
Report on Waste Burial Charges

Escalation of Decommissioning Waste Disposal
Costs at Low-Level Waste Burial Facilities

U.S. Nuclear Regulatory Commission

Office of Nuclear Regulatory Research



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NUREG-1307
Revision 1

Report on Waste Burial Charges

Escalation of Decommissioning Waste Disposal
Costs at Low-Level Waste Burial Facilities

Manuscript Completed: August 1989
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**Division of Engineering
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
Washington, DC 20555**



ABSTRACT

One of the requirements placed upon nuclear power reactor licensees by the U.S. Nuclear Regulatory Commission (NRC) is for the licensees to periodically adjust the estimate of the cost of decommissioning their plant, in dollars of the current year, as part of the process to provide reasonable assurance that adequate funds for decommissioning will be available when needed. This report, which is scheduled to be revised annually, contains the development of a formula for escalating decommissioning cost estimates that is acceptable to the NRC. The sources of information to be used in the escalation formula are identified, and the values developed for the escalation of radioactive waste burial costs, by site and by year, are given in this report. The licensees may use the formula, the coefficients, and the burial escalation factors from this report in their escalation analysis, or may use an escalation rate at least equal to the escalation approach presented herein.

This first revision of NUREG-1307 contains corrected spreadsheets on the disposal costs for the reference PWR and BWR in Appendix B and the revised ratios of disposal costs at the Washington, Nevada, and Barnwell sites for the years 1986 and 1988, superceding the values given in the July 1988 issue of this report.

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1.0 INTRODUCTION

One of the requirements placed upon nuclear power reactor licensees by the U.S. Nuclear Regulatory Commission (NRC) is for the licensees to periodically adjust the estimate of the cost of decommissioning their plant, in dollars of the current year, as part of the process to provide reasonable assurance that adequate funds for decommissioning will be available when needed. This report, which is scheduled to be revised annually, contains the development of a formula for escalating decommissioning cost estimates that is acceptable to the NRC. The sources of information to be used in the escalation formula are identified, and the values developed for the escalation of radioactive waste burial costs, by site and by year, are given in this report. The licensees may use the formula, the coefficients, and the burial escalation factors from this report in their escalation analysis, or may use an escalation rate at least equal to the escalation approach presented herein.

The formula and its coefficients, together with guidance to the appropriate sources of data, are summarized in Chapter 2. The development of the formula and its coefficients are presented in Chapter 3. Price schedules for burial for the year of issue of this report are given in Appendix A, for currently operating burial sites. The calculations performed to determine the burial cost escalation factors, B_x , for each site for the year 1988 are summarized in Appendix B.

2.0 SUMMARY

The elements of decommissioning cost are assigned to three categories: those that will escalate proportional to labor costs, L_x ; those that escalate proportional to energy costs, E_x ; and those that escalate proportional to burial costs, B_x . Then, the escalation of the total decommissioning cost estimate can be expressed by

$$\text{Estimated Cost (Year X)} = [1986 \$ \text{ Cost}] [A L_x + B E_x + C B_x]$$

where A, B, and C are the fractions of the total 1986 \$ costs that are attributable to labor (0.65), energy (0.13), and burial (0.22), respectively, and sum to 1.0. The factors L_x , E_x , and B_x are defined by

L_x = labor cost escalation, January of 1986 to January of Year X,

E_x = energy cost escalation, January of 1986 to January of Year X, and

B_x = burial cost escalation, January of 1986 to January of Year X, i.e.,
burial cost in January of Year X / burial cost in January of 1986.

Evaluation of L_x and E_x for the years subsequent to 1986 is to be performed by the licensees, based on the national consumer price indices and on local conditions for a given site (see Section 3). Evaluation of B_x is accomplished by recalculating the costs of burial of the radioactive wastes from the reference PWR(1) and the reference BWR(2), based on the price schedules issued by the available burial sites for the year of interest. The results of these recalculations (B_x) are presented in Table 2.1, by site and by year.

TABLE 2.1. Values of B_x as a Function of Burial Site and Year
Values of B_x (PWR/BWR)

<u>YEAR</u>	<u>WASHINGTON</u>	<u>NEVADA</u>	<u>SO. CAROLINA</u>
1986	1.000/1.000	0.857/0.898	1.703/1.563
1988	1.183/1.142	1.140/1.125	2.007/1.814

The values presented in the above table are developed in Appendix B, with all values normalized to the Washington (PWR/BWR) values.

3.0 DEVELOPMENT OF COST ESCALATION FORMULA

In the years since the initial studies were completed for decommissioning a reference PWR⁽³⁾ and a reference BWR⁽⁴⁾ power station, a number of updates were prepared in which the estimated costs were adjusted for escalation in the various cost elements. As a result of these analyses, it became apparent that the cost elements could be separated into three categories: those that escalate proportional to labor costs; those that escalate proportional to energy costs; and those that escalate proportional to burial costs. Thus, it was possible to write a relatively simple equation that could be used to estimate the cost of decommissioning at some future time, given a cost estimate in present year dollars and the fractional escalation of these three categories of cost over the time period of interest. That equation is:

$$\text{Estimated Cost (Year X)} = [1986 \$ \text{ Cost}] [A L_x + B E_x + C B_x]$$

where A, B, and C are the fractions of the total 1986 \$ cost that are attributable to labor (0.65), energy (0.13), and burial (0.22), respectively, and sum to 1.0. Evaluation of these factors for the 1986 \$ cost, are contained in Appendix B. The factors L_x , E_x , and B_x are defined below.

L_x = labor cost escalation, January of 1986 to January of year X

E_x = energy cost escalation, January of 1986 to January of year X

B_x = burial cost escalation, January of 1986 to January of year X, i.e.,
burial cost in January of year X / burial cost in January of 1986.

Values for L_x and E_x for years subsequent to 1986 are to be based on the national consumer price indices and on local conditions for a given site, as outlined in Sections 3.1 and 3.2. Thus, the licensee can evaluate these parameters appropriately for his particular site. Evaluation of B_x is provided to the licensees via this report.

The evaluations presented in this chapter are based on information presented in NUREG/CR-0130 (Addendum 4)⁽¹⁾, and NUREG/CR-0672 (Addendum 3)⁽²⁾, in which the estimated costs for immediate dismantlement of the reference PWR and BWR are escalated to January, 1986 dollars.

The cost elements for the PWR and the BWR are rearranged into the three categories, labor-related, energy-related, and burial-related, in Tables 6.3 and 5.3 of Addendum 4 and 3, respectively, and are combined for presentation in Table 3.1.

TABLE 3.1. Evaluation of the Coefficients A, B, and C, in January 1986 Dollars

Cost Category	Reference PWR Values		Reference BWR Values	
	1986 \$ (million)	Coefficient	1986 \$ (millions)	Coefficient
Labor	17.98	(a)	35.12	(c)
Equipment	1.64	(a)	4.03	(c)
Supplies	3.12	(a)	3.71	(c)
Contractor	12.9	(a)	21.1	(c)
Insurance	1.9	(a)	1.9	(c)
Containers	10.9	(b)	8.14	(d)
Added Staff	7.5	(a)	4.4	(c)
Added Supplies	1.2	(a)	0.2	(c)
Spec. Contractor	0.78	(a)	0.71	(c)
Pre-engineering	7.4	(a)	7.4	(c)
Post TMI backfits	0.9	(a)	0.1	(c)
Surveillance	0.31	(a)	--	
Fees	0.14	(a)	0.14	(c)
Subtotal	<u>66.67</u>	A = 0.64	<u>86.95</u>	A = 0.66
Energy	8.31	(a)	8.84	(c)
Transportation	6.08	(b)	7.54	(d)
Subtotal	<u>14.39</u>	B = 0.14	<u>16.38</u>	0.12
Burial	22.48	(b) C = 0.22	29.98	= 0.22
Total	<u>103.5</u>		<u>133.31</u>	

Note: All costs include a 25% contingency

(a) Table 3.1, NUREG/CR-0130, Addendum 4

(b) Table 6.2, NUREG/CR-0130, Addendum 4

(c) Table 3.1, NUREG/CR-0672, Addendum 3

(d) Table 5.2, NUREG/CR-0672, Addendum 3

Considering the uncertainties and contingencies contained within these numbers, and considering that the values of the coefficients for the PWR and the BWR are so similar, the best estimates of their values are their averages:

$$\bar{A} = 0.65$$

$$\bar{B} = 0.13$$

$$\bar{C} = 0.22$$

for both the PWR and BWR estimates.

3.1 Labor Escalation Factors

The escalation factor for labor, L, can be obtained from "Monthly Labor Review", published by the U.S. Department of Labor Statistics (BLS). Specifically, the appropriate regional data from the table (currently Table 24) entitled "Employment Cost Index, Private Nonfarm Workers", subtitled "Compensation", should be used. L should be escalated from a base value in Table 24 corresponding to the amounts in the decommissioning rule amendments that are in January 1986 dollars. The base values of L from the BLS data corresponding to January 1986 are 130.5, 127.7, 125.0, and 130.1, for the Northeast, South, Midwest, and West regions, respectively. For example, the value of L for December 1987 in the Northeast region is $141.9 \div 130.5 = 1.087$. This value of L could then be used in the equation for a plant in the Northeast region of the U.S.

3.2 Energy Escalation Factors

The escalation factor for energy, E, can be obtained from the "Producer Price Indexes", published by the U.S. Department of Labor Statistics (BLS). Specifically, data from the table (currently Table 6) entitled "Producer Price Indexes for Commodity Groupings and Individual Items" (PPI) should be used. The energy term, E, in the equation is made up of two components, namely electric power, P, and fuel oil, F. Hence, E should be obtained from the BLS data by using the following equations: for the reference PWR, $[0.58P + 0.42F]$; and for the reference BWR, $[0.23P + 0.77F]$. These equations are derived from Table 6.3 of Reference 1 and Table 5.3 of Reference 2. P should be taken from appropriate regional data for industrial power (Commodity code 0543 in Table 6) and F should be taken from data for light fuel oils (Commodity code 0573 in Table 6). As discussed for L in the preceding paragraph, P and F should be escalated from a base value in the BLS table corresponding to the amounts in the decommissioning rule amendments that are in January 1986 dollars. The base values of P from the BLS data corresponding to January 1986 are 105.8, 111.9, 115.3, 115.65, 119.3, 117.4, 111.4, 119.3, and 112.2 for the following regions, respectively: New England, Mid-Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain, and Pacific. The base value of F for January 1986 is 82 (no regional BLS data for PPI is available). Thus, for example, the value of P for July 1988 in the New England region is $93.3 \div 105.8 = 0.88$, and the value of F is $46.9 \div 82 = 0.57$. Thus, the value of E for this example for the reference PWR is given by $E = [0.58 \times 0.88 + 0.42 \times 0.57] = 0.75$.

3.3 Waste Burial Escalation Factors

The escalation factor for waste burial, B, can be taken directly from data on the appropriate burial location as given in Table 2.1 of this report. The base value of B, independent of the burial site location, for January 1986 is 1.0 (this corresponds to the value used in the calculation of the waste burial cost for decommissioning in paragraph 50.75c of the decommissioning rule amendments. For example, the value of B (PWR) in January 1988 for the South Carolina burial site is $2.007 \div 1.0 = 2.007$. This value of B could then be used in the equation for a PWR station.

4.0 REFERENCES

- (1) Technology, Safety and Costs of Decommissioning a Reference Pressurized Water Reactor Power Station - Technical Support for Decommissioning Matters Related to the Final Decommissioning Rule. NUREG/CR-0130 Addendum 4, Pacific Northwest Laboratory for U.S. Nuclear Regulatory Commission, May, 1988.
- (2) Technology, Safety and Costs of Decommissioning a Reference Boiling Water Reactor Power Station - Technical Support for Decommissioning Matters Related to the Final Decommissioning Rule. NUREG/CR-0672 Addendum 3, Pacific Northwest Laboratory for U.S. Nuclear Regulatory Commission, May, 1988.
- (3) Technology, Safety and Costs of Decommissioning a Reference Pressurized Water Reactor Power Station. NUREG/CR-0130, Vols. 1 and 2, Pacific Northwest Laboratory for U.S. Nuclear Regulatory Commission, June, 1978.
- (4) Technology, Safety and Costs of Decommissioning a Reference Boiling Water Reactor Power Station. NUREG/CR-0672, Vols. 1 and 2, Pacific Northwest Laboratory for U.S. Nuclear Regulatory Commission, June, 1980.

APPENDIX A

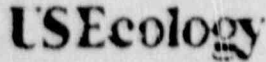
BURIAL SITE PRICE SCHEDULES FOR THE CURRENT YEAR

APPENDIX A

BURIAL SITE PRICE SCHEDULES FOR THE CURRENT YEAR

Contained in this appendix are the price schedules for burial of low level wastes at the Washington, Nevada and South Carolina sites, effective during January of 1988. These schedules are used in the calculations contained in Appendix B to develop the waste burial escalation factor, B_x , for the year 1988.

US ECOLOGY
 WASHINGTON NUCLEAR CENTER
 SCHEDULE OF CHARGES
 RADIOACTIVE WASTE



an American Ecology company

EFFECTIVE: August 17, 1987

1. DISPOSAL CHARGES

A. SOLID MATERIAL

i. Packages 12.0 cu.ft. each or less

<u>R/HR AT CONTAINER SURFACE</u>	<u>PRICE PER CU.FT.</u>
0.00 - 0.20	\$ 29.60
0.201 - 1.00	31.10
1.01 - 2.00	32.25
2.01 - 5.00	33.50
5.01 - 10.00	36.75
10.01 - 20.00	40.00
20.01 - 40.00	45.00
Over 40.00	By Request

ii. Disposal Liners Removed from Shield: (Greater than 12.0 cu.ft. each)

<u>R/HR AT CONTAINER SURFACE</u>	<u>SURCHARGE PER LINER</u>	<u>PRICE PER CU.FT.</u>
0.00 - 0.20	No Charge	\$ 29.60
0.201 - 1.00	\$ 193.50	29.60
1.01 - 2.00	441.00	29.60
2.01 - 5.00	747.00	29.60
5.01 - 10.00	1,192.50	29.60
10.01 - 20.00	1,566.00	29.60
20.01 - 40.00	1,791.00	29.60
Over 40.00	By Request	By Request

B. LIQUID WASTES

1. Aqueous liquids in vials, less than 50 ml. each \$36.54/cu.ft.
2. Aqueous liquids, absorbed \$29.60/cu.ft.

C. BIOLOGICAL WASTE, ANIMAL CARCASSES \$31.46/cu.ft.

(Continued from previous page)

2. SURCHARGE FOR HEAVY OBJECTS:
- | | |
|---|---|
| Less than 10,000 pounds | No Charge |
| 10,001 pounds to capacity of site equipment | \$215.52 plus 10¢ per lb. above 10,000 lbs. per package |
3. SURCHARGE FOR CURIES (Per Load):
- | | |
|----------------------|-------------------------------------|
| Less than 100 curies | No Charge |
| 101 - 300 curies | \$1,569.00 plus 21¢/Ci above 100 Ci |
| 301 - License Limits | By Request |
4. SURCHARGE FOR SPECIAL NUCLEAR MATERIAL (SNM) (Greater than 5 grams per shipment) \$2.83 per gram of Special Nuclear Material by isotope weight
5. MINIMUM CHARGE PER SHIPMENT \$485.00
6. CASK HANDLING FEE: \$550.00 minimum each
7. WASTE CONTAINING CHELATING AGENTS IN AMOUNTS GREATER THAN 0.1% BY WEIGHT AFTER TREATMENT: By Request
8. SOLIDIFIED OILY WASTES REQUIRING SEGREGATION: By Request
9. SURCHARGE FOR NONROUTINE MAN-REM EXPOSURE (DUE TO DESIGN OR PHYSICAL DEFECT OF CONTAINER OR SHIELD): \$29.50 per man millirem
10. DECONTAMINATION SERVICES (If Required) \$96.92 per man hour plus supplies at cost plus 21%
11. CONTAINER VOLUMES:
- | | | |
|-----------------|---|-------------|
| 55-Gallon Drums | - | 7.50 cu.ft. |
| 30-Gallon Drums | - | 4.01 cu.ft. |
| 5-Gallon Drums | - | 0.67 cu.ft. |
12. All waste material shall be properly classified, described, packaged, marked, labeled and certified in accordance with all applicable federal, state and local laws, rules and regulations and shall be in compliance with all license requirements and amendments thereto applicable at the Richland, Washington disposal facility.
13. This Schedule of Charges does not constitute an offer of contract which is capable of being accepted by any party and is subject to change solely upon notice by US Ecology.

Effective August 17, 1987
Washington Nuclear Center

US ECOLOGY
 NEVADA NUCLEAR CENTER
 SCHEDULE OF CHARGES
 RADIOACTIVE WASTE

USEcology

an American Ecology company

EFFECTIVE: January 18, 1988

1. DISPOSAL CHARGES

A. SOLID MATERIAL

i. All Disposal Packages (except those in item A(ii) below):

<u>R/HR AT CONTAINER SURFACE</u>	<u>PRICE PER CU. FT.</u>
0.00 - 0.20	\$28.36
0.201 - 1.00	29.10
1.01 - 2.00	30.60
2.01 - 5.00	31.50
5.01 - 10.00	36.00
10.01 - 20.00	43.85
20.01 - 40.00	51.25
Over 40.00	By Request

ii. Disposal Liners Removed From Shield (Greater Than 12.0 Cu.Ft. Each)

<u>R/HR AT CONTAINER SURFACE</u>	<u>SURCHARGE PER LINER</u>	<u>PRICE PER CU. FT.</u>
0.00 - 0.20	No Charge	\$28.36
0.201 - 1.00	125.00	28.36
1.01 - 2.00	201.60	28.36
2.01 - 5.00	282.60	28.36
5.01 - 10.00	687.60	28.36
10.01 - 20.00	1,394.10	28.36
20.01 - 40.00	2,060.10	28.36
Over 40.00	By Request	By Request

- B. BIOLOGICAL WASTE, ANIMAL CARCASSES \$30.12/cu.ft.
- C. ABSORBED AQUEOUS LIQUIDS \$28.36/cu.ft.
- D. ABSORBED AQUEOUS VIALS \$28.36/cu.ft.

(CONTINUED FROM PREVIOUS PAGE)

2. SURCHARGE FOR HEAVY OBJECTS:

Less than 10,000 pounds	No Charge
10,000 pounds to Capacity of Site Equipment	\$214.00 plus \$.10 per lb. above 10,000 lbs.

3. SURCHARGE FOR CURIES (Per Load)

Less than 100 curies	No Charge
100 - 300 curies	\$1,554.00 plus 20¢/Ci above 100 Ci
301 - License Limits	By Request

4. MINIMUM CHARGE PER SHIPMENT \$485.00

5. CASK HANDLING FEE* \$550.00 minimum each

6. WASTE CONTAINING CHELATING AGENTS IN PACKAGES
AMOUNT GREATER THAN 1% BY WEIGHT: By Request

7. SURCHARGE FOR NON-ROUTINE MAN-REM EXPOSURE
(DUE TO DESIGN OR PHYSICAL DEFECT OF
CONTAINER OR SHIELD) \$29.50 per man millirem

8. DECONTAMINATION SERVICES (If Required) \$106.20 per man hour plus
supplies at cost plus 15%

9. CONTAINER VOLUMES:

55 Gallon Drums - 7.50 cu. ft.
30 Gallon Drums - 4.01 cu. ft.
5 Gallon Drums - 0.67 cu. ft.

10. All waste material shall be properly classified, described, packaged, marked, labeled, and certified in accordance with all applicable Federal, State and Local laws, rules and regulations and shall be in compliance with all license requirements and amendments thereto applicable at the Beatty, Nevada disposal facility.

11. This Schedule of Charges does not constitute an offer of contract which is capable of being accepted by any party and is subject to change solely upon notice by US Ecology.

Effective January 18, 1988
Nevada Nuclear Center



CHEM-NUCLEAR SYSTEMS, INC.

220 Stoneridge Drive • Columbia, South Carolina 29210

BARNWELL LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT FACILITY RATE SCHEDULE

All radwaste material shall be packaged in accordance with Department of Transportation and Nuclear Regulatory Commission Regulations in Title 49 and Title 10 of the Code of Federal Regulations, CNSI's Nuclear Regulatory Commission and South Carolina Radioactive Material Licenses, CNSI's Barnwell Site Disposal Criteria, and amendments thereto.

1. BASE DISPOSAL CHARGES: (Not including Surcharges, Barnwell County Business License Tax, and Cask Handling Fee)

A.	Standard Waste	\$35.32/ft. ³
B.	Biological Waste	\$36.97/ft. ³
C.	Special Nuclear Material (SNM)	\$35.32/ft. ³ plus \$4.50 per Gram SNM

Note: Minimum charge per shipment, excluding Surcharges and specific Other Charges is \$750.00.

2. SURCHARGES:

A. Weight Surcharges (Crane Loads Only)

<u>Weight of Container</u>	<u>Surcharge Per Container</u>
0 - 1,000 lbs.	No Surcharge
1,001 - 5,000 lbs.	\$ 405.00
5,001 - 10,000 lbs.	\$ 710.00
10,001 - 20,000 lbs.	\$1,010.00
20,001 - 30,000 lbs.	\$1,310.00
30,001 - 40,000 lbs.	\$1,915.00
40,001 - 50,000 lbs.	\$2,520.00
greater than 50,000 lbs.	By Special Request

B. Curie Surcharges For Shielded Shipments:

<u>Curie Content Per Shipment</u>	<u>Surcharge Per Shipment</u>
0 - 5	\$ 2,500.00
> 5 - 15	\$ 2,820.00
> 15 - 25	\$ 3,750.00
> 25 - 50	\$ 5,650.00
> 50 - 75	\$ 6,900.00
> 75 - 100	\$ 9,350.00
> 100 - 150	\$11,200.00
> 150 - 250	\$15,000.00
> 250 - 500	\$18,800.00
> 500 - 1,000	\$22,500.00
>1,000 - 5,000	\$30,000.00
>5,000	By Special Request

C. Curie Surcharges for Non-Shielded Shipments Containing Tritium and Carbon 14:

<u>Curie Content Per Shipment</u>	<u>Surcharge Per Shipment</u>
0-100	No Surcharge
greater than 100	By Special Request

D. Special Handling Surcharge may apply on unusually large or bulky containers. These types of containers are acceptable upon approval of prior request.

3. OTHER CHARGES

A. Cask Handling Fee \$1,000.00 per cask, minimum

B. Taxes and Special Funds

1. Extended Care Fund \$ 2.80 per ft.³

2. South Carolina Low-Level
Radioactive Waste Disposal
Tax \$ 6.00 per ft.³

3. Southeast Regional Compact Fee 66¢ per ft.³

4. A 2.4% surcharge is added to each bill to cover Barnwell
County Business License Taxes.

NOTE: ITEMS 3.B. 1, 2, AND 3 ARE INCLUDED IN ITEM 1, BASE DISPOSAL
CHARGES.

4. MISCELLANEOUS:

A. Transport vehicles with additional shielding features may be subject to an additional handling fee which will be provided upon request.

B. Decontamination services (if required): \$100.00 per man-hour plus supplies at current CNSI rate.

C. Customers may be charged for all special services as described in the Barnwell Site Disposal Criteria.

D. Terms of payment are NET 30 DAYS upon presentation of invoices. A service charge per month of 1-1/2% shall be levied on accounts not paid within thirty (30) days.

Miscellaneous (cont.)

- E. Company purchase orders or a written letter of authorization in form and substance acceptable to CNSI shall be received before receipt of radioactive waste material at the Barnwell Disposal Site and shall refer to CNSI's Radioactive Material Licenses, the Barnwell Site Disposal Criteria, and subsequent changes thereto.
- F. All shipments shall receive a CNSI allocation number and conform to the Prior Notification Plan. Additional information may be obtained at (803) 259-3577 or (803) 259-3578.
- G. This Rate Schedule is subject to change and does not constitute an offer of contract which is capable of being accepted by any party.
- H. A charge of \$7,500.00 is applicable to all shipments which require special site set-up for waste disposal.
- I. Class B/C waste received with chelating agents, which requires separation in the trench, may be subject to a surcharge if Stable Class A waste is not available for use in achieving the required separation from other wastes.

APPENDIX B

CALCULATION OF BURIAL COST ESCALATION FACTORS

APPENDIX B

CALCULATION OF BURIAL COST ESCALATION FACTORS

The calculations necessary to determine the costs for burial of the radioactive wastes postulated to result from decommissioning of the reference PWR and BWR are performed using a detailed spreadsheet. The spreadsheet evaluates the burial costs for each of the items originally costed in the reference PWR(3) and BWR(4) decommissioning studies and in the updated costs presented in Addendums 4(1) and 3(2), respectively, to those reports. Those costs are based on the burial price schedule for U.S. Ecology's Washington Nuclear Center, located on the Hanford Site near Richland, Washington.

To account for the differences in burial price schedules between the Washington facility and the facilities in Nevada and South Carolina, the base burial costs for each of those latter sites are also calculated, using the spreadsheet, and are normalized to the costs calculated for the Washington site. In addition, to account for the different mixture and volume of waste associated with the reference BWR, the escalation factors are also calculated for the BWR, which are also normalized to the value for the Washington Nuclear Center. Thus, in the base year (1986), for the Washington site, $B_x = 1.0/1.0$, where (PWR/BWR) is the order of presentation. For the Nevada site, $B_x = 0.857/0.898$, for the South Carolina site $B_x = 1.667/1.560$, as shown in Table 2.1 of the summary.

The spreadsheet calculations, which are too voluminous to present here, are summarized in Tables B.1 through B.6, for the years 1986 and 1988 and for each of the three sites. Recalculation of the costs for burial is based on the same inventory of radioactive wastes as was postulated in the 1986 and 1978-80 analyses. Using the 1988 price schedules for the three sites, and dividing the calculated burial costs at each site by the Washington site burial costs calculated for the year 1986, results in 1988 values for B_x at each of the three sites, as listed in Table 2.1 of the summary.

As other low-level radioactive waste burial sites come into service in the various interstate compacts, values for B_x will be calculated using the price schedules for each of those sites, and will be incorporated into subsequent issues of this report.

TABLE B.1 BURIAL COSTS AT THE WASHINGTON SITE
REFERENCE PWR (1986 DOLLARS)

ACTIVATED MATERIAL	CRANE SURCHARGE	CASK HANDLING	SLINGS (SPECIAL)	CURIE	LINER DOSE RATE	BURIAL CHARGE	DISPOSAL COST
VESSEL WALL	28864	27284	0	56544	106224	94620	313536
VESSEL HEAD & BOTTOM	0	28720	0	0	0	99600	128320
UPPER CORE SUPPORT ASSM	0	2872	0	0	5154	9900	17906
UPPER SUPPORT COLUMN	0	2872	0	0	5154	9900	17906
UPPER CORE BARREL	0	1436	0	2981	6351	4980	15748
UPPER CORE GRID PLATE	0	3590	0	11090	15878	12450	43016
GUIDE TUBES	0	4300	0	0	5345	14940	24593
LOWER CORE BARREL	0	22976	0	155990	101617	79600	360270
THERMAL SHIELDS	0	4300	0	31173	19053	14940	69474
CORE SHROUD	0	2872	0	667474	12702	9900	693000
LOWER GRID PLATE	0	3590	0	107777	15878	12450	139094
LOWER SUPPORT COLUMN	0	718	0	3006	3176	2490	9470
LOWER CORE FORGING	0	7898	0	15772	34931	27390	85991
MISC INTERNALS	0	5744	0	11503	25404	19920	62571
BIO SHIELD CONCRETE	0	0	0	0	0	621504	621504
REACTOR CAVITY LINER	0	0	0	0	0	12749	12749
REACTOR COOLANT PUMPS	65532	0	0	0	0	104500	170112
PRESSURIZER	13054	0	0	0	0	89640	102694
R. Hx, EHx, SUMP PUMP, CAVITY PUMP	0	0	0	0	0	9960	9960
PRESSURIZER RELIEF TANK	1109	0	0	0	0	29800	30989
SAFETY INJECTION ACCUM TANKS	24154	0	0	0	0	99600	123754
STEAM GENERATORS	249417	0	0	0	0	531914	781331
REACTOR COOLANT PIPING	16560	0	0	0	0	82170	90730
REMAINING CONTAM. MATLS	0	0	0	0	0	1309936	1309939
CONTAMINATED MATRL DTHR BLD	0	0	0	0	0	11879040	11879040
FILTER CARTRIDGES	0	4300	0	9322	26663	7844	48137
SPENT RESINS	0	14360	0	35889	55907	49800	155956
COMBUSTIBLE WASTES	0	43000	0	0	0	252113	295193
EVAPORATOR BOTTOMS	0	67492	0	0	64931	234060	366483
TOTAL PWR	398691	248428	0	1108617	504366	15728932	17989034

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TABLE B.1 BURIAL COSTS AT THE WASHINGTON SITE (cont.)
REFERENCE BWR (1986 DOLLARS)

ACTIVATED MATERIAL	CRANE SURCHARGE	CASK HANDLING	SLINGS (SPECIAL)	CURIE	LINER DOSE RATE	BURIAL CHARGE	DISPOSAL COST
STEAM SEPARATOR	0	20104	0	21301	119000	8790	109255
FUEL SUPPORT & PIECES	0	10052	0	0	39135	4407	53594
CONTROL RODS/INCORES	0	5744	0	47074	320000	13197	305015
CONTROL RODS GUIDES	0	0610	0	0	19730	3511	31005
JET PUMPS	0	28720	0	31799	070000	12320	742755
TOP FUEL GUIDES	0	51696	0	100191	1200000	21115	1305003
CORE SUPPORT PLATE	0	22250	0	0	50990	9000	82934
CORE SHROUD	0	100520	0	1392304	1705000	41334	3319210
REACTOR VESSEL WALL	16960	15790	0	0	30100	7047	75900
SAC SHIELD	48560	0	0	0	0	79132	127692
REACT. WATER REC	35071	0	0	0	0	77309	113201
SAC SHIELD	137901	0	0	0	0	272005	410507
OTHER PRIMARY CONTAINMENT	0	0	0	0	0	3109263	3109263
CONTAINM. ATMOSPHERIC	009	0	0	0	0	42200	43094
HIGH PRESSURE CORE SPRAY	4409	0	0	0	0	14940	19429
LOW PRESSURE CORE SPRAY	1394	0	0	0	0	8700	10104
REACTOR BLDG CLOSED COOLING	2603	0	0	0	0	20137	30020
REACTOR CORE ISO COOLING	094	0	0	0	0	11429	12123
RESIDUAL HEAT REMOVAL	12700	0	0	0	0	54531	07291
POOL LINES & RACKS	51514	0	0	0	0	335030	306544
CONTAMINATED CONCRETE	9509	0	0	0	0	301642	391151
OTHER REACTOR BUILDING	0	0	0	0	0	1247739	1247739
TURBINE	127072	0	0	0	0	1236335	1363400
NUCLEAR STEAM CONDENSATE	10432	0	0	0	0	319103	337625
LOW PRESSURE FEEDWATER HEATERS	139000	0	0	0	0	040047	707907
MAIN STEAM	4003	0	0	0	0	02449	07132
MOISTURE SEPARATOR REHEATERS	05052	0	0	0	0	020725	714377
REACTOR FEEDWATER PUMPS	0943	0	0	0	0	170590	179533
HIGH PRESSURE FEEDWATER PUMPS	27554	0	0	0	0	100390	133952
OTHER TG BLDG	0	0	0	0	0	4270040	4270040
RAD WASTE BLDG	0	0	0	0	0	2114702	2114702
REACTOR BLDG	0	45952	0	0	0	272059	310011
TG BLDG	0	30150	0	0	0	104190	214354
RAD WASTE & CONTROL	0	27204	0	0	0	150975	100259
CONCENTRATOR BOTTOMS	0	161500	0	0	153090	500250	075090
OTHER	0	43790	0	0	4911	151090	200590
TOTAL BWR	735500	572240	0	1590700	4404050	16669704	23901094

TABLE B.2 BURIAL COSTS AT THE WASHINGTON SITE
REFERENCE PWR (1988 DOLLARS)

ACTIVATED MATERIAL	CRANE SURCHARGE	CASK HANDLING	SLINGS (SPECIAL)	CURIE	LINER DOSE RATE	BURIAL CHARGE	DISPOSAL COST
VESSEL WALL	29671	45600	0	62710	144400	112480	394861
VESSEL HEAD & BOTTOM	0	22000	0	0	0	118400	148400
UPPER CORE SUPPORT ASSM	0	2200	0	0	4770	11840	18810
UPPER SUPPORT COLUMN	0	2200	0	0	4770	11840	18810
UPPER CORE BARREL	0	2400	0	3300	10000	5920	21620
UPPER CORE GRID PLATE	0	6000	0	12295	25000	14800	58095
GUIDE TUBES	0	3300	0	0	4482	17760	25542
LOWER CORE BARREL	0	38400	0	172599	100000	94720	465719
THERMAL SHIELDS	0	7200	0	34486	30000	17760	89448
CORE SHROUD	0	4800	0	738079	20000	11840	774719
LOWER GRID PLATE	0	6000	0	119178	25000	14800	184978
LOWER SUPPORT COLUMN	0	1200	0	3417	5000	2960	12577
LOWER CORE FORGING	0	13200	0	17495	55000	32560	118255
MISC INTERNALS	0	9600	0	12759	40000	23600	86039
BIO SHIELD CONCRETE	0	0	0	0	0	738816	738816
REACTOR CAVITY LINER	0	0	0	0	0	15155	15155
REACTOR COOLANT PUMPS	65787	0	0	0	0	124320	190107
PRESSURIZER	13224	0	0	0	0	106560	119784
R. Hx, EHx, SUMP PUMP, CAVITY PUMP	0	0	0	0	0	11840	11840
PRESSURIZER RELIEF TANK	1151	0	0	0	0	35520	36671
SAFETY INJECTION ACCUM TANKS	24324	0	0	0	0	118400	142724
STEAM GENERATORS	250097	0	0	0	0	632315	882412
REACTOR COOLANT PIPING	16708	0	0	0	0	97600	114388
REMAINING CONTAM. MATLS	0	0	0	0	0	1557197	1557197
CONTAMINATED MATRL OTHR BLD	0	0	0	0	0	14122219	14122219
FILTER CARTRIDGES	0	3300	0	10338	10522	9324	41484
SPENT RESINS	0	24000	0	39780	34860	59200	187780
COMBUSTIBLE WASTES	0	33000	0	0	0	299700	332700
EVAPORATOR BOTTOMS	0	51700	0	0	63700	278240	393648
TOTAL PWR	400962	276100	0	1226444	675452	18697845	21276804

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TABLE B.2 BURIAL COSTS AT THE WASHINGTON SITE (cont.)
REFERENCE BWR (1988 DOLLARS)

ACTIVATED MATERIAL	CRANE SURCHARGE	CASK HANDLING	SLINGS (SPECIAL)	CURIE	LINER DOSE RATE	BURIAL CHARGE	DISPOSAL COST
STEAM SEPARATOR	0	33600	0	23689	291200	10449	358938
FUEL SUPPORT & PIECES	0	16800	0	0	53200	5239	75239
CONTROL RODS/INCORES	0	9600	0	52074	329000	15888	397362
CONTROL RODS GUIDES	0	6600	0	0	18722	4174	29568
JET PUMPS	0	48000	0	35100	610002	14852	707812
TOP FUEL GUIDES	0	86400	0	117776	1098000	25101	1327277
CORE SUPPORT PLATE	0	17050	0	0	485*6	11514	77110
CORE SHROUD	0	168000	0	1539720	1792000	49136	3548856
REACTOR VESSEL WALL	17435	12100	0	0	34452	8377	72364
SAC SHIELD	48857	0	0	0	0	94869	142926
REACT. WATER REC	35978	0	0	0	0	91997	127974
SAC SHIELD	138788	0	0	0	0	324861	482849
OTHER PRIMARY CONTAINMENT	0	0	0	0	0	3696152	3696152
CONTAINM. ATMOSPHERIC	931	0	0	0	0	50172	51103
HIGH PRESSURE CORE SPRAY	4531	0	0	0	0	17760	22291
LOW PRESSURE CORE SPRAY	1416	0	0	0	0	10449	11864
REACTOR BLDG CLOSED COOLING	2747	0	0	0	0	33448	36195
REACTOR CORE ISO COOLING	716	0	0	0	0	13550	14302
RESIDUAL HEAT REMOVAL	12909	0	0	0	0	64824	77733
POOL LINES & RACKS	51833	0	0	0	0	398268	450101
CONTAMINATED CONCRETE	9848	0	0	0	0	453679	463528
OTHER REACTOR BUILDING	0	0	0	0	0	1483256	1483256
TURBINE	128303	0	0	0	0	1469699	1598002
NUCLEAR STEAM CONDENSATE	18687	0	0	0	0	379442	398129
LOW PRESSURE FEEDWATER HEATERS	140751	0	0	0	0	770370	911121
MAIN STEAM	4747	0	0	0	0	74237	78983
MOISTURE SEPARATOR REHEATERS	86204	0	0	0	0	747430	833604
REACTOR FEEDWATER PUMPS	9155	0	0	0	0	202790	211045
HIGH PRESSURE FEEDWATER PUMPS	27724	0	0	0	0	126481	154205
OTHER TG BLDG	0	0	0	0	0	5076992	5076992
RAD WASTE BLDG	0	0	0	0	0	2513958	2513958
REACTOR BLDG	0	35200	0	0	0	322664	357864
TG BLDG	0	23100	0	0	0	217372	240472
RAD WASTE & CONTROL	0	20900	0	0	0	187607	208507
CONCENTRATOR BOTTOMS	0	123750	0	0	150890	666000	940648
OTHER	0	33650	0	0	3677	180560	217767
TOTAL BWR	741559	634650	0	1768419	4420765	19811621	27377013

TABLE R.3 BURIAL COSTS AT THE NEVADA SITE
REFERENCE PWR (1986 DOLLARS)

ACTIVATED MATERIAL	CRANE SURCHARGE	CASK HANDLING	SLINGS (SPECIAL)	CURIE	LINER DOSE RATE	BURIAL CHARGE	DISPOSAL COST
VESSEL WALL	29613	30172	0	61613	127370	78318	327087
VESSEL HEAD & BOTTOM	0	31760	0	0	0	82440	114200
UPPER CORE SUPPORT ASSM	0	3176	0	0	5441	8244	18061
UPPER SUPPORT COLUMN	0	3176	0	0	5441	8244	18061
UPPER CORE BARREL	0	1580	0	3248	6704	4122	15062
UPPER CORE GRID PLATE	0	3970	0	11950	16759	18305	42992
GUIDE TUBES	0	4764	0	0	5646	12396	22776
LOWER CORE BARREL	0	25408	0	165571	187259	65952	364590
THERMAL SHIELDS	0	4764	0	33144	20111	12366	70385
CORE SHROUD	0	3176	0	705965	13487	8244	730793
LOWER GRID PLATE	0	3970	0	114000	16759	18305	145034
LOWER SUPPORT COLUMN	0	794	0	3304	3352	2061	9511
LOWER CORE FORGING	0	8734	0	17200	36670	22571	65484
MISC INTERNALS	0	6352	0	12549	26615	16488	62204
BIO SHIELD CONCRETE	0	0	0	0	0	514426	514426
REACTOR CAVITY LINER	0	0	0	0	0	10552	10552
REACTOR COOLANT PUMPS	65768	0	0	0	0	96562	152330
PRESSURIZER	13212	0	0	0	0	74196	87408
R. Hx, EHx, SUMP PUMP, CAVITY PUMP	0	0	0	0	0	8244	8244
PRESSURIZER RELIEF TANK	1148	0	0	0	0	24732	25880
SAFETY INJECTION ACCUM TANKS	24312	0	0	0	0	82440	186752
STEAM GENERATORS	250048	0	0	0	0	449271	690319
REACTOR COOLANT PIPING	16698	0	0	0	0	68013	84711
REMAINING CONTAM. MATLS	0	0	0	0	0	1004251	1004251
CONTAMINATED MATRL OTHR BLD	0	0	0	0	0	9833072	9833072
FILTER CARTRIDGES	0	4764	0	10144	20079	6492	49478
SPENT RESINS	0	15880	0	36000	59032	41220	155012
COMBUSTIBLE WASTES	0	47640	0	0	0	200676	268318
EVAPORATOR BOTTOMS	0	74636	0	0	68486	193734	338858
TOTAL PWR	400000	274724	0	1177964	547538	13019007	16420045

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TABLE B.3 BURIAL COSTS AT THE NEVADA SITE (cont.)
REFERENCE BWR (1986 DOLLARS)

ACTIVATED MATERIAL	CRANE SURCHARGE	CASK HANDLING	SLINGS (SPECIAL)	CURIE	LINER DOSE RATE	BURIAL CHARGE	DISPOSAL COST
STEAM SEPARATOR	0	22232	0	23257	291200	7275	343954
FUEL SUPPORT & PIECES	0	11110	0	0	46926	3648	51090
CONTROL RODS/INCORES	0	6352	0	49992	342400	10923	409667
CONTROL RODS GUIDES	0	9528	0	0	20829	2906	33263
JET PUMPS	0	31760	0	34400	600000	10202	756442
TOP FUEL GUIDES	0	57160	0	115747	1224000	17477	1414392
CORE SUPPORT PLATE	0	24614	0	0	53009	8017	65440
CORE SHROUD	0	111160	0	1473360	1792000	34213	3410733
REACTOR VESSEL WALL	17402	17460	0	0	38187	5833	78009
SAC SHIELD	48836	0	0	0	0	65499	114335
REACT. WATER REC	35970	0	0	0	0	64056	100026
SAC SHIELD	130730	0	0	0	0	225638	364369
OTHER PRIMARY CONTAINMENT	0	0	0	0	0	273571	2573571
CONTAINM. ATMOSPHERIC	920	0	0	0	0	34934	35062
HIGH PRESSURE CORE SPRAY	4520	0	0	0	0	12366	16094
LOW PRESSURE CORE SPRAY	1414	0	0	0	0	7275	8609
REACTOR BLDG CLOSED COOLING	2742	0	0	0	0	23209	26031
REACTOR CORE ISO COOLING	714	0	0	0	0	9460	10174
RESIDUAL HEAT REMOVAL	12090	0	0	0	0	45136	50034
POOL LINES & RACKS	51810	0	0	0	0	277300	329110
CONTAMINATED CONCRETE	9824	0	0	0	0	315009	325713
OTHER REACTOR BUILDING	0	0	0	0	0	1032767	1032767
TURBINE	128215	0	0	0	0	1023320	1151543
NUCLEAR STEAM CONDENSATE	10608	0	0	0	0	264200	282060
LOW PRESSURE FEEDWATER HEATERS	140607	0	0	0	0	536396	677003
MAIN STEAM	4742	0	0	0	0	51690	56432
MOISTURE SEPARATOR REHEATERS	86164	0	0	0	0	520403	606567
REACTOR FEEDWATER PUMPS	9140	0	0	0	0	141199	150339
HIGH PRESSURE FEEDWATER PUMPS	27712	0	0	0	0	80067	115779
OTHER TG BLDG	0	0	0	0	0	3535027	3535027
RAD WASTE BLDG	0	0	0	0	0	1750420	1750420
REACTOR BLDG	0	50016	0	0	0	226401	277297
TG BLDG	0	33340	0	0	0	152090	160730
RAD WASTE & CONTROL	0	30172	0	0	0	131954	162126
CONCENTRATOR BOTTOMS	0	170660	0	0	162320	463725	904695
OTHER	0	40434	0	0	5163	125721	179310
TOTAL BWR	741126	632010	0	1696036	4656032	13799100	21520001

TABLE B.4 BURIAL COSTS AT THE NEVADA SITE
REFERENCE PWR (1988 DOLLARS)

ACTIVATED MATERIAL	CRANE SURCHARGE	CASK HANDLING	SLINGS (SPECIAL)	CURTIE	LINER DOSE RATE	BURIAL CHARGE	DISPOSAL COST
VESSEL WALL	29613	45600	0	62710	144400	107768	390092
VESSEL HEAD & BOTTOM	0	22000	0	0	0	113440	135440
UPPER CORE SUPPORT ASSM	0	4800	0	0	7750	11344	18894
UPPER SUPPORT COLUMN	0	4800	0	0	2750	11344	18894
UPPER CORE BARREL	0	2400	0	3306	9000	5672	20378
UPPER CURVE GRID PLATE	0	6000	0	12295	22500	14180	54975
GUIDE TUBES	0	7200	0	0	1695	17016	25912
LOWER CORE BARREL	0	38400	0	172599	144000	90752	445751
THERMAL SHIELDS	0	7200	0	34488	27000	17016	85704
CORE SHROUD	0	4800	0	738079	18000	11344	772223
LOWER GRID PLATE	0	6000	0	119178	22500	14180	161858
LOWER SUPPORT COLUMN	0	1200	0	3417	4500	2836	11953
LOWER CORE FORGING	0	13200	0	17495	49500	31196	111391
MISC INTERNALS	0	9600	0	12759	36000	22688	81047
BIO SHIELD CONCRETE	0	0	0	0	0	707866	707866
REACTOR CAVITY LINER	0	0	0	0	0	14520	14520
REACTOR COOLANT PUMPS	65768	0	0	0	0	119112	184880
PRESSURIZER	13212	0	0	0	0	102096	115308
R. Hx, EHx, SUMP PUMP, CAVITY PUMP	0	0	0	0	0	11344	11344
PRESSURIZER RELIEF TANK	1148	0	0	0	0	34032	35180
SAFETY INJECTION ACCUM TANKS	24312	0	0	0	0	113440	137752
STEAM GENERATORS	250048	0	0	0	0	605626	855874
REACTOR COOLANT PIPING	16598	0	0	0	0	93588	110206
REMAINING CONTAM. MATLS	0	0	0	0	0	1491963	1491963
CONTAMINATED MATL DTHR BLD	0	0	0	0	0	13530613	13530612
FILTER CARTRIDGES	0	7200	0	10338	8467	8933	34938
SPENT RESINS	0	24000	0	39730	65000	56720	185500
COMBUSTIBLE WASTES	0	33000	0	0	0	287145	320145
EVAPORATOR BOTTOMS	0	112800	0	0	60625	266584	440009
TOTAL PWR	400000	350200	0	1226444	618689	17914558	20510690

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TABLE B.4 BURIAL COSTS AT THE NEVADA SITE (cont.)
REFERENCE BWR (1988 DOLLARS)

ACTIVATED MATERIAL	CRANE SURCHARGE	CASK HANDLING	SLINGS (SPECIAL)	CURIE	LINER DOSE RATE	BURIAL CHARGE	DISPOSAL COST
STEAM SEPARATOR	0	33600	0	23689	291200	10011	358500
FUEL SUPPORT & PIECES	0	16800	0	0	53200	6020	75920
CONTROL RODS/INCORES	0	9600	0	52074	342400	15031	419105
CONTROL RODS GUIDES	0	14400	0	0	16729	3999	35120
JET PUMPS	0	48000	0	35100	580000	14038	777100
TOP FUEL GUIDES	0	86400	0	117776	1224000	24049	1452225
CORE SUPPORT PLATE	0	37200	0	0	43217	11032	91440
CORE SHROUD	0	168000	0	1639720	1792000	47078	3546790
REACTOR VESSEL WALL	17402	26400	0	0	30070	6020	82490
SAC SHIELD	48036	0	0	0	0	90120	130904
REACT. WATER REC.	35970	0	0	0	0	86143	124113
SAC SHIELD	138730	0	0	0	0	310485	449210
OTHER PRIMARY CONTAINMENT	0	0	0	0	0	3541313	3541313
CONTAINM. ATMOSPHERIC	928	0	0	0	0	48070	48000
HIGH PRESSURE CORE SPRAY	4520	0	0	0	0	17010	21544
LOW PRESSURE CORE SPRAY	1414	0	0	0	0	10011	71425
REACTOR BLDG. CLOSED COOLING	2742	0	0	0	0	32047	34700
REACTOR CORE ISO COOLING	714	0	0	0	0	13017	13731
RESIDUAL HEAT REMOVAL	12898	0	0	0	0	82100	75097
POSL. LINES & RACKS	51810	0	0	0	0	381504	433394
CONTAMINATED CONCRETE	9824	0	0	0	0	434674	444400
OTHER REACTOR BUILDING	0	0	0	0	0	1421120	1421120
TURBINE	128215	0	0	0	0	1400131	1630340
NUCLEAR STEAM CONDENSATE	18668	0	0	0	0	303547	302215
LOW PRESSURE FEEDWATER HEATERS	140687	0	0	0	0	738097	878785
MAIN STEAM	4742	0	0	0	0	71127	75000
MOISTURE SEPARATION REHEATERS	86164	0	0	0	0	716000	892254
REACTOR FEEDWATER PUMPS	9140	0	0	0	0	194294	203434
HIGH PRESSURE FEEDWATER PUMPS	27712	0	0	0	0	121182	140094
OTHER TG BLDG	0	0	0	0	0	4004307	4004307
RAD WASTE BLDG	0	0	0	0	0	2400043	2400043
REACTOR BLDG	0	35200	0	0	0	300194	341304
TG BLDG	0	23100	0	0	0	200702	220002
RAD WASTE & CONTROL	0	20000	0	0	0	170300	190200
CONCENTRATOR BOTTOMS	0	270000	0	0	143500	630100	1051000
OTHER	0	73200	0	0	2375	172990	248571
TOTAL BWR	741126	862000	0	1768419	4619292	18975009	20957445

TABLE B.5 BURIAL COSTS AT THE SOUTH CAROLINA SITE
REFERENCE PWR (1986 DOLLARS)

ACTIVATED MATERIAL	CRANE SURCHARGE	CASK HANDLING	SLINGS (SPECIAL)	CURIE	LINER DOSE RATE	BURIAL CHARGE	DISPOSAL COST
VESSEL WALL	34500	26000	0	714400	0	106400	861000
VESSEL HEAD & BOTTOM	0	28000	0	0	0	112000	140000
UPPER CORE SUPPORT ASSM	0	2800	0	0	0	11200	14000
UPPER SUPPORT COLUMN	0	2800	0	0	0	11200	14000
UPPER CORE BARREL	0	1400	0	37500	0	5800	44000
UPPER CORE GRID PLATE	0	3500	0	150000	0	14000	157500
GUIDE TUBES	0	4200	0	56100	0	16800	77100
LOWER CORE BARREL	0	22400	0	1824000	0	89600	1936000
THERMAL SHIELDS	0	4200	0	360000	0	16800	361000
CORE SHROUD	0	2800	0	6100000	0	11200	6114000
LOWER GRID PLATE	0	3500	0	1200000	0	14000	1017500
LOWER SUPPORT COLUMN	0	700	0	36500	0	2800	40000
LOWER CORE FORGING	0	7700	0	165000	0	30800	203500
MISC INTERNALS	0	5600	0	120000	0	22400	148000
BIO SHIELD CONCRETE	0	0	0	0	0	698000	698000
REACTOR CAVITY LINER	0	0	0	0	0	14336	14336
REACTOR COOLANT PUMPS	36848	0	0	0	0	117600	154448
PRESSURIZER	9600	0	0	0	0	100000	110400
R. Hx, EHx, SUMP PUMP, CAVITY PUMP	0	0	0	0	0	11200	11200
PRESSURIZER RELIEF TANK	1820	0	0	0	0	33600	35420
SAFETY INJECTION ACCUM TANKS	14620	0	0	0	0	112000	126620
STEAM GENERATORS	134848	0	0	0	0	598136	732984
REACTOR COOLANT PIPING	12705	0	0	0	0	92400	105105
REMAINING CONTAM. MATLS	0	0	0	0	0	1473024	1473024
CONTAMINATED MATRL OTHR BLD	0	0	0	0	0	1320866	1335866
FILTER CARTRIDGES	0	4200	0	135000	0	8820	148020
SPENT RESINS	0	14000	0	600000	0	56000	670000
COMBUSTIBLE WASTES	0	42000	0	0	0	283500	325500
EVAPORATOR BOTTOMS	0	65800	0	0	0	263200	329000
POST TWI-2 ADDITIONS	0	0	0	0	0	43576	43576
SUBTOTAL PWR COSTS	245301	242200	0	11298500	0	18122916	29906717
BARNWELL COUNTY BUSINESS TAX (2.4%)							717009
TOTAL PWR COSTS							30626526

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TABLE B.5 BURIAL COSTS AT THE SOUTH CAROLINA SITE (cont.)
REFERENCE BWR (1986 DOLLARS)

ACTIVATED MATERIAL	CRANE SURCHARGE	CASK HANDLING	SLINGS (SPECIAL)	CURIE	LINER DOSE RATE	BURIAL CHARGE	DISPOSAL COST
STEAM SEPARATOR	0	19600	0	529200	0	9004	550604
FUEL SUPPORT & PIECES	0	9000	0	315000	0	4956	329756
CONTROL RODS/INCORES	2440	5600	0	529000	0	14040	552400
CONTROL RODS GUIDES	0	8400	0	0	0	3940	12340
JET PUMPS	0	20000	0	450000	0	13000	491000
TOP FUC. GUIDES	0	50400	0	1353000	0	27772	1427772
CORE SUPPORT PLATE	0	21700	0	110250	0	10920	140070
CORE SHROUD	0	90000	0	1323000	0	46400	13374400
REACTOR VESSEL WALL	20020	15400	0	205700	0	7196	240316
SAC SHIELD	33000	0	0	0	0	100600	134500
REACT. WATER REC	19551	0	0	0	0	07000	105631
SAC SHIELD	91960	0	0	0	0	306600	398560
OTHER PRIMARY CONTAINMENT	0	0	0	0	0	3496304	3496304
CONTAINM. ATMOSPHERIC	1020	0	0	0	0	47432	49252
HIGH PRESSURE CORE SPRAY	3630	0	0	0	0	16000	20430
LOW PRESSURE CORE SPRAY	1210	0	0	0	0	9940	11150
REACTOR BLDG CLOSED COOLING	2730	0	0	0	0	31600	34420
REACTOR CORE COOLING	910	0	0	0	0	12000	13700
RESIDUAL HEAT REMOVAL	0470	0	0	0	0	61370	60046
POOL LINES & RACKS	36300	0	0	0	0	376604	412904
CONTAMINATED CONCRETE	14560	0	0	0	0	429100	443660
OTHER REACTOR BUILDING	0	0	0	0	0	1403276	1403276
TURBINE	70100	0	0	0	0	1300000	1460200
NUCLEAR STEAM CONDENSATE	14520	0	0	0	0	350932	373452
LOW PRESSURE FEEDWATER HEATERS	101640	0	0	0	0	720720	830360
MAIN STEAM	3630	0	0	0	0	70252	73002
MOISTURE SEPARATOR REHEATERS	62920	0	0	0	0	706000	769700
REACTOR FEEDWATER PUMPS	9100	0	0	0	0	192036	201936
HIGH PRESSURE FEEDWATER PUMPS	19360	0	0	0	0	119616	130976
OTHER TG BLDG	0	0	0	0	0	4012192	4012192
RAD WASTE BLDG	0	0	0	0	0	2370096	2370096
REACTOR BLDG	0	44000	0	0	0	299000	343000
TG BLDG	0	29400	0	0	0	202440	231040
RAD WASTE & CONTROL	0	26600	0	0	0	174720	201200
CONCENTRATOR BOTTOMS	0	157500	0	0	0	630000	787500
OTHER	0	42700	0	0	0	170000	213000
POST TMI-2 ADDITIONS	0	0	0	0	0	35616	35616
SUBTOTAL BWR COSTS	510031	557900	0	16729350	0	10706740	36592021
BARNWELL COUNTY BUSINESS TAX (2.4%)							870220
TOTAL BWR COSTS							37470049

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TABLE B.6 BURIAL COSTS AT THE SOUTH CAROLINA SITE
REFERENCE PWR (1988 DOLLARS)

ACTIVATED MATERIAL	CRANE SURCHARGE	CASK HANDLING	SLINGS (SPECIAL)	CURIE	LINER DOSE RATE	BURIAL CHARGE	DISPOSAL COST
VESSEL WALL	38300	38000	0	714400	6	134216	924996
VESSEL HEAD & BOTTOM	0	40000	0	100000	0	141200	281200
UPPER CORE SUPPORT ASSM	0	4000	0	10000	0	14123	28120
UPPER SUPPORT COLUMN	0	4000	0	10000	0	14120	28120
UPPER CORE BARREL	0	2000	9	37600	0	7064	40664
UPPER CORE GRID PLATE	0	5000	0	150000	0	17600	172500
GUIDE TUBES	0	6000	0	56100	0	21192	83292
LOWER CORE BARREL	0	32000	0	1024000	0	113024	1969024
THERMAL SHIELDS	0	6000	0	360000	0	21192	387192
CORE SHROUD	0	4000	0	610000	0	14120	6118120
LOWER GRID PLATE	0	5000	0	100000	0	17600	1022600
LOWER SUPPORT COLUMN	0	1000	0	36500	0	3532	41032
LOWER CORE FORGING	0	11000	0	105000	0	38852	214852
MISC INTERNALS	0	8000	0	120000	0	28256	156256
BIO SHIELD CONCRETE	0	0	0	0	0	881587	881587
REACTOR CAVITY LINER	0	0	0	0	0	10004	10004
REACTOR COOLANT PUMPS	36848	0	0	0	0	148344	185192
PRESSURIZER	10400	0	0	0	0	127152	137632
R. Hx, EHx, SUMP PUMP, CAVITY PUMP	0	0	0	0	0	14120	14120
PRESSURIZER RELIEF TANK	2020	0	0	0	0	42304	44404
SAFETY INJECTION ACCUM TANKS	15320	0	0	0	0	141200	156600
STEAM GENERATORS	134848	0	0	0	0	754506	889354
REACTOR COOLANT PIPING	13405	0	0	0	0	116556	129961
REMAINING CONTAM. MATLS	0	0	0	0	0	1858115	1858115
CONTAMINATED MATRL OTHR BLD	0	0	0	0	0	16851243	16851243
FILTER CARTRIDGES	0	6000	0	135000	0	11126	152126
SPENT RESINS	0	20000	0	600000	0	70640	690640
COMBUSTIBLE WASTES	0	60000	0	150000	0	357615	567615
EVAPORATOR BOTTOMS	0	94000	0	235000	0	332000	601000
POST TWI-2 ADDITIONS	0	0	0	0	0	549685	549685
SUBTOTAL PWR COSTS	251301	346000	0	11603600	0	22860764	35261665
BARNWELL COUNTY BUSINESS TAX (2.4%)							846200
TOTAL PWR COSTS							36107945

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TABLE B.6 BURIAL COSTS AT THE SOUTH CAROLINA SITE (cont.)
REFERENCE BWR (1988 DOLLARS)

ACTIVATED MATERIAL	CRANE SURCHARGE	CASK HANDLING	SLINGS (SPECIAL)	CURIE	LINER DOSE RATE	BURIAL CHARGE	DISPOSAL COST
STEAM SEPARATOR	0	28000	0	529200	0	12468	58968
FUEL SUPPORT & PIECES	0	14000	0	315000	0	8252	335252
CONTROL RODS/INCORES	3240	8000	0	529000	0	18720	559560
CONTROL RODS GUIDES	0	12000	0	38000	0	4900	46900
JET PUMPS	0	40000	0	450000	0	17483	587483
TOP FUEL GUIDES	0	72000	0	1353600	0	29987	1455587
CORE SUPPORT PLATE	0	31000	0	116250	0	13775	161825
CORE SHROUD	0	140000	0	13230000	0	58631	13428631
REACTOR VESSEL WALL	22220	22000	0	285700	0	9877	258997
SAC SHIELD	35200	0	0	0	0	127811	162291
REACT. WATER REC	19551	0	0	0	0	189845	129396
SAC SHIELD	95760	0	0	0	0	386754	482514
OTHER PRIMARY CONTAINMENT	0	0	0	0	0	4418338	4418338
CONTAINM. ATMOSPHERIC	2820	0	0	0	0	59832	61852
HIGH PRESSURE CORE SPRAY	3830	0	0	0	0	21192	25822
LOW PRESSURE CORE SPRAY	1310	0	0	0	0	12539	13849
REACTOR BLDG CLOSED COOLING	3030	0	0	0	0	39982	43812
REACTOR CORE COOLING	1810	0	0	0	0	16247	17257
RESIDUAL HEAT REMOVAL	9170	0	0	0	0	77421	86591
POOL LINES & RACKS	37800	0	0	0	0	475168	512968
CONTAMINATED CONCRETE	16160	0	0	9	0	541279	557439
OTHER REACTOR BUILDING	0	0	0	0	0	1778132	1778132
TURBINE	75980	0	0	0	0	1753461	1829441
NUCLEAR STEAM CONDENSATE	15720	0	0	0	0	452767	468487
LOW PRESSURE FEEDWATER HEATERS	185840	0	0	0	0	919238	1825878
MAIN STEAM	3930	0	0	0	0	88618	92548
MOISTURE SEPARATOR REHEATERS	65520	0	0	0	0	891653	957173
REACTOR FEEDWATER PUMPS	18100	0	0	0	0	243241	253349
HIGH PRESSURE FEEDWATER PUMPS	28160	0	0	0	0	158887	171847
OTHER TG BLDG	0	0	0	0	0	6878236	6878236
RAD WASTE BLDG	0	0	0	0	0	2999798	2999798
REACTOR BLDG	0	84000	0	180000	0	299888	523888
TG BLDG	0	42000	0	185000	0	282448	349448
RAD WASTE & CONTROL	0	38000	0	95000	0	174728	387728
CONCENTRATOR BOTTOMS	0	225000	0	582500	0	630000	1417500
OTHER	0	61000	0	152500	0	178000	384300
POST TWI-2 ADDITIONS	0	0	0	0	0	44927	44927
SUBTOTAL BWR COSTS	547631	797000	0	17834350	0	27311781	42498762
BARNWELL COUNTY BUSINESS TAX (2.4%)							1819778
TOTAL BWR COSTS							43518540

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(See instructions on the reverse)

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10. SUPPLEMENTARY NOTES

Supersedes NUREG-1307 dated July 1988

11. ABSTRACT *(200 words or less)*

One of the requirements placed upon nuclear power reactor licensees by the U.S. Nuclear Regulatory Commission (NRC) is for the licensees to periodically adjust the estimate of the cost of decommissioning their plant, in dollars of the current year, as part of the process to provide reasonable assurance that adequate funds for decommissioning will be available when needed. This report, which is scheduled to be revised annually, contains the development of a formula for escalating decommissioning cost estimates that is acceptable to the NRC, and contains values for the escalation of radioactive waste burial costs, by site and by year. The licensees may use the formula, the coefficients, and the burial escalation factors from this report in their escalation analysis, or may use an escalation rate at least equal to the escalation approach presented herein.

Revision 1 of this report corrects several errors in the calculation and disposal costs for the reference BWR.

12. KEY WORDS/DESCRIPTORS *(List words or phrases that will assist researchers in locating the report.)*

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