152	762	762	-	-	-	-	-	-	-	-	-	-
4e.4.4	Disposal of DAW generated	-	-	5	3	-	20	-	14	107	33	-	-	306	-	-	-	-	6,127	75	-
4e.4.5	Plant energy budget	-	-	-	-	-	-	93	14	107	107	-	-	-	-	-	-	-	-	-	-
4e.4.6	NRC Fees	-	-	-	-	-	-	248	25	272	272	-	-	-	-	-	-	-	-	-	-
4e.4.7	Emergency Planning Fees	-	-	-	-	-	-	75	8	83	-	83	-	-	-	-	-	-	-	-	-
4e.4.8	Fixed Costs - Site	-	-	-	-	-	-	370	56	426	426	-	-	-	-	-	-	-	-	-	-
4e.4.9	ISFSI Operating Costs	-	-	-	-	-	-	28	4	33	-	33	-	-	-	-	-	-	-	-	-
4e.4.10	Security Staff Cost	-	-	-	-	-	-	354	53	407	407	-	-	-	-	-	-	-	-	-	14,194
4e.4.11	DOC Staff Cost	-	-	-	-	-	-	3,823	573	4,396	4,396	-	-	-	-	-	-	-	-	-	57,566
4e.4.12	Utility Staff Cost	-	-	-	-	-	-	3,790	569	4,359	4,359	-	-	-	-	-	-	-	-	-	72,943
4e.4	Subtotal Period 4e Period-Dependent Costs	-	610	5	3	-	20	9,714	1,552	11,903	11,787	116	-	306	-	-	-	-	6,127	75	144,703
4e.0	TOTAL PERIOD 4e COST	-	610	5	3	-	20	17,211	3,610	21,458	21,143	315	-	306	-	-	-	-	6,127	123,008	144,703
PERIOD 4 TOTALS		3,699	40,184	10,007	4,422	12,307	18,080	114,220	42,379	245,297	237,618	964	6,715	205,748	68,570	3,019	344	-	15,644,660	749,636	1,880,237
PERIOD 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	Reactor Building	-	3,008	-	-	-	-	-	451	3,459	-	-	3,459	-	-	-	-	-	-	-	43,452
5b.1.1.2	Auxiliary Building	-	730	-	-	-	-	-	110	840	-	-	840	-	-	-	-	-	-	-	11,790
5b.1.1.3	Circulating Water Piping	-	40	-	-	-	-	-	6	46	-	-	46	-	-	-	-	-	-	-	677
5b.1.1.4	Cooling Tower	-	354	-	-	-	-	-	53	407	-	-	407	-	-	-	-	-	-	-	6,064
5b.1.1.5	Cooling Tower Pump House	-	138	-	-	-	-	-	21	159	-	-	159	-	-	-	-	-	-	-	2,461
5b.1.1.6	Diesel Generator Building	-	88	-	-	-	-	-	13	101	-	-	101	-	-	-	-	-	-	-	1,379
5b.1.1.7	Fuel and Decon Building	-	808	-	-	-	-	-	121	929	-	-	929	-	-	-	-	-	-	-	12,570
5b.1.1.8	Main Steam, Cable Vault, Safeguards	-	364	-	-	-	-	-	55	418	-	-	418	-	-	-	-	-	-	-	5,603
5b.1.1.9	Service Building, Wtrse & Control Area	-	1,092	-	-	-	-	-	164	1,256	-	-	1,256	-	-	-	-	-	-	-	18,914
5b.1.1.10	Solid Waste & Coolant Recovery Storage	-	293	-	-	-	-	-	44	337	-	-	337	-	-	-	-	-	-	-	4,703
5b.1.1.11	Turbine Building	-	1,988	-	-	-	-	-	298	2,286	-	-	2,286	-	-	-	-	-	-	-	36,496
5b.1.1.12	Turbine Pedestal	-	527	-	-	-	-	-	79	606	-	-	606	-	-	-	-	-	-	-	6,567
5b.1.1.13	Warehouse	-	187	-	-	-	-	-	28	215	-	-	215	-	-	-	-	-	-	-	3,648
5b.1.1.14	Yard Tanks & Foundations	-	127	-	-	-	-	-	19	146	-	-	146	-	-	-	-	-	-	-	2,063
5b.1.1	Totals	-	9,744	-	-	-	-	-	1,462	11,206	-	-	11,206	-	-	-	-	-	-	-	156,586
Site Closeout Activities																					
5b.1.2	Remove Rubble	-	10,043	-	-	-	-	-	1,506	11,550	-	-	11,550	-	-	-	-	-	-	-	15,135
5b.1.3	Grade & landscape site	-	162	-	-	-	-	-	24	186	-	-	186	-	-	-	-	-	-	-	593
5b.1.4	Final report to NRC	-	-	-	-	-	-	59	9	68	68	-	-	-	-	-	-	-	-	-	668
5b.1	Subtotal Period 5b Activity Costs	-	19,949	-	-	-	-	-	59	3,001	23,009	68	-	22,942	-	-	-	-	-	-	172,314

Table C-1  
Beaver Valley Power Station, Unit 1  
SAFSTOR (Integrated with Unit 2 DECON) Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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			
Period 5b Additional Costs																				
5b.2.1	Concrete Crushing	-	499	-	-	-	-	2	125	627	627	-	-	-	-	-	-	-	2,990	-
5b.2	Subtotal Period 5b Additional Costs	-	499	-	-	-	-	2	125	627	627	-	-	-	-	-	-	-	2,990	-
Period 5b Collateral Costs																				
5b.3.1	Small tool allowance	-	135	-	-	-	-	-	20	156	-	-	156	-	-	-	-	-	-	-
5b.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	266	40	306	-	306	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	135	-	-	-	-	266	60	461	-	306	156	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																				
5b.4.1	Insurance	-	-	-	-	-	-	719	72	791	-	791	-	-	-	-	-	-	-	-
5b.4.2	Property taxes	-	-	-	-	-	-	1,672	167	1,839	-	1,839	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	4,294	-	-	-	-	-	644	4,938	-	-	4,938	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	119	18	137	-	-	137	-	-	-	-	-	-	-
5b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	227	23	250	-	250	-	-	-	-	-	-	-	-
5b.4.6	Emergency Planning Fees	-	-	-	-	-	-	194	19	213	-	213	-	-	-	-	-	-	-	-
5b.4.7	Fixed Costs - Site	-	-	-	-	-	-	849	127	976	976	-	-	-	-	-	-	-	-	-
5b.4.8	ISFSI Operating Costs	-	-	-	-	-	-	73	11	84	-	84	-	-	-	-	-	-	-	-
5b.4.9	Security Staff Cost	-	-	-	-	-	-	907	136	1,043	-	605	438	-	-	-	-	-	-	36,411
5b.4.10	DOC Staff Cost	-	-	-	-	-	-	10,809	1,621	12,431	-	-	12,431	-	-	-	-	-	-	159,806
5b.4.11	Utility Staff Cost	-	-	-	-	-	-	5,859	879	6,738	-	1,213	5,525	-	-	-	-	-	-	103,166
5b.4	Subtotal Period 5b Period-Dependent Costs	-	4,294	-	-	-	-	21,429	3,718	29,441	976	4,995	23,469	-	-	-	-	-	-	299,383
5b.0	TOTAL PERIOD 5b COST	-	24,877	-	-	-	-	21,756	8,904	53,537	1,671	5,301	46,566	-	-	-	-	-	175,304	300,051
PERIOD 5c - Fuel Storage Operations/Shipping																				
Period 5c Direct Decommissioning Activities																				
Period 5c Collateral Costs																				
5c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	3,739	561	4,299	-	4,299	-	-	-	-	-	-	-	-
5c.3	Subtotal Period 5c Collateral Costs	-	-	-	-	-	-	3,739	561	4,299	-	4,299	-	-	-	-	-	-	-	-
Period 5c Period-Dependent Costs																				
5c.4.1	Insurance	-	-	-	-	-	-	8,072	807	8,879	-	8,879	-	-	-	-	-	-	-	-
5c.4.2	Property taxes	-	-	-	-	-	-	16,764	1,876	20,640	-	20,640	-	-	-	-	-	-	-	-
5c.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	2,547	255	2,802	-	2,802	-	-	-	-	-	-	-	-
5c.4.5	Emergency Planning Fees	-	-	-	-	-	-	2,176	218	2,393	-	2,393	-	-	-	-	-	-	-	-
5c.4.6	Fixed Costs - Site	-	-	-	-	-	-	3,029	454	3,483	-	3,483	-	-	-	-	-	-	-	-
5c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	820	123	943	-	943	-	-	-	-	-	-	-	-
5c.4.8	Security Staff Cost	-	-	-	-	-	-	5,939	891	6,830	-	6,830	-	-	-	-	-	-	-	238,380
5c.4.9	Utility Staff Cost	-	-	-	-	-	-	11,573	1,736	13,309	-	13,309	-	-	-	-	-	-	-	221,580
5c.4	Subtotal Period 5c Period-Dependent Costs	-	-	-	-	-	-	52,919	6,360	59,279	-	59,279	-	-	-	-	-	-	-	459,960
5c.0	TOTAL PERIOD 5c COST	-	-	-	-	-	-	56,658	6,921	63,579	-	63,579	-	-	-	-	-	-	-	459,960
PERIOD 5d - GTCC shipping																				
Period 5d Direct Decommissioning Activities																				
Nuclear Steam Supply System Removal																				
5d.1.1.1	Vessel & Internals GTCC Disposal	-	-	300	-	-	11,104	-	1,696	13,100	13,100	-	-	-	-	-	-	489	110,653	-
5d.1.1	Totals	-	-	300	-	-	11,104	-	1,696	13,100	13,100	-	-	-	-	-	-	489	110,653	-
5d.1	Subtotal Period 5d Activity Costs	-	-	300	-	-	11,104	-	1,696	13,100	13,100	-	-	-	-	-	-	489	110,653	-

Table C-1  
Beaver Valley Power Station, Unit 1  
SAFSTOR (Integrated with Unit 2 DECON) Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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 WL, Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet					
Period 5d Period-Dependent Costs																						
5d.4.1	Insurance	-	-	-	-	-	-	30	3	34	-	34	-	-	-	-	-	-	-	-	-	
5d.4.2	Property taxes	-	-	-	-	-	-	71	7	78	-	78	-	-	-	-	-	-	-	-	-	
5d.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5d.4.4	NRC ISFSI Fees	-	-	-	-	-	-	10	1	11	-	11	-	-	-	-	-	-	-	-	-	
5d.4.5	Emergency Planning Fees	-	-	-	-	-	-	8	1	9	-	9	-	-	-	-	-	-	-	-	-	
5d.4.6	Fixed Costs - Site	-	-	-	-	-	-	11	2	13	-	13	-	-	-	-	-	-	-	-	-	
5d.4.7	ISFSI Operating Costs	-	-	-	-	-	-	3	0	4	-	4	-	-	-	-	-	-	-	-	-	
5d.4.8	Security Staff Cost	-	-	-	-	-	-	22	3	26	-	26	-	-	-	-	-	-	-	-	900	
5d.4.9	Utility Staff Cost	-	-	-	-	-	-	44	7	50	-	50	-	-	-	-	-	-	-	-	837	
5d.4	Subtotal Period 5d Period-Dependent Costs	-	-	-	-	-	-	200	24	224	-	224	-	-	-	-	-	-	-	-	1,737	
5d.0	TOTAL PERIOD 5d COST	-	-	300	-	-	11,104	200	1,720	13,324	13,100	224	-	-	-	-	489	110,653	-	-	1,737	
PERIOD 5e - ISFSI Decontamination																						
Period 5e Direct Decommissioning Activities																						
Period 5e Additional Costs																						
5e.2.1	ISFSI License Termination	-	488	5	74	-	329	798	335	2,028	-	2,028	-	-	3,424	-	-	-	-	380,555	8,021	1,280
5e.2	Subtotal Period 5e Additional Costs	-	488	5	74	-	329	798	335	2,028	-	2,028	-	-	3,424	-	-	-	-	380,555	8,021	1,280
Period 5e Collateral Costs																						
5e.3.1	Small tool allowance	-	5	-	-	-	-	-	1	6	-	6	-	-	-	-	-	-	-	-	-	-
5e.3	Subtotal Period 5e Collateral Costs	-	5	-	-	-	-	-	1	6	-	6	-	-	-	-	-	-	-	-	-	-
Period 5e Period-Dependent Costs																						
5e.4.1	Insurance	-	-	-	-	-	-	123	12	135	-	135	-	-	-	-	-	-	-	-	-	-
5e.4.2	Property taxes	-	-	-	-	-	-	288	29	314	-	314	-	-	-	-	-	-	-	-	-	-
5e.4.3	Heavy equipment rental	-	215	-	-	-	-	-	32	247	-	247	-	-	-	-	-	-	-	-	-	-
5e.4.4	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5e.4.5	NRC ISFSI Fees	-	-	-	-	-	-	39	4	43	-	43	-	-	-	-	-	-	-	-	-	-
5e.4.6	Emergency Planning Fees	-	-	-	-	-	-	33	3	36	-	36	-	-	-	-	-	-	-	-	-	-
5e.4.7	Fixed Costs - Site	-	-	-	-	-	-	46	7	53	-	53	-	-	-	-	-	-	-	-	-	-
5e.4.8	Security Staff Cost	-	-	-	-	-	-	45	7	52	-	52	-	-	-	-	-	-	-	-	-	1,818
5e.4.9	Utility Staff Cost	-	-	-	-	-	-	154	23	177	-	177	-	-	-	-	-	-	-	-	-	2,939
5e.4	Subtotal Period 5e Period-Dependent Costs	-	215	-	-	-	-	726	117	1,058	-	1,058	-	-	-	-	-	-	-	-	-	4,757
5e.0	TOTAL PERIOD 5e COST	-	707	5	74	-	329	1,524	453	3,092	-	3,092	-	-	3,424	-	-	-	-	380,555	8,021	6,037
PERIOD 5f - ISFSI Site Restoration																						
Period 5f Direct Decommissioning Activities																						
Period 5f Additional Costs																						
5f.2.1	ISFSI Demolition and Site Restoration	-	764	-	-	-	-	23	194	982	-	982	-	-	-	-	-	-	-	-	1,836	80
5f.2	Subtotal Period 5f Additional Costs	-	764	-	-	-	-	23	194	982	-	982	-	-	-	-	-	-	-	-	1,836	80
Period 5f Collateral Costs																						
5f.3.1	Small tool allowance	-	1	-	-	-	-	-	0	2	-	2	-	-	-	-	-	-	-	-	-	-
5f.3	Subtotal Period 5f Collateral Costs	-	1	-	-	-	-	-	0	2	-	2	-	-	-	-	-	-	-	-	-	-
5f.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5f.4.2	Property taxes	-	-	-	-	-	-	144	14	158	-	158	-	-	-	-	-	-	-	-	-	-
5f.4.3	Heavy equipment rental	-	74	-	-	-	-	-	11	85	-	85	-	-	-	-	-	-	-	-	-	-
5f.4.4	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5f.4.5	Fixed Costs - Site	-	-	-	-	-	-	23	3	27	-	27	-	-	-	-	-	-	-	-	-	-
5f.4.6	Security Staff Cost	-	-	-	-	-	-	23	3	26	-	26	-	-	-	-	-	-	-	-	-	917
5f.4.7	Utility Staff Cost	-	-	-	-	-	-	70	10	80	-	80	-	-	-	-	-	-	-	-	-	1,307

**Table C-1**  
**Beaver Valley Power Station, Unit 1**  
**SAFSTOR (Integrated with Unit 2 DECON) Decommissioning Cost Estimate**  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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				
Sf.4	Subtotal Period Sf Period-Dependent Costs	-	74	-	-	-	-	260	43	377	-	377	-	-	-	-	-	-	-	-	-	2,224
Sf.0	TOTAL PERIOD Sf COST	-	839	-	-	-	-	283	238	1,360	-	1,360	-	-	-	-	-	-	-	-	1,836	2,304
<b>PERIOD 5 TOTALS</b>		-	26,424	305	74	-	11,433	80,421	16,235	134,892	14,770	73,555	46,566	-	3,424	-	-	489	491,208	185,161	770,088	
<b>TOTAL COST TO DECOMMISSION</b>		9,443	70,875	11,105	6,322	12,942	36,371	398,147	93,537	638,742	376,746	208,238	53,758	205,748	78,151	11,076	344	489	17,449,620	1,003,944	4,518,391	

<b>TOTAL COST TO DECOMMISSION WITH 17.16% CONTINGENCY:</b>	<b>\$638,742</b>	thousands of 2005 dollars
<b>TOTAL NRC LICENSE TERMINATION COST IS 88.88% OR:</b>	<b>\$376,746</b>	thousands of 2005 dollars
<b>SPENT FUEL MANAGEMENT COST IS 32.6% OR:</b>	<b>\$208,238</b>	thousands of 2005 dollars
<b>NON-NUCLEAR DEMOLITION COST IS 8.42% OR:</b>	<b>\$53,758</b>	thousands of 2005 dollars
<b>RADWASTE VOLUME BURIED:</b>	<b>89,671</b>	cubic feet
<b>TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:</b>	<b>489</b>	cubic feet
<b>TOTAL SCRAP METAL REMOVED:</b>	<b>40,486</b>	tons
<b>TOTAL CRAFT LABOR REQUIREMENTS:</b>	<b>1,003,944</b>	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  
Beaver Valley Power Station, Unit 2  
DECON Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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	-	-	-	-	-	-	114	17	132	132	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	176	26	202	202	-	-	-	-	-	-	-	-	-	2,000
1a.1.7	Review plant dwgs & specs.	-	-	-	-	-	-	405	61	466	466	-	-	-	-	-	-	-	-	-	4,600
1a.1.8	Perform detailed rad survey	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.9	Estimate by-product inventory	-	-	-	-	-	-	88	13	101	101	-	-	-	-	-	-	-	-	-	1,000
1a.1.10	End product description	-	-	-	-	-	-	88	13	101	101	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	Detailed by-product inventory	-	-	-	-	-	-	114	17	132	132	-	-	-	-	-	-	-	-	-	1,300
1a.1.12	Define major work sequence	-	-	-	-	-	-	660	99	759	759	-	-	-	-	-	-	-	-	-	7,500
1a.1.13	Perform SER and EA	-	-	-	-	-	-	273	41	314	314	-	-	-	-	-	-	-	-	-	3,100
1a.1.14	Perform Site-Specific Cost Study	-	-	-	-	-	-	440	66	506	506	-	-	-	-	-	-	-	-	-	5,000
1a.1.15	Prepare/submit License Termination Plan	-	-	-	-	-	-	360	54	415	415	-	-	-	-	-	-	-	-	-	4,096
1a.1.16	Receive NRC approval of termination plan	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities	-	-	-	-	-	-	433	65	498	448	-	50	-	-	-	-	-	-	-	4,920
1a.1.17.2	Plant systems	-	-	-	-	-	-	367	55	422	380	-	42	-	-	-	-	-	-	-	4,167
1a.1.17.3	NSSS Decontamination Flush	-	-	-	-	-	-	44	7	51	51	-	-	-	-	-	-	-	-	-	500
1a.1.17.4	Reactor internals	-	-	-	-	-	-	625	94	719	719	-	-	-	-	-	-	-	-	-	7,100
1a.1.17.5	Reactor vessel	-	-	-	-	-	-	572	86	658	658	-	-	-	-	-	-	-	-	-	6,500
1a.1.17.6	Biological shield	-	-	-	-	-	-	44	7	51	51	-	-	-	-	-	-	-	-	-	500
1a.1.17.7	Steam generators	-	-	-	-	-	-	275	41	316	316	-	-	-	-	-	-	-	-	-	3,120
1a.1.17.8	Reinforced concrete	-	-	-	-	-	-	141	21	162	81	-	81	-	-	-	-	-	-	-	1,600
1a.1.17.9	Main Turbine	-	-	-	-	-	-	35	5	40	-	-	40	-	-	-	-	-	-	-	400
1a.1.17.10	Main Condensers	-	-	-	-	-	-	35	5	40	-	-	40	-	-	-	-	-	-	-	400
1a.1.17.11	Plant structures & buildings	-	-	-	-	-	-	275	41	316	158	-	158	-	-	-	-	-	-	-	3,120
1a.1.17.12	Waste management	-	-	-	-	-	-	405	61	466	466	-	-	-	-	-	-	-	-	-	4,600
1a.1.17.13	Facility & site closeout	-	-	-	-	-	-	79	12	91	46	-	46	-	-	-	-	-	-	-	900
1a.1.17	Total	-	-	-	-	-	-	3,329	499	3,828	3,371	-	457	-	-	-	-	-	-	-	37,827
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-	-	-	-	-	-	211	32	243	243	-	-	-	-	-	-	-	-	-	2,400
1a.1.19	Plant prep. & temp. svces	-	-	-	-	-	-	2,419	363	2,782	2,782	-	-	-	-	-	-	-	-	-	-
1a.1.20	Design water clean-up system	-	-	-	-	-	-	123	18	142	142	-	-	-	-	-	-	-	-	-	1,400
1a.1.21	Rigging/Cont. Crtri Envips/tooling/etc.	-	-	-	-	-	-	2,048	307	2,355	2,355	-	-	-	-	-	-	-	-	-	-
1a.1.22	Procure casks/liners & containers	-	-	-	-	-	-	108	16	124	124	-	-	-	-	-	-	-	-	-	1,230
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	10,957	1,644	12,601	12,143	-	457	-	-	-	-	-	-	-	73,753
Period 1a Additional Costs																					
1a.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	5,739	861	6,600	6,600	-	-	-	-	-	-	-	-	-	-
1a.2	Subtotal Period 1a Additional Costs	-	-	-	-	-	-	5,739	861	6,600	6,600	-	-	-	-	-	-	-	-	-	-
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	3,771	566	4,337	-	4,337	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	3,771	566	4,337	-	4,337	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,160	116	1,276	1,276	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	862	86	948	948	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	250	-	-	-	-	-	62	312	312	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	329	-	-	-	-	-	49	379	379	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	6	4	-	26	-	8	44	44	-	-	-	404	-	-	-	-	8,103	99

Table C-2  
Beaver Valley Power Station, Unit 2  
DECON Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Burial Volumes			Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
																Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
Period 1a Period-Dependent Costs (continued)																					
1a.4.6	Plant energy budget	-	-	-	-	-	-	615	92	707	707	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	265	27	292	292	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	225	22	247	-	247	-	-	-	-	-	-	-	-	-
1a.4.9	Fixed Costs - Site	-	-	-	-	-	-	490	73	563	563	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	630	95	725	-	725	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	38	6	43	-	43	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	1,468	220	1,688	1,688	-	-	-	-	-	-	-	-	-	58,921
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	20,548	3,082	23,631	23,631	-	-	-	-	-	-	-	-	-	438,000
1a.4	Subtotal Period 1a Period-Dependent Costs	-	579	6	4	-	26	26,301	3,939	30,855	29,839	1,015	-	-	404	-	-	-	8,103	99	496,921
1a.0	TOTAL PERIOD 1a COST	-	579	6	4	-	26	46,768	7,009	54,393	48,583	5,352	457	-	404	-	-	-	8,103	99	570,674
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems	-	-	-	-	-	-	417	62	479	431	-	48	-	-	-	-	-	-	-	4,733
1b.1.1.2	NSSS Decontamination Flush	-	-	-	-	-	-	88	13	101	101	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.3	Reactor internals	-	-	-	-	-	-	220	33	253	253	-	-	-	-	-	-	-	-	-	2,500
1b.1.1.4	Remaining buildings	-	-	-	-	-	-	119	18	137	34	-	102	-	-	-	-	-	-	-	1,350
1b.1.1.5	CRD cooling assembly	-	-	-	-	-	-	88	13	101	101	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.6	CRD housings & ICI tubes	-	-	-	-	-	-	88	13	101	101	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.7	Incore instrumentation	-	-	-	-	-	-	88	13	101	101	-	-	-	-	-	-	-	-	-	1,000
1b.1.1.8	Reactor vessel	-	-	-	-	-	-	319	48	367	367	-	-	-	-	-	-	-	-	-	3,630
1b.1.1.9	Facility closeout	-	-	-	-	-	-	106	16	121	61	-	61	-	-	-	-	-	-	-	1,200
1b.1.1.10	Missile shields	-	-	-	-	-	-	40	6	46	46	-	-	-	-	-	-	-	-	-	450
1b.1.1.11	Biological shield	-	-	-	-	-	-	106	16	121	121	-	-	-	-	-	-	-	-	-	1,200
1b.1.1.12	Steam generators	-	-	-	-	-	-	405	61	466	466	-	-	-	-	-	-	-	-	-	4,600
1b.1.1.13	Reinforced concrete	-	-	-	-	-	-	88	13	101	51	-	51	-	-	-	-	-	-	-	1,000
1b.1.1.14	Main Turbine	-	-	-	-	-	-	137	21	158	-	-	158	-	-	-	-	-	-	-	1,560
1b.1.1.15	Main Condensers	-	-	-	-	-	-	137	21	158	-	-	158	-	-	-	-	-	-	-	1,560
1b.1.1.16	Auxiliary building	-	-	-	-	-	-	240	36	276	249	-	28	-	-	-	-	-	-	-	2,730
1b.1.1.17	Reactor building	-	-	-	-	-	-	240	36	276	249	-	28	-	-	-	-	-	-	-	2,730
1b.1.1	Total	-	-	-	-	-	-	2,925	439	3,364	2,732	-	633	-	-	-	-	-	-	-	33,243
1b.1.2	Decon primary loop	912	-	-	-	-	-	-	456	1,369	1,369	-	-	-	-	-	-	-	-	-	1,067
1b.1	Subtotal Period 1b Activity Costs	912	-	-	-	-	-	2,925	895	4,733	4,100	-	633	-	-	-	-	-	-	-	33,243
Period 1b Additional Costs																					
1b.2.1	Mixed Waste	-	-	133	-	634	-	-	112	901	901	-	-	-	-	-	-	-	-	-	-
1b.2.2	Site Characterization	-	-	-	-	-	-	836	251	1,087	1,087	-	-	-	-	-	-	-	-	-	-
1b.2.3	Cofferdam Construction and Teardown	-	182	-	-	-	-	-	27	209	209	-	-	-	-	-	-	-	-	-	2,223
1b.2	Subtotal Period 1b Additional Costs	-	182	133	22	634	-	836	390	2,197	2,197	-	-	-	-	-	-	-	-	-	2,223
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	710	-	-	-	-	-	-	107	817	817	-	-	-	-	-	-	-	-	-	-
1b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,105	166	1,271	1,271	-	-	-	-	-	-	-	-	-	-
1b.3.3	Process liquid waste	92	-	391	915	-	4,193	-	1,271	6,862	6,862	-	-	-	4,739	-	-	-	-	772,116	223
1b.3.4	Small tool allowance	-	2	-	-	-	-	-	0	3	3	-	-	-	-	-	-	-	-	-	-
1b.3.5	Pipe cutting equipment	-	957	-	-	-	-	-	143	1,100	1,100	-	-	-	-	-	-	-	-	-	-
1b.3.6	Decon rig	1,243	-	-	-	-	-	-	186	1,430	1,430	-	-	-	-	-	-	-	-	-	-
1b.3.7	Spent Fuel Capital and Transfer	-	-	-	-	-	-	4,139	621	4,759	-	4,759	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	2,046	959	391	915	-	4,193	5,243	2,494	16,241	11,482	4,759	-	-	4,739	-	-	-	-	772,116	223

Table C-2  
Beaver Valley Power Station, Unit 2  
DECON Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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 1b Period-Dependent Costs																						
1b.4.1	Decon supplies	22	-	-	-	-	-	-	6	28	28	-	-	-	-	-	-	-	-	-	-	
1b.4.2	Insurance	-	-	-	-	-	-	594	59	654	654	-	-	-	-	-	-	-	-	-	-	
1b.4.3	Property taxes	-	-	-	-	-	-	442	44	486	486	-	-	-	-	-	-	-	-	-	-	
1b.4.4	Health physics supplies	-	140	-	-	-	-	-	35	175	175	-	-	-	-	-	-	-	-	-	-	
1b.4.5	Heavy equipment rental	-	169	-	-	-	-	-	25	194	194	-	-	-	-	-	-	-	-	-	-	
1b.4.6	Disposal of DAW generated	-	-	3	-	-	-	-	4	24	24	-	-	-	-	-	-	-	-	-	-	
1b.4.7	Plant energy budget	-	-	-	2	-	14	-	-	-	-	-	-	-	-	224	-	-	-	4,483	55	
1b.4.8	NRC Fees	-	-	-	-	-	-	630	95	725	725	-	-	-	-	-	-	-	-	-	-	
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	136	14	149	149	-	-	-	-	-	-	-	-	-	-	
1b.4.10	Fixed Costs - Site	-	-	-	-	-	-	115	12	127	127	-	-	-	-	-	-	-	-	-	-	
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	251	38	289	289	-	127	-	-	-	-	-	-	-	-	
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	323	48	371	371	-	-	-	-	-	-	-	-	-	-	
1b.4.13	Security Staff Cost	-	-	-	-	-	-	19	3	22	22	-	-	-	-	-	-	-	-	-	-	
1b.4.14	DOC Staff Cost	-	-	-	-	-	-	752	113	865	865	-	-	-	-	-	-	-	-	-	30,187	
1b.4.15	Utility Staff Cost	-	-	-	-	-	-	4,235	635	4,870	4,870	-	-	-	-	-	-	-	-	-	65,183	
1b.4	Subtotal Period 1b Period-Dependent Costs	22	309	3	2	-	14	10,581	1,587	12,168	12,168	-	-	-	-	-	-	-	-	4,483	55	225,469
1b.0	TOTAL PERIOD 1b COST	2,981	1,450	528	939	634	4,207	27,082	6,496	44,317	38,405	5,279	633	-	224	4,739	-	-	776,599	3,567	354,082	
PERIOD 1 TOTALS		2,981	2,029	534	943	634	4,233	73,851	13,506	98,710	86,988	10,632	1,090	-	628	4,739	-	-	784,702	3,667	924,756	
PERIOD 2a - Large Component Removal																						
Period 2a Direct Decommissioning Activities																						
Nuclear Steam Supply System Removal																						
2a.1.1.1	Reactor Coolant Piping	126	106	14	31	-	372	-	189	837	837	-	-	-	1,183	-	-	-	143,095	4,769	-	
2a.1.1.2	Pressurizer Relief Tank	23	19	3	7	-	77	-	37	166	166	-	-	-	265	-	-	-	29,424	863	-	
2a.1.1.3	Reactor Coolant Pumps & Motors	56	62	29	96	60	1,675	-	489	2,467	2,467	-	-	187	2,407	-	-	-	694,244	2,675	-	
2a.1.1.4	Pressurizer	34	52	398	367	-	180	-	170	1,201	1,201	-	-	-	1,874	-	-	-	159,207	2,282	-	
2a.1.1.5	Steam Generators	269	1,932	1,870	889	2,667	1,143	-	1,623	10,393	10,393	-	-	12,400	11,910	-	-	-	2,323,333	23,059	-	
2a.1.1.6	CRDMs/CIs/Service Structure Removal	134	79	101	47	-	189	-	151	702	702	-	-	-	3,310	-	-	-	72,844	4,132	-	
2a.1.1.7	Reactor Vessel Internals	88	1,953	5,500	779	-	3,694	210	4,957	17,181	17,181	-	-	-	1,377	568	344	-	252,382	27,817	1,245	
2a.1.1.8	Reactor Vessel	102	3,588	1,402	1,071	-	10,828	210	8,806	26,007	26,007	-	-	-	10,789	2,003	-	-	1,379,061	27,817	1,245	
2a.1.1	Totals	831	7,791	9,318	3,287	2,727	18,158	420	16,421	58,954	58,954	-	-	12,587	33,115	2,561	344	-	5,053,611	93,414	2,489	
Removal of Major Equipment																						
2a.1.2	Main Turbine/Generator	-	286	169	19	268	192	-	179	1,113	1,113	-	-	-	2,623	2,914	-	-	514,339	6,062	-	
2a.1.3	Main Condensers	-	1,459	89	75	274	167	-	488	2,532	2,532	-	-	-	5,071	2,536	-	-	481,749	31,533	-	
Cascading Costs from Clean Building Demolition																						
2a.1.4.1	Reactor Building	-	502	-	-	-	-	-	75	577	577	-	-	-	-	-	-	-	-	-	7,157	-
2a.1.4.2	Auxiliary Building	-	115	-	-	-	-	-	17	132	132	-	-	-	-	-	-	-	-	-	1,752	-
2a.1.4.3	Fuel and Decon Building	-	87	-	-	-	-	-	13	100	100	-	-	-	-	-	-	-	-	-	1,340	-
2a.1.4.4	Gaseous Waste Storage Tank Enclosure	-	2	-	-	-	-	-	0	3	3	-	-	-	-	-	-	-	-	-	37	-
2a.1.4.5	Main Steam, Cable Vault, Safeguards Area	-	95	-	-	-	-	-	14	109	109	-	-	-	-	-	-	-	-	-	1,426	-
2a.1.4.6	Waste Handling/Condensate Polishing	-	110	-	-	-	-	-	16	126	126	-	-	-	-	-	-	-	-	-	1,633	-
2a.1.4	Totals	-	910	-	-	-	-	-	137	1,047	1,047	-	-	-	-	-	-	-	-	-	13,345	-
Disposal of Plant Systems																						
2a.1.5.1	Area Vent. Syst. - Condensate Polish Bid	-	150	2	6	88	-	-	52	298	298	-	-	1,799	-	-	-	-	-	73,041	3,082	-
2a.1.5.2	Area Ventilation Systems - Air Condition	-	0	-	-	-	-	-	-	0	-	-	0	-	-	-	-	-	-	-	5	-
2a.1.5.3	Area Ventilation Systems - Auxiliary Bid	-	212	3	10	140	-	-	76	441	441	-	-	2,883	-	-	-	-	-	117,063	4,295	-
2a.1.5.4	Area Ventilation Systems - Control Area	-	25	-	-	-	-	-	4	29	29	-	29	-	-	-	-	-	-	-	601	-
2a.1.5.5	Area Ventilation Systems - Cooling	-	257	4	12	176	-	-	93	542	542	-	-	3,602	-	-	-	-	-	146,295	5,212	-
2a.1.5.6	Auxiliary Boiler	-	208	-	-	-	-	-	31	240	240	-	240	-	-	-	-	-	-	-	4,858	-
2a.1.5.7	Auxiliary Steam and Condensate	-	84	-	-	-	-	-	13	96	96	-	96	-	-	-	-	-	-	-	2,032	-
2a.1.5.8	Auxiliary Steam and Condensate - RCA	-	148	2	6	80	-	-	50	286	286	-	-	1,649	-	-	-	-	-	66,954	3,052	-

Table C-2  
Beaver Valley Power Station, Unit 2  
DECON Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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)																					
2a.1.5.9	Boron Recovery & Primary Grade Water	-	211	2	5	74	-	-	65	357	357	-	-	1,523	-	-	-	-	61,857	4,562	-
2a.1.5.10	Building Services Hot Water Heating	-	84	-	-	-	-	-	13	97	-	-	97	-	-	-	-	-	-	-	2,029
2a.1.5.11	Building Services Hot Water Hing - RCA	-	138	1	4	51	-	-	43	237	237	-	-	1,056	-	-	-	-	42,875	2,843	-
2a.1.5.12	Building and Yard Drains	-	34	-	-	-	-	-	5	40	-	-	40	-	-	-	-	-	-	-	831
2a.1.5.13	Building and Yard Drains - RCA	-	49	0	-	13	-	-	14	78	78	-	-	272	-	-	-	-	-	-	11,037
2a.1.5.14	Chemical & Volume Control	-	577	17	28	147	210	-	225	1,205	1,205	-	-	3,013	914	-	-	-	203,309	12,493	-
2a.1.5.15	Chilled Water	-	179	-	-	-	-	-	27	206	-	-	206	-	-	-	-	-	-	-	4,330
2a.1.5.16	Chilled Water - RCA	-	404	6	17	239	-	-	140	805	805	-	-	4,898	-	-	-	-	198,897	8,381	-
2a.1.5.17	Condensate	-	352	-	-	-	-	-	53	405	-	-	405	-	-	-	-	-	-	-	8,371
2a.1.5.18	Condensate Polishing	-	926	19	58	827	-	-	366	2,197	2,197	-	-	16,966	-	-	-	-	688,978	20,006	-
2a.1.5.19	Containment Vacuum & Leakage Monitoring	-	53	0	1	16	-	-	16	86	86	-	-	331	-	-	-	-	13,449	1,146	-
2a.1.5.20	Domestic Water	-	36	-	-	-	-	-	5	41	-	-	41	-	-	-	-	-	-	-	888
2a.1.5.21	Domestic Water - RCA	-	30	0	1	11	-	-	9	51	51	-	-	221	-	-	-	-	8,958	613	-
2a.1.5.22	ERF Building	-	95	-	-	-	-	-	14	109	-	-	109	-	-	-	-	-	-	-	2,294
2a.1.5.23	Electrical - Contaminated	-	315	3	8	116	-	-	98	540	540	-	-	2,372	-	-	-	-	96,331	6,821	-
2a.1.5.24	Extraction Steam	-	205	-	-	-	-	-	31	235	-	-	235	-	-	-	-	-	-	-	4,999
2a.1.5.25	Fire Protection	-	566	-	-	-	-	-	85	651	-	-	651	-	-	-	-	-	-	-	13,627
2a.1.5.26	Heater Drains	-	271	-	-	-	-	-	41	311	-	-	311	-	-	-	-	-	-	-	6,560
2a.1.5.27	Incore Instrumentation	-	12	1	1	1	7	-	5	26	26	-	-	22	30	-	-	-	3,593	245	-
2a.1.5.28	Loose Parts Monitoring	-	0	-	-	-	-	-	10	73	-	-	73	-	-	-	-	-	-	-	3
2a.1.5.29	Main Generator and Main Transformer	-	64	-	-	-	-	-	10	73	-	-	73	-	-	-	-	-	-	-	1,509
2a.1.5.30	Main Steam	-	128	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	-	3,013
2a.1.5.31	Main Steam - RCA	-	261	7	19	271	-	-	109	667	667	-	-	5,551	-	-	-	-	225,448	5,521	-
2a.1.5.32	Main Turbine and Condenser	-	324	-	-	-	-	-	49	373	-	-	373	-	-	-	-	-	-	-	7,821
2a.1.5.33	Main Turbine and Condenser - RCA	-	12	-	0	2	-	-	3	17	17	-	-	40	-	-	-	-	-	-	1,620
2a.1.5.34	Outbuildings - Waste Handling Building	-	67	1	2	32	-	-	22	124	124	-	-	653	-	-	-	-	26,501	1,441	-
2a.1.5.35	Plant Process Control	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	-	23
2a.1.5.36	Post Accident Sampling - RCA	-	144	1	2	33	-	-	41	221	221	-	-	680	-	-	-	-	27,634	3,137	-
2a.1.5.37	Post DBA Hydrogen Control	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	-	47
2a.1.5.38	Post DBA Hydrogen Control - RCA	-	39	1	2	21	-	-	13	75	75	-	-	438	-	-	-	-	17,780	805	-
2a.1.5.39	Primary Access Facility	-	24	-	-	-	-	-	4	27	-	-	27	-	-	-	-	-	-	-	565
2a.1.5.40	Reactor Control & Protection	-	1	-	-	-	-	-	1	1	-	-	1	-	-	-	-	-	-	-	13
2a.1.5.41	Reactor Coolant	-	177	11	19	29	196	-	102	534	534	-	-	594	848	-	-	-	99,639	3,895	-
2a.1.5.42	Reactor Excore Instrumentation	-	0	-	-	-	-	-	0	0	-	-	0	-	-	-	-	-	-	-	3
2a.1.5.43	Reactor Plant Sample	-	109	5	6	13	57	-	45	235	235	-	-	272	246	-	-	-	33,092	2,291	-
2a.1.5.44	River Water - RCA	-	4	-	0	2	-	-	1	8	8	-	-	47	-	-	-	-	1,924	78	-
2a.1.5.45	Safety Injection - RCA	-	562	16	46	652	-	-	247	1,522	1,522	-	-	13,370	-	-	-	-	542,951	12,039	-
2a.1.5.46	Sewage Treatment	-	16	-	-	-	-	-	2	19	-	-	19	-	-	-	-	-	-	-	390
2a.1.5.47	Simulator Building	-	7	-	-	-	-	-	1	8	-	-	8	-	-	-	-	-	-	-	153
2a.1.5.48	South Office Shop Building	-	59	-	-	-	-	-	9	68	-	-	68	-	-	-	-	-	-	-	1,422
2a.1.5.49	Steam Generator Blowdown	-	866	38	77	545	450	-	426	2,402	2,402	-	-	11,174	1,968	-	-	-	626,733	18,630	-
2a.1.5.50	Steam Generator Feedwater	-	251	-	-	-	-	-	38	288	-	-	288	-	-	-	-	-	-	-	5,959
2a.1.5.51	Steam Generator Feedwater - RCA	-	205	6	18	266	-	-	93	578	578	-	-	5,252	-	-	-	-	213,288	4,356	-
2a.1.5.52	Supplementary Leak Collection & Release	-	75	2	3	32	13	-	27	152	152	-	-	663	55	-	-	-	31,869	1,640	-
2a.1.5.53	Turbine Plant Component Cooling Water	-	216	-	-	-	-	-	32	248	-	-	248	-	-	-	-	-	-	-	5,235
2a.1.5.54	Turbine Plant Sample	-	32	-	-	-	-	-	5	36	-	-	36	-	-	-	-	-	-	-	770
2a.1.5.55	Water Treating - RCA	-	64	1	2	22	-	-	20	109	109	-	-	462	-	-	-	-	18,748	1,357	-
2a.1.5	Totals	-	9,329	149	354	3,889	934	-	2,891	17,544	13,792	-	3,752	79,802	4,061	-	-	-	3,599,866	207,810	-
2a.1.6	Scaffolding in support of decommissioning	-	1,048	11	4	48	3	-	272	1,387	1,387	-	-	897	45	-	-	-	44,863	26,142	-
2a.1	Subtotal Period 2a Activity Costs	831	20,823	9,735	3,739	7,206	19,455	420	20,367	82,577	78,825	-	3,752	100,980	42,671	2,561	344	-	9,694,427	378,307	2,489
Period 2a Additional Costs																					
2a.2.1	Curie Surcharge	-	-	-	-	-	856	-	214	1,070	1,070	-	-	-	-	-	-	-	-	-	-
2a.2	Subtotal Period 2a Additional Costs	-	-	-	-	-	856	-	214	1,070	1,070	-	-	-	-	-	-	-	-	-	-

Table C-2  
Beaver Valley Power Station, Unit 2  
DECON Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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 2a Collateral Costs																					
2a.3.1	Process liquid waste	149	-	56	260	-	714	-	298	1,477	1,477	-	-	-	-	1,043	-	-	131,512	205	-
2a.3.2	Small tool allowance	-	280	-	-	-	-	-	42	322	290	-	32	-	-	-	-	-	-	-	-
2a.3.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	10,968	1,645	12,613	-	12,613	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	149	280	56	260	-	714	10,968	1,985	14,412	1,767	12,613	32	-	-	1,043	-	-	131,512	205	-
Period 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	66	-	-	-	-	-	-	16	82	82	-	-	-	-	-	-	-	-	-	-
2a.4.2	Insurance	-	-	-	-	-	-	601	60	661	661	-	-	-	-	-	-	-	-	-	-
2a.4.3	Property taxes	-	-	-	-	-	-	1,303	130	1,434	1,290	-	143	-	-	-	-	-	-	-	-
2a.4.4	Health physics supplies	-	1,673	-	-	-	-	-	418	2,091	2,091	-	-	-	-	-	-	-	-	-	-
2a.4.5	Heavy equipment rental	-	2,426	-	-	-	-	-	364	2,789	2,789	-	-	-	-	-	-	-	-	-	-
2a.4.6	Disposal of DAW generated	-	-	87	59	-	372	-	111	628	628	-	-	-	5,812	-	-	-	116,474	1,427	-
2a.4.7	Plant energy budget	-	-	-	-	-	-	884	133	1,016	1,016	-	-	-	-	-	-	-	-	-	-
2a.4.8	NRC Fees	-	-	-	-	-	-	495	50	545	545	-	-	-	-	-	-	-	-	-	-
2a.4.9	Emergency Planning Fees	-	-	-	-	-	-	340	34	374	-	374	-	-	-	-	-	-	-	-	-
2a.4.10	Fixed Costs - Site	-	-	-	-	-	-	741	111	852	852	-	-	-	-	-	-	-	-	-	-
2a.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	953	143	1,096	-	1,096	-	-	-	-	-	-	-	-	-
2a.4.12	ISFSI Operating Costs	-	-	-	-	-	-	57	9	65	-	65	-	-	-	-	-	-	-	-	-
2a.4.13	Security Staff Cost	-	-	-	-	-	-	2,770	416	3,186	3,186	-	-	-	-	-	-	-	-	-	111,189
2a.4.14	DOC Staff Cost	-	-	-	-	-	-	15,178	2,277	17,455	17,455	-	-	-	-	-	-	-	-	-	239,726
2a.4.15	Utility Staff Cost	-	-	-	-	-	-	22,074	3,311	25,385	25,385	-	-	-	-	-	-	-	-	-	467,686
2a.4	Subtotal Period 2a Period-Dependent Costs	66	4,098	87	59	-	372	45,397	7,582	57,660	55,981	1,535	143	-	5,812	-	-	-	116,474	1,427	818,600
2a.0	TOTAL PERIOD 2a COST	1,046	25,202	9,877	4,058	7,206	21,397	56,785	30,148	155,720	137,643	14,149	3,928	100,980	48,483	3,605	344	-	9,942,412	379,939	821,090
PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b.1.1.1	Area Ventilation Systems - Containment	-	358	7	21	300	-	-	138	825	825	-	-	6,165	-	-	-	-	250,356	7,222	-
2b.1.1.2	Area Ventilation Systems - Miscellaneous	-	154	-	-	-	-	-	23	177	-	-	177	-	-	-	-	-	-	-	3,858
2b.1.1.3	Circulating Water	-	399	-	-	-	-	-	60	458	-	-	458	-	-	-	-	-	-	-	9,646
2b.1.1.4	Compressed Air	-	48	-	-	-	-	-	7	56	-	-	56	-	-	-	-	-	-	-	1,198
2b.1.1.5	Compressed Air - RCA	-	256	3	8	107	-	-	81	454	454	-	-	2,199	-	-	-	-	89,320	5,287	-
2b.1.1.6	Containment	-	23	0	1	21	-	-	9	54	54	-	-	425	-	-	-	-	17,264	487	-
2b.1.1.7	Containment Depressurization	-	107	-	-	-	-	-	16	123	-	-	123	-	-	-	-	-	-	-	2,334
2b.1.1.8	Containment Depressurization - RCA	-	483	27	79	1,113	-	-	302	2,003	2,003	-	-	22,839	-	-	-	-	927,485	10,291	-
2b.1.1.9	Electrical - Clean	-	3,015	-	-	-	-	-	452	3,467	-	-	3,467	-	-	-	-	-	-	-	69,021
2b.1.1.10	Electrical - RCA	-	1,911	25	73	1,042	-	-	648	3,699	3,699	-	-	21,373	-	-	-	-	867,962	40,573	-
2b.1.1.11	Fire Protection - RCA	-	438	6	17	236	-	-	148	845	845	-	-	4,850	-	-	-	-	196,943	9,156	-
2b.1.1.12	Gaseous Waste Disposal	-	396	4	12	167	-	-	126	705	705	-	-	3,432	-	-	-	-	139,394	8,617	-
2b.1.1.13	Liquid Waste Disposal	-	72	3	4	25	30	-	30	165	165	-	-	515	156	-	-	-	32,610	1,570	-
2b.1.1.14	Prim Comp & Nrm Shield Tnk Cing Wtr - RCA	-	1,473	37	113	1,603	-	-	629	3,857	3,857	-	-	32,904	-	-	-	-	1,336,230	32,317	-
2b.1.1.15	Radiation Monitoring	-	115	6	7	13	67	-	49	255	255	-	-	258	286	-	-	-	36,055	2,381	-
2b.1.1.16	Reactor Plant Vents & Drains	-	338	9	13	40	115	-	122	636	636	-	-	818	505	-	-	-	77,281	7,390	-
2b.1.1.17	Residual Heat Removal	-	314	38	64	186	599	-	270	1,471	1,471	-	-	3,821	2,570	-	-	-	385,589	6,993	-
2b.1.1.18	Service Water	-	351	-	-	-	-	-	53	403	-	-	403	-	-	-	-	-	-	-	8,434
2b.1.1.19	Service Water - RCA	-	578	24	70	997	-	-	307	1,977	1,977	-	-	20,450	-	-	-	-	830,486	12,686	-
2b.1.1.20	Solid Waste Disposal	-	166	7	10	41	89	-	72	387	387	-	-	842	411	-	-	-	68,401	3,570	-
2b.1.1.21	Station Service - 4KV	-	91	-	-	-	-	-	14	104	-	-	104	-	-	-	-	-	-	-	2,140
2b.1.1.22	Turbine Plant Comp Cooling Water - RCA	-	17	0	0	6	-	-	5	29	29	-	-	128	-	-	-	-	5,214	356	-
2b.1.1.23	Water Treating	-	425	-	-	-	-	-	64	489	-	-	489	-	-	-	-	-	-	-	10,008
2b.1.1	Totals	-	11,527	198	492	5,898	899	-	3,626	22,640	17,363	-	5,277	121,019	3,929	-	-	-	5,260,491	255,536	-
2b.1.2	Scaffolding in support of decommissioning	-	1,310	14	6	61	4	-	340	1,734	1,734	-	-	1,122	56	-	-	-	56,079	32,678	-

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Beaver Valley Power Station, Unit 2  
DECON Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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					
Decommissioning of Site Buildings																							
2b.1.3.1	Reactor Building	871	668	31	64	202	141	-	881	2,656	2,656	-	-	4,136	2,179	-	-	-	-	381,387	31,912	-	
2b.1.3.2	Auxiliary Building	354	197	24	50	40	128	-	274	1,066	1,066	-	-	818	1,958	-	-	-	-	227,447	11,493	-	
2b.1.3.3	Fuel and Decon Building	430	487	7	14	93	23	-	359	1,413	1,413	-	-	1,915	361	-	-	-	-	113,178	18,748	-	
2b.1.3.4	Gaseous Waste Storage Tank Enclosure	8	4	1	1	1	3	-	6	25	25	-	-	17	48	-	-	-	-	5,498	259	-	
2b.1.3.5	Main Steam, Cable Vault, Safeguards Area	120	70	7	15	27	37	-	94	370	370	-	-	555	568	-	-	-	-	78,352	3,965	-	
2b.1.3.6	Turbine Building	352	47	4	9	24	20	-	198	653	653	-	-	486	311	-	-	-	-	50,206	8,836	-	
2b.1.3	Totals	2,135	1,472	73	153	386	353	-	1,812	6,184	6,184	-	-	7,926	5,425	-	-	-	-	856,068	75,213	-	
2b.1	Subtotal Period 2b Activity Costs	2,135	14,310	285	651	6,344	1,256	-	5,578	30,558	25,281	-	5,277	130,066	9,409	-	-	-	-	6,172,638	363,427	-	
Period 2b Collateral Costs																							
2b.3.1	Process liquid waste	127	-	49	229	-	628	-	260	1,292	1,292	-	-	-	-	-	-	-	917	-	115,586	180	-
2b.3.2	Small tool allowance	-	267	-	-	-	-	-	40	307	307	-	-	-	-	-	-	-	-	-	-	-	-
2b.3.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	34,150	5,122	39,272	-	39,272	-	-	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	127	267	49	229	-	628	34,150	5,422	40,871	1,599	39,272	-	-	-	-	-	-	917	-	115,586	180	-
Period 2b Period-Dependent Costs																							
2b.4.1	Decon supplies	781	-	-	-	-	-	-	195	976	976	-	-	-	-	-	-	-	-	-	-	-	-
2b.4.2	Insurance	-	-	-	-	-	-	-	99	1,091	1,091	-	-	-	-	-	-	-	-	-	-	-	-
2b.4.3	Property taxes	-	-	-	-	-	-	2,151	215	2,366	2,366	-	-	-	-	-	-	-	-	-	-	-	-
2b.4.4	Health physics supplies	-	1,868	-	-	-	-	-	467	2,334	2,334	-	-	-	-	-	-	-	-	-	-	-	-
2b.4.5	Heavy equipment rental	-	4,028	-	-	-	-	-	604	4,632	4,632	-	-	-	-	-	-	-	-	-	-	-	-
2b.4.6	Disposal of DAW generated	-	-	78	53	-	335	-	100	566	566	-	-	-	5,236	-	-	-	-	-	104,918	1,285	-
2b.4.7	Plant energy budget	-	-	-	-	-	-	1,151	173	1,324	1,324	-	-	-	-	-	-	-	-	-	-	-	-
2b.4.8	NRC Fees	-	-	-	-	-	-	818	62	899	899	-	-	-	-	-	-	-	-	-	-	-	-
2b.4.9	Emergency Planning Fees	-	-	-	-	-	-	561	56	617	-	617	-	-	-	-	-	-	-	-	-	-	-
2b.4.10	Fbad Costs - Site	-	-	-	-	-	-	1,222	183	1,406	1,406	-	-	-	-	-	-	-	-	-	-	-	-
2b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	1,573	236	1,809	-	1,809	-	-	-	-	-	-	-	-	-	-	-
2b.4.12	Radwaste Processing Equipment/Services	-	-	-	-	-	-	482	69	532	532	-	-	-	-	-	-	-	-	-	-	-	-
2b.4.13	ISFSI Operating Costs	-	-	-	-	-	-	94	14	108	-	108	-	-	-	-	-	-	-	-	-	-	-
2b.4.14	Security Staff Cost	-	-	-	-	-	-	1,654	248	1,902	1,902	-	-	-	-	-	-	-	-	-	-	-	66,373
2b.4.15	DOC Staff Cost	-	-	-	-	-	-	17,263	2,589	19,853	19,853	-	-	-	-	-	-	-	-	-	-	-	281,109
2b.4.16	Utility Staff Cost	-	-	-	-	-	-	24,402	3,660	28,062	28,062	-	-	-	-	-	-	-	-	-	-	-	533,586
2b.4	Subtotal Period 2b Period-Dependent Costs	781	5,895	78	53	-	335	52,343	8,991	68,477	65,942	2,534	-	-	5,236	-	-	-	-	104,918	1,285	881,067	
2b.0	TOTAL PERIOD 2b COST	3,043	20,472	412	933	6,344	2,218	86,492	19,991	139,906	92,823	41,806	5,277	130,066	14,645	917	-	-	-	6,393,142	364,893	881,067	
PERIOD 2c - Decontamination Following Wet Fuel Storage																							
Period 2c Direct Decommissioning Activities																							
2c.1.1	Remove spent fuel racks	457	48	99	54	-	162	-	299	1,119	1,119	-	-	-	2,457	-	-	-	-	245,700	1,193	-	
Disposal of Plant Systems																							
2c.1.2.1	Fuel Pool Electrical Contaminated	-	80	1	2	28	4	-	26	141	141	-	-	585	18	-	-	-	-	25,137	1,739	-	
2c.1.2.2	Fuel Pool Electrical RCA	-	477	6	18	259	-	-	161	922	922	-	-	5,318	-	-	-	-	-	215,981	10,125	-	
2c.1.2.3	Fuel Pool Area Ventilation Aux Bldg	-	95	2	6	69	12	-	38	223	223	-	-	1,418	53	-	-	-	-	62,384	1,939	-	
2c.1.2.4	Fuel Pool Compressed Air RCA	-	70	1	3	36	-	-	23	133	133	-	-	739	-	-	-	-	-	30,012	1,450	-	
2c.1.2.5	Fuel Pool Cooling & Purification	-	332	11	21	117	154	-	144	781	781	-	-	2,409	662	-	-	-	-	157,192	7,264	-	
2c.1.2.6	Fuel Pool Fire Protection RCA	-	107	1	4	54	-	-	36	202	202	-	-	1,111	-	-	-	-	-	45,108	2,230	-	
2c.1.2.7	Fuel Transfer System & Tools	-	92	2	5	36	29	-	37	202	202	-	-	748	126	-	-	-	-	41,687	2,038	-	
2c.1.2.8	Miscellaneous	-	23	-	-	-	-	-	4	27	-	-	-	-	-	-	-	-	-	-	533	-	
2c.1.2	Totals	-	1,277	25	59	601	200	-	468	2,631	2,604	-	27	12,328	857	-	-	-	-	577,501	27,319	-	
Decommissioning of Site Buildings																							
2c.1.3.1	Waste Handling/Condensate Polishing	230	147	17	34	50	86	-	188	752	752	-	-	1,020	1,312	-	-	-	-	171,072	7,820	-	
2c.1.3	Totals	230	147	17	34	50	86	-	188	752	752	-	-	1,020	1,312	-	-	-	-	171,072	7,820	-	
2c.1.4	Scaffolding in support of decommissioning	-	262	3	1	12	1	-	68	347	347	-	-	224	11	-	-	-	-	11,216	6,536	-	

Table C-2  
Beaver Valley Power Station, Unit 2  
DECON Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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			
2c.1	Subtotal Period 2c Activity Costs	687	1,734	143	149	663	448	-	1,023	4,848	4,821	-	27	13,572	4,638	-	-	1,005,489	42,867	-
Period 2c Collateral Costs																				
2c.3.1	Process liquid waste	62	-	24	112	-	309	-	128	635	635	-	-	-	-	451	-	56,857	89	-
2c.3.2	Small tool allowance	-	39	-	-	-	-	-	6	45	45	-	-	-	-	-	-	-	-	-
2c.3.3	Decommissioning Equipment Disposition	-	-	74	35	324	20	-	66	519	519	-	-	6,000	300	-	-	300,000	735	-
2c.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	93	14	107	-	107	-	-	-	-	-	-	-	-
2c.3	Subtotal Period 2c Collateral Costs	62	39	98	148	324	329	93	214	1,305	1,198	107	-	6,000	300	451	-	356,857	824	-
Period 2c Period-Dependent Costs																				
2c.4.1	Decon supplies	138	-	-	-	-	-	-	35	173	173	-	-	-	-	-	-	-	-	-
2c.4.2	Insurance	-	-	-	-	-	-	219	22	241	241	-	-	-	-	-	-	-	-	-
2c.4.3	Property taxes	-	-	-	-	-	-	475	47	522	522	-	-	-	-	-	-	-	-	-
2c.4.4	Health physics supplies	-	287	-	-	-	-	-	72	359	359	-	-	-	-	-	-	-	-	-
2c.4.5	Heavy equipment rental	-	889	-	-	-	-	-	133	1,022	1,022	-	-	-	-	-	-	-	-	-
2c.4.6	Disposal of DAW generated	-	-	23	16	-	98	-	29	166	166	-	-	1,538	-	-	-	30,828	378	-
2c.4.7	Plant energy budget	-	-	-	-	-	-	135	20	156	156	-	-	-	-	-	-	-	-	-
2c.4.8	NRC Fees	-	-	-	-	-	-	180	18	198	198	-	-	-	-	-	-	-	-	-
2c.4.9	Emergency Planning Fees	-	-	-	-	-	-	65	6	61	-	61	-	-	-	-	-	-	-	-
2c.4.10	Fixed Costs - Site	-	-	-	-	-	-	270	40	310	310	-	-	-	-	-	-	-	-	-
2c.4.11	Radwaste Processing Equipment/Services	-	-	-	-	-	-	204	31	235	235	-	-	-	-	-	-	-	-	-
2c.4.12	ISFSI Operating Costs	-	-	-	-	-	-	21	3	24	-	24	-	-	-	-	-	-	-	-
2c.4.13	Security Staff Cost	-	-	-	-	-	-	365	55	420	420	-	-	-	-	-	-	-	-	14,644
2c.4.14	DOC Staff Cost	-	-	-	-	-	-	2,582	387	2,969	2,969	-	-	-	-	-	-	-	-	41,923
2c.4.15	Utility Staff Cost	-	-	-	-	-	-	3,524	529	4,053	4,053	-	-	-	-	-	-	-	-	78,677
2c.4	Subtotal Period 2c Period-Dependent Costs	138	1,176	23	16	-	98	8,030	1,427	10,908	10,823	84	-	-	1,538	-	-	30,828	378	135,244
2c.0	TOTAL PERIOD 2c COST	888	2,949	264	312	987	875	8,123	2,663	17,061	16,842	192	27	19,572	6,476	451	-	1,393,173	44,069	135,244
PERIOD 2e - License Termination																				
Period 2e Direct Decommissioning Activities																				
2e.1.1	ORISE confirmatory survey	-	-	-	-	-	-	125	37	162	162	-	-	-	-	-	-	-	-	-
2e.1.2	Terminate license	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2e.1	Subtotal Period 2e Activity Costs	-	-	-	-	-	-	125	37	162	162	-	-	-	-	-	-	-	-	-
Period 2e Additional Costs																				
2e.2.1	License Termination Survey	-	-	-	-	-	-	6,094	1,828	7,923	7,923	-	-	-	-	-	-	-	122,933	-
2e.2	Subtotal Period 2e Additional Costs	-	-	-	-	-	-	6,094	1,828	7,923	7,923	-	-	-	-	-	-	-	122,933	-
Period 2e Collateral Costs																				
2e.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,105	166	1,271	1,271	-	-	-	-	-	-	-	-	-
2e.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	107	16	123	-	123	-	-	-	-	-	-	-	-
2e.3	Subtotal Period 2e Collateral Costs	-	-	-	-	-	-	1,212	182	1,393	1,271	123	-	-	-	-	-	-	-	-
Period 2e Period-Dependent Costs																				
2e.4.1	Insurance	-	-	-	-	-	-	280	28	308	308	-	-	-	-	-	-	-	-	-
2e.4.2	Property taxes	-	-	-	-	-	-	652	65	717	717	-	-	-	-	-	-	-	-	-
2e.4.3	Health physics supplies	-	610	-	-	-	-	-	152	762	762	-	-	-	-	-	-	-	-	-
2e.4.4	Disposal of DAW generated	-	-	5	3	-	20	-	6	33	33	-	-	306	-	-	-	6,127	75	-
2e.4.5	Plant energy budget	-	-	-	-	-	-	93	14	107	107	-	-	-	-	-	-	-	-	-
2e.4.6	NRC Fees	-	-	-	-	-	-	248	25	272	272	-	-	-	-	-	-	-	-	-
2e.4.7	Emergency Planning Fees	-	-	-	-	-	-	76	8	83	-	83	-	-	-	-	-	-	-	-
2e.4.8	Fixed Costs - Site	-	-	-	-	-	-	370	56	426	426	-	-	-	-	-	-	-	-	-
2e.4.9	ISFSI Operating Costs	-	-	-	-	-	-	28	4	33	-	33	-	-	-	-	-	-	-	-
2e.4.10	Security Staff Cost	-	-	-	-	-	-	275	41	316	316	-	-	-	-	-	-	-	-	11,040
2e.4.11	DOC Staff Cost	-	-	-	-	-	-	2,310	348	2,658	2,658	-	-	-	-	-	-	-	-	36,274
2e.4.12	Utility Staff Cost	-	-	-	-	-	-	2,066	310	2,376	2,376	-	-	-	-	-	-	-	-	41,006
2e.4	Subtotal Period 2e Period-Dependent Costs	-	610	5	3	-	20	6,398	1,055	8,090	7,974	116	-	-	306	-	-	6,127	75	88,320

Table C-2  
Beaver Valley Power Station, Unit 2  
DECON Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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			
2e.0	TOTAL PERIOD 2e COST	-	610	5	3	-	20	13,829	3,103	17,568	17,329	239	-	-	306	-	-	-	6,127	123,008	88,320
<b>PERIOD 2 TOTALS</b>		4,977	49,232	10,558	5,306	14,537	24,510	165,229	55,905	330,255	264,637	56,385	9,232	250,617	69,910	4,973	344	-	17,734,850	911,909	1,925,721
<b>PERIOD 3b - Site Restoration</b>																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	Reactor Building	-	2,994	-	-	-	-	-	449	3,443	-	-	3,443	-	-	-	-	-	-	43,207	-
3b.1.1.2	Alternate Intake	-	153	-	-	-	-	-	23	176	-	-	176	-	-	-	-	-	-	2,324	-
3b.1.1.3	Auxiliary Building	-	1,064	-	-	-	-	-	150	1,223	-	-	1,223	-	-	-	-	-	-	16,536	-
3b.1.1.4	Cable Tunnel	-	85	-	-	-	-	-	13	98	-	-	98	-	-	-	-	-	-	1,174	-
3b.1.1.5	Circulating Water Piping	-	30	-	-	-	-	-	4	34	-	-	34	-	-	-	-	-	-	496	-
3b.1.1.6	Control Building	-	217	-	-	-	-	-	33	249	-	-	249	-	-	-	-	-	-	3,315	-
3b.1.1.7	Cooling Tower	-	354	-	-	-	-	-	53	407	-	-	407	-	-	-	-	-	-	6,064	-
3b.1.1.8	Cooling Tower Pump House	-	81	-	-	-	-	-	12	93	-	-	93	-	-	-	-	-	-	1,393	-
3b.1.1.9	Diesel Generator Building	-	302	-	-	-	-	-	45	347	-	-	347	-	-	-	-	-	-	4,677	-
3b.1.1.10	Emergency Service Water Overflow	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	85	-
3b.1.1.11	Fuel and Decon Building	-	808	-	-	-	-	-	121	929	-	-	929	-	-	-	-	-	-	12,570	-
3b.1.1.12	Gaseous Waste Storage Tank Enclosure	-	21	-	-	-	-	-	3	24	-	-	24	-	-	-	-	-	-	333	-
3b.1.1.13	Intake	-	568	-	-	-	-	-	85	653	-	-	653	-	-	-	-	-	-	7,963	-
3b.1.1.14	Main Steam, Cable Vault, Safeguards Area	-	853	-	-	-	-	-	128	981	-	-	981	-	-	-	-	-	-	12,879	-
3b.1.1.15	Misc. Site Structures - 2005	-	1,808	-	-	-	-	-	271	2,080	-	-	2,080	-	-	-	-	-	-	26,619	-
3b.1.1.16	Miscellaneous Buildings	-	1,055	-	-	-	-	-	158	1,213	-	-	1,213	-	-	-	-	-	-	20,886	-
3b.1.1.17	Miscellaneous Yard	-	1,052	-	-	-	-	-	158	1,210	-	-	1,210	-	-	-	-	-	-	14,159	-
3b.1.1.18	Old Steam Generator Storage Facility	-	278	-	-	-	-	-	42	320	-	-	320	-	-	-	-	-	-	4,337	-
3b.1.1.19	Primary Access Facility	-	237	-	-	-	-	-	36	273	-	-	273	-	-	-	-	-	-	10,603	-
3b.1.1.20	Service Building	-	701	-	-	-	-	-	105	806	-	-	806	-	-	-	-	-	-	10,603	-
3b.1.1.21	South Office and Shops	-	924	-	-	-	-	-	139	1,062	-	-	1,062	-	-	-	-	-	-	18,885	-
3b.1.1.22	Turbine Building	-	1,640	-	-	-	-	-	246	1,896	-	-	1,896	-	-	-	-	-	-	30,983	-
3b.1.1.23	Turbine Pedestal	-	615	-	-	-	-	-	92	707	-	-	707	-	-	-	-	-	-	7,734	-
3b.1.1.24	Waste Handling Building	-	363	-	-	-	-	-	54	417	-	-	417	-	-	-	-	-	-	5,147	-
3b.1.1.25	Waste Handling/Condensate Polishing	-	997	-	-	-	-	-	150	1,146	-	-	1,146	-	-	-	-	-	-	14,893	-
3b.1.1	Totals	-	17,204	-	-	-	-	-	2,581	19,785	-	-	19,785	-	-	-	-	-	-	269,108	-
Site Closeout Activities																					
3b.1.2	Grade & landscape site	-	162	-	-	-	-	-	24	186	-	-	186	-	-	-	-	-	-	593	-
3b.1.3	Final report to NRC	-	-	-	-	-	-	137	21	158	158	-	-	-	-	-	-	-	-	-	1,560
3b.1	Subtotal Period 3b Activity Costs	-	17,367	-	-	-	-	137	2,626	20,129	158	-	19,972	-	-	-	-	-	-	269,701	1,560
Period 3b Additional Costs																					
3b.2.1	Concrete Crushing	-	750	-	-	-	-	4	188	941	941	-	-	-	-	-	-	-	-	4,492	-
3b.2	Subtotal Period 3b Additional Costs	-	750	-	-	-	-	4	188	941	941	-	-	-	-	-	-	-	-	4,492	-
Period 3b Collateral Costs																					
3b.3.1	Small lot allowance	-	212	-	-	-	-	-	32	243	-	-	243	-	-	-	-	-	-	-	-
3b.3.2	Spent Fuel Capital and Transfer	-	-	-	-	-	-	332	50	382	-	382	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	-	212	-	-	-	-	332	82	625	-	382	243	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Insurance	-	-	-	-	-	-	719	72	791	-	791	-	-	-	-	-	-	-	-	-
3b.4.2	Property taxes	-	-	-	-	-	-	1,672	167	1,839	-	1,839	-	-	-	-	-	-	-	-	-
3b.4.3	Heavy equipment rental	-	4,294	-	-	-	-	-	644	4,938	-	-	4,938	-	-	-	-	-	-	-	-
3b.4.4	Plant energy budget	-	-	-	-	-	-	119	18	137	-	-	137	-	-	-	-	-	-	-	-
3b.4.5	NRC ISFSI Fees	-	-	-	-	-	-	227	23	250	-	250	-	-	-	-	-	-	-	-	-
3b.4.6	Emergency Planning Fees	-	-	-	-	-	-	194	19	213	-	213	-	-	-	-	-	-	-	-	-
3b.4.7	Fixed Costs - Site	-	-	-	-	-	-	849	127	976	976	-	-	-	-	-	-	-	-	-	-
3b.4.8	ISFSI Operating Costs	-	-	-	-	-	-	73	11	84	-	84	-	-	-	-	-	-	-	-	-

Table C-2  
Beaver Valley Power Station, Unit 2  
DECON Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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	-	-	-	-	-	-	706	106	811	-	609	203	-	-	-	-	-	-	-	28,320	
3b.4.10	DOC Staff Cost	-	-	-	-	-	-	6,481	972	7,453	-	-	7,453	-	-	-	-	-	-	-	87,097	
3b.4.11	Utility Staff Cost	-	-	-	-	-	-	2,863	430	3,293	-	1,185	2,107	-	-	-	-	-	-	-	54,617	
3b.4	Subtotal Period 3b Period-Dependent Costs	-	4,294	-	-	-	-	13,904	2,589	20,787	976	4,971	14,839	-	-	-	-	-	-	-	180,034	
3b.0	TOTAL PERIOD 3b COST	-	22,622	-	-	-	-	14,377	5,484	42,483	2,076	5,353	35,054	-	-	-	-	-	-	274,193	181,594	
PERIOD 3c - Fuel Storage Operations/Shipping																						
Period 3c Direct Decommissioning Activities																						
Period 3c Collateral Costs																						
3c.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,914	437	3,351	-	3,351	-	-	-	-	-	-	-	-	-	
3c.3	Subtotal Period 3c Collateral Costs	-	-	-	-	-	-	2,914	437	3,351	-	3,351	-	-	-	-	-	-	-	-	-	
Period 3c Period-Dependent Costs																						
3c.4.1	Insurance	-	-	-	-	-	-	8,072	807	8,879	-	8,879	-	-	-	-	-	-	-	-	-	
3c.4.2	Property taxes	-	-	-	-	-	-	18,764	1,876	20,640	-	20,640	-	-	-	-	-	-	-	-	-	
3c.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3c.4.4	NRC ISFSI Fees	-	-	-	-	-	-	2,547	255	2,802	-	2,802	-	-	-	-	-	-	-	-	-	
3c.4.5	Emergency Planning Fees	-	-	-	-	-	-	2,176	218	2,393	-	2,393	-	-	-	-	-	-	-	-	-	
3c.4.6	Fixed Costs - Site	-	-	-	-	-	-	3,029	454	3,483	-	3,483	-	-	-	-	-	-	-	-	-	
3c.4.7	ISFSI Operating Costs	-	-	-	-	-	-	820	123	943	-	943	-	-	-	-	-	-	-	-	-	
3c.4.8	Security Staff Cost	-	-	-	-	-	-	5,939	891	6,830	-	6,830	-	-	-	-	-	-	-	-	238,380	
3c.4.9	Utility Staff Cost	-	-	-	-	-	-	11,574	1,736	13,310	-	13,310	-	-	-	-	-	-	-	-	221,580	
3c.4	Subtotal Period 3c Period-Dependent Costs	-	-	-	-	-	-	52,920	6,360	59,280	-	59,280	-	-	-	-	-	-	-	-	459,960	
3c.0	TOTAL PERIOD 3c COST	-	-	-	-	-	-	55,834	6,797	62,631	-	62,631	-	-	-	-	-	-	-	-	459,960	
PERIOD 3d - GTCC shipping																						
Period 3d Direct Decommissioning Activities																						
Nuclear Steam Supply System Removal																						
3d.1.1.1	Vessel & Internals GTCC Disposal	-	-	300	-	-	11,104	-	1,696	13,100	13,100	-	-	-	-	-	-	-	489	110,653	-	
3d.1.1	Totals	-	-	300	-	-	11,104	-	1,696	13,100	13,100	-	-	-	-	-	-	-	489	110,653	-	
3d.1	Subtotal Period 3d Activity Costs	-	-	300	-	-	11,104	-	1,696	13,100	13,100	-	-	-	-	-	-	-	489	110,653	-	
Period 3d Period-Dependent Costs																						
3d.4.1	Insurance	-	-	-	-	-	-	30	3	34	-	34	-	-	-	-	-	-	-	-	-	
3d.4.2	Property taxes	-	-	-	-	-	-	71	7	78	-	78	-	-	-	-	-	-	-	-	-	
3d.4.3	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3d.4.4	NRC ISFSI Fees	-	-	-	-	-	-	10	1	11	-	11	-	-	-	-	-	-	-	-	-	
3d.4.5	Emergency Planning Fees	-	-	-	-	-	-	8	1	9	-	9	-	-	-	-	-	-	-	-	-	
3d.4.6	Fixed Costs - Site	-	-	-	-	-	-	11	2	13	-	13	-	-	-	-	-	-	-	-	-	
3d.4.7	ISFSI Operating Costs	-	-	-	-	-	-	3	0	4	-	4	-	-	-	-	-	-	-	-	-	
3d.4.8	Security Staff Cost	-	-	-	-	-	-	22	3	26	-	26	-	-	-	-	-	-	-	-	900	
3d.4.9	Utility Staff Cost	-	-	-	-	-	-	44	7	50	-	50	-	-	-	-	-	-	-	-	837	
3d.4	Subtotal Period 3d Period-Dependent Costs	-	-	-	-	-	-	200	24	224	-	224	-	-	-	-	-	-	-	-	1,737	
3d.0	TOTAL PERIOD 3d COST	-	-	300	-	-	11,104	200	1,720	13,324	13,100	224	-	-	-	-	-	-	489	110,653	-	1,737
PERIOD 3e - ISFSI Decontamination																						
Period 3e Direct Decommissioning Activities																						
Period 3e Additional Costs																						
3e.2.1	ISFSI License Termination	-	489	5	74	-	329	798	335	2,028	-	2,028	-	-	3,424	-	-	-	380,555	8,021	1,280	

Table C-2  
Beaver Valley Power Station, Unit 2  
DECON Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Burial Volumes			Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours	
																Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet				
3e.2	Subtotal Period 3e Additional Costs	-	488	5	74	-	329	798	335	2,028	-	2,028	-	-	3,424	-	-	-	380,555	8,021	1,280	
Period 3e Collateral Costs																						
3e.3.1	Small tool allowance	-	5	-	-	-	-	-	1	6	-	6	-	-	-	-	-	-	-	-	-	
3e.3	Subtotal Period 3e Collateral Costs	-	5	-	-	-	-	-	1	6	-	6	-	-	-	-	-	-	-	-	-	
Period 3e Period-Dependent Costs																						
3e.4.1	Insurance	-	-	-	-	-	-	123	12	135	-	135	-	-	-	-	-	-	-	-	-	
3e.4.2	Property taxes	-	-	-	-	-	-	286	29	314	-	314	-	-	-	-	-	-	-	-	-	
3e.4.3	Heavy equipment rental	-	215	-	-	-	-	-	32	247	-	247	-	-	-	-	-	-	-	-	-	
3e.4.4	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3e.4.5	NRC ISFSI Fees	-	-	-	-	-	-	39	4	43	-	43	-	-	-	-	-	-	-	-	-	
3e.4.6	Emergency Planning Fees	-	-	-	-	-	-	33	3	36	-	36	-	-	-	-	-	-	-	-	-	
3e.4.7	Fixed Costs - Site	-	-	-	-	-	-	46	7	53	-	53	-	-	-	-	-	-	-	-	-	
3e.4.8	Security Staff Cost	-	-	-	-	-	-	45	7	52	-	52	-	-	-	-	-	-	-	-	1,818	
3e.4.9	Utility Staff Cost	-	-	-	-	-	-	154	23	177	-	177	-	-	-	-	-	-	-	-	2,939	
3e.4	Subtotal Period 3e Period-Dependent Costs	-	215	-	-	-	-	726	117	1,058	-	1,058	-	-	-	-	-	-	-	-	4,757	
3e.0	TOTAL PERIOD 3e COST	-	707	5	74	-	329	1,524	453	3,092	-	3,092	-	-	3,424	-	-	-	380,555	8,021	6,037	
PERIOD 3f - ISFSI Site Restoration																						
Period 3f Direct Decommissioning Activities																						
Period 3f Additional Costs																						
3f.2.1	ISFSI Demolition and Site Restoration	-	764	-	-	-	-	23	194	982	-	982	-	-	-	-	-	-	-	-	1,836	80
3f.2	Subtotal Period 3f Additional Costs	-	764	-	-	-	-	23	194	982	-	982	-	-	-	-	-	-	-	-	1,836	80
Period 3f Collateral Costs																						
3f.3.1	Small tool allowance	-	1	-	-	-	-	-	0	2	-	2	-	-	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	1	-	-	-	-	-	0	2	-	2	-	-	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																						
3f.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.2	Property taxes	-	-	-	-	-	-	144	14	158	-	158	-	-	-	-	-	-	-	-	-	-
3f.4.3	Heavy equipment rental	-	74	-	-	-	-	-	11	85	-	85	-	-	-	-	-	-	-	-	-	-
3f.4.4	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3f.4.5	Fixed Costs - Site	-	-	-	-	-	-	23	3	27	-	27	-	-	-	-	-	-	-	-	-	-
3f.4.6	Security Staff Cost	-	-	-	-	-	-	23	3	26	-	26	-	-	-	-	-	-	-	-	-	917
3f.4.7	Utility Staff Cost	-	-	-	-	-	-	70	10	80	-	80	-	-	-	-	-	-	-	-	-	1,307
3f.4	Subtotal Period 3f Period-Dependent Costs	-	74	-	-	-	-	260	43	377	-	377	-	-	-	-	-	-	-	-	-	2,224
3f.0	TOTAL PERIOD 3f COST	-	839	-	-	-	-	283	238	1,360	-	1,360	-	-	-	-	-	-	-	-	1,836	2,304
PERIOD 3 TOTALS																						
		-	24,169	305	74	-	11,433	72,217	14,692	122,890	15,176	72,660	35,054	-	3,424	-	-	489	491,208	284,050	651,632	
TOTAL COST TO DECOMMISSION		7,958	75,429	11,396	6,323	15,171	40,176	311,297	34,102	551,854	366,801	139,677	45,376	250,617	73,962	8,711	344	489	19,010,760	1,189,625	3,502,109	

Table C-2  
Beaver Valley Power Station, Unit 2  
DECON Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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 17.98% CONTINGENCY:						\$551,854	thousands of 2005 dollars														
TOTAL NRC LICENSE TERMINATION COST IS 66.47% OR:						\$366,801	thousands of 2005 dollars														
SPENT FUEL MANAGEMENT COST IS 25.31% OR:						\$139,677	thousands of 2005 dollars														
NON-NUCLEAR DEMOLITION COST IS 8.22% OR:						\$45,376	thousands of 2005 dollars														
RADWASTE VOLUME BURIED:						84,018	cubic feet														
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:						489	cubic feet														
TOTAL SCRAP METAL REMOVED:						50,835	tons														
TOTAL CRAFT LABOR REQUIREMENTS:						1,189,625	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 ANALYSES  
SAFSTOR**

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Table D-1  
Beaver Valley Power Station, Unit 1  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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	-	-	-	-	-	-	391	117	509	509	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	114	17	132	132	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	176	26	202	202	-	-	-	-	-	-	-	-	-	2,000
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	114	17	132	132	-	-	-	-	-	-	-	-	-	1,300
1a.1.9	Perform detailed rad survey	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	88	13	101	101	-	-	-	-	-	-	-	-	-	1,000
1a.1.11	End product description	-	-	-	-	-	-	88	13	101	101	-	-	-	-	-	-	-	-	-	1,000
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	132	20	152	152	-	-	-	-	-	-	-	-	-	1,500
1a.1.13	Define major work sequence	-	-	-	-	-	-	88	13	101	101	-	-	-	-	-	-	-	-	-	1,000
1a.1.14	Perform SER and EA	-	-	-	-	-	-	273	41	314	314	-	-	-	-	-	-	-	-	-	3,100
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	440	66	506	506	-	-	-	-	-	-	-	-	-	5,000
Activity Specifications																					
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	433	65	498	498	-	-	-	-	-	-	-	-	-	4,920
1a.1.16.2	Plant systems	-	-	-	-	-	-	367	55	422	422	-	-	-	-	-	-	-	-	-	4,167
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	275	41	316	316	-	-	-	-	-	-	-	-	-	3,120
1a.1.16.4	Waste management	-	-	-	-	-	-	176	26	202	202	-	-	-	-	-	-	-	-	-	2,000
1a.1.16.5	Facility and site dormancy	-	-	-	-	-	-	176	26	202	202	-	-	-	-	-	-	-	-	-	2,000
1a.1.16	Total	-	-	-	-	-	-	1,426	214	1,640	1,640	-	-	-	-	-	-	-	-	-	16,207
Detailed Work Procedures																					
1a.1.17.1	Plant systems	-	-	-	-	-	-	104	16	120	120	-	-	-	-	-	-	-	-	-	1,183
1a.1.17.2	Facility closeout & dormancy	-	-	-	-	-	-	106	16	121	121	-	-	-	-	-	-	-	-	-	1,200
1a.1.17	Total	-	-	-	-	-	-	210	31	241	241	-	-	-	-	-	-	-	-	-	2,383
1a.1.18	Procure vacuum drying system	-	-	-	-	-	-	9	1	10	10	-	-	-	-	-	-	-	-	-	100
1a.1.19	Drain/de-energize non-cont. systems	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.20	Drain & dry NSSS	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.21	Drain/de-energize contaminated systems	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.22	Decon/secure contaminated systems	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	3,550	591	4,141	4,141	-	-	-	-	-	-	-	-	-	35,890
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	823	123	946	-	946	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	823	123	946	-	946	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,157	116	1,272	1,272	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	860	86	946	946	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	249	-	-	-	-	-	62	311	311	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	328	-	-	-	-	-	49	378	378	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	6	4	-	26	-	8	44	44	-	-	-	403	-	-	-	8,081	99	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	603	90	693	693	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	264	26	291	291	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	224	22	247	-	247	-	-	-	-	-	-	-	-	-
1a.4.9	Fixed Costs - Site	-	-	-	-	-	-	488	73	562	562	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	628	94	723	-	723	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	38	6	43	-	43	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	674	101	775	775	-	-	-	-	-	-	-	-	-	27,040
1a.4.13	Utility Staff Cost	-	-	-	-	-	-	20,490	3,074	23,564	23,564	-	-	-	-	-	-	-	-	-	436,800

**Table D-1**  
**Beaver Valley Power Station, Unit 1**  
**SAFSTOR Decommissioning Cost Estimate**  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet				
1a.4	Subtotal Period 1a Period-Dependent Costs	-	577	6	4	-	26	25,426	3,808	29,847	28,835	1,013	-	-	403	-	-	-	8,081	99	483,840	
1a.0	TOTAL PERIOD 1a COST	-	577	6	4	-	26	29,798	4,522	34,934	32,976	1,959	-	-	403	-	-	-	8,081	99	499,730	
<b>PERIOD 1b - SAFSTOR Limited DECON Activities</b>																						
Period 1b Direct Decommissioning Activities																						
Decontamination of Site Buildings																						
1b.1.1.1	Reactor Building	854	-	-	-	-	-	-	427	1,280	1,280	-	-	-	-	-	-	-	-	-	18,743	-
1b.1.1.2	Auxiliary Building	266	-	-	-	-	-	-	133	399	399	-	-	-	-	-	-	-	-	-	6,054	-
1b.1.1.3	Fuel and Decon Building	426	-	-	-	-	-	-	213	638	638	-	-	-	-	-	-	-	-	-	8,280	-
1b.1.1.4	Main Steam, Cable Vault, Safeguards	66	-	-	-	-	-	-	33	99	99	-	-	-	-	-	-	-	-	-	1,503	-
1b.1.1.5	Service Building, Wrtise & Control Area	99	-	-	-	-	-	-	49	148	148	-	-	-	-	-	-	-	-	-	2,243	-
1b.1.1.6	Solid Waste & Coolant Recovery Storage	84	-	-	-	-	-	-	42	126	126	-	-	-	-	-	-	-	-	-	1,718	-
1b.1.1.7	Turbine Building	333	-	-	-	-	-	-	166	499	499	-	-	-	-	-	-	-	-	-	7,570	-
1b.1.1	Totals	2,127	-	-	-	-	-	-	1,063	3,190	3,190	-	-	-	-	-	-	-	-	-	46,107	-
1b.1	Subtotal Period 1b Activity Costs	2,127	-	-	-	-	-	-	1,063	3,190	3,190	-	-	-	-	-	-	-	-	-	46,107	-
Period 1b Additional Costs																						
1b.2.1	Mixed Waste	-	-	133	22	634	-	-	112	901	901	-	-	-	-	-	-	-	-	-	-	-
1b.2	Subtotal Period 1b Additional Costs	-	-	133	22	634	-	-	112	901	901	-	-	-	-	-	-	-	-	-	-	-
Period 1b Collateral Costs																						
1b.3.1	Decon equipment	710	-	-	-	-	-	-	107	817	817	-	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process liquid waste	288	-	98	459	-	1,259	-	527	2,611	2,611	-	-	-	-	1,839	-	-	-	231,859	362	-
1b.3.3	Small tool allowance	-	35	-	-	-	-	-	5	40	40	-	-	-	-	-	-	-	-	-	-	-
1b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,880	432	3,312	-	3,312	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	978	35	98	459	-	1,259	2,880	1,071	6,779	3,468	3,312	-	-	-	1,839	-	-	-	231,859	362	-
Period 1b Period-Dependent Costs																						
1b.4.1	Decon supplies	637	-	-	-	-	-	-	159	797	797	-	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	289	29	318	318	-	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	215	21	236	236	-	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	221	-	-	-	-	-	55	277	277	-	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	82	-	-	-	-	-	12	94	94	-	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	9	6	-	41	-	12	69	69	-	-	-	635	-	-	-	-	12,715	156	-
1b.4.7	Plant energy budget	-	-	-	-	-	-	151	23	173	173	-	-	-	-	-	-	-	-	-	-	-
1b.4.8	NRC Fees	-	-	-	-	-	-	86	7	73	73	-	-	-	-	-	-	-	-	-	-	-
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	56	6	62	-	62	-	-	-	-	-	-	-	-	-	-
1b.4.10	Fixed Costs - Site	-	-	-	-	-	-	122	18	140	140	-	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	157	24	181	-	181	-	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	9	1	11	-	11	-	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	168	25	194	194	-	-	-	-	-	-	-	-	-	-	6,760
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	5,123	768	5,891	5,891	-	-	-	-	-	-	-	-	-	-	109,200
1b.4	Subtotal Period 1b Period-Dependent Costs	637	303	9	6	-	41	6,357	1,161	8,515	8,262	253	-	-	635	-	-	-	-	12,715	156	115,960
1b.0	TOTAL PERIOD 1b COST	3,742	338	241	487	634	1,300	9,236	3,407	19,386	15,821	3,565	-	-	635	1,839	-	-	-	244,574	46,825	115,960
<b>PERIOD 1c - Preparations for SAFSTOR Dormancy</b>																						
Period 1c Direct Decommissioning Activities																						
1c.1.1	Prepare support equipment for storage	-	409	-	-	-	-	-	61	471	471	-	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	37	-	-	-	-	-	5	42	42	-	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	-	13,663	-
1c.1.4	Secure building accesses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table D-1  
Beaver Valley Power Station, Unit 1  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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			
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	51	8	59	59	-	-	-	-	-	-	-	-	583
1c.1	Subtotal Period 1c Activity Costs	-	446	-	-	-	-	784	294	1,524	1,524	-	-	-	-	-	-	-	17,363	583
Period 1c Additional Costs																				
1c.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	8,609	1,291	9,900	9,900	-	-	-	-	-	-	-	-	-
1c.2	Subtotal Period 1c Additional Costs	-	-	-	-	-	-	8,609	1,291	9,900	9,900	-	-	-	-	-	-	-	-	-
Period 1c Collateral Costs																				
1c.3.1	Process liquid waste	290	-	106	498	-	1,368	-	572	2,835	2,835	-	-	-	-	-	-	-	251,911	393
1c.3.2	Small tool allowance	-	3	-	-	-	-	-	0	4	4	-	-	-	-	-	-	-	-	-
1c.3.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,880	432	3,312	-	3,312	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	290	3	106	498	-	1,368	2,880	1,005	6,151	2,839	3,312	-	-	-	-	-	-	251,911	393
Period 1c Period-Dependent Costs																				
1c.4.1	Insurance	-	-	-	-	-	-	289	29	318	318	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	216	21	236	236	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	123	-	-	-	-	-	31	154	154	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	82	-	-	-	-	-	12	94	94	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	2	1	-	6	-	2	11	11	-	-	-	-	101	-	-	2,020	25
1c.4.6	Plant energy budget	-	-	-	-	-	-	151	23	173	173	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	66	7	73	73	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	56	6	62	-	62	-	-	-	-	-	-	-	-
1c.4.9	Fixed Costs - Site	-	-	-	-	-	-	122	18	140	140	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	157	24	181	-	181	-	-	-	-	-	-	-	-
1c.4.11	ISFSI Operating Costs	-	-	-	-	-	-	9	1	11	11	-	-	-	-	-	-	-	-	-
1c.4.12	Security Staff Cost	-	-	-	-	-	-	168	25	194	194	-	-	-	-	-	-	-	-	6,760
1c.4.13	Utility Staff Cost	-	-	-	-	-	-	5,123	768	5,891	5,891	-	-	-	-	-	-	-	-	109,200
1c.4	Subtotal Period 1c Period-Dependent Costs	-	205	2	1	-	6	6,357	967	7,338	7,285	253	-	-	-	101	-	-	2,020	25
1c.0	TOTAL PERIOD 1c COST	290	654	108	499	-	1,374	18,629	3,558	25,113	21,549	3,565	-	-	-	101	-	-	253,931	17,780
PERIOD 1 TOTALS		4,032	1,570	355	991	634	2,700	57,664	11,488	79,433	70,345	9,088	-	-	-	1,138	-	-	506,587	64,504
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	-	-	-	-	-	-	282	42	325	325	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	503	126	629	629	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	788	168	954	954	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																				
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	57,681	8,852	66,333	-	66,333	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	57,681	8,852	66,333	-	66,333	-	-	-	-	-	-	-	-
Period 2a Period-Dependent Costs																				
2a.4.1	Insurance	-	-	-	-	-	-	1,591	159	1,750	1,599	151	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	3,452	345	3,798	3,798	-	-	-	-	-	-	-	-	-
2a.4.3	Health physics supplies	-	250	-	-	-	-	-	63	313	313	-	-	-	-	-	-	-	-	-
2a.4.4	Disposal of DAW generated	-	-	24	18	-	104	-	31	175	175	-	-	-	-	1,820	-	-	32,456	398
2a.4.5	Plant energy budget	-	-	-	-	-	-	484	73	557	278	278	-	-	-	-	-	-	-	-
2a.4.6	NRC Fees	-	-	-	-	-	-	937	94	1,031	1,031	-	-	-	-	-	-	-	-	-
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	901	90	991	-	991	-	-	-	-	-	-	-	-
2a.4.8	Fixed Costs - Site	-	-	-	-	-	-	1,961	294	2,256	2,256	-	-	-	-	-	-	-	-	-
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	2,524	378	2,903	-	2,903	-	-	-	-	-	-	-	-

Table D-1  
Beaver Valley Power Station, Unit 1  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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	ISFSI Operating Costs	-	-	-	-	-	-	151	23	173	-	173	-	-	-	-	-	-	-	-	-	-
2a.4.11	Security Staff Cost	-	-	-	-	-	-	2,446	367	2,813	778	2,035	-	-	-	-	-	-	-	-	98,163	
2a.4.12	Utility Staff Cost	-	-	-	-	-	-	15,636	2,345	17,982	3,761	14,220	-	-	-	-	-	-	-	-	332,083	
2a.4	Subtotal Period 2a Period-Dependent Costs	-	250	24	16	-	-	30,084	4,262	34,740	13,988	20,752	-	-	-	1,620	-	-	-	32,456	398	430,246
2a.0	TOTAL PERIOD 2a COST	-	250	24	16	-	104	88,550	13,082	102,027	14,942	87,084	-	-	1,620	-	-	-	32,456	398	430,246	
PERIOD 2b - SAFSTOR Dormancy with Dry Spent Fuel Storage																						
Period 2b Direct Decommissioning Activities																						
2b.1.1	Quarterly inspection	-	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
2b.1.2	Semi-annual environmental survey	-	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
2b.1.3	Prepare reports	-	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
2b.1.4	Bituminous roof replacement	-	-	-	-	-	-	2,568	365	2,953	2,953	-	-	-	-	-	-	-	-	-	-	-
2b.1.5	Maintenance supplies	-	-	-	-	-	-	4,582	1,145	5,727	5,727	-	-	-	-	-	-	-	-	-	-	-
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	7,150	1,531	8,680	8,680	-	-	-	-	-	-	-	-	-	-	-
Period 2b Collateral Costs																						
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	5,871	881	6,751	-	6,751	-	-	-	-	-	-	-	-	-	-
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	5,871	881	6,751	-	6,751	-	-	-	-	-	-	-	-	-	-
Period 2b Period-Dependent Costs																						
2b.4.1	Insurance	-	-	-	-	-	-	13,515	1,352	14,867	14,549	318	-	-	-	-	-	-	-	-	-	-
2b.4.2	Property taxes	-	-	-	-	-	-	31,416	3,142	34,558	34,558	-	-	-	-	-	-	-	-	-	-	-
2b.4.3	Health physics supplies	-	2,276	-	-	-	-	-	569	2,845	2,845	-	-	-	-	-	-	-	-	-	-	-
2b.4.4	Disposal of DAW generated	-	-	220	150	-	943	-	280	1,593	1,593	-	-	14,738	-	-	-	-	-	295,349	3,619	-
2b.4.5	Plant energy budget	-	-	-	-	-	-	2,203	330	2,534	2,534	-	-	-	-	-	-	-	-	-	-	-
2b.4.6	NRC Fees	-	-	-	-	-	-	8,531	853	9,384	9,384	-	-	-	-	-	-	-	-	-	-	-
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	3,643	364	4,007	-	4,007	-	-	-	-	-	-	-	-	-	-
2b.4.8	Fixed Costs - Site	-	-	-	-	-	-	17,849	2,877	20,527	20,527	-	-	-	-	-	-	-	-	-	-	-
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	1,372	206	1,578	-	1,578	-	-	-	-	-	-	-	-	-	-
2b.4.10	Security Staff Cost	-	-	-	-	-	-	11,128	1,669	12,797	7,079	5,718	-	-	-	-	-	-	-	-	-	447,014
2b.4.11	Utility Staff Cost	-	-	-	-	-	-	41,814	6,272	48,087	34,225	13,861	-	-	-	-	-	-	-	-	-	874,263
2b.4	Subtotal Period 2b Period-Dependent Costs	-	2,276	220	150	-	943	131,471	17,715	152,775	127,293	25,482	-	14,738	-	-	-	-	295,349	3,619	1,321,277	
2b.0	TOTAL PERIOD 2b COST	-	2,276	220	150	-	943	144,492	20,126	168,207	135,974	32,233	-	14,738	-	-	-	-	295,349	3,619	1,321,277	
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	-	-	-	-	-	-	792	119	911	911	-	-	-	-	-	-	-	-	-	-	-
2c.1.5	Maintenance supplies	-	-	-	-	-	-	1,413	353	1,767	1,767	-	-	-	-	-	-	-	-	-	-	-
2c.1	Subtotal Period 2c Activity Costs	-	-	-	-	-	-	2,206	472	2,678	2,678	-	-	-	-	-	-	-	-	-	-	-
Period 2c Period-Dependent Costs																						
2c.4.1	Insurance	-	-	-	-	-	-	4,080	408	4,488	4,488	-	-	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	9,691	969	10,660	10,660	-	-	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	702	-	-	-	-	-	176	878	878	-	-	-	-	-	-	-	-	-	-	-
2c.4.4	Disposal of DAW generated	-	-	68	46	-	291	-	86	491	491	-	-	4,548	-	-	-	-	-	91,109	1,116	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	690	102	792	792	-	-	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	2,631	263	2,895	2,895	-	-	-	-	-	-	-	-	-	-	-
2c.4.7	Fixed Costs - Site	-	-	-	-	-	-	5,506	828	6,332	6,332	-	-	-	-	-	-	-	-	-	-	-
2c.4.8	Security Staff Cost	-	-	-	-	-	-	1,899	285	2,184	2,184	-	-	-	-	-	-	-	-	-	-	78,217
2c.4.9	Utility Staff Cost	-	-	-	-	-	-	9,181	1,377	10,558	10,558	-	-	-	-	-	-	-	-	-	-	199,337

Table D-1  
Bever Valley Power Station, Unit 1  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet			
2c.4	Subtotal Period 2c Period-Dependent Costs	-	702	68	46	-	291	33,668	4,492	39,267	39,267	-	-	-	4,546	-	-	-	91,109	1,116	275,554
2c.0	TOTAL PERIOD 2c COST	-	702	68	46	-	291	35,874	4,964	41,845	41,845	-	-	-	4,546	-	-	-	91,109	1,116	275,554
<b>PERIOD 2 TOTALS</b>		-	3,228	312	212	-	1,338	268,916	38,172	312,178	192,861	118,317	-	-	20,904	-	-	-	418,914	5,133	2,027,077
<b>PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy</b>																					
<b>Period 3a Direct Decommissioning Activities</b>																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	114	17	132	132	-	-	-	-	-	-	-	-	-	1,300
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	405	61	466	466	-	-	-	-	-	-	-	-	-	4,600
3a.1.3	Perform detailed rad survey	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
3a.1.4	End product description	-	-	-	-	-	-	88	13	101	101	-	-	-	-	-	-	-	-	-	1,000
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	114	17	132	132	-	-	-	-	-	-	-	-	-	1,300
3a.1.6	Define major work sequence	-	-	-	-	-	-	860	99	759	759	-	-	-	-	-	-	-	-	-	7,500
3a.1.7	Perform SER and EA	-	-	-	-	-	-	273	41	314	314	-	-	-	-	-	-	-	-	-	3,100
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	440	66	506	506	-	-	-	-	-	-	-	-	-	5,000
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	360	54	415	415	-	-	-	-	-	-	-	-	-	4,086
3a.1.10	Receive NRC approval of termination plan	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
<b>Activity Specifications</b>																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	649	97	746	671	-	75	-	-	-	-	-	-	-	7,370
3a.1.11.2	Plant systems	-	-	-	-	-	-	367	55	422	380	-	42	-	-	-	-	-	-	-	4,167
3a.1.11.3	Reactor internals	-	-	-	-	-	-	625	94	719	719	-	-	-	-	-	-	-	-	-	7,100
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	572	86	658	658	-	-	-	-	-	-	-	-	-	6,500
3a.1.11.5	Biological shield	-	-	-	-	-	-	44	7	51	51	-	-	-	-	-	-	-	-	-	500
3a.1.11.6	Steam generators	-	-	-	-	-	-	275	41	316	316	-	-	-	-	-	-	-	-	-	3,120
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	141	21	162	81	-	81	-	-	-	-	-	-	-	1,600
3a.1.11.8	Main Turbine	-	-	-	-	-	-	35	5	40	-	-	40	-	-	-	-	-	-	-	400
3a.1.11.9	Main Condensers	-	-	-	-	-	-	35	5	40	-	-	40	-	-	-	-	-	-	-	400
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	275	41	316	158	-	158	-	-	-	-	-	-	-	3,120
3a.1.11.11	Waste management	-	-	-	-	-	-	405	61	466	466	-	-	-	-	-	-	-	-	-	4,600
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-	79	12	91	46	-	46	-	-	-	-	-	-	-	900
3a.1.11	Total	-	-	-	-	-	-	3,500	525	4,025	3,543	-	482	-	-	-	-	-	-	-	39,777
<b>Planning &amp; Site Preparations</b>																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	211	32	243	243	-	-	-	-	-	-	-	-	-	2,400
3a.1.13	Plant prep. & temp. svcs	-	-	-	-	-	-	2,419	363	2,782	2,782	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	123	18	142	142	-	-	-	-	-	-	-	-	-	1,400
3a.1.15	Rigging/Cont. Cntrl Envlp/sooling/etc.	-	-	-	-	-	-	2,048	307	2,355	2,355	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	108	16	124	124	-	-	-	-	-	-	-	-	-	1,230
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	10,865	1,630	12,494	12,012	-	482	-	-	-	-	-	-	-	72,703
<b>Period 3a Period-Dependent Costs</b>																					
3a.4.1	Insurance	-	-	-	-	-	-	365	36	401	401	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	887	87	953	953	-	-	-	-	-	-	-	-	-	-
3a.4.3	Health physics supplies	-	251	-	-	-	-	-	63	314	314	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	331	-	-	-	-	-	50	381	381	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	6	4	-	26	-	8	44	44	-	-	-	407	-	-	-	8,147	100	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	608	91	699	699	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	267	27	293	293	-	-	-	-	-	-	-	-	-	-
3a.4.8	Fixed Costs - Site	-	-	-	-	-	-	492	74	566	566	-	-	-	-	-	-	-	-	-	-
3a.4.9	Security Staff Cost	-	-	-	-	-	-	405	61	466	466	-	-	-	-	-	-	-	-	-	16,253
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	12,682	1,902	14,584	14,584	-	-	-	-	-	-	-	-	-	265,813
3a.4	Subtotal Period 3a Period-Dependent Costs	-	582	6	4	-	26	15,685	2,398	18,702	18,702	-	-	-	407	-	-	-	8,147	100	282,066
3a.0	TOTAL PERIOD 3a COST	-	582	6	4	-	26	26,560	4,028	31,196	30,714	-	482	-	407	-	-	-	8,147	100	354,768

Table D-1  
Beaver Valley Power Station, Unit 1  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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				
<b>PERIOD 3b - Decommissioning Preparations</b>																						
<b>Period 3b Direct Decommissioning Activities</b>																						
<b>Detailed Work Procedures</b>																						
3b.1.1.1	Plant systems	-	-	-	-	-	-	417	62	479	431	-	48	-	-	-	-	-	-	-	-	4,733
3b.1.1.2	Reactor internals	-	-	-	-	-	-	220	33	253	253	-	-	-	-	-	-	-	-	-	-	2,500
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	119	18	137	34	-	102	-	-	-	-	-	-	-	-	1,350
3b.1.1.4	CRD cooling assembly	-	-	-	-	-	-	88	13	101	101	-	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.5	CRD housings & ICI tubes	-	-	-	-	-	-	88	13	101	101	-	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.6	Incore instrumentation	-	-	-	-	-	-	88	13	101	101	-	-	-	-	-	-	-	-	-	-	1,000
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	319	48	367	367	-	-	-	-	-	-	-	-	-	-	3,630
3b.1.1.8	Facility closeout	-	-	-	-	-	-	106	16	121	61	-	61	-	-	-	-	-	-	-	-	1,200
3b.1.1.9	Missile shields	-	-	-	-	-	-	40	6	46	46	-	-	-	-	-	-	-	-	-	-	450
3b.1.1.10	Biological shield	-	-	-	-	-	-	106	16	121	121	-	-	-	-	-	-	-	-	-	-	1,200
3b.1.1.11	Steam generators	-	-	-	-	-	-	405	61	466	466	-	-	-	-	-	-	-	-	-	-	4,800
3b.1.1.12	Reinforced concrete	-	-	-	-	-	-	88	13	101	51	-	51	-	-	-	-	-	-	-	-	1,000
3b.1.1.13	Main Turbine	-	-	-	-	-	-	137	21	158	-	-	158	-	-	-	-	-	-	-	-	1,560
3b.1.1.14	Main Condensers	-	-	-	-	-	-	137	21	158	-	-	158	-	-	-	-	-	-	-	-	1,560
3b.1.1.15	Auxiliary building	-	-	-	-	-	-	240	36	276	249	-	28	-	-	-	-	-	-	-	-	2,730
3b.1.1.16	Reactor building	-	-	-	-	-	-	240	36	276	249	-	28	-	-	-	-	-	-	-	-	2,730
3b.1.1	Total	-	-	-	-	-	-	2,837	426	3,263	2,630	-	633	-	-	-	-	-	-	-	-	32,243
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	2,837	426	3,263	2,630	-	633	-	-	-	-	-	-	-	-	32,243
<b>Period 3b Additional Costs</b>																						
3b.2.1	Site Characterization	-	-	-	-	-	-	836	251	1,087	1,087	-	-	-	-	-	-	-	-	-	-	-
3b.2.2	Cofferdam Construction and Teardown	-	182	-	-	-	-	-	27	209	209	-	-	-	-	-	-	-	-	-	2,223	-
3b.2	Subtotal Period 3b Additional Costs	-	182	-	-	-	-	836	278	1,296	1,296	-	-	-	-	-	-	-	-	-	2,223	-
<b>Period 3b Collateral Costs</b>																						
3b.3.1	Decon equipment	710	-	-	-	-	-	-	107	817	817	-	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,105	166	1,271	1,271	-	-	-	-	-	-	-	-	-	-	-
3b.3.3	Small tool allowance	-	1	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-	-
3b.3.4	Pipe cutting equipment	-	957	-	-	-	-	-	143	1,100	1,100	-	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	710	958	-	-	-	-	1,105	416	3,189	3,189	-	-	-	-	-	-	-	-	-	-	-
<b>Period 3b Period-Dependent Costs</b>																						
3b.4.1	Decon supplies	21	-	-	-	-	-	-	5	27	27	-	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	195	19	214	214	-	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	423	42	465	465	-	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	130	-	-	-	-	-	33	163	163	-	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	161	-	-	-	-	-	24	186	186	-	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	3	2	-	13	-	4	21	21	-	-	-	-	-	-	-	-	-	-	-
3b.4.7	Plant energy budget	-	-	-	-	-	-	296	44	341	341	-	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	130	13	143	143	-	-	-	-	-	-	-	-	-	-	-
3b.4.9	Fixed Costs - Site	-	-	-	-	-	-	240	36	276	276	-	-	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	197	30	227	227	-	-	-	-	-	-	-	-	-	-	-
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	4,053	608	4,661	4,661	-	-	-	-	-	-	-	-	-	-	7,827
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	6,322	948	7,270	7,270	-	-	-	-	-	-	-	-	-	-	62,394
3b.4	Subtotal Period 3b Period-Dependent Costs	21	292	3	2	-	13	11,857	1,807	13,994	13,994	-	-	-	-	-	-	-	-	-	3,974	49
3b.0	TOTAL PERIOD 3b COST	732	1,432	3	2	-	13	16,635	2,927	21,743	21,110	-	633	-	-	-	-	-	-	3,974	2,271	235,280
<b>PERIOD 3 TOTALS</b>		<b>732</b>	<b>2,014</b>	<b>9</b>	<b>6</b>	<b>-</b>	<b>39</b>	<b>43,185</b>	<b>6,954</b>	<b>52,939</b>	<b>51,824</b>	<b>-</b>	<b>1,115</b>	<b>-</b>	<b>605</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>12,121</b>	<b>2,371</b>	<b>590,049</b>

Table D-1  
Beaver Valley Power Station, Unit 1  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Reactor Coolant Piping	24	96	14	16	79	186	-	98	512	512	-	-	592	592	-	-	-	137,217	2,652	-
4a.1.1.2	Pressurizer Relief Tank	4	17	3	4	18	38	-	20	104	104	-	-	133	133	-	-	-	29,424	480	-
4a.1.1.3	Reactor Coolant Pumps & Motors	10	55	29	67	383	718	-	268	1,531	1,531	-	-	1,314	1,138	-	-	-	595,000	1,671	-
4a.1.1.4	Pressurizer	7	52	402	383	-	184	-	180	1,188	1,188	-	-	-	1,913	-	-	-	181,953	1,801	-
4a.1.1.5	Steam Generators	56	1,932	1,870	889	2,667	1,143	-	1,517	10,074	10,074	-	-	12,400	11,910	-	-	-	2,323,333	19,209	-
4a.1.1.6	CRDMs/Cl/SERVICE Structure Removal	25	78	100	34	26	124	-	82	466	466	-	-	588	2,581	-	-	-	69,441	2,095	-
4a.1.1.7	Reactor Vessel Internals	35	1,572	3,704	402	-	2,153	150	3,322	11,339	11,339	-	-	-	2,121	125	423	-	254,217	18,950	890
4a.1.1.8	Vessel & Internals GTCC Disposal	-	-	300	-	-	11,104	-	1,696	13,100	13,100	-	-	-	-	-	-	489	110,653	-	-
4a.1.1.9	Reactor Vessel	-	3,207	867	449	-	7,126	150	6,320	18,120	18,120	-	-	-	10,961	2,669	-	-	1,386,386	18,950	890
4a.1.1	Totals	161	7,007	7,289	2,244	3,173	22,776	300	13,482	56,432	56,432	-	-	15,026	31,347	2,794	423	489	5,087,625	65,807	1,780
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	250	88	21	295	-	-	119	773	773	-	-	2,889	-	-	-	-	245,595	5,301	-
4a.1.3	Main Condensers	-	1,307	66	21	304	-	-	362	2,080	2,080	-	-	5,634	-	-	-	-	253,552	28,172	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor Building	-	502	-	-	-	-	-	75	577	577	-	-	-	-	-	-	-	-	7,157	-
4a.1.4.2	Auxiliary Building	-	79	-	-	-	-	-	12	90	90	-	-	-	-	-	-	-	-	1,244	-
4a.1.4.3	Fuel and Decon Building	-	87	-	-	-	-	-	13	100	100	-	-	-	-	-	-	-	-	1,340	-
4a.1.4.4	Main Steam, Cable Vault, Safeguards	-	40	-	-	-	-	-	6	46	46	-	-	-	-	-	-	-	-	638	-
4a.1.4.5	Solid Waste & Coolant Recovery Storage	-	34	-	-	-	-	-	5	39	39	-	-	-	-	-	-	-	-	552	-
4a.1.4	Totals	-	742	-	-	-	-	-	111	853	853	-	-	-	-	-	-	-	-	10,930	-
Disposal of Plant Systems																					
4a.1.5.1	Area Ventilation Systems - Auxiliary Bld	-	144	2	8	107	-	-	54	315	315	-	-	2,195	-	-	-	-	89,124	2,872	-
4a.1.5.2	Area Ventilation Systems - Control Area	-	22	-	-	-	-	-	3	25	-	-	25	-	-	-	-	-	-	520	-
4a.1.5.3	Area Ventilation Systems - Cooling	-	175	3	9	134	-	-	66	387	387	-	-	2,759	-	-	-	-	112,043	3,480	-
4a.1.5.4	Auxiliary Boiler	-	208	-	-	-	-	-	31	240	-	-	240	-	-	-	-	-	-	4,858	-
4a.1.5.5	Auxiliary Steam and Condensate	-	83	-	-	-	-	-	13	96	-	-	96	-	-	-	-	-	-	2,030	-
4a.1.5.6	Auxiliary Steam and Condensate - RCA	-	148	2	6	80	-	-	50	286	286	-	-	1,649	-	-	-	-	66,954	3,052	-
4a.1.5.7	Building Services Hot Water Heating	-	79	-	-	-	-	-	12	90	-	-	90	-	-	-	-	-	-	1,887	-
4a.1.5.8	Building Services Hot Water Htg - RCA	-	138	1	4	51	-	-	43	237	237	-	-	1,056	-	-	-	-	42,875	2,843	-
4a.1.5.9	Building and Yard Drains	-	34	-	-	-	-	-	5	40	-	-	40	-	-	-	-	-	-	831	-
4a.1.5.10	Building and Yard Drains - RCA	-	49	0	1	13	-	-	14	78	78	-	-	272	-	-	-	-	11,037	1,073	-
4a.1.5.11	Chilled Water	-	179	-	-	-	-	-	27	206	-	-	206	-	-	-	-	-	-	4,330	-
4a.1.5.12	Chilled Water - RCA	-	404	6	17	239	-	-	140	805	805	-	-	4,898	-	-	-	-	198,897	8,361	-
4a.1.5.13	Compressed Air	-	48	-	-	-	-	-	7	56	-	-	56	-	-	-	-	-	-	1,188	-
4a.1.5.14	Condensate	-	352	-	-	-	-	-	53	405	-	-	405	-	-	-	-	-	-	8,371	-
4a.1.5.15	Containment Vacuum & Leakage Monitoring	-	47	0	1	16	-	-	14	79	79	-	-	331	-	-	-	-	13,449	1,016	-
4a.1.5.16	Domestic Water	-	36	-	-	-	-	-	5	41	-	-	41	-	-	-	-	-	-	880	-
4a.1.5.17	Domestic Water - RCA	-	30	0	1	11	-	-	9	51	51	-	-	221	-	-	-	-	8,958	613	-
4a.1.5.18	Electrical - Contaminated	-	245	2	7	102	-	-	78	434	434	-	-	2,088	-	-	-	-	84,792	5,262	-
4a.1.5.19	Extraction Steam	-	205	-	-	-	-	-	31	235	-	-	235	-	-	-	-	-	-	4,989	-
4a.1.5.20	Heater Drains	-	271	-	-	-	-	-	41	311	-	-	311	-	-	-	-	-	-	6,580	-
4a.1.5.21	Incore Instrumentation	-	11	1	1	1	7	-	5	25	25	-	-	22	30	-	-	-	3,593	220	-
4a.1.5.22	Loose Parts Monitoring	-	0	-	-	-	-	-	0	0	-	-	0	-	-	-	-	-	-	3	-
4a.1.5.23	Main Generator and Main Transformer	-	64	-	-	-	-	-	10	73	-	-	73	-	-	-	-	-	-	1,509	-
4a.1.5.24	Main Steam	-	125	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	3,013	-
4a.1.5.25	Main Steam - RCA	-	281	7	19	271	-	-	109	867	867	-	-	5,551	-	-	-	-	225,448	5,521	-
4a.1.5.26	Main Turbine and Condenser	-	32	-	-	-	-	-	49	373	-	-	373	-	-	-	-	-	-	7,821	-
4a.1.5.27	Main Turbine and Condenser - RCA	-	12	-	0	2	-	-	3	17	17	-	-	40	-	-	-	-	1,620	268	-
4a.1.5.28	Miscellaneous	-	22	-	-	-	-	-	3	25	-	-	25	-	-	-	-	-	-	495	-
4a.1.5.29	Plant Process Control	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	23	-

Table D-1  
Beaver Valley Power Station, Unit 1  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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	Post Accident Sampling - RCA	-	144	1	2	33	-	-	41	221	221	-	-	680	-	-	-	-	27,634	3,137	-	
4a.1.5.31	Post DBA Hydrogen Control	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	47	-	
4a.1.5.32	Post DBA Hydrogen Control - RCA	-	39	1	2	21	-	-	13	76	76	-	-	438	-	-	-	-	17,780	820	-	
4a.1.5.33	Primary Access Facility	-	3	-	-	-	-	-	0	3	-	-	3	-	-	-	-	-	-	79	-	
4a.1.5.34	Reactor Control & Protection	-	1	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	13	-	
4a.1.5.35	Reactor Coolant	-	157	9	16	51	142	-	86	461	481	-	-	1,056	611	-	-	-	97,398	3,428	-	
4a.1.5.36	Reactor Excore Instrumentation	-	0	-	-	-	-	-	-	0	-	-	0	-	-	-	-	-	-	3	-	
4a.1.5.37	Reactor Plant Sample	-	99	1	3	37	-	-	31	170	170	-	-	749	-	-	-	-	30,428	2,039	-	
4a.1.5.38	Safety Injection - RCA	-	562	16	46	652	-	-	247	1,522	1,522	-	-	13,370	-	-	-	-	542,951	12,039	-	
4a.1.5.39	Service Water	-	351	-	-	-	-	-	53	403	-	-	-	403	-	-	-	-	-	8,434	-	
4a.1.5.40	Service Water - RCA	-	578	24	70	997	-	-	307	1,977	1,977	-	-	20,450	-	-	-	-	830,486	12,686	-	
4a.1.5.41	Simulator Building	-	0	-	-	-	-	-	-	0	-	-	-	0	-	-	-	-	-	3	-	
4a.1.5.42	Station Service - 4KV	-	125	-	-	-	-	-	19	143	-	-	-	143	-	-	-	-	-	2,881	-	
4a.1.5.43	Steam Generator Blowdown	-	776	17	51	730	-	-	313	1,887	1,887	-	-	14,970	-	-	-	-	607,940	16,874	-	
4a.1.5.44	Steam Generator Feedwater	-	250	-	-	-	-	-	38	288	-	-	-	288	-	-	-	-	-	5,950	-	
4a.1.5.45	Steam Generator Feedwater - RCA	-	205	6	18	256	-	-	93	578	578	-	-	5,252	-	-	-	-	213,288	4,356	-	
4a.1.5.46	Supplementary Leak Collection & Release	-	63	1	3	36	-	-	22	124	124	-	-	742	-	-	-	-	30,127	1,375	-	
4a.1.5.47	Turbine Plant Comp Cooling Water - RCA	-	17	0	0	6	-	-	5	29	29	-	-	128	-	-	-	-	5,214	356	-	
4a.1.5.48	Turbine Plant Component Cooling Water	-	216	-	-	-	-	-	32	248	-	-	-	248	-	-	-	-	-	5,228	-	
4a.1.5.49	Turbine Plant Sample	-	31	-	-	-	-	-	5	38	-	-	-	36	-	-	-	-	-	767	-	
4a.1.5	Totals	-	7,338	101	284	3,846	149	-	2,198	13,916	10,426	-	-	3,489	78,816	641	-	-	3,262,037	164,220	-	
4a.1.6	Scaffolding in support of decommissioning	-	824	9	4	39	2	-	214	1,092	1,092	-	-	720	38	-	-	-	35,993	20,621	-	
4a.1	Subtotal Period 4a Activity Costs	161	17,468	7,553	2,574	7,656	22,927	300	16,506	75,146	71,656	-	-	3,489	103,187	32,024	2,794	423	489	8,884,802	295,052	1,780
Period 4a Additional Costs																						
4a.2.1	Curie Surcharge	-	-	-	-	-	-	98	25	123	123	-	-	-	-	-	-	-	-	-	-	
4a.2	Subtotal Period 4a Additional Costs	-	-	-	-	-	-	98	25	123	123	-	-	-	-	-	-	-	-	-	-	
Period 4a Collateral Costs																						
4a.3.1	Process liquid waste	8	-	7	34	-	-	95	34	178	178	-	-	-	-	-	139	-	-	17,558	27	
4a.3.2	Small tool allowance	-	215	-	-	-	-	-	32	247	222	-	25	-	-	-	-	-	-	-	-	
4a.3	Subtotal Period 4a Collateral Costs	8	215	7	34	-	-	95	66	425	400	-	25	-	-	-	139	-	-	17,558	27	
Period 4a Period-Dependent Costs																						
4a.4.1	Decon supplies	50	-	-	-	-	-	-	12	62	62	-	-	-	-	-	-	-	-	-	-	
4a.4.2	Insurance	-	-	-	-	-	-	453	45	498	498	-	-	-	-	-	-	-	-	-	-	
4a.4.3	Property taxes	-	-	-	-	-	-	982	98	1,081	973	-	108	-	-	-	-	-	-	-	-	
4a.4.4	Health physics supplies	-	1,294	-	-	-	-	-	324	1,618	1,618	-	-	-	-	-	-	-	-	-	-	
4a.4.5	Heavy equipment rental	-	1,828	-	-	-	-	-	274	2,102	2,102	-	-	-	-	-	-	-	-	-	-	
4a.4.6	Disposal of DAW generated	-	-	62	42	-	265	-	79	448	448	-	-	-	4,148	-	-	-	-	83,124	1,018	
4a.4.7	Plant energy budget	-	-	-	-	-	-	654	98	753	753	-	-	-	-	-	-	-	-	-	-	
4a.4.8	NRC Fees	-	-	-	-	-	-	373	37	411	411	-	-	-	-	-	-	-	-	-	-	
4a.4.9	Fixed Costs - Site	-	-	-	-	-	-	558	84	642	642	-	-	-	-	-	-	-	-	-	-	
4a.4.10	Radwaste Processing Equipment/Services	-	-	-	-	-	-	211	32	243	243	-	-	-	-	-	-	-	-	-	-	
4a.4.11	Security Staff Cost	-	-	-	-	-	-	1,664	250	1,913	1,913	-	-	-	-	-	-	-	-	-	86,774	
4a.4.12	DOC Staff Cost	-	-	-	-	-	-	11,439	1,716	13,155	13,155	-	-	-	-	-	-	-	-	-	180,663	
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	14,753	2,213	16,966	16,966	-	-	-	-	-	-	-	-	-	314,615	
4a.4	Subtotal Period 4a Period-Dependent Costs	50	3,122	62	42	-	265	31,087	5,262	39,890	39,782	-	-	108	-	4,148	-	-	-	83,124	1,018	562,052
4a.0	TOTAL PERIOD 4a COST	219	20,805	7,622	2,850	7,656	23,386	31,387	21,858	115,584	111,961	-	-	3,622	103,187	36,172	2,933	423	489	8,985,483	296,097	563,832
PERIOD 4b - Site Decontamination																						
Period 4b Direct Decommissioning Activities																						
4b.1.1	Remove spent fuel racks	409	48	98	54	-	161	-	274	1,043	1,043	-	-	-	2,438	-	-	-	-	243,750	1,184	-

Table D-1  
Beaver Valley Power Station, Unit 1  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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																						
4b.1.2.1	Area Ventilation Systems - Containment	-	322	7	21	300	-	-	130	781	781	-	-	6,165	-	-	-	-	-	250,356	6,286	-
4b.1.2.2	Area Ventilation Systems - Miscellaneous	-	142	-	-	-	-	-	21	164	-	-	164	-	-	-	-	-	-	-	3,556	-
4b.1.2.3	Boron Recovery & Primary Grade Water	-	189	2	5	74	-	-	59	329	329	-	-	1,520	-	-	-	-	-	81,718	4,032	-
4b.1.2.4	Chemical & Volume Control	-	517	17	28	147	210	-	210	1,130	1,130	-	-	3,013	914	-	-	-	-	203,309	11,070	-
4b.1.2.5	Circulating Water	-	399	-	-	-	-	-	60	458	-	-	458	-	-	-	-	-	-	-	9,646	-
4b.1.2.6	Compressed Air - RCA	-	256	3	8	107	-	-	81	454	454	-	-	2,199	-	-	-	-	-	89,320	5,287	-
4b.1.2.7	Containment	-	13	0	1	17	-	-	6	37	37	-	-	348	-	-	-	-	-	14,124	263	-
4b.1.2.8	Containment Depressurization	-	107	-	-	-	-	-	16	123	-	-	123	-	-	-	-	-	-	-	2,334	-
4b.1.2.9	Containment Depressurization - RCA	-	483	27	79	1,113	-	-	302	2,003	2,003	-	-	22,839	-	-	-	-	-	927,485	10,291	-
4b.1.2.10	Electrical - Clean	-	1,978	-	-	-	-	-	297	2,275	-	-	2,275	-	-	-	-	-	-	-	45,230	-
4b.1.2.11	Electrical - RCA	-	1,644	22	64	911	-	-	560	3,201	3,201	-	-	18,693	-	-	-	-	-	759,119	34,914	-
4b.1.2.12	Fire Protection	-	3	-	-	-	-	-	0	3	-	-	3	-	-	-	-	-	-	-	75	-
4b.1.2.13	Fuel Pool Area Ventilation Syst Aux Bldg	-	66	1	4	60	-	-	26	158	158	-	-	1,229	-	-	-	-	-	49,893	1,317	-
4b.1.2.14	Fuel Pool Compressed Air RCA	-	67	1	2	30	-	-	22	122	122	-	-	623	-	-	-	-	-	25,284	1,397	-
4b.1.2.15	Fuel Pool Cooling & Purification	-	297	11	21	117	154	-	135	736	736	-	-	2,409	662	-	-	-	-	157,192	8,429	-
4b.1.2.16	Fuel Pool Electrical - RCA	-	410	6	16	227	-	-	139	797	797	-	-	4,650	-	-	-	-	-	188,843	8,702	-
4b.1.2.17	Fuel Pool Electrical-Contam	-	21	-	-	-	-	-	3	24	-	-	24	-	-	-	-	-	-	-	488	-
4b.1.2.18	Fuel Pool Fire Protection	-	1	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	-	18	-
4b.1.2.19	Fuel Transfer System & Tools	-	54	1	3	21	17	-	22	119	119	-	-	439	74	-	-	-	-	24,458	1,200	-
4b.1.2.20	Gaseous Waste Disposal	-	354	4	12	167	-	-	116	652	652	-	-	3,432	-	-	-	-	-	139,394	7,616	-
4b.1.2.21	Liquid Waste Disposal	-	65	3	4	25	30	-	28	155	155	-	-	515	156	-	-	-	-	32,510	1,392	-
4b.1.2.22	Prim Comp & Nrm Sfld Trk Clng Wtr - RCA	-	1,057	39	113	1,603	-	-	526	3,339	3,339	-	-	32,904	-	-	-	-	-	1,336,230	22,579	-
4b.1.2.23	Radiation Monitoring	-	105	1	3	40	-	-	33	181	181	-	-	812	-	-	-	-	-	32,959	2,129	-
4b.1.2.24	Reactor Plant Vents & Drains	-	300	7	10	55	77	-	105	555	555	-	-	1,129	335	-	-	-	-	75,629	6,481	-
4b.1.2.25	Residual Heat Removal	-	281	20	43	338	228	-	187	1,097	1,097	-	-	6,946	978	-	-	-	-	369,776	6,159	-
4b.1.2.26	Sewage Treatment	-	16	-	-	-	-	-	2	19	-	-	19	-	-	-	-	-	-	-	390	-
4b.1.2.27	Solid Waste Disposal	-	150	5	6	56	53	-	61	333	333	-	-	1,142	235	-	-	-	-	66,902	3,168	-
4b.1.2	Totals	-	9,296	178	447	5,410	771	-	3,146	19,247	16,181	-	3,067	111,005	3,355	-	-	-	-	4,804,499	202,446	-
4b.1.3	Scaffolding in support of decommissioning	-	1,236	13	5	58	4	-	321	1,638	1,638	-	-	1,080	54	-	-	-	-	53,990	30,931	-
Decontamination of Site Buildings																						
4b.1.4.1	Reactor Building	777	563	24	51	202	105	-	596	2,317	2,317	-	-	4,136	1,835	-	-	-	-	326,879	27,757	-
4b.1.4.2	Auxiliary Building	248	76	10	21	27	52	-	164	597	597	-	-	545	801	-	-	-	-	101,472	6,863	-
4b.1.4.3	Fuel and Decon Building	364	421	5	10	92	13	-	316	1,242	1,242	-	-	1,896	203	-	-	-	-	96,712	16,472	-
4b.1.4.4	Main Steam, Cable Vault, Safeguards	61	17	2	5	6	11	-	39	141	141	-	-	125	172	-	-	-	-	22,146	1,866	-
4b.1.4.5	Service Building, Wrtse & Control Area	92	18	3	7	18	-	-	56	194	194	-	-	278	-	-	-	-	-	27,807	2,364	-
4b.1.4.6	Solid Waste & Coolant Recovery Storage	76	38	3	6	37	10	-	57	227	227	-	-	759	159	-	-	-	-	46,893	2,309	-
4b.1.4.7	Turbine Building	302	28	2	5	20	10	-	165	532	532	-	-	412	182	-	-	-	-	32,369	7,308	-
4b.1.4	Totals	1,939	1,160	50	105	384	221	-	1,393	5,250	5,250	-	-	7,873	3,410	-	-	-	-	654,177	64,759	-
4b.1	Subtotal Period 4b Activity Costs	2,347	11,740	339	611	5,852	1,156	-	5,134	27,179	24,112	-	3,067	119,957	9,257	-	-	-	-	5,756,416	299,321	-
Period 4b Additional Costs																						
4b.2.1	ISFSI License Termination	-	488	5	74	-	329	798	335	2,028	-	2,028	-	-	3,424	-	-	-	-	380,555	8,021	1,280
4b.2	Subtotal Period 4b Additional Costs	-	488	5	74	-	329	798	335	2,028	-	2,028	-	-	3,424	-	-	-	-	380,555	8,021	1,280
Period 4b Collateral Costs																						
4b.3.1	Process liquid waste	13	-	13	59	-	164	-	57	306	306	-	-	-	239	-	-	-	-	30,170	47	-
4b.3.2	Small tool allowance	-	232	-	-	-	-	-	35	267	267	-	-	-	-	-	-	-	-	-	-	-
4b.3	Subtotal Period 4b Collateral Costs	13	232	13	59	-	164	-	92	573	573	-	-	-	239	-	-	-	-	30,170	47	-
Period 4b Period-Dependent Costs																						
4b.4.1	Decon supplies	716	-	-	-	-	-	-	179	896	896	-	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	823	82	905	905	-	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	1,785	179	1,964	1,964	-	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	1,569	-	-	-	-	-	392	1,961	1,961	-	-	-	-	-	-	-	-	-	-	-

**Table D-1**  
**Beaver Valley Power Station, Unit 1**  
**SAFSTOR Decommissioning Cost Estimate**  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed WT, Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet				
Period 4b Period-Dependent Costs (continued)																						
4b.4.5	Heavy equipment rental	-	3,342	-	-	-	-	-	501	3,844	3,844	-	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	68	46	-	293	-	87	494	494	-	-	-	4,574	-	-	-	-	91,657	1,123	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	939	141	1,080	1,080	-	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	678	68	746	746	-	-	-	-	-	-	-	-	-	-	-
4b.4.9	Fixed Costs - Site	-	-	-	-	-	-	1,014	152	1,166	1,166	-	-	-	-	-	-	-	-	-	-	-
4b.4.10	Radwaste Processing Equipment/Services	-	-	-	-	-	-	767	115	883	883	-	-	-	-	-	-	-	-	-	-	-
4b.4.11	Security Staff Cost	-	-	-	-	-	-	1,668	250	1,919	1,919	-	-	-	-	-	-	-	-	-	-	66,960
4b.4.12	DOC Staff Cost	-	-	-	-	-	-	14,326	2,149	16,475	16,475	-	-	-	-	-	-	-	-	-	-	233,280
4b.4.13	Utility Staff Cost	-	-	-	-	-	-	18,155	2,723	20,878	20,878	-	-	-	-	-	-	-	-	-	-	399,600
4b.4	Subtotal Period 4b Period-Dependent Costs	716	4,912	68	46	-	293	40,156	7,019	53,211	53,211	-	-	-	4,574	-	-	-	-	91,657	1,123	699,840
4b.0	TOTAL PERIOD 4b COST	3,077	17,372	425	790	5,852	1,942	40,954	12,581	82,991	77,896	2,028	3,067	119,957	17,254	239	-	-	6,258,798	308,512	701,120	
PERIOD 4d - Delay before License Termination																						
Period 4d Direct Decommissioning Activities																						
Period 4d Period-Dependent Costs																						
4d.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4d.4.2	Property taxes	-	-	-	-	-	-	1,193	119	1,312	1,312	-	-	-	-	-	-	-	-	-	-	-
4d.4.3	Health physics supplies	-	86	-	-	-	-	-	22	108	108	-	-	-	-	-	-	-	-	-	-	-
4d.4.4	Disposal of DAW generated	-	-	2	1	-	9	-	3	15	15	-	-	-	140	-	-	-	-	2,803	34	-
4d.4.5	Plant energy budget	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4d.4.6	NRC Fees	-	-	-	-	-	-	324	32	356	356	-	-	-	-	-	-	-	-	-	-	-
4d.4.7	Fixed Costs - Site	-	-	-	-	-	-	678	102	779	779	-	-	-	-	-	-	-	-	-	-	-
4d.4.8	Utility Staff Cost	-	-	-	-	-	-	1,035	155	1,191	1,191	-	-	-	-	-	-	-	-	-	-	23,086
4d.4	Subtotal Period 4d Period-Dependent Costs	-	86	2	1	-	9	3,229	433	3,761	3,761	-	-	-	140	-	-	-	-	2,803	34	23,086
4d.0	TOTAL PERIOD 4d COST	-	86	2	1	-	9	3,229	433	3,761	3,761	-	-	-	140	-	-	-	-	2,803	34	23,086
PERIOD 4e - License Termination																						
Period 4e Direct Decommissioning Activities																						
Period 4e.1 ORISE confirmatory survey																						
4e.1.1	ORISE confirmatory survey	-	-	-	-	-	-	125	37	162	162	-	-	-	-	-	-	-	-	-	-	-
4e.1.2	Terminate license	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4e.1	Subtotal Period 4e Activity Costs	-	-	-	-	-	-	125	37	162	162	-	-	-	-	-	-	-	-	-	-	-
Period 4e.2 License Termination Survey																						
4e.2.1	License Termination Survey	-	-	-	-	-	-	6,094	1,828	7,923	7,923	-	-	-	-	-	-	-	-	-	-	122,993
4e.2	Subtotal Period 4e Additional Costs	-	-	-	-	-	-	6,094	1,828	7,923	7,923	-	-	-	-	-	-	-	-	-	-	122,993
Period 4e.3 DOC staff relocation expenses																						
4e.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,105	166	1,271	1,271	-	-	-	-	-	-	-	-	-	-	-
4e.3	Subtotal Period 4e Collateral Costs	-	-	-	-	-	-	1,105	166	1,271	1,271	-	-	-	-	-	-	-	-	-	-	-
Period 4e.4 Period-Dependent Costs																						
4e.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4e.4.2	Property taxes	-	-	-	-	-	-	652	65	717	717	-	-	-	-	-	-	-	-	-	-	-
4e.4.3	Health physics supplies	-	610	-	-	-	-	-	152	762	762	-	-	-	-	-	-	-	-	-	-	-
4e.4.4	Disposal of DAW generated	-	-	5	3	-	20	-	6	33	33	-	-	-	306	-	-	-	-	6,127	75	-
4e.4.5	Plant energy budget	-	-	-	-	-	-	91	14	105	105	-	-	-	-	-	-	-	-	-	-	-
4e.4.6	NRC Fees	-	-	-	-	-	-	248	25	272	272	-	-	-	-	-	-	-	-	-	-	-
4e.4.7	Fixed Costs - Site	-	-	-	-	-	-	370	56	426	426	-	-	-	-	-	-	-	-	-	-	-
4e.4.8	Security Staff Cost	-	-	-	-	-	-	147	22	169	169	-	-	-	-	-	-	-	-	-	-	5,914
4e.4.9	DOC Staff Cost	-	-	-	-	-	-	2,310	348	2,656	2,656	-	-	-	-	-	-	-	-	-	-	36,274
4e.4.10	Utility Staff Cost	-	-	-	-	-	-	2,105	316	2,421	2,421	-	-	-	-	-	-	-	-	-	-	41,794
4e.4	Subtotal Period 4e Period-Dependent Costs	-	610	5	3	-	20	5,923	1,002	7,562	7,562	-	-	-	306	-	-	-	-	6,127	75	83,983

Table D-1  
Beaver Valley Power Station, Unit 1  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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			
4e.0	TOTAL PERIOD 4e COST	-	610	5	3	-	20	13,247	3,033	16,918	16,918	-	-	-	306	-	-	-	6,127	123,068	83,983
<b>PERIOD 4 TOTALS</b>		<b>3,295</b>	<b>38,873</b>	<b>8,053</b>	<b>3,445</b>	<b>13,508</b>	<b>25,356</b>	<b>88,818</b>	<b>37,905</b>	<b>219,253</b>	<b>210,535</b>	<b>2,028</b>	<b>6,889</b>	<b>223,144</b>	<b>53,872</b>	<b>3,173</b>	<b>423</b>	<b>489</b>	<b>15,253,210</b>	<b>727,712</b>	<b>1,372,020</b>
<b>PERIOD 5b - Site Restoration</b>																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
Sb.1.1.1	Reactor Building	-	3,008	-	-	-	-	-	451	3,459	-	-	3,459	-	-	-	-	-	-	43,452	-
Sb.1.1.2	Auxiliary Building	-	735	-	-	-	-	-	110	846	-	-	846	-	-	-	-	-	-	11,896	-
Sb.1.1.3	Circulating Water Piping	-	40	-	-	-	-	-	6	46	-	-	46	-	-	-	-	-	-	677	-
Sb.1.1.4	Cooling Tower	-	354	-	-	-	-	-	53	407	-	-	407	-	-	-	-	-	-	6,964	-
Sb.1.1.5	Cooling Tower Pump House	-	138	-	-	-	-	-	21	159	-	-	159	-	-	-	-	-	-	2,461	-
Sb.1.1.6	Diesel Generator Building	-	88	-	-	-	-	-	13	101	-	-	101	-	-	-	-	-	-	1,379	-
Sb.1.1.7	Fuel and Decon Building	-	809	-	-	-	-	-	121	930	-	-	930	-	-	-	-	-	-	12,581	-
Sb.1.1.8	Main Steam, Cable Vault, Safeguards	-	364	-	-	-	-	-	55	418	-	-	418	-	-	-	-	-	-	5,803	-
Sb.1.1.9	Service Building, W/rtse & Control Area	-	1,092	-	-	-	-	-	164	1,256	-	-	1,256	-	-	-	-	-	-	18,914	-
Sb.1.1.10	Solid Waste & Coolant Recovery Storage	-	310	-	-	-	-	-	47	357	-	-	357	-	-	-	-	-	-	4,992	-
Sb.1.1.11	Turbine Building	-	1,988	-	-	-	-	-	298	2,286	-	-	2,286	-	-	-	-	-	-	36,496	-
Sb.1.1.12	Turbine Pedestal	-	527	-	-	-	-	-	79	606	-	-	606	-	-	-	-	-	-	6,567	-
Sb.1.1.13	Warehouse	-	187	-	-	-	-	-	28	215	-	-	215	-	-	-	-	-	-	3,648	-
Sb.1.1.14	Yard Tanks & Foundations	-	169	-	-	-	-	-	25	195	-	-	195	-	-	-	-	-	-	2,761	-
Sb.1.1	Totals	-	9,810	-	-	-	-	-	1,471	11,281	-	-	11,281	-	-	-	-	-	-	157,693	-
Site Closeout Activities																					
Sb.1.2	Grade & landscape site	-	162	-	-	-	-	-	24	186	-	-	186	-	-	-	-	-	-	593	-
Sb.1.3	Final report to NRC	-	-	-	-	-	-	-	137	21	158	158	-	-	-	-	-	-	-	-	1,560
Sb.1	Subtotal Period 5b Activity Costs	-	9,972	-	-	-	-	-	137	1,516	11,825	158	11,488	-	-	-	-	-	-	158,286	1,560
Period 5b Additional Costs																					
Sb.2.1	ISFSI Demolition and Site Restoration	-	764	-	-	-	-	23	194	982	-	982	-	-	-	-	-	-	-	1,836	80
Sb.2.2	Concrete Crushing	-	499	-	-	-	-	2	125	627	627	-	-	-	-	-	-	-	-	2,990	-
Sb.2	Subtotal Period 5b Additional Costs	-	1,263	-	-	-	-	26	320	1,608	627	982	-	-	-	-	-	-	-	4,826	80
Period 5b Collateral Costs																					
Sb.3.1	Small tool allowance	-	125	-	-	-	-	-	19	144	-	-	144	-	-	-	-	-	-	-	-
Sb.3	Subtotal Period 5b Collateral Costs	-	125	-	-	-	-	-	19	144	-	-	144	-	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																					
Sb.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sb.4.2	Property taxes	-	-	-	-	-	-	1,872	167	1,839	-	-	1,839	-	-	-	-	-	-	-	-
Sb.4.3	Heavy equipment rental	-	4,294	-	-	-	-	-	844	4,938	-	-	4,938	-	-	-	-	-	-	-	-
Sb.4.4	Plant energy budget	-	-	-	-	-	-	117	18	135	-	-	135	-	-	-	-	-	-	-	-
Sb.4.5	Fixed Costs - Site	-	-	-	-	-	-	849	127	976	976	-	-	-	-	-	-	-	-	-	-
Sb.4.6	Security Staff Cost	-	-	-	-	-	-	378	57	435	-	-	435	-	-	-	-	-	-	-	15,171
Sb.4.7	DOC Staff Cost	-	-	-	-	-	-	6,481	972	7,453	-	-	7,453	-	-	-	-	-	-	-	97,097
Sb.4.8	Utility Staff Cost	-	-	-	-	-	-	2,863	429	3,293	-	-	3,293	-	-	-	-	-	-	-	54,617
Sb.4	Subtotal Period 5b Period-Dependent Costs	-	4,294	-	-	-	-	12,360	2,415	19,069	976	-	18,092	-	-	-	-	-	-	-	166,886
Sb.0	TOTAL PERIOD 5b COST	-	15,654	-	-	-	-	12,523	4,269	32,447	1,761	982	29,704	-	-	-	-	-	-	163,112	168,526
<b>PERIOD 5 TOTALS</b>		<b>-</b>	<b>15,654</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>12,523</b>	<b>4,269</b>	<b>32,447</b>	<b>1,761</b>	<b>982</b>	<b>29,704</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>163,112</b>	<b>168,526</b>
<b>TOTAL COST TO DECOMMISSION</b>		<b>8,059</b>	<b>61,338</b>	<b>8,729</b>	<b>4,654</b>	<b>14,142</b>	<b>29,433</b>	<b>471,106</b>	<b>98,788</b>	<b>698,250</b>	<b>527,327</b>	<b>131,415</b>	<b>37,508</b>	<b>223,144</b>	<b>76,520</b>	<b>7,010</b>	<b>423</b>	<b>489</b>	<b>16,190,830</b>	<b>962,831</b>	<b>4,889,905</b>

Table D-1  
Beaver Valley Power Station, Unit 1  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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 16.53% CONTINGENCY:		\$696,250	thousands of 2005 dollars																		
TOTAL NRC LICENSE TERMINATION COST IS 76.74% OR:		\$627,327	thousands of 2005 dollars																		
SPENT FUEL MANAGEMENT COST IS 18.87% OR:		\$131,415	thousands of 2005 dollars																		
NON-NUCLEAR DEMOLITION COST IS 5.39% OR:		\$37,508	thousands of 2005 dollars																		
RADWASTE VOLUME BURIED:		83,863	cubic feet																		
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:		489	cubic feet																		
TOTAL SCRAP METAL REMOVED:		40,768	tons																		
TOTAL CRAFT LABOR REQUIREMENTS:		962,831	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  
Beaver Valley Power Station, Unit 2  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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 WL, Lbs.	Craft Manhours	Utility and Contractor Manhours
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet				
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	SAFSTOR site characterization survey	-	-	-	-	-	-	391	117	509	509	-	-	-	-	-	-	-	-	-	-
1a.1.2	Prepare preliminary decommissioning cost	-	-	-	-	-	-	49	7	56	56	-	-	-	-	-	-	-	-	-	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	-	-	-	-	-	-	75	11	87	87	-	-	-	-	-	-	-	-	-	856
1a.1.8	Review plant dwgs & specs.	-	-	-	-	-	-	49	7	56	56	-	-	-	-	-	-	-	-	-	556
1a.1.9	Perform detailed rad survey	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.10	Estimate by-product inventory	-	-	-	-	-	-	38	6	43	43	-	-	-	-	-	-	-	-	-	428
1a.1.11	End product description	-	-	-	-	-	-	38	6	43	43	-	-	-	-	-	-	-	-	-	428
1a.1.12	Detailed by-product inventory	-	-	-	-	-	-	56	8	65	65	-	-	-	-	-	-	-	-	-	642
1a.1.13	Define major work sequence	-	-	-	-	-	-	38	6	43	43	-	-	-	-	-	-	-	-	-	428
1a.1.14	Perform SER and EA	-	-	-	-	-	-	117	18	134	134	-	-	-	-	-	-	-	-	-	1,327
1a.1.15	Perform Site-Specific Cost Study	-	-	-	-	-	-	188	28	217	217	-	-	-	-	-	-	-	-	-	2,140
Activity Specifications																					
1a.1.16.1	Prepare plant and facilities for SAFSTOR	-	-	-	-	-	-	185	28	213	213	-	-	-	-	-	-	-	-	-	2,106
1a.1.16.2	Plant systems	-	-	-	-	-	-	157	24	180	180	-	-	-	-	-	-	-	-	-	1,783
1a.1.16.3	Plant structures and buildings	-	-	-	-	-	-	118	18	135	135	-	-	-	-	-	-	-	-	-	1,335
1a.1.16.4	Waste management	-	-	-	-	-	-	75	11	87	87	-	-	-	-	-	-	-	-	-	856
1a.1.16.5	Facility and site dormancy	-	-	-	-	-	-	75	11	87	87	-	-	-	-	-	-	-	-	-	856
1a.1.16	Total	-	-	-	-	-	-	610	92	702	702	-	-	-	-	-	-	-	-	-	6,936
Detailed Work Procedures																					
1a.1.17.1	Plant systems	-	-	-	-	-	-	45	7	51	51	-	-	-	-	-	-	-	-	-	506
1a.1.17.2	Facility closeout & dormancy	-	-	-	-	-	-	45	7	52	52	-	-	-	-	-	-	-	-	-	514
1a.1.17	Total	-	-	-	-	-	-	90	13	103	103	-	-	-	-	-	-	-	-	-	1,020
1a.1.18	Procure vacuum drying system	-	-	-	-	-	-	4	1	4	4	-	-	-	-	-	-	-	-	-	43
1a.1.19	Drain/de-energize non-cont. systems	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.20	Drain & dry NSSS	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.21	Drain/de-energize contaminated systems	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
1a.1.22	Decon/secure contaminated systems	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
1a.1	Subtotal Period 1a Activity Costs	-	-	-	-	-	-	1,743	320	2,063	2,063	-	-	-	-	-	-	-	-	-	15,381
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	3,749	562	4,311	-	4,311	-	-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-	-	-	-	3,749	562	4,311	-	4,311	-	-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-	-	-	-	1,157	116	1,272	1,272	-	-	-	-	-	-	-	-	-	-
1a.4.2	Property taxes	-	-	-	-	-	-	860	86	946	946	-	-	-	-	-	-	-	-	-	-
1a.4.3	Health physics supplies	-	249	-	-	-	-	-	62	311	311	-	-	-	-	-	-	-	-	-	-
1a.4.4	Heavy equipment rental	-	328	-	-	-	-	-	49	378	378	-	-	-	-	-	-	-	-	-	-
1a.4.5	Disposal of DAW generated	-	-	6	4	-	26	-	8	44	44	-	-	-	403	-	-	-	8,081	99	-
1a.4.6	Plant energy budget	-	-	-	-	-	-	603	90	693	693	-	-	-	-	-	-	-	-	-	-
1a.4.7	NRC Fees	-	-	-	-	-	-	264	26	291	291	-	-	-	-	-	-	-	-	-	-
1a.4.8	Emergency Planning Fees	-	-	-	-	-	-	224	22	247	-	247	-	-	-	-	-	-	-	-	-
1a.4.9	Fixed Costs - Site	-	-	-	-	-	-	488	73	562	562	-	-	-	-	-	-	-	-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	628	94	723	-	723	-	-	-	-	-	-	-	-	-
1a.4.11	ISFSI Operating Costs	-	-	-	-	-	-	38	6	43	-	43	-	-	-	-	-	-	-	-	-
1a.4.12	Security Staff Cost	-	-	-	-	-	-	1,494	220	1,684	1,684	-	-	-	-	-	-	-	-	-	58,760

Table D-2  
Beaver Valley Power Station, Unit 2  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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.4.13	Utility Staff Cost	-	-	-	-	-	-	15,924	2,389	18,312	18,312	-	-	-	-	-	-	-	-	-	-	349,440
1a.4	Subtotal Period 1a Period-Dependent Costs	-	577	6	4	-	26	21,650	3,241	25,504	24,492	1,013	-	-	-	-	-	-	-	8,081	99	408,200
1a.0	TOTAL PERIOD 1a COST	-	577	6	4	-	26	27,142	4,124	31,879	26,555	5,324	-	-	-	-	-	-	-	8,081	99	423,561
PERIOD 1b - SAFSTOR Limited DECON Activities																						
Period 1b Direct Decommissioning Activities																						
Decontamination of Site Buildings																						
1b.1.1.1	Reactor Building	854	-	-	-	-	-	-	427	1,280	1,280	-	-	-	-	-	-	-	-	-	-	18,743
1b.1.1.2	Auxiliary Building	334	-	-	-	-	-	-	167	500	500	-	-	-	-	-	-	-	-	-	-	7,566
1b.1.1.3	Fuel and Decon Building	426	-	-	-	-	-	-	213	638	638	-	-	-	-	-	-	-	-	-	-	8,280
1b.1.1.4	Gaseous Waste Storage Tank Enclosure	8	-	-	-	-	-	-	4	11	11	-	-	-	-	-	-	-	-	-	-	173
1b.1.1.5	Main Steam, Cable Vault, Safeguards Area	114	-	-	-	-	-	-	57	172	172	-	-	-	-	-	-	-	-	-	-	2,603
1b.1.1.6	Turbine Building	348	-	-	-	-	-	-	174	523	523	-	-	-	-	-	-	-	-	-	-	7,924
1b.1.1.7	Waste Handling/Condensate Polishing	217	-	-	-	-	-	-	108	325	325	-	-	-	-	-	-	-	-	-	-	4,933
1b.1.1	Totals	2,300	-	-	-	-	-	-	1,150	3,450	3,450	-	-	-	-	-	-	-	-	-	-	50,221
1b.1	Subtotal Period 1b Activity Costs	2,300	-	-	-	-	-	-	1,150	3,450	3,450	-	-	-	-	-	-	-	-	-	-	50,221
Period 1b Additional Costs																						
1b.2.1	Mixed Waste	-	-	133	22	634	-	-	112	901	901	-	-	-	-	-	-	-	-	-	-	-
1b.2	Subtotal Period 1b Additional Costs	-	-	133	22	634	-	-	112	901	901	-	-	-	-	-	-	-	-	-	-	-
Period 1b Collateral Costs																						
1b.3.1	Decon equipment	710	-	-	-	-	-	-	107	817	817	-	-	-	-	-	-	-	-	-	-	-
1b.3.2	Process liquid waste	270	-	99	463	-	1,272	-	533	2,637	2,637	-	-	-	-	-	-	-	-	-	-	1,858
1b.3.3	Small tool allowance	-	38	-	-	-	-	-	6	43	43	-	-	-	-	-	-	-	-	-	-	-
1b.3.4	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,014	302	2,316	-	2,316	-	-	-	-	-	-	-	-	-	-
1b.3	Subtotal Period 1b Collateral Costs	981	38	99	483	-	1,272	2,014	947	5,813	3,497	2,316	-	-	-	-	-	-	-	-	-	1,858
Period 1b Period-Dependent Costs																						
1b.4.1	Decon supplies	735	-	-	-	-	-	-	184	918	918	-	-	-	-	-	-	-	-	-	-	-
1b.4.2	Insurance	-	-	-	-	-	-	289	29	318	318	-	-	-	-	-	-	-	-	-	-	-
1b.4.3	Property taxes	-	-	-	-	-	-	215	21	236	236	-	-	-	-	-	-	-	-	-	-	-
1b.4.4	Health physics supplies	-	235	-	-	-	-	-	59	294	294	-	-	-	-	-	-	-	-	-	-	-
1b.4.5	Heavy equipment rental	-	82	-	-	-	-	-	12	94	94	-	-	-	-	-	-	-	-	-	-	-
1b.4.6	Disposal of DAW generated	-	-	11	7	-	46	-	14	77	77	-	-	-	-	-	-	-	-	-	-	712
1b.4.7	Plant energy budget	-	-	-	-	-	-	151	23	173	173	-	-	-	-	-	-	-	-	-	-	14,265
1b.4.8	NRC Fees	-	-	-	-	-	-	66	7	73	73	-	-	-	-	-	-	-	-	-	-	175
1b.4.9	Emergency Planning Fees	-	-	-	-	-	-	56	6	62	-	62	-	-	-	-	-	-	-	-	-	-
1b.4.10	Fixed Costs - Site	-	-	-	-	-	-	122	18	140	140	-	-	-	-	-	-	-	-	-	-	-
1b.4.11	Spent Fuel Pool O&M	-	-	-	-	-	-	157	24	181	-	181	-	-	-	-	-	-	-	-	-	-
1b.4.12	ISFSI Operating Costs	-	-	-	-	-	-	9	1	11	-	11	-	-	-	-	-	-	-	-	-	-
1b.4.13	Security Staff Cost	-	-	-	-	-	-	368	55	421	421	-	-	-	-	-	-	-	-	-	-	14,690
1b.4.14	Utility Staff Cost	-	-	-	-	-	-	3,981	597	4,578	4,578	-	-	-	-	-	-	-	-	-	-	87,360
1b.4	Subtotal Period 1b Period-Dependent Costs	735	317	11	7	-	46	5,412	1,049	7,577	7,324	253	-	-	-	-	-	-	-	-	-	102,050
1b.0	TOTAL PERIOD 1b COST	4,016	355	243	493	634	1,317	7,426	3,258	17,742	15,173	2,589	-	-	-	-	-	-	-	712	1,858	248,488

Table D-2  
Beaver Valley Power Station, Unit 2  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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				
<b>PERIOD 1c - Preparations for SAFSTOR Dormancy</b>																						
Period 1c Direct Decommissioning Activities																						
1c.1.1	Prepare support equipment for storage	-	409	-	-	-	-	-	61	471	471	-	-	-	-	-	-	-	-	-	3,000	-
1c.1.2	Install containment pressure equal. lines	-	37	-	-	-	-	-	5	42	42	-	-	-	-	-	-	-	-	-	700	-
1c.1.3	Interim survey prior to dormancy	-	-	-	-	-	-	733	220	953	953	-	-	-	-	-	-	-	-	-	13,863	-
1c.1.4	Secure building accesses	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1c.1.5	Prepare & submit interim report	-	-	-	-	-	-	22	3	25	25	-	-	-	-	-	-	-	-	-	-	250
1c.1	Subtotal Period 1c Activity Costs	-	446	-	-	-	-	755	290	1,491	1,491	-	-	-	-	-	-	-	-	-	17,363	250
Period 1c Additional Costs																						
1c.2.1	Spent Fuel Pool Isolation	-	-	-	-	-	-	5,739	861	6,600	6,600	-	-	-	-	-	-	-	-	-	-	-
1c.2	Subtotal Period 1c Additional Costs	-	-	-	-	-	-	5,739	861	6,600	6,600	-	-	-	-	-	-	-	-	-	-	-
Period 1c Collateral Costs																						
1c.3.1	Process liquid waste	290	-	106	498	-	1,368	-	572	2,835	2,835	-	-	-	-	-	1,998	-	-	-	251,911	393
1c.3.2	Small tool allowance	-	3	-	-	-	-	-	0	4	4	-	-	-	-	-	-	-	-	-	-	-
1c.3.3	Spent Fuel Capital and Transfer	-	-	-	-	-	-	2,014	302	2,316	-	2,316	-	-	-	-	-	-	-	-	-	-
1c.3	Subtotal Period 1c Collateral Costs	290	3	106	498	-	1,368	2,014	875	5,155	2,839	2,316	-	-	-	-	1,998	-	-	-	251,911	393
Period 1c Period-Dependent Costs																						
1c.4.1	Insurance	-	-	-	-	-	-	289	29	318	318	-	-	-	-	-	-	-	-	-	-	-
1c.4.2	Property taxes	-	-	-	-	-	-	215	21	236	236	-	-	-	-	-	-	-	-	-	-	-
1c.4.3	Health physics supplies	-	123	-	-	-	-	-	31	154	154	-	-	-	-	-	-	-	-	-	-	-
1c.4.4	Heavy equipment rental	-	82	-	-	-	-	-	12	94	94	-	-	-	-	-	-	-	-	-	-	-
1c.4.5	Disposal of DAW generated	-	-	2	1	-	6	-	2	11	11	-	-	-	101	-	-	-	-	-	2,020	25
1c.4.6	Plant energy budget	-	-	-	-	-	-	151	23	173	173	-	-	-	-	-	-	-	-	-	-	-
1c.4.7	NRC Fees	-	-	-	-	-	-	66	7	73	73	-	-	-	-	-	-	-	-	-	-	-
1c.4.8	Emergency Planning Fees	-	-	-	-	-	-	56	8	62	-	62	-	-	-	-	-	-	-	-	-	-
1c.4.9	Fixed Costs - Site	-	-	-	-	-	-	122	18	140	140	-	-	-	-	-	-	-	-	-	-	-
1c.4.10	Spent Fuel Pool O&M	-	-	-	-	-	-	157	24	181	-	181	-	-	-	-	-	-	-	-	-	-
1c.4.11	ISFSI Operating Costs	-	-	-	-	-	-	9	1	11	-	11	-	-	-	-	-	-	-	-	-	-
1c.4.12	Security Staff Cost	-	-	-	-	-	-	368	55	421	421	-	-	-	-	-	-	-	-	-	-	14,890
1c.4.13	Utility Staff Cost	-	-	-	-	-	-	3,981	587	4,578	4,578	-	-	-	-	-	-	-	-	-	-	87,380
1c.4	Subtotal Period 1c Period-Dependent Costs	-	205	2	1	-	6	5,412	826	6,452	6,199	253	-	-	101	-	-	-	-	-	2,020	25
1c.0	TOTAL PERIOD 1c COST	290	654	108	499	-	1,374	13,921	2,852	19,698	17,129	2,569	-	-	101	1,998	-	-	-	-	253,931	17,780
PERIOD 1 TOTALS		4,306	1,587	357	996	634	2,718	48,489	10,233	69,320	58,857	10,462	-	-	1,216	3,857	-	-	-	-	510,501	68,640
<b>PERIOD 2a - SAFSTOR Dormancy with Wet Spent Fuel Storage</b>																						
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	-	-	-	-	-	-	548	82	630	630	-	-	-	-	-	-	-	-	-	-	-
2a.1.5	Maintenance supplies	-	-	-	-	-	-	503	126	629	629	-	-	-	-	-	-	-	-	-	-	-
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	1,051	208	1,259	1,259	-	-	-	-	-	-	-	-	-	-	-
Period 2a Collateral Costs																						
2a.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	45,251	6,788	52,038	-	52,038	-	-	-	-	-	-	-	-	-	-
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	45,251	6,788	52,038	-	52,038	-	-	-	-	-	-	-	-	-	-

**Table D-2**  
**Beaver Valley Power Station, Unit 2**  
**SAFSTOR Decommissioning Cost Estimate**  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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				
<b>Period 2a Period-Dependent Costs</b>																						
2a.4.1	Insurance	-	-	-	-	-	-	1,591	159	1,750	1,599	151	-	-	-	-	-	-	-	-	-	-
2a.4.2	Property taxes	-	-	-	-	-	-	3,452	345	3,798	3,798	-	-	-	-	-	-	-	-	-	-	
2a.4.3	Health physics supplies	-	250	-	-	-	-	-	83	313	313	-	-	-	-	-	-	-	-	-	-	
2a.4.4	Disposal of DAW generated	-	-	24	16	-	104	-	31	175	175	-	-	-	1,620	-	-	-	-	32,456	398	
2a.4.5	Plant energy budget	-	-	-	-	-	-	484	73	557	278	278	-	-	-	-	-	-	-	-	-	
2a.4.6	NRC Fees	-	-	-	-	-	-	937	94	1,031	1,031	-	-	-	-	-	-	-	-	-	-	
2a.4.7	Emergency Planning Fees	-	-	-	-	-	-	901	90	991	-	991	-	-	-	-	-	-	-	-	-	
2a.4.8	Fixed Costs - Site	-	-	-	-	-	-	1,961	294	2,256	2,256	-	-	-	-	-	-	-	-	-	-	
2a.4.9	Spent Fuel Pool O&M	-	-	-	-	-	-	2,524	379	2,903	-	2,903	-	-	-	-	-	-	-	-	-	
2a.4.10	ISFSI Operating Costs	-	-	-	-	-	-	151	23	173	-	173	-	-	-	-	-	-	-	-	-	
2a.4.11	Security Staff Cost	-	-	-	-	-	-	3,228	484	3,710	778	2,932	-	-	-	-	-	-	-	-	129,491	
2a.4.12	Utility Staff Cost	-	-	-	-	-	-	3,205	481	3,685	(78)	(78)	-	-	-	-	-	-	-	-	79,366	
2a.4	Subtotal Period 2a Period-Dependent Costs	-	250	24	16	-	104	18,433	2,514	21,342	13,968	7,353	-	-	1,620	-	-	-	-	32,456	398	208,857
2a.0	TOTAL PERIOD 2a COST	-	250	24	16	-	104	64,735	9,510	74,839	15,248	59,391	-	-	1,620	-	-	-	-	32,456	398	208,857
<b>PERIOD 2b - SAFSTOR Dormancy with Dry Spent Fuel Storage</b>																						
<b>Period 2b Direct Decommissioning Activities</b>																						
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	-	-	-	-	-	-	3,434	515	3,950	3,950	-	-	-	-	-	-	-	-	-	-	
2b.1.5	Maintenance supplies	-	-	-	-	-	-	3,157	789	3,947	3,947	-	-	-	-	-	-	-	-	-	-	
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-	-	6,592	1,304	7,896	7,896	-	-	-	-	-	-	-	-	-	-	
<b>Period 2b Collateral Costs</b>																						
2b.3.1	Spent Fuel Capital and Transfer	-	-	-	-	-	-	3,446	517	3,963	-	3,963	-	-	-	-	-	-	-	-	-	
2b.3	Subtotal Period 2b Collateral Costs	-	-	-	-	-	-	3,446	517	3,963	-	3,963	-	-	-	-	-	-	-	-	-	
<b>Period 2b Period-Dependent Costs</b>																						
2b.4.1	Insurance	-	-	-	-	-	-	9,314	931	10,245	10,026	219	-	-	-	-	-	-	-	-	-	
2b.4.2	Property taxes	-	-	-	-	-	-	21,649	2,165	23,814	23,814	-	-	-	-	-	-	-	-	-	-	
2b.4.3	Health physics supplies	-	1,568	-	-	-	-	-	392	1,961	1,961	-	-	-	-	-	-	-	-	-	-	
2b.4.4	Disposal of DAW generated	-	-	152	103	-	650	-	193	1,098	1,098	-	-	10,156	-	-	-	-	-	203,530	2,494	
2b.4.5	Plant energy budget	-	-	-	-	-	-	1,518	228	1,746	1,746	-	-	-	-	-	-	-	-	-	-	
2b.4.6	NRC Fees	-	-	-	-	-	-	5,879	588	6,468	6,468	-	-	-	-	-	-	-	-	-	-	
2b.4.7	Emergency Planning Fees	-	-	-	-	-	-	2,510	251	2,761	-	2,761	-	-	-	-	-	-	-	-	-	
2b.4.8	Fixed Costs - Site	-	-	-	-	-	-	12,300	1,845	14,145	14,145	-	-	-	-	-	-	-	-	-	-	
2b.4.9	ISFSI Operating Costs	-	-	-	-	-	-	946	142	1,088	-	1,088	-	-	-	-	-	-	-	-	-	
2b.4.10	Security Staff Cost	-	-	-	-	-	-	7,868	1,150	8,818	4,878	3,940	-	-	-	-	-	-	-	-	308,045	
2b.4.11	Utility Staff Cost	-	-	-	-	-	-	28,815	4,322	33,137	23,585	9,552	-	-	-	-	-	-	-	-	602,469	
2b.4	Subtotal Period 2b Period-Dependent Costs	-	1,568	152	103	-	650	90,599	12,298	105,280	87,720	17,560	-	-	10,156	-	-	-	-	203,530	2,494	910,513
2b.0	TOTAL PERIOD 2b COST	-	1,568	152	103	-	650	100,837	14,029	117,139	95,616	21,523	-	-	10,156	-	-	-	-	203,530	2,494	910,513
<b>PERIOD 2c - SAFSTOR Dormancy without Spent Fuel Storage</b>																						
<b>Period 2c Direct Decommissioning Activities</b>																						
2c.1.1	Quarterly Inspection	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	
2c.1.2	Semi-annual environmental survey	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	
2c.1.3	Prepare reports	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	
2c.1.4	Bituminous roof replacement	-	-	-	-	-	-	1,831	245	1,876	1,876	-	-	-	-	-	-	-	-	-	-	
2c.1.5	Maintenance supplies	-	-	-	-	-	-	1,499	375	1,874	1,874	-	-	-	-	-	-	-	-	-	-	
2c.1	Subtotal Period 2c Activity Costs	-	-	-	-	-	-	3,131	620	3,750	3,750	-	-	-	-	-	-	-	-	-	-	

Table D-2  
Beaver Valley Power Station, Unit 2  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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																						
2c.4.1	Insurance	-	-	-	-	-	-	4,329	433	4,762	4,762	-	-	-	-	-	-	-	-	-	-	-
2c.4.2	Property taxes	-	-	-	-	-	-	10,282	1,028	11,310	11,310	-	-	-	-	-	-	-	-	-	-	-
2c.4.3	Health physics supplies	-	745	-	-	-	-	-	188	931	931	-	-	-	-	-	-	-	-	-	-	-
2c.4.4	Disposal of DAW generated	-	-	72	49	-	309	-	92	521	521	-	-	-	4,823	-	-	-	-	96,659	1,184	-
2c.4.5	Plant energy budget	-	-	-	-	-	-	721	108	829	829	-	-	-	-	-	-	-	-	-	-	-
2c.4.6	NRC Fees	-	-	-	-	-	-	2,792	279	3,071	3,071	-	-	-	-	-	-	-	-	-	-	-
2c.4.7	Fixed Costs - Site	-	-	-	-	-	-	5,842	676	6,718	6,718	-	-	-	-	-	-	-	-	-	-	-
2c.4.8	Security Staff Cost	-	-	-	-	-	-	2,015	302	2,317	2,317	-	-	-	-	-	-	-	-	-	-	80,860
2c.4.9	Utility Staff Cost	-	-	-	-	-	-	9,740	1,461	11,201	11,201	-	-	-	-	-	-	-	-	-	-	211,480
2c.4	Subtotal Period 2c Period-Dependent Costs	-	745	72	49	-	309	35,719	4,766	41,659	41,659	-	-	-	4,823	-	-	-	-	96,659	1,184	292,340
2c.0	TOTAL PERIOD 2c COST	-	745	72	49	-	309	38,850	5,385	45,409	45,409	-	-	-	4,823	-	-	-	-	96,659	1,184	292,340
PERIOD 2 TOTALS		-	2,563	248	168	-	1,062	204,221	26,924	237,167	156,273	80,914	-	-	16,599	-	-	-	-	332,645	4,078	1,411,711
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																						
Period 3a Direct Decommissioning Activities																						
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	49	7	56	56	-	-	-	-	-	-	-	-	-	-	556
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	-	1,969
3a.1.3	Perform detailed rad survey	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-
3a.1.4	End product description	-	-	-	-	-	-	38	6	43	43	-	-	-	-	-	-	-	-	-	-	428
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	49	7	56	56	-	-	-	-	-	-	-	-	-	-	556
3a.1.6	Define major work sequence	-	-	-	-	-	-	282	42	325	325	-	-	-	-	-	-	-	-	-	-	3,210
3a.1.7	Perform SER and EA	-	-	-	-	-	-	117	18	134	134	-	-	-	-	-	-	-	-	-	-	1,327
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	188	28	217	217	-	-	-	-	-	-	-	-	-	-	2,140
3a.1.9	Prepare/submit License Termination Plan	-	-	-	-	-	-	154	23	177	177	-	-	-	-	-	-	-	-	-	-	1,753
3a.1.10	Receive NRC approval of termination plan	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-	-
Activity Specifications																						
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	278	42	319	287	-	32	-	-	-	-	-	-	-	-	3,154
3a.1.11.2	Plant systems	-	-	-	-	-	-	157	24	180	162	-	18	-	-	-	-	-	-	-	-	1,783
3a.1.11.3	Reactor internals	-	-	-	-	-	-	267	40	308	308	-	-	-	-	-	-	-	-	-	-	3,039
3a.1.11.4	Reactor vessel	-	-	-	-	-	-	245	37	282	282	-	-	-	-	-	-	-	-	-	-	2,782
3a.1.11.5	Biological shield	-	-	-	-	-	-	19	3	22	22	-	-	-	-	-	-	-	-	-	-	214
3a.1.11.6	Steam generators	-	-	-	-	-	-	118	18	135	135	-	-	-	-	-	-	-	-	-	-	1,335
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	60	9	69	35	-	35	-	-	-	-	-	-	-	-	685
3a.1.11.8	Main Turbine	-	-	-	-	-	-	15	2	17	-	-	17	-	-	-	-	-	-	-	-	171
3a.1.11.9	Main Condensers	-	-	-	-	-	-	15	2	17	-	-	17	-	-	-	-	-	-	-	-	171
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	118	18	135	68	-	68	-	-	-	-	-	-	-	-	1,335
3a.1.11.11	Waste management	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	-	1,969
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-	34	5	39	19	-	19	-	-	-	-	-	-	-	-	385
3a.1.11	Total	-	-	-	-	-	-	1,498	225	1,723	1,517	-	206	-	-	-	-	-	-	-	-	17,024
Planning & Site Preparations																						
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	90	14	104	104	-	-	-	-	-	-	-	-	-	-	1,027
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	2,419	363	2,782	2,782	-	-	-	-	-	-	-	-	-	-	-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	53	8	61	61	-	-	-	-	-	-	-	-	-	-	599
3a.1.15	Rigging/Cont. Cntrl Envips/tooling/etc.	-	-	-	-	-	-	2,048	307	2,355	2,355	-	-	-	-	-	-	-	-	-	-	-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	46	7	53	53	-	-	-	-	-	-	-	-	-	-	526
3a.1	Subtotal Period 3a Activity Costs	-	-	-	-	-	-	7,205	1,081	8,286	8,080	-	206	-	-	-	-	-	-	-	-	31,117
Period 3a Period-Dependent Costs																						
3a.4.1	Insurance	-	-	-	-	-	-	362	36	398	398	-	-	-	-	-	-	-	-	-	-	-
3a.4.2	Property taxes	-	-	-	-	-	-	860	86	946	946	-	-	-	-	-	-	-	-	-	-	-

Table D-2  
Beaver Valley Power Station, Unit 2  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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 WL, 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.4.3	Health physics supplies	-	249	-	-	-	-	-	82	311	311	-	-	-	-	-	-	-	-	-	-
3a.4.4	Heavy equipment rental	-	328	-	-	-	-	-	49	378	378	-	-	-	-	-	-	-	-	-	-
3a.4.5	Disposal of DAW generated	-	-	6	4	-	26	-	8	44	44	-	-	-	-	-	-	-	8,081	99	-
3a.4.6	Plant energy budget	-	-	-	-	-	-	603	90	693	693	-	-	-	-	-	-	-	-	-	-
3a.4.7	NRC Fees	-	-	-	-	-	-	254	26	291	291	-	-	-	-	-	-	-	-	-	-
3a.4.8	Fixed Costs - Site	-	-	-	-	-	-	488	73	562	562	-	-	-	-	-	-	-	-	-	-
3a.4.9	Security Staff Cost	-	-	-	-	-	-	402	60	462	462	-	-	-	-	-	-	-	-	-	-
3a.4.10	Utility Staff Cost	-	-	-	-	-	-	11,025	1,854	12,879	12,879	-	-	-	-	-	-	-	-	-	18,120
3a.4	Subtotal Period 3a Period-Dependent Costs	-	577	6	4	-	26	14,004	2,145	16,763	16,763	-	-	-	403	-	-	-	8,081	99	238,680
3a.0	TOTAL PERIOD 3a COST	-	577	6	4	-	26	21,209	3,226	25,049	24,842	-	206	-	403	-	-	-	8,081	99	254,800
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems	-	-	-	-	-	-	178	27	205	185	-	21	-	-	-	-	-	-	-	2,026
3b.1.1.2	Reactor internats	-	-	-	-	-	-	94	14	108	108	-	-	-	-	-	-	-	-	-	1,070
3b.1.1.3	Remaining buildings	-	-	-	-	-	-	51	8	58	15	-	44	-	-	-	-	-	-	-	578
3b.1.1.4	CRD cooling assembly	-	-	-	-	-	-	38	6	43	43	-	-	-	-	-	-	-	-	-	428
3b.1.1.5	CRD housings & ICI tubes	-	-	-	-	-	-	38	6	43	43	-	-	-	-	-	-	-	-	-	428
3b.1.1.6	Incore instrumentation	-	-	-	-	-	-	38	6	43	43	-	-	-	-	-	-	-	-	-	428
3b.1.1.7	Reactor vessel	-	-	-	-	-	-	137	21	157	157	-	-	-	-	-	-	-	-	-	1,554
3b.1.1.8	Facility closeout	-	-	-	-	-	-	45	7	52	28	-	26	-	-	-	-	-	-	-	514
3b.1.1.9	Missile shields	-	-	-	-	-	-	17	3	19	19	-	-	-	-	-	-	-	-	-	193
3b.1.1.10	Biological shield	-	-	-	-	-	-	45	7	52	52	-	-	-	-	-	-	-	-	-	514
3b.1.1.11	Steam generators	-	-	-	-	-	-	173	26	199	199	-	-	-	-	-	-	-	-	-	1,969
3b.1.1.12	Reinforced concrete	-	-	-	-	-	-	38	6	43	22	-	22	-	-	-	-	-	-	-	428
3b.1.1.13	Main Turbine	-	-	-	-	-	-	59	9	68	-	-	68	-	-	-	-	-	-	-	668
3b.1.1.14	Main Condensers	-	-	-	-	-	-	59	9	68	-	-	68	-	-	-	-	-	-	-	668
3b.1.1.15	Auxiliary building	-	-	-	-	-	-	103	15	118	106	-	12	-	-	-	-	-	-	-	1,168
3b.1.1.16	Reactor building	-	-	-	-	-	-	103	15	118	106	-	12	-	-	-	-	-	-	-	1,168
3b.1.1	Total	-	-	-	-	-	-	1,214	182	1,397	1,128	-	271	-	-	-	-	-	-	-	13,800
3b.1	Subtotal Period 3b Activity Costs	-	-	-	-	-	-	1,214	182	1,397	1,128	-	271	-	-	-	-	-	-	-	13,800
Period 3b Additional Costs																					
3b.2.1	Site Characterization	-	-	-	-	-	-	836	251	1,087	1,087	-	-	-	-	-	-	-	-	-	-
3b.2.2	Cofferdam Construction and Teardown	-	182	-	-	-	-	-	27	209	209	-	-	-	-	-	-	-	-	2,223	-
3b.2	Subtotal Period 3b Additional Costs	-	182	-	-	-	-	836	278	1,286	1,296	-	-	-	-	-	-	-	-	2,223	-
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	710	-	-	-	-	-	-	107	817	817	-	-	-	-	-	-	-	-	-	-
3b.3.2	DOC staff relocation expenses	-	-	-	-	-	-	1,105	188	1,271	1,271	-	-	-	-	-	-	-	-	-	-
3b.3.3	Small tool allowance	-	1	-	-	-	-	-	0	2	2	-	-	-	-	-	-	-	-	-	-
3b.3.4	Pipe cutting equipment	-	957	-	-	-	-	-	143	1,100	1,100	-	-	-	-	-	-	-	-	-	-
3b.3	Subtotal Period 3b Collateral Costs	710	958	-	-	-	-	1,105	416	3,189	3,189	-	-	-	-	-	-	-	-	-	-
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	22	-	-	-	-	-	-	5	27	27	-	-	-	-	-	-	-	-	-	-
3b.4.2	Insurance	-	-	-	-	-	-	200	20	220	220	-	-	-	-	-	-	-	-	-	-
3b.4.3	Property taxes	-	-	-	-	-	-	434	43	478	478	-	-	-	-	-	-	-	-	-	-
3b.4.4	Health physics supplies	-	134	-	-	-	-	-	33	167	167	-	-	-	-	-	-	-	-	-	-
3b.4.5	Heavy equipment rental	-	166	-	-	-	-	-	25	191	191	-	-	-	-	-	-	-	-	-	-
3b.4.6	Disposal of DAW generated	-	-	3	2	-	13	-	4	22	22	-	-	-	204	-	-	-	4,085	50	-

Table D-2  
Beaver Valley Power Station, Unit 2  
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Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes			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 3b Period-Dependent Costs (continued)																					
3b.4.7	Plant energy budget	-	-	-	-	-	-	305	46	350	350	-	-	-	-	-	-	-	-	-	-
3b.4.8	NRC Fees	-	-	-	-	-	-	134	13	147	147	-	-	-	-	-	-	-	-	-	-
3b.4.9	Fixed Costs - Site	-	-	-	-	-	-	247	37	284	284	-	-	-	-	-	-	-	-	-	-
3b.4.10	Security Staff Cost	-	-	-	-	-	-	203	30	233	233	-	-	-	-	-	-	-	-	-	8,149
3b.4.11	DOC Staff Cost	-	-	-	-	-	-	3,046	457	3,502	3,502	-	-	-	-	-	-	-	-	-	47,314
3b.4.12	Utility Staff Cost	-	-	-	-	-	-	5,800	870	6,670	6,670	-	-	-	-	-	-	-	-	-	125,909
3b.4	Subtotal Period 3b Period-Dependent Costs	22	300	3	2	-	13	10,368	1,584	12,292	12,292	-	-	-	204	-	-	-	4,085	50	181,371
3b.0	TOTAL PERIOD 3b COST	732	1,440	3	2	-	13	13,523	2,461	18,174	17,903	-	271	-	204	-	-	-	4,085	2,273	195,171
PERIOD 3 TOTALS		732	2,017	9	6	-	39	34,732	5,687	43,223	42,746	-	477	-	607	-	-	-	12,166	2,372	481,088
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Reactor Coolant Piping	24	96	14	22	16	335	-	126	632	632	-	-	118	1,065	-	-	-	141,918	2,852	-
4a.1.1.2	Pressurizer Relief Tank	4	17	3	5	4	69	-	25	127	127	-	-	27	239	-	-	-	29,424	480	-
4a.1.1.3	Reactor Coolant Pumps & Motors	11	55	29	92	137	1,508	-	433	2,266	2,266	-	-	427	2,166	-	-	-	694,244	1,694	-
4a.1.1.4	Pressurizer	7	52	398	367	-	180	-	156	1,160	1,160	-	-	-	1,874	-	-	-	159,207	1,799	-
4a.1.1.5	Steam Generators	56	1,932	1,870	889	2,667	1,143	-	1,517	10,074	10,074	-	-	12,400	11,910	-	-	-	2,323,333	19,209	-
4a.1.1.6	CRDMs/Cis/Service Structure Removal	25	76	100	34	15	153	-	87	491	491	-	-	327	2,905	-	-	-	70,953	2,095	-
4a.1.1.7	Reactor Vessel Internals	37	1,586	3,730	457	-	2,330	152	3,443	11,736	11,736	-	-	-	2,121	125	412	-	254,907	19,283	903
4a.1.1.8	Vessel & Internals GTCC Disposal	-	-	300	-	-	11,104	-	1,696	13,100	13,100	-	-	-	-	-	-	489	110,853	-	-
4a.1.1.9	Reactor Vessel	-	3,221	884	449	-	7,135	152	6,339	18,180	18,180	-	-	-	10,961	2,669	-	-	1,386,386	19,283	903
4a.1.1	Totals	164	7,035	7,328	2,316	2,838	23,956	305	13,623	57,766	57,766	-	-	13,299	33,240	2,794	412	489	5,171,028	66,496	1,807
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator	-	252	89	21	297	-	-	120	779	779	-	-	2,914	-	-	-	-	247,899	5,346	-
4a.1.3	Main Condensers	-	1,307	66	21	304	-	-	382	2,080	2,080	-	-	5,634	-	-	-	-	253,562	28,172	-
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor Building	-	502	-	-	-	-	-	75	577	577	-	-	-	-	-	-	-	-	-	7,157
4a.1.4.2	Auxiliary Building	-	115	-	-	-	-	-	17	132	132	-	-	-	-	-	-	-	-	-	1,752
4a.1.4.3	Fuel and Decon Building	-	87	-	-	-	-	-	13	100	100	-	-	-	-	-	-	-	-	-	1,340
4a.1.4.4	Gaseous Waste Storage Tank Enclosure	-	2	-	-	-	-	-	0	3	3	-	-	-	-	-	-	-	-	-	37
4a.1.4.5	Main Steam, Cable Vault, Safeguards Area	-	95	-	-	-	-	-	14	109	109	-	-	-	-	-	-	-	-	-	1,426
4a.1.4.6	Waste Handling/Condensate Polishing	-	110	-	-	-	-	-	16	126	126	-	-	-	-	-	-	-	-	-	1,633
4a.1.4	Totals	-	910	-	-	-	-	-	137	1,047	1,047	-	-	-	-	-	-	-	-	-	13,345
Disposal of Plant Systems																					
4a.1.5.1	Area Vent. Syst. - Condensate Polish Bld	-	135	2	6	88	-	-	48	279	279	-	-	1,799	-	-	-	-	73,041	2,700	-
4a.1.5.2	Area Ventilation Systems - Air Condition	-	0	-	-	-	-	-	-	0	-	-	-	0	-	-	-	-	-	5	-
4a.1.5.3	Area Ventilation Systems - Auxiliary Bld	-	191	3	10	140	-	-	71	415	415	-	-	2,883	-	-	-	-	117,063	3,740	-
4a.1.5.4	Area Ventilation Systems - Control Area	-	25	-	-	-	-	-	4	29	-	-	-	29	-	-	-	-	-	801	-
4a.1.5.5	Area Ventilation Systems - Cooling	-	232	4	12	176	-	-	86	510	510	-	-	3,602	-	-	-	-	146,295	4,544	-
4a.1.5.6	Auxiliary Boiler	-	208	-	-	-	-	-	31	240	-	-	-	240	-	-	-	-	-	4,858	-
4a.1.5.7	Auxiliary Steam and Condensate	-	84	-	-	-	-	-	13	96	-	-	-	96	-	-	-	-	-	2,032	-
4a.1.5.8	Auxiliary Steam and Condensate - RCA	-	148	2	6	80	-	-	50	286	286	-	-	1,649	-	-	-	-	66,954	3,052	-
4a.1.5.9	Boron Recovery & Primary Grade Water	-	189	2	5	74	-	-	59	330	330	-	-	1,523	-	-	-	-	61,857	4,041	-
4a.1.5.10	Building Services Hot Water Heating	-	84	-	-	-	-	-	13	97	-	-	-	97	-	-	-	-	-	2,029	-
4a.1.5.11	Building Services Hot Water Htg - RCA	-	138	1	4	51	-	-	43	237	237	-	-	1,056	-	-	-	-	42,875	2,843	-
4a.1.5.12	Building and Yard Drains	-	34	-	-	-	-	-	5	40	-	-	-	40	-	-	-	-	-	831	-
4a.1.5.13	Building and Yard Drains - RCA	-	49	0	1	13	-	-	14	78	78	-	-	272	-	-	-	-	11,037	1,073	-
4a.1.5.14	Chemical & Volume Control	-	517	17	28	147	210	-	210	1,130	1,130	-	-	3,013	914	-	-	-	203,309	11,070	-

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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						
Disposal of Plant Systems (continued)																							
4a.1.5.15	Chilled Water	-	179	-	-	-	-	-	-	27	208	-	-	-	-	-	-	-	-	-	4,330	-	
4a.1.5.16	Chilled Water - RCA	-	404	6	17	239	-	-	-	140	805	805	-	206	-	-	-	-	-	-	8,361	-	
4a.1.5.17	Condensate	-	352	-	-	-	-	-	-	53	405	-	-	4,898	-	-	-	-	-	-	8,371	-	
4a.1.5.18	Condensate Polishing	-	833	19	58	827	-	-	-	343	2,081	2,081	-	405	-	-	-	-	-	-	17,842	-	
4a.1.5.19	Containment Vacuum & Leakage Monitoring	-	47	0	1	16	-	-	-	14	79	79	-	-	18,966	-	-	-	-	-	17,842	-	
4a.1.5.20	Domestic Water	-	36	-	-	-	-	-	-	5	41	-	-	41	331	-	-	-	-	-	13,449	-	
4a.1.5.21	Domestic Water - RCA	-	30	0	1	11	-	-	-	9	51	51	-	-	221	-	-	-	-	-	8,958	-	
4a.1.5.22	ERF Building	-	95	-	-	-	-	-	-	14	109	-	-	109	-	-	-	-	-	-	2,294	-	
4a.1.5.23	Electrical - Contaminated	-	283	3	8	116	-	-	-	90	499	499	-	-	2,372	-	-	-	-	-	96,331	-	
4a.1.5.24	Extraction Steam	-	205	-	-	-	-	-	-	31	235	-	-	235	-	-	-	-	-	-	4,999	-	
4a.1.5.25	Fire Protection	-	568	-	-	-	-	-	-	85	651	-	-	651	-	-	-	-	-	-	13,627	-	
4a.1.5.26	Heater Drains	-	271	-	-	-	-	-	-	41	311	-	-	311	-	-	-	-	-	-	6,560	-	
4a.1.5.27	Incore Instrumentation	-	11	1	1	1	7	-	-	5	25	25	-	-	22	30	-	-	-	-	3,593	-	
4a.1.5.28	Loose Parts Monitoring	-	0	-	-	-	-	-	-	10	73	-	-	0	-	-	-	-	-	-	3	-	
4a.1.5.29	Main Generator and Main Transformer	-	64	-	-	-	-	-	-	19	147	-	-	73	-	-	-	-	-	-	1,509	-	
4a.1.5.30	Main Steam	-	128	-	-	-	-	-	-	19	147	-	-	147	-	-	-	-	-	-	3,013	-	
4a.1.5.31	Main Steam - RCA	-	261	7	19	271	-	-	-	109	667	667	-	-	5,551	-	-	-	-	-	225,448	-	
4a.1.5.32	Main Turbine and Condenser	-	324	-	-	-	-	-	-	49	373	-	-	373	-	-	-	-	-	-	7,821	-	
4a.1.5.33	Main Turbine and Condenser - RCA	-	12	-	0	2	-	-	-	3	17	17	-	-	40	-	-	-	-	-	1,620	-	
4a.1.5.34	Outbuildings - Waste Handling Building	-	61	1	2	32	-	-	-	20	116	116	-	-	653	-	-	-	-	-	26,501	-	
4a.1.5.35	Plant Process Control	-	1	-	-	-	-	-	-	0	1	-	-	1	-	-	-	-	-	-	23	-	
4a.1.5.36	Post Accident Sampling - RCA	-	144	1	2	33	-	-	-	41	221	221	-	-	680	-	-	-	-	-	27,634	-	
4a.1.5.37	Post DBA Hydrogen Control	-	2	-	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	47	-	
4a.1.5.38	Post DBA Hydrogen Control - RCA	-	39	1	2	21	-	-	-	13	75	75	-	-	438	-	-	-	-	-	17,780	-	
4a.1.5.39	Primary Access Facility	-	24	-	-	-	-	-	-	4	27	-	-	27	-	-	-	-	-	-	565	-	
4a.1.5.40	Reactor Control & Protection	-	1	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	13	-	
4a.1.5.41	Reactor Coolant	-	157	9	16	51	142	-	-	86	481	481	-	-	1,056	611	-	-	-	-	97,398	-	
4a.1.5.42	Reactor Excore Instrumentation	-	0	-	-	-	-	-	-	31	170	170	-	0	-	-	-	-	-	-	3	-	
4a.1.5.43	Reactor Plant Sample	-	99	1	3	37	-	-	-	1	8	8	-	-	749	-	-	-	-	-	30,428	-	
4a.1.5.44	River Water - RCA	-	4	-	0	2	-	-	-	1	8	8	-	-	47	-	-	-	-	-	1,824	-	
4a.1.5.45	Safety Injection - RCA	-	562	16	46	652	-	-	-	247	1,522	1,522	-	-	13,370	-	-	-	-	-	542,951	-	
4a.1.5.46	Sewage Treatment	-	16	-	-	-	-	-	-	2	19	-	-	19	-	-	-	-	-	-	390	-	
4a.1.5.47	Simulator Building	-	7	-	-	-	-	-	-	1	8	-	-	8	-	-	-	-	-	-	153	-	
4a.1.5.48	South Office Shop Building	-	59	-	-	-	-	-	-	9	69	-	-	69	-	-	-	-	-	-	1,422	-	
4a.1.5.49	Steam Generator Blowdown	-	776	17	51	730	-	-	-	313	1,887	1,887	-	-	14,970	-	-	-	-	-	607,040	-	
4a.1.5.50	Steam Generator Feedwater	-	251	-	-	-	-	-	-	38	288	-	-	288	-	-	-	-	-	-	5,959	-	
4a.1.5.51	Steam Generator Feedwater - RCA	-	205	8	18	256	-	-	-	83	578	578	-	-	5,252	-	-	-	-	-	213,288	-	
4a.1.5.52	Supplementary Leak Collection & Release	-	67	1	3	38	-	-	-	23	131	131	-	-	771	-	-	-	-	-	31,302	-	
4a.1.5.53	Turbine Plant Component Cooling Water	-	216	-	-	-	-	-	-	32	248	-	-	248	-	-	-	-	-	-	5,235	-	
4a.1.5.54	Turbine Plant Sample	-	32	-	-	-	-	-	-	5	36	-	-	36	-	-	-	-	-	-	770	-	
4a.1.5.55	Water Treating - RCA	-	64	1	2	22	-	-	-	20	109	109	-	-	462	-	-	-	-	-	18,748	-	
4a.1.5	Totals	-	8,920	120	321	4,125	359	-	-	2,672	16,518	12,768	-	3,752	84,645	1,555	-	-	-	-	3,575,600	198,007	-
4a.1.6	Scaffolding in support of decommissioning	-	958	11	4	48	3	-	-	249	1,274	1,274	-	-	897	45	-	-	-	-	44,863	23,881	-
4a.1	Subtotal Period 4a Activity Costs	164	19,383	7,614	2,684	7,613	24,318	305	17,383	79,465	75,712	-	3,752	107,390	34,840	-2,794	412	489	8,282,741	335,247	1,807	-	
Period 4a Additional Costs																							
4a.2.1	Curie Surcharge	-	-	-	-	-	128	-	32	160	160	-	-	-	-	-	-	-	-	-	-	-	
4a.2	Subtotal Period 4a Additional Costs	-	-	-	-	-	128	-	32	160	160	-	-	-	-	-	-	-	-	-	-	-	
Period 4a Collateral Costs																							
4a.3.1	Process liquid waste	10	-	8	38	-	105	-	38	198	198	-	-	-	-	-	-	-	-	153	-	19,339	30
4a.3.2	Small tool allowance	-	244	-	-	-	-	-	37	281	252	-	28	-	-	-	-	-	-	-	-	-	-
4a.3	Subtotal Period 4a Collateral Costs	10	244	8	38	-	105	-	74	479	451	-	28	-	-	-	-	-	-	153	-	19,339	30

Table D-2  
Beaver Valley Power Station, Unit 2  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes				Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet				
Period 4a Period-Dependent Costs																						
4a.4.1	Decon supplies	50	-	-	-	-	-	-	13	63	83	-	-	-	-	-	-	-	-	-	-	-
4a.4.2	Insurance	-	-	-	-	-	-	457	46	503	503	-	-	-	-	-	-	-	-	-	-	-
4a.4.3	Property taxes	-	-	-	-	-	-	992	99	1,091	982	-	-	-	-	-	-	-	-	-	-	-
4a.4.4	Health physics supplies	-	1,435	-	-	-	-	-	359	1,793	1,793	-	109	-	-	-	-	-	-	-	-	-
4a.4.5	Heavy equipment rental	-	1,846	-	-	-	-	-	277	2,122	2,122	-	-	-	-	-	-	-	-	-	-	-
4a.4.6	Disposal of DAW generated	-	-	71	48	-	303	-	90	512	512	-	-	-	-	-	-	-	-	-	94,855	1,162
4a.4.7	Plant energy budget	-	-	-	-	-	-	661	99	760	760	-	-	-	-	-	-	-	-	-	-	-
4a.4.8	NRC Fees	-	-	-	-	-	-	377	38	415	415	-	-	-	-	-	-	-	-	-	-	-
4a.4.9	Fixed Costs - Site	-	-	-	-	-	-	563	85	648	648	-	-	-	-	-	-	-	-	-	-	-
4a.4.10	Radwaste Processing Equipment/Services	-	-	-	-	-	-	213	32	245	245	-	-	-	-	-	-	-	-	-	-	-
4a.4.11	Security Staff Cost	-	-	-	-	-	-	1,598	240	1,837	1,837	-	-	-	-	-	-	-	-	-	-	84,128
4a.4.12	DOC Staff Cost	-	-	-	-	-	-	11,549	1,732	13,281	13,281	-	-	-	-	-	-	-	-	-	-	182,400
4a.4.13	Utility Staff Cost	-	-	-	-	-	-	14,750	2,213	16,963	16,963	-	-	-	-	-	-	-	-	-	-	315,648
4a.4	Subtotal Period 4a Period-Dependent Costs	50	3,280	71	48	-	303	31,180	5,321	40,233	40,123	-	109	-	4,733	-	-	-	-	94,855	1,162	562,176
4a.0	TOTAL PERIOD 4a COST	223	22,907	7,893	2,770	7,813	24,854	31,485	22,810	120,336	116,446	-	3,889	107,390	39,574	2,947	412	489	9,406,938	336,439	563,983	
PERIOD 4b - Site Decontamination																						
Period 4b Direct Decommissioning Activities																						
4b.1.1	Remove spent fuel racks	412	48	99	54	-	182	-	277	1,052	1,052	-	-	-	2,457	-	-	-	-	245,700	1,193	-
Disposal of Plant Systems																						
4b.1.2.1	Area Ventilation Systems - Containment	-	322	7	21	300	-	-	130	781	781	-	-	6,165	-	-	-	-	-	250,356	6,286	-
4b.1.2.2	Area Ventilation Systems - Miscellaneous	-	154	-	-	-	-	-	23	177	-	-	177	-	-	-	-	-	-	-	3,858	-
4b.1.2.3	Circulating Water	-	399	-	-	-	-	-	60	458	-	-	458	-	-	-	-	-	-	-	9,846	-
4b.1.2.4	Compressed Air	-	48	-	-	-	-	-	7	56	-	-	56	-	-	-	-	-	-	-	1,198	-
4b.1.2.5	Compressed Air - RCA	-	258	3	8	107	-	-	81	454	454	-	-	2,199	-	-	-	-	-	89,320	5,287	-
4b.1.2.6	Containment	-	20	0	1	21	-	-	8	52	52	-	-	425	-	-	-	-	-	17,264	435	-
4b.1.2.7	Containment Depressurization	-	107	-	-	-	-	-	16	123	-	-	123	-	-	-	-	-	-	-	2,334	-
4b.1.2.8	Containment Depressurization - RCA	-	483	27	79	1,113	-	-	302	2,003	2,003	-	-	22,839	-	-	-	-	-	927,485	10,291	-
4b.1.2.9	Electrical - Clean	-	3,015	-	-	-	-	-	452	3,467	-	-	-	-	-	-	-	-	-	-	69,021	-
4b.1.2.10	Electrical - RCA	-	1,911	25	73	1,042	-	-	648	3,699	3,699	-	-	3,487	-	-	-	-	-	867,962	40,573	-
4b.1.2.11	Fire Protection - RCA	-	438	6	17	236	-	-	148	845	845	-	-	4,850	-	-	-	-	-	196,943	9,156	-
4b.1.2.12	Fuel Pool Electrical Contaminated	-	72	1	2	30	-	-	23	128	128	-	-	615	-	-	-	-	-	24,991	1,553	-
4b.1.2.13	Fuel Pool Electrical RCA	-	477	6	18	259	-	-	161	922	922	-	-	5,318	-	-	-	-	-	215,981	10,125	-
4b.1.2.14	Fuel Pool Area Ventilation Aux Bldg	-	86	2	5	74	-	-	34	200	200	-	-	1,523	-	-	-	-	-	61,866	1,668	-
4b.1.2.15	Fuel Pool Compressed Air RCA	-	70	1	3	36	-	-	23	133	133	-	-	739	-	-	-	-	-	30,012	1,450	-
4b.1.2.16	Fuel Pool Cooling & Purification	-	287	11	21	117	154	-	135	736	736	-	-	2,408	682	-	-	-	-	157,192	6,429	-
4b.1.2.17	Fuel Pool Fire Protection RCA	-	107	1	4	54	-	-	36	202	202	-	-	1,111	-	-	-	-	-	45,108	2,230	-
4b.1.2.18	Fuel Transfer System & Tools	-	82	2	5	36	29	-	34	190	190	-	-	748	128	-	-	-	-	41,887	1,821	-
4b.1.2.19	Gaseous Waste Disposal	-	354	4	12	187	-	-	118	652	652	-	-	3,432	-	-	-	-	-	139,394	7,816	-
4b.1.2.20	Liquid Waste Disposal	-	65	3	4	25	30	-	28	155	155	-	-	515	156	-	-	-	-	32,510	1,392	-
4b.1.2.21	Miscellaneous	-	23	-	-	-	-	-	4	27	-	-	27	-	-	-	-	-	-	-	533	-
4b.1.2.22	Prim Comp & Ntm Shld Trk Cng Wtr - RCA	-	1,321	37	113	1,603	-	-	591	3,866	3,866	-	-	32,904	-	-	-	-	-	1,336,230	28,717	-
4b.1.2.23	Radiation Monitoring	-	105	1	3	40	-	-	33	181	181	-	-	812	-	-	-	-	-	32,959	2,129	-
4b.1.2.24	Reactor Plant Vents & Drains	-	300	7	10	55	77	-	105	555	555	-	-	1,120	335	-	-	-	-	75,629	6,481	-
4b.1.2.25	Residual Heat Removal	-	281	20	43	338	228	-	187	1,097	1,097	-	-	6,946	978	-	-	-	-	369,776	6,159	-
4b.1.2.26	Service Water	-	351	-	-	-	-	-	53	403	-	-	403	-	-	-	-	-	-	-	8,434	-
4b.1.2.27	Service Water - RCA	-	578	24	70	997	-	-	307	1,977	1,977	-	-	20,450	-	-	-	-	-	830,486	12,886	-
4b.1.2.28	Solid Waste Disposal	-	150	5	8	56	53	-	61	333	333	-	-	1,142	235	-	-	-	-	66,902	3,168	-
4b.1.2.29	Station Service - 4KV	-	91	-	-	-	-	-	14	104	-	-	104	-	-	-	-	-	-	-	2,140	-
4b.1.2.30	Turbine Plant Comp Cooling Water - RCA	-	17	0	0	6	-	-	5	29	29	-	-	128	-	-	-	-	-	5,214	356	-
4b.1.2.31	Water Treating	-	425	-	-	-	-	-	64	489	-	-	489	-	-	-	-	-	-	-	10,008	-
4b.1.2	Totals	-	12,404	195	522	6,714	573	-	3,888	24,285	18,991	-	5,304	137,772	2,493	-	-	-	-	5,815,266	273,202	-

Table D-2  
Beaver Valley Power Station, Unit 2  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
4b.1.3	Scaffolding in support of decommissioning	-	1,437	17	7	73	4	-	374	1,911	1,911	-	-	1,346	67	-	-	-	67,295	35,822	-
Decommissioning of Site Buildings																					
4b.1.4.1	Reactor Building	777	549	23	49	202	100	-	590	2,290	2,290	-	-	4,136	1,557	-	-	-	319,203	27,509	-
4b.1.4.2	Auxiliary Building	310	94	12	25	28	84	-	204	738	738	-	-	574	982	-	-	-	120,798	8,806	-
4b.1.4.3	Fuel and Decon Building	384	421	5	10	92	13	-	316	1,242	1,242	-	-	1,896	203	-	-	-	96,712	16,472	-
4b.1.4.4	Gaseous Waste Storage Tank Enclosure	7	2	0	1	1	2	-	5	18	18	-	-	17	24	-	-	-	3,119	199	-
4b.1.4.5	Main Steam, Cable Vault, Safeguards Area	106	41	4	8	25	19	-	73	277	277	-	-	517	291	-	-	-	49,431	3,119	-
4b.1.4.6	Turbine Building	316	31	2	5	23	10	-	173	560	560	-	-	487	163	-	-	-	34,688	7,671	-
4b.1.4.7	Waste Handling/Condensate Polishing	202	83	9	19	44	43	-	143	543	543	-	-	912	689	-	-	-	102,731	6,007	-
4b.1.4	Totals	2,101	1,221	56	118	415	251	-	1,504	5,667	5,667	-	-	8,520	3,890	-	-	-	726,683	69,583	-
4b.1	Subtotal Period 4b Activity Costs	2,513	15,109	366	701	7,202	691	-	6,042	32,924	27,620	-	5,304	147,637	8,907	-	-	-	6,854,943	379,800	-
Period 4b Additional Costs																					
4b.2.1	ISFSI License Termination	-	488	5	74	-	329	798	335	2,028	-	2,028	-	-	-	-	-	-	380,555	8,021	1,280
4b.2	Subtotal Period 4b Additional Costs	-	488	5	74	-	329	798	335	2,028	-	2,028	-	-	-	-	-	-	380,555	8,021	1,280
Period 4b Collateral Costs																					
4b.3.1	Process liquid waste	16	-	14	65	-	180	-	64	340	340	-	-	-	-	-	-	-	33,213	52	-
4b.3.2	Small tool allowance	-	291	-	-	-	-	-	44	334	334	-	-	-	-	-	-	-	-	-	-
4b.3	Subtotal Period 4b Collateral Costs	16	291	14	65	-	180	-	108	674	674	-	-	-	-	-	-	-	33,213	52	-
Period 4b Period-Dependent Costs																					
4b.4.1	Decon supplies	844	-	-	-	-	-	-	211	1,055	1,055	-	-	-	-	-	-	-	-	-	-
4b.4.2	Insurance	-	-	-	-	-	-	1,094	109	1,203	1,203	-	-	-	-	-	-	-	-	-	-
4b.4.3	Property taxes	-	-	-	-	-	-	2,373	237	2,611	2,611	-	-	-	-	-	-	-	-	-	-
4b.4.4	Health physics supplies	-	2,015	-	-	-	-	-	504	2,519	2,519	-	-	-	-	-	-	-	-	-	-
4b.4.5	Heavy equipment rental	-	4,443	-	-	-	-	-	686	5,110	5,110	-	-	-	-	-	-	-	-	-	-
4b.4.6	Disposal of DAW generated	-	-	81	55	-	349	-	104	589	589	-	-	-	5,450	-	-	-	109,215	1,338	-
4b.4.7	Plant energy budget	-	-	-	-	-	-	1,248	187	1,435	1,435	-	-	-	-	-	-	-	-	-	-
4b.4.8	NRC Fees	-	-	-	-	-	-	902	90	992	992	-	-	-	-	-	-	-	-	-	-
4b.4.9	Fixed Costs - Site	-	-	-	-	-	-	1,348	202	1,551	1,551	-	-	-	-	-	-	-	-	-	-
4b.4.10	Radwaste Processing Equipment/Services	-	-	-	-	-	-	1,020	153	1,173	1,173	-	-	-	-	-	-	-	-	-	-
4b.4.11	Security Staff Cost	-	-	-	-	-	-	3,291	494	3,784	3,784	-	-	-	-	-	-	-	-	-	132,086
4b.4.12	DOC Staff Cost	-	-	-	-	-	-	26,640	3,996	30,635	30,635	-	-	-	-	-	-	-	-	-	419,229
4b.4.13	Utility Staff Cost	-	-	-	-	-	-	32,256	4,838	37,095	37,095	-	-	-	-	-	-	-	-	-	676,221
4b.4	Subtotal Period 4b Period-Dependent Costs	844	6,458	81	55	-	349	70,173	11,782	89,752	89,752	-	-	-	5,450	-	-	-	109,215	1,338	1,227,536
4b.0	TOTAL PERIOD 4b COST	3,373	22,346	467	895	7,202	1,849	70,970	18,278	125,379	118,047	2,028	5,304	147,637	17,781	263	-	-	7,377,926	389,211	1,228,816
PERIOD 4e - License Termination																					
Period 4e Direct Decommissioning Activities																					
4e.1.1	ORISE confirmatory survey	-	-	-	-	-	-	125	37	162	162	-	-	-	-	-	-	-	-	-	-
4e.1.2	Terminate license	-	-	-	-	-	-	-	-	a	-	-	-	-	-	-	-	-	-	-	-
4e.1	Subtotal Period 4e Activity Costs	-	-	-	-	-	-	125	37	162	162	-	-	-	-	-	-	-	-	-	-
Period 4e Additional Costs																					
4e.2.1	License Termination Survey	-	-	-	-	-	-	6,094	1,828	7,923	7,923	-	-	-	-	-	-	-	-	-	122,933
4e.2	Subtotal Period 4e Additional Costs	-	-	-	-	-	-	6,094	1,828	7,923	7,923	-	-	-	-	-	-	-	-	-	122,933
Period 4e Collateral Costs																					
4e.3.1	DOC staff relocation expenses	-	-	-	-	-	-	1,105	166	1,271	1,271	-	-	-	-	-	-	-	-	-	-
4e.3	Subtotal Period 4e Collateral Costs	-	-	-	-	-	-	1,105	166	1,271	1,271	-	-	-	-	-	-	-	-	-	-

Table D-2  
Beaver Valley Power Station, Unit 2  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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 WL, Lbs.	Craft Manhours	Utility and Contractor Manhours	
															Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet				
Period 4e Period-Dependent Costs																						
4e.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4e.4.2	Property taxes	-	-	-	-	-	-	852	65	717	717	-	-	-	-	-	-	-	-	-	-	
4e.4.3	Health physics supplies	-	610	-	-	-	-	-	152	762	762	-	-	-	-	-	-	-	-	-	-	
4e.4.4	Disposal of DAW generated	-	-	5	3	-	20	-	6	33	33	-	-	-	306	-	-	-	-	6,127	75	
4e.4.5	Plant energy budget	-	-	-	-	-	-	91	14	105	105	-	-	-	-	-	-	-	-	-	-	
4e.4.6	NRC Fees	-	-	-	-	-	-	248	25	272	272	-	-	-	-	-	-	-	-	-	-	
4e.4.7	Fixed Costs - Site	-	-	-	-	-	-	370	56	426	426	-	-	-	-	-	-	-	-	-	-	
4e.4.8	Security Staff Cost	-	-	-	-	-	-	354	53	407	407	-	-	-	-	-	-	-	-	-	-	
4e.4.9	DOC Staff Cost	-	-	-	-	-	-	3,823	573	4,396	4,396	-	-	-	-	-	-	-	-	-	14,194	
4e.4.10	Utility Staff Cost	-	-	-	-	-	-	3,790	569	4,359	4,359	-	-	-	-	-	-	-	-	-	57,566	
4e.4	Subtotal Period 4e Period-Dependent Costs	-	610	5	3	-	20	16,652	1,512	11,477	11,477	-	-	-	306	-	-	-	-	6,127	75	144,703
4e.0	TOTAL PERIOD 4e COST	-	610	5	3	-	20	16,652	3,544	20,832	20,832	-	-	-	306	-	-	-	-	6,127	123,008	144,703
<b>PERIOD 4 TOTALS</b>		<b>3,596</b>	<b>45,862</b>	<b>8,164</b>	<b>3,668</b>	<b>14,815</b>	<b>26,722</b>	<b>119,087</b>	<b>44,832</b>	<b>266,547</b>	<b>255,325</b>	<b>2,028</b>	<b>9,193</b>	<b>255,027</b>	<b>57,660</b>	<b>3,211</b>	<b>412</b>	<b>489</b>	<b>16,790,990</b>	<b>848,658</b>	<b>1,937,501</b>	
PERIOD 5b - Site Restoration																						
Period 5b Direct Decommissioning Activities																						
Demolition of Remaining Site Buildings																						
5b.1.1.1	Reactor Building	-	2,994	-	-	-	-	-	449	3,443	-	-	3,443	-	-	-	-	-	-	-	43,207	-
5b.1.1.2	Alternate Intake	-	153	-	-	-	-	-	23	176	-	-	176	-	-	-	-	-	-	-	2,324	-
5b.1.1.3	Auxiliary Building	-	1,071	-	-	-	-	-	161	1,232	-	-	1,232	-	-	-	-	-	-	-	16,689	-
5b.1.1.4	Cable Tunnel	-	85	-	-	-	-	-	13	98	-	-	98	-	-	-	-	-	-	-	1,174	-
5b.1.1.5	Circulating Water Piping	-	30	-	-	-	-	-	4	34	-	-	34	-	-	-	-	-	-	-	496	-
5b.1.1.6	Control Building	-	217	-	-	-	-	-	33	249	-	-	249	-	-	-	-	-	-	-	3,315	-
5b.1.1.7	Cooling Tower	-	354	-	-	-	-	-	53	407	-	-	407	-	-	-	-	-	-	-	6,064	-
5b.1.1.8	Cooling Tower Pump House	-	81	-	-	-	-	-	12	93	-	-	93	-	-	-	-	-	-	-	1,393	-
5b.1.1.9	Diesel Generator Building	-	302	-	-	-	-	-	45	347	-	-	347	-	-	-	-	-	-	-	4,877	-
5b.1.1.10	Emergency Service Water Overflow	-	5	-	-	-	-	-	1	6	-	-	6	-	-	-	-	-	-	-	85	-
5b.1.1.11	Fuel and Decon Building	-	809	-	-	-	-	-	121	930	-	-	930	-	-	-	-	-	-	-	12,581	-
5b.1.1.12	Gaseous Waste Storage Tank Enclosure	-	21	-	-	-	-	-	3	24	-	-	24	-	-	-	-	-	-	-	333	-
5b.1.1.13	Intake	-	568	-	-	-	-	-	85	653	-	-	653	-	-	-	-	-	-	-	7,963	-
5b.1.1.14	Main Steam, Cable Vault, Safeguards Area	-	855	-	-	-	-	-	128	983	-	-	983	-	-	-	-	-	-	-	12,903	-
5b.1.1.15	Misc. Site Structures - 2005	-	1,808	-	-	-	-	-	271	2,080	-	-	2,080	-	-	-	-	-	-	-	26,619	-
5b.1.1.16	Miscellaneous Buildings	-	1,055	-	-	-	-	-	158	1,213	-	-	1,213	-	-	-	-	-	-	-	20,886	-
5b.1.1.17	Miscellaneous Yard	-	1,181	-	-	-	-	-	177	1,358	-	-	1,358	-	-	-	-	-	-	-	16,262	-
5b.1.1.18	Old Steam Generator Storage Facility	-	278	-	-	-	-	-	42	320	-	-	320	-	-	-	-	-	-	-	3,877	-
5b.1.1.19	Primary Access Facility	-	237	-	-	-	-	-	36	273	-	-	273	-	-	-	-	-	-	-	4,337	-
5b.1.1.20	Service Building	-	701	-	-	-	-	-	105	806	-	-	806	-	-	-	-	-	-	-	10,803	-
5b.1.1.21	South Office and Shops	-	824	-	-	-	-	-	139	1,062	-	-	1,062	-	-	-	-	-	-	-	16,885	-
5b.1.1.22	Turbine Building	-	1,640	-	-	-	-	-	246	1,886	-	-	1,886	-	-	-	-	-	-	-	30,965	-
5b.1.1.23	Turbine Pedestal	-	615	-	-	-	-	-	92	707	-	-	707	-	-	-	-	-	-	-	7,734	-
5b.1.1.24	Waste Handling Building	-	363	-	-	-	-	-	54	417	-	-	417	-	-	-	-	-	-	-	5,147	-
5b.1.1.25	Waste Handling/Condensate Polishing	-	998	-	-	-	-	-	150	1,149	-	-	1,149	-	-	-	-	-	-	-	14,945	-
5b.1.1	Totals	-	17,345	-	-	-	-	-	2,602	19,947	-	-	19,947	-	-	-	-	-	-	-	271,463	-
Site Closeout Activities																						
5b.1.2	Remove Rubble	-	9,641	-	-	-	-	-	1,448	11,087	-	-	11,087	-	-	-	-	-	-	-	14,529	-
5b.1.3	Grade & landscape site	-	162	-	-	-	-	-	24	186	-	-	186	-	-	-	-	-	-	-	593	-
5b.1.4	Final report to NRC	-	-	-	-	-	-	59	9	68	68	-	-	-	-	-	-	-	-	-	-	688
5b.1	Subtotal Period 5b Activity Costs	-	27,149	-	-	-	-	59	4,081	31,288	68	-	31,221	-	-	-	-	-	-	-	298,585	668

Table D-2  
Beaver Valley Power Station, Unit 2  
SAFSTOR Decommissioning Cost Estimate  
(Thousands of 2005 Dollars)

Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal 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 Additional Costs																						
5b.2.1	ISFSI Demolition and Site Restoration	-	764	-	-	-	-	23	194	982	-	982	-	-	-	-	-	-	-	-	1,836	80
5b.2.2	Concrete Crushing	-	750	-	-	-	-	4	188	941	941	-	-	-	-	-	-	-	-	-	4,492	80
5b.2	Subtotal Period 5b Additional Costs	-	1,514	-	-	-	-	27	382	1,923	941	982	-	-	-	-	-	-	-	-	6,328	160
Period 5b Collateral Costs																						
5b.3.1	Small tool allowance	-	227	-	-	-	-	-	34	261	-	-	261	-	-	-	-	-	-	-	-	-
5b.3	Subtotal Period 5b Collateral Costs	-	227	-	-	-	-	-	34	261	-	-	261	-	-	-	-	-	-	-	-	-
Period 5b Period-Dependent Costs																						
5b.4.1	Insurance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5b.4.2	Property taxes	-	-	-	-	-	-	1,672	167	1,839	-	-	1,839	-	-	-	-	-	-	-	-	-
5b.4.3	Heavy equipment rental	-	4,294	-	-	-	-	-	644	4,938	-	-	4,938	-	-	-	-	-	-	-	-	-
5b.4.4	Plant energy budget	-	-	-	-	-	-	117	18	135	-	-	135	-	-	-	-	-	-	-	-	-
5b.4.5	Fixed Costs - Site	-	-	-	-	-	-	849	127	976	976	-	-	-	-	-	-	-	-	-	-	-
5b.4.6	Security Staff Cost	-	-	-	-	-	-	907	136	1,043	-	-	1,043	-	-	-	-	-	-	-	-	36,411
5b.4.7	DOC Staff Cost	-	-	-	-	-	-	10,810	1,621	12,431	-	-	12,431	-	-	-	-	-	-	-	-	159,806
5b.4.8	Utility Staff Cost	-	-	-	-	-	-	5,859	879	6,738	-	-	6,738	-	-	-	-	-	-	-	-	103,166
5b.4	Subtotal Period 5b Period-Dependent Costs	-	4,294	-	-	-	-	20,214	3,563	28,100	976	-	27,124	-	-	-	-	-	-	-	-	296,383
5b.0	TOTAL PERIOD 5b COST	-	33,183	-	-	-	-	20,299	8,090	61,572	1,986	982	58,605	-	-	-	-	-	-	-	292,913	300,211
<b>PERIOD 5b TOTALS</b>		-	33,183	-	-	-	-	20,299	8,090	61,572	1,986	982	58,605	-	-	-	-	-	-	-	292,913	300,211
<b>TOTAL COST TO DECOMMISSION</b>		8,635	85,212	8,778	4,839	15,450	30,541	426,828	97,566	677,849	515,187	94,386	68,276	255,027	76,082	7,067	412	489	17,646,300	1,216,659	4,758,421	

<b>TOTAL COST TO DECOMMISSION WITH 16.81% CONTINGENCY:</b>	<b>\$677,849</b> thousands of 2005 dollars
<b>TOTAL NRC LICENSE TERMINATION COST IS 76% OR:</b>	<b>\$515,187</b> thousands of 2005 dollars
<b>SPENT FUEL MANAGEMENT COST IS 13.92% OR:</b>	<b>\$94,386</b> thousands of 2005 dollars
<b>NON-NUCLEAR DEMOLITION COST IS 10.07% OR:</b>	<b>\$68,276</b> thousands of 2005 dollars
<b>RADWASTE VOLUME BURIED:</b>	<b>83,662</b> cubic feet
<b>TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:</b>	<b>489</b> cubic feet
<b>TOTAL SCRAP METAL REMOVED:</b>	<b>51,169</b> tons
<b>TOTAL CRAFT LABOR REQUIREMENTS:</b>	<b>1,216,659</b> man-hours

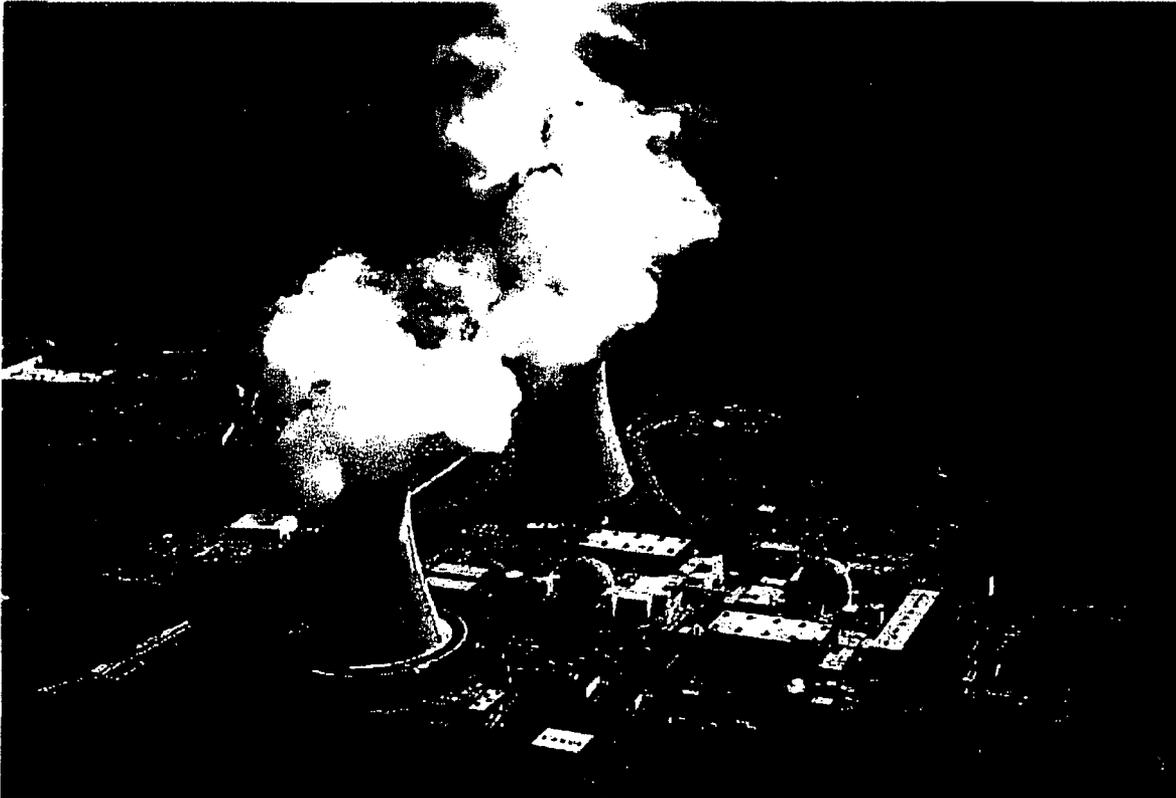
End Notes:  
n/a - indicates that this activity not charged as decommissioning expense.  
- indicates that this activity performed by decommissioning staff.  
0 - indicates that this value is less than 0.5 but is non-zero.  
a cell containing " - " indicates a zero value

Attachment 2  
L-09-187

*FINANCIAL ESCALATION ANALYSIS for the  
DECOMMISSIONING OF BEAVER VALLEY POWER STATION*

(22 Pages excluding this page)

**FINANCIAL ESCALATION ANALYSIS**  
**for the**  
**DECOMMISSIONING OF BEAVER VALLEY POWER STATION**



*prepared for*

**FirstEnergy Corporation**

*prepared by*

**TLG Services, Inc.**  
Bridgewater, Connecticut

**October 2005**

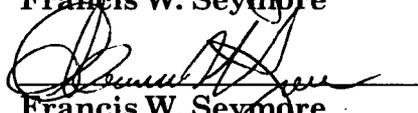
APPROVALS

Project Manager

  
Francis W. Seymore

10/13/05  
Date

Project Engineer

  
Francis W. Seymore

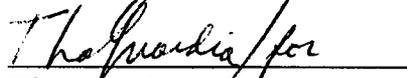
10/13/05  
Date

Technical Manager

  
William A. Cloutier, Jr.

10/13/05  
Date

Quality Assurance Manager

  
Thomas L. Williamson

10/13/05  
Date

REVISION LOG

No.	CRA No.	Date	Item Revised	Reason for Revision
0		10-13-2005		Original Issue

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Schedule of Annual Expenditures (escalated dollars)

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## INTRODUCTION

This report presents the results of an escalation of the costs to decommission the Beaver Valley Power Station (Beaver Valley) to the projected year of expenditure. Financial schedules are provided for the base case, in which the nuclear units are expected to operate for 40 years, for both the integrated SAFSTOR/DECON and SAFSTOR decommissioning scenarios. The baseline estimates (in 2005 dollars)<sup>[1]</sup> were adjusted for the required contingency ceiling and escalated using the Global Insight (GI) forecast and other historical information. A twenty-five year moving average was used for future years beyond the current forecast horizon of the GI database. A single value effective escalation rate (composite value) is also identified for each of the nuclear units and decommissioning scenarios. The results are summarized in Table 1.

### Order of Operations

The process to escalate the decommissioning estimates was conducted in the following sequence:

- Source information was extracted from the latest decommissioning cost analyses (reproduced in Tables 2 through 5).
- The schedules of expenditures are presented in the following five categories: Labor, Equipment & Materials, Energy, Waste Burial & Recycling, and Other. The appropriate escalation index for each of the five escalation categories was identified, as summarized in Table 6.
- The index values were applied against each of the unescalated schedules of expenditures to calculate a schedule of future value (Tables 7 through 10).
- An effective single value annual escalation rate was determined.

### Escalation Factors

The escalation indices selected for the five cost categories are identified in Table 6 and were extracted from Global Insight's Cost Analyzer Version 3.0 using second quarter 2005 projections.

When the decommissioning schedule extended beyond the GI forecast database, the escalation was determined using a twenty-five year moving average logic.

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<sup>1</sup> "Decommissioning Cost Analysis for the Beaver Valley Power Station," Document No. F07-1525-002, TLG Services, Inc., Rev. 0, August 2005.

Low-level radioactive waste burial is a much more uncertain component of the total cost. Historical information shows wide fluctuations in yearly escalation rates, ranging from 0% to over 150%. An escalation rate tied to the consumer price index for services (CPI, Services) was selected as an approximation of the current levels of price escalation emerging for the disposal costs for low-level radioactive waste disposal. There has been little increase in the Barnwell disposal rates over the past few years with competition from Envirocare a stabilizing factor. However, the State of South Carolina intends to restrict access to Barnwell to non-Atlantic Compact states after 2008. This would leave Envirocare as the only commercial disposal site available to the majority of waste generators. While the potential for monopolistic pricing exists, and the impediments in developing new disposal facilities to compete against Envirocare continue, the use of the CPI, Services escalator for waste disposal appears reasonable at this time. It may become less reasonable over time; therefore this assumption should be periodically re-examined to verify its continued use. There is sufficient uncertainty in the future of waste disposal to justify a higher rate for escalation than that provided by economic indices reflecting general inflation.

**TABLE 1**  
**ESCALATION SUMMARY**  
 (millions of dollars)

Unit	Start	End	Baseline Cost (2005 \$)	Escalated Value (escalated \$)	Effective Escalation Rate
<b>Integrated DECON</b>					
Unit 1	2016	2058	638.74	1,506.01	3.3281%
Unit 2	2027	2058	551.85	1,415.36	3.2990%
<b>SAFSTOR</b>					
Unit 1	2016	2078	696.26	4,201.54	3.4880%
Unit 2	2027	2078	677.83	4,931.71	3.4710%

**TABLE 2**  
**SCHEDULE OF ANNUAL EXPENDITURES**  
**UNIT 1 SAFSTOR (Integrated)**  
 (thousands, 2005 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2016	24,702	1,399	655	30	3,274	30,060
2017	28,984	21,249	464	8,886	5,200	64,782
2018	9,385	12,679	141	32	2,673	24,911
2019	9,385	12,679	141	32	2,673	24,911
2020	9,411	12,714	142	32	2,680	24,979
2021	6,266	7,457	111	32	2,347	16,214
2022	2,088	460	71	32	1,911	4,562
2023	2,088	460	71	32	1,911	4,562
2024	2,093	461	71	32	1,917	4,574
2025	2,088	460	71	32	1,911	4,562
2026	2,088	460	71	32	1,911	4,562
2027	2,088	460	71	32	1,911	4,562
2028	12,715	883	430	32	2,191	16,252
2029	25,965	4,311	705	1,454	2,622	35,057
2030	45,833	14,584	672	20,794	5,668	87,551
2031	38,297	7,657	577	10,036	4,136	60,702
2032	34,654	4,233	532	4,713	3,386	47,518
2033	28,632	3,196	323	2,207	2,875	37,232
2034	17,018	8,453	86	7	2,208	27,773
2035	15,179	10,208	71	0	2,143	27,600
2036	3,273	1,775	11	0	1,859	6,918
2037	974	148	0	0	1,798	2,920
2038	974	148	0	0	1,798	2,920
2039	974	148	0	0	1,798	2,920
2040	977	149	0	0	1,803	2,928
2041	974	148	0	0	1,798	2,920
2042	974	148	0	0	1,798	2,920
2043	974	148	0	0	1,798	2,920
2044	977	149	0	0	1,803	2,928
2045	974	148	0	0	1,798	2,920
2046	974	148	0	0	1,798	2,920
2047	974	148	0	0	1,798	2,920
2048	977	149	0	0	1,803	2,928
2049	974	148	0	0	1,798	2,920
2050	974	148	0	0	1,798	2,920

**TABLE 2 (continued)**  
**SCHEDULE OF ANNUAL EXPENDITURES**  
**UNIT 1 SAFSTOR (Integrated)**  
(thousands, 2005 dollars)

<b>Year</b>	<b>Labor</b>	<b>Equipment &amp; Materials</b>	<b>Energy</b>	<b>Burial</b>	<b>Other</b>	<b>Total</b>
2051	974	148	0	0	1,798	2,920
2052	977	149	0	0	1,803	2,928
2053	974	148	0	0	1,798	2,920
2054	974	148	0	0	1,798	2,920
2055	974	148	0	0	1,798	2,920
2056	977	149	0	0	1,803	2,928
2057	973	470	0	3	14,576	16,022
2058	798	1,439	0	408	1,783	4,426
	343,503	131,109	5,486	48,894	109,751	638,742

**TABLE 3**  
**SCHEDULE OF ANNUAL EXPENDITURES**  
**DECON, UNIT 2**  
(thousands, 2005 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2027	25,074	4,658	424	19	2,459	32,636
2028	45,843	14,752	1,068	8,313	5,408	75,383
2029	49,700	20,497	672	25,566	6,532	102,967
2030	39,315	17,775	590	13,119	5,049	75,848
2031	31,736	15,787	530	4,034	3,967	56,055
2032	30,745	14,836	511	4,046	3,941	54,079
2033	18,694	3,087	207	1,902	2,951	26,842
2034	14,524	5,371	86	7	2,209	22,197
2035	13,419	6,268	71	0	2,143	21,901
2036	2,980	1,110	11	0	1,859	5,960
2037	964	115	0	0	1,798	2,877
2038	964	115	0	0	1,798	2,877
2039	964	115	0	0	1,798	2,877
2040	966	116	0	0	1,803	2,885
2041	964	115	0	0	1,798	2,877
2042	964	115	0	0	1,798	2,877
2043	964	115	0	0	1,798	2,877
2044	966	116	0	0	1,803	2,885
2045	964	115	0	0	1,798	2,877
2046	964	115	0	0	1,798	2,877
2047	964	115	0	0	1,798	2,877
2048	966	116	0	0	1,803	2,885
2049	964	115	0	0	1,798	2,877
2050	964	115	0	0	1,798	2,877
2051	964	115	0	0	1,798	2,877
2052	966	116	0	0	1,803	2,885
2053	964	115	0	0	1,798	2,877
2054	964	115	0	0	1,798	2,877
2055	964	115	0	0	1,798	2,877
2056	966	116	0	0	1,803	2,885
2057	963	440	0	3	14,576	15,982
2058	798	1,439	0	408	1,783	4,426
	293,075	108,330	4,172	57,418	88,859	551,854

TABLE 4  
 SCHEDULE OF ANNUAL EXPENDITURES  
 SAFSTOR, UNIT 1  
 (thousands, 2005 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2016	26,571	1,399	644	30	3,796	32,439
2017	29,073	19,473	456	4,088	4,860	57,951
2018	9,385	12,679	139	32	3,236	25,472
2019	9,385	12,679	139	32	3,236	25,472
2020	9,411	12,714	139	32	3,245	25,542
2021	6,130	7,430	109	32	2,855	16,558
2022	1,770	398	70	32	2,345	4,615
2023	1,770	398	70	32	2,345	4,615
2024	1,775	399	70	32	2,352	4,627
2025	1,770	398	70	32	2,345	4,615
2026	1,770	398	70	32	2,345	4,615
2027	1,770	398	70	32	2,345	4,615
2028	1,775	399	70	32	2,352	4,627
2029	1,770	398	70	32	2,345	4,615
2030	1,770	398	70	32	2,345	4,615
2031	1,770	398	70	32	2,345	4,615
2032	1,775	399	70	32	2,352	4,627
2033	1,770	398	70	32	2,345	4,615
2034	1,770	398	70	32	2,345	4,615
2035	1,770	398	70	32	2,345	4,615
2036	1,775	399	70	32	2,352	4,627
2037	1,770	398	70	32	2,345	4,615
2038	1,770	398	70	32	2,345	4,615
2039	1,770	398	70	32	2,345	4,615
2040	1,775	399	70	32	2,352	4,627
2041	1,770	398	70	32	2,345	4,615
2042	1,770	398	70	32	2,345	4,615
2043	1,770	398	70	32	2,345	4,615
2044	1,775	399	70	32	2,352	4,627
2045	1,770	398	70	32	2,345	4,615
2046	1,770	398	70	32	2,345	4,615
2047	1,770	398	70	32	2,345	4,615
2048	1,775	399	70	32	2,352	4,627
2049	1,770	398	70	32	2,345	4,615
2050	1,770	398	70	32	2,345	4,615

**TABLE 4 (continued)**  
**SCHEDULE OF ANNUAL EXPENDITURES**  
**SAFSTOR, UNIT 1**  
(thousands, 2005 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2051	1,770	398	70	32	2,345	4,615
2052	1,775	399	70	32	2,352	4,627
2053	1,770	398	70	32	2,345	4,615
2054	1,770	398	70	32	2,345	4,615
2055	1,770	398	70	32	2,345	4,615
2056	1,775	399	70	32	2,352	4,627
2057	1,768	397	70	32	2,345	4,612
2058	1,187	259	70	32	2,183	3,730
2059	1,187	259	70	32	2,183	3,730
2060	1,190	260	70	32	2,189	3,741
2061	1,187	259	70	32	2,183	3,730
2062	1,187	259	70	32	2,183	3,730
2063	1,187	259	70	32	2,183	3,730
2064	1,190	260	70	32	2,189	3,741
2065	1,187	259	70	32	2,183	3,730
2066	1,187	259	70	32	2,183	3,730
2067	1,187	259	70	32	2,183	3,730
2068	1,190	260	70	32	2,189	3,741
2069	20,900	987	549	32	2,201	24,670
2070	36,162	7,377	686	6,325	6,095	56,645
2071	42,810	14,353	642	20,757	14,784	93,346
2072	27,383	4,214	523	4,433	3,626	40,178
2073	25,641	3,942	488	4,143	3,500	37,715
2074	861	80	0	8	1,770	2,718
2075	12,656	1,455	94	25	1,842	16,073
2076	10,833	4,794	75	2	1,502	17,206
2077	10,189	5,002	70	0	1,467	16,727
2078	140	69	1	0	20	229
	354,356	125,826	8,024	41,494	166,550	696,250

**TABLE 5**  
**SCHEDULE OF ANNUAL EXPENDITURES**  
**SAFSTOR, UNIT 2**  
 (thousands, 2005 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2027	13,859	2,425	417	19	2,459	19,180
2028	28,611	13,614	638	4,110	5,158	52,131
2029	5,197	10,019	139	32	3,246	18,634
2030	5,197	10,019	139	32	3,246	18,634
2031	5,197	10,019	139	32	3,246	18,634
2032	4,859	9,045	132	32	3,162	17,231
2033	1,813	394	70	32	2,355	4,664
2034	1,813	394	70	32	2,355	4,664
2035	1,813	394	70	32	2,355	4,664
2036	1,818	395	70	32	2,361	4,676
2037	1,813	394	70	32	2,355	4,664
2038	1,813	394	70	32	2,355	4,664
2039	1,813	394	70	32	2,355	4,664
2040	1,818	395	70	32	2,361	4,676
2041	1,813	394	70	32	2,355	4,664
2042	1,813	394	70	32	2,355	4,664
2043	1,813	394	70	32	2,355	4,664
2044	1,818	395	70	32	2,361	4,676
2045	1,813	394	70	32	2,355	4,664
2046	1,813	394	70	32	2,355	4,664
2047	1,813	394	70	32	2,355	4,664
2048	1,818	395	70	32	2,361	4,676
2049	1,813	394	70	32	2,355	4,664
2050	1,813	394	70	32	2,355	4,664
2051	1,813	394	70	32	2,355	4,664
2052	1,818	395	70	32	2,361	4,676
2053	1,813	394	70	32	2,355	4,664
2054	1,813	394	70	32	2,355	4,664
2055	1,813	394	70	32	2,355	4,664
2056	1,818	395	70	32	2,361	4,676
2057	1,811	393	70	32	2,355	4,661
2058	1,236	275	70	32	2,193	3,807
2059	1,236	275	70	32	2,193	3,807
2060	1,240	276	70	32	2,199	3,817
2061	1,236	275	70	32	2,193	3,807

**TABLE 5 (continued)**  
**SCHEDULE OF ANNUAL EXPENDITURES**  
**SAFSTOR, UNIT 2**  
(thousands, 2005 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2062	1,236	275	70	32	2,193	3,807
2063	1,236	275	70	32	2,193	3,807
2064	1,240	276	70	32	2,199	3,817
2065	1,236	275	70	32	2,193	3,807
2066	1,236	275	70	32	2,193	3,807
2067	1,236	275	70	32	2,193	3,807
2068	1,240	276	70	32	2,199	3,817
2069	2,858	352	121	32	2,194	5,558
2070	21,530	1,579	695	32	2,210	26,046
2071	38,647	11,723	675	14,303	10,505	75,853
2072	41,197	10,949	602	15,685	10,873	79,306
2073	33,747	3,979	521	3,847	3,442	45,536
2074	33,747	3,979	521	3,847	3,442	45,536
2075	26,715	2,705	262	1,255	2,378	33,315
2076	18,747	11,181	75	2	1,503	31,508
2077	18,306	11,900	70	0	1,467	31,743
2078	251	163	1	0	20	435
	357,627	126,533	7,651	44,429	141,609	677,849

**TABLE 6  
ESCALATION BASES**

<b>Cost Category</b>	<b>Escalation Source</b>
Labor	Global Insight Forecast Database, Employment cost index, total private compensation (JECIWSSP)
Equipment and Materials	Global Insight Forecast Database, Producer Price Index, Machinery & Equipment (WPIP11)
Energy	Global Insight Forecast Database, Producer Price Index, Fuels and Related Products and Power (WPIP05S)
Other	Global Insight Forecast Database, Consumer price index, services (CUSASNS)
Low-Level Radioactive Waste Processing/Disposal	Global Insight Forecast Database, Consumer price index, services (CUSASNS)

**TABLE 7**  
**SCHEDULE OF ANNUAL EXPENDITURES**  
**UNIT 1 SAFSTOR (Integrated)**  
 (thousands, escalated dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2016	37,310	1,480	662	43	4,734	44,229
2017	45,441	22,668	477	13,301	7,784	89,671
2018	15,273	13,639	147	50	4,142	33,251
2019	15,853	13,752	149	51	4,288	34,093
2020	16,501	13,904	153	53	4,450	35,061
2021	11,404	8,223	121	55	4,036	23,839
2022	3,943	511	79	57	3,403	7,993
2023	4,093	516	80	59	3,522	8,270
2024	4,262	521	81	61	3,654	8,579
2025	4,409	524	83	63	3,774	8,853
2026	4,577	529	84	65	3,907	9,162
2027	4,751	533	85	68	4,045	9,482
2028	30,047	1,032	525	70	4,798	36,472
2029	63,684	5,079	874	3,296	5,942	78,875
2030	116,686	17,324	846	48,801	13,302	196,959
2031	101,212	9,159	733	24,370	10,043	145,517
2032	95,077	5,098	682	11,842	8,508	121,207
2033	81,541	3,875	419	5,738	7,475	99,048
2034	50,302	10,325	113	19	5,942	66,701
2035	46,566	12,562	95		5,969	65,192
2036	10,418	2,201	15		5,360	17,994
2037	3,219	185			5,366	8,770
2038	3,341	186			5,555	9,082
2039	3,468	188			5,749	9,405
2040	3,610	191			5,968	9,769
2041	3,736	191			6,160	10,087
2042	3,878	192			6,376	10,446
2043	4,025	194			6,600	10,819
2044	4,191	197			6,851	11,239
2045	4,337	197			7,072	11,606
2046	4,502	199			7,320	12,021
2047	4,673	200			7,577	12,450
2048	4,866	203			7,865	12,934
2049	5,035	203			8,118	13,356
2050	5,226	205			8,403	13,834

TABLE 7 (continued)  
SCHEDULE OF ANNUAL EXPENDITURES  
Integrated DECON, UNIT 1  
(thousands, escalated dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2051	5,425	207			8,698	14,330
2052	5,648	210			9,028	14,886
2053	5,845	210			9,319	15,374
2054	6,067	211			9,646	15,924
2055	6,297	213			9,985	16,495
2056	6,557	216			10,364	17,137
2057	6,778	687		18	86,729	94,212
2058	5,770	2,121		2,513	10,981	21,385
	869,844	150,261	6,503	110,593	368,808	1,506,009

**TABLE 8**  
**SCHEDULE OF ANNUAL EXPENDITURES**  
**Integrated DECON, UNIT 2**  
(thousands, escalated dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2027	57,081	5,398	509	40	5,202	68,230
2028	108,322	17,236	1,303	18,205	11,844	156,910
2029	121,897	24,148	833	57,961	14,809	219,648
2030	100,092	21,114	743	30,789	11,849	164,587
2031	83,875	18,883	674	9,796	9,631	122,859
2032	84,349	17,867	655	10,166	9,902	122,939
2033	53,239	3,744	268	4,945	7,673	69,869
2034	42,930	6,561	113	19	5,942	55,565
2035	41,167	7,715	95		5,969	54,946
2036	9,485	1,377	15		5,360	16,237
2037	3,186	144			5,366	8,696
2038	3,307	145			5,555	9,007
2039	3,432	146			5,749	9,327
2040	3,570	148			5,968	9,686
2041	3,698	148			6,160	10,006
2042	3,838	150			6,376	10,364
2043	3,984	151			6,600	10,735
2044	4,144	153			6,851	11,148
2045	4,293	153			7,072	11,518
2046	4,456	154			7,320	11,930
2047	4,625	156			7,577	12,358
2048	4,811	158			7,865	12,834
2049	4,983	158			8,118	13,259
2050	5,173	159			8,403	13,735
2051	5,369	161			8,698	14,228
2052	5,585	163			9,028	14,776
2053	5,785	163			9,319	15,267
2054	6,005	164			9,646	15,815
2055	6,233	166			9,985	16,384
2056	6,483	168			10,364	17,015
2057	6,709	643		18	86,729	94,099
2058	5,770	2,121		2,513	10,981	21,385
	807,876	129,915	5,208	134,452	337,911	1,415,362

**TABLE 9**  
**SCHEDULE OF ANNUAL EXPENDITURES**  
**SAFSTOR, UNIT 1**  
(thousands, escalated dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2016	40,133	1,480	651	43	5,489	47,796
2017	45,581	20,774	468	6,119	7,276	80,218
2018	15,273	13,639	146	50	5,015	34,123
2019	15,853	13,752	148	51	5,191	34,995
2020	16,501	13,904	151	53	5,389	35,998
2021	11,158	8,193	120	55	4,908	24,434
2022	3,344	443	78	57	4,173	8,095
2023	3,471	446	79	59	4,320	8,375
2024	3,613	451	80	61	4,483	8,688
2025	3,740	454	81	63	4,629	8,967
2026	3,882	457	83	65	4,792	9,279
2027	4,029	461	84	68	4,961	9,603
2028	4,194	466	85	70	5,149	9,964
2029	4,341	469	87	73	5,316	10,286
2030	4,506	473	88	75	5,503	10,645
2031	4,678	476	89	78	5,694	11,015
2032	4,870	481	90	80	5,907	11,428
2033	5,041	483	91	83	6,097	11,795
2034	5,232	486	92	86	6,310	12,206
2035	5,430	490	93	89	6,532	12,634
2036	5,652	495	95	92	6,779	13,113
2037	5,849	497	96	96	6,999	13,537
2038	6,071	501	97	99	7,244	14,012
2039	6,301	505	99	102	7,499	14,506
2040	6,559	511	100	106	7,782	15,058
2041	6,789	514	102	110	8,034	15,549
2042	7,047	518	103	113	8,316	16,097
2043	7,315	522	105	117	8,608	16,667
2044	7,615	527	106	122	8,933	17,303
2045	7,882	530	108	126	9,223	17,869
2046	8,181	534	109	130	9,547	18,501
2047	8,492	538	111	135	9,882	19,158
2048	8,840	544	112	140	10,255	19,891
2049	9,150	547	114	144	10,588	20,543
2050	9,497	551	116	150	10,960	21,274
2051	9,858	556	117	155	11,344	22,030
2052	10,262	561	119	160	11,772	22,874
2053	10,622	564	120	166	12,155	23,627
2054	11,025	569	122	172	12,581	24,469

**TABLE 9 (continued)**  
**SCHEDULE OF ANNUAL EXPENDITURES**  
**SAFSTOR, UNIT 1**  
(thousands, escalated dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2055	11,444	573	124	178	13,023	25,342
2056	11,913	579	125	184	13,514	26,315
2057	12,323	582	127	190	13,947	27,169
2058	8,583	382	129	197	13,445	22,736
2059	8,909	385	131	204	13,917	23,546
2060	9,271	389	133	211	14,445	24,449
2061	9,599	391	135	219	14,911	25,255
2062	9,964	394	137	226	15,434	26,155
2063	10,343	397	138	234	15,976	27,088
2064	10,763	402	140	242	16,583	28,130
2065	11,144	403	142	251	17,118	29,058
2066	11,567	406	144	260	17,718	30,095
2067	12,007	410	146	269	18,340	31,172
2068	12,495	414	149	278	19,036	32,372
2069	227,783	1,586	1,182	288	19,812	250,651
2070	409,097	11,943	1,497	58,933	56,799	538,269
2071	502,709	23,419	1,421	200,191	142,584	870,324
2072	333,771	6,927	1,174	44,255	36,198	422,325
2073	324,415	6,532	1,111	42,811	36,167	411,036
2074	11,308	134		86	18,932	30,460
2075	172,528	2,449	220	277	20,394	195,868
2076	153,288	8,132	178	23	17,213	178,834
2077	149,654	8,549	169		17,402	175,774
2078	2,134	117	2		246	2,499
	2,794,889	164,257	13,789	359,820	868,789	4,201,544

**TABLE 10**  
**SCHEDULE OF ANNUAL EXPENDITURES**  
**SAFSTOR, UNIT 2**  
(thousands, escalated dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2027	31,549	2,809	501	40	5,202	40,101
2028	67,605	15,907	777	9,001	11,296	104,586
2029	12,747	11,803	174	73	7,359	32,156
2030	13,231	11,902	176	75	7,618	33,002
2031	13,735	11,984	178	78	7,882	33,857
2032	13,334	10,893	169	80	7,945	32,421
2033	5,163	477	91	83	6,123	11,937
2034	5,359	480	92	86	6,337	12,354
2035	5,562	484	93	89	6,560	12,788
2036	5,789	490	95	92	6,807	13,273
2037	5,992	491	96	96	7,028	13,703
2038	6,219	495	97	99	7,275	14,185
2039	6,454	499	99	102	7,531	14,685
2040	6,718	506	100	106	7,815	15,245
2041	6,954	507	102	110	8,068	15,741
2042	7,219	511	103	113	8,352	16,298
2043	7,493	515	105	117	8,645	16,875
2044	7,799	522	106	122	8,971	17,520
2045	8,073	523	108	126	9,262	18,092
2046	8,380	528	109	130	9,588	18,735
2047	8,698	532	111	135	9,924	19,400
2048	9,054	539	112	140	10,299	20,144
2049	9,372	540	114	144	10,633	20,803
2050	9,728	544	116	150	11,006	21,544
2051	10,098	549	117	155	11,393	22,312
2052	10,510	556	119	160	11,822	23,167
2053	10,880	557	120	166	12,206	23,929
2054	11,293	562	122	172	12,635	24,784
2055	11,722	566	124	178	13,078	25,668
2056	12,201	573	125	184	13,572	26,655
2057	12,616	575	127	190	14,007	27,515
2058	8,938	405	129	197	13,506	23,175
2059	9,277	408	131	204	13,981	24,001
2060	9,661	413	133	211	14,511	24,929
2061	9,996	415	135	219	14,979	25,744
2062	10,375	418	137	226	15,505	26,661
2063	10,770	421	138	234	16,049	27,612
2064	11,215	426	140	242	16,658	28,681
2065	11,604	428	142	251	17,196	29,621

**TABLE 10**  
**SCHEDULE OF ANNUAL EXPENDITURES**  
**SAFSTOR, UNIT 2**  
(thousands, escalated dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2066	12,045	432	144	260	17,799	30,680
2067	12,503	435	146	269	18,424	31,777
2068	13,020	440	149	278	19,123	33,010
2069	31,148	565	260	288	19,749	52,010
2070	243,567	2,556	1,517	298	20,592	268,530
2071	453,824	19,128	1,494	137,945	101,315	713,706
2072	502,150	18,002	1,351	156,583	108,555	786,641
2073	426,974	6,592	1,186	39,753	35,568	510,073
2074	443,199	6,643	1,203	41,148	36,816	529,009
2075	364,182	4,552	613	13,895	26,328	409,570
2076	265,272	18,965	178	23	17,225	301,663
2077	268,875	20,339	169		17,402	306,785
2078	3,827	281	2		246	4,356
	3,483,969	180,683	14,175	405,116	847,766	4,931,709

Attachment 3  
L-09-187

Regulatory Commitment List  
Page 1 of 1

The following list identifies those actions committed to by FirstEnergy Nuclear Operating Company (FENOC) for the Beaver Valley Power Station Unit No. 1 in this document. Any other actions discussed in the submittal represent intended or planned actions by FENOC. They are described only as information and are not Regulatory Commitments. Please notify Mr. Thomas A. Lentz, Manager - Fleet Licensing, at (330) 761-6071 of any questions regarding this document or associated Regulatory Commitments.

Regulatory Commitment

Due Date

1. FENOC also proposes to implement an amendment to paragraph 8 of the existing [Parental] Guaranty to provide as follows:

1. FENOC intends to implement this amendment by October 1, 2009.

The guarantor agrees to submit revised financial statements, financial test data, and a special auditor's report and reconciling schedule to the NRC [Nuclear Regulatory Commission] annually within 90 days of the close of the parent guarantor's fiscal year. In addition, within the same 90 day period, FENGenCo [FirstEnergy Nuclear Generation Corp.] will annually calculate the amount of decommissioning funding assurance required using the prepayment method as compared with the value of decommissioning trust fund assets available. The Guarantor will increase or decrease the Guaranty amount to cover the difference in value and provide Notice to NRC, in the guarantor's annual submission, if any change is made to the Guaranty amount as a result of the annual assessment. If the NRC disagrees with the amount of increase or decrease in the guaranty amount made in the annual assessment, upon Notice issued by NRC to FENGenCo, FENGenCo shall promptly provide alternative additional assurance in a form and amount to be approved by the NRC.