DOCKET NO. 050078
PROGRESS ENERGY FLORIDA
EXHIBIT NO. ___ (DEY-4)
NUCLEAR DECOMMISSIONING
STUDY VOL. 1 OF 1

Progress Energy

CRYSTAL RIVER NUCLEAR PLANT

2005

NUCLEAR DECOMMISSIONING COST STUDY

PROGRESS ENERGY
2005 NUCLEAR DECOMMISSIONING COST STUDY

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Section 1

Decommissioning Study Summary

PROGRESS ENERGY FLORIDA
2005 NUCLEAR DECOMMISSIONING COST STUDY
DECOMMISSIONING STUDY SUMMARY

A site specific decommissioning cost study has been prepared by TLG Services, Inc. (TLG) for Crystal River Unit No. Three (CR3) which estimates the cost of decommissioning to be $668,668,051 in 2005 dollars. The costs can be categorized as follows:

	(in 000's) 2005 $'s	% of Total
Decontamination	$ 11,789	1.8%
Removal	76,389	11.4%
Packaging	13,698	2.0%
Shipping	6,564	1.0%
Burial	76,158	11.4%
Program Management	280,985	42.0%
Other	203,085	30.4%
	$ 668,668	100.0%

The cost estimate includes updated decommissioning assumptions from the cost study that was approved by the Florida Public Service Commission (FPSC) in 2000. The most significant changes are related to changes in program management and spent fuel storage. Comparative analyses detailing the factors that contributed to most significant cost changes since the last study are contained in Section 8.

ESCALATION RATE

The future cost of decommissioning CR3 is forecast by analyzing the individual cost categories from TLG's cost study as described above. The 2005 cost of each category is divided into components of labor, material, burial, transportation and other. These components are escalated by the estimated inflationary rates for wages, material, transportation and Gross Domestic Product as projected by Economy.com. Burial costs are escalated by a growth rate specific to low level radioactive waste burial costs. Section 3 contains schedules, which indicate the percentage allocations for each category and the applicable escalation rates. The cost estimate obtained by applying these rates yields the future cost of decommissioning CR3 using currently available technology and procedures.

The methodology used to determine the escalation rate for converting the current estimated decommissioning cost to future estimated decommissioning cost is the same as that approved in FPSC Order No. PSC-95-1531-FOF-EI dated December 12, 1995. An additional index was added in that study to capture the rate of escalation in low level radioactive waste burial cost, because burial cost had historically increased at a much faster rate than the other inflation indices that were used in the cost forecast. The resulting composite escalation rate is 3.45%.

The rate of increase in nuclear decommissioning costs has generally exceeded inflation. This is attributable primarily to increasing burial rates for low level radioactive waste and the impact of the delayed acceptance of high level radioactive waste by the Department of Energy. The delayed acceptance will, among other things, require Progress Energy Florida (PEF) to design, license and construct an independent spent fuel storage installation (ISPSI), including a dry cask storage pad, the purchase of multi purpose canisters, and the provision of on site management of the high level waste.

MINIMUM FUND EARNINGS RATE

The minimum fund earnings rate was determined using the same methodology specified in Order No. 21928 (long-term CPI over the next 25 years), which results in a minimum fund earnings rate, net of taxes and all other administrative costs charged to the trust fund, of 2.20%. See Section 4 for the detailed calculation.

PEF has developed an assumed fund earnings rate which recognizes that securities with higher risk and return are used in both the FPSC and FERC jurisdictional portions of the qualified fund. PEF has determined that an appropriate assumed earnings rate for the next five year review period would be 5.50% based on the projected long-term earnings rate of the current investment strategy, the expected taxes and administrative expenses of the trust, and market volatility over the next thirty years. See Section 4 for the calculation of the assumed fund earnings rate, and Section 5 for a summary of historical returns earned by the fund for the past five years compared to CPI and other indices.

CONTINGENCY ALLOWANCE

The overall contingency allowance of 25% approved in Order No. 21928 was reduced to 17% in the 1994 cost study. The contingency factor used in the 2000 study remained at 17%. The contingency factor used in the 2005 study is approximately 17.3%. The reductions in the factor during the 1990s are based on improved study methodology and industry experience over those used in Order No. 21928. A detailed explanation of the contingency allowance is contained in Subsection 3.3.1 of the TLG cost study Section 7.

CONCLUSION

The annual accrual amount requested for PEF's retail share of total decommissioning costs is $0. This is based on the assumptions of a total cost in 2005 dollars of $668,668,051 an escalation rate of 3.45%, and an assumed fund earnings rate of 5.50%. PEF requests that the annual accrual be effective January 1, 2006. Section 2 of this report provides the related assumptions and calculations. Section 6 contains a cash flow schedule, which shows that funding at the requested level would satisfy the future cost of decommissioning.

PARTIES OWNING AN INTEREST IN CR3

There are 9 participants other than PEF in the ownership of the CR3 nuclear unit. The total participant's share is 8.2194%. Participants are responsible for funding their individual portion of the total cost of decommissioning.

In 1990, PEF and the co-owners submitted a certification to the Nuclear Regulatory Commission (PEF letter 3F0790-05) that funds will be available to decommission the nuclear facility. Assurance was provided that PEF and each participant would fund their pro rata share of the decommissioning cost liability using an external trust fund. The NRC requires biennially that PEF and the participants provide an update on the funding status of the external trust fund. In the March 2005 report, PEF and the participants reported current funding balances, accrual rates, assumed cost escalation rates, and assumed fund earnings rates. PEF reported that funds were being accrued at a rate sufficient to meet the site specific cost study approved by the FPSC.

Participants	% Share	Costs in 2005 $'s	Required at 12/31/04 *	Balance at 12/31/04
City of Alachua	0.0779%	$ 520,892	$ 251,764	$ 332,271
City of Bushnell	0.0388%	259,443	125,397	172,396
City of Gainsville	1.4079%	9,414,178	4,550,186	5,707,317
City of Kissimmmee	0.6754%	4,516,184	2,182,822	2,770,829
City of Leesburg	0.8244%	5,512,499	2,664,375	3,381,995
City of Ocala	1.3333%	8,915,351	4,309,086	5,396,724
City of New Smyrna Beach	0.5608%	3,749,891	1,812,447	1,926,896
Orlando Utilities Commission	1.6015%	10,708,719	5,175,881	8,309,088
Seminole Electric Coop. Inc.	1.6994%	11,363,345	5,492,283	6,063,947
Total - Participants	8.2194%	54,960,502	$ 26,564,241	$ 34,061,463
Florida Power Corporation	91.7806%	613,707,549		
Total	100.0000%	$ 668,668,051		

* At 12/31/04, the funded amount should approximate 48% (29 years / 60 years) of the decomm costs.

IRS REQUIRED ISSUES

The following items require specific FPSC rulings to obtain Internal Revenue Service (IRS) approval of PEF's treatment of decommissioning costs for tax purposes. PEF seeks approval of:

1) Prompt Removal/Dismantling method of decommissioning, which is consistent with the last filing

2) Estimated cost of $668,668,051 in 2005 dollars needed to decommission CR3. This cost includes a contingency allowance of 17.3% for which we also seek approval

3) Estimated cost of decommissioning of $2,587,759,722 in future dollars based on the 17.3% contingency, PEF's assumed escalation rate of 3.45%, and an operating license termination date of December 3, 2036

4) Expenditure of funds accumulated in the Nuclear Decommissioning Trust in the years 2036 – 2073

5) Estimated future costs of decommissioning in each year in which decommissioning funds will be expended:

Year of Decomm.	Estimated Future Cost Crystal River Unit No. 3	Year of Decomm.	Estimated Future Cost Crystal River Unit No. 3
2036	$ 15,977,199	2055	18,017,082
2037	217,391,344	2056	18,689,736
2038	343,951,242	2057	19,281,706
2039	331,732,415	2058	19,946,925
2040	217,666,674	2059	20,635,093
2041	224,560,939	2060	21,405,489
2042	182,647,560	2061	22,083,476
2043	132,034,134	2062	22,845,356
2044	101,416,626	2063	23,633,521
2045	67,156,640	2064	24,515,860
2046	13,277,307	2065	25,292,363
2047	13,735,374	2066	26,164,950
2048	14,248,174	2067	27,067,641
2049	14,699,464	2068	28,078,191
2050	15,206,595	2069	28,967,525
2051	15,731,223	2070	29,966,905
2052	16,318,536	2071	31,000,763
2053	16,835,401	2072	155,472,851
2054	17,416,223	2073	52,691,219
			$ 2,587,759,722

6) Methodology of converting the estimated cost of decommissioning in current dollars to estimated cost of decommissioning in future dollars is accomplished by multiplying each year's expenditures by the composite escalation factor of 3.45% compounded by the number of years between 2005 and the year of expenditure

7) The assumed after-tax, net of administrative expenses, rate of return of 5.50%, to be earned by the amounts collected for decommissioning

8) Inclusion of $0 in cost of service each year, beginning January 1, 2006, until expiration of the operating license on December 3, 2036

9) Projected date Crystal River Unit No. 3 will no longer be included in rate base for ratemaking purposes of December 3, 2036.

10) Affirmative statement that decommissioning costs in the amount of $0 be included in PEF's cost of service for ratemaking purposes.

OTHER ISSUES

Spent Nuclear Fuel Storage Costs

The Department of Energy's delay in acceptance of spent nuclear fuel has impacted the overall cost of decommissioning. Additional costs will be incurred to fund, among other things, the design, licensing and construction of an independent spent fuel storage installation including the construction of a dry spent fuel storage pad, the purchase of multi purpose storage casks, and staffing to monitor the fuel during storage prior to DOE acceptance of the fuel. Section 7 of this document contains the CR3 decommissioning cost study which addresses the necessity of on-site spent fuel storage and its impact of the cost of decommissioning (Section 7, Executive Summary, page x and Subsections 1.3.1 and 3.4.1).

Section 2

Determination of Annual Accrual for Decommissioning

PROGRESS ENERGY FLORIDA
ESTIMATED COST OF DECOMMISSIONING
(COST INCLUDES 17.3% CONTINGENCY)

2005 SYSTEM
DETERMINATION OF ANNUAL ACCRUAL FOR DECOMMISSIONING

CRYSTAL RIVER #3 - NUCLEAR PLANT

YEAR	% OF 2005 COST TO BE SPENT	ESTIMATED 100% COST IN 2005 DOLLARS	(1) ESTIMATED COST IN YEAR INCURRED	(2) FPC SHARE IN YEAR INCURRED	78.12% * (2) QUALIFIED PLAN AMOUNT	21.88% * (2) NONQUALIFIED PLAN AMOUNT PRE-TAX	TAX SAVINGS NQ * .38575	NONQUALIFIED PLAN AMOUNT NET OF TAX	(3) 2005 NPV OF NONQUALIFIED FUND NET OF TAX	(3) 2005 NPV OF QUALIFIED FUND	
									374,815.57		
2036	0.8349%	$ 5,582,841	$ 15,977,199	$ 14,663,968	$ 11,455,493	$ 3,208,476	$ 1,237,670	$ 1,970,806	$ 374,816	$ 2,178,650	31
2037	10.9814%	$ 73,428,796	217,391,344	199,523,080	155,867,430	43,655,650	16,840,167	26,815,483	4,834,003	28,098,081	32
2038	16.7950%	$ 112,302,790	343,951,242	315,680,514	246,609,618	69,070,896	26,644,098	42,426,798	7,249,517	42,138,478	33
2039	15.6582%	$ 104,701,061	331,732,415	304,466,001	237,848,840	66,617,161	25,697,570	40,919,591	6,627,468	38,522,761	34
2040	9.9315%	$ 66,408,645	217,666,674	199,775,779	156,064,839	43,710,940	16,861,495	26,849,445	4,121,917	23,959,016	35
2041	9.9043%	$ 66,227,200	224,560,939	206,103,377	161,007,958	45,095,419	17,395,558	27,699,861	4,030,780	23,429,272	36
2042	7.7871%	$ 52,069,758	182,647,560	167,635,026	130,956,482	36,678,544	14,148,748	22,529,796	3,107,537	18,062,838	37
2043	5.4415%	$ 36,385,422	132,034,134	121,181,720	94,667,160	26,514,560	10,227,992	16,286,568	2,129,296	12,376,729	38
2044	4.0403%	$ 27,015,926	101,416,626	93,080,788	72,714,712	20,366,076	7,856,214	12,509,862	1,550,267	9,011,070	39
2045	2.5862%	$ 17,292,953	67,156,640	61,636,767	48,150,642	13,486,125	5,202,273	8,283,852	973,047	5,655,926	40
2046	0.4943%	$ 3,304,911	13,277,307	12,185,992	9,519,697	2,666,295	1,028,523	1,637,772	182,349	1,059,918	41
2047	0.4943%	$ 3,304,911	13,735,374	12,606,409	9,848,127	2,758,282	1,064,007	1,694,275	178,805	1,039,323	42
2048	0.4956%	$ 3,313,965	14,248,174	13,077,060	10,215,799	2,861,261	1,103,731	1,757,530	175,811	1,021,919	43
2049	0.4943%	$ 3,304,911	14,699,464	13,491,256	10,539,369	2,951,887	1,138,690	1,813,197	171,924	999,324	44
2050	0.4943%	$ 3,304,911	15,206,595	13,956,704	10,902,977	3,053,727	1,177,975	1,875,752	168,583	979,906	45
2051	0.4943%	$ 3,304,911	15,731,223	14,438,211	11,279,130	3,159,081	1,218,615	1,940,466	165,308	960,865	46
2052	0.4956%	$ 3,313,965	16,318,536	14,977,260	11,700,228	3,277,022	1,264,111	2,012,911	162,540	944,776	47
2053	0.4943%	$ 3,304,911	16,836,401	15,451,632	12,070,815	3,380,817	1,304,150	2,076,667	158,946	923,886	48
2054	0.4943%	$ 3,304,911	17,416,223	15,984,714	12,487,259	3,497,455	1,349,143	2,148,312	155,857	905,934	49
2055	0.4943%	$ 3,304,911	18,017,082	16,536,186	12,918,069	3,618,117	1,395,689	2,222,428	152,829	888,331	50
2056	0.4956%	$ 3,313,965	18,689,736	17,153,552	13,400,355	3,753,197	1,447,796	2,305,401	150,270	873,456	51
2057	0.4943%	$ 3,304,911	19,281,706	17,696,865	13,824,791	3,872,074	1,493,653	2,378,421	146,947	854,143	52
2058	0.4943%	$ 3,304,911	19,946,925	18,307,407	14,301,746	4,005,661	1,545,184	2,460,477	144,092	837,546	53
2059	0.4943%	$ 3,304,911	20,635,093	18,939,012	14,795,156	4,143,856	1,598,492	2,545,364	141,292	821,271	54
2060	0.4956%	$ 3,313,965	21,405,489	19,646,086	15,347,522	4,298,564	1,658,171	2,640,393	138,926	807,519	55
2061	0.4943%	$ 3,304,911	22,083,476	20,268,347	15,833,633	4,434,714	1,710,691	2,724,023	135,854	789,665	56
2062	0.4943%	$ 3,304,911	22,845,356	20,967,605	16,379,893	4,587,712	1,769,710	2,818,002	133,214	774,321	57
2063	0.4943%	$ 3,304,911	23,633,521	21,690,987	16,944,999	4,745,988	1,830,765	2,915,223	130,626	759,275	58
2064	0.4956%	$ 3,313,965	24,515,860	22,500,803	17,577,627	4,923,176	1,899,115	3,024,061	128,439	746,561	59
2065	0.4943%	$ 3,304,911	25,292,363	23,213,483	18,134,373	5,079,110	1,959,267	3,119,843	125,599	730,054	60
2066	0.4943%	$ 3,304,911	26,164,950	24,014,348	18,760,009	5,254,339	2,026,861	3,227,479	123,158	715,868	61
2067	0.4943%	$ 3,304,911	27,067,641	24,842,843	19,407,229	5,435,614	2,096,788	3,338,826	120,765	701,958	62
2068	0.4956%	$ 3,313,965	28,078,191	25,770,332	20,131,783	5,638,549	2,175,070	3,463,479	118,743	690,204	63
2069	0.4943%	$ 3,304,911	28,967,525	26,586,568	20,769,427	5,817,141	2,243,962	3,573,179	116,117	674,943	64
2070	0.4943%	$ 3,304,911	29,966,905	27,503,805	21,485,972	6,017,833	2,321,379	3,696,454	113,861	661,828	65
2071	0.4943%	$ 3,304,911	31,000,763	28,452,686	22,227,238	6,225,448	2,401,467	3,823,981	111,649	648,968	66
2072	2.3961%	$ 16,021,803	155,472,851	142,693,915	111,472,486	31,221,429	12,043,666	19,177,763	530,742	3,084,984	67
2073	0.7850%	$ 5,248,855	52,691,219	48,360,317	37,779,080	10,581,237	4,081,712	6,499,525	170,496	991,024	68
	100.0000%	$ 668,668,051	$ 2,587,759,722	$ 2,375,061,396	$ 1,855,397,963	$ 519,663,433	$ 200,460,168	$ 319,203,265	$ 39,452,390	$ 229,320,591	

	NONQUALIFIED	QUALIFIED	TOTAL
NPV @ 12/31/04	$ 39,452,390	$ 229,320,591	$ 268,772,981
CITY OF TALLAHASSEE'S PERMANENT RE-ALLOCATION (6)	$ 3,779,502	($ 3,779,502)	$ 0
ADJUSTED NET PRESENT VALUE	$ 43,231,892	$ 225,541,089	$ 268,772,981
LESS BOOK VALUE @ 12/31/04			
PROGRESS ENERGY FLORIDA	$ 78,917,083	$ 285,656,495	$ 364,573,579
CITY OF TALLAHASSEE	5,734,036	0	5,734,036
	$ 84,651,119	$ 285,656,495	$ 370,307,614
PV OF FUND REQUIREMENTS	($ 41,419,227)	($ 60,115,406)	($ 101,534,633)
MONTHLY FUND REQUIREMENT (4)	$ 0	$ 0	$ 0
ANNUAL FUND REQUIREMENT	$ 0	$ 0	$ 0
MONTHLY ACCRUAL (5)	$ 0	$ 0	$ 0
ANNUAL ACCRUAL - SYSTEM	$ 0	$ 0	$ 0

(1) ESTIMATED COST IN2005 DOLLARS X (1 + INFLATION RATE) ^ (YEAR OF EXPENDITURE - 2005)
(2) QUAL. AND NONQUAL. PLAN AMOUNTS 91.7806% 91.7806%
(3) ESTIMATED ANNUAL DOLLARS / (1 + EARNINGS RATE) ^ (YEAR OF DECOMMISSIONING - CURRENT YEAR(2005))
(4) PMT(.05366039 / 12, 371 (mos.), - $(41,419,227)), (EXCEL FORMULA) 371
(5) FOR THE NONQUALIFIED FUND,$(228,952) / (1 - .38575)
(6) RE-ALLOCATION OF THE THEORETICAL QUAL PORTION OF THE CITY OF TALLAHASSEE'S ACQUIRED NDC FUND BALANCE OF $4,838,072.30

ASSUMPTIONS:

2005 COST -	$ 668,668,051
COST ESCALATION RATE -	3.450000%
EARNINGS RATE (AFTER TAX) - ANNUAL	5.500000%
- MONTHLY	#NAME?
FEDERAL TAX RATE	35.000000%
STATE TAX RATE	5.500000%

Date: 4/13/2005

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PROGRESS ENERGY FLORIDA
ESTIMATED COST OF DECOMMISSIONING
(COST INCLUDES 17.3% CONTINGENCY)

2005 RETAIL
DETERMINATION OF ANNUAL ACCRUAL FOR DECOMMISSIONING

CRYSTAL RIVER #3 - NUCLEAR PLANT

YEAR	% OF 2005 COST TO BE SPENT	ESTIMATED 100% COST IN 2005 DOLLARS	(1) ESTIMATED COST IN YEAR INCURRED	(2) FPC SHARE IN YEAR INCURRED	78.12% * (2) QUALIFIED PLAN AMOUNT	21.88% * (2) NONQUALIFIED PLAN AMOUNT PRE-TAX	TAX SAVINGS NQ * .38575	NONQUALIFIED PLAN AMOUNT NET OF TAX	(3) 2005 NPV OF NONQUALIFIED FUND NET OF TAX	(3) 2005 NPV OF QUALIFIED FUND	
2036	0.8349%	$ 5,582,841	$ 15,977,199	$ 13,715,826	$ 10,714,803	$ 3,001,023	$ 1,157,645	$ 1,843,378	$ 350,581	$ 2,037,783	31
2037	10.9814%	73,428,796	217,391,344	186,622,308	145,789,347	40,832,961	15,751,315	25,081,646	4,521,446	26,281,314	32
2038	16.7950%	112,302,790	343,951,242	295,269,229	230,664,322	64,604,907	24,921,343	39,683,564	6,780,778	39,413,886	33
2039	15.6582%	104,701,081	331,732,415	284,779,825	222,469,999	62,309,826	24,036,015	38,273,811	6,198,949	36,031,955	34
2040	9.9315%	66,406,645	217,666,674	186,858,668	145,973,991	40,884,677	15,771,264	25,113,413	3,855,402	22,409,873	35
2041	9.9043%	66,227,200	224,560,939	192,777,136	150,597,499	42,179,637	16,270,795	25,908,842	3,770,157	21,914,381	36
2042	7.7871%	52,069,758	182,647,560	156,796,073	122,489,092	34,306,981	13,233,918	21,073,063	2,906,609	16,894,930	37
2043	5.4415%	36,385,422	132,034,134	113,346,347	88,546,166	24,800,181	9,566,670	15,233,511	1,991,620	11,576,474	38
2044	4.0403%	27,015,926	101,416,626	87,062,366	68,013,120	19,049,246	7,348,247	11,700,999	1,450,030	8,428,432	39
2045	2.5862%	17,292,953	67,156,640	57,651,454	45,037,316	12,614,138	4,865,904	7,748,234	910,132	5,290,225	40
2046	0.4943%	3,304,911	13,277,307	11,398,070	8,904,172	2,493,898	962,021	1,531,877	170,558	991,386	41
2047	0.4943%	3,304,911	13,735,374	11,791,303	9,211,366	2,579,937	995,211	1,584,726	167,244	972,122	42
2048	0.4956%	3,313,965	14,248,174	12,231,522	9,555,265	2,676,257	1,032,366	1,643,891	164,444	955,844	43
2049	0.4943%	3,304,911	14,699,464	12,618,938	9,857,914	2,761,024	1,065,065	1,695,959	160,808	934,710	44
2050	0.4943%	3,304,911	15,206,595	13,054,291	10,198,012	2,856,279	1,101,810	1,754,469	157,683	916,547	45
2051	0.4943%	3,304,911	15,731,223	13,504,664	10,549,844	2,954,820	1,139,822	1,814,998	154,619	898,738	46
2052	0.4956%	3,313,965	16,318,536	14,008,851	10,943,714	3,065,137	1,182,377	1,882,760	152,030	883,688	47
2053	0.4943%	3,304,911	16,835,401	14,452,560	11,290,340	3,162,220	1,219,826	1,942,394	148,669	864,150	48
2054	0.4943%	3,304,911	17,416,223	14,951,174	11,679,857	3,271,317	1,261,911	2,009,406	145,780	847,358	49
2055	0.4943%	3,304,911	18,017,082	15,466,989	12,082,812	3,384,177	1,305,446	2,078,731	142,947	830,893	50
2056	0.4956%	3,313,965	18,689,736	16,044,437	12,533,914	3,510,523	1,354,184	2,156,339	140,553	816,980	51
2057	0.4943%	3,304,911	19,281,706	16,552,621	12,930,908	3,621,713	1,397,076	2,224,637	137,446	798,916	52
2058	0.4943%	3,304,911	19,946,925	17,123,686	13,377,024	3,746,662	1,445,275	2,301,387	134,775	783,392	53
2059	0.4943%	3,304,911	20,635,093	17,714,453	13,838,531	3,875,922	1,495,137	2,380,785	132,156	768,170	54
2060	0.4956%	3,313,965	21,405,489	18,375,809	14,355,182	4,020,627	1,550,957	2,469,670	129,943	755,307	55
2061	0.4943%	3,304,911	22,083,476	18,957,835	14,809,861	4,147,974	1,600,081	2,547,893	127,070	738,607	56
2062	0.4943%	3,304,911	22,845,356	19,611,880	15,320,801	4,291,079	1,655,264	2,635,795	124,601	724,255	57
2063	0.4943%	3,304,911	23,633,521	20,288,491	15,849,369	4,439,122	1,712,391	2,726,731	122,180	710,181	58
2064	0.4956%	3,313,965	24,515,860	21,045,945	16,441,092	4,604,853	1,776,322	2,828,531	120,134	698,290	59
2065	0.4943%	3,304,911	25,292,363	21,712,544	16,961,839	4,750,705	1,832,584	2,918,121	117,478	682,850	60
2066	0.4943%	3,304,911	26,164,950	22,461,627	17,547,023	4,914,604	1,895,808	3,018,796	115,195	669,581	61
2067	0.4943%	3,304,911	27,067,641	23,236,554	18,152,396	5,084,158	1,961,214	3,122,944	112,957	656,571	62
2068	0.4956%	3,313,965	28,078,191	24,104,073	18,830,102	5,273,971	2,034,434	3,239,537	111,065	645,577	63
2069	0.4943%	3,304,911	28,967,525	24,867,533	19,426,517	5,441,016	2,098,672	3,342,144	108,609	631,303	64
2070	0.4943%	3,304,911	29,968,905	25,725,463	20,096,732	5,628,731	2,171,283	3,457,448	106,499	619,036	65
2071	0.4943%	3,304,911	31,000,763	26,612,991	20,790,069	5,822,922	2,246,192	3,576,730	104,430	607,007	66
2072	2.3961%	16,021,803	155,472,851	133,467,606	104,264,894	29,202,712	11,264,946	17,937,766	496,425	2,885,515	67
2073	0.7850%	5,248,855	52,691,219	45,233,433	35,336,358	9,897,075	3,817,797	6,079,278	159,472	926,946	68
	100.0000%	$ 668,668,051	$ 2,587,759,722	$ 2,221,494,575	$ 1,735,431,563	$ 486,063,012	$ 187,498,808	$ 298,564,204	$ 36,901,474	$ 214,493,173	

	NONQUALIFIED	QUALIFIED	TOTAL
NPV @ 12/31/04 RETAIL	$ 36,901,474	$ 214,493,173	$ 251,394,647
LESS BOOK VALUE @ 12/31/04			
PROGRESS ENERGY FLORIDA	$ 74,902,571	$ 271,125,149	$ 346,027,720
CITY OF TALLAHASSEE	0	0	0
	$ 74,902,571	$ 271,125,149	$ 346,027,720
PV OF FUND REQUIREMENTS	($ 38,001,097)	($ 56,631,976)	($ 94,633,073)
MONTHLY FUND REQUIREMENT (4)			
ANNUAL FUND REQUIREMENT	$ 0	$ 0	$ 0
MONTHLY ACCRUAL (5)	$ 0	$ 0	$ 0
ANNUAL ACCRUAL - RETAIL	$ 0	$ 0	$ 0

(1) ESTIMATED COST IN 2005 DOLLARS X (1 + INFLATION RATE) ^ (YEAR OF EXPENDITURE - 2005)
(2) QUAL. AND NONQUAL. PLAN AMOUNTS X 904473) X (.94913)
(3) ESTIMATED ANNUAL DOLLARS / (1 + EARNINGS RATE) ^ (YEAR OF DECOMMISSIONING - CURRENT YEAR (2005))
(4)=PMT(.05366039 / 12, 371 (mos.), - $(38,001,097)), (EXCEL FORMULA)
(5) FOR THE NONQUALIFIED FUND,$(210,058)/ (1 - .38575)

		0.904473	0.94913
		371	

ASSUMPTIONS:

2005 COST -	$ 668,668,051
COST ESCALATION RATE -	3.450000%
EARNINGS RATE (AFTER TAX) - ANNUAL	5.500000%
- MONTHLY	#NAME?
FEDERAL TAX RATE	35.000000%
STATE TAX RATE	5.500000%

Date: 4/13/2005

#162677
B. Manges

PROGRESS ENERGY FLORIDA
ESTIMATED COST OF DECOMMISSIONING
(COST INCLUDES 17.3% CONTINGENCY)

2005 WHOLESALE
DETERMINATION OF ANNUAL ACCRUAL FOR DECOMMISSIONING

CRYSTAL RIVER #3 - NUCLEAR PLANT

YEAR	% OF 2005 COST TO BE SPENT	ESTIMATED 100% COST IN 2005 DOLLARS	(1) ESTIMATED COST IN YEAR INCURRED	(2) FPC SHARE IN YEAR INCURRED	78.12% * (2) QUALIFIED PLAN AMOUNT	21.88% * (2) NONQUALIFIED PLAN AMOUNT PRE-TAX	TAX SAVINGS NQ * .38575	NONQUALIFIED PLAN AMOUNT NET OF TAX	(3) 2005 NPV OF NONQUALIFIED FUND NET OF TAX	(3) 2005 NPV OF QUALIFIED FUND	
2036	0.8349%	$ 5,582,841	$ 15,977,199	$ 948,143	$ 740,690	$ 207,453	$ 80,025	$ 127,428	$ 24,235	$ 140,667	31
2037	10.9814%	73,428,796	217,391,344	12,900,772	10,078,083	2,822,689	1,088,852	1,733,837	312,557	1,816,767	32
2038	16.7950%	112,302,790	343,951,242	20,411,285	15,945,296	4,465,989	1,722,755	2,743,234	468,740	2,724,692	33
2039	15.6582%	104,701,061	331,732,415	19,686,176	15,378,841	4,307,335	1,661,554	2,645,781	428,519	2,490,806	34
2040	9.9315%	66,408,645	217,666,674	12,917,111	10,090,848	2,826,263	1,090,231	1,736,032	268,515	1,549,143	35
2041	9.9043%	66,227,200	224,560,939	13,326,241	10,410,459	2,915,782	1,124,763	1,791,019	260,622	1,514,891	36
2042	7.7871%	52,069,758	182,647,560	10,838,953	8,467,390	2,371,563	914,830	1,456,733	200,927	1,167,908	37
2043	5.4415%	36,385,422	132,034,134	7,835,373	6,120,994	1,714,379	661,322	1,053,057	137,676	800,255	38
2044	4.0403%	27,015,926	101,416,626	6,018,422	4,701,592	1,316,830	507,967	808,863	100,237	582,638	39
2045	2.5862%	17,292,953	67,156,640	3,985,313	3,113,326	871,987	336,369	535,618	62,915	365,701	40
2046	0.4943%	3,304,911	13,277,307	787,922	615,525	172,397	66,502	105,895	11,790	68,532	41
2047	0.4943%	3,304,911	13,735,374	815,106	636,761	178,345	68,797	109,548	11,561	67,201	42
2048	0.4956%	3,313,965	14,248,174	845,538	660,534	185,004	71,365	113,639	11,368	66,075	43
2049	0.4943%	3,304,911	14,699,464	872,318	681,455	190,863	73,625	117,238	11,118	64,614	44
2050	0.4943%	3,304,911	15,206,595	902,413	704,965	197,448	76,166	121,282	10,900	63,359	45
2051	0.4943%	3,304,911	15,731,223	933,547	729,286	204,261	78,794	125,467	10,688	62,128	46
2052	0.4956%	3,313,965	16,318,536	968,399	756,514	211,885	81,735	130,150	10,509	61,087	47
2053	0.4943%	3,304,911	16,835,401	999,072	780,475	218,597	84,324	134,273	10,277	59,737	48
2054	0.4943%	3,304,911	17,416,223	1,033,540	807,402	226,138	87,233	138,905	10,077	58,576	49
2055	0.4943%	3,304,911	18,017,082	1,069,197	835,257	233,940	90,242	143,698	9,882	57,438	50
2056	0.4956%	3,313,965	18,689,736	1,109,115	866,441	242,674	93,611	149,063	9,716	56,476	51
2057	0.4943%	3,304,911	19,281,706	1,144,244	893,883	250,361	96,577	153,784	9,501	55,227	52
2058	0.4943%	3,304,911	19,946,925	1,183,721	924,722	258,999	99,909	159,090	9,317	54,154	53
2059	0.4943%	3,304,911	20,635,093	1,224,559	956,625	267,934	103,356	164,578	9,136	53,102	54
2060	0.4956%	3,313,965	21,405,489	1,270,277	992,340	277,937	107,214	170,723	8,983	52,213	55
2061	0.4943%	3,304,911	22,083,476	1,310,512	1,023,772	286,740	110,610	176,130	8,784	51,058	56
2062	0.4943%	3,304,911	22,845,356	1,355,725	1,059,092	296,633	114,428	182,207	8,613	50,066	57
2063	0.4943%	3,304,911	23,633,521	1,402,496	1,095,630	306,866	118,374	188,492	8,446	49,093	58
2064	0.4956%	3,313,965	24,515,860	1,454,858	1,136,535	318,323	122,793	195,530	8,305	48,271	59
2065	0.4943%	3,304,911	25,292,363	1,500,939	1,172,534	328,405	126,682	201,723	8,121	47,204	60
2066	0.4943%	3,304,911	26,164,950	1,552,721	1,212,986	339,735	131,053	208,682	7,963	46,287	61
2067	0.4943%	3,304,911	27,067,641	1,606,289	1,254,833	351,456	135,574	215,882	7,808	45,387	62
2068	0.4956%	3,313,965	28,078,191	1,666,259	1,301,681	364,578	140,636	223,942	7,678	44,627	63
2069	0.4943%	3,304,911	28,967,525	1,719,035	1,342,910	376,125	145,090	231,035	7,508	43,640	64
2070	0.4943%	3,304,911	29,966,905	1,778,342	1,389,240	389,102	150,096	239,006	7,362	42,782	65
2071	0.4943%	3,304,911	31,000,763	**1,839,695**	**1,437,169**	**402,526**	**155,274**	**247,252**	**7,219**	41,961	66
2072	2.3961%	16,021,603	155,472,851	**9,226,309**	**7,207,592**	**2,018,717**	**778,720**	**1,239,997**	**34,317**	199,469	67
2073	0.7850%	5,248,855	52,691,219	3,126,884	2,442,722	684,162	263,915	420,247	11,024	64,078	68
	100.0000%	$ 668,668,051	$ 2,587,759,722	$ 153,566,821	$ 119,966,400	$ 33,600,421	$ 12,961,361	$ 20,639,060	$ 2,550,912	$ 14,827,420	

	NONQUALIFIED	QUALIFIED	TOTAL
NPV @ 12/31/04 - WHOLESALE	$ 2,550,912	$ 14,827,420	$ 17,378,332
CITY OF TALLAHASSEE'S PERMANENT RE-ALLOCATION (6)	$ 3,779,502	($ 3,779,502)	$ 0
ADJUSTED NET PRESENT VALUE	$ 6,330,414	$ 11,047,918	$ 17,378,332
LESS BOOK VALUE @ 12/31/04			
PROGRESS ENERGY FLORIDA	$ 4,014,512	$ 14,531,346	$ 18,545,859
CITY OF TALLAHASSEE	5,734,036	0	$ 5,734,036
	$ 9,748,548	$ 14,531,346	$ 24,279,894
PV OF FUND REQUIREMENTS	($ 3,418,134)	($ 3,483,428)	($ 6,901,562)
MONTHLY FUND REQUIREMENT (4)	$ 0	$ 0	$ 0
ANNUAL FUND REQUIREMENT	$ 0	$ 0	$ 0
MONTHLY ACCRUAL (5)	$ 0	$ 0	$ 0
ANNUAL ACCRUAL - WHOLESALE	$ 0	$ 0	$ 0

(1) ESTIMATED COST IN 2005 DOLLARS X (1 + INFLATION RATE) ^ (YEAR OF EXPENDITURE - 2005)
(2) QUAL. AND NONQUAL. PLAN AMOUNTS (TALLAHASSEE WHOLESALE + PROGRESS ENERGY FLORIDA WHOLESALE = WHOLESALE CONSOLIDATED)
(3) ESTIMATED ANNUAL DOLLARS / (1 + EARNINGS RATE) ^ (YEAR OF DECOMMISSIONING - CURRENT YEAR (2005))
(4)=PMT(.05366039/12, 371 (mos.), - ($3,418,134), (EXCEL FORMULA) 371
(5) FOR THE NONQUALIFIED FUND,($18,894) / (1 - .38575)
(6) RE-ALLOCATION OF THE THEORETICAL QUAL PORTION OF THE CITY OF TALLAHASSEE'S ACQUIRED NDC FUND BALANCE OF $4,838,072.30

ASSUMPTIONS:		
	2005 COST -	$ 668,668,051
	COST ESCALATION RATE -	3.450000%
	EARNINGS RATE (AFTER TAX) - ANNUAL	5.500000%
	- MONTHLY	#NAME?
	FEDERAL TAX RATE	35.000000%
	STATE TAX RATE	5.500000%

Date: 4/13/2005

#162677
B. Manges

Section 3

Calculation of Inflation Indices

PROGRESS ENERGY FLORIDA INDICES
(COST INCLUDES 15% CONTINGENCY)

PROGRESS ENERGY FLORIDA
2005 NUCLEAR DECOMMISSIONING COST STUDY
CALCULATION OF INFLATION INDICES

	INFLATION INDICES (1)					DECONTAMINATION			REMOVAL			PACKAGING			SHIPPING	BURIAL	STAFFS	OTHER				CURRENT	Annual Weigted	Compound Average
				Trans		Labor	Material	Total	Labor	Material	Total	Labor	Material	Total	Transport.	Burial	Labor	Labor	Material	Other	TOTAL	DOLLAR	Inflation	Annual
Year	Labor	Material	Burial	portation	Other	49%	51%	($000)	41%	59%	($000)	22%	78%	($000)	(100%)	(100%)	(100%)	12%	11%	77%	($000)	TOTAL	Rate	Growth Rate
	Base	Base	Base	Base	Base																			
2005						5,764	6,025	11,789	31,620	44,769	76,389	2,987	10,711	13,698	6,564	76,158	280,985	29,769	23,085	156,241	209,095	669,668		
2006	4.15%	1.68%	6.00%	1.19%	2.35%	6,003	6,126	12,129	32,933	45,521	78,454	3,111	10,891	14,002	6,642	80,727	292,646	24,745	23,473	159,913	208,131	692,731	3.60%	3.60%
2007	4.06%	2.65%	6.00%	2.05%	2.11%	6,247	6,301	12,548	34,270	46,818	81,088	3,237	11,201	14,438	6,778	85,571	304,527	25,750	24,142	163,287	213,179	718,129	3.67%	3.63%
2008	3.88%	2.48%	6.00%	2.13%	1.83%	6,489	6,457	12,946	35,600	47,979	83,579	3,363	11,479	14,842	6,922	90,705	316,343	26,749	24,741	166,276	217,765	743,102	3.46%	3.58%
2009	3.65%	2.07%	6.00%	2.20%	1.84%	6,719	6,591	13,310	36,864	48,972	85,836	3,482	11,717	15,199	7,074	96,147	327,573	27,699	25,253	169,334	222,286	767,425	3.27%	3.50%
2010	3.42%	1.81%	6.00%	2.25%	1.79%	6,949	6,710	13,659	38,125	49,858	87,983	3,601	11,929	15,530	7,233	101,916	338,776	28,646	25,710	172,365	226,721	791,818	3.18%	3.44%
2011	3.30%	1.72%	6.00%	2.24%	1.79%	7,178	6,825	14,003	39,383	50,716	90,099	3,720	12,134	15,854	7,395	108,031	349,956	29,591	26,152	175,450	231,193	816,631	3.12%	3.39%
2012	3.08%	1.92%	6.00%	2.21%	1.69%	7,399	6,956	14,355	40,696	51,690	92,286	3,836	12,367	16,202	7,558	114,513	360,735	30,502	26,654	178,415	235,571	841,220	3.02%	3.33%
2013	2.95%	1.91%	6.00%	2.19%	1.66%	7,617	7,089	14,706	41,794	52,677	94,471	3,948	12,603	16,551	7,724	121,384	371,377	31,402	27,163	181,412	239,977	866,190	2.97%	3.29%
2014	2.81%	1.87%	6.00%	2.18%	1.63%	7,831	7,222	15,053	42,968	53,662	96,630	4,059	12,839	16,898	7,892	128,667	381,813	32,284	27,671	184,369	244,324	891,277	2.90%	3.24%
2015	2.77%	1.91%	6.00%	2.17%	1.59%	8,048	7,360	15,408	44,158	54,687	98,845	4,171	13,084	17,255	8,063	136,367	392,389	33,178	28,200	187,300	248,678	917,025	2.89%	3.21%
2016	2.73%	2.03%	6.00%	2.24%	1.54%	8,268	7,509	15,777	45,364	55,797	101,161	4,285	13,350	17,635	8,244	144,570	403,101	34,084	28,772	190,184	253,040	943,528	2.89%	3.18%
2017	2.63%	2.03%	6.00%	2.24%	1.50%	8,485	7,661	16,146	46,657	56,930	103,487	4,398	13,621	18,019	8,429	153,244	413,703	34,980	29,356	193,037	257,373	970,401	2.85%	3.15%
2018	2.53%	1.99%	6.00%	2.25%	1.47%	8,700	7,813	16,513	47,735	58,083	105,798	4,509	13,892	18,401	8,619	162,439	424,170	35,865	29,940	196,876	261,680	997,620	2.80%	3.13%
2019	2.46%	1.97%	6.00%	2.23%	1.45%	8,914	7,967	16,881	48,909	59,207	108,116	4,620	14,166	18,786	8,811	172,185	434,605	36,747	30,530	198,715	265,992	1,025,376	2.76%	3.10%
2020	2.46%	1.97%	6.00%	2.24%	1.48%	9,133	8,124	17,257	50,112	60,373	110,485	4,734	14,445	19,179	9,008	182,516	445,296	37,651	31,131	201,656	270,438	1,054,179	2.81%	3.08%
2021	2.45%	1.95%	6.00%	2.26%	1.52%	9,357	8,282	17,639	51,340	61,550	112,890	4,850	14,727	19,577	9,211	193,467	456,206	38,573	31,738	204,721	275,032	1,084,022	2.83%	3.07%
2022	2.44%	1.93%	6.00%	2.24%	1.51%	9,585	8,442	18,027	52,593	62,736	115,331	4,968	15,011	19,979	9,417	205,075	467,337	39,514	32,351	207,812	279,677	1,114,843	2.84%	3.06%
2023	2.44%	1.91%	6.00%	2.22%	1.49%	9,819	8,603	18,422	53,876	63,936	117,812	5,089	15,298	20,387	9,626	217,380	478,740	40,478	32,969	210,908	284,355	1,146,722	2.86%	3.04%
2024	2.46%	1.87%	6.00%	2.22%	1.49%	10,061	8,764	18,825	55,201	65,132	120,333	5,214	15,584	20,798	9,840	230,423	490,517	41,474	33,586	214,051	289,111	1,179,847	2.89%	3.03%
2026	2.50%	1.79%	6.00%	2.23%	1.48%	10,313	8,921	19,234	56,561	66,298	122,879	5,344	15,863	21,207	10,059	244,248	502,780	42,511	34,187	217,219	293,917	1,214,324	2.92%	3.03%
2026	2.50%	1.78%	6.00%	2.22%	1.48%	10,571	9,080	19,651	57,996	67,478	125,474	5,478	16,145	21,623	10,282	258,903	515,350	43,574	34,795	220,434	298,804	1,250,087	2.95%	3.02%
2027	2.50%	1.77%	6.00%	2.24%	1.48%	10,835	9,241	20,076	59,446	68,672	128,118	5,615	16,431	22,046	10,512	274,437	528,234	44,663	35,412	223,696	303,771	1,287,194	2.97%	3.02%
2028	2.49%	1.77%	6.00%	2.21%	1.48%	11,105	9,405	20,510	60,926	69,887	130,813	5,755	16,722	22,477	10,744	290,903	541,387	45,775	36,039	227,007	308,821	1,325,655	2.99%	3.02%
2029	2.51%	1.77%	6.00%	2.21%	1.48%	11,384	9,571	20,955	62,455	71,124	133,579	5,899	17,018	22,917	10,981	308,357	554,976	46,924	36,677	230,387	313,968	1,365,733	3.02%	3.02%
2030	2.44%	1.76%	6.00%	2.20%	1.48%	11,662	9,739	21,401	63,979	72,376	136,355	6,043	17,318	23,361	11,223	326,858	568,517	48,099	37,323	233,776	319,198	1,406,883	3.01%	3.02%
2031	2.45%	1.76%	6.00%	2.21%	1.49%	11,948	9,910	21,858	65,546	73,650	139,196	6,191	17,623	23,814	11,471	345,489	582,446	49,247	37,960	237,259	324,466	1,449,740	3.05%	3.02%
2032	2.48%	1.76%	6.00%	2.22%	1.49%	12,244	10,084	22,328	67,172	74,946	142,118	6,345	17,933	24,278	11,726	367,257	596,891	50,468	38,648	240,794	329,910	1,494,508	3.09%	3.02%
2033	2.43%	1.77%	6.00%	2.22%	1.49%	12,542	10,262	22,804	68,804	76,273	145,077	6,499	18,250	24,749	11,986	389,292	611,395	51,694	39,332	244,382	335,408	1,540,711	3.09%	3.03%
2034	2.43%	1.78%	6.00%	2.22%	1.50%	12,847	10,445	23,292	70,476	77,631	148,107	6,657	18,575	25,232	12,252	412,650	626,252	52,950	40,032	248,046	341,030	1,588,815	3.12%	3.03%
2035	2.43%	1.78%	6.00%	2.22%	1.50%	13,159	10,631	23,790	72,189	79,013	151,202	8,819	18,906	25,726	12,524	437,409	641,470	54,237	40,745	251,769	346,751	1,638,871	3.15%	3.03%
2036	2.43%	1.78%	6.00%	2.22%	1.50%	13,479	10,820	24,299	73,943	80,419	154,362	6,985	19,243	26,228	12,802	463,654	657,058	55,555	41,470	256,546	352,571	1,690,974	3.18%	3.04%
2037	2.43%	1.78%	6.00%	2.22%	1.50%	13,807	11,013	24,820	75,740	81,850	157,590	7,155	19,586	26,741	13,086	491,473	673,025	56,905	42,208	259,379	358,492	1,745,227	3.21%	3.04%
2038	2.43%	1.78%	6.00%	2.22%	1.50%	14,143	11,209	25,352	77,580	83,307	160,887	7,329	19,935	27,264	13,377	520,961	689,380	58,288	42,959	263,270	364,517	1,801,738	3.24%	3.05%
2039	2.43%	1.78%	6.00%	2.22%	1.50%	14,487	11,409	25,896	79,465	84,790	164,255	7,507	20,290	27,797	13,674	552,219	706,132	59,704	43,724	267,219	370,647	1,860,820	3.27%	3.06%
2040	2.43%	1.78%	6.00%	2.22%	1.50%	14,839	11,612	26,451	81,396	86,299	167,695	7,689	20,651	28,340	13,978	585,352	723,291	61,155	44,502	271,227	376,884	1,921,991	3.30%	3.06%
2041	2.43%	1.78%	6.00%	2.22%	1.50%	15,200	11,819	27,019	83,374	87,835	171,209	7,876	21,019	28,895	14,288	620,473	740,667	62,641	45,294	275,295	383,230	1,985,981	3.33%	3.07%
2042	2.43%	1.78%	6.00%	2.22%	1.50%	15,569	12,029	27,598	85,400	89,398	174,798	8,067	21,393	29,460	14,605	657,701	758,870	64,163	46,100	279,424	389,687	2,052,719	3.36%	3.08%
2043	2.43%	1.78%	6.00%	2.22%	1.50%	15,947	12,243	28,190	87,475	90,989	178,464	8,263	21,774	30,037	14,929	697,163	777,311	65,722	46,921	283,615	396,258	2,122,352	3.39%	3.09%
2044	2.43%	1.78%	6.00%	2.22%	1.50%	16,335	12,461	28,796	89,601	92,609	182,210	8,464	22,162	30,626	15,299	736,993	796,200	67,319	47,756	287,869	402,944	2,195,029	3.42%	3.09%
2045	2.43%	1.78%	6.00%	2.22%	1.50%	16,732	12,683	29,415	91,778	94,257	186,035	8,670	22,556	31,226	15,599	783,333	815,548	68,955	48,606	292,187	409,748	2,270,904	3.46%	3.10%
2046	2.43%	1.78%	6.00%	2.22%	1.50%	17,139	12,909	30,048	94,008	95,935	189,943	8,881	22,957	31,838	15,945	830,333	835,368	70,631	49,471	296,570	416,672	2,350,145	3.49%	3.11%
2047	2.43%	1.78%	6.00%	2.22%	1.50%	17,555	13,139	30,694	96,292	97,643	193,935	9,097	23,366	32,463	16,299	880,153	855,665	72,347	50,352	301,019	423,718	2,432,927	3.52%	3.12%
2048	2.43%	1.78%	6.00%	2.22%	1.50%	17,982	13,373	31,355	98,632	99,381	198,013	9,316	23,782	33,100	16,661	932,962	876,458	74,105	51,246	305,534	430,887	2,519,436	3.56%	3.13%
2049	2.43%	1.78%	6.00%	2.22%	1.50%	18,419	13,611	32,030	101,029	101,150	202,179	9,544	24,206	33,749	17,031	988,940	897,756	75,906	52,160	310,117	438,183	2,609,868	3.59%	3.14%
2050	2.43%	1.78%	6.00%	2.22%	1.50%	18,867	13,853	32,720	103,484	102,950	206,434	9,776	24,636	34,412	17,409	1,048,275	919,571	77,751	53,088	314,769	445,608	2,704,430	3.62%	3.15%
2051	2.43%	1.78%	6.00%	2.22%	1.50%	19,325	14,100	33,426	105,999	104,783	210,782	10,014	25,075	35,089	17,795	1,111,173	941,917	79,640	54,033	319,491	453,164	2,803,345	3.66%	3.16%
2052	2.43%	1.78%	6.00%	2.22%	1.50%	19,795	14,351	34,146	108,575	106,648	215,223	10,257	25,521	35,778	18,190	1,177,843	964,806	81,575	54,995	324,283	460,853	2,906,839	3.69%	3.18%
2053	2.43%	1.78%	6.00%	2.22%	1.50%	20,276	14,606	34,882	111,213	108,546	219,759	10,506	25,975	36,481	18,594	1,248,514	988,251	83,557	55,974	329,147	468,678	3,015,159	3.73%	3.19%
2054	2.43%	1.78%	6.00%	2.22%	1.50%	20,769	14,866	35,635	113,915	110,478	224,393	10,761	26,437	37,198	19,007	1,323,425	1,012,265	85,587	56,970	334,084	476,641	3,128,564	3.76%	3.20%
2055	2.43%	1.78%	6.00%	2.22%	1.50%	21,274	15,131	36,405	116,683	112,445	229,128	11,022	26,908	37,930	19,429	1,402,831	1,036,863	87,657	57,984	339,095	484,746	3,247,332	3.80%	3.21%
2056	2.43%	1.78%	6.00%	2.22%	1.50%	21,791	15,400	37,191	119,518	114,447	233,965	11,290	27,387	38,677	19,866	1,487,001	1,062,059	89,797	59,016	344,181	492,994	3,371,747	3.83%	3.22%
2057	2.43%	1.78%	6.00%	2.22%	1.50%	22,321	15,674	37,995	122,422	116,484	238,906	11,564	27,874	39,438	20,301	1,576,221	1,087,867	91,979	60,066	349,344	501,389	3,502,117	3.87%	3.24%
2058	2.43%	1.78%	6.00%	2.22%	1.50%	22,863	15,953	38,816	125,397	118,557	243,954	11,845	28,370	40,215	20,752	1,670,794	1,114,302	94,214	61,135	354,684	509,933	3,638,766	3.90%	3.25%
2059	2.43%	1.78%	6.00%	2.22%	1.50%	23,419	16,237	39,656	128,444	120,667	249,111	12,133	28,875	41,008	21,213	1,771,042	1,141,380	96,503	62,223	359,903	518,629	3,782,039	3.94%	3.26%
2060	2.43%	1.78%	6.00%	2.22%	1.50%	23,988	16,526	40,514	131,565	122,815	254,380	12,428	29,389	41,817	21,684	1,877,305	1,169,116	98,848	63,331	365,302	527,481	3,932,287	3.97%	3.27%
2061	2.43%	1.78%	6.00%	2.22%	1.50%	24,571	16,820	41,391	134,762	125,001	259,763	12,730	29,912	42,642	22,165	1,989,943	1,197,526	101,250	64,458	370,782	536,490	4,089,920	4.01%	3.29%
2062	2.43%	1.78%	6.00%	2.22%	1.50%	25,168	17,119	42,287	138,037	127,226	265,263	13,039	30,444	43,483	22,657	2,109,340	1,226,626	103,710	65,605	376,344	545,659	4,255,315	4.04%	3.30%
2063	2.43%	1.78%	6.00%	2.22%	1.50%	25,780	17,424	43,204	141,391	129,491	270,882	13,356	30,986	44,342	23,160	2,235,900	1,256,433	106,230	66,773	381,989	554,992	4,428,913	4.08%	3.31%
2064	2.43%	1.78%	6.00%	2.22%	1.50%	26,406	17,734	44,140	144,827	131,796	276,623	13,681	31,538	45,219	23,674	2,370,054	1,286,964	108,811	67,962	387,719	564,492	4,611,166	4.12%	3.33%
2065	2.43%	1.78%	6.00%	2.22%	1.50%	27,048	18,050	45,098	148,346	134,142	282,488	14,013	32,099	46,112	24,200	2,512,257	1,318,237	111,455	69,172	393,535	574,162	4,802,554	4.16%	3.34%
2066	2.43%	1.78%	6.00%	2.22%	1.50%	27,705	18,371	46,076	151,951	136,530	288,481	14,354	32,670	47,024	24,737	2,662,992	1,350,270	114,163	70,403	399,438	584,004	5,003,584	4.19%	3.35%
2067	2.43%	1.78%	6.00%	2.22%	1.50%	28,378	18,698	47,076	155,643	138,960	294,603	14,703	33,252	47,955	25,286	2,822,772	1,383,082	116,937	71,656	405,430	594,023	5,214,797	4.22%	3.37%
2068	2.43%	1.78%	6.00%	2.22%	1.50%	29,068	19,031	48,099	159,425	141,433	300,858	15,060	33,844	48,904	25,847	2,992,138	1,416,891	119,779	72,931	411,611	604,221	5,436,758	4.26%	3.38%
2069	2.43%	1.78%	6.00%	2.22%	1.50%	29,774	19,370	49,144	163,299	143,951	307,250	15,426	34,446	49,872	26,421	3,171,666	1,451,117	122,690	74,229	417,684	614,603	5,670,073	4.29%	3.40%
2070	2.43%	1.78%	6.00%	2.22%	1.50%	30,498	19,715	50,213	167,267	146,513	313,780	15,801	35,059	50,860	27,008	3,361,966	1,486,379	125,671	75,550	423,949	625,170	5,915,376	4.33%	3.41%
2071	2.43%	1.78%	6.00%	2.22%	1.50%	31,239	20,066	51,305	171,332	149,121	320,453	16,185	35,683	51,868	27,608	3,563,684	1,522,498	128,725	76,895	430,308	635,928	6,173,344	4.36%	3.43%
2072	2.43%	1.78%	6.00%	2.22%	1.50%	31,998	20,423	52,421	175,496	151,775	327,270	16,578	36,318	52,896	28,221	3,777,505	1,559,495	131,853	78,264	436,763	646,880	6,444,688	4.40%	3.44%
2073	2.43%	1.78%	6.00%	2.22%	1.50%	32,776	20,787	53,563	179,760	154,477	334,237	16,981	36,964	53,945	28,848	4,004,156	1,597,391	135,057	79,667	443,314	658,028	6,730,167	4.43%	3.45%
COMPOUND ANNUAL GROWTH RATE FROM 2005								2.25%			2.19%			2.04%	2.20%	6.00%	2.59%				1.56%	3.45%		

(1) SOURCES OF INFORMATION TO COMPLETE THE INFLATION INDICIES:

INFLATION INDICES SOURCE: Economy.com

LABOR: Wages and Productivity in the Nonfarm Business Sector. Compensation per Hour. % change - Index 1992 = 100

MATERIAL: Producer Price Indexes - Stage of Processing - Intermediate Materials, Supplies, & Components. % change - Index 1982 = 100

TRANSPORTATION: CPI: Urban Consumer - Transportation, % change (1982-84=100, SA)

OTHER: GDP Chain-Weighted Price Index % change - Index 2000 = 100

BURIAL INDICES SOURCE: NUREG-1307 Revision 9 - Report on Waste Burial Charges, August 2000; Discussion with industry experts

Date: 4/12/2005

#162677
B. Manges

Section 4

Calculation of Minimum Fund Earnings Rate and Assumed Fund Earnings Rate

PROGRESS ENERGY FLORIDA
2005 NUCLEAR DECOMMISSIONING COST STUDY
ASSUMED FUND EARNINGS RATE

	COMBINED	QUALIFIED	NONQUALIFIED
LCG ASSOCIATES STUDY AFTER-TAX RETURN (1)	6.77%	7.12%	5.00%
ESTIMATED EXPENSES:			
MANAGEMENT FEES			
FIXED INCOME	0.10%		
EQUITY	0.19%		
TRUSTEE FEES	0.04%		
OUTSIDE PROFESSIONAL SERVICES	0.01%		
TOTAL EXPENSES	0.34%		
NET RETURN AFTER TAXES AND FEES	6.43%		
LONG TERM CPI (page D.1)	2.20%		
DIFFERENCE	4.23%		
PROPOSED AFTER-TAX, AFTER EXPENSES ASSUMED FUND EARNINGS RATE	5.50% (2)		

(1) 2005 ESTIMATE OF EXPECTED AFTER-TAX RETURNS WAS DEVELOPED BY LCG ASSOCIATES INCORPORATED. **RETURNS ARE FOR A THIRTY YEAR TIMEFRAME. THE ES**TIMATED AFTER-TAX EXPENSES ARE BASED ON MARKET VALUE AT 12/31/04 PER SCHEDULE B-1.

(2) AVERAGE OF NET RETURN AFTER TAXES AND FEES AND LONG TERM CPI.
Formula = Long Term CPI + ((Net Return after Taxes and Fees - Long Term CPI) x 75%) +/- Rounding Factor

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PROGRESS ENERGY FLORIDA
2005 NUCLEAR DECOMMISSIONING COST STUDY
MINIMUM FUND EARNINGS RATE

LONG-TERM AVERAGE CPI

YEAR	ANNUAL PERCENT CHANGE
2005	2.85%
2006	1.19%
2007	2.05%
2008	2.13%
2009	2.20%
2010	2.25%
2011	2.24%
2012	2.21%
2013	2.19%
2014	2.18%
2015	2.17%
2016	2.24%
2017	2.24%
2018	2.25%
2019	2.23%
2020	2.24%
2021	2.25%
2022	2.24%
2023	2.22%
2024	2.22%
2025	2.23%
2026	2.22%
2027	2.24%
2028	2.21%
2029	2.21%

25 year average CPI = 2.20%

Source:
Consumer Price Indexes - All Urban Consumers (Economy.com)

Section 5

Historical Fund Returns

PROGRESS ENERGY FLORIDA
TOTAL NUCLEAR DECOMMISSIONING TRUST FUND
TIME WEIGHTED RETURNS FOR THE PERIODS ENDED
31-Dec-04

				Annualized	
	Quarter	Year To-Date	One Year	Three Years	Five Years
Nuc Decom Trust Fund -Total*					
Before Tax Total Fund	6.68%	9.58%	9.58%	6.93%	3.76%
After Tax Total Fund	6.52%	7.21%	7.21%	5.69%	2.50%
Indices					
Lehman Govt/Corp Bonds	0.81%	4.21%	4.21%	6.59%	8.00%
S&P 500	9.23%	10.88%	10.88%	3.58%	(2.32%)
CPI	0.25%	3.26%	3.26%	2.51%	2.49%

* Fund returns are net of investment management fees

Section 6

Cash Flow Schedule of Liability Funding

PROGRESS ENERGY FLORIDA
2005 NUCLEAR DECOMMISSIONING COST STUDY
CASH FLOW SCHEDULE

CURRENT YEAR YEARS REMAINING	2005 31	2006 30	2007 29	2008 28	2009 27	2010 26	2011 25	2012 24	2013 23	2014 22	2015 21	2016 20	2017 19	2018 18	2019 17
ESTIMATED COST OF DECOMMISSIONING															
ESTIMATED 100% COST IN 2005 DOLLARS	$ 668,668,051														
OWNERSHIP PERCENT	90.4473% 604,792,198														
RETAIL SEPARATION PERCENT	94.9130%														
RETAIL - CURRENT DOLLARS (1)	$ 574,026,419	$ 593,830,331	$ 614,317,477	$ 635,511,430	$ 657,436,574	$ 680,118,136	$ 703,582,212	$ 727,855,798	$ 752,966,823	$ 778,944,178	$ 805,817,752	$ 833,618,464	$ 862,378,301	$ 892,130,352	$ 922,908,849
SOURCE OF DECOMMISSIONING FUNDS															
FROM QUALIFIED FUND															
FROM NONQUALIFIED FUND															
FROM TAX SAVINGS															
ANNUAL EXPENDITURES		0	0	0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED ESTIMATED COST OF DECOMMISSIONING - RETAIL		$ 593,830,331	$ 614,317,477	$ 635,511,430	$ 657,436,574	$ 680,118,136	$ 703,582,212	$ 727,855,798	$ 752,966,823	$ 778,944,178	$ 805,817,752	$ 833,618,464	$ 862,378,301	$ 892,130,352	$ 922,908,849
FUNDED RESERVE BEGINNING OF YEAR BALANCE - RETAIL		$ 346,027,720	$ 365,059,246	$ 385,137,506	$ 406,320,070	$ 428,667,675	$ 452,244,398	$ 477,117,841	$ 503,359,324	$ 531,044,088	$ 560,251,515	$ 591,065,350	$ 623,573,946	$ 657,870,515	$ 694,053,395
ANNUAL EARNINGS ON BEGINNING FUND BALANCE (COMPOUNDED MONTHLY)		19,031,526	20,078,260	21,182,564	22,347,605	23,576,723	24,873,443	26,241,483	27,684,764	29,207,427	30,813,835	32,508,596	34,296,569	36,182,880	38,172,939
ANNUAL PRINCIPAL DEPOSITS															
EARNINGS ON MONTHLY DEPOSITS COMPOUNDED MONTHLY															
FUNDS WITHDRAWN FOR DECOMMISSIONING															
FUND RESERVE END OF YEAR BALANCE		$ 365,059,246	$ 385,137,506	$ 406,320,070	$ 428,667,675	$ 452,244,398	$ 477,117,841	$ 503,359,324	$ 531,044,088	$ 560,251,515	$ 591,065,350	$ 623,573,946	$ 657,870,515	$ 694,053,395	$ 732,226,334

ASSUMPTIONS

ESCALATION RATE	3.450000%
EARNINGS RATE - ANNUAL	5.500000%
EARNINGS RATE - MONTHLY	5.366039%

(1) PRIOR YEAR BALANCE X (1 + ESCALATION RATE), FPC RETAIL ONLY.

PROGRESS ENERGY FLORIDA
2005 NUCLEAR DECOMMISSIONING COST STUDY
CASH FLOW SCHEDULE

CURRENT YEAR YEARS REMAINING	2020 16	2021 15	2022 14	2023 13	2024 12	2025 11	2026 10	2027 9	2028 8	2029 7	2030 6	2031 5	2032 4	2033 3	2034 2
ESTIMATED COST OF DECOMMISSIONING ESTIMATED 100% COST IN 2005 DOLLARS															
OWNERSHIP PERCENT															
RETAIL SEPARATION PERCENT															
RETAIL - CURRENT DOLLARS (1)	$ 954,749,204	$ 987,688,052	$ 1,021,763,290	$ 1,057,014,124	$ 1,093,461,111	$ 1,131,206,209	$ 1,170,232,823	$ 1,210,605,855	$ 1,252,371,757	$ 1,295,576,583	$ 1,340,276,044	$ 1,386,515,568	$ 1,434,350,355	$ 1,483,835,442	$ 1,535,027,765
SOURCE OF DECOMMISSIONING FUNDS FROM QUALIFIED FUND FROM NONQUALIFIED FUND FROM TAX SAVINGS															
ANNUAL EXPENDITURES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ADJUSTED ESTIMATED COST OF DECOMMISSIONING - RETAIL	$ 954,749,204	$ 987,688,052	$ 1,021,763,290	$ 1,057,014,124	$ 1,093,461,111	$ 1,131,206,209	$ 1,170,232,823	$ 1,210,605,855	$ 1,252,371,757	$ 1,295,576,583	$ 1,340,276,044	$ 1,386,515,568	$ 1,434,350,355	$ 1,483,835,442	$ 1,535,027,765
FUNDED RESERVE BEGINNING OF YEAR BALANCE - RETAIL	$ 732,226,334	$ 772,498,785	$ 814,986,221	$ 859,810,466	$ 907,100,044	$ 956,990,549	$ 1,009,625,032	$ 1,065,154,412	$ 1,123,737,908	$ 1,185,543,496	$ 1,250,748,392	$ 1,319,539,557	$ 1,392,114,237	$ 1,468,680,524	$ 1,549,457,957
ANNUAL EARNINGS ON BEGINNING FUND BALANCE (COMPOUNDED MONTHLY)	40,272,451	42,487,436	44,824,245	47,289,578	49,890,505	52,634,483	55,529,380	58,583,496	61,805,588	65,204,896	68,791,165	72,574,680	76,566,287	80,777,433	85,220,193
ANNUAL PRINCIPAL DEPOSITS															
EARNINGS ON MONTHLY DEPOSITS COMPOUNDED MONTHLY															
FUNDS WITHDRAWN FOR DECOMMISSIONING															
FUND RESERVE END OF YEAR BALANCE	$ 772,498,785	$ 814,986,221	$ 859,810,466	$ 907,100,044	$ 956,990,549	$ 1,009,625,032	$ 1,065,154,412	$ 1,123,737,908	$ 1,185,543,496	$ 1,250,748,392	$ 1,319,539,557	$ 1,392,114,237	$ 1,468,680,524	$ 1,549,457,957	$ 1,634,678,150
ASSUMPTIONS ESCALATION RATE EARNINGS RATE - ANNUAL EARNINGS RATE - MONTHLY															

(1) PRIOR YEAR BALANCE X (1 + ESCALATION RATE), FPC RETAIL ONLY.

PROGRESS ENERGY FLORIDA
2005 NUCLEAR DECOMMISSIONING COST STUDY
CASH FLOW SCHEDULE

CURRENT YEAR YEARS REMAINING	2035 1	2036	2037 -1	2038 -2	2039 -3	2040 -4	2041 -5	2042 -6	2043 -7	2044 -8	2045 -9	2046 -10	2047 -11	2048 -12	2049 -13
ESTIMATED COST OF DECOMMISSIONING															
ESTIMATED 100% COST IN 2005 DOLLARS															
OWNERSHIP PERCENT															
RETAIL SEPARATION PERCENT															
RETAIL - CURRENT DOLLARS (1)	$ 1,587,986,223	$ 1,642,771,748	$ 1,685,256,351	$ 1,550,338,986	$ 1,298,369,664	$ 1,048,556,686	$ 891,426,671	$ 722,755,013	$ 585,484,523	$ 488,426,943	$ 415,211,855	$ 369,896,028	$ 370,866,138	$ 371,462,917	$ 371,624,878
SOURCE OF DECOMMISSIONING FUNDS															
FROM QUALIFIED FUND		10,714,803	145,789,347	230,664,322	222,469,999	145,973,991	150,597,499	122,489,092	88,546,166	68,013,120	45,037,316	8,904,172	9,211,366	9,555,265	9,857,914
FROM NONQUALIFIED FUND		1,843,378	25,081,646	39,683,564	38,273,811	25,113,413	25,908,842	21,073,063	15,233,511	11,700,999	7,748,234	1,531,877	1,584,726	1,643,891	1,695,959
FROM TAX SAVINGS		1,157,645	15,751,315	24,921,343	24,036,015	15,771,264	16,270,795	13,233,918	9,566,670	7,348,247	4,865,904	962,021	995,211	1,032,366	1,065,065
ANNUAL EXPENDITURES	0	13,715,826	186,622,308	295,269,229	284,779,825	186,858,668	192,777,136	156,796,073	113,346,347	87,062,366	57,651,454	11,398,070	11,791,303	12,231,522	12,618,938
ADJUSTED ESTIMATED COST OF DECOMMISSIONING - RETAIL	$ 1,587,986,223	$ 1,629,055,922	$ 1,498,636,043	$ 1,255,069,757	$ 1,013,589,839	$ 861,700,020	$ 698,651,535	$ 565,958,940	$ 472,138,176	$ 401,364,577	$ 357,560,401	$ 358,497,958	$ 359,074,835	$ 359,231,395	$ 359,006,940
FUNDED RESERVE BEGINNING OF YEAR BALANCE - RETAIL	$ 1,634,678,150	$ 1,724,585,453	$ 1,806,879,477	$ 1,735,386,861	$ 1,560,485,258	$ 1,385,568,142	$ 1,290,686,990	$ 1,185,168,438	$ 1,106,790,551	$ 1,063,884,358	$ 1,042,683,882	$ 1,047,245,949	$ 1,094,408,430	$ 1,143,804,805	$ 1,195,514,917
ANNUAL EARNINGS ON BEGINNING FUND BALANCE (COMPOUNDED MONTHLY)	89,907,303	94,852,205	99,378,377	95,446,283	85,826,694	76,206,252	70,987,769	65,184,268	60,873,484	58,513,643	57,347,617	57,598,530	60,192,467	62,909,268	65,753,324
ANNUAL PRINCIPAL DEPOSITS															
EARNINGS ON MONTHLY DEPOSITS COMPOUNDED MONTHLY															
FUNDS WITHDRAWN FOR DECOMMISSIONING		(12,558,181)	(170,870,993)	(270,347,886)	(260,743,810)	(171,087,404)	(176,506,341)	(143,562,155)	(103,779,677)	(79,714,119)	(52,785,550)	(10,436,049)	(10,796,092)	(11,199,156)	(11,553,873)
FUND RESERVE END OF YEAR BALANCE	$ 1,724,585,453	$ 1,806,879,477	$ 1,735,386,861	$ 1,560,485,258	$ 1,385,568,142	$ 1,290,686,990	$ 1,185,168,438	$ 1,106,790,551	$ 1,063,884,358	$ 1,042,683,882	$ 1,047,245,949	$ 1,094,408,430	$ 1,143,804,805	$ 1,195,514,917	$ 1,249,714,368
ASSUMPTIONS															
ESCALATION RATE															
EARNINGS RATE - ANNUAL															
EARNINGS RATE - MONTHLY															

(1) PRIOR YEAR BALANCE X (1 + ESCALATION RATE), FPC RETAIL ONLY

Date: 4/14/2005

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PROGRESS ENERGY FLORIDA
2005 NUCLEAR DECOMMISSIONING COST STUDY
CASH FLOW SCHEDULE

CURRENT YEAR YEARS REMAINING	2050 -14	2051 -15	2052 -16	2053 -17	2054 -18	2055 -19	2056 -20	2057 -21	2058 -22	2059 -23	2060 -24	2061 -25	2062 -26	2063 -27	2064 -28
ESTIMATED COST OF DECOMMISSIONING ESTIMATED 100% COST IN 2005 DOLLARS															
OWNERSHIP PERCENT															
RETAIL SEPARATION PERCENT															
RETAIL - CURRENT DOLLARS (1)	$ 371,391,645	$ 370,699,993	$ 369,518,568	$ 367,774,802	$ 365,511,859	$ 362,655,029	$ 359,166,027	$ 354,959,285	$ 350,081,694	$ 344,445,059	$ 338,002,812	$ 330,654,135	$ 322,449,622	$ 313,285,851	$ 303,105,769
SOURCE OF DECOMMISSIONING FUNDS															
FROM QUALIFIED FUND	10,198,012	10,549,844	10,943,714	11,290,340	11,679,857	12,082,812	12,533,914	12,930,908	13,377,024	13,838,531	14,355,182	14,809,861	15,320,801	15,849,369	16,441,092
FROM NONQUALIFIED FUND	1,754,469	1,814,998	1,882,760	1,942,394	2,009,406	2,078,731	2,156,339	2,224,637	2,301,387	2,380,785	2,469,670	2,547,893	2,635,795	2,726,731	2,828,531
FROM TAX SAVINGS	1,101,810	1,139,822	1,182,377	1,219,826	1,261,911	1,305,446	1,354,184	1,397,076	1,445,275	1,495,137	1,550,957	1,600,081	1,655,284	1,712,391	1,776,322
ANNUAL EXPENDITURES	13,054,291	13,504,664	14,008,851	14,452,560	14,951,174	15,466,989	16,044,437	16,552,621	17,123,686	17,714,453	18,375,809	18,957,835	19,611,880	20,288,491	21,045,945
ADJUSTED ESTIMATED COST OF DECOMMISSIONING - RETAIL	$ 358,337,354	$ 357,195,329	$ 355,509,717	$ 353,322,242	$ 350,560,685	$ 347,188,040	$ 343,121,590	$ 338,406,664	$ 332,958,008	$ 326,730,606	$ 319,627,003	$ 311,696,300	$ 302,837,942	$ 292,997,360	$ 282,059,824
FUNDED RESERVE BEGINNING OF YEAR BALANCE - RETAIL	$ 1,249,714,368	$ 1,306,496,181	$ 1,365,968,633	$ 1,428,291,538	$ 1,493,614,843	$ 1,562,074,401	$ 1,633,826,955	$ 1,708,997,190	$ 1,787,836,496	$ 1,870,489,098	$ 1,957,146,688	$ 2,047,964,910	$ 2,143,245,232	$ 2,243,167,131	$ 2,347,965,230
ANNUAL EARNINGS ON BEGINNING FUND BALANCE (COMPOUNDED MONTHLY)	68,734,294	71,857,294	75,129,379	78,556,039	82,148,821	85,914,097	89,860,488	93,994,851	98,331,013	102,876,906	107,643,074	112,638,076	117,878,495	123,374,199	129,136,095
ANNUAL PRINCIPAL DEPOSITS															
EARNINGS ON MONTHLY DEPOSITS COMPOUNDED MONTHLY															
FUNDS WITHDRAWN FOR DECOMMISSIONING	(11,952,481)	(12,364,842)	(12,826,474)	(13,232,734)	(13,689,263)	(14,161,543)	(14,690,253)	(15,155,545)	(15,678,411)	(16,219,316)	(16,824,852)	(17,357,754)	(17,956,596)	(18,576,100)	(19,269,623)
FUND RESERVE END OF YEAR BALANCE	$ 1,306,496,181	$ 1,365,968,633	$ 1,428,291,538	$ 1,493,614,843	$ 1,562,074,401	$ 1,633,826,955	$ 1,708,997,190	$ 1,787,836,496	$ 1,870,489,098	$ 1,957,146,688	$ 2,047,964,910	$ 2,143,245,232	$ 2,243,167,131	$ 2,347,965,230	$ 2,457,833,702
ASSUMPTIONS ESCALATION RATE EARNINGS RATE - ANNUAL EARNINGS RATE - MONTHLY															

(1) PRIOR YEAR BALANCE X (1 + ESCALATION RATE), FPC RETAIL ONLY.

PROGRESS ENERGY FLORIDA
2005 NUCLEAR DECOMMISSIONING COST STUDY
CASH FLOW SCHEDULE

CURRENT YEAR YEARS REMAINING	2065 -29	2066 -30	2067 -31	2068 -32	2069 -33	2070 -34	2071 -35	2072 -36	2073 -37	
ESTIMATED COST OF DECOMMISSIONING ESTIMATED 100% COST IN 2005 DOLLARS										
OWNERSHIP PERCENT										
RETAIL SEPARATION PERCENT										
RETAIL - CURRENT DOLLARS (1)	$ 291,790,888	$ 279,396,047	$ 265,798,657	$ 250,930,496	$ 234,651,935	$ 217,021,960	$ 197,896,222	$ 177,192,498	$ 45,233,400	
SOURCE OF DECOMMISSIONING FUNDS										
FROM QUALIFIED FUND	16,961,839	17,547,023	18,152,396	18,830,102	19,426,517	20,096,732	20,790,069	104,264,894	35,336,358	$ 1,735,431,563
FROM NONQUALIFIED FUND	2,918,121	3,018,796	3,122,944	3,239,537	3,342,144	3,457,448	3,576,730	17,937,766	6,079,278	298,564,204
FROM TAX SAVINGS	1,832,584	1,895,808	1,961,214	2,034,434	2,098,872	2,171,283	2,246,192	11,264,946	3,817,797	187,498,808
ANNUAL EXPENDITURES	21,712,544	22,461,627	23,236,554	24,104,073	24,867,533	25,725,463	26,612,991	133,467,606	45,233,433	$ 2,221,494,575
ADJUSTED ESTIMATED COST OF DECOMMISSIONING - RETAIL	$ 270,078,344	$ 256,934,420	$ 242,562,103	$ 226,826,423	$ 209,784,402	$ 191,296,497	$ 171,283,231	$ 43,724,892	($ 33)	
FUNDED RESERVE BEGINNING OF YEAR BALANCE - RETAIL	$ 2,457,833,702	$ 2,573,134,603	$ 2,694,091,195	$ 2,820,990,879	$ 2,954,075,747	$ 3,093,781,261	$ 3,240,385,060	$ 3,394,239,449	$ 3,458,719,969	
ANNUAL EARNINGS ON BEGINNING FUND BALANCE (COMPOUNDED MONTHLY)	135,180,861	141,522,411	148,175,024	155,154,507	162,474,175	170,157,979	178,221,188	186,683,180	190,229,609	$ 4,570,210,033
ANNUAL PRINCIPAL DEPOSITS										
EARNINGS ON MONTHLY DEPOSITS COMPOUNDED MONTHLY										
FUNDS WITHDRAWN FOR DECOMMISSIONING	(19,879,960)	(20,565,819)	(21,275,340)	(22,069,639)	(22,768,661)	(23,554,180)	(24,366,799)	(122,202,660)	(41,415,636)	($ 2,033,995,767)
FUND RESERVE END OF YEAR BALANCE	$ 2,573,134,603	$ 2,694,091,195	$ 2,820,990,879	$ 2,954,075,747	$ 3,093,781,261	$ 3,240,385,060	$ 3,394,239,449	$ 3,458,719,969	$ 3,607,533,942	

ASSUMPTIONS
ESCALATION RATE
EARNINGS RATE - ANNUAL
EARNINGS RATE - MONTHLY

(1) PRIOR YEAR BALANCE X (1 + ESCALATION RATE), FPC RETAIL ONLY

Section 7

TLG Services, Inc.
Decommissioning Cost Study

DECOMMISSIONING COST ANALYSIS

for the

CRYSTAL RIVER NUCLEAR PLANT, UNIT 3

prepared for

Progress Energy Service Company, LLC

prepared by

TLG Services, Inc.
Bridgewater, Connecticut

March 2005

APPROVALS

Project Manager	William A. Cloutier, Jr.	3/29/05 Date
Project Engineer	Thomas J. Garrett	3/29/05 Date
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Quality Assurance Manager	Thomas L. Willamson	3/30/05 Date

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No.	CRA No.	Date	Item Revised	Reason for Revision
0		03-30-05		Original Issue

EXECUTIVE SUMMARY

This report presents estimates of the cost to decommission the Crystal River Nuclear Plant, Unit 3 (Crystal River) for the selected decommissioning scenarios following the scheduled cessation of plant operations. The analysis relies upon site-specific, technical information from an evaluation prepared in 2000,[1] updated to reflect current assumptions pertaining to the disposition of the nuclear unit and relevant industry experience in undertaking such projects. The current estimates are designed to provide Progress Energy Service Company, (Progress Energy) with sufficient information to assess its financial obligations, as they pertain to the eventual decommissioning of the nuclear unit.

The primary goal of the decommissioning is the removal and disposal of the contaminated systems and structures so that the plant's operating license 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 currently projected cost to decommission the station, assuming the DECON alternative, is estimated at $668.7 million, as reported in 2005 dollars. An estimate for the SAFSTOR alternative is also provided. The estimates are based on numerous fundamental assumptions, including regulatory requirements, project contingencies, low-level radioactive waste disposal practices, high-level radioactive waste management options, and site restoration requirements. The estimates incorporate a minimum cooling period for the spent fuel that resides in the storage pool when operations cease. Any residual fuel remaining in the pool after the cooling period is relocated to the ISFSI to await transfer to a DOE facility. The estimates also include the dismantling of non-essential structures and limited restoration of the site.

Alternatives and Regulations

The Nuclear Regulatory Commission (NRC or Commission) provided initial decommissioning requirements in its rule adopted on June 27, 1988.[2] In this rule, the NRC set forth financial criteria for decommissioning licensed nuclear power facilities.

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1 "Decommissioning Cost Study for the Crystal River Plant - Unit 3," Document No. F01-1342-002, Rev. 0, TLG Services, Inc., November 2000.

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

The regulations addressed planning needs, timing, funding methods, and environmental review requirements for decommissioning. The rule also defined three decommissioning alternatives as being acceptable to the NRC: DECON, SAFSTOR, and ENTOMB.

> DECON is defined as "the alternative in which the equipment, structures, and portions of a facility and site containing radioactive contaminants are removed or decontaminated to a level that permits the property to be released for unrestricted use shortly after cessation of operations."[3]
>
> SAFSTOR is defined as "the alternative in which the nuclear facility is placed and maintained in a condition that allows the nuclear facility to be safely stored and subsequently decontaminated (deferred decontamination) to levels that permit release for unrestricted use."[4] Decommissioning is to be completed within 60 years, although longer time periods will be considered when necessary to protect public health and safety.
>
> ENTOMB is defined as "the alternative in which radioactive contaminants are encased in a structurally long-lived material, such as concrete; the entombed structure is appropriately maintained and continued surveillance is carried out until the radioactive material decays to a level permitting unrestricted release of the property."[5] As with the SAFSTOR alternative, decommissioning is currently required to be completed within 60 years.

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

In 1996, the NRC published revisions to the general requirements for decommissioning nuclear power plants to clarify ambiguities and codify procedures and terminology as a means of enhancing efficiency and uniformity in the

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3 **Ibid.** Page FR24022, Column 3.
4 Ibid.
5 Ibid. Page FR24023, Column 2.

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

Methodology

The methodology used to develop the estimates described within this document follows the basic approach originally presented in the cost estimating guidelines[7] 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.

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."[8] 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

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

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

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

this analysis, does not account for price escalation and inflation in the cost of decommissioning over the remaining operating life of the station.

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

Low-Level Radioactive Waste Disposal

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

Progress Energy 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. Despite 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. However, 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"[11] (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

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

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

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

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 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 is not expected to begin before 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, Progress Energy has assumed that the high-level waste repository, or some interim storage facility, will be fully operational by 2020.

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.[12] Interim storage of the fuel, until the DOE has completed the transfer, will be in the storage pool and/or an ISFSI located on the Crystal River site.

The ISFSI will be operational prior to the cessation of plant operations. The facility is expanded following plant shutdown to accommodate the inventory of spent fuel residing in the plant's storage pool at the conclusion of the required cooling period. Once emptied, the auxiliary building can be either decontaminated and dismantled or prepared for long-term storage. The ISFSI will be independently licensed once the plant's operating license is terminated.

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12 "Domestic Licensing of Production and Utilization Facilities," U.S. Code of Federal Regulations, Title 10, Part 50.54 (bb).

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 36 years after the cessation of operations. Consequently, costs are included within the estimates for the long-term caretaking of the spent fuel at the Crystal River site until the year 2052.

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 backfilled, graded and stabilized.

Summary

The costs to decommission Crystal River were evaluated for both the DECON and SAFSTOR decommissioning alternatives. Regardless of the timing of the decommissioning activities, the estimates assume the eventual removal of all the contaminated and activated plant components and structural materials, such that the facility operator may then have unrestricted use of the site with no further requirement for an operating license. Decommissioning is accomplished within the 60-year period required by current NRC regulations. In the interim, the spent fuel remains in storage at the site until such time that the transfer to a DOE facility 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 two scenarios are provided at the end of this section for the major cost components.

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

Cost Element	Total
Decontamination	11,789
Removal	76,389
Packaging	13,698
Transportation	6,564
Waste Disposal	54,233
Off-site Waste Processing	21,925
Program Management [1]	280,985
Spent Fuel Pool Isolation	9,900
ISFSI Related	99,208
Insurance and Regulatory Fees	22,373
Energy	8,972
Characterization and Licensing Surveys	9,170
Property Taxes	29,196
Utility Site Indirect	17,954
Miscellaneous Equipment / Site Services	6,310
Total [2]	668,668
NRC License Termination	444,756
Spent Fuel Management [3]	180,374
Site Restoration	43,538
Total [2]	668,668

[1] Includes engineering and security
[2] Columns may not add due to rounding
[3] Includes "ISFSI Related" capital and loading costs as well as the associated period-dependent expenditures, e.g., program management, security, fees and taxes

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

Cost Element	Total
Decontamination	9,454
Removal	74,443
Packaging	9,871
Transportation	5,929
Waste Disposal	40,160
Off-site Waste Processing	25,127
Program Management [1]	326,582
Spent Fuel Pool Isolation	9,900
ISFSI Related	91,628
Insurance and Regulatory Fees	47,703
Energy	13,180
Characterization and Licensing Surveys	10,557
Property Taxes	89,731
Utility Site Indirect	26,632
Miscellaneous Equipment / Site Services	16,823
Total [2]	797,720

NRC License Termination	602,935
Spent Fuel Management [3]	150,914
Site Restoration	43,870
Total [2]	797,720

[1] Includes engineering and security
[2] Columns may not add due to rounding
[3] Includes "ISFSI Related" capital and loading costs as well as the associated period-dependent expenditures, e.g., program management, security, fees and taxes

1. INTRODUCTION

This report presents estimates of the costs to decommission the Crystal River Nuclear Plant, Unit 3, (Crystal River) following a scheduled cessation of plant operations. The supporting analysis was designed to provide Progress Energy Service Company (Progress Energy), the plant's owner, 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 were to prepare comprehensive estimates of the costs to decommission Crystal River, to provide a sequence or schedule for the associated activities, and to develop waste stream projections from the decontamination and dismantling activities.

The plant was issued its operating license in December 1976. For the purposes of this study, the final shutdown date (license expiration) is 40 years from this date, or December 3, 2016.

1.2 SITE DESCRIPTION

The Crystal River site is located in Citrus County, Florida, approximately 70 miles north of Tampa on the shore of the Gulf of Mexico. The generating site is comprised of four fossil units and one nuclear unit. The Gulf of Mexico provides the heat sink for both Units 1 and 2 fossil units, and the nuclear unit.

The nuclear steam supply system (NSSS) consists of a pressurized water reactor and a two-loop reactor coolant system, designed by Babcock & Wilcox. The generating unit has a reference core design of 2568 MWt (thermal), with a corresponding net dependable capability electrical rating of 838 megawatts (electric) with the reactor at rated power.

The reactor coolant system is comprised of the reactor vessel and two heat transfer loops, each loop containing a vertical once-through type steam generator, and two single speed centrifugal reactor coolant pumps. In addition, the system includes an electrically heated pressurizer, a reactor coolant drain tank and interconnected piping. The system is housed within the reactor containment building, a seismic Category I reinforced concrete structure. The

reactor containment building is a reinforced concrete structure composed of a vertical cylinder with a shallow dome and flat circular foundation slab. The cylinder wall is prestressed with a post-tensioning system in the vertical and horizontal directions. The dome roof is prestressed utilizing a three-way post-tensioning system. The foundation slab is reinforced with conventional mild steel. The inside surface of the reactor building is lined with a carbon steel liner to ensure a high degree of leak tightness during operating and accident conditions.

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 unit's turbine generator consists of high-pressure and low-pressure turbine sections driving a direct-coupled generator at 1800 rpm. The turbines are operated in a closed feedwater cycle, which condenses the steam; the heated feedwater is returned to the steam generators. Heat rejected in the main condensers is removed by the circulating water system. The condenser circulating water is taken from and returned to the Gulf of Mexico through the intake and discharge canals, respectively.

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.[1]* 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,"[2] 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

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

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

The ENTOMB alternative has not been viewed as a viable option for power reactors due to the significant time required to isolate the long-lived radionuclides for decay to permissible levels. However, with recent rulemaking permitting the controlled release of a site,[3] the NRC has re-evaluated this alternative. The resulting feasibility study, based upon an assessment by Pacific Northwest National Laboratory, concluded that the method did have conditional merit for some, if not most reactors. However, the staff also found that additional rulemaking would be needed before this option could be treated as a generic alternative. The NRC had considered rulemaking to alter the 60-year time for completing decommissioning and to clarify the use of engineered barriers for reactor entombments.[4] However, the NRC's staff has recommended that rulemaking be deferred, based upon several factors, e.g., no licensee has committed to pursuing the entombment option, the unresolved issues associated with the disposition of greater-than-Class C material (GTCC), and the NRC's current priorities, at least until after the additional research studies are complete. The Commission concurred with the staff's recommendation.

In 1996, the NRC published revisions to the general requirements for decommissioning nuclear power plants.[5] When the decommissioning regulations were adopted in 1988, it was assumed that the majority of licensees would decommission at the end of the facility's operating licensed life. Since that time, several licensees permanently and prematurely ceased operations. Exemptions from certain operating requirements were required once the reactor was defueled to facilitate the decommissioning. Each case was handled individually, without clearly defined generic requirements. The NRC amended the decommissioning regulations in 1996 to clarify ambiguities and codify procedures and terminology as a means of enhancing

efficiency and uniformity in the decommissioning process. The amendments allow for greater public participation and better define the transition process from operations to decommissioning.

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

1.3.1 Nuclear Waste Policy Act

Congress passed the Nuclear Waste Policy Act[6] (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,[7] the U.S. Court of Appeals for the Federal Circuit reaffirmed the utility position that DOE had breached its contractual obligation. Legal actions seeking the recovery of damages for DOE's failure to begin spent fuel disposal continue; however, 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).[8] This funding requirement is fulfilled through inclusion of certain high-level waste cost elements in the decommissioning estimates, as identified in Section 3.

With the delays in developing a national waste management system, the plant's existing fuel storage facility needs to be supplemented to support long-term plant operations. This analysis assumes that an independent spent fuel storage installation (ISFSI) is constructed at the site to support plant operations. The ISFSI infrastructure, including the pad, fencing, access ramps, etc., will be designed to accommodate the total number of storage modules needed to support both operations and decommissioning. As such, the cost to construct the facility is not included as a decommissioning expense.

For estimating purposes, the DOE is assumed to commence geologic repository operations in 2020, with the first assemblies from Crystal River being received in 2023. 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 on site for 36 years after the cessation of plant operations in 2016. Consequently, costs are included within the estimate for the long-term caretaking of the spent fuel at the site until the year 2052.

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,[9] 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,"[10] 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.

Progress Energy 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. Despite 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 generated using pricing for the currently operating Envirocare facility in Clive, Utah. Since Envirocare does not have a license to dispose of more highly radioactive waste (Class B and C), pricing for the Barnwell facility is also used.

1.3.3 Radiological Criteria for License Termination

In 1997, the NRC published Subpart E, "Radiological Criteria for License Termination,"[11] amending 10 CFR Part 20. This subpart provides radiological criteria for releasing a facility for unrestricted use. The regulation states that the site can be released for unrestricted use if radioactivity levels are such that the average member of a critical group would not receive a Total Effective Dose Equivalent (TEDE) in excess of 25 millirem per year, and provided that residual radioactivity has been reduced to levels that are As Low As Reasonably Achievable (ALARA). The decommissioning estimates assume that the

Crystal River 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).[12] An additional and separate limit of 4 millirem per year, as defined in 40 CFR §141.16, is applied to drinking water.[13]

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

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

2. DECOMMISSIONING ALTERNATIVES

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

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

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

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

2.1 DECON

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

2.1.1 Period 1 - Preparations

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

Engineering and Planning

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

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

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

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

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

Site Preparations

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

- Characterization of the site and surrounding environs. This includes radiation surveys of work areas, major components (including the reactor vessel and its internals), internal piping, and primary shield cores.

- Isolation of the spent fuel storage pool and fuel handling systems, such that decommissioning operations can commence on the balance of the plant. The pool will remain operational for approximately 5½ years following the cessation of operations before the inventory resident at shutdown can be transferred to the ISFSI.

- Specification of transport and disposal requirements for activated materials and/or hazardous materials, including shielding and waste stabilization.

- Development of procedures for occupational exposure control, control and release of liquid and gaseous effluent, processing of radwaste (including dry-active waste, resins, filter media, metallic and non-metallic components generated in decommissioning), site security and emergency programs, and industrial safety.

2.1.2 Period 2 - Decommissioning Operations

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

- Construction of temporary facilities and/or modification of existing facilities to support dismantling activities. This may include a centralized processing area to facilitate equipment removal and component preparations for off-site disposal.

- Reconfiguration and modification of site structures and facilities as needed to support decommissioning operations. This may include the upgrading of roads (on- and off-site) to facilitate hauling and transport. Modifications may be required to the containment structure to facilitate access of large/heavy equipment. Modifications may also be required to the refueling area of the building to support the segmentation of the reactor vessel internals and component extraction.

- Design and fabrication of temporary and permanent shielding to support removal and transportation activities, construction of contamination control envelopes, and the procurement of specialty tooling.

- Procurement (lease or purchase) of shipping canisters, cask liners, and industrial packages for the disposition of low-level radioactive waste.

- Decontamination of components and piping systems as required to control (minimize) worker exposure.

- Removal of piping and components no longer essential to support decommissioning operations.

- Removal of control rod drive housings and the head service structure from the reactor vessel head. Segmentation of the vessel closure head.

- Removal and segmentation of the upper internals assemblies. Segmentation will maximize the loading of the shielded transport casks, i.e., by weight and activity. The operations are conducted under water using remotely operated tooling and contamination controls.

- Disassembly and segmentation of the remaining reactor internals, including the core shroud and lower core support assembly. Some material is expected to exceed Class C disposal requirements. As such, the segments will be packaged in modified fuel storage canisters for geologic disposal.

- Segmentation of the reactor vessel. A shielded platform is installed for segmentation as cutting operations are performed in-air using remotely operated equipment within a contamination control envelope. The water level is maintained just below the cut to minimize the working area dose rates. Segments are transferred in-air to containers that are stored under water, for example, in an isolated area of the refueling canal.

- Removal of the activated portions of the concrete biological shield and accessible contaminated concrete surfaces. If dictated by the steam generator and pressurizer removal scenarios, those portions of the associated cubicles necessary for access and component extraction are removed.

- Removal of the steam generators and pressurizer for material recovery and controlled disposal. The generators will be moved to an on-site processing center and prepared for transport to the disposal site. To facilitate transport, the generators are cut in half, across the tube bundle. The exposed ends are capped and sealed. The segments can serve as their own burial containers provided that all penetrations are properly sealed and the internal contaminants are stabilized, e.g., with grout. Steel shielding will be added, as necessary, to those external areas of the package to meet transportation limits and regulations. The pressurizer is disposed of intact.

At least two years prior to the anticipated date of license termination, an LTP is required. Submitted as a supplement to the Final Safety Analysis Report (FSAR) or its equivalent, the plan must include: a site characterization, description of the remaining dismantling activities,

plans for site remediation, procedures for the final radiation survey, designation of the end use of the site, an updated cost estimate to complete the decommissioning, and any associated environmental concerns. The NRC will notice the receipt of the plan, make the plan available for public comment, and schedule a local hearing. LTP approval will be subject to any conditions and limitations as deemed appropriate by the Commission. The licensee may then commence with the final remediation of site facilities and services, including:

- Removal of remaining plant systems and associated components as they become nonessential to the decommissioning program or worker health and safety (e.g., waste collection and treatment systems, electrical power and ventilation systems).

- Removal of the steel liners from refueling canal, disposing of the activated and contaminated sections as radioactive waste. Removal of any activated/ contaminated concrete.

- Surveys of the decontaminated areas of the containment structure.

- Remediation and removal of the contaminated equipment and material from the auxiliary building and any other contaminated facility. Radiation and contamination controls will be utilized until residual levels indicate that the structures and equipment can be released for unrestricted access and conventional demolition. This activity may necessitate the dismantling and disposition of most of the systems and components (both clean and contaminated) located within these buildings. This activity facilitates surface decontamination and subsequent verification surveys required prior to obtaining release for demolition.

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

Incorporated into the LTP is the Final Survey Plan. This plan identifies the radiological surveys to be performed once the decontamination

activities are completed and is developed using the guidance provided in the "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)."[15] 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, fuel handling, radioactive waste, solidification facility and condensate polishing buildings. Under certain circumstances, verifying that subsurface radionuclide concentrations meet NRC site release requirements will require removal of grade slabs and lower floors, potentially weakening footings and structural supports. This removal activity will be necessary for those facilities and plant areas where historical records, when available, indicate the potential for radionuclides having been present in the soil, where system failures have been recorded, or where it is required to confirm that subsurface process and drain lines were not breached over the operating life of the station.

Prompt dismantling of site structures is clearly the most appropriate and cost-effective option. It is unreasonable to anticipate that these structures would be repaired and preserved after the radiological contamination is removed. The cost to dismantle site structures with a

work force already mobilized on site is more efficient than if the process were deferred. Site facilities quickly degrade without maintenance, adding additional expense and creating potential hazards to the public as well as to future workers. Abandonment creates a breeding ground for vermin infestation as well as other biological hazards.

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

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

2.1.4 ISFSI Operations and Decommissioning

The ISFSI will continue to operate under a separate and independent license (10 CFR §72) following the termination of the §50 operating license. Assuming the DOE starts accepting fuel in 2020, transfer of spent fuel from the ISFSI is anticipated to begin in 2023, and continue through the year 2052.

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 horizontal concrete module for pad storage. For purposes of this cost analysis, it is assumed that once the inner canisters containing the spent fuel assemblies have been removed, any required

decontamination performed on the storage modules (some minor activation is assumed), 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 is then removed and the area regraded.

2.2 SAFSTOR

The NRC defines SAFSTOR as "the alternative in which the nuclear facility is placed and maintained in a condition that allows the nuclear facility to be safely stored and subsequently decontaminated (deferred decontamination) to levels that permit release for unrestricted use." The facility is left intact (during the dormancy period), with structures maintained in a sound condition. Systems that are not required to support the spent fuel 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 reactor, revision of technical specifications appropriate to the operating conditions and requirements, a characterization of the facility and major components, and the development of the PSDAR.

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

- Isolation of the spent fuel storage services and fuel handling systems so that safe-storage operations may commence on the balance of the plant. This activity may be carried out by plant personnel in accordance with existing operating technical specifications. Activities are scheduled around the fuel handling systems to the greatest extent possible.

- Transfer of the spent fuel from the storage pool to the ISFSI pad for interim storage, following the minimum required cooling period in the spent fuel pool.

- Draining and de-energizing of the non-contaminated systems not required to support continued site operations or maintenance.

- Disposing of contaminated filter elements and resin beds not required for processing wastes from layup activities for future operations.

- Draining of the reactor vessel, with the internals left in place and the vessel head secured.

- Draining and de-energizing non-essential, contaminated systems with decontamination as required for future maintenance and inspection.

- Preparing lighting and alarm systems whose continued use is required; de-energizing portions of fire protection, electric power, and HVAC systems whose continued use is not required.

- Cleaning of the loose surface contamination from building access pathways.

- Performing an interim radiation survey of plant, posting warning signs where appropriate.

- Erecting physical barriers and/or securing all access to radioactive or contaminated areas, except as required for inspection and maintenance.

- Installing security and surveillance monitoring equipment and relocating security fence around secured structures, as required.

2.2.2 Period 2 - Dormancy

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

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

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

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

Consistent with the DECON scenario, the spent fuel storage pool is emptied within 5½ years of the cessation of operations. The transfer of the spent fuel from the ISFSI to a DOE facility begins in 2023 and continues throughout the dormancy period until completed in 2052. Once emptied, the ISFSI is secured for storage and decommissioned along with the power block structures in Period 4.

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

2.2.3 Periods 3 and 4 - Delayed Decommissioning

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

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

Variations in the length of the dormancy period are expected to have little effect upon the quantities of radioactive wastes generated from system and structure removal operations. Given the levels of radioactivity and spectrum of radionuclides expected from 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 estimate for this delayed scenario incorporates reduced ALARA controls for the SAFSTOR's lower occupational exposure potential.

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

2.2.4 Period 5 - Site Restoration

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

3. COST ESTIMATE

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

3.1 BASIS OF ESTIMATE

The estimates were developed using the site-specific, technical information from the 2000 analysis.[16] This information was reviewed for the current analysis and updated as deemed appropriate. The site-specific considerations and assumptions used in the previous evaluation were also revisited. Modifications were incorporated where new information was available or experience from ongoing decommissioning programs provided viable alternatives or improved processes.

3.2 METHODOLOGY

The methodology used to develop the estimates follows the basic approach originally presented in the AIF/NESP-036 study report, "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates,"[17] and the DOE "Decommissioning Handbook."[18] These documents present a unit factor method for estimating decommissioning activity costs, which simplifies the estimating calculations. Unit factors for concrete removal ($/cubic yard), steel removal ($/ton), and cutting costs ($/inch) are developed using local labor rates. The activity-dependent costs are estimated with the item quantities (cubic yards and tons), developed from plant drawings and inventory documents. Removal rates and material costs for the conventional disposition of components and structures rely upon information available in the industry publication, "Building Construction Cost Data," published by R.S. Means.[19]

This analysis reflects lessons learned from TLG's involvement in the Shippingport Station Decommissioning Project, completed in 1989, as well as the decommissioning of the Cintichem reactor, hot cells, and associated facilities, completed in 1997. In addition, the planning and engineering for the Pathfinder, Shoreham, Rancho Seco, Trojan, Yankee Rowe, Big Rock Point, Maine Yankee, Humboldt Bay-3, Oyster Creek, Connecticut Yankee, and San Onofre-1 nuclear units have provided additional insight into the process, the

regulatory aspects, and the technical challenges of decommissioning commercial nuclear units.

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

Work Difficulty Factors

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

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

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

Scheduling Program Durations

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

An activity duration critical path is used to determine the total decommissioning program schedule. The schedule is relied upon in calculating the carrying costs, which include program management, administration, field engineering, equipment rental, and support services such as quality control and

security. This systematic approach for assembling decommissioning estimates ensures a high degree of confidence in the reliability of the resulting costs.

3.3 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"[20] as "specific provision for unforeseeable elements of cost within the defined project scope; particularly important where previous experience relating estimates and actual costs has shown that unforeseeable events which will increase costs are likely to occur." The cost elements in this analysis are based upon ideal conditions and maximum efficiency; therefore, consistent with industry practice, contingency is included. In the AIF/NESP-036 study, the types of unforeseeable events that are likely to occur in decommissioning are discussed and guidelines are provided for percentage contingency in each category. It should be noted that contingency, as used in this analysis, does not account for price escalation and inflation in the cost of decommissioning over the remaining operating life of the station.

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 detailed estimate (as provided in Appendix C and D). For example, the composite contingency value reported for the DECON alternative in Appendix C is approximately 17.3%.

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 costs to the estimate for financial risk, since there is insufficient historical data from which to project future liabilities. Consequently, the areas of uncertainty or risk are

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

3.4 SITE-SPECIFIC CONSIDERATIONS

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

3.4.1 Spent Fuel Management

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

The total inventory of assemblies that will need to be handled during decommissioning is based upon several assumptions. The pickup of commercial fuel in the U.S. nuclear industry by the DOE is assumed to begin in the year 2020 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. A delay in the startup of the repository, or a decrease in the rate of acceptance rate, will correspondingly prolong the transfer process and result in the fuel remaining at the Crystal River site longer.

The ISFSI, constructed to support plant operations, will continue to operate throughout decommissioning, and beyond the termination of the operating license in the DECON decommissioning scenario, until such time that the transfer of spent fuel to the DOE can be completed. Assuming that DOE commences repository operation in 2020, Crystal River fuel is projected to be removed from the site beginning in 2023. The process is expected to be completed by the year 2052, based upon the current shutdown date. The scenario is similar for the SAFSTOR alternative, however, based upon the expected completion date for fuel

transfer, the ISFSI will be emptied prior to the commencement of decommissioning operations.

Operation and maintenance costs for the ISFSI are included within the estimate and address the cost for staffing the facility, 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 facility 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 approval to construct the repository at Yucca Mountain will require at least as long a review period. Construction is not expected to begin before 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 2020.

Spent Fuel Management Model

The ability to complete the decommissioning is highly dependent upon when the DOE is assumed to remove spent fuel from the site. DOE's repository program assumes that spent fuel will be accepted for disposal from the nation's commercial nuclear plants in the order (the "queue") in which it was removed from service ("oldest fuel first").[21] The site residence schedule for the spent fuel is based upon the DOE's most recently published annual 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.[22]

Based on the revised DOE acceptance rates (the original 1995 rates were based upon 900 MTU/year), the first shipment will occur in Year 3. When the time comes for shipping, it is possible that Crystal River could

"swap" dates with another unit that has earlier deliveries, subject to the DOE's approval, but this cannot be assumed at this time.

Storage Canister Design

An ISFSI, constructed to maintain full-core discharge capability in the spent fuel pool during operations, is also available to support decommissioning. No additional capital cost is included as a decommissioning expense with the exception of the transfer crane, once the auxiliary building is unavailable. The design and capacity of the ISFSI is based upon the NUHOMS system, with a 32 fuel assembly capacity. A unit cost of $1,000,000 is used for pricing the internal multi-purpose canister (MPC) and the horizontal concrete storage module. For fuel transferred directly from the pool to the DOE, the DOE is assumed to provide the MPC at no additional cost to the owner.

Canister Loading and Transfer

An average cost of $100,000 is used for the labor and equipment to seal each spent fuel canister once it is loaded. An additional cost of $200,000 is used for the labor to load/transport the spent fuel from the pool to the ISFSI pad or to a DOE transport vehicle (assuming the ISFSI and the DOE casks are both welded multi-purpose canister designs within a storage or transportation overpack). For estimating purposes, 50% of this cost is used to estimate the cost to transfer the fuel from the ISFSI into a DOE transport cask.

Operations and Maintenance

An annual cost (excluding labor) of approximately $715,000 and $75,000 are used for operation and maintenance of the spent fuel pool and the ISFSI, respectively. Pool operations are expected to continue approximately 5½ years after the cessation of operations. ISFSI operating costs are based upon a 36 year period of operations following plant shutdown.

ISFSI Design Considerations

A multi-purpose (storage and transport) dry shielded storage canister with a horizontal, reinforced concrete storage module is used as a basis for the cost analysis. Approximately 50% of the modules are assumed to have some level of neutron-induced activation as a result of the long-term storage of the fuel, i.e., to levels exceeding free-release limits.

Approximately 10% of the concrete and steel is assumed to be removed from the modules for controlled disposal. The cost of the disposition of this material, as well as the demolition of the ISFSI facility, is included in the estimate.

GTCC

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

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

3.4.2 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 dictate the segmentation and packaging methodology.

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 the Crystal River unit ceases operation. Future viability of this option will depend upon the ultimate location of the disposal site, as well as the disposal site licensee's ability to accept highly radioactive packages and effectively isolate them from the environment. Consequently, the study assumes the reactor vessel will require segmentation, as a bounding condition.

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

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

The generators are segmented on-site to facilitate transportation. Each unit is cut in half, across the tube sheet. The exposed ends are capped and sealed. The interior volume is filled with low-density cellular concrete for stabilization of the internal contamination. Each component is then loaded onto a rail car for transport to the disposal facility.

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

The reactor head at Crystal River has been replaced, with the retired component place in storage at the site. The decommissioning estimates include the disposition of this component in a manner similar to the installed head and the dismantling of the storage facility.

3.4.4 Main Turbine and Condenser

The main turbine is dismantled using conventional maintenance procedures. The turbine rotors and shafts are removed to a laydown

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

3.4.5 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.[23] The contaminated material will be packaged in Industrial Packages (IP-1, IP-2, or IP-3, as defined in subpart 173.411) for transport unless demonstrated to qualify as their own shipping containers. The reactor vessel and internal components are expected to be transported in accordance with §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.

Transportation costs for material requiring controlled disposal 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.[24]

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.

The Envirocare facility is used as a proxy for the future disposal of decommissioning waste. Since Envirocare does not have a license for Class B or C material, the Barnwell rates are also used, as appropriate. Surcharges are added for the highly activated components, e.g., generated in the segmentation of the reactor vessel.

3.4.7 Site Conditions Following Decommissioning

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

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 for the power block foundations. Excess construction debris is trucked off site as an alternative to onsite disposal. 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. Costs are included, however, for the remediation of the firing range, i.e., removal of soil containing lead residue.

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

Progress Energy will manage the decontamination and dismantling of the station in addition to maintaining site security, radiological health and safety, quality assurance and overall site administration during the decommissioning. Personnel costs are based upon average salary information provided by Progress Energy. Overhead costs are included for site and corporate support, reduced commensurate with the staffing of the project.

Progress Energy will hire a Decommissioning Operations Contractor (DOC) to manage the decommissioning. Contract personnel will provide engineering services, e.g., for preparing the activity specifications, work procedures, activation, and structural analyses, under the direction of Progress Energy.

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

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

3.5.3 Design Conditions

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

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

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

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

3.5.4 General

Transition Activities

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

- Drain and collect fuel oils, lubricating oils, and transformer oils for recycle and/or sale.

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

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

Scrap and Salvage

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

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

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

Energy

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

Insurance

Costs for continuing coverage (nuclear liability and property insurance) following cessation of plant operations and during decommissioning are included and based upon current operating premiums. Reductions in premiums, throughout the decommissioning process, are based upon the guidance and the limits for coverage defined in the NRC's proposed rulemaking "Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors."[28] The NRC's financial protection requirements are based on various reactor (and spent fuel) configurations.

Taxes

Property taxes are included within the estimates. Taxes are included for the land and the ISFSI (during its operation), throughout the decommissioning timeframe. Taxes on plant systems and structures are included (at a reduced level) and further reduced as dismantling operations proceed.

Site Modifications

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

3.6 COST ESTIMATE SUMMARY

Schedules of expenditures are provided for each scenario in Tables 3.1 and 3.2. Four tables are provided for each decommissioning alternative delineating the total cost as well as the individual cost contributors of License Termination, Spent Fuel Management and Site Restoration. 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 Appendix C and D, along with the timelines presented in Section 4.

As discussed in Section 3.4.2, it is not anticipated that the DOE would accept the GTCC waste prior to completing the transfer of spent fuel. Therefore, for the DECON scenario, GTCC disposal is shown in the final year of ISFSI operation, i.e., 2052. In SAFSTOR, the fuel is removal prior to the start of reactor vessel dismantling. The disposal of the GTCC, in this scenario, is assumed to be concurrent with the disposal of the other reactor internals. While designated for disposal at the geologic repository along with the spent fuel, GTCC waste is still classified as low-level radioactive waste and, as such, included as a "License Termination" expense.

TABLE 3.1
SCHEDULE OF DECON EXPENDITURES
(thousands, 2005 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2016	3,110	248	105	3	2,117	5,583
2017	40,713	4,758	1,429	458	26,071	73,429
2018	50,745	22,234	1,856	16,959	20,509	112,303
2019	43,013	18,241	1,206	22,245	19,996	104,701
2020	36,590	6,518	996	7,633	14,673	66,409
2021	36,490	6,500	993	7,612	14,633	66,227
2022	30,405	5,107	725	6,214	9,619	52,070
2023	24,557	3,035	294	857	7,642	36,385
2024	16,937	7,815	133	0	2,132	27,016
2025	10,745	4,667	95	0	1,787	17,293
2026	1,835	134	40	0	1,295	3,305
2027	1,835	134	40	0	1,295	3,305
2028	1,840	135	40	0	1,299	3,314
2029	1,835	134	40	0	1,295	3,305
2030	1,835	134	40	0	1,295	3,305
2031	1,835	134	40	0	1,295	3,305
2032	1,840	135	40	0	1,299	3,314
2033	1,835	134	40	0	1,295	3,305
2034	1,835	134	40	0	1,295	3,305
2035	1,835	134	40	0	1,295	3,305
2036	1,840	135	40	0	1,299	3,314
2037	1,835	134	40	0	1,295	3,305
2038	1,835	134	40	0	1,295	3,305
2039	1,835	134	40	0	1,295	3,305
2040	1,840	135	40	0	1,299	3,314
2041	1,835	134	40	0	1,295	3,305
2042	1,835	134	40	0	1,295	3,305
2043	1,835	134	40	0	1,295	3,305
2044	1,840	135	40	0	1,299	3,314
2045	1,835	134	40	0	1,295	3,305
2046	1,835	134	40	0	1,295	3,305
2047	1,835	134	40	0	1,295	3,305
2048	1,840	135	40	0	1,299	3,314
2049	1,835	134	40	0	1,295	3,305
2050	1,835	134	40	0	1,295	3,305
2051	1,835	134	40	0	1,295	3,305
2052	1,849	463	40	9	13,660	16,022
2053	2,212	1,510	65	1,116	345	5,249
	345,115	84,590	8,972	63,106	166,885	668,668

TABLE 3.1a
SCHEDULE OF DECON EXPENDITURES
LICENSE TERMINATION
(thousands, 2005 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2016	3,016	97	105	3	604	3,825
2017	39,453	2,850	1,429	458	7,712	51,903
2018	48,737	20,122	1,856	16,959	9,597	97,271
2019	41,278	16,060	1,206	22,245	9,419	90,208
2020	35,484	4,298	996	7,633	6,950	55,361
2021	35,387	4,287	993	7,612	6,931	55,210
2022	29,940	4,173	725	6,214	6,256	47,307
2023	22,948	2,287	282	857	3,844	30,219
2024	112	0	0	0	362	474
2025	66	0	0	0	213	280
2026	0	0	0	0	0	0
2027	0	0	0	0	0	0
2028	0	0	0	0	0	0
2029	0	0	0	0	0	0
2030	0	0	0	0	0	0
2031	0	0	0	0	0	0
2032	0	0	0	0	0	0
2033	0	0	0	0	0	0
2034	0	0	0	0	0	0
2035	0	0	0	0	0	0
2036	0	0	0	0	0	0
2037	0	0	0	0	0	0
2038	0	0	0	0	0	0
2039	0	0	0	0	0	0
2040	0	0	0	0	0	0
2041	0	0	0	0	0	0
2042	0	0	0	0	0	0
2043	0	0	0	0	0	0
2044	0	0	0	0	0	0
2045	0	0	0	0	0	0
2046	0	0	0	0	0	0
2047	0	0	0	0	0	0
2048	0	0	0	0	0	0
2049	0	0	0	0	0	0
2050	0	0	0	0	0	0
2051	0	0	0	0	0	0
2052	0	330	0	0	12,368	12,698
2053	0	0	0	0	0	0
	256,423	54,504	7,593	61,981	64,255	444,756

TABLE 3.1b
SCHEDULE OF DECON EXPENDITURES
SPENT FUEL MANAGEMENT
(thousands, 2005 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2016	50	151	0	0	1,513	1,714
2017	636	1,908	0	0	18,358	20,902
2018	696	2,089	0	0	10,692	13,477
2019	716	2,147	0	0	10,266	13,128
2020	737	2,212	0	0	7,723	10,673
2021	735	2,206	0	0	7,702	10,644
2022	310	931	0	0	3,364	4,605
2023	179	26	4	0	3,743	3,952
2024	1,873	273	40	0	1,195	3,381
2025	1,855	216	40	0	1,234	3,345
2026	1,835	134	40	0	1,295	3,305
2027	1,835	134	40	0	1,295	3,305
2028	1,840	135	40	0	1,299	3,314
2029	1,835	134	40	0	1,295	3,305
2030	1,835	134	40	0	1,295	3,305
2031	1,835	134	40	0	1,295	3,305
2032	1,840	135	40	0	1,299	3,314
2033	1,835	134	40	0	1,295	3,305
2034	1,835	134	40	0	1,295	3,305
2035	1,835	134	40	0	1,295	3,305
2036	1,840	135	40	0	1,299	3,314
2037	1,835	134	40	0	1,295	3,305
2038	1,835	134	40	0	1,295	3,305
2039	1,835	134	40	0	1,295	3,305
2040	1,840	135	40	0	1,299	3,314
2041	1,835	134	40	0	1,295	3,305
2042	1,835	134	40	0	1,295	3,305
2043	1,835	134	40	0	1,295	3,305
2044	1,840	135	40	0	1,299	3,314
2045	1,835	134	40	0	1,295	3,305
2046	1,835	134	40	0	1,295	3,305
2047	1,835	134	40	0	1,295	3,305
2048	1,840	135	40	0	1,299	3,314
2049	1,835	134	40	0	1,295	3,305
2050	1,835	134	40	0	1,295	3,305
2051	1,835	134	40	0	1,295	3,305
2052	1,849	133	40	9	1,292	3,324
2053	2,212	1,510	65	1,116	345	5,249
	59,600	17,298	1,222	1,125	101,128	180,374

TABLE 3.1c
SCHEDULE OF DECON EXPENDITURES
SITE RESTORATION
(thousands, 2005 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2016	44	0	0	0	0	44
2017	624	0	0	0	0	624
2018	1,312	23	0	0	221	1,555
2019	1,019	34	0	0	312	1,365
2020	368	7	0	0	0	375
2021	367	7	0	0	0	374
2022	155	3	0	0	0	158
2023	1,430	721	9	0	55	2,215
2024	14,951	7,542	93	0	575	23,161
2025	8,824	4,451	55	0	339	13,669
2026	0	0	0	0	0	0
2027	0	0	0	0	0	0
2028	0	0	0	0	0	0
2029	0	0	0	0	0	0
2030	0	0	0	0	0	0
2031	0	0	0	0	0	0
2032	0	0	0	0	0	0
2033	0	0	0	0	0	0
2034	0	0	0	0	0	0
2035	0	0	0	0	0	0
2036	0	0	0	0	0	0
2037	0	0	0	0	0	0
2038	0	0	0	0	0	0
2039	0	0	0	0	0	0
2040	0	0	0	0	0	0
2041	0	0	0	0	0	0
2042	0	0	0	0	0	0
2043	0	0	0	0	0	0
2044	0	0	0	0	0	0
2045	0	0	0	0	0	0
2046	0	0	0	0	0	0
2047	0	0	0	0	0	0
2048	0	0	0	0	0	0
2049	0	0	0	0	0	0
2050	0	0	0	0	0	0
2051	0	0	0	0	0	0
2052	0	0	0	0	0	0
2053	0	0	0	0	0	0
	29,091	12,789	157	0	1,501	43,538

TABLE 3.2
SCHEDULE OF SAFSTOR EXPENDITURES
(thousands, 2005 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2016	2,405	214	105	3	2,117	4,844
2017	30,650	3,415	1,324	416	26,156	61,961
2018	21,999	9,832	1,468	1,230	15,730	50,258
2019	6,002	2,429	993	42	12,990	22,456
2020	6,018	2,435	996	43	13,026	22,518
2021	6,002	2,429	993	42	12,990	22,456
2022	4,098	1,248	442	42	7,051	12,882
2023	2,709	386	40	42	2,717	5,894
2024	2,717	387	40	43	2,724	5,910
2025	2,709	386	40	42	2,717	5,894
2026	2,709	386	40	42	2,717	5,894
2027	2,709	386	40	42	2,717	5,894
2028	2,717	387	40	43	2,724	5,910
2029	2,709	386	40	42	2,717	5,894
2030	2,709	386	40	42	2,717	5,894
2031	2,709	386	40	42	2,717	5,894
2032	2,717	387	40	43	2,724	5,910
2033	2,709	386	40	42	2,717	5,894
2034	2,709	386	40	42	2,717	5,894
2035	2,709	386	40	42	2,717	5,894
2036	2,717	387	40	43	2,724	5,910
2037	2,709	386	40	42	2,717	5,894
2038	2,709	386	40	42	2,717	5,894
2039	2,709	386	40	42	2,717	5,894
2040	2,717	387	40	43	2,724	5,910
2041	2,709	386	40	42	2,717	5,894
2042	2,709	386	40	42	2,717	5,894
2043	2,709	386	40	42	2,717	5,894
2044	2,717	387	40	43	2,724	5,910
2045	2,709	386	40	42	2,717	5,894
2046	2,709	386	40	42	2,717	5,894
2047	2,709	386	40	42	2,717	5,894
2048	2,717	387	40	43	2,724	5,910
2049	2,709	386	40	42	2,717	5,894
2050	2,709	386	40	42	2,717	5,894
2051	2,709	386	40	42	2,717	5,894
2052	2,714	387	40	43	2,723	5,906
2053	1,791	251	40	42	2,252	4,376
2054	1,791	251	40	42	2,252	4,376
2055	1,791	251	40	42	2,252	4,376
2056	1,796	252	40	43	2,258	4,388

TABLE 3.2 (continued)
SCHEDULE OF SAFSTOR EXPENDITURES
(thousands, 2005 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2057	1,791	251	40	42	2,252	4,376
2058	1,791	251	40	42	2,252	4,376
2059	1,791	251	40	42	2,252	4,376
2060	1,796	252	40	43	2,258	4,388
2061	1,791	251	40	42	2,252	4,376
2062	1,791	251	40	42	2,252	4,376
2063	1,791	251	40	42	2,252	4,376
2064	1,796	252	40	43	2,258	4,388
2065	1,791	251	40	42	2,252	4,376
2066	1,791	251	40	42	2,252	4,376
2067	1,791	251	40	42	2,252	4,376
2068	1,796	252	40	43	2,258	4,388
2069	1,791	251	40	42	2,252	4,376
2070	1,791	251	40	42	2,252	4,376
2071	3,282	350	92	42	2,345	6,112
2072	29,502	2,212	996	43	3,972	36,724
2073	38,998	13,386	1,139	13,320	12,527	79,370
2074	39,319	13,762	1,139	19,295	13,134	86,650
2075	37,096	5,401	993	13,342	5,407	62,240
2076	25,263	3,220	378	2,298	2,832	33,990
2077	15,659	8,064	132	0	694	24,549
2078	9,524	4,905	81	0	422	14,931
	389,411	89,414	13,180	52,198	253,517	797,720

TABLE 3.2a
SCHEDULE OF SAFSTOR EXPENDITURES
LICENSE TERMINATION
(thousands, 2005 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2016	2,355	63	105	3	604	3,130
2017	30,013	1,505	1,324	416	7,790	41,049
2018	19,285	7,707	919	1,230	5,079	34,220
2019	1,791	251	40	42	2,252	4,376
2020	1,796	252	40	43	2,258	4,388
2021	1,791	251	40	42	2,252	4,376
2022	1,791	251	40	42	2,252	4,376
2023	1,791	251	40	42	2,252	4,376
2024	1,796	252	40	43	2,258	4,388
2025	1,791	251	40	42	2,252	4,376
2026	1,791	251	40	42	2,252	4,376
2027	1,791	251	40	42	2,252	4,376
2028	1,796	252	40	43	2,258	4,388
2029	1,791	251	40	42	2,252	4,376
2030	1,791	251	40	42	2,252	4,376
2031	1,791	251	40	42	2,252	4,376
2032	1,796	252	40	43	2,258	4,388
2033	1,791	251	40	42	2,252	4,376
2034	1,791	251	40	42	2,252	4,376
2035	1,791	251	40	42	2,252	4,376
2036	1,796	252	40	43	2,258	4,388
2037	1,791	251	40	42	2,252	4,376
2038	1,791	251	40	42	2,252	4,376
2039	1,791	251	40	42	2,252	4,376
2040	1,796	252	40	43	2,258	4,388
2041	1,791	251	40	42	2,252	4,376
2042	1,791	251	40	42	2,252	4,376
2043	1,791	251	40	42	2,252	4,376
2044	1,796	252	40	43	2,258	4,388
2045	1,791	251	40	42	2,252	4,376
2046	1,791	251	40	42	2,252	4,376
2047	1,791	251	40	42	2,252	4,376
2048	1,796	252	40	43	2,258	4,388
2049	1,791	251	40	42	2,252	4,376
2050	1,791	251	40	42	2,252	4,376
2051	1,791	251	40	42	2,252	4,376
2052	1,796	252	40	43	2,258	4,388
2053	1,791	251	40	42	2,252	4,376
2054	1,791	251	40	42	2,252	4,376
2055	1,791	251	40	42	2,252	4,376
2056	1,796	252	40	43	2,258	4,388

TABLE 3.2a (continued)
SCHEDULE OF SAFSTOR EXPENDITURES
LICENSE TERMINATION
(thousands, 2005 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2057	1,791	251	40	42	2,252	4,376
2058	1,791	251	40	42	2,252	4,376
2059	1,791	251	40	42	2,252	4,376
2060	1,796	252	40	43	2,258	4,388
2061	1,791	251	40	42	2,252	4,376
2062	1,791	251	40	42	2,252	4,376
2063	1,791	251	40	42	2,252	4,376
2064	1,796	252	40	43	2,258	4,388
2065	1,791	251	40	42	2,252	4,376
2066	1,791	251	40	42	2,252	4,376
2067	1,791	251	40	42	2,252	4,376
2068	1,796	252	40	43	2,258	4,388
2069	1,791	251	40	42	2,252	4,376
2070	1,791	251	40	42	2,252	4,376
2071	3,250	350	92	42	2,345	6,080
2072	28,869	2,212	996	43	3,972	36,091
2073	37,516	13,360	1,139	13,320	12,457	77,792
2074	37,840	13,659	1,139	18,983	13,061	84,682
2075	35,606	5,229	993	12,647	5,402	59,876
2076	23,732	2,528	368	2,180	2,799	31,606
2077	112	0	0	0	311	423
2078	68	0	0	0	189	257
	311,855	59,667	9,142	51,073	171,198	602,935

TABLE 3.2b
SCHEDULE OF SAFSTOR EXPENDITURES
SPENT FUEL MANAGEMENT
(thousands, 2005 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2016	50	151	0	0	1,513	1,714
2017	637	1,910	0	0	18,366	20,912
2018	2,713	2,125	549	0	10,651	16,038
2019	4,210	2,178	953	0	10,738	18,080
2020	4,222	2,184	956	0	10,768	18,130
2021	4,210	2,178	953	0	10,738	18,080
2022	2,307	997	402	0	4,799	8,506
2023	918	135	0	0	465	1,518
2024	920	136	0	0	466	1,522
2025	918	135	0	0	465	1,518
2026	918	135	0	0	465	1,518
2027	918	135	0	0	465	1,518
2028	920	136	0	0	466	1,522
2029	918	135	0	0	465	1,518
2030	918	135	0	0	465	1,518
2031	918	135	0	0	465	1,518
2032	920	136	0	0	466	1,522
2033	918	135	0	0	465	1,518
2034	918	135	0	0	465	1,518
2035	918	135	0	0	465	1,518
2036	920	136	0	0	466	1,522
2037	918	135	0	0	465	1,518
2038	918	135	0	0	465	1,518
2039	918	135	0	0	465	1,518
2040	920	136	0	0	466	1,522
2041	918	135	0	0	465	1,518
2042	918	135	0	0	465	1,518
2043	918	135	0	0	465	1,518
2044	920	136	0	0	466	1,522
2045	918	135	0	0	465	1,518
2046	918	135	0	0	465	1,518
2047	918	135	0	0	465	1,518
2048	920	136	0	0	466	1,522
2049	918	135	0	0	465	1,518
2050	918	135	0	0	465	1,518
2051	918	135	0	0	465	1,518
2052	918	135	0	0	465	1,518
2053	0	0	0	0	0	0
2054	0	0	0	0	0	0
2055	0	0	0	0	0	0
2056	0	0	0	0	0	0

TABLE 3.2b (continued)
SCHEDULE OF SAFSTOR EXPENDITURES
SPENT FUEL MANAGEMENT
(thousands, 2005 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2057	0	0	0	0	0	0
2058	0	0	0	0	0	0
2059	0	0	0	0	0	0
2060	0	0	0	0	0	0
2061	0	0	0	0	0	0
2062	0	0	0	0	0	0
2063	0	0	0	0	0	0
2064	0	0	0	0	0	0
2065	0	0	0	0	0	0
2066	0	0	0	0	0	0
2067	0	0	0	0	0	0
2068	0	0	0	0	0	0
2069	0	0	0	0	0	0
2070	0	0	0	0	0	0
2071	0	0	0	0	0	0
2072	0	0	0	0	0	0
2073	0	0	0	0	0	0
2074	403	72	0	312	2	790
2075	897	161	0	695	6	1,759
2076	159	72	0	118	1	349
2077	74	542	0	0	0	615
2078	45	329	0	0	0	374
	47,484	16,960	3,814	1,125	81,532	150,914

TABLE 3.2c
SCHEDULE OF SAFSTOR EXPENDITURES
SITE RESTORATION
(thousands, 2005 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0
2018	0	0	0	0	0	0
2019	0	0	0	0	0	0
2020	0	0	0	0	0	0
2021	0	0	0	0	0	0
2022	0	0	0	0	0	0
2023	0	0	0	0	0	0
2024	0	0	0	0	0	0
2025	0	0	0	0	0	0
2026	0	0	0	0	0	0
2027	0	0	0	0	0	0
2028	0	0	0	0	0	0
2029	0	0	0	0	0	0
2030	0	0	0	0	0	0
2031	0	0	0	0	0	0
2032	0	0	0	0	0	0
2033	0	0	0	0	0	0
2034	0	0	0	0	0	0
2035	0	0	0	0	0	0
2036	0	0	0	0	0	0
2037	0	0	0	0	0	0
2038	0	0	0	0	0	0
2039	0	0	0	0	0	0
2040	0	0	0	0	0	0
2041	0	0	0	0	0	0
2042	0	0	0	0	0	0
2043	0	0	0	0	0	0
2044	0	0	0	0	0	0
2045	0	0	0	0	0	0
2046	0	0	0	0	0	0
2047	0	0	0	0	0	0
2048	0	0	0	0	0	0
2049	0	0	0	0	0	0
2050	0	0	0	0	0	0
2051	0	0	0	0	0	0
2052	0	0	0	0	0	0
2053	0	0	0	0	0	0
2054	0	0	0	0	0	0
2055	0	0	0	0	0	0
2056	0	0	0	0	0	0

TABLE 3.2c (continued)
SCHEDULE OF SAFSTOR EXPENDITURES
SITE RESTORATION
(thousands, 2005 dollars)

Year	Labor	Equipment & Materials	Energy	Burial	Other	Total
2057	0	0	0	0	0	0
2058	0	0	0	0	0	0
2059	0	0	0	0	0	0
2060	0	0	0	0	0	0
2061	0	0	0	0	0	0
2062	0	0	0	0	0	0
2063	0	0	0	0	0	0
2064	0	0	0	0	0	0
2065	0	0	0	0	0	0
2066	0	0	0	0	0	0
2067	0	0	0	0	0	0
2068	0	0	0	0	0	0
2069	0	0	0	0	0	0
2070	0	0	0	0	0	0
2071	32	0	0	0	0	32
2072	633	0	0	0	0	633
2073	1,482	26	0	0	70	1,579
2074	1,076	31	0	0	70	1,177
2075	593	11	0	0	0	604
2076	1,373	620	11	0	31	2,035
2077	15,473	7,522	132	0	383	23,511
2078	9,411	4,575	81	0	233	14,300
	30,073	12,786	224	0	788	43,870

4. SCHEDULE ESTIMATE

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

A schedule or sequence of activities for the DECON alternative is presented in Figure 4.1. The scheduling sequence assumes that fuel is removed from the spent fuel pool within 5½ years. The key activities listed in the schedule do not reflect a one-to-one correspondence with those activities in the cost tables, but reflect dividing some activities for clarity and combining others for convenience. The schedule was prepared using the "Microsoft Project Professional 2002" computer software.[29]

4.1 SCHEDULE ESTIMATE ASSUMPTIONS

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

- The auxiliary building is isolated until such time that all spent fuel has been discharged from the spent fuel pool to the DOE and/or the ISFSI. Decontamination and dismantling of the storage pool is initiated once the transfer of spent fuel is complete (DECON option).

- All work (except vessel and internals removal) is performed during an 8-hour workday, 5 days per week, with no overtime. There are eleven paid holidays per year.

- Reactor and internals removal activities are performed by using separate crews for different activities working on different shifts, with a corresponding backshift charge for the second shift.

- Multiple crews work parallel activities to the maximum extent possible, consistent with optimum efficiency, adequate access for cutting, removal and laydown space, and with the stringent safety measures necessary during demolition of heavy components and structures.

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

4.2 PROJECT SCHEDULE

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

Project timelines are provided in Figures 4.2 and 4.3 with milestone dates based on a 2016 shutdown date. The fuel pool is emptied approximately 5½ years after shutdown, while ISFSI operations continue until the DOE can complete the transfer of assemblies to its geologic repository. Deferred decommissioning in the SAFSTOR scenarios is assumed to commence so that the operating license is terminated within a 60-year period from the cessation of plant operations.

FIGURE 4.1
ACTIVITY SCHEDULE

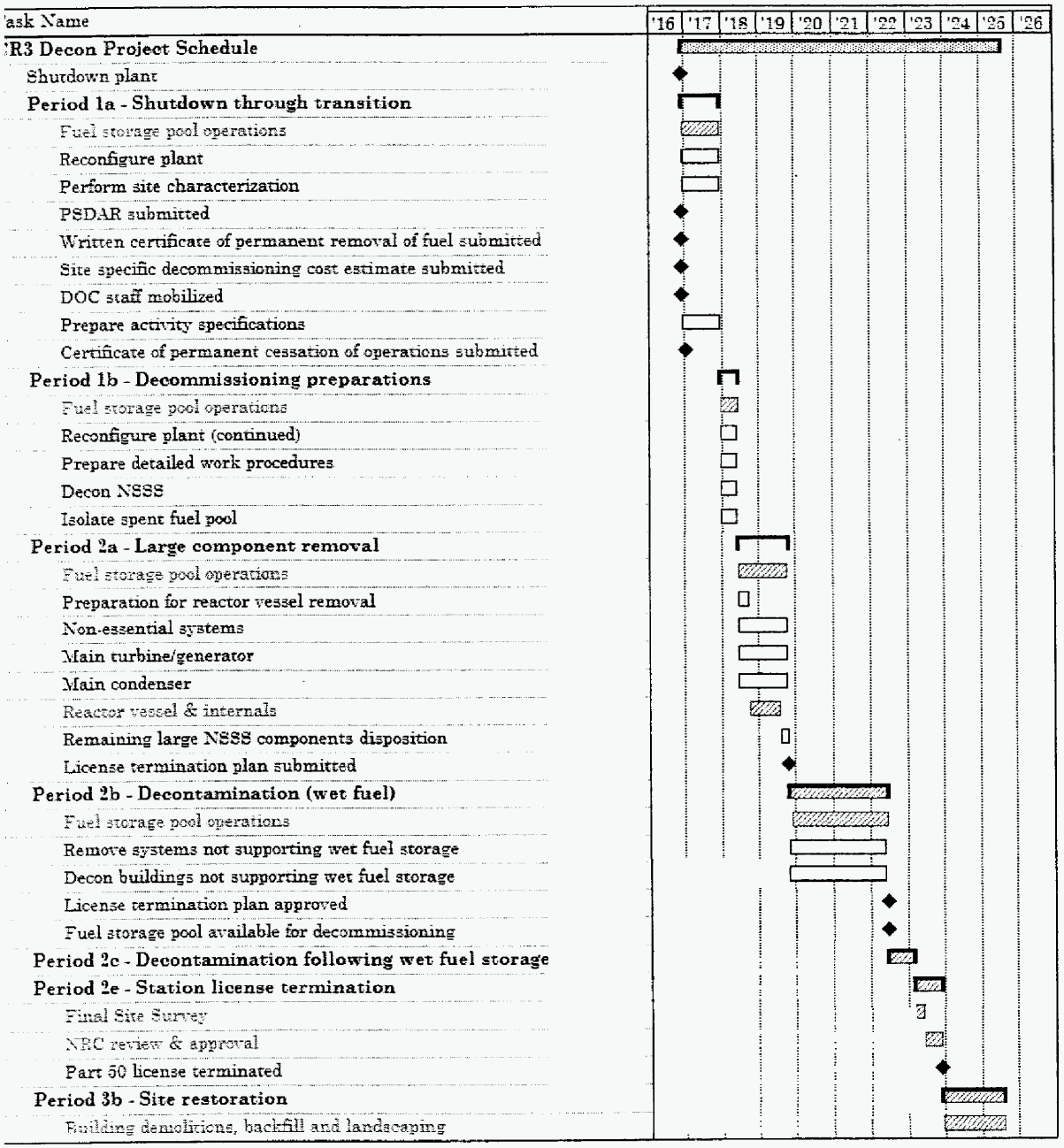


FIGURE 4.2
DECOMMISSIONING TIMELINE
DECON
(not to scale)

Crystal River Nuclear Plant, Unit 3
(Shutdown December 3, 2016)

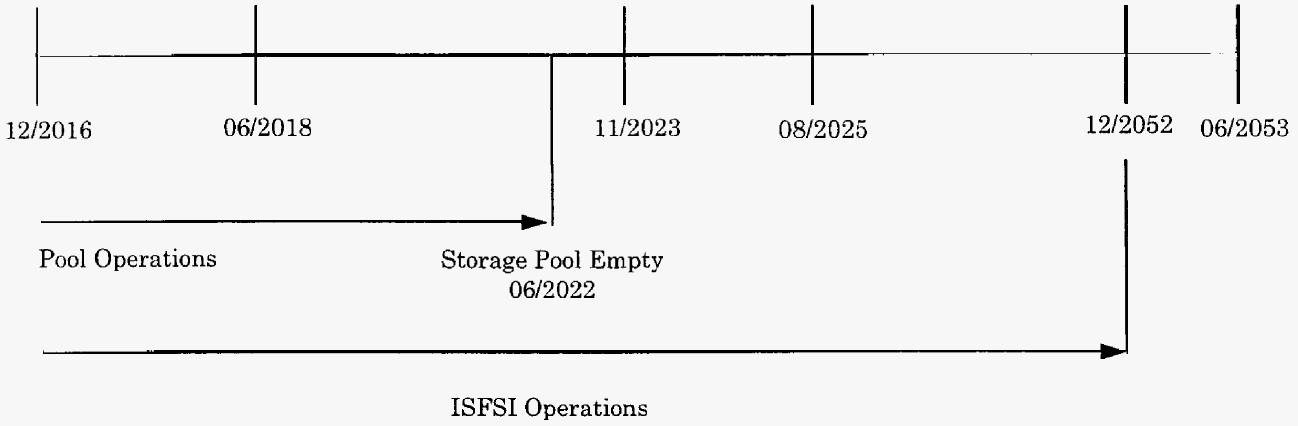
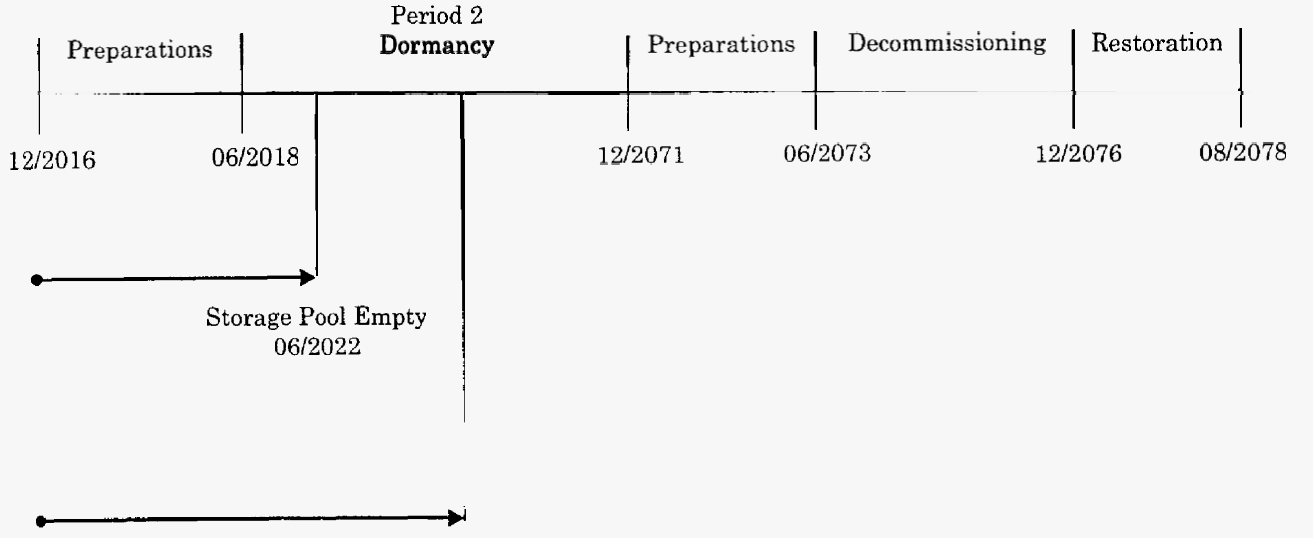


FIGURE 4.3
DECOMMISSIONING TIMELINE
SAFSTOR
(not to scale)

Crystal River Nuclear Plant, Unit 3
(Shutdown December 3, 2016)



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,[30] the NRC is responsible for protecting the public from sources of ionizing radiation. Title 10 of the Code of Federal Regulations delineates the production, utilization, and disposal of radioactive materials and processes. In particular, §71 defines radioactive material as it pertains to transportation and §61 specifies its disposition.

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

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

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

No process system containing/handling radioactive substances at shutdown is presumed to meet material release criteria by decay alone, i.e., systems radioactive at shutdown will still be radioactive over the time period during which the decommissioning is accomplished, due to the presence of long-lived radionuclides. While the dose rates decrease with time, radionuclides such as ^{137}Cs will still control the disposition requirements.

The waste material generated in the decontamination and dismantling of the nuclear station is primarily generated during Period 2 of DECON and Period 4 of SAFSTOR. Material that is considered potentially contaminated when removed from the radiologically controlled area is sent to processing facilities in Tennessee for conditioning and disposal at a unit cost of $2.25 per pound (excluding transportation). Heavily contaminated components and activated materials are routed for controlled disposal. The disposal volumes reported in the tables reflect the savings resulting from reprocessing and recycling.

For purposes of constructing the estimates, the cost for disposal at the Envirocare facility was used as a proxy for future disposal facilities. A rate of $198 per cubic foot is used for containerized waste and other large components including the reactor coolant pump motors, miscellaneous steel, metal siding, scaffolding, and structural steel. Demolition debris and dry active waste are disposed of at a bulk rate of $84 per cubic foot.

Since Envirocare is not currently able to receive the more highly radioactive components generated in the decontamination and dismantling of the reactor, disposal costs for the Class B and C material are based upon Barnwell rates. An average disposal rate of approximately $448 per cubic foot is used for this material, with additional surcharges for activity, dose rate, and/or handling added as appropriate for the particular package.

TABLE 5.1
DECOMMISSIONING WASTE SUMMARY
DECON

	Waste Class[1]	Volume (cubic feet)	Weight (pounds)
Low-Level Radioactive Waste			
	A	101,672	9,212,157
	B	10,909	1,631,284
	C	517	61,605
Geologic Repository (Greater-than Class C)			
	>C	524	105,646
Total [2]		113,623	11,010,692
Processed Waste (Off Site)			8,472,192
Scrap Metal			75,409,783

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

TABLE 5.2
DECOMMISSIONING WASTE SUMMARY
SAFSTOR

	Waste Class[1]	Volume (cubic feet)	Weight (pounds)
Low-Level Radioactive Waste			
	A	101,385	7,707,446
	B	4,884	554,510
	C	527	60,915
Geologic Repository (Greater-than Class C)			
	>C	524	105,646
Total [2]		107,321	8,428,517
Processed Waste (Off Site)			9,709,614
Scrap Metal			75,409,783

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

6. RESULTS

The analysis to estimate the costs to decommission Crystal River relied upon the site-specific, technical information developed for a previous analysis prepared in 2000. While not an engineering study, the estimates provide Progress Energy with sufficient information to assess their financial obligations, as they pertain to the eventual decommissioning of the nuclear station.

The estimates described in this report are based on numerous fundamental assumptions, including regulatory requirements, project contingencies, low-level radioactive waste disposal practices, high-level radioactive waste management options, and site restoration requirements. The decommissioning scenarios assume continued operation of the station's spent fuel pool 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) Crystal River is estimated to be $668.7 million. The majority of this cost (approximately 66.5%) is associated with the physical decontamination and dismantling of the nuclear unit so that the operating license can be terminated. Another 27.0% is associated with the management, interim storage, and eventual transfer of the spent fuel. The remaining 6.5% is for the demolition of the designated structures and limited restoration of the site.

The cost projected for deferred decommissioning (SAFSTOR) is estimated to be $797.7 million. The majority of this cost (approximately 75.6%) is associated with placing the unit in storage, ongoing caretaking of the unit during dormancy, and the eventual physical decontamination and dismantling of the nuclear unit so that the operating license can be terminated. Another 18.9% is associated with the management, interim storage, and eventual transfer of the spent fuel. The remaining 5.5% 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 Progress Energy will oversee the decommissioning program, using a DOC to manage the decommissioning labor force

and the associated subcontractors. The size and composition of the management organization varies with the decommissioning phase and associated site activities. However, once the operating license is terminated, the staff is substantially reduced for the conventional demolition and restoration of the site, and the long-term care of the spent fuel (for the DECON alternative).

As described in this report, the spent fuel pool will remain operational for a minimum of 5½ years following the cessation of operations. The pool will be isolated and an independent spent fuel island created. This will allow decommissioning operations to proceed in and around the pool area. 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 modules 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, disposition of the low-level radioactive material required controlled disposal is at the Envirocare facility. 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 tables for processing is all-inclusive, incorporating the ultimate disposition of the material.

Removal costs reflect the labor-intensive nature of the decommissioning process, as well as the management controls required to ensure a safe and successful program. Decontamination and packaging costs also have a large labor component that is based upon prevailing union wages. Non-radiological demolition is a natural extension of the decommissioning process. The methods employed in decontamination and dismantling are generally destructive and indiscriminate in inflicting collateral damage. With a work force mobilized to support decommissioning operations, non-radiological demolition can be an integrated

activity and a logical expansion of the work being performed in the process of terminating the operating license. Prompt demolition reduces future liabilities and can be more cost effective than deferral, due to the deterioration of the facilities (and therefore the working conditions) with time.

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

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

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

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

TABLE 6.1
SUMMARY OF DECOMMISSIONING COST ELEMENTS
DECON

Cost Element	Cost 2005$ (thousands)	Percent of Total Costs
Decontamination	11,789	1.8
Removal	76,389	11.4
Packaging	13,698	2.0
Transportation	6,564	1.0
Waste Disposal	54,233	8.1
Off-site Waste Processing	21,925	3.3
Program Management [1]	280,985	42.0
Spent Fuel Pool Isolation	9,900	1.5
ISFSI Related	99,208	14.8
Insurance and Regulatory Fees	22,373	3.3
Energy	8,972	1.3
Characterization and Licensing Surveys	9,170	1.4
Property Taxes	29,196	4.4
Utility Site Indirect	17,954	2.7
Miscellaneous Equipment / Site Services	6,310	0.9
Total [2]	668,668	100.0
NRC License Termination	444,756	66.5
Spent Fuel Management [3]	180,374	27.0
Site Restoration	43,538	6.5
Total [2]	668,668	100.0

[1] Utility staffing includes engineering and security.

[2] Columns may not add due to rounding.

[3] Includes "ISFSI Related" capital and loading costs as well as the associated period-dependent expenditures, e.g., program management, security, fees and taxes

TABLE 6.2
SUMMARY OF DECOMMISSIONING COST ELEMENTS
SAFSTOR

Cost Element	Cost 2005$ (thousands)	Percent of Total Costs
Decontamination	9,454	1.2
Removal	74,443	9.3
Packaging	9,871	1.2
Transportation	5,929	0.7
Waste Disposal	40,160	5.0
Off-site Waste Processing	25,127	3.1
Program Management [1]	326,582	40.9
Spent Fuel Pool Isolation	9,900	1.2
ISFSI Related	91,628	11.5
Insurance and Regulatory Fees	47,703	6.0
Energy	13,180	1.7
Characterization and Licensing Surveys	10,557	1.3
Property Taxes	89,731	11.2
Utility Site Indirect	26,632	3.3
Miscellaneous Equipment / Site Services	16,823	2.1
Total [2]	797,720	100.0
NRC License Termination	602,935	75.6
Spent Fuel Management [3]	150,914	18.9
Site Restoration	43,870	5.5
Total [2]	797,720	100.0

[1] Utility staffing includes engineering and security.

[2] Columns may not add due to rounding.

[3] Includes "ISFSI Related" capital and loading costs as well as the associated period-dependent expenditures, e.g., program management, security, fees and taxes

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 Act," 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)

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

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

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

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

16. "Decommissioning Cost Study for the Crystal River Plant – Unit 3," Rev. 0, Document No. F01-1342-002, TLG Services, Inc., November 2000.

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

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

19. "Building Construction Cost Data 2005," Robert Snow Means Company, Inc., Kingston, Massachusetts.

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

21. "Acceptance Priority Ranking & Annual Capacity Report," DOE/RW-0567, July 2004.

22. "Civilian Radioactive Waste Management System Total System Description," Revision 02 (TDR-CRW-SE-000002), DOE/RW-0500, September 2001.

7. REFERENCES
(continued)

23. U.S. Department of Transportation, Section 49 of the Code of Federal Regulations, "Transportation," Parts 173 through 178, 1996.

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

25. J.C. Evans et al., "Long-Lived Activation Products in Reactor Materials" NUREG/CR-3474, Pacific Northwest Laboratory for the Nuclear Regulatory Commission. August 1984.

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

27. H.D. Oak, et al., "Technology, Safety and Costs of Decommissioning a Reference Boiling Water Reactor Power Station," NUREG/CR-0672 and addenda, Pacific Northwest Laboratory for the Nuclear Regulatory Commission. June 1980.

28. "Financial Protection Requirements for Permanently Shutdown Nuclear Power Reactors," 10 CFR Parts 50 and 140, Federal Register Notice, Vol. 62, No. 210, October 30, 1997.

29. "Microsoft Project Professional 2002," Microsoft Corporation, Redmond, WA.

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

APPENDIX A

UNIT COST FACTOR DEVELOPMENT

APPENDIX A
UNIT COST FACTOR DEVELOPMENT

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

1. SCOPE

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

2. CALCULATIONS

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

Duration adjustment(s):	
+ Respiratory protection adjustment (50% of critical duration)	128
+ Radiation/ALARA adjustment (37% of critical duration)	94
Adjusted work duration	477
+ Protective clothing adjustment (30% of adjusted duration)	143
Productive work duration	620
+ Work break adjustment (8.33 % of productive duration)	52
Total work duration (minutes)	672

***** Total duration = 11.200 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	11.200	$24.84	$822.53
Craftsmen	2.00	11.200	$35.53	$795.87
Foreman	1.00	11.200	$37.85	$423.92
General Foreman	0.25	11.200	$38.85	$108.78
Fire Watch	0.05	11.200	$24.48	$13.71
Health Physics Technician	1.00	11.200	$42.22	$472.86

Total labor cost $2,637.67

4. EQUIPMENT & CONSUMABLES COSTS

Equipment Costs	none
Consumables/Materials Costs	
-Blotting paper 50 @ $0.47 sq ft {2}	$23.50
-Plastic sheets/bags 50 @ $0.11/sq ft {3}	$5.50
-Gas torch consumables 1 @ $8.08/hr x 1 hr {1}	$8.08
Subtotal cost of equipment and materials	$37.08
Overhead & profit on equipment and materials @ 16.00 %	$5.93
Total costs, equipment & material	$43.01

TOTAL COST:

Removal of contaminated heat exchanger <3000 pounds: $2,680.68

Total labor cost:	$2,637.67
Total equipment/material costs:	$43.01
Total craft labor man-hours required per unit:	81.760

5. NOTES AND REFERENCES

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

- References for equipment & consumables costs:

    1. www.mcmaster.com online catalog
    2. R.S. Means (2005) Section 01540-800-0200, page 5
    3. R.S. Means (2005) Section 01590-400-6360, page 13

- Material and consumable costs were adjusted using the regional indices for Tampa, Florida.

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	0.28
Removal of clean pipe 0.25 to 2 inches diameter, $/linear foot	2.93
Removal of clean pipe >2 to 4 inches diameter, $/linear foot	4.24
Removal of clean pipe >4 to 8 inches diameter, $/linear foot	8.46
Removal of clean pipe >8 to 14 inches diameter, $/linear foot	16.16
Removal of clean pipe >14 to 20 inches diameter, $/linear foot	21.00
Removal of clean pipe >20 to 36 inches diameter, $/linear foot	30.90
Removal of clean pipe >36 inches diameter, $/linear foot	36.71
Removal of clean valve >2 to 4 inches	55.88
Removal of clean valve >4 to 8 inches	84.61
Removal of clean valve >8 to 14 inches	161.56
Removal of clean valve >14 to 20 inches	210.00
Removal of clean valve >20 to 36 inches	308.98
Removal of clean valve >36 inches	367.14
Removal of clean pipe hanger for small bore piping	18.62
Removal of clean pipe hanger for large bore piping	65.71
Removal of clean pump, <300 pound	142.64
Removal of clean pump, 300-1000 pound	400.28
Removal of clean pump, 1000-10,000 pound	1,575.51
Removal of clean pump, >10,000 pound	3,046.65
Removal of clean pump motor, 300-1000 pound	167.83
Removal of clean pump motor, 1000-10,000 pound	655.38
Removal of clean pump motor, >10,000 pound	1,474.62
Removal of clean heat exchanger <3000 pound	846.87
Removal of clean heat exchanger >3000 pound	2,131.37

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit($)
Removal of clean feedwater heater/deaerator	6,002.12
Removal of clean moisture separator/reheater	12,331.43
Removal of clean tank, <300 gallons	183.49
Removal of clean tank, 300-3000 gallon	578.74
Removal of clean tank, >3000 gallons, $/square foot surface area	4.91
Removal of clean electrical equipment, <300 pound	77.63
Removal of clean electrical equipment, 300-1000 pound	273.22
Removal of clean electrical equipment, 1000-10,000 pound	546.44
Removal of clean electrical equipment, >10,000 pound	1,307.15
Removal of clean electrical transformer < 30 tons	907.79
Removal of clean electrical transformer > 30 tons	2,614.29
Removal of clean standby diesel generator, <100 kW	927.23
Removal of clean standby diesel generator, 100 kW to 1 MW	2,069.65
Removal of clean standby diesel generator, >1 MW	4,284.58
Removal of clean electrical cable tray, $/linear foot	7.27
Removal of clean electrical conduit, $/linear foot	3.18
Removal of clean mechanical equipment, <300 pound	77.63
Removal of clean mechanical equipment, 300-1000 pound	273.22
Removal of clean mechanical equipment, 1000-10,000 pound	546.44
Removal of clean mechanical equipment, >10,000 pound	1,307.15
Removal of clean HVAC equipment, <300 pound	77.63
Removal of clean HVAC equipment, 300-1000 pound	273.22
Removal of clean HVAC equipment, 1000-10,000 pound	546.44
Removal of clean HVAC equipment, >10,000 pound	1,307.15
Removal of clean HVAC ductwork, $/pound	0.29

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit($)
Removal of contaminated instrument and sampling tubing, $/linear foot	0.99
Removal of contaminated pipe 0.25 to 2 inches diameter, $/linear foot	13.38
Removal of contaminated pipe >2 to 4 inches diameter, $/linear foot	22.59
Removal of contaminated pipe >4 to 8 inches diameter, $/linear foot	36.86
Removal of contaminated pipe >8 to 14 inches diameter, $/linear foot	71.42
Removal of contaminated pipe >14 to 20 inches diameter, $/linear foot	85.67
Removal of contaminated pipe >20 to 36 inches diameter, $/linear foot	118.34
Removal of contaminated pipe >36 inches diameter, $/linear foot	139.77
Removal of contaminated valve >2 to 4 inches	283.21
Removal of contaminated valve >4 to 8 inches	338.63
Removal of contaminated valve >8 to 14 inches	680.53
Removal of contaminated valve >14 to 20 inches	864.09
Removal of contaminated valve >20 to 36 inches	1,149.78
Removal of contaminated valve >36 inches	1,364.03
Removal of contaminated pipe hanger for small bore piping	68.96
Removal of contaminated pipe hanger for large bore piping	217.09
Removal of contaminated pump, <300 pound	598.89
Removal of contaminated pump, 300-1000 pound	1,387.44
Removal of contaminated pump, 1000-10,000 pound	4,381.44
Removal of contaminated pump, >10,000 pound	10,655.56
Removal of contaminated pump motor, 300-1000 pound	594.27
Removal of contaminated pump motor, 1000-10,000 pound	1,779.17
Removal of contaminated pump motor, >10,000 pound	4,016.32
Removal of contaminated heat exchanger <3000 pound	2,680.68
Removal of contaminated heat exchanger >3000 pound	7,779.55

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit($)
Removal of contaminated tank, <300 gallons	1,005.02
Removal of contaminated tank, >300 gallons, $/square foot	19.40
Removal of contaminated electrical equipment, <300 pound	464.74
Removal of contaminated electrical equipment, 300-1000 pound	1,116.42
Removal of contaminated electrical equipment, 1000-10,000 pound	2,149.33
Removal of contaminated electrical equipment, >10,000 pound	4,186.41
Removal of contaminated electrical cable tray, $/linear foot	22.38
Removal of contaminated electrical conduit, $/linear foot	10.32
Removal of contaminated mechanical equipment, <300 pound	517.43
Removal of contaminated mechanical equipment, 300-1000 pound	1,234.36
Removal of contaminated mechanical equipment, 1000-10,000 pound	2,372.55
Removal of contaminated mechanical equipment, >10,000 pound	4,186.41
Removal of contaminated HVAC equipment, <300 pound	517.43
Removal of contaminated HVAC equipment, 300-1000 pound	1,234.36
Removal of contaminated HVAC equipment, 1000-10,000 pound	2,372.55
Removal of contaminated HVAC equipment, >10,000 pound	4,186.41
Removal of contaminated HVAC ductwork, $/pound	1.46
Removal/plasma arc cut of contaminated thin metal components, $/linear in.	2.41
Additional decontamination of surface by washing, $/square foot	4.97
Additional decontamination of surfaces by hydrolasing, $/square foot	22.60
Decontamination rig hook up and flush, $/ 250 foot length	4,381.86
Chemical flush of components/systems, $/gallon	12.39
Removal of clean standard reinforced concrete, $/cubic yard	87.87
Removal of grade slab concrete, $/cubic yard	115.47
Removal of clean concrete floors, $/cubic yard	236.50

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit($)
Removal of sections of clean concrete floors, $/cubic yard	676.47
Removal of clean heavily rein concrete w/#9 rebar, $/cubic yard	158.86
Removal of contaminated heavily rein concrete w/#9 rebar, $/cubic yard	1,351.31
Removal of clean heavily rein concrete w/#18 rebar, $/cubic yard	200.97
Removal of contaminated heavily rein concrete w/#18 rebar, $/cubic yard	1,787.83
Removal heavily rein concrete w/#18 rebar & steel embedments, $/cubic yard	294.09
Removal of below-grade suspended floors, $/cubic yard	236.50
Removal of clean monolithic concrete structures, $/cubic yard	562.63
Removal of contaminated monolithic concrete structures, $/cubic yard	1,349.50
Removal of clean foundation concrete, $/cubic yard	441.98
Removal of contaminated foundation concrete, $/cubic yard	1,257.21
Explosive demolition of bulk concrete, $/cubic yard	20.54
Removal of clean hollow masonry block wall, $/cubic yard	57.74
Removal of contaminated hollow masonry block wall, $/cubic yard	214.04
Removal of clean solid masonry block wall, $/cubic yard	57.74
Removal of contaminated solid masonry block wall, $/cubic yard	214.04
Backfill of below-grade voids, $/cubic yard	14.93
Removal of subterranean tunnels/voids, $/linear foot	68.76
Placement of concrete for below-grade voids, $/cubic yard	102.60
Excavation of clean material, $/cubic yard	2.00
Excavation of contaminated material, $/cubic yard	28.39
Removal of clean concrete rubble (tipping fee included), $/cubic yard	90.03
Removal of contaminated concrete rubble, $/cubic yard	17.86
Removal of building by volume, $/cubic foot	0.21
Removal of clean building metal siding, $/square foot	0.70

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit($)
Removal of contaminated building metal siding, $/square foot	2.73
Removal of standard asphalt roofing, $/square foot	3.70
Removal of transite panels, $/square foot	1.58
Scarifying contaminated concrete surfaces (drill & spall), $/square foot	9.90
Scabbling contaminated concrete floors, $/square foot	5.33
Scabbling contaminated concrete walls, $/square foot	5.85
Scabbling contaminated ceilings, $/square foot	52.61
Scabbling structural steel, $/square foot	4.69
Removal of clean overhead crane/monorail < 10 ton capacity	387.79
Removal of contaminated overhead crane/monorail < 10 ton capacity	1,176.51
Removal of clean overhead crane/monorail >10-50 ton capacity	930.70
Removal of contaminated overhead crane/monorail >10-50 ton capacity	2,826.97
Removal of polar crane > 50 ton capacity	3,906.69
Removal of gantry crane > 50 ton capacity	16,339.29
Removal of structural steel, $/pound	0.24
Removal of clean steel floor grating, $/square foot	2.84
Removal of contaminated steel floor grating, $/square foot	8.69
Removal of clean free standing steel liner, $/square foot	7.36
Removal of contaminated free standing steel liner, $/square foot	22.64
Removal of clean concrete-anchored steel liner, $/square foot	3.68
Removal of contaminated concrete-anchored steel liner, $/square foot	26.38
Placement of scaffolding in clean areas, $/square foot	12.95
Placement of scaffolding in contaminated areas, $/square foot	19.88
Landscaping with topsoil, $/acre	18,076.03
Cost of CPC B-88 LSA box & preparation for use	1,315.04

APPENDIX B

UNIT COST FACTOR LISTING
(Power Block Structures Only)

Unit Cost Factor	Cost/Unit($)
Cost of CPC B-25 LSA box & preparation for use	1,030.63
Cost of CPC B-12V 12 gauge LSA box & preparation for use	875.01
Cost of CPC B-144 LSA box & preparation for use	5,244.93
Cost of LSA drum & preparation for use	99.98
Cost of cask liner for CNSI 14 195 cask	9,368.29
Cost of cask liner for CNSI 8 120A cask (resins)	6,150.00
Cost of cask liner for CNSI 8 120A cask (filters)	6,150.00
Decontamination of surfaces with vacuuming, $/square foot	0.44

APPENDIX C

DETAILED COST ANALYSIS

DECON

Table C
Crystal River Nuclear Plant, Unit 3
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: Class A Cu. Feet	Burial Volumes: Class B Cu. Feet	Burial Volumes: Class C Cu. Feet	Burial Volumes: GTCC Cu. Feet	Burial / Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	Prepare preliminary decommissioning cost	-	-	-	-		-	137	21	158	158	-	-	-	-						1,300
1a.1.2	Notification of Cessation of Operations									a											
1a.1.3	Remove fuel & source material									n/a											
1a.1.4	Notification of Permanent Defueling																				
1a.1.5	Deactivate plant systems & process waste																				
1a.1.6	Prepare and submit PSDAR	-	-	-	-		-	211	32	243	243	-	-	-	-						2,000
1a.1.7	Review plant dwgs & specs	-	-	-	-		-	486	73	559	559	-	-	-	-						4,600
1a.1.8	Perform detailed rad survey																				
1a.1.9	Estimate by-product inventory	-	-	-	-		-	96	16	121	121	-	-	-	-						800
1a.1.10	End product description	-	-	-	-		-	108	16	121	121	-	-	-	-	-	-	-			1,000
1a.1.11	Detailed by-product inventory	-	-	-	-		-	137	21	158	158	-	-	-	-	-	-	-			1,300
1a.1.12	Define major work sequence	-	-	-	-		-	792	119	911	911	-	-	-	-						7,500
1a.1.13	Perform SER and EA	-	-	-	-		-	327	49	377	377	-									3,100
1a.1.14	Perform Site Specific Cost Study	-	-	-	-		-	528	79	607	607	-									5,000
1a.1.15	Prepare/submit License Termination Plan																				
1a.1.16	Receive NRC approval of termination plan									a											
Activity Specifications																					
1a.1.17.1	Plant & temporary facilities								78	598	538										
1a.1.17.2	Plant systems							449	68	506	456										4,167
1a.1.17.3	NSSS Decontamination Flush							53	8	61	61										500
1a.1.17.4	Reactor internals							750	113	863	863										7,100
1a.1.17.5	Reactor vessel							687	103	790	790										6,500
1a.1.17.6	Biological shield							53	8	61											500
1a.1.17.7	Steam generators	-	-	-	-		-	330	49	379	379	-									3,120
1a.1.17.8	Reinforced concrete	-	-	-	-		-	169	25	194	97	-	97								1,600
1a.1.17.9	Main Turbine	-	-	-	-		-	42	6	48		-	49								400
1a.1.17.10	Main Condensers	-	-	-	-		-	42	6	48		-	49								
1a.1.17.11	Plant structures & buildings	-	-	-	-		-	330	49	379		-	190								3,120
1a.1.17.12	Waste management	-	-	-	-			486	73		559	-	-								
1a.1.17.13	Facility & site closeout	-	-	-	-			95	14	109	55										900
1a.1.17	Total	-	-	-	-			3,996	599	4,595			385								
Planning & Site Preparations																					
1a.1.18	Prepare dismantling sequence	-																			2,400
1a.1.19	Plant prep. & temp. svces	-	-	-				2,419	363	2,782	2,782	-	-	-	-	-	-	-			-
1a.1.20	Design water clean-up system	-	-	-				148	22	170	170	-	-	-	-						1,400
1a.1.21	Rigging/Cont. Cntrl Envlps/tooling/etc.	-	-	-				2,048		2,355	2,355	-	-	-	-						-
1a.1.22	Procure casks/liners & containers	-	-	-				130	19	149	149	-	-	-	-						1,230
1a.1	Subtotal Period 1a Activity Costs	-	-	-								-	549	-	-						73,752
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Transfer	-	-	-								2,530	-	-	-						
1a.3.2	ISFSI Capital Expenditures	-	-	-				15,333	2,300	17,633		17,633	-	-	-						
1a.3.3	Florida LLRW Inspection Fee	-	-	-				1		1											
1a.3	Subtotal Period 1a Collateral Costs	-	-	-				17,534	2,630		-	20,163									
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance	-	-	-				329	49	378	378			-		-	-	-			
1a.4.2	Property taxes																				
1a.4.3	Health physics supplies	-	253	-				329	49	378	378										
1a.4.4	Heavy equipment rental	-	334	-				55	8	63	316										
1a.4.5	Disposal of DAW generated			6	5		34			50	384				404				8,100	99	

Table C
Crystal River Nuclear Plant, Unit 3
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 Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 1a Period-Dependent Costs (continued)																					
1a.4.6	Plant energy budget							1,152	173	1,324	1,324										
1a.4.7	NRC Fees							265	27	292	292										
1a.4.8	Emergency Planning Fees							455	46	501	-	501									
1a.4.9	Utility Site Indirect							2,424	364	2,788	2,788	-									
1a.4.10	Spent Fuel Pool O&M							714	107	821	-	821			-						
1a.4.11	ISFSI Operating Costs							75	11	87		87			-						
1a.4.12	Security Staff Cost							1,468	220	1,688	1,688	-			-					-	58,921
1a.4.13	Utility Staff Cost							20,207	3,031	23,239	23,239	-			-				-	-	438,000
1a.4	Subtotal Period 1a Period-Dependent Costs		587	6	5		34	30,863	4,511	36,006	34,597	1,409			404				8,103	99	496,921
1a.0	TOTAL PERIOD 1a COST		587	6	5		34	60,655	8,980	70,267	48,146	21,572	549		404			-	8,103	99	570,674
PERIOD 1b - Decommissioning Preparations																					
Period 1b Direct Decommissioning Activities																					
Detailed Work Procedures																					
1b.1.1.1	Plant systems						-	500	-	---	---		57								----
1b.1.1.2	NSSS Decontamination Flush						-	186	-	121	121										1,000
1b.1.1.3	Reactor internals						-	264	40	304	304										2,500
1b.1.1.4	Remaining buildings						-	143	21	164	41		123								1,350
1b.1.1.5	CRD cooling assembly						-	106	16	121	121										1,000
1b.1.1.6	CRD housings & ICI tubes						-	106	-	121	121										1,000
1b.1.1.7	Incore instrumentation						-	106	-	121	1										
1b.1.1.8	Reactor vessel						-	383	58	441	441										3,630
1b.1.1.9	Facility closeout						-	127	19	146	73		73								1,200
1b.1.1.10	Missile shields						-	48	7	55	55										450
1b.1.1.11	Biological shield						-	127	19	146	146										----
1b.1.1.12	Steam generators						-	486	73	559	559										4,600
1b.1.1.13	Reinforced concrete						-	106	16	121	61		61								1,000
1b.1.1.14	Main Turbine						-	165	25	190			190								1,560
1b.1.1.15	Main Condensers						-	165	25	190			190								1,560
1b.1.1.16	Auxiliary building						-	286	43	332	----		33								
1b.1.1.17	Reactor building						-	286	43	---	298		33							-	2,730
1b.1.1	Total						-	3,511	---	4,039			760							-	33,240
1b.1.2	Decon primary loop	784							392	1,175	1,175									1,067	-
1b.1	Subtotal Period 1b Activity Costs	784					-	3,511	919	5,214	4,454		760							1,067	33,240
Period 1b Additional Costs																					
1b.2.1	Spent Fuel Pool Isolation					-	-	8,808	----	9,900	9,900										
1b.2.2	Site Characterization Survey					-	-	1,333	400	1,733	1,733										
1b.2.3	Mixed Waste			2	405	22	648	-		----	1,299		-	122	2,196				1,540,574		
1b.2.4	Hazardous Waste			1	0	2	-	-		3	3		-	374	-						
1b.2	Subtotal Period 1b Additional Costs			2	406	23	648	9,942	1,914		12,936		-	496	2,196				1,540,574		
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	720				-	-	-	---	---	---			-							
1b.3.2	DOC staff relocation expenses	-				-	-	1,155	173	1,328	1,328			-	-	-					
1b.3.3	Process liquid waste	42	-	324	80		1,466	-	432					-		3,804			629,224	141	
1b.3.4	Small tool allowance		1	-	-				0	1				-							
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 Transfer						-	1,200	180	1,380	-	1,380		-							
1b.3.8	ISFSI Capital Expenditures						-	4,000	---	----	-	4,600		-							

Table C
Crystal River Nuclear Plant, Unit 3
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 Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 1b Collateral Costs (continued)																					
1b.3.9	Florida LLRW Inspection Fee						-	15	1	16	16										
1b.3	Subtotal Period 1b Collateral Costs	2,005	957	324	80		1,466	6,370	1,825	13,027	7,047	5,980				3,804	-	-	629,224	141	-
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	22					-	-	6	28	---					-	-	-			
1b.4.2	Insurance						-	431	43	474	---					-	-	-			
1b.4.3	Property taxes						-	1,797	180	1,977	1,977					-	-	-			
1b.4.4	Health physics supplies		---						33	199	166					-	-	-			
1b.4.5	Heavy equipment rental								26	196	196					-	-	-			
1b.4.6	Disposal of DAW generated			2	3		19	-	3	30	---				223	-	-	-	4,461		
1b.4.7	Plant energy budget						-	1,174	176	1,350	-----					-	-	-			
1b.4.8	NRC Fees						-	135	14	149	149					-	-	-			
1b.4.9	Emergency Planning Fees						-	232	23	255		255				-	-	-			
1b.4.10	Utility Site Indirect						-	1,240	186	1,426	1,426	-				-	-	-			
1b.4.11	Spent Fuel Pool O&M							---	55	418		418				-	-	-			
1b.4.12	ISFSI Operating Costs						-	38	6	44						-					
1b.4.13	Security Staff Cost						-	748	112	860	---					-	-	-		-	30,026
1b.4.14	DOC Staff Cost						-	4,885	733	5,617	5,617					-	-	-		-	64,834
1b.4.15	Utility Staff Cost						-	10,365	1,555	11,919	11,919					-	-	-	-	-	224,260
1b.4	Subtotal Period 1b Period-Dependent Costs	22	303	3	3		19	21,409	3,151	24,911	24,193	718	-	-	223	-	-	-	4,461	55	319,120
1b.0	TOTAL PERIOD 1b COST	2,811	1,260	328	488	22	2,133	41,233	7,809	56,088	48,630	6,698	760	496	2,383	3,804	-	-	2,174,258	1,282	352,366
PERIOD 1 TOTALS		2,811	1,847	335	493	22	2,167	101,888	16,789	126,354	96,776	28,270	1,308	496	2,787	3,804	-	-	2,182,361	1,382	923,040
PERIOD 2a - Large Component Removal																					
Period 2a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
2a.1.1.1	Reactor Coolant Piping	--	82	13	34		- --		155	898	---			-	1,125	-	-	-	136,089	5,066	
2a.1.1.2	Pressurizer Relief Tank	12	10	2	6		49		21	99	99			-	182	-		-	20,849	513	
2a.1.1.3	Reactor Coolant Pumps & Motors	94	59	--	-	141	1,888		559	2,781	2,781			487	6,278	-		-	872,445	4,664	
2a.1.1.4	Pressurizer	24		807	-		445		300	2,129	2,129			-	2,246	-		-	427,826	2,291	
2a.1.1.5	Steam Generators	136	------	2,296	1,647		589		1,606	9,932	9,932			-	21,184	-	-	-	1,460,167	15,275	
2a.1.1.6	CRDMs/ICIs/Service Structure Removal	110	74	138	73		223		154	773	773			-	4,040	-	-	-	95,738	4,987	-
2a.1.1.7	Reactor Vessel Internals	59	2,116	5,150			4,507	---	5,276	17,653	17,653			-	876	605	517	-	222,155	23,558	1,074
2a.1.1.8	Reactor Vessel	53	4,538	1,091	272		7,924	182	7,761	21,823	21,823			-	7,083	2,003	-	-	980,935	23,558	1,074
2a.1.1	Totals	---	10,272	9,332	3,120	141	-- ----	365	15,632	55,889	-- ---			-	43,018	2,608	517	-	4,216,204	80,012	2,149
Removal of Major Equipment																					
2a.1.2	Main Turbine/Generator		---	---	--	---	---		224	1,420	-----			-	2,783	1,550	-	-	-	375,544	8,086	-
2a.1.3	Main Condensers		---	---	--	---	---		328	1,902	-----			-	4,983	1,469	-	-	-	356,681	19,310	-
Cascading Costs from Clean Building Demolition																					
2a.1.4.1	Reactor		501						75	576	---			-	-	-	-	-		8,722	-
2a.1.4.2	Auxiliary Building		---						20	153	153			-	-	-	-	-		2,486	-
2a.1.4.3	Intermediate Bldg		32						5	37	37			-	-	-	-	-		569	-
2a.1.4.4	Machine Shop - Hot		3						0	3	3			-	-	-	-	-		70	-
2a.1.4.5	Rad Materials Storage & Processing Bldg		1						-	1	1			-	-	-	-	-		13	-
2a.1.4.6	Fuel Handling Area (Aux Bldg)		80						12	92	92			-	-	-	-	-		1,390	-
2a.1.4	Totals								112	862	---			-	-	-	-	-		13,248	-
Disposal of Plant Systems																					
2a.1.5.1	Auxiliary Steam		--						6	46			46						-	1,377	
2a.1.5.2	Auxiliary Steam - RCA			0	2	34			11	69	69			376	-	-	-		15,255	594	

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Disposal of Plant Systems (continued)																					
2a.1.5.3	Chemical Addition - Cont		45	-	4	34	-		-	-	136			-	-				24,725	1,223	-
2a.1.5.4	Chemical Addition - Cont - Insulated		7	-	1	1	-		3	17	17			-	-				-	178	-
2a.1.5.5	Chemical Addition - Insulated - RCA		5		0	6			2	-	13			61	-				2,481	124	-
2a.1.5.6	Chemical Addition - RCA		35		3	60				-	117			658	-	-	-	-		-	-
2a.1.5.7	Chemical Feed Secondary Cycle				-	-				-	-		11	-		-	-			331	-
2a.1.5.8	Chemical Feed Secondary Cycle - RCA		4		0	5			2	-	11			51					2,087	-	-
2a.1.5.9	Chilled Water		45	-	-	-				51	-		51	-						1,520	-
2a.1.5.10	Chilled Water - RCA		46	1	3	61			-	132	132			672					27,273	1,199	-
2a.1.5.11	Circulating Water		67	-		-			10	77			77							2,275	-
2a.1.5.12	Cond Demin Regeneration			-		-				-			37							1,049	-
2a.1.5.13	Condensate		-	-		-			-	96			96							-	-
2a.1.5.14	Condensate & Demin Water Supply		18	-		-			-	-						-	-	-		606	-
2a.1.5.15	Condensate & Demin Water Supply - Cont		48	1	-	44			-	114	-			-					-	1,330	-
2a.1.5.16	Condensate & Demin Water Supply - RCA				4	80			29	180	180			875					35,538	1,730	-
2a.1.5.17	Condensate - Cont		134	4	13	296			80	527	527									3,948	-
2a.1.5.18	Condensate Demineralizer		-			-				83			83							2,482	-
2a.1.5.19	Condensate Demineralizer - Cont		106	5	11	96	59		-	334	334			1,048	287	-	-	-	67,952	2,979	-
2a.1.5.20	Condenser Air Removal & Priming		64			-			16	79			79							2,308	-
2a.1.5.21	Cycle Makeup Demin Water		45			-			7	51			-						-	1,472	-
2a.1.5.22	Cycle Makeup Demin Water - RCA				2	47			16	110	110			513					20,841	-	-
2a.1.5.23	Cycle Startup		-			-			1	7	-		7	-						222	-
2a.1.5.24	Cycle Startup - RCA		15	-	2	38			10	66	66			431					17,516	396	-
2a.1.5.25	Diesel Jacket Coolant		19							22					-					613	-
2a.1.5.26	Diesel-Air Cooler Coolant		3							0	-			4	-	-	-	-		-	-
2a.1.5.27	EDG FO & Compressed Air & Exhaust	-	31	-	-	-		-		5	36			36	-					-	-
2a.1.5.28	EDG Lube Oil	-		-	-	-				0	-			4						111	-
2a.1.5.29	EFP-3 Compressed and Starting Air	-	8	-				-		1	10			10						302	-
2a.1.5.30	EFP-3 Fuel Oil Transfer		13					-		2	15			15						444	-
2a.1.5.31	EFPB Sump Discharge		6					-		1	7			7						226	-
2a.1.5.32	Emergency Feedwater		51							-	58			59	-	-				1,688	-
2a.1.5.33	Emergency Feedwater - RCA		89	2	7	150			48	293	293			1,640	-	-	-	-	66,593	2,373	-
2a.1.5.34	Extraction Steam		86							-					-	-	-	-		2,916	-
2a.1.5.35	FW Heater Relief Vents & Drains		35						-	41						-	-	-		1,225	-
2a.1.5.36	FW Heater Relief Vents & Drains - Cont		43	0	2	33			16	95	95			366		-	-	-	14,864	1,225	-
2a.1.5.37	Feedwater		65							75			75			-	-	-		2,106	-
2a.1.5.38	Feedwater - Insulated		35						6	40			40			-	-	-		1,222	-
2a.1.5.39	Feedwater - Insulated - RCA		71	-	-	-			51	344	-			-		-	-	-	93,138	1,944	-
2a.1.5.40	Feedwater - RCA		17	-	-	-			-	-	-			-					23,243	449	-
2a.1.5.41	HVAC Misc Outbldgs	-	12					-	2	14				-						-	-
2a.1.5.42	LP & HP Feedwater Drains & Vents		148					-	22	168				-						5,048	-
2a.1.5.43	LP & HP Feedwater Drains & Vents - Cont		166				-		75	468	468			-	-				-	4,724	-
2a.1.5.44	Liquid Sampling - Cont		55	2	-	8	26		22	-	115			88	126				14,096	1,565	-
2a.1.5.45	Liquid Sampling - RCA						-		-	86	-									1,100	-
2a.1.5.46	Lube Oil		-							6										-	-
2a.1.5.47	Main & Reheat Steam		64						10	-			-						-	2,230	-
2a.1.5.48	Main & Reheat Steam - Cont		444	26	94	-			440	3,085	-			-					925,077	13,087	-
2a.1.5.49	Main & Reheat Steam - RCA			0		21				38	-			226					9,182	275	-
2a.1.5.50	Misc Turbine Room Steam Drains		-			-				43			43	-						1,332	-
2a.1.5.51	Misc Turbine Room Steam Drains - Cont		152	2	6	126			58	346	346		-	1,405					57,049	4,076	-
2a.1.5.52	Nitrogen/Hydrogen/Carbon Dioxide		20							23	-		23							-	-
2a.1.5.53	Nuc Serv & Decay Heat Sea Water		35							40	-		-							1,172	-
2a.1.5.54	Nuc Serv & Decay Heat Sea Water - Cont		53	-	-	-	74		77	511	-			3,039	356				155,331	1,587	-
2a.1.5.55	Nuc Serv & Decay Heat Sea Water - RCA		52	3	10	229			49	343	343			2,594	-				101,697	1,442	-
2a.1.5.56	RC & Misc Waste Evaporator	301		23			-			1,661	1,661			4,706	1,279				-	16,917	-
2a.1.5.57	RC & Misc Waste Evaporator - Insulated	37	27	2	3	2	-		-	127				-	-				11,274	1,780	-
2a.1.5.58	Screen Wash Water		30							-			38							989	-

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Disposal of Plant Systems (continued)																					
2a.1.5.59	Seal & Spray Water		-		-				0	3		-	3						-	89	
2a.1.5.60	Seal & Spray Water - Cont		75		3				31	184		-		814					33,044	2,024	
2a.1.5.61	Seal & Spray Water - RCA		54		3				25	155	155			783					31,811	1,382	
2a.1.5.62	Secondary Cycle Sampling				-				3	20	-		20	-					-	622	
2a.1.5.63	Secondary Cycle Sampling - Cont		7		0	5			3	16	16			60					2,419	188	
2a.1.5.64	Secondary Cycle Sampling - Cont - Ins		2			2			1	5	5			20					810	63	
2a.1.5.65	Secondary Cycle Sampling - Insulated		-						1	6									-	186	
2a.1.5.66	Secondary Serv Closed Cycle Cooling		-						22	167			167	-					-	4,978	
2a.1.5.67	Turb Bldg Sump & Oily Water Separator		14						2	17			17						-	491	
2a.1.5.68	Turbine Generator Seal Oil		18						3	20			20	-					-	621	
2a.1.5.69	Turbine Gland Steam & Drains								2	13			13	-					-	391	
2a.1.5.70	Turbine Lube Oil	-	33						5	38			38						-	1,107	
2a.1.5.71	Waste Drumming	14	11	1	1	1	30	-	13	51	-			10	48				4,770	701	
2a.1.5.72	Waste Gas Disposal	246	210	15	25	152	163	-	246	1,067	1,067			1,776	875				141,397	12,846	
2a.1.5	Totals	597	3,898	109	291	4,988	595	-	2,080	12,556	10,900		1,655	54,563	3,219				2,471,356	134,516	
2a.1.6	Scaffolding in support of decommissioning	-	689	9	6	79	3	-	187	973	973			784	38				39,211	23,572	
2a.1	Subtotal Period 2a Activity Costs	1,182	16,445	9,654	3,496	6,243	17,454	365	18,762	73,600	71,945		1,655	63,600	49,295	2,808	517		7,458,398	276,745	2,149
Period 2a Additional Costs																					
2a.2.1	Curie Surcharge (excluding RPV)					-	798	-	200	998	-			-	-			-	-	-		
2a.2.2	RVCH Segmentation and Disposal		-	-	-	-	1,127	15	313	1,693	1,693			-	2,097			-	220,498	2,200	88
2a.2	Subtotal Period 2a Additional Costs		-	-	-	-	1,925	15	513	2,691				-	2,097			-	220,498	2,200	88
Period 2a Collateral Costs																					
2a.3.1	Process liquid waste	159	-	67	61		371		188	846	-		-			1,226		-	159,329	222	
2a.3.2	Smear tool allowance		165						25	190	-		19					-	-	-	
2a.3.3	Spent Fuel Transfer						-	3,400	510	3,910		3,910	-								
2a.3.4	ISFSI Capital Expenditures						-	11,333	1,700	13,033		13,033									
2a.3.5	Florida LLRW Inspection Fee	-	-				-	242	24	266	266	-									
2a.3	Subtotal Period 2a Collateral Costs	159	165	67	61		371	14,975	2,447	18,247	1,284	16,943	19			1,226			159,329	222	
Period 2a Period-Dependent Costs																					
2a.4.1	Decon supplies	81	-						15	78	-										
- -	Insurance							- - -	72	787	787										
2a.4.3	Property taxes							- - -	484	5,322	4,790		532								
2a.4.4	Health physics supplies	-	1,316						329	1,645	1,645										
2a.4.5	Heavy equipment rental	-	2,235						335	2,570	2,570										
2a.4.6	Disposal of DAW generated			67	54		383	-	111	615	615				4,565				91,476	1,121	
2a.4.7	Plant energy budget						-	1,505	226	1,730	1,730										
2a.4.8	NRC Fees						-	451	45	496	496										
2a.4.9	Emergency Planning Fees						-	627	63	689		689									
2a.4.10	Utility Site Indirect						-	2,628	379	2,908	2,908										
2a.4.11	Spent Fuel Pool O&M							- - -	147	1,128	-	1,128									
2a.4.12	Radwaste Processing Equipment/Services						-	255	38	293	293	-									
2a.4.13	ISFSI Operating Costs				-		-	104	16	119		119									
2a.4.14	Security Staff Cost		-		-		-	2,519	378	2,897	2,897										- - - - -
2a.4.15	DOC Staff Cost				-		-	15,990	2,385	18,285	18,285										216,011
2a.4.16	Utility Staff Cost						-	19,721	2,958	22,679	22,679										425,983
	Subtotal Period 2a Period-Dependent Costs	81	3,551	67	54		383	50,145	7,590	62,241	59,771	1,937	532	-	4,565		-	-	91,476	1,121	
2a.0	TOTAL PERIOD 2a COST	1,402	20,253	9,912	3,632	6,243	20,134	65,486	29,793	156,779	135,881	18,881	2,207	63,600	55,957	3,834	517	-	7,929,699	280,288	747,348

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PERIOD 2b - Site Decontamination																					
Period 2b Direct Decommissioning Activities																					
Disposal of Plant Systems																					
2b.1.1.1	Chemical Cleaning Steam Gen - Cont		--	0	1	14	-	-	6	38	---			151	-	-		-	6,141	466	-
2b.1.1.2	Chemical Cleaning Steam Gen - RCA		15	0	1	17	-	-	7	40	40			188	-	-		-	7,642	391	-
2b.1.1.3	Containment Monitoring			2	3	12	24	-	19	105	105			126	116	-		-	15,529	1,195	-
2b.1.1.4	Core Flooding		--		9	91	41	-	44	260	---			992	199	-		-	57,785	2,030	-
2b.1.1.5	Decay Heat Closed Cycle Cooling		246	21	52	591	232		218	1,351	-----			6,466	1,115				362,167	7,046	-
2b.1.1.6	Decay Heat Removal	293	225	40	78	379	548		412	1,975	---			4,144	2,667				483,540	9,775	-
2b.1.1.7	Domestic Water		28		-	-	-		4	33			33							---	
2b.1.1.8	Domestic Water - RCA		43	1	2	48	-		18	113	113			525					21,339	1,086	-
2b.1.1.9	Electrical - Clean		405		-	-	-		61	466			466						-	13,208	-
2b.1.1.10	Electrical - Contaminated		394	6	20	381	23		165	990	990			4,175	111				179,502	11,486	-
2b.1.1.11	Electrical - Decontaminated		----	49	172	3,809			1,205	7,646	7,646			41,690	-				------	68,474	-
2b.1.1.12	Fire Service Water		203						30	233			233							6,727	
2b.1.1.13	Fire Service Water - RCA			8	29	651	-		192	1,239	1,239		-	7,126				-	289,375	9,564	-
2b.1.1.14	Floor & Equip Drains - Aux & Reac Bldg		--	5	6	5	53	-	30	160	160		-	57	252	-		-	24,900	1,579	-
2b.1.1.15	HVAC - Auxiliary Bldg		183	7	20	347	40		112	709	709			3,800	190	-		-	171,340	4,896	-
2b.1.1.16	HVAC - Clean Machine Shop		5						1	6	-		6							185	-
2b.1.1.17	HVAC - Control Complex		24						4	28	-		28							822	-
2b.1.1.18	HVAC - Diesel Gen Bldg		-						1	5	-		5					-	-	---	
2b.1.1.19	HVAC - Fire Pump House		-						0	2			-							67	
2b.1.1.20	HVAC - Hot Machine Shop		29	1	2	44	3	-	15	94	94			485	13	-		-	20,856	780	-
2b.1.1.21	HVAC - Intermediate Bldg			3	9	141	27	-	43	279	279			1,546	125			-	74,342	-----	-
2b.1.1.22	HVAC - Maintenance Support		4						1	5	-		5	-	-	-		-	-	159	
2b.1.1.23	HVAC - Office Bldg		5			-	-		1	5	-		5	-	-			-	-	168	
2b.1.1.24	HVAC - Reactor Bldg		345	12	37	643	78		209	1,322	1,322			7,035	364			-	318,318	8,915	-
2b.1.1.25	HVAC - Turbine Bldg				-	-	-		12	92			92	-				-		2,992	-
2b.1.1.26	ICI Instrumentation		--	5	7	17	60		38	210	210		-	185	287			-	33,190	-----	-
2b.1.1.27	Industrial Cooler Water		23	-	-	-	-		3	26			26	-	-			-	-	731	
2b.1.1.28	Industrial Cooler Water - RCA		137	3	10	212	-		68	428	428		-	2,320	-			-	94,222		
-----	Instrument & Station Service Air				-	-	-		8	62	-		62					-	-	1,884	
2b.1.1.30	Instrument & Station Service Air - Cont		---	6	10	45	71		57	309	309			495	341			-	50,635	3,368	-
	Instrument & Station Service Air - RCA		---	2	8	184			78	470	470			2,012	-			-	81,728	5,095	-
2b.1.1.32	Leak Rate Test - Cont	-	--	3	6	31	40		32	177	177			343	193			-	31,210	1,843	-
-----	Leak Rate Test - RCA	-	58		4	86	-		28	175	175			945	-			-	38,385		
2b.1.1.34	Liquid Waste Disposal	594	638	--	63	218	480		622	2,650	2,650			2,389	2,375			-	302,858	------	
2b.1.1.35	Makeup & Purification			18	37	170	265		269	1,140	1,140			1,861	1,274			-	189,536	12,184	-
2b.1.1.36	Makeup & Purification - Insulated		---		8	32	63		50	269	269			348	302			-	41,216	3,125	-
2b.1.1.37	Nitrogen/Hydrogen/Carbon Dioxide - Cont	-	--		1	4	12		8	43	43			40	56			-	6,627	458	-
2b.1.1.38	Nitrogen/Hydrogen/Carbon Dioxide - RCA	-	--		3	59	-		24	144	144			644	-	-		-	26,153	-----	-
	Noble Gas Effluent Monitoring - Cont	-	16		1	6	9		7	41	41			71	42			-	6,624	435	-
2b.1.1.40	Noble Gas Effluent Monitoring - RCA			-	1	14	-		5	32	32			162	-	-		-	6,172	299	-
-----	Nuc Serv Closed Cycle Cooling - Cont		511	35	80	771	412		362	2,171	2,171			8,438	1,971			-	519,414	------	
2b.1.1.42	Nuc Serv Closed Cycle Cooling - RCA		411	18	64	1,426	-		198	2,248	2,248			15,611	-	-	-	-	633,983	---	
2b.1.1.43	PASS Containment Monitoring - Cont		--	0	0	1	4		3	14	14			10	17	-	-	-	1,966	--	
2b.1.1.44	PASS Containment Monitoring - RCA		12		1	12	-		5	29	29			128	-	-	-	-	5,207	---	
2b.1.1.45	Post Accident Sampling - Cont		24	1	2	8	13		11	58	--			87	61	-	-	-	8,998	649	-
2b.1.1.46	Post Accident Sampling - RCA		20	0	1	22	-		8	51	51			237	-	-		-	9,629	520	-
2b.1.1.47	Post Accident Venting - Cont			1	3	22	18		15	86	86			239	88	-		-	17,545	735	-
2b.1.1.48	Post Accident Venting - RCA		8	0	1	15	-		5	29				162	-	-		-	6,581	--	
2b.1.1.49	RB Penetration Cooling - RCA		--	1	4	88	-		34	205	----			960	-	-		-	39,005	------	
2b.1.1.50	RCP Lube Oil - Cont		3	0	0	4	2		2	11				44	8	-		-	2,441	95	-
2b.1.1.51	RCP Lube Oil - RCA		3		0	5	-		1	10	10			58	-	-		-	2,361	65	-
	Radwaste Demineralizer	20	24		2	13	16		22	98	98			138	76	-		-	12,394	---	

Table C
Crystal River Nuclear Plant, Unit 3
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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 Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., t.ba.	Craft Manhours	Utility and Contractor Manhours
Disposal of Plant Systems (continued)																					
2b.1.1.53	Reac Bldg Pressure Sensing & Test	-	2				-	-	0	2			2						-	55	
2b.1.1.54	Reac Bldg Pressure Sensing & Test - RCA	-	28	0		27			11	67	67			293	-	-	-		11.905	673	
2b.1.1.55	Reactor Building Spray	-	167	8	12	178	---		93	548	548			1,943	419	-	-		115,773	4,758	
2b.1.1.56	Refueling Equipment	-	108	-		81	94		65	369	368			890	450	-	-		76,479	3,295	
2b.1.1.57	Sewage		8			-	-	-	1	10	-		10	-	-				-	282	-
2b.1.1.58	Waste Gas Sampling		---	3	4	13	32	-	23	126	126			142	155				19,694	1,330	-
2b.1.1.59	Wet Layup/N2 Blanketing	-	3			-	-	-	0	1			3							112	-
2b.1.1.60	Wet Layup/N2 Blanketing - Cont	-	5		0	4	-	-	2	11	11			---					1,626	146	-
2b.1.1.61	Wet Layup/N2 Blanketing - RCA					-	-	-	1	6	6			---					978	61	
2b.1.1	Totals	907	8,786	318	796	10,943	2,742		5,043	29,535	--- ---		978	119,757	13,269				6,040,343	266,285	
2b.1.2	Scaffolding in support of decommissioning	-	882	12	6	98	4	-	233	1,216	1,216			980	49				49,014	29,465	-
Decontamination of Site Buildings																					
2b.1.3.1	Reactor	745	610	97	228	---	1,165	-	892	3,945	--- ---			2,289	8,450				897,873	37,654	
2b.1.3.2	Auxiliary Building	264	145	22	55	45	---		225	913	913			497	1,883				207,306	11,241	
2b.1.3.3	Intermediate Bldg	54	32	5	---	19	34		49	205	205			208	409				49,092	2,343	-
2b.1.3.4	Machine Shop - Hot	41	19	4	-	6	26		33	132				3	313				31,388	1,820	
2b.1.3.5	RVCH Storage Building	3	2	0	1	-	2		3	14	-			27	21				3,172	158	
2b.1.3.6	Rad Materials Storage & Processing Bldg	26	12	-					21	83	83			-	198				19,770	1,016	
2b.1.3	Totals	1,134	819	130	310	274	1,401		1,223	5,292	5,292			3,004	11,274				1,208,601	54,005	
2b.1	Subtotal Period 2b Activity Costs	2,041	10,467	460	1,112	11,316	4,148		6,499	36,043	35,084		978	123,741	24,592				7,297,958	351,759	
Period 2b Additional Costs																					
2b.2.1	Asbestos Removal Program	-	28	---		-	---		56	293	---			500	500				9,150	940	
2b.2	Subtotal Period 2b Additional Costs	-	28	---		-	---		56	293	---			500	500				9,150	940	
Period 2b Collateral Costs																					
2b.3.1	Process liquid waste	88	-	146	57		89		240	1,222	-----			-	-	1,918			296,661	155	
2b.3.2	Small tool allowance		19						29	218	---			-	-						
2b.3.3	Spent Fuel Transfer						-	6,700	1,005	7,705		7,705									
2b.3.4	ISFSI Capital Expenditures						-	14,333	2,150	16,483		16,483		-	-						
2b.3.5	Florida LLRW Inspection Fee	-	-				-	305	30	335	335	-				-					
2b.3	Subtotal Period 2b Collateral Costs	88	19	146	57		89	21,338	3,454	25,965	1,776	24,188				1,918			296,661	155	
Period 2b Period-Dependent Costs																					
---	Decon supplies	689							172	861	---			-	-						
2b.4.2	Insurance	-	-				-	1,361	136	1,499	---			-	-						
2b.4.3	Property taxes						-	7,293	729	8,022	8,022			-	-						
2b.4.4	Health physics supplies		-----						472	2,358	2,358			-	-						
2b.4.5	Heavy equipment rental		-----				-	-	642	4,925	4,925			-	-						
2b.4.6	Disposal of DAW generated				69	71		505	148	811	811			-	6,015				120,530	1,477	
	Plant energy budget	-	-					2,262	339	2,601	2,601			-	-						
2b.4.8	NRC Fees							858	86	944				-	-						
--- ---	Emergency Planning Fees								119	1,313		1,313		-	-						
2b.4.10	Utility Site Indirect							4,667	700	5,367	5,367	-		-	-						
2b.4.11	Spent Fuel Pool O&M								280	2,150	-	2,150									
2b.4.12	Radwaste Processing Equipment/Services						-	485	73	558	558	-									
2b.4.13	ISFSI Operating Costs						-	197	30	227	-	227									
2b.4.14	Security Staff Cost						-	3,845	577	4,422	4,422			-						-	154,326
2b.4.15	DOC Staff Cost						-	29,160	4,374	33,534	-----									-	398,799
2b.4.16	Utility Staff Cost						-	36,147	5,422	41,569	41,569			-						-	--- ---
2b.4	Subtotal Period 2b Period-Dependent Costs	689	6,169	69	71		505	89,340	14,298	111,180		3,689		-	6,015				120,530	1,477	1,331,571
2b.6	TOTAL PERIOD 2b COST	2,818	16,654	767	1,240	11,316	5,539	110,678	24,307	173,467	144,605	27,878	978	124,241	31,107	1,918			7,724,299	354,331	1,331,571

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PERIOD 2c - Decontamination Following Wet Fuel Storage																					
Period 2c Direct Decommissioning Activities																					
2c.1.1	Remove spent fuel racks	283	28	85	58	-	530	-	298	1,283	1,283				2,534				227,343	989	-
Disposal of Plant Systems																					
2c.1.2.1	HVAC - Fuel Handling Area	-	170	4	14	261	16	-	88	552	552			2,851	76				122,587	4,272	-
2c.1.2.2	Spent Fuel Cooling	271	254	21	46	200	332	-	321	1,445	1,445			2,184	1,589				231,247	10,058	-
2c.1.2	Totals	271	424	25	59	460	348	-	409	1,997	1,997			5,035	1,665				353,844	14,330	-
Decontamination of Site Buildings																					
2c.1.3.1	Fuel Handling Area (Aux Bldg)	590	519	21	54	400	115	-	524	2,225	2,225	-	-	4,376	1,380	-	-	-	315,061	31,290	-
2c.1.3	Totals	590	519	21	54	400	115	-	524	2,225	2,225	-	-	4,376	1,380	-	-	-	315,061	31,290	-
2c.1.4	Scaffolding in support of decommissioning		172	2	1	20	1	-	47	243	243	-	-	196	19	-	-	-	9,803	5,893	-
2c.1	Subtotal Period 2c Activity Costs	1,145	1,144	134	173	880	994	-	1,278	5,748	5,748	-	-	9,607	5,589				906,051	52,502	
Period 2c Collateral Costs																					
2c.3.1	Process liquid waste	67		101	42	-	483	-	171	864	864	-	-	-	-	1,353			207,465	116	-
2c.3.2	Small tool allowance	-	34	-	-	-	-	-	5	39	39	-							-	-	-
2c.3.3	Decommissioning Equipment Disposition	-	-	73	42	608	78	-	124	925	925	-		6,000	373				303,507	739	-
2c.3.4	Florida LLRW Inspection Fee	-	-	-	-	-	-	48	5	53	53	-							-	-	-
2c.3	Subtotal Period 2c Collateral Costs	67	34	174	84	608	561	48	305	1,881	1,881	-		6,000	373	1,353			510,972	856	-
Period 2c Period-Dependent Costs																					
2c.4.1	Decon supplies	181				-	-	-	45	227	227										
2c.4.2	Insurance					-	-	383	38	422	422										
2c.4.3	Property taxes							1,534	153	1,687	[illegible]										
2c.4.4	Health physics supplies								[illegible]	[illegible]	484										
2c.4.5	Heavy equipment rental		1,205						181	1,386	1,386										
2c.4.6	Disposal of DAW generated			24	19		138		40	222	222				1,643				32,931	403	-
2c.4.7	Plant energy budget						-	[illegible]	51	390	390			-	-	-	-				
2c.4.8	NRC Fees						-	241	24	266				-	-						
2c.4.9	Emergency Planning Fees						-	74	7	82		82									
2c.4.10	Utility Site Indirect						-	1,033		1,188	[illegible]										
2c.4.11	Radwaste Processing Equipment/Services						-	273	[illegible]	314	[illegible]										
2c.4.12	ISFSI Operating Costs						-	56	8	64		64									
2c.4.13	Security Staff Cost						-	1,082	162	1,244	[illegible]									-	43,424
2c.4.14	DOC Staff Cost						-	5,606	841	6,447	6,447									-	76,857
2c.4.15	Utility Staff Cost						-	7,590	1,139	[illegible]	8,729			-	-	-				-	157,557
2c.4	Subtotal Period 2c Period-Dependent Costs	181	1,577	24	19		138			23,130		146	-	-	1,643				32,931	403	277,839
2c.0	TOTAL PERIOD 2c COST	1,393	2,755	333	277	1,487	1,693	18,260	4,562	30,759	30,614	148	-	15,607	7,605	1,353			449,953	53,761	277,839
PERIOD 2a - License Termination																					
Period 2a Direct Decommissioning Activities																					
2a.1.1	ORISE confirmatory survey	-	-	-	-	-	-	119	36	155	155	-	-	-	-	-					
2a.1.2	Terminate license									a											
2a.1	Subtotal Period 2a Activity Costs	-	-	-	-	-	-	119	36	155	155	-	-	-	-	-					
Period 2a Additional Costs																					
2a.2.1	License Termination Survey	-	-	-	-	-	-	5,601	1,680	7,281	7,281	-	-	-	-	-	-	-	-	147,228	-
2a.2	Subtotal Period 2a Additional Costs	-	-	-	-	-	-	5,601	1,680	7,281	7,281	-	-	-	-	-	-	-	-	147,228	-

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Period 2e Collateral Costs																					
2e.3.1	DOC staff relocation expenses								173	1,328	1,328										
2e.3.2	ISFSI Capital Expenditures								450	3,450	-	3,450									
2e.3.3	Florida LLRW Inspection Fee								-	1	1	-									
2e.3	Subtotal Period 2e Collateral Costs						-	4,158	623	4,779	1,329	3,450									
Period 2e Period-Dependent Costs																					
2e.4.1	Insurance		-				-	356	36	391	-										
2e.4.2	Property taxes		-	-	-	-	-	1,291	129	1,420	1,420										
2e.4.3	Health physics supplies		699	-	-	-	-	-	175	874	874										
2e.4.4	Disposal of DAW generated		-	4	4	-	25	-	7	41	41			301					8,038	74	
2e.4.5	Plant energy budget		-					-	26	197	197										
2e.4.6	NRC Fees		-				-	244	24	268	-					-	-	-	-	-	
	Emergency Planning Fees		-				-	75	8	83		83				-	-	-	-	-	
2e.4.8	Utility Site Indirect		-				-	704	106	810	810	-				-	-	-	-	-	
2e.4.9	ISFSI Operating Costs		-				-	56	8	65	-	65				-	-	-	-	-	
2e.4.10	Security Staff Cost		-				-	600	90	690	690	-				-	-	-	-	-	24,091
2e.4.11	DOC Staff Cost		-				-	4,370	655	5,025	5,025	-				-	-	-	-	-	56,731
2e.4.12	Utility Staff Cost		-				-	4,427	664	5,091	5,091	-	-	-	-	-	-	-	-	-	**84,709**
	Subtotal Period 2e Period-Dependent Costs		699	4	4		25	12,294	1,928	14,954	14,807	147	-	301	-	-	-	-	8,038	74	165,531
2e.0	TOTAL PERIOD 2e COST		699	4	4		25	22,170	4,267	27,170	23,573	3,597	-	301	-	-	-	-	8,038	147,302	165,531
PERIOD 2 TOTALS		5,613	40,561	10,956	5,152	19,048	27,391	216,607	62,838	388,168	334,482	50,501	3,185	203,448	94,870	7,106	517	-	17,109,960	835,682	2,522,290
PERIOD 3b - Site Restoration																					
Period 3b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
3b.1.1.1	Reactor	-	2,946						442	3,388										50,955	
3b.1.1.2	Auxiliary Building	-	1,209						181	1,390			1,390						-	22,912	-
3b.1.1.3	Control Complex	-	521						78	599			599						-	9,432	-
3b.1.1.4	Diesel Generator Bldg.		-						33	254			254						-	4,827	-
3b.1.1.5	EFW Pump Building		87						13	100			100							1,711	
3b.1.1.6	Fire Pumphouse		12						2	13			13						-	315	-
3b.1.1.7	Intake & Discharge Structures		298						45	343			343						-	6,177	-
3b.1.1.8	Intermediate Bldg		524						79	602			-						-	5,866	-
3b.1.1.9	Machine Shop - Cold		67						10	77			-							1,706	
3b.1.1.10	Machine Shop - Hot		64						10	73			73						-	1,630	-
3b.1.1.11	Maintenance Support Bldg								6	46			-						-	1,077	-
3b.1.1.12	Misc Yard Structures & Foundations		-						154	1,183			1,183						-	12,342	-
3b.1.1.13	Outage Support Bldg		15						2	17			17							418	
3b.1.1.14	RVCH Storage Building		52						8	59			59						-	1,090	-
3b.1.1.15	Rad Materials Storage & Processing Bldg		-						4	30			30						-	445	-
3b.1.1.16	Rusty Bldg	-	253						38	291			291						-	6,338	-
3b.1.1.17	Turbine Building	-	2,054						308	2,362			2,362						-	43,581	-
3b.1.1.18	Turbine Pedestal	-	306						46	352			-						-	4,730	-
3b.1.1.19	Warehouse Bldg (Maint) Mezzanine	-	124						19	143			143							3,146	
3b.1.1.20	Fuel Handling Area (Aux Bldg)	-	756						113	868			-							-	
3b.1.1	Totals		10,603						1,591	12,194			12,194							-	
Site Closeout Activities																					
3b.1.2	Remove Rubble		-						290	1,531			-							2,026	
3b.1.3	Grade & landscape site		-						16	125			-						-	316	-
3b.1.4	Final report to NRC						-	165	25	190	190									-	1,560

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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 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
3b.1	Subtotal Period 3b Activity Costs		12,040					165	1,831	14,039	198		13,850							194,629	1,560
Period 3b Additional Costs																					
3b.2.1	Intake & Discharge Structure Cofferdam		-					-	-	-			-							-	
3b.2.2	Concrete Crushing		364				-	7	55	426			426							-	
3b.2.3	Fixing Kevlar Closure		-				-	-	96	750			750							-	
3b.2	Subtotal Period 3b Additional Costs		1,364				-	7	205	-										6,795	
Period 3b Collateral Costs																					
3b.3.1	Small tool allowance		109						16	-			125								
3b.3.2	Spent Fuel Transfer		-					-	80	613		-	-								
3b.3	Subtotal Period 3b Collateral Costs		109					-	96			-	125								
Period 3b Period-Dependent Costs																					
3b.4.1	Insurance							-	81	-		-									
3b.4.2	Property taxes							-	121	1,328		-	969								
3b.4.3	Heavy equipment rental		3,791						569				4,360								
3b.4.4	Plant energy budget						-	195	29	-	-	-	-								
3b.4.5	NRC ISFSI Fees						-	398	40	435	-	435									
3b.4.6	Emergency Planning Fees						-	171	17	188	-	188									
3b.4.7	Utility Site Indirect						-	530	79	609	609										
3b.4.8	ISFSI Operating Costs							-			-	-									
3b.4.9	Security Staff Cost							-	-	-	-	1,065	-							-	54,649
3b.4.10	DOC Staff Cost						-	10,886	1,633	12,519	-	-	12,519							-	139,266
3b.4.11	Utility Staff Cost						-	6,024	904	6,927	-	1,946	4,980							-	113,704
3b.4	Subtotal Period 3b Period-Dependent Costs		3,791				-	21,703	-	-	609	5,086	23,494							-	307,619
3b.0	TOTAL PERIOD 3b COST		17,307					22,409	5,827	45,543	798	5,700	38,044							201,424	309,179
PERIOD 3c - Fuel Storage Operations/Shipping																					
Period 3c Direct Decommissioning Activities																					
Period 3c Collateral Costs																					
3c.3.1	Spent Fuel Transfer						-	4,267	640	4,907		-									
3c.3	Subtotal Period 3c Collateral Costs						-	4,267	640	4,907		-									
Period 3c Period-Dependent Costs																					
3c.4.1	Insurance	-					-	13,066	1,307	14,372		14,372								-	-
3c.4.2	Property taxes	-					-	5,300	530	5,830		5,830								-	-
3c.4.3	Plant energy budget	-					-	946	142	1,088		1,088								-	-
3c.4.4	NRC ISFSI Fees	-					-	6,408	641	7,050		7,050								-	-
3c.4.5	Emergency Planning Fees	-					-	2,764	276	3,040		3,040									
3c.4.6	Utility Site Indirect	-					-	2,443	366	2,809		-									
3c.4.7	ISFSI Operating Costs	-					-	2,062	309	2,371	-	2,371									
3c.4.8	Security Staff Cost	-					-	14,941	2,241	17,182	-	17,182								-	599,700
3c.4.9	Utility Staff Cost	-					-	27,696	4,154	31,851		-								-	556,864
3c.4	Subtotal Period 3c Period-Dependent Costs	-						75,627	9,967	85,594		85,594								-	1,156,564
3c.0	TOTAL PERIOD 3c COST	-						79,893	10,607	90,500		90,500								-	1,156,564

Table C
Crystal River Nuclear Plant, Unit 3
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 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 3d - GTCC shipping																					
Period 3d Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
3d.1.1.1	Vessel & Internals GTCC Disposal		-	300		-	10,755		1,643	12,698	12,698							524	105,646	-	
3d.1.1	Totals		-	300		-	10,755		1,643	12,698	12,698							524	105,646	-	
3d.1	Subtotal Period 3d Activity Costs		-	300		-	10,755		1,643	12,698	12,698							524	105,646	-	
Period 3d Collateral Costs																					
3d.3.1	Florida LLRW Inspection Fee						-	1	0	1	-	-									
3d.3	Subtotal Period 3d Collateral Costs						-	1	0	1	-										
Period 3d Period-Dependent Costs																					
3d.4.1	Insurance						-	20	2	22	-	—									
3d.4.2	Property taxes						-	1	0	2	-	2									
3d.4.3	Plant energy budget						-	1	-	2	-	2									
3d.4.4	NRC ISFSI Fees						-	10	-	11	-	11									
3d.4.5	Emergency Planning Fees						-	4	0	5	-	5									
3d.4.6	Utility Site Indirect						-	4	-	4	-	4									
3d.4.7	ISFSI Operating Costs						-	3	-	4	-	4									
3d.4.8	Security Staff Cost						-	22	3	26	-	26									-
3d.4.9	Utility Staff Cost						-	42	6	48	-	-									836
3d.4	Subtotal Period 3d Period-Dependent Costs						-	107		121	-	121									
3d.0	TOTAL PERIOD 3d COST			300			10,755	108	1,658	12,821	12,698	122						524	105,646		1,736
PERIOD 3e - ISFSI Decontamination																					
Period 3e Direct Decommissioning Activities																					
Period 3e Additional Costs																					
3e.2.1	ISFSI License Termination	52	68	11	8	-	900	1,339	471	2,848		[illegible]			[illegible]			-	84,897	5,182	[illegible]
3e.2	Subtotal Period 3e Additional Costs	52	68	11	8	-	900	1,339	471	2,848	-	[illegible]			[illegible]			-	84,897	5,182	[illegible]
Period 3e Collateral Costs																					
3e.3.1	Small tool allowance	-	1	-	-				0	2		2									
3e.3.2	Florida LLRW Inspection Fee	-	-	-	-			8	1	8		8									
3e.3	Subtotal Period 3e Collateral Costs		1				-	8	1	10		10									
Period 3e Period-Dependent Costs																					
3e.4.1	Insurance						-	156	18	174		[illegible]									
3e.4.2	Property taxes						-	8	1	9		9									
3e.4.3	Heavy equipment rental		217						33	250		250									
3e.4.4	Plant energy budget						-	38	6	44		44									
3e.4.5	NRC ISFSI Fees						-	78	8	85		85									
3e.4.6	Utility Site Indirect						-	27	4	31		31									
3e.4.7	Security Staff Cost						-	90	14	104		104									3,630
3e.4.8	Utility Staff Cost						-	296	44	340		340									5,877
3e.4	Subtotal Period 3e Period-Dependent Costs		217				-	895	125	1,037											9,507
3e.0	TOTAL PERIOD 3e COST	52	287	11	8	-	900	2,042	597	3,895		3,895		-	3,816				84,897	5,183	12,067

Table C
Crystal River Nuclear Plant, Unit 3
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 Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 3f - ISFSI Site Restoration																					
Period 3f Direct Decommissioning Activities																					
Period 3f Additional Costs																					
3f.2.1	ISFSI Demolition	-	797	-	-	-	-	38	205	1,040	-	1,040	-	-	-	-	-	-	-	2,844	160
3f.2	Subtotal Period 3f Additional Costs	-	797	-	-	-	-	38	205	1,040	-	1,040	-	-	-	-	-	-	-	2,844	160
Period 3f Collateral Costs																					
3f.3.1	Small tool allowance	-	2	-	-	-	-	-	0	2	-	2	-	-	-	-	-	-	-	-	-
3f.3	Subtotal Period 3f Collateral Costs	-	2	-	-	-	-	-	0	2	-	2	-	-	-	-	-	-	-	-	-
Period 3f Period-Dependent Costs																					
3f.4.1	Insurance	-	-			-	-	-	-	-					-	-	-	-	-	-	-
3f.4.2	Property taxes	-	-			-	-	-	-	-	-	-			-	-	-	-	-	-	-
3f.4.3	Heavy equipment rental	-	74			-	-	-	11	85	-	85			-	-	-	-	-	-	-
3f.4.4	Plant energy budget	-	-					19	3	22	-	22			-	-	-	-	-	-	-
3f.4.5	Utility Site Indirect	-	-					12	2	14	-	14			-	-					
3f.4.6	Security Staff Cost	-	-			-	-	46	7	52	-	52									-----
3f.4.7	Utility Staff Cost	-	-			-	-	134	20	154	-	154								-	2,571
3f.4	Subtotal Period 3f Period-Dependent Costs	-	74			-	-	229	44	344	-										
3f.0	TOTAL PERIOD 3f COST	-	872					264	249	1,386	-	1,386								2,844	4,531
PERIOD 3 TOTALS		52	18,468	311	8	-	11,655	104,716	18,938	154,145	13,497	161,564	39,044	-	3,916	-	-	524	190,543	209,450	1,484,077
TOTAL COST TO DECOMMISSION		8,476	60,875	11,602	5,653	19,071	41,213	423,211	98,567	668,668	444,756	180,374	43,538	283,944	101,672	10,909	517	524	19,482,880	1,046,493	4,929,407

TOTAL COST TO DECOMMISSION WITH 17.29% CONTINGENCY:	**$668,668**	**thousands of 2005 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 66.51% OR:	**$444,756**	**thousands of 2005 dollars**
SPENT FUEL MANAGEMENT COST IS 26.98% OR:	**$180,374**	**thousands of 2005 dollars**
NON-NUCLEAR DEMOLITION COST IS 6.51% OR:	**$43,538**	**thousands of 2005 dollars**
TOTAL PRIMARY SITE RADWASTE VOLUME BURIED:	**113,098**	**cubic feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**524**	**cubic feet**
TOTAL SCRAP METAL REMOVED:	**37,705**	**tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,046,493**	**man-hours**

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

APPENDIX D

DETAILED COST ANALYSIS

SAFSTOR

Table D
Crystal River Nuclear Plant, Unit 3
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: Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 1a - Shutdown through Transition																					
Period 1a Direct Decommissioning Activities																					
1a.1.1	SAFSTOR site characterization survey							334	100	435	435	-	-	-	-	-	-		-	-	-
1a.1.2	Prepare preliminary decommissioning cost							137	21	158	158	-	-	-	-	-	-		-	-	1,300
1a.1.3	Notification of Cessation of Operations									-											
1a.1.4	Remove fuel & source material																				
1a.1.5	Notification of Permanent Defueling																				
1a.1.6	Deactivate plant systems & process waste																				
1a.1.7	Prepare and submit PSDAR							[illegible]	32	243	243										[illegible]
1a.1.8	Review plant dwgs & specs.							[illegible]	21	158	158										[illegible]
1a.1.9	Perform detailed rad survey																				
1a.1.10	Estimate by-product inventory							[illegible]	16	121	121						[illegible]			[illegible]	1,000
1a.1.11	End product description							106	16	121	121						[illegible]			[illegible]	1,000
1a.1.12	Detailed by-product inventory							158	24	182	182	-	-							[illegible]	1,500
1a.1.13	Define major work sequence							106	16	121	121	-	-			[illegible]					1,000
1a.1.14	Perform SER and EA							327	49	377	377	-	-			[illegible]					3,100
1a.1.15	Perform Site-Specific Cost Study							[illegible]	74	607	607	-	-			[illegible]					5,000
Activity Specifications																					
1a.1.16.1	Prepare plant and facilities for SAFSTOR							520	78	598	598	-	-	-	-						[illegible]
1a.1.16.2	Plant systems							440	66	506	506	-	-	-	-						4,167
1a.1.16.3	Plant structures and buildings							330	49	379	379	-	-	-	-						3,120
1a.1.16.4	Waste management							-	32	243	243	-	-	-	-						[illegible]
1a.1.16.5	Facility and site dormancy							[illegible]	32	243	243	-	-	-	-	-					[illegible]
1a.1.16	Total							[illegible]	257	1,969	1,969	-	-	-	-						[illegible]
Detailed Work Procedures																					
1a.1.17.1	Plant systems						-	125	19	144	144	-	-	-	-						1,183
1a.1.17.2	Facility closeout & dormancy						-	127	19	146	146	-	-				[illegible]				[illegible]
1a.1.17	Total						-	252	38	290	290	-	-				[illegible]				[illegible]
1a.1.18	Procure vacuum drying system							11	2	12	12	-	-								100
1a.1.19	Drain/de-energize non-cont. systems									-											
1a.1.20	Drain & dry NSSS																				
1a.1.21	Drain/de-energize contaminated systems																				
1a.1.22	Decon/secure contaminated systems									a											
1a.1	Subtotal Period 1a Activity Costs							4,126	669	4,795	4,795					-	-	-	-	-	35,890
Period 1a Collateral Costs																					
1a.3.1	Spent Fuel Transfer							2,200	330	2,530	-	2,530	-	-	-	-	-	-	-	-	-
1a.3.2	ISFSI Capital Expenditures							15,333	2,300	17,633	-	17,633	-	-	-	-	-	-	-	-	-
1a.3.3	Florida LLRW Inspection Fee							1	-	1	1			-	-	-	-	-	-	-	-
1a.3	Subtotal Period 1a Collateral Costs	-	-	-				17,534	2,630	20,164	1	20,163		-	-	-	-	-	-	-	-
Period 1a Period-Dependent Costs																					
1a.4.1	Insurance							[illegible]	85	931	931			-	-	-	-	-			-
1a.4.2	Property taxes							[illegible]	326	3,582	3,582	-	-	-	-	-	-	-			-
1a.4.3	Health physics supplies	-	253	-					63	316	316	-	-	-	-	-	-	-			-
1a.4.4	Heavy equipment rental	-	334	-					50	384	384			-	-	-	-	-			-
1a.4.5	Disposal of DAW generated			6	5		34	-	10	55	55			-	404	-	-	-	8,103	99	-
1a.4.6	Plant energy budget							[illegible]	173	1,324	1,324					-	-	-			-
1a.4.7	NRC Fees							265	27	292	292					-	-		-	-	-
1a.4.8	Emergency Planning Fees							456	46	501	-	501	-			-	-		-	-	-
1a.4.9	Utility Site Indirect							2,424	364	2,788	2,788					-	-		-	-	-
1a.4.10	Spent Fuel Pool O&M	-	-	-	-	-			107	831	-	831				-	-				
1a.4.11	ISFSI Operating Costs	-	-	-	-	-		75	11	87		87	-			-	-				

Table D
Crystal River Nuclear Plant, Unit 3
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 Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 1a Period-Dependent Costs (continued)																					
1a.4.12	Security Staff Cost								220	1,688	1,688	-								-	58,921
1a.4.13	Utility Staff Cost							26,207	3,031	23,239	23,239	-		-						-	438,000
1a.4	Subtotal Period 1a Period-Dependent Costs		587	6	5		34	30,883	4,511	36,006	34,597	1,409		-	464				8,103	99	496,921
1a.0	TOTAL PERIOD 1a COST		587	6	5		34	52,523	7,810	60,965	39,393	21,572		-	464				8,103	99	532,811
PERIOD 1b - SAFSTOR Limited DECON Activities																					
Period 1b Direct Decommissioning Activities																					
Decontamination of Site Buildings																					
1b.1.1.1	Reactor	732							366	1,099	1,099									21,630	
1b.1.1.2	Auxiliary Building	---							125	374	374	-								---	
1b.1.1.3	Fuel Handling Area (Aux Bldg)	579							290	869	869									16,150	
1b.1.1.4	Intermediate Bldg	51							26	77	77									1,557	
1b.1.1.5	Machine Shop - Hot	39							19	58	58									1,167	
1b.1.1.6	RVCM Storage Building	3							2	5	5									102	
1b.1.1.7	Rad Materials Storage & Processing Bldg	24							12	36	36									730	
1b.1.1	Totals								839	2,517	2,517									48,863	
1b.1	Subtotal Period 1b Activity Costs	1,678							839	2,517	2,517			-	-					48,863	
Period 1b Additional Costs																					
1b.2.1	Mixed Waste			-	---	22	648		223	1,299	1,299			122	2,160	-			1,540,574		
1b.2.2	Hazardous Waste			1	0	2	-		-	3	3			374	-				-		
1b.2	Subtotal Period 1b Additional Costs					23	648		223	1,302	1,302			496	2,160	-			1,540,574		
Period 1b Collateral Costs																					
1b.3.1	Decon equipment	720							108	828	828	-		-	-	-					
1b.3.2	Process liquid waste	120		42	44		241		131	578	578	-	-	-	-	822			103,582	162	
1b.3.3	Small tool allowance		28						4	32	32					-					
1b.3.4	Spent Fuel Transfer						-	600	90	690	-	---				-					
1b.3.5	ISFSI Capital Expenditures						-	2,000	300	2,300	-	2,300				-					
1b.3.6	Florida LLRW Inspection Fee						-	8	1	9	9	-				-					
1b.3	Subtotal Period 1b Collateral Costs	839	28	42	44		241	2,608	634	4,436	1,448	2,990				822			103,582	162	
Period 1b Period-Dependent Costs																					
1b.4.1	Decon supplies	672					-	-	168	840	840										
1b.4.2	Insurance						-	213	21	235	235		-	-	-	-					
1b.4.3	Property taxes						-	888	89	978	978		-	-	-	-	-	-	-		
1b.4.4	Health physics supplies		234						58	292	292	-	-	-	-	-	-	-	-		
1b.4.5	Heavy equipment rental		84						13	97	97	-	-	-	-						
1b.4.6	Disposal of DAW generated			9		-	51	-	15	81	81		-	-	602				12,066	148	
1b.4.7	Plant energy budget						-	290	44	334	334								-		
1b.4.8	NRC Fees						-	67	7	74	74								-		
1b.4.9	Emergency Planning Fees						-	115	11	126	-	126							-		
1b.4.10	Utility Site Indirect						-	611	92	703	703										-
1b.4.11	Spent Fuel Pool O&M						-	180	27	207	-	207									-
1b.4.12	ISFSI Operating Costs						-	19	3	22	-	22									
1b.4.13	Security Staff Cost						-	376	56	426	426										14,651
1b.4.14	Utility Staff Cost						-	5,093	764	5,857	5,857			-	-				-	-	110,400
1b.4	Subtotal Period 1b Period-Dependent Costs	672	318	9	7		51	7,848	1,367	10,271	9,518	355		-	602	-			12,066	148	125,251
1b.0	TOTAL PERIOD 1b COST	3,190	345	54	456	23	940	10,456	3,060	18,527	15,182	3,345		496	2,762	822			1,656,222	49,173	125,251

Table D
Crystal River Nuclear Plant, Unit 3
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 Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
PERIOD 1c - Preparations for SAFSTOR Dormancy																					
Period 1c Direct Decommissioning Activities																					
1c.1.1	Prepare support equipment for storage	-	[illegible]						[illegible]	[illegible]										[illegible]	
1c.1.2	Install containment pressure equal. lines	-	[illegible]					4	29	29											
1c.1.3	Interim survey prior to dormancy	-						733												16,339	-
1c.1.4	Secure building accesses	-																			
1c.1.5	Prepare & submit interim report	-						62	9	71	71									-	583
1c.1	Subtotal Period 1c Activity Costs	-	384					795	287	1,465	1,465									26,039	583
Period 1c Additional Costs																					
1c.2.1	Spent Fuel Pool Isolation	-						[illegible]	[illegible]	9,900	9,900										
1c.2	Subtotal Period 1c Additional Costs	-								9,900	9,900										
Period 1c Collateral Costs																					
1c.3.1	Process liquid waste	148		53	54		300		[illegible]	[illegible]					-	1,022			128,786	201	-
1c.3.2	Small tool allowance	-	2	-					0	3											-
1c.3.3	Spent Fuel Transfer	-		-						890											-
1c.3.4	ISFSI Capital Expenditures	-		-				2,000	[illegible]	2,300		2,300									
1c.3.5	Florida LLRW Inspection Fee	-		-				2	0	2	-	-									
1c.3	Subtotal Period 1c Collateral Costs	148	2	53	54		300					2,990			-	1,022			128,786	201	
Period 1c Period-Dependent Costs																					
1c.4.1	Insurance	-		-				[illegible]	[illegible]	[illegible]											
1c.4.2	Property taxes	-		-					89	977	977										
1c.4.3	Health physics supplies	-	[illegible]	-					33	167											
1c.4.4	Heavy equipment rental	-		-					13	[illegible]											
1c.4.5	Disposal of DAW generated	-		1	1		9		2	[illegible]	14				102	-			2,042	25	
1c.4.6	Plant energy budget	-		-				586	87	668	668										
1c.4.7	NRC Fees	-		-				[illegible]	7	74											
1c.4.8	Emergency Planning Fees	-		-				115	11	126		126									
1c.4.9	Utility Site Indirect	-		-				611	92	703	703	-									
1c.4.10	Spent Fuel Pool O&M	-		-				[illegible]	[illegible]	207		207									
1c.4.11	ISFSI Operating Costs	-		-				[illegible]	[illegible]	22											
1c.4.12	Security Staff Cost	-		-				370	56	426	[illegible]										14,851
1c.4.13	Utility Staff Cost	-		-				5,093	784	5,857	5,857										110,400
1c.4	Subtotal Period 1c Period-Dependent Costs	-	218	1			9					355			102	-		-	2,042	25	125,251
1c.0	TOTAL PERIOD 1c COST	148	604	54	58		309	20,143	3,338	24,651	21,306	3,345			102	1,022		-	130,828	26,265	125,835
PERIOD 1 TOTALS		3,338	[illegible]	114	517	23	1,283	83,122	14,709	104,142	75,880	28,260		498	3,268	1,843		-	1,795,153	68,537	783,858
PERIOD 2a - SAFSTOR Dormancy with Wet Spent Fuel Storage																					
Period 2a Direct Decommissioning Activities																					
2a.1.1	Quarterly Inspection																				
2a.1.2	Semi-annual environmental survey																				
2a.1.3	Prepare reports																				
2a.1.4	Bituminous roof replacement	-		-				[illegible]	26	[illegible]	[illegible]										
2a.1.5	Maintenance supplies	-		-				503	[illegible]	629	629										
2a.1	Subtotal Period 2a Activity Costs	-		-					[illegible]												
Period 2a Collateral Costs																					
2a.3.1	Spent Fuel Transfer							10,100	[illegible]	[illegible]		[illegible]							-		
2a.3.2	ISFSI Capital Expenditures							[illegible]	4,300	32,987									-		
2a.3.3	Florida LLRW Inspection Fee										3								-		

Table D
Crystal River Nuclear Plant, Unit 3
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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 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
2a.3	Subtotal Period 2a Collateral Costs	-	-	-	-	-	-	38,770	5,815	44,585	3	44,582	-	-	-	-	-	-	-	-	-
Period 2a Period-Dependent Costs																					
2a.4.1	Insurance						-	2,061	206	2,269	2,042	227	-	-	-						
2a.4.2	Property taxes						-	7,328	733	8,060	5,082	2,979	-	-	-	-	-				
2a.4.3	**Health physics supplies**	-	253	-					63	316	316					-	-				
2a.4.4	Disposal of DAW generated			24	19	-	136	-	39	218	218			-	1,617	-	-		32,412	397	-
2a.4.5	Plant energy budget						-	3,455	**518**	**3,973**	**159**	**3,814**	-	-	-	-	-				
2a.4.6	NRC Fees						-	936	**94**	**1,030**	**1,030**	-	-			-	-				
2a.4.7	Emergency Planning Fees						-	1,823	**182**	**2,005**	-	**2,005**	-		-	-					
2a.4.8	Utility Site Indirect						-	1,683	**252**	**1,936**	**809**	**1,127**	-			-	-				
2a.4.9	Spent Fuel Pool O&M						-	2,855	**428**	**3,283**	-	**3,283**	-								
2a.4.10	ISFSI Operating Costs						-	301	**45**	**346**	-	**346**	-								
2a.4.11	Security Staff Cost						-	3,222	**483**	**3,705**	**1,255**	**2,450**	-						-	-	129,314
2a.4.12	Utility Staff Cost						-	15,038	2,256	17,294	5,808	11,488	-						-	-	331,629
2a.4	Subtotal Period 2a Period-Dependent Costs	-	253	24	19	-	136	38,721	5,302	44,455	16,717	27,738	-	-	1,617				32,412	397	460,943
2a.0	TOTAL PERIOD 2a COST	-	253	24	19	-	136	78,130	11,264	89,826	17,506	72,320			1,617				32,412	397	460,943
PERIOD 2b - SAFSTOR Dormancy with Dry Spent Fuel Storage																					
Period 2b Direct Decommissioning Activities																					
2b.1.1	Quarterly inspection																				
2b.1.2	Semi-annual environmental survey																				
2b.1.3	Prepare reports																				
2b.1.4	Bituminous roof replacement	-	-	-	-	-		1,045	157	1,202	1,202										
2b.1.5	Maintenance supplies	-	-	-	-	-		3,846	962	4,808	4,808										
2b.1	Subtotal Period 2b Activity Costs	-	-	-	-	-		4,891	1,118	6,009	6,009										
Period 2b Collateral Costs																					
2b.3.1	Spent Fuel Transfer	-						-----	720	5,520	-	5,520									
2b.3.2	Florida LLRW Inspection Fee	-						24	2	27	27	-									
2b.3	Subtotal Period 2b Collateral Costs	-						4,824	722	5,547	27	5,520									
Period 2b Period-Dependent Costs																					
2b.4.1	Insurance	-						14,599	1,460	16,059	15,623	436	-								
2b.4.2	Property taxes	-					-	41,151	4,115	45,266	38,870	6,396									
2b.4.3	Health physics supplies	-	1,936	-			-	-	484	2,420	2,420			-	-						
2b.4.4	Disposal of DAW generated	-		182	146		1,039	-	309	1,668	1,668			-	12,372				247,930	3,038	
2b.4.5	Plant energy budget	-					-	1,057	159	1,216	1,216	-	-	-	-	-	-	-			
2b.4.6	NRC Fees	-					-	7,161	**716**	**7,877**	**7,877**	-	-	-	-	-	-	-			
2b.4.7	Emergency Planning Fees	-					-	3,088	309	3,397	-	3,397	-	-	-	-	-				
2b.4.8	Utility Site Indirect	-					-	**6,543**	**982**	**7,525**	**6,186**	**1,338**	-	-	-	-	-				
2b.4.9	ISFSI Operating Costs	-					-	**2,304**	**346**	**2,650**	-	**2,650**	-	-	-	-	-	-			
2b.4.10	Security Staff Cost	-					-	16,695	2,504	19,199	9,599	9,600	-	-	-	-	-				[redacted]
2b.4.11	Utility Staff Cost	-					-	53,495	8,024	61,519	44,412	17,107	-	-	-	-	-	-			[redacted]
2b.4	Subtotal Period 2b Period-Dependent Costs	-	1,936	182	146	-	1,039	146,093	19,398	168,794	127,870	40,924	-	-	12,372	-	-		247,930	3,038	1,818,789
2b.0	TOTAL PERIOD 2b COST	-	1,936	182	146	-	1,039	155,808	21,239	180,350	133,906	46,444	-	-	12,372				247,930	3,038	1,818,789
PERIOD 2c - SAFSTOR Dormancy without Spent Fuel Storage																					
Period 2c Direct Decommissioning Activities																					
2c.1.1	Quarterly inspection																				
2c.1.2	Semi-annual environmental survey																				
2c.1.3	Prepare reports																				
2c.1.4	Bituminous roof replacement							848	97	745	745			-	-		-				
2c.1.5	Maintenance supplies							2,383	596	2,979	2,979			-	-						

Table D
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Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
2c.1	Subtotal Period 2c Activity Costs	-	-	-	-	-	-	3,03[illegible]	693	3,724	3,724			-	-	-	-	-	-		
Period 2c Collateral Costs																					
2c.3.1	Florida LLRW Inspection Fee	-	-	-	-	-	-	15	-	16	16			-	-	-	-	-	-		
2c.3	Subtotal Period 2c Collateral Costs	-	-	-	-	-	-	15	-	16	16			-	-	-	-	-	-		
Period 2c Period-Dependent Costs																					
2c.4.1	Insurance	-	-	-	-	-	-	8,800	---	9,680	9,680								-		
2c.4.2	Property taxes	-	-	-	-	-	-	21,896	2,190	24,085	24,085								-		
2c.4.3	Health physics supplies	-	1,200	-	-	-	-	-	300	1,499	1,499								-		
2c.4.4	Disposal of DAW generated	-	-	113	91	-	644	-	186	1,033	1,033				7,666				153,624	1,882	
2c.4.5	Plant energy budget	-	-	-	-	-	-	655	98	753	753								-		
2c.4.6	NRC Fees	-	-	-	-	-	-	4,437	444	4,881	4,881								-		
2c.4.7	Utility Site Indirect	-	-	-	-	-	-	3,333	500	3,833	3,833								-		
2c.4.8	Security Staff Cost	-	-	-	-	-	-	5,172	776	5,948	5,948								-		
2c.4.9	Utility Staff Cost	-	-	-	-	-	-	23,929	3,588	27,519	27,519								-		553,600
2c.4	Subtotal Period 2c Period-Dependent Costs	-	1,200	113	91	-	644	68,223		79,232	79,232				7,666				153,624	1,882	
2c.0	TOTAL PERIOD 2c COST	-	1,200	113	91	-	644	71,268	9,657	82,972	82,972			-	7,666				153,624	1,882	761,200
PERIOD 2 TOTALS		-	3,388	319	256	-	1,819	305,206	42,159	353,148	234,384	118,764		-	21,656				433,866	5,311	3,040,931
PERIOD 3a - Reactivate Site Following SAFSTOR Dormancy																					
Period 3a Direct Decommissioning Activities																					
3a.1.1	Prepare preliminary decommissioning cost	-	-	-	-	-	-	---	21	158	---								-		-----
3a.1.2	Review plant dwgs & specs.	-	-	-	-	-	-	---	73	558	---								-		[illegible]
3a.1.3	Perform detailed rad survey																				
3a.1.4	End product description	-	-	-	-	-	-	---	16	121	--								-		-----
3a.1.5	Detailed by-product inventory	-	-	-	-	-	-	137	21	158	158								-		1,300
3a.1.6	Define major work sequence	-	-	-	-	-	-	792	119	911	911								-		7,500
3a.1.7	Perform SER and EA	-	-	-	-	-	-	327	49	377	377								-		3,100
3a.1.8	Perform Site-Specific Cost Study	-	-	-	-	-	-	528	79	607	607								-		5,000
3a.1.9	Prepare/submit License Termination Plan								85	498									-		[illegible]
3a.1.10	Receive NRC approval of termination plan																		-		
Activity Specifications																					
3a.1.11.1	Re-activate plant & temporary facilities	-	-	-	-	-	-	---	117	895	---		90	-					-		-----
3a.1.11.2	Plant systems	-	-	-	-	-	-	440	66	506	456		51	-					-		4,167
3a.1.11.3	Reactor internals	-	-	-	-	-	-	750	113	863	863								-		7,100
3a.1.11.4	Reactor vessel	-	-	-	-	-	-		103	796									-		6,500
3a.1.11.5	Biological shield	-	-	-	-	-	-	--	8	61	61								-		500
3a.1.11.6	Steam generators	-	-	-	-	-	-	330	49	379	379								-		3,120
3a.1.11.7	Reinforced concrete	-	-	-	-	-	-	169	25	194	--								-		-----
3a.1.11.8	Main Turbine	-	-	-	-	-	-	42	6	48			48						-		400
3a.1.11.9	Main Condensers	-	-	-	-	-	-	42	6	49			48						-		
3a.1.11.10	Plant structures & buildings	-	-	-	-	-	-	330	49	379	---								-		3,120
3a.1.11.11	Waste management	-	-	-	-	-	-	486	73	558	558								-		-----
3a.1.11.12	Facility & site closeout	-	-	-	-	-	-		14	109	55								-		900
3a.1.11	Total	-	-	-	-	-	-	4,202	630	4,832	---		---						-		
Planning & Site Preparations																					
3a.1.12	Prepare dismantling sequence	-	-	-	-	-	-	---	38	292	---								-		2,400
3a.1.13	Plant prep. & temp. svces	-	-	-	-	-	-	2,415	363	2,782	2,782								-		-
3a.1.14	Design water clean-up system	-	-	-	-	-	-	148	22	170	170								-		1,400
3a.1.15	Rigging/Cont. Cnstr Envrs/tooling/etc	-	-	-	-	-	-	2,048	307	2,355	2,355								-		-
3a.1.16	Procure casks/liners & containers	-	-	-	-	-	-	130	19	148									-		1,230

Table D
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Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
3a.1	Subtotal Period 3a Activity Costs							12,147	1,822	13,969	13,391		579		-	-					72,703
Period 3a Additional Costs																					
3a.2.1	Site Characterization Survey								400	1,733											
3a.2	Subtotal Period 3a Additional Costs								400	1,733											
Period 3a Collateral Costs																					
3a.3.1	Florida LLRW Inspection Fee																				
3a.3	Subtotal Period 3a Collateral Costs																				
Period 3a Period-Dependent Costs																					
3a.4.1	Insurance							464	46	511											
3a.4.2	Property taxes							1,154	115	1,270	1,270				-	-	-	-	-	-	
3a.4.3	Health physics supplies								63	316	316				-	-	-	-	-	-	
3a.4.4	Heavy equipment rental								50	384	384				-	-	-	-	-	-	
3a.4.5	Disposal of DAW generated			€	$		34		10	55	55				404	-	-	-	8,103	99	
3a.4.6	Plant energy budget								130	993	993				-	-	-	-	-	-	
3a.4.7	NRC Fees							265	27	292	292				-	-	-	-	-	-	
3a.4.8	Utility Site Indirect							1,632	245	1,877	1,877				-	-	-	-	-	-	
3a.4.9	Security Staff Cost							403	80	483	483				-					-	16,164
3a.4.10	Utility Staff Cost							12,337	1,851	14,188	14,188				-				-	-	264,364
3a.4	Subtotal Period 3a Period-Dependent Costs		587	€	$		34		2,597	20,348	20,348				404				8,103	99	280,529
3a.0	TOTAL PERIOD 3a COST		587	€	$		34	30,600	4,819	36,051	35,472		579		404				8,103	99	353,231
PERIOD 3b - Decommissioning Preparations																					
Period 3b Direct Decommissioning Activities																					
Detailed Work Procedures																					
3b.1.1.1	Plant systems								75	575	517		57								4,733
3b.1.1.2	Reactor internals							264	40	304	304										2,500
3b.1.1.3	Remaining buildings							143	21	164	41		123								1,350
3b.1.1.4	CRD cooling assembly								16	121	121										1,000
3b.1.1.5	CRD housings & ICI tubes								16	121	121										1,000
3b.1.1.6	Incore instrumentation							106	16	121	121										1,000
3b.1.1.7	Reactor vessel							383	58	441	441										3,630
3b.1.1.8	Facility closeout								19	146	73		73								1,200
3b.1.1.9	Missile shields								7	55	55										450
3b.1.1.10	Biological shield							127	19	146	146										1,200
3b.1.1.11	Steam generators							486	73	559	559										4,600
3b.1.1.12	Reinforced concrete								16	121	61										1,000
3b.1.1.13	Main Turbine								25	190	-		190								1,560
3b.1.1.14	Main Condensers							165	25	190	-		190								1,560
3b.1.1.15	Auxiliary building							288	43	332	299		33								2,730
3b.1.1.16	Reactor building								43	332	299		33								2,730
3b.1.1	Total							3,406	511	3,917	3,158		760								32,243
3b.1	Subtotal Period 3b Activity Costs							3,406	511	3,917	3,158		760	-	-	-	-	-	-	-	32,243
Period 3b Collateral Costs																					
3b.3.1	Decon equipment	720	-						108	828	828										
3b.3.2	DOC staff relocation expenses							1,155	173	1,328	1,328										
3b.3.3	Pipe cutting equipment		957					-	143	1,100	1,100										
3b.3.4	Florida LLRW Inspection Fee							2	0	3	3										
3b.3	Subtotal Period 3b Collateral Costs	720	957						425	3,259	3,259										

Table D
Crystal River Nuclear Plant, Unit 3
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Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 3b Period-Dependent Costs																					
3b.4.1	Decon supplies	22	-					-	-	28	28				-	-	-	-	-		
3b.4.2	Insurance	-	-					264	26	290	290				-	-	-	-	-		
3b.4.3	Property taxes	-	-					586	59	645	645				-	-	-	-	-		
3b.4.4	Health physics supplies	-	128					-	32	160	160				-	-	-	-	-		
3b.4.5	Heavy equipment rental	-	169					-	-	184	184			-	-	-	-		-		
3b.4.6	Disposal of DAW generated	-	-	3	2		17	-	-	28	28			-	205	-			4,107	50	
3b.4.7	Plant energy budget	-	-					438	66	503	503			-	-	-					
3b.4.8	NRC Fees	-	-					134	11	148	148										
3b.4.9	Utility Site Indirect	-	-	-				842	126	968	968										
3b.4.10	Security Staff Cost	-	-	-				204	31	235	235										
3b.4.11	DOC Staff Cost	-	-	-				4,858	729	5,587	5,587	-	-	-							64,488
3b.4.12	Utility Staff Cost	-	-	-	-			5,411	962	7,372	7,372			-	-						137,164
3b.4	Subtotal Period 3b Period-Dependent Costs	22	297	3	2		17	13,737	2,079	16,159	16,159			-	205	-			4,107	50	
3b.0	TOTAL PERIOD 3b COST	742	1,254	3	2		17	18,301	3,015	23,335	22,575		760	-	205	-			4,107	50	242,086
PERIOD 3 TOTALS		742	1,841	9	7		51	48,991	7,834	59,385	58,047		1,338	-	609	-			12,210	150	695,317
PERIOD 4a - Large Component Removal																					
Period 4a Direct Decommissioning Activities																					
Nuclear Steam Supply System Removal																					
4a.1.1.1	Reactor Coolant Piping	19	72	13	18	141	159		92	513	513			583	583				130,499	2,704	
4a.1.1.2	Pressurizer Relief Tank	2	9	2	3	23	24		14	77	77			94	94	-			20,849	333	
4a.1.1.3	Reactor Coolant Pumps & Motors	18	51	35	50	1,052	943		427	2,577	2,577			3,625	3,138	-			872,445	2,446	
4a.1.1.4	Pressurizer	5	36	667	718	-	445		291	2,100	2,100			-	2,246	-			427,826	1,781	
4a.1.1.5	Steam Generators	119	3,358	2,286	1,647	-	889	-	1,598	9,907	9,907			-	21,184	-	-	-	1,460,167	14,812	
4a.1.1.6	CRDMs/ICIs/Service Structure Removal	21	71	136	53	63	148	-	96	588	589			753	3,106	-	-	-	91,378	2,573	
4a.1.1.7	Reactor Vessel Internals	29	1,826	3,188	218	-	2,613	136	3,565	11,585	11,585			-	1,710	250	527	-	224,215	16,708	800
4a.1.1.8	Vessel & Internals GTCC Disposal	-	-	-	-	-	10,758	-	1,613	12,368	12,368							524	105,646		
4a.1.1.9	Reactor Vessel	-	4,248	684	95	-	5,071	136	5,936	16,170	16,170			-	7,148	2,573	-	-	986,490	16,708	800
4a.1.1	Totals	213	9,671	6,970	2,802	1,279	21,047	272	13,632	55,885	55,885			5,035	39,188	2,824	527	524	4,319,516	58,065	
Removal of Major Equipment																					
4a.1.2	Main Turbine/Generator		[illegible]	129	24	532	307		217	1,383	1,383			2,783	1,550	-			375,544	5,211	
4a.1.3	Main Condensers		-	75	57	505	307		307	1,802	1,802			4,983	1,469	-			358,081	16,801	
Cascading Costs from Clean Building Demolition																					
4a.1.4.1	Reactor		[illegible]						75	576	576				-					[illegible]	
4a.1.4.2	Auxiliary Building								20	153	153				-					2,486	
4a.1.4.3	Fuel Handling Area (Aux Bldg)		80						12	89	89				-					1,390	
4a.1.4.4	Intermediate Bldg		[illegible]						5	37	37				-						
4a.1.4.5	Machine Shop - Hot		3						0	3	3									70	
4a.1.4.6	Rad Materials Storage & Processing Bldg								-	1	1									[illegible]	
4a.1.4	Totals		749						112	862	862										
Disposal of Plant Systems																					
4a.1.5.1	Auxiliary Steam	-	46		-				8	46			46	-					-	1,377	
4a.1.5.2	Auxiliary Steam - RCA	-	22	0	2	[illegible]			11	69	[illegible]			376					15,255	564	
4a.1.5.3	Chemical Addition - Cont	-	40		2	53			18	115	115			581					23,576	1,073	
4a.1.5.4	Chemical Addition - Cont - Insulated	-	6		0	6			2	15	15			61					2,461	156	
4a.1.5.5	Chemical Addition - Insulated - RCA	-	5		0	6			2	13	13			61					2,461	124	
4a.1.5.6	Chemical Addition - RCA	-	35	1	3				18	117				658					26,704	903	
4a.1.5.7	Chemical Feed Secondary Cycle	-	10						1	11			11	-					-	331	
4a.1.5.8	Chemical Feed Secondary Cycle - RCA	-	4		0	5			2	11	11			51					2,067	106	
4a.1.5.9	Chilled Water	-	45						7	51			51	-					-	1,520	

Table D
Crystal River Nuclear Plant, Unit 3
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 Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt, Lbs.	Craft Manhours	Utility and Contractor Manhours
Disposal of Plant Systems (continued)																					
4a.1.5.10	Chilled Water - RCA	-	46	1	3	61	-	-	21	132	132	-	-	672	-	-	-	-	27,273	1,199	-
4a.1.5.11	Circulating Water	-	67	-	-	-	-	-	10	77	-	-	77	-	-	-	-	-	-	2,275	-
4a.1.5.12	Cond Demin Regeneration	-	32	-	-	-	-	-	5	37	-	-	37	-	-	-	-	-	-	1,049	-
4a.1.5.13	Condensate	-	83	-	-	-	-	-	12	96	-	-	96	-	-	-	-	-	-	2,568	-
4a.1.5.14	Condensate & Demin Water Supply	-	18	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	606	-
4a.1.5.15	Condensate & Demin Water Supply - Cont	-	43	1	2	44	-	-	18	107	107	-	-	483	-	-	-	-	19,601	1,146	-
4a.1.5.16	Condensate & Demin Water Supply - RCA	-	67	1	4	58	-	-	29	160	160	-	-	875	-	-	-	-	35,538	1,730	-
4a.1.5.17	Condensate - Cont	-	119	4	13	296	-	-	76	508	508	-	-	3,236	-	-	-	-	131,415	3,464	-
4a.1.5.18	Condensate Demineralizer	-	72	-	-	-	-	-	11	83	-	-	83	-	-	-	-	-	-	2,482	-
4a.1.5.19	Condensate Demineralizer - Cont	-	94	2	7	147	-	-	47	295	295	-	-	1,864	-	-	-	-	85,131	2,576	-
4a.1.5.20	Condenser Air Removal & Priming	-	66	-	-	-	-	-	10	79	-	-	79	-	-	-	-	-	-	2,308	-
4a.1.5.21	Cycle Makeup Demin Water	-	45	-	-	-	-	-	7	51	-	-	51	-	-	-	-	-	-	1,472	-
4a.1.5.22	Cycle Makeup Demin Water - RCA	-	42	1	2	47	-	-	18	110	110	-	-	513	-	-	-	-	20,841	1,086	-
4a.1.5.23	Cycle Startup	-	6	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	-	-
4a.1.5.24	Cycle Startup - RCA	-	15	1	2	38	-	-	10	66	66	-	-	431	-	-	-	-	17,510	396	-
4a.1.5.25	Diesel Jacket Coolant	-	19	-	-	-	-	-	3	23	-	-	-	-	-	-	-	-	-	613	-
4a.1.5.26	Diesel Air Cooler Coolant	-	3	-	-	-	-	-	0	4	-	-	4	-	-	-	-	-	-	-	-
4a.1.5.27	EDG FO & Compressed Air & Exhaust	-	31	-	-	-	-	-	5	36	-	-	36	-	-	-	-	-	-	1,026	-
4a.1.5.28	EDG Lube Oil	-	3	-	-	-	-	-	0	4	-	-	4	-	-	-	-	-	-	-	-
4a.1.5.29	EFP-3 Compressed and Starting Air	-	8	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	302	-
4a.1.5.30	EFP-3 Fuel Oil Transfer	-	13	-	-	-	-	-	2	15	-	-	15	-	-	-	-	-	-	444	-
4a.1.5.31	EFPB Sump Discharge	-	6	-	-	-	-	-	1	7	-	-	7	-	-	-	-	-	-	-	-
4a.1.5.32	Emergency Feedwater	-	51	-	-	-	-	-	-	59	-	-	-	-	-	-	-	-	-	-	-
4a.1.5.33	Emergency Feedwater - RCA	-	89	2	7	150	-	-	-	293	293	-	-	1,640	-	-	-	-	66,593	2,373	-
4a.1.5.34	Extraction Steam	-	66	-	-	-	-	-	13	98	-	-	-	-	-	-	-	-	-	2,916	-
4a.1.5.35	FW Heater Relief Vents & Drains	-	35	-	-	-	-	-	6	41	-	-	-	-	-	-	-	-	-	1,225	-
4a.1.5.36	FW Heater Relief Vents & Drains - Cont	-	38	0	2	33	-	-	15	88	88	-	-	366	-	-	-	-	14,864	1,062	-
4a.1.5.37	Feedwater	-	65	-	-	-	-	-	10	75	-	-	-	-	-	-	-	-	-	2,106	-
4a.1.5.38	Feedwater - Insulated	-	35	-	-	-	-	-	5	40	-	-	-	-	-	-	-	-	-	1,222	-
4a.1.5.39	Feedwater - Insulated - RCA	-	71	3	-	-	-	-	51	344	-	-	-	2,293	-	-	-	-	93,138	-	-
4a.1.5.40	Feedwater - RCA	-	17	1	-	-	-	-	12	84	-	-	-	572	-	-	-	-	23,243	-	-
4a.1.5.41	HVAC Misc Outfridgs	-	12	-	-	-	-	-	2	14	-	-	14	-	-	-	-	-	-	464	-
4a.1.5.42	LP & HP Feedwater Drains & Vents	-	146	-	-	-	-	-	22	168	-	-	168	-	-	-	-	-	-	5,048	-
4a.1.5.43	LP & HP Feedwater Drains & Vents - Cont	-	146	3	10	-	-	-	70	443	443	-	-	2,346	-	-	-	-	95,269	-	-
4a.1.5.44	Liquid Sampling - Cont	-	49	0	1	29	-	-	17	96	96	-	-	313	-	-	-	-	12,721	-	-
4a.1.5.45	Liquid Sampling - RCA	-	41	0	-	-	-	-	-	89	-	-	-	336	-	-	-	-	13,655	-	-
4a.1.5.46	Lube Oil	-	8	-	-	-	-	-	-	9	-	-	-	-	-	-	-	-	-	-	-
4a.1.5.47	Main & Reheat Steam	-	64	-	-	-	-	-	10	74	-	-	-	-	-	-	-	-	-	2,230	-
4a.1.5.48	Main & Reheat Steam - Cont	-	391	26	-	-	-	-	427	3,019	-	-	-	-	-	-	-	-	925,077	11,388	-
4a.1.5.49	Main & Reheat Steam - RCA	-	10	0	-	-	-	-	6	38	38	-	-	-	-	-	-	-	9,182	275	-
4a.1.5.50	Misc Turbine Room Steam Drains	-	37	-	-	-	-	-	6	43	-	-	43	-	-	-	-	-	-	1,332	-
4a.1.5.51	Misc Turbine Room Steam Drains - Cont	-	138	2	6	128	-	-	55	328	328	-	-	1,405	-	-	-	-	57,049	3,583	-
4a.1.5.52	Nitrogen/Hydrogen/Carbon Dioxide	-	20	-	-	-	-	-	-	23	-	-	-	-	-	-	-	-	-	-	-
4a.1.5.53	Nuc Serv & Decay Heat Sea Water	-	35	-	-	-	-	-	-	40	-	-	40	-	-	-	-	-	-	1,172	-
4a.1.5.54	Nuc Serv & Decay Heat Sea Water - Cont	-	47	-	-	-	-	-	66	474	-	-	-	3,740	-	-	-	-	151,890	1,375	-
4a.1.5.55	Nuc Serv & Decay Heat Sea Water - RCA	-	-	3	10	229	-	-	49	343	-	-	-	2,604	-	-	-	-	101,697	1,442	-
4a.1.5.56	RC & Misc Waste Evaporator	-	267	12	-	-	67	-	173	1,106	-	-	-	6,075	374	-	-	-	275,440	7,777	-
4a.1.5.57	RC & Misc Waste Evaporator - Insulated	-	25	-	2	6	20	-	-	67	-	-	-	62	96	-	-	-	11,065	623	-
4a.1.5.58	Screen Wash Water	-	-	-	-	-	-	-	-	35	-	-	35	-	-	-	-	-	-	989	-
4a.1.5.59	Seal & Spray Water	-	-	-	-	-	-	-	-	3	-	-	3	-	-	-	-	-	-	99	-
4a.1.5.60	Seal & Spray Water - Cont	-	67	1	-	-	-	-	25	175	-	-	-	814	-	-	-	-	33,044	1,797	-
4a.1.5.61	Seal & Spray Water - RCA	-	54	-	-	-	-	-	25	155	155	-	-	783	-	-	-	-	31,811	1,362	-
4a.1.5.62	Secondary Cycle Sampling	-	-	-	-	-	-	-	3	20	-	-	20	-	-	-	-	-	-	622	-
4a.1.5.63	Secondary Cycle Sampling - Cont	-	-	-	0	1	-	-	2	15	15	-	-	80	-	-	-	-	2,419	166	-
4a.1.5.64	Secondary Cycle Sampling - Cont - Ins	-	2	-	-	2	-	-	-	-	-	-	-	20	-	-	-	-	810	56	-
4a.1.5.65	Secondary Cycle Sampling - Insulated	-	-	-	-	-	-	-	-	6	-	-	6	-	-	-	-	-	-	180	-
4a.1.5.66	Secondary Serv Closed Cycle Cooling	-	145	-	-	-	-	-	22	-	-	-	167	-	-	-	-	-	-	4,978	-

Table D
Crystal River Nuclear Plant, Unit 3
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 Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Disposal of Plant Systems (continued)																					
4a.1.5.67	Turb Bldg Sump & Oily Water Separator									17			17								
4a.1.5.68	Turbine Generator Seal Oil		18						3	20			20							621	
4a.1.5.69	Turbine Gland Steam & Drains		11						2				13								
4a.1.5.70	Turbine Lube Oil		33						5	38			38								
4a.1.5.71	Waste Drumming			1	1									26	40			-	4,682	264	
4a.1.5.72	Waste Gas Disposal		188	11	21	217	99		109		645			2,374	495			-	139,046	5,140	
4a.1.5	Totals		3,688	82	262				1,674				1,855	58,334	1,005			-	2,452,528		
4a.1.6	Scaffolding in support of decommissioning		613	9	5	79	3		168	877	877			784	38			-	39,211	21,047	
4a.1	Subtotal Period 4a Activity Costs	213	15,447	7,266	3,146	7,725	21,859	272	16,109	72,040	70,384	-	1,855	71,919	43,251	2,824	527	524	7,542,879	225,731	1,601
Period 4a Additional Costs																					
4a.2.1	Guns Surcharge (excluding RPV)																				
4a.2.2	RVCH Segmentation and Disposal			124	20		1,124		313	1,689	1,689										
4a.2	Subtotal Period 4a Additional Costs			124	20																
Period 4a Collateral Costs																					
4a.3.1	Process liquid waste	3		3	3		16		6							56			7,075	11	
4a.3.2	Small tool allowance		131						26	151	136		5								
4a.3.3	Florida LLRW Inspection Fee								24	267	267										
4a.3	Subtotal Period 4a Collateral Costs	3	131	3	3		16						5			56		-	7,075	11	
Period 4a Period-Dependent Costs																					
4a.4.1	Decon supplies	48																			
4a.4.2	Insurance								57	630	630										
4a.4.3	Property taxes								127	1,402	1,262		140								
4a.4.4	Health physics supplies								267	1,336	1,336										
4a.4.5	Heavy equipment rental								268	2,058	2,058										
4a.4.8	Disposal of DAW generated			51	41		290		84	466	466				3,458			-	69,295	849	
4a.4.7	Plant energy budget								191	1,386	1,386										
4a.4.8	NRC Fees							361	36	397	397										
4a.4.9	Utility Site Indirect							1,868	280	2,148	2,148										
4a.4.10	Radwaste Processing Equipment/Services							408	61	469	469										
4a.4.11	Security Staff Cost							1,717	258	1,975	1,975										
4a.4.12	DOE Staff Cost							12,733	1,910	14,642	14,642										174,583
4a.4.13	Utility Staff Cost							13,994	2,099	16,093	16,093										306,669
4a.4	Subtotal Period 4a Period-Dependent Costs	48	2,856	51	41		290	34,132					140		3,458			-	69,295	849	
4a.0	TOTAL PERIOD 4a COST	265	18,530	7,443	3,213	7,725	23,392	34,662	22,138	117,369	115,558		1,871	71,919	48,806	2,880	527	524	7,839,740	226,791	551,854
PERIOD 4b - Site Decontamination																					
Period 4b Direct Decommissioning Activities																					
4b.1.1	Remove spent fuel racks	250	28	86	58		530		282	1,233	1,233				2,534			-	227,343	989	
Disposal of Plant Systems																					
4b.1.2.1	Chemical Cleaning Steam Gen - Cont			0	1													-	6,141		
4b.1.2.2	Chemical Cleaning Steam Gen - RCA		15	0	1	17			7	40	40			188				-	7,842	391	
4b.1.2.3	Containment Monitoring		40	0	1	32			15	88								-	14,268	1,046	
4b.1.2.4	Core Flooding			2	6	125												-	55,743		
4b.1.2.5	Decay Heat Closed Cycle Cooling			10	38						1,233			8,851				-	351,308	6,077	
4b.1.2.6	Decay Heat Removal		198	21	53	669	210		213	1,364								-	387,470		
4b.1.2.7	Domestic Water		28						4	33			33							985	
4b.1.2.8	Domestic Water - RCA		43	1	2	48			18	113	113			525				-	21,339	1,086	
4b.1.2.9	Electrical - Clean		405						61	466			466							13,208	
4b.1.2.10	Electrical - Contaminated			5	18	402					915			4,394				-	178,459		

Table D
Crystal River Nuclear Plant, Unit 3
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 Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt. Lbs.	Craft Manhours	Utility and Contractor Manhours
Disposal of Plant Systems (continued)																					
4b.1.2.11	Electrical - Decontaminated	-	2,411	49	172	3,809			1,205	7,646	7,646			41,890	-	-			1,683,054	68,474	-
4b.1.2.12	Fire Service Water	-	203		-	-			30	233	-		233	-					-	6,727	-
4b.1.2.13	Fire Service Water - RCA	-	358	8	29	651			192	1,239	1,239			7,126					289,375	9,564	-
4b.1.2.14	Floor & Equip Drains - Aux & Reac Bldg	-	55	4	5	12	44		28	149	149	-		141	209	-	-	-	24,423	1,399	-
4b.1.2.15	HVAC - Auxiliary Bldg	-	162	5	17	381			101	666	666	-	-	4,174	-	-	-	-	169,500	4,228	-
4b.1.2.16	HVAC - Clean Machine Shop	-	5	-					1	6	-	-	6	-	-	-	-	-	-	185	-
4b.1.2.17	HVAC - Control Complex	-	24	-					4	28	-	-	28	-	-	-	-	-	-	922	-
4b.1.2.18	HVAC - Diesel Gen Bldg	-	5	-	-	-			1	5	-	-	5	-	-	-	-	-	-	156	-
4b.1.2.19	HVAC - Fire Pump House	-	2	-					0	2	-	-	2	-	-	-	-	-	-	67	-
4b.1.2.20	HVAC - Fuel Handling Area	-	151	3	12	274			81	523	523	-	-	3,001	-	-	-	-	121,884	3,981	-
4b.1.2.21	HVAC - Hot Machine Shop	-	25	1	2	47			14	88	88	-		511					20,735	655	-
4b.1.2.22	HVAC - Intermediate Bldg	-	48	2	7	164			38	260	260	-	-	1,799	-	-	-	-	73,976	1,271	-
4b.1.2.23	HVAC - Maintenance Support	-	4	-					1	5	-	-	5	-	-	-	-	-	-	159	-
4b.1.2.24	HVAC - Office Bldg	-	5	-					1	5	-	-	5	-	-	-	-	-	-	168	-
4b.1.2.25	HVAC - Reactor Bldg	-	306	9	32	708			188	1,243	1,243	-	-	7,751	-	-	-	-	314,790	7,686	-
4b.1.2.26	HVAC - Turbine Bldg	-	80	-	-	-			12	92	-	-	92	-	-	-	-	-	-	2,992	-
4b.1.2.27	IGI Instrumentation	-	74	1	3	68			29	175	175	-	-	740	-	-	-	-	30,061	1,853	-
4b.1.2.28	Industrial Cooler Water	-	23	-	-	-			3	26	-	-	26	-	-	-	-	-	-	731	-
4b.1.2.29	Industrial Cooler Water - RCA	-	137	3	10	212			68	428	428	-	-	2,326	-	-	-	-	94,722	3,614	-
4b.1.2.30	Instrument & Station Service Air	-	54	-	-	-			8	62	-	-	62	-	-	-	-	-	-	1,884	-
4b.1.2.31	Instrument & Station Service Air - Cont	-	107	1	5	106			44	263	263	-	-	[illegible]			-	-	47,115	2,919	-
4b.1.2.32	Instrument & Station Service Air - RCA	-	197	2	8	184			78	470	470	-	-	-			-	-	81,728	5,095	-
4b.1.2.33	Leak Rate Test - Cont	-	57	1	3	68			25	152	152	-	-	723	-	-	-	-	29,355	1,577	-
4b.1.2.34	Leak Rate Test - RCA	-	56	1	4	86			28	175	175	-	-	845	-	-	-	-	38,385	1,533	-
4b.1.2.35	Liquid Waste Disposal	-	564	28	54	322	359		290	1,617	1,617	-	-	3,526	1,732	-	-	-	297,136	15,315	-
4b.1.2.36	Makeup & Purification	-	387	5	18	398			160	968	968	-	-	4,355	-	-	-	-	176,876	10,458	-
4b.1.2.37	Makeup & Purification - Insulated	-	99	1	4	86			38	228	228	-	-	941	-	-	-	-	38,212	2,706	-
4b.1.2.38	Nitrogen/Hydrogen/Carbon Dioxide - Cont	-	16	0	1	14			6	36	36	-	-	148	-	-	-	-	6,028	401	-
4b.1.2.39	Nitrogen/Hydrogen/Carbon Dioxide - RCA	-	58	1	3	59			24	144	144	-	-	-	-	-	-	-	26,153	1,394	-
4b.1.2.40	Noble Gas Effluent Monitoring - Cont	-	14	0	1	14			6	35	35	-	-	152	-	-	-	-	6,172	380	-
4b.1.2.41	Noble Gas Effluent Monitoring - RCA	-	12	0	1	14			5	32	32	-	-	-	-	-	-	-	6,172	299	-
4b.1.2.42	Nuc Serv Closed Cycle Cooling - Cont	-	451	14	51	1,125			291	1,932	1,932	-	-	12,315	-	-	-	-	500,136	12,533	-
4b.1.2.43	Nuc Serv Closed Cycle Cooling - RCA	-	411	18	94	1,426			328	2,248	2,248	-	-	15,611	-	-	-	-	633,983	11,175	-
4b.1.2.44	PASS Containment Monitoring - Cont	-	5	-	0	9			2	12	12	-	-	44	-	-	-	-	1,777	144	-
4b.1.2.45	PASS Containment Monitoring - RCA	-	12	0	1	12			5	29	29	-	-	128	-	-	-	-	5,207	309	-
4b.1.2.46	Post Accident Sampling - Cont	-	21	0	1	19			8	49	49	-	-	205	-	-	-	-	8,338	567	-
4b.1.2.47	Post Accident Sampling - RCA	-	20	0	1	22			8	51	51	-	-	237	-	-	-	-	9,629	620	-
4b.1.2.48	Post Accident Venting - Cont	-	23	0	2	38			12	75	75	-	-	411	-	-	-	-	16,678	636	-
4b.1.2.49	Post Accident Venting - RCA	-	9	0	1	15			5	29	29	-	-	162	-	-	-	-	6,581	231	-
4b.1.2.50	RB Penetration Cooling - RCA	-	79	1	4	88			34	205	205	-	-	960	-	-	-	-	39,005	2,105	-
4b.1.2.51	RCP Lube Oil - Cont	-	3	-	0	5			2	10	10	-	-	58	-	-	-	-	2,361	83	-
4b.1.2.52	RCP Lube Oil - RCA	-	3	-	0	5			1	10	10	-	-	58	-	-	-	-	2,361	85	-
4b.1.2.53	Radwaste Demineralizer	-	21	1	2	15	12		11	63	63	-	-	177	56	-	-	-	12,193	569	-
4b.1.2.54	Reac Bldg Pressure Sensing & Test	-	2	-	-	-	-	-	0	2	-	-	2	-	-	-	-	-	-	55	-
4b.1.2.55	Reac Bldg Pressure Sensing & Test - RCA	-	28	0	1	27	-	-	11	67	67	-	-	293	-	-	-	-	11,905	673	-
4b.1.2.56	Reactor Building Spray	-	147	3	11	251	-	-	78	489	489	-	-	2,752	-	-	-	-	111,749	4,112	-
4b.1.2.57	Refueling Equipment	-	94	4	11	122	47	-	56	333	333	-	-	1,334	225	-	-	-	74,367	2,861	-
4b.1.2.58	Sewage	-	8	-	-	-	-	-	1	10	-	-	10	-	-	-	-	-	-	282	-
4b.1.2.59	Spent Fuel Cooling	-	223	15	38	317	198	-	159	945	945	-	-	3,470	936	-	-	-	224,924	8,333	-
4b.1.2.60	Waste Gas Sampling	-	45	0	2	41	-	-	18	106	106	-	-	443	-	-	-	-	18,005	1,167	-
4b.1.2.61	Wet Layup/N2 Blanketing	-	3	-	-	-	-	-	0	3	-	-	3	-	-	-	-	-	-	112	-
4b.1.2.62	Wet Layup/N2 Blanketing - Cont	-	5	-	0	4	-	-	2	11	11	-	-	40	-	-	-	-	1,628	129	-
4b.1.2.63	Wet Layup/N2 Blanketing - RCA	-	2	-	-	2	-	-	1	6	6	-	-	24	-	-	-	-	978	61	-
4b.1.2	Totals	-	8,689	221	696	13,312	867	-	4,427	28,213	27,234	-	978	145,690	4,173	-	-	-	6,288,617	243,753	-
4b.1.3	Scaffolding in support of decommissioning	-	919	14	7	119	5		251	1,315	1,315	-	-	1,178	58				58,817	31,570	

Table D
Crystal River Nuclear Plant, Unit 3
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Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Burial Volumes Class B Cu. Feet	Burial Volumes Class C Cu. Feet	Burial Volumes GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Decontamination of Site Buildings																					
4b.1.4.1	Reactor	[illegible]	[illegible]	[illegible]	[illegible]	297	1,105	-	798	3,548	[illegible]			2,269	7,734			-	[illegible]	31,875	
4b.1.4.2	Auxiliary Building	226	78	11	28	45	79	-	165	633	633			497	953			-	114,286	8,587	
4b.1.4.3	Fuel Handling Area (Aux Bldg)		419			400	62	-	443	1,887	1,887			4,376	740			-	251,083	26,480	
4b.1.4.4	Intermediate Bldg	[illegible]		[illegible]	7	19	17	-	36	145				208	208	-		-		1,784	
4b.1.4.5	Machine Shop - Hot	35	8	2	4	0	13		24	86	86		-	3	157	-		-	15,752		
4b.1.4.6	RVCH Storage Building	3	-	0	-	-	-		3	11			-	27	11	-			2,176	[illegible]	
4b.1.4.7	Rad Materials Storage & Processing Bldg	22	5		3	-	8	-	15	54	54		-	-	99	-			[illegible]	757	
4b.1.4	Totals			120		674	1,286	-	1,481	6,365			-	7,380	9,902	-			1,248,467		
4b.1	Subtotal Period 4b Activity Costs	1,746	10,658	440	1,048	14,108	2,687		6,441	37,127	36,148		978	154,247	16,667	-			7,823,243	347,112	
Period 4b Additional Costs																					
4b.2.1	ISFSI License Termination	52	-	-	8		900	1,338	471	2,848		2,848		-	3,916	-			[illegible]	5,182	2,560
4b.2.2	Asbestos Removal Program		28	13		1	195	-	58	290	[illegible]			500	500	-			9,150	940	-
4b.2	Subtotal Period 4b Additional Costs	52			8	1	1,095	1,338	527	3,142	[illegible]	2,848	-	500	4,416	-			[illegible]	[illegible]	2,560
Period 4b Collateral Costs																					
4b.3.1	Process liquid waste	8		8	9		47		18	91	-			-	-	161	-	-	20,278	32	
4b.3.2	Small tool allowance		194						29	223	223					-	-				
4b.3.3	Florida LLRW Inspection Fee		-					352	35	388	388					-	-				
4b.3	Subtotal Period 4b Collateral Costs	8	194	8	9		47	352	82	701						161	-		20,278	32	
- -- -	Period-Dependent Costs																				
4b.4.1	Decon supplies	732							183	915	- -										
4b.4.2	Insurance						-	842	84	927	927										
4b.4.3	Property taxes							1,805	181	1,986	1,986										
4b.4.4	Health physics supplies		[illegible]						409	2,043	2,043										
4b.4.5	Heavy equipment rental		[illegible]						397	3,045	3,045										
4b.4.6	Disposal of DAW generated			83	67		475	-	137	763	763				5,660	-			113,414	1,390	
4b.4.7	Plant energy budget						-	1,398	210	1,608	1,608			-	-	-					
4b.4.8	NRC Fees						-	530	53	583	583										
- - -	Utility Site Indirect						-	2,504	376	2,879	2,879										
4b.4.10	Radwaste Processing Equipment/Services						-	600	90	690	690										
4b.4.11	Security Staff Cost							[illegible]	290	2,225	2,225	-	-	-	-	-	-	-			[illegible]
4b.4.12	DOC Staff Cost					-	-	18,027	2,704	20,731	20,731	-	-	-	-	-	-	-			246,531
4b.4.13	Utility Staff Cost					-	-	18,618	2,793	21,412	21,412	-	-	-	-	-	-	-			397,655
	Subtotal Period 4b Period-Dependent Costs	732	4,280	83	67	-	475	46,261	7,906	59,807		-	-	-	5,660	-	-	-	113,414	1,390	
4b.0	TOTAL PERIOD 4b COST	2,538	15,225	556	1,131	14,107	4,305	47,952	14,958	100,777	96,950	2,848	978	154,747	26,743	161	-	-	8,050,990	354,655	724,424
PERIOD 4e - License Termination																					
Period 4e Direct Decommissioning Activities																					
4e.1.1	ORISE confirmatory survey							119	36	155	155										
4e.1.2	Terminate license																				
4e.1	Subtotal Period 4e Activity Costs							119	36	155	155										
Period 4e Additional Costs																					
4e.2.1	License Termination Survey							[illegible]	1,680	7,281	7,281									147,228	-
4e.2	Subtotal Period 4e Additional Costs							[illegible]	1,680	7,281	7,281									147,228	-
Period 4e Collateral Costs																					
4e.3.1	DOC staff relocation expenses							1,155	173	1,328	[illegible]										
4e.3.2	Florida LLRW Inspection Fee							1	-	1	1										
4e.3	Subtotal Period 4e Collateral Costs							1,156	173	1,328											

Table D
Crystal River Nuclear Plant, Unit 3
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Activity Index	Activity Description	Decon Cost	Removal Cost	Packaging Costs	Transport Costs	Off-Site Processing Costs	LLRW Disposal Costs	Other Costs	Total Contingency	Total Costs	NRC Lic. Term. Costs	Spent Fuel Management Costs	Site Restoration Costs	Processed Volume Cu. Feet	Burial Volumes Class A Cu. Feet	Class B Cu. Feet	Class C Cu. Feet	GTCC Cu. Feet	Burial / Processed Wt., Lbs.	Craft Manhours	Utility and Contractor Manhours
Period 4e Period-Dependent Costs																					
4e.4.1	Insurance													-	-	-					
4e.4.2	Property taxes							757	76	833	---			-	-	-					
4e.4.3	Health physics supplies		700						175	875	875			-	-	-					
4e.4.4	Disposal of DAW generated			4	4	-	25		7	41	41			-	304	-		-	6,083	75	
4e.4.5	Plant energy budget							---	26	199	199			-	-	-					
4e.4.6	NRC Fees							246	25	270	270			-	-	-					
4e.4.7	Utility Site Indirect							650	98	748	748										
4e.4.8	Security Staff Cost								53	404											-----
4e.4.9	DOC Staff Cost							-----	660	5,082	-----										57,149
4e.4.10	Utility Staff Cost							3,854	548	4,202	4,202										72,414
4e.4	Subtotal Period 4e Period-Dependent Costs		700	4	4	-	25		1,987	12,835					304			-	6,083	75	
4e.0	TOTAL PERIOD 4e COST		700	4	4	-	25	17,110	3,557	21,400	21,400				304			-	6,083	147,303	143,854
PERIOD 4 TOTALS		2,804	34,480	8,003	4,348	21,832	27,722	99,724	40,853	239,546	233,909	2,848	2,789	226,666	75,852	3,041	527	524	15,896,800	730,749	1,419,933
PERIOD 5b - Site Restoration																					
Period 5b Direct Decommissioning Activities																					
Demolition of Remaining Site Buildings																					
5b.1.1.1	Reactor		-----						442	3,388				-	-	-				50,955	
5b.1.1.2	Auxiliary Building		1,205						181	1,390		-	1,390							22,812	
-----	Control Complex		521						78	599		-	599							-----	
5b.1.1.4	Diesel Generator Bldg								33	254		-	254							4,527	
5b.1.1.5	EFW Pump Building		87						13	100		-	100							1,711	
5b.1.1.6	Fire Pumphouse		---						2	13		-	13							315	
	Fuel Handling Area (Aux Bldg)		756						113	869		-	869							13,690	
5b.1.1.8	Intake & Discharge Structures		298						45	343		-	343							8,177	
-----	Intermediate Bldg								79	602		-	602							5,866	
5b.1.1.10	Machine Shop - Cold		---						10	77		-	77							1,706	
5b.1.1.11	Machine Shop - Hot		64						10	73		-	73							1,630	
5b.1.1.12	Maintenance Support Bldg			-					6	46		-	46							1,077	
5b.1.1.13	Misc Yard Structures & Foundations		-----	-					154	1,183		-	1,183							-----	
5b.1.1.14	Outage Support Bldg		15	-					2	17		-	17							---	
5b.1.1.15	RWCH Storage Building		52	-					8	58		-	58							1,090	
5b.1.1.16	Rad Materials Storage & Processing Bldg								4	30		-	30							445	
	Rusty Bldg								38	291		-	291							6,338	
5b.1.1.18	Turbine Building		2,054			-	-		308	2,362		-	2,362	-	-	-				43,581	
-----	Turbine Pedestal		306			-	-		46	352		-	352	-	-	-				4,730	
5b.1.1.20	Warehouse Bldg (Maint) Mezzanine					-	-		18	143		-	143	-	-	-				3,146	
	Totals		10,600			-	-		1,591	12,194		-	12,194	-	-	-					
Site Closeout Activities																					
5b.1.2	Remove Rubble	-	----			-	-		200	1,531		-	-----	-	-	-				2,026	
5b.1.3	Grade & landscape site	-	108			-	-		16	125		-	125	-	-	-				316	
5b.1.4	Final report to NRC	-	-			-	-	---	25	190	190	-	-	-	-	-				-	-----
5b.1	Subtotal Period 5b Activity Costs	-	12,043			-	-	---	1,831	14,039	190	-	13,850	-	-	-				194,629	-----
Period 5b Additional Costs																					
5b.2.1	Intake & Discharge Structure Cofferdam		---	-		-	-		52	400			400	-	-	-				---	
5b.2.2	ISFSI Demolition		797	-		-	-	---	205	1,040		1,040		-	-	-				2,844	160
5b.2.3	Concrete Crushing		364	-		-	-	7	55	426			---	-	-	-					
5b.2.4	Final Range Closure					-	-		98	750		-	750	-	-	-					
5b.2	Subtotal Period 5b Additional Costs		2,161			-	-	45	410	2,616		1,040	1,576	-	-	-				9,939	160

Table D
Crystal River Nuclear Plant, Unit 3
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Period 5b Collateral Costs																					
5b.3.1	Small tool allowance	-	110						17	127											
5b.3	Subtotal Period 5b Collateral Costs	-	110						17	127											
Period 5b Period-Dependent Costs																					
5b.4.1	Insurance																				
5b.4.2	Property taxes							589	59	647											
5b.4.3	Heavy equipment rental	-	3,791					-	569	4,360			4,360								
5b.4.4	Plant energy budget							195	29	224											
5b.4.5	Utility Site Indirect							457	69	525	525										
5b.4.6	Security Staff Cost							791	119	909											
5b.4.7	DOC Staff Cost							10,886	1,633	12,519			12,519								139,268
5b.4.8	Utility Staff Cost							4,810	721	5,531			5,531								89,906
5b.4	Subtotal Period 5b Period-Dependent Costs	-	3,791					17,726	3,198	24,716	525										
5b.0	TOTAL PERIOD 5b COST	-	18,106					17,936	5,456	41,498	715	1,040	39,743	-	-	-	-	-	-	204,268	262,623
PERIOD 5 TOTALS		-	18,106					17,936	5,456	41,498	715	1,040	39,743	-	-	-	-	-	-	204,268	262,623
TOTAL COST TO DECOMMISSION		6,884	59,331	8,445	5,128	21,856	30,875	554,890	110,311	797,720	602,935	150,914	43,870	227,162	191,385	4,884	527	524	18,138,130	1,010,020	6,102,702

TOTAL COST TO DECOMMISSION WITH 16.85% CONTINGENCY:	**$797,720**	**thousands of 2005 dollars**
TOTAL NRC LICENSE TERMINATION COST IS 75.58% OR:	**$602,935**	**thousands of 2005 dollars**
SPENT FUEL MANAGEMENT COST IS 18.92% OR:	**$150,914**	**thousands of 2005 dollars**
NON-NUCLEAR DEMOLITION COST IS 5.5% OR:	**$43,870**	**thousands of 2005 dollars**
TOTAL PRIMARY SITE RADWASTE VOLUME BURIED:	**186,797**	**cubic feet**
TOTAL GREATER THAN CLASS C RADWASTE VOLUME GENERATED:	**524**	**cubic feet**
TOTAL SCRAP METAL REMOVED:	**37,765**	**tons**
TOTAL CRAFT LABOR REQUIREMENTS:	**1,010,020**	**man-hours**

End Notes
n/a - indicates that this activity not charged as decommissioning expense.
s - 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

Section 8

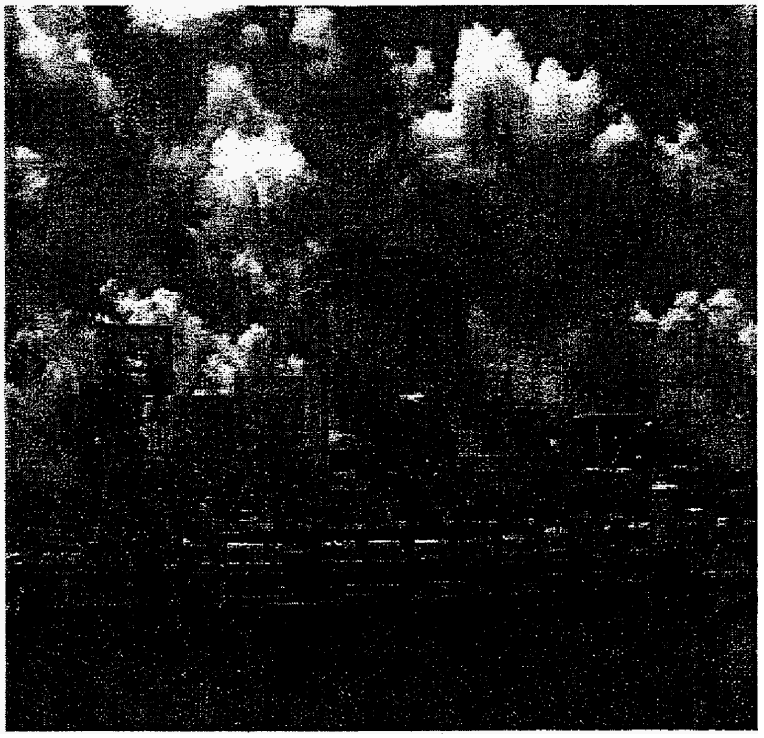
Comparative Analysis of Cost Studies

1999 - 2005 Cost Study

COMPARISON REPORT 1999 - 2005

for the

CRYSTAL RIVER NUCLEAR PLANT, UNIT 3



prepared for

Progress Energy Service Company, LLC

prepared by

TLG Services, Inc.
Bridgewater, Connecticut

April 2005

APPROVALS

Project Manager	William A. Cloutier, Jr.	04/12/05
	William A. Cloutier, Jr.	**Date**
Project Engineer	Thomas J. Garrett	04/12/05
	Thomas J. Garrett	**Date**
Technical Manager	Francis W. Seymore	4/12/05
	Francis W. Seymore	**Date**
Quality Assurance Manager	T Laguardia for TLW	
	Thomas L. Williamson	**Date**

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TABLES

REVISION LOG

No.	CRA No.	Date	Item Revised	Reason for Revision
0		04-12-2005		Original Issue

SUMMARY

This document provides comparative discussion on the decommissioning cost estimate prepared for the Crystal River Nuclear Plant, Unit 3 (Crystal River) in 1999-2000 and the estimate most recently updated in 2005 by TLG Services, Inc. (TLG). The 2005 analysis was prepared with the benefit of additional experience gained both from fieldwork in actual decommissioning programs and from plant-related decommissioning activities such as outages, retrofits, and change-out programs.

The 2005, or current estimate, was developed using the basic inventory and plant design information from the 1999-2000 or previous cost model. The data, estimating assumptions and site-specific considerations were reviewed for the 2005 analysis. The cost model was modified where new information was available, updated site-specific information was obtained from the client, or experience from ongoing decommissioning programs justified such changes.

Overall, the estimate to decommission Crystal River increased approximately 35% over the six-year period (1999-2005 financial years). As can be seen in Table 1, the increase in the cost is primarily associated with program management ($129.0 million) and spent fuel storage ($41.8 million). A decrease in low-level radioactive waste management ($18.1 million) was realized by using a lower-cost disposal site.

The rationale for specific changes in several major cost centers is discussed in more detail within the following narrative. Comparisons are focused on permutations in the technical work scope and modifications to assumptions that have affected the cost of decommissioning (inflationary effects are generally ignored for purposes of this analysis).

COMPARATIVE ANALYSIS

TLG completed a decommissioning cost analysis for Crystal River in 2000. The analysis provided Florida Power Corporation, the previous owner and operator of the plant, with the projected costs (in 1999 dollars) to completely decontaminate and dismantle its nuclear facility following the normal cessation of plant operations. For purposes of this comparison, this analysis is referred to as the 1999 estimate or analysis.

In 2005, TLG updated the cost analysis for Progress Energy Service Company (Progress Energy). The current analysis uses the physical plant inventory and design information from the previous analysis. This data was reviewed, along with the assumptions and other site-specific considerations, and modified or updated where new information was available or experience from ongoing decommissioning programs justified such changes.

Generally, escalation of the various cost components in a decommissioning analysis (with the exception of those costs associated with radioactive waste disposal), follows "standard" cost indices. However, such indices can only be applied successfully to a static model, i.e., where the bases against which the indices are applied have not undergone significant change. In the period between the last two analyses (the 1999 and 2005 financial years), new cost elements have been added and older cost elements revised. With this in mind, the following discussion encompasses the major areas of difference between the two estimates.

In 2000, the estimate to promptly decommissioning Crystal River was estimated at approximately $493.9 million (in 1999 dollars). The comparable cost in 2005 is $668.7 million (in 2005 dollars). Areas of change in the two estimates are shown in Table 1. The cost centers identified in the table were extracted from TLG documents F01-1342-002 "Decommissioning Cost Study for the Crystal River Plant - Unit 3," issued in November 2000 and P23-1518-002 issued in March 2005.

The overall decommissioning scope of the current cost estimate has not significantly changed from that presented in 1999. As described earlier, the majority of the 35% increase in the cost over the six-year period can be attributed to corresponding increases in the cost centers associated with program management and spent fuel storage. While the scope may not have changed, there are differences in the base assumptions between the two studies. These differences are identified in the discussion of the following cost elements.

1. Spent Fuel Storage (ISFSI Related)

For purposes of generating a comprehensive post-shutdown cost, spent fuel generated over the operating life of Crystal River is assumed to be stored at the site until the DOE can complete the transfer of assemblies to its geologic repository. The projected storage period is based upon the latest information available from the DOE at the time the cost model was assembled, operating data for the nuclear unit, and some historical perspective on this ongoing government program to develop a national waste repository.

The current analysis assumes that the high-level waste repository will initiate operations in 2020, 10 years later than that assumed in the previous analysis. The DOE has also revised the priority and acceptance schedules for commercial fuel in 2004. As such, Progress Energy now predicts that fuel will be in storage at the site until 2052, approximately 15 years longer than projected in the 1999 cost model. While not a direct impact on this cost element (which is primarily capital), the extended duration does increase the cost of several schedule-dependent costs, e.g., staffing, security, taxes, fees and other site operating costs.

In the 2005 analysis, the design and capacity of the ISFSI was based upon a NUHOMS horizontal storage system, with a 32 fuel assembly canister capacity. By comparison, the earlier analysis assumed a vertical cask storage system with a 24 fuel assembly canister capacity. While there are differences in the capital costs for the units, and the number of units required (due to differences in capacity and the fuel acceptance schedule), the total capital costs projected in the two estimates are similar, in part due to differences in the allocation of design, licensing and construction costs.

The process to load the spent fuel storage canisters, seal, drain and dry the canisters, and place the canisters into a transfer or transport cask, however, was not defined in the 1999 cost model. The activities were assumed to be performed by the staff at no additional cost to the project. Subsequent experience at sites involved in building and operating independent dry fuel storage facilities has provided useful information on the additional costs incurred in accomplishing these tasks. As such, the 2005 cost model includes separately identified additional costs for the handling and packaging activities, as well as the operation of the spent fuel pool during the transfer process. Approximately, one-half of the $42 million increase in this category is attributable to the handling and transfer activities. A transfer cost for each spent fuel canister of $200,000, with a closure cost of $100,000, was allocated in the current analyses for the transfer of fuel from the pool to the ISFSI or to

the DOE. An additional transfer cost of $100,000 per canister was allocated for transfer of the canisters from the ISFSI to the DOE.

Pool and ISFSI operating costs added another $7.6 million to the 2005 spent fuel expenditure. Additionally, the current study assigns the license fees and emergency planning fees to this line item, for a total of $13.7 million over the total duration of the project.

2. Off-Site Waste Processing

The unit cost to process and condition waste at a centralized, off-site facility increased in the 2005 study. However, the disposition of the plant inventory was reevaluated so that the overall change in this cost element was not significant. In particular, the main turbine, which had previously been sent off-site for processing was disassembled on-site in the 2005 cost model, with a majority of the component's mass free-released. With a lower cost of direct disposal, the spent fuel racks were shipped for direct disposal in the 2005 cost model rather than designated for processing. Off-setting these savings in processing is a general increase in the number of plant systems routed for conditioning and treatment in the 2005 estimate. The overall impact of the changes in the waste management model on the cost, as reported in Table 1, is a 1.4% decrease from the expenditure reported in 1999.

3. Low-Level Radioactive Waste Disposal

For estimating purposes, and as a proxy for future disposal facilities, waste disposal costs are estimated using rates charged by the currently operating facilities, e.g., at Barnwell, South Carolina and the Envirocare facility in Utah.

The 1999 cost model assumed that the majority of material requiring controlled disposal would be sent to the Barnwell facility. Only a limited amount of material, e.g., concrete debris, was sent to the Envirocare site. A disposal rate of $4.40 per pound (or approximately $374 per cubic foot) was used for disposal at Barnwell.

The equivalent rate in the 2005 cost model for the Barnwell facility is $5.20 per pound (or approximately $448 per cubic foot). This increase, however, has been off-set by using the lower cost Envirocare facility for disposal of a majority of the decommissioning waste stream. In the 2005 cost model, the Barnwell rates are only used for the more highly radioactive waste (10 CFR §61 Class B and C) that cannot be currently disposed of at Envirocare. As such, all of the Class A material requiring controlled disposal is buried at Envirocare at a unit cost of $198 per cubic foot, including containerized waste and other large

components, e.g., steam generators, reactor coolant pump motors, miscellaneous steel, metal siding, scaffolding, and structural steel. This change in the waste management model has produced an $18.1 million or 25% reduction in the 2005 cost component for low-level radioactive disposal.

4. Taxes

Property tax information included within the 1999 estimate reflected a continuing, although annually decreasing, tax obligation over the life of the decommissioning program. The tax model was updated by Progress Energy for use in the 2005 estimate, with taxes on existing plant structures and equipment reduced over the phase in which they are removed. Taxes were added on new construction/capital improvement; for example, dry storage canisters, and were assessed on an annual basis over the storage period. The changes in the tax model resulted in a decrease of $2.0 million from the 1999 cost model.

5. Spent Fuel Pool Isolation

Costs to isolate the spent fuel pool were updated in the 2005 cost model. The isolation cost includes the engineering, facility modifications, and the capital improvements necessary to segregate the pool area and reduce the protected boundary, so that decommissioning operations can proceed expeditiously. The 2005 value for this cost element increase $2.2 million from the 1999 analysis.

6. Energy

The decrease in energy costs is attributable to a revision in the methodology in calculating energy consumption. Actual usage data, provided from ongoing decommissioning projects, was used to project a similar consumption model for Crystal River. The slight increase in electrical purchase price from the previous analysis was offset by the lower usage projection.

7. Site Characterization and License Termination Surveys

Survey costs increased commensurate with the increase in labor. However, savings were realized in the license termination survey due to greater assumed efficiencies in the performance of exterior surveys and less expensive sample testing, which was performed by an off-site laboratory in the 1999 analysis.

8. Other (Mixed Waste)

The expenditure identified in the 1999 study as "Other" costs was associated with the disposition of mixed waste. The current analysis redistributes the costs into the categories of removal, transportation burial and waste processing.

9. Insurance

The application of nuclear and property insurance premiums during decommissioning was revised in the 2005 cost model to conform with the proposed NRC guidance on "minimum" insurance coverage during decommissioning. The overall effect of the proposed NRC guidance was to increase the monthly insurance costs during the early phases of decommissioning, and lower them during the latter stages of the project. The net effect was an increase of $11.9 million in the 2005 cost element.

10. Transportation

The increase in transportation costs is primarily attributed to the associated increase in mileage for waste disposal, i.e., from Barnwell, South Carolina to Clive, Utah. The general increase in transportation tariffs over the six year period also was a contributor.

11. Decontamination, Packaging, and Misc. Equipment & Supplies

The decrease in the decontamination cost as report in the 2005 cost model is a result of more material (from plant systems) being sent to an off-site processing center as opposed to being treated on site (as was assumed in the 1999 cost model). Packaging costs increased in 2005, in part, due to the reallocation of GTCC cask costs from ISFSI capital in 1999 to the 2005 packaging element. The costs reported for the category "Misc. Equipment and Supplies" increased, consistent with a general increase the cost of materials over the six year period.

12. NRC and EP Fees

The 2005 study includes only NRC fees in this cost center, which have increased from $2.1 million to $2.4 million due to a restructured NRC fee schedule.

ISFSI and Emergency Planning Fees, which were included in this category in the 1999 analysis, have been reassigned to the ISFSI Related cost center in the 2005 study.

13. Removal

Craft labor is used to decontaminate, remove, and package the plant inventory, as well as to support the dismantling and demolition of the physical structures. The rates for craft, used as a basis for the 2005 estimate, increased on an average of 21% from the values used in the 1999 analysis. The increase in craft labor rates offset any decrease in craft hours created by productivity improvements and reduced removal costs associated with the use of an off site waste processor. The net result is an increase of $8.3 million.

14. Program Management (Staffing)

The increase in the cost of program management is primarily due to a corresponding increase in the size of the organization designated to manage/ oversee the decommissioning project. The increase is particularly significant during the preparation phase with approximately 69 more utility staff on the 2005 staff during the initial phase and 14 additional Decommissioning Operations Contractor (DOC) staff added to the organization.

The decision to increase the organization for the 2005 analyses was based upon several factors, including current field experience at facilities undergoing decommissioning. In addition, the previous analyses assumed an instantaneous reduction of the operating organization immediately following the cessation of plant operations. However, during this transitional period, a majority of the plant systems will remain operational. Preparations for decommissioning will still require many of the other plant services to be functional and the support of a significant portion of the current workforce. Preparations also include the drain-down of non-essential plant systems, processing of operating inventories, decontamination of the selected plant systems to reduce working area dose rates, remediation of any hazardous and toxic wastes, as well as a detailed characterization of the plant facilities and surrounding environs. Therefore, the reduction of plant personnel is more gradual in 2005 analysis during this period.

The transition or preparations phase is approximately 18 months in duration. The owner is expected to have deactivated and reconfigured the non-essential portions of the facility during this time period in preparation for the start of the physical dismantling phase. The engineering will need to

be completed to support the major technical activities, e.g., segmentation of the reactor vessel internals and disposition of the large components. Therefore, significant resources must be committed to the oversight of the engineering and planning, as well as to the support services such as licensing, quality assurance, radiation protection, as well as procurement services.

During the active decommissioning phases, revisions in personnel levels are generally due to resources that have been added as a result of experience from active decommissioning projects. Utility staffing and DOC staffing levels during Period 2 large component removal and decontamination activities have increased, reflective of industry experience. Overall project management staffing level has increased by approximately 38%. In addition to the increase in the number of personnel, salaries increased by approximately 24%.

The extended spent fuel storage period; an increase of approximately 15 years also contributed to increase in the staffing costs.

TABLE 1
COST COMPARISON
1999 vs. 2005

Cost Center	1999 ($1000s)	2005 ($1000s)	Delta ($1000s)	% Change	Annual Change
Spent Fuel Pool	7,699	9,900	2,201	28.6	4.3
Site Characterization	1,245	1,733	488	39.2	5.7
Engineering	12,772	16,281	3,509	27.5	4.1
Decontamination	12,546	11,789	-757	-6.0	-1.0
Removal	68,079	76,389	8,310	12.2	1.9
Packaging	6,359	13,698	7,339	115.4	13.6
Transportation	5,841	6,564	723	12.4	2.0
Waste Processing	22,228	21,925	-303	-1.4	-0.2
LLRW Disposal	72,306	54,233	-18,073	-25.0	-4.7
Staffing	153,685	282,658	128,974	83.9	10.7
Taxes	31,232	29,196	-2,036	-6.5	-1.1
Energy	9,728	8,972	-756	-7.8	-1.3
Insurance	8,087	19,959	11,872	146.8	16.2
ISFSI Related	57,436	99,208	41,772	72.7	9.5
NRC and EP Fees	7,744	2,414	-5,330	-68.8	-17.7
License Termination Survey	7,624	7,437	-187	-2.5	-0.4
Misc. Equip & Supplies	4,480	6,310	1,830	40.9	5.9
Other [1]	4,848	0	-4,848		
Total [2]	493,940	668,668	174,728	35.4	6.2

[1] Hazardous/mixed waste disposal in the 1999 study (redistributed in 2005)
[2] Columns may not add due to rounding

CONCLUSION

The largest differential in the costs reported to decommission Crystal River in 1999 and 2005 were in the area of Staffing (+$129 million), ISFSI Related (+41.8 million), LLRW Disposal (-$18.1 million), Insurance (+$11.9 million), Removal (+$8.3 million), and Packaging (+$7.3 million). Staffing increased as a result of an increase in the size of the organization designated to manage/oversee the decommissioning project, an increase in salaries and other compensation, and the longer fuel storage schedule. Additional cost elements contributed to the reported increase in the "ISFSI Related" such as cask transfer and closure costs that were not specifically identified in 1999. Low-level radioactive waste disposal decreased in the 2005 with the use of a lower costs disposal site, i.e., the Envirocare facility. Insurance costs increased in accordance with the proposed NRC guidance on "minimum" insurance coverage during decommissioning. Removal costs were most affected by an increase in craft labor rates. Packaging costs increased with the reassignment of GTCC canister costs in the 2005 cost model (from ISFSI capital in 1999). Overall, the cost increased 35% over the six year period or approximately 6.2% per year.