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Nuclear Waste Fund Fee Adequacy: An Assessment

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INTRODUCTION AND SUMMARY

This report summarizes the results of the analysis for the adequacy of the 1.0 mill per net kilowatt-hour civilian high-level waste disposal fee. This is the fifth annual report in a series [1,2,3,4/] that evaluates the adequacy of the fees assessed to cover the Federal Government's costs for the disposal of high-level radioactive wastes. As with past reports, the fees for commercial spent nuclear fuel (SNF) are covered. These fees were established under the Nuclear Waste Policy Act of 1982 (NWPA) (Public Law 97-425). The fees assessed on the commercial nuclear-electric generating industry consist of a one-time fee for waste existing on April 7, 1983, and an ongoing fee assessed on subsequent nuclear-powered generation. Based on a December 1985 court decision, the contracts covering spent nuclear fuel are interpreted as specifying that the ongoing fee will be assessed on net generation, rather than gross generation. Accordingly, utilities are being reimbursed for the excess of past ongoing fees based on gross generation over fees based on net generation. The Department has estimated that reimbursements totaling $40.4 million are due the utilities. This estimate is based on the definition of net generation contained in the Notice of Proposed Rulemaking published in the Federal Register on November 7, 1986 [5/]. As of March 31, 1987, $39.9 million had been reimbursed to the utilities. The total amount to be reimbursed will be subject to the definition of net generation adopted in the final rule and the Department's final verification procedures. A Presidential decision made on April 30, 1985, directed that a common repository system be used for the permanent disposal of both wastes resulting from atomic energy defense activities and high-level civilian wastes. Thus this report incorporates an assessment of fee adequacy that includes the estimated long-term impact of the costs and fees associated with disposal of defense high-level wastes (DHLW) in the Office of Civilian Radioactive Waste Management (OCRWM) repository system. It is assumed that the DHLW disposal fees paid will provide funds equivalent to the OCRWM costs for disposing of this waste, including interest on costs incurred before the payment of the fee(s) to cover these costs, and the appropriate share of the common costs of the OCRWM waste disposal system. The DHLW disposal fee payments into the Nuclear Waste Fund will be subject to Congressional appropriations.

This report is based on the assumptions contained in the OCRWM Mission Plan Amendment [6/], under which the first repository is proposed to open in 2003 and the second repository in 2023. In addition, this analysis features an Improved Performance System (IPS), a major component of which is a proposed (but currently unauthorized) Monitored Retrievable Storage (MRS) facility that is assumed to open in 1998. (Since the MRS has not been authorized, the system in this Amendment without an MRS, is referred to as the "authorized system.") These conditions, together with the possibility of adverse developments in inflation and real interest rates should be considered in assessing the findings of this analysis.

The principal recommendation of this year's analysis is that the ongoing disposal fee should remain at 1.0 mill per (net) kilowatt-hour (kWh) for 1987 based on the assumption that defense waste fees will be adequate to cover the defense share of the program costs and the following findings:

- The current 1.0 mill per kWh fee is projected to produce revenues sufficient to offset estimated total system life-cycle costs for high-level civilian radioactive waste disposal for a reasonable range of program cost, nuclear electric generation, and interest rate forecasts, as detailed later in this report. The margin of revenues over costs varies considerably among the cases analyzed. In a number of cases the present fee is barely adequate, while many others show substantial margins of receipts over outlays.

- Many of the cost and revenue forecasts analyzed, particularly those based on the U.S. Energy Information Administration (EIA) Upper Reference Case generation forecast with increased fuel burnup, show margins of revenues over costs. These margins indicate that, if cost and commercial nuclear electric generation estimates are correct, the cumulative program costs could be recovered by a reduced fee, or that program costs higher than the current estimates could be recovered by the 1.0 mill per net kWh fee. However, these margins are within the uncertainty range of the electric generation, program cost, inflation, and interest rate estimates, so a fee adjustment is not warranted at this time. Fee revisions may be recommended within a few years, when more accurate program cost estimates will be developed as the program matures from its present conceptual design phase to the engineering design phase and if interest rate and/or inflation expectations should change.

- For many of the scenarios examined, future program cost increases due to general inflation or real price increases could be recovered by indexing the fee to an inflation or other cost index. Based on current estimates, the margins of revenues over costs provided by the 1.0 mill per kWh fee could provide a buffer so that indexing at the inflation rate would not need to begin immediately. The date when indexing would be needed varies with the system configuration, with nuclear electric generation growth rates, and with the rates of interest and inflation. The need to index the fee to take account of the effects of inflation could occur as early as 1988 if it is likely that no additional nuclear plants will be ordered and that a high-cost repository pair is likely to be selected, but not until 1992 or later if the nuclear electric growth rate matches that portrayed by the Upper Reference Case and a low cost repository pair is used. Indexing is an alternative to larger, less frequent fee adjustments. This analysis does not provide a compelling case for recommending that indexing be initiated at this time.

These findings are based on a cash flow analysis that utilized methods very similar to those employed in previous fee adequacy studies. Revisions were made in the areas of system logistics, repository schedules, real interest rates, inflation rates, and the estimation of costs for design and evaluation work, transportation, and repositories in differing host rocks.

BACKGROUND AND LEGAL REQUIREMENTS

The NWPA prescribed that the owners and generators of nuclear waste will pay the full costs of its disposal, and established a Nuclear Waste Fund (NWF) to ensure the full cost recovery funding of a safe and environmentally acceptable program. This fund receives revenue from an adjustable ongoing fee charged quarterly for all electricity generated by commercial nuclear facilities beginning April 7, 1983, as well as a one-time fee, estimated to produce a total of $2.4 billion for nuclear waste produced prior to April 7, 1983. One-time fees of $1.4 billion were received by OCRWM in June 1985. Operators of commercial nuclear facilities have made commitments to pay the balance, plus accrued interest, later. An additional $9 million in principal and interest was received between June 1985 and March 31, 1987.

On April 30, 1985, following a study made pursuant to Section 8 of the NWPA, the President directed that the DOE Defense Programs make use of the OCRWM system for the disposal of DHLW. It is anticipated that revenues to cover the full OCRWM cost of handling DHLW, which includes a share of common costs, will be received by OCRWM. In this analysis, cost sharing is based on the method proposed in the Federal Register notice of December 2, 1986 [7]. Revenues from these sources, as well as earnings from the investment of any surpluses in U.S. Treasury securities, are deposited to the NWF and disbursements are made to cover costs as the program progresses.

The NWPA (Section 302(a)(4)) calls for an annual review of the adequacy of the waste disposal fees to recover waste disposal program costs. Based on the results of the evaluation, the ongoing fee may be adjusted, if necessary. Adjustment of the ongoing fee requires Congressional approval. In addition, payments of the DHLW disposal fee are subject to Congressional appropriation.

METHODOLOGY AND ASSUMPTIONS

This evaluation of fee adequacy is based on the principle of "full cost recovery", under which OCRWM is to be reimbursed for all costs related to the waste disposal services it provides to the signatories of DOE's "Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste" [8/] as well as the cost of disposal for DHLW. The principle of full-cost recovery underlies the basic analytic approaches used by DOE in 1978, 1980, and 1983 through 1986 to evaluate financing methods suited to a federally administered program for the disposal of high-level nuclear waste. The general methodology employed in this year's report projects Nuclear Waste Fund cash flows and resulting balances based on estimated program costs and revenues, including both interest earnings and interest expenses for borrowing. If the final program balance is projected to be positive, then the fee is judged adequate to ensure full cost recovery. If the projected final program balance is estimated to be negative, then the fee would be judged inadequate.

This analysis uses a real interest rate of 3 percent for the reference case. Recent real interest rates for intermediate term U.S. Treasury securities have been near 3 percent, which suggests that recent experience differs from the long term pattern of real interest rates in the 0 to 2 percent range. Such high real rates may not continue indefinitely, but prospects for inflation and nominal interest rates indicate that real rates above 2 percent could continue for some time. To investigate the effects of a wider range of interest rates, this year's analysis includes alternative real interest rates of 0, 1, 3, and 5 percent.

The principal assumptions underlying the analysis summarized in this report are noted below:

o Nuclear electric growth projections	EIA "Upper Reference" and "No New Orders" Cases
o Civilian spent fuel: cumulative discharge through the year 2020	metric tons uranium (extended burnup)
Upper Reference Case	106,000
No New Orders Case	79,300
o Defense program wastes	16,000 canisters, equivalent to 8,000 MTU of spent fuel
o System Configuration and Availability dates	
First Repository	2003
Second Repository	2023
MRS (in IPS only)	1998

o Repository design capacity	70,000 MTU for the first repository; the balance goes to the second repository
o Retrievability period	50 years after the first emplacement

The total system life cycle repository cost range studied is bounded by the highest cost 2-repository media combination (basalt and a representative hard rock site) and the lowest cost 2-repository system (tuff and a representative salt site). The assumptions for the alternative cases studied diverge from the assumptions in the "authorized system" with respect to the use of an Improved Performance System (IPS) that includes a Monitored Retrievable Storage (MRS) facility, and variations in economic parameters. With the IPS, an MRS was assumed to begin operation in 1998 at the same time that construction authorization is received for the first repository. The IPS is expected to provide a facility for repackaging of SNF together with limited temporary storage capacity that can allow for optimization of flows of spent fuel in the waste management system. DHLW is shipped directly from defense facilities to OCRWM repositories.

The ongoing fee revenue and spent fuel projections used in this analysis were derived from two projections of net electricity generation [9/] and spent fuel discharges [10/] prepared in 1986 by EIA. The Upper Reference Case is based on the assumption that there will be no net future cancellations of present construction projects and that there will be modest improvements in the average equilibrium-cycle capacity factor. This results in average annual growth rates for operable nuclear capacity of 5.6 percent from 1985 to 1990 and 1.1 percent from 1990 to 1995. This projection includes an increase of installed nuclear capacity from 111 gigawatts electrical (GWe) in 1995 and 2000 to 219 GWe in 2020. The No New Orders case is the lower nuclear electric generation projection examined and is based on the assumptions that no orders for new reactors will be placed as well as the cancellation of reactors that are currently under construction but are less than 40 percent complete or are subject to any of several major problems. The operating life of completed reactors is assumed to be 40 years. The net effect of No New Orders is that, after the reactors that are completed begin operation by about 1990, the installed nuclear capacity will be in the range of 101 to 106 GWe through 2010, and then decline to 55 GWe in 2020 and zero soon after as plants are retired.

Together, the Upper Reference and No New Orders nuclear electric generation projections are believed to furnish a useful range of assumptions within which to evaluate fee adequacy. They are not intended to represent absolute bounding cases, but to illustrate the potential effects of a reasonable range of nuclear generation projections.

An explicit life cycle for waste disposal costs and revenues is required in order to bound the cash flow analysis. The current analysis is based on the convention, consistent with the NWPA and recent Presidential decision, that the costs and revenues estimated include those for all SNF generated through the year 2020 and an estimated 16,000 canisters of DHLW. It should be noted that the EIA spent nuclear fuel discharge projections used in this analysis, which are major determinants of total system life cycle costs, are based on the assumption that fuel burnup in commercial nuclear reactors will increase over time. An alternative assumption, that fuel burnup will not increase over time, would result in a larger physical quantity of spent nuclear fuel and, it is estimated, higher program costs.

In May 1986, the Secretary of Energy recommended and the President approved three sites for detailed site characterization as candidates for the first repository. The three sites are Yucca Mountain in Nevada (tuff), Deaf Smith County in Texas (salt), and Hanford in Washington (basalt). The search for a site for a second repository has focused on hard rock (crystalline rock or other hard rock media). However, possible second repository sites include those first repository sites that are characterized but not selected together with those sites that were evaluated but not nominated for characterization for a first repository. In this analysis hard rock and salt are used as representative media for second repository sites. Cost estimates were developed for several possible media combinations, and the highest and lowest cost combinations were selected for cash flow analysis.

This evaluation incorporates the December 1985 decision by the United States Court of Appeals for the District of Columbia Circuit No. 83-2066, that future ongoing fees will be based only on net generation. Unless otherwise indicated, all dollar values will be given in 1986 dollars.

In the Improved Performance System cases presented in this analysis, an MRS is fully integrated with the repository system. Spent fuel rod consolidation and canistering of waste are performed at the MRS, thereby shifting some costs from the repositories to the MRS facility in cases that involve the Improved Performance System.

Since the program is projected to be in a surplus position for much of its life cycle, and since inflation also affects the nominal interest rate, the effects of inflation on outlays are partially offset by higher interest earnings. To separate these effects, a calculation of the potential impact of real price increases that includes long-term inflation rates as high as 4 percent is included in this year's analysis. These results show the amount of real program cost increases that can be tolerated given the 1.0 mill per (net) kWh fee.

Significant Changes in Methodology and Assumptions

For the most part, the methods and assumptions used for this analysis are the same as those used in the previous fee adequacy reports. There are, however, a few significant changes that are briefly summarized below.

The first-repository cost estimates are based upon site-specific designs, thereby resulting in improved accuracy in these estimates. The first repository is assumed to come on line in 2003, rather than 1998, as in last year's analysis. The second repository is assumed to come on line in 2023, rather than in 2008, as in last year's analysis. An MRS is assumed to begin operation in 1998. Cost estimates for the hard rock repository were made using a generic design. In this analysis, for the first time, DHLW disposal costs used in the analysis are sensitive to the DHLW shares of total disposal packages, disposal packages processed in a facility, and repository storage area, reflecting the cost-sharing proposal contained in the Federal Register notice of December 2, 1986 [7]. Estimates relating to the long-term financial position of the program include costs for handling atomic energy defense wastes together with DHLW disposal fees that are assumed to fully cover these costs.

ANALYSIS

This section discusses both revenue and program cost projections and describes the analysis used to assess the adequacy of the current 1.0 mill per kWn fee to fully recover program costs.

Revenues

If the disposal fee remains unchanged at 1.0 mill per kwh of net generation and defense waste fees cover DHLW disposal costs, the cumulative fee revenues (including the one-time fee) under the two EIA electricity generation projections are $27.4 billion for the Upper Reference Case and $18.6 billion for the No New Orders Case. The revenues from the ongoing fee for the disposal of spent nuclear fuel are distributed over time in proportion to annual net electrical generation. For those cases in which the fee is adequate, interest earnings that may

amount to several billion dollars would also accrue to the Nuclear Waste Fund during those years when program revenues are expected to exceed program costs. Conversely, interest expenses of several billion dollars are projected for some cases in which the current 1.0 mill/kWh fee is inadequate.

Life-Cycle Costs

Estimated total system life-cycle costs are organized into four major categories: 1) development and evaluation costs; 2) geologic repository construction, operations, and decommissioning costs; 3) waste transportation costs; and (4) monitored retrievable storage costs in the IPS. Table 1 displays the total system life-cycle cost estimates for a representative set of media combinations for the Upper Reference Case with reference repository schedule.

Life-cycle costs associated with development and evaluation (D&E) cover the program administration costs and all the siting, testing, design development, regulatory, and institutional activities relating to the two geologic repositories, monitored retrievable storage facilities, and the required transportation network. For the reference repository development schedule, these costs range from $13.6 billion to $14.0 billion. This cost projection is based on the DOE's five-year budget estimate.

Life-cycle transportation costs reflect the use of transportation packages that will accept spent nuclear fuel (SNF) that is at least 5 years old, and technology and procedures to ship SNF from individual commercial reactor storage sites to the repositories. For the Upper Reference Case with the reference repository schedule, these costs range from $2.0 billion to $2.7 billion for the authorized system and from $1.8 to $2.4 billion for the IPS, depending on the locations of the two repositories assumed.

Total life-cycle repository cost estimates vary significantly among the candidate host rocks, with the overall difference amounting to almost 80 percent for the first repository (from $6.4 billion to $11.4 billion) for the authorized system. MRS costs were estimated to be in the range of $2.7 to $2.8 billion (1986 dollars). However, inclusion of an MRS in the waste management system will bring about cost reductions in other elements of the system such as the first repository and the transportation program. When considering these offsetting cost reductions, the incremental cost increase to the system is only $1.5 to $1.6 billion. There are further potential savings due to the use of an MRS in the form of avoided at-reactor storage costs (potentially up to $1 billion), which have not been incorporated in this analysis.

Table 1. Summary of Total Systems Life Cycle Costs for the Upper Reference Case from 1986 through the Decommissioning of the Second Repository (Billion 1986 dollars)

Host Rock	System Type	D & E[a]	Repository First	Repository Second	Transportation	MRS[b]	Total[c]
Tuff/ Salt	AS[d]	13.7	6.5	7.1	2.4	0.0	29.7
Tuff/ Salt	IPS[f]	13.8	5.5	7.1	2.2	2.7[g]	31.2
Tuff/ H.R.[e]	AS	13.8	6.5	8.2	2.3	0.0	30.8
Salt/ H.R.	AS	13.8	9.3	8.2	2.0	0.0	33.3
Basalt/ H.R.	AS	13.8	11.4	8.2	2.3	0.0	35.7
Basalt/ H.R.	IPS	13.9	10.4	8.2	2.1	2.7[g]	37.3

(a) Development and Evaluation
(b) Monitored Retrievable Storage
(c) Totals may not equal the sums of components because of independent rounding.
(d) AS = Authorized System
(e) H.R. = Hard rock
(f) IPS = Improved Performance System
(g) Incremental system costs due to the MRS range from $1.5 to $1.6 billion

Cost sensitivity cases were analyzed for two EIA nuclear electricity generation forecasts and resulting spent fuel discharge projections. For each system scenario, total system life-cycle costs were estimated for the lowest-and highest-cost pairs of repository media. The ranges for estimated system life-cycle costs from 1986 through the decommissioning of the second repository are shown in Table 2. For the system used in this analysis, the estimated total cost for OCRWM disposal of DHLW varies from $4.2 billion to $6.2 billion, for an overall range of approximately 13 to 20 percent of total costs. In general, both the DHLW disposal cost and the DHLW share of total cost are higher in the No New Orders cases because DHLW accounts for a larger share of the waste handled and is thus allocated a larger share of costs common to both waste streams.

Table 2. Total System Life-Cycle Cost Ranges for Upper Reference and No New Orders Cases from 1986 through the Decommissioning of the Second Repository (Billions of 1986 dollars)

Alternate Program Assumptions	Low Cost Estimate	High Cost Estimate
Upper Reference Case	$29.7	$35.7
Upper Reference Case - IPS (a)	31.2	37.3
No New Orders Case	27.5	33.7
No New Orders - IPS	29.0	35.2

(a) IPS = Improved Performance System

Nuclear Waste Program Cash Flow Analysis

The cost and revenue forecasts discussed above were combined in a series of cash flow analyses that simulate the financial status of the Nuclear Waste Program over time. This simulation was based on guidelines for fund management set forth in the NWPA. These guidelines state that surpluses will be invested in U.S. Treasury securities or used to redeem outstanding debt, and that shortfalls in revenue will be met by redeeming securities held by the fund or by borrowing from the U.S. Treasury, if necessary. The fee adequacy evaluation includes three major steps 1) the estimation of total OCRWM costs, 2) the allocation of these costs between civilian and defense high-level waste, and 3) the evaluation of the adequacy of civilian and defense waste-disposal fees to cover their respective shares of costs. In this analysis, it is assumed that fees paid for the disposal of DHLW will be sufficient, when taking account of interest earned and/or paid, to cover the full cost share for DHLW disposal. Various measures of performance for the program are available from the analysis, including the final program balance, near-term program balances, and tolerance for program cost increases. These are discussed in the following subsections.

Final Program Balances. The final program balances--shown in Table 3 as the civilian portion of these balances--are very sensitive to the effects of the interest earned or paid by the program. Since payments for the disposal of DHLW are assumed to be sufficient to cover the DHLW full-cost share, the final fund balance for DHLW disposal is equal to zero. The effects of real interest rates of 0, 1, 3, and 5 percent were tested. In 23 of the 32 cases shown in Table 3, the final program balance is positive, but varies substantially depending on the program variations and on the interest rate. In the No New Orders Case, the 1.0 mill per kWh fee is not adequate to meet the high cost estimate if surplus funds earn 1 percent real interest or less. These final program balances will result if program costs do not increase above the current estimates or if the fee is adjusted to compensate for future price level increases.

Table 3. Final Nuclear Waste Program Balances, Civilian Portion
(Billions of 1986 dollars)

Alternate Program Assumptions	Program Cost Category	Annual Real Interest Rate (Percent) 0	1	3	5
Upper Reference Case	low	5	15	111	672
	high	-1	4	63	459
Upper Reference Case - IPS	low	3	11	88	550
	high	-3	0	39	332
No New Orders Case	low	-1	4	60	465
	high	-6	-8	9	237
No New Orders Case - IPS	low	-2	0	38	345
	high	-8	-12	-15	109

Near Term Program Status. In the near term (through 1990) the performance of the Nuclear Waste Program will not be altered substantially by either the nuclear industry growth rate or by the selection of repository media. At the end of FY 1986, the program had a fund balance with a market value of approximately $1.62 billion. The utilities owed about $2.33 billion in one-time fees to the Nuclear Waste Fund for disposal of the waste generated prior to April 7, 1983. At the end of June, 1985, the utilities paid $1.426 billion in one-time fees. The balance of one-time fees, plus accrued interest from April 7, 1983, will be paid either in quarterly installments or as a single lump-sum payment prior to the transfer of spent nuclear fuel to OCRWM. Utilities have expressed to DOE their intent to pay $173 million plus accrued interest by the 40 quarterly payments option, and $735 million plus accrued interest in the form of lump-sum payments prior to first delivery of SNF to OCRWM. The projection shown in Table 4 illustrates that the near-term cash position of the program appears to be relatively good. Upward revisions in the outlook for inflation and program costs could cause a deterioration in this outlook. DHLW disposal fee payments are not shown below because a payment schedule has not been approved. However, the inclusion of these revenues would improve the near-term outlook.

Table 4. Near-Term Nuclear Waste Program Projection, Based on the Authorized System and a 7 Percent Nominal Interest Rate[a] (Millions of current year dollars)

Fiscal Year	Program Outlays	One-time Fee Revenue[b]	1 mill/kWh Fee Revenue[c]	Interest Earned	FY End Program Balance
1986					1622 (d)
1987	456	6	442	113	1728
1988	616	31	475	121	1739
1989	926	40	502	122	1476
1990	991	40	533	103	1160

(a) Costs and revenues for atomic energy defense wastes are not included.
(b) Payments after June 31, 1985, include interest from April 7, 1983.
(c) EIA projections of fees based on net nuclear electric generation.
(d) Estimated market value of NWF investments at the end of FY 1986.

Tolerance to Cost Increases. As shown by the positive ending program balances in Table 3, the 1.0 mill per kWh fee is adequate to meet costs that are somewhat higher than the projected costs in all but 3 of the 16 low-cost cases shown. It is also adequate in all but one of the cases shown for which real interest rates are 3 percent or more, but is adequate in only half of the 16 cases shown with real interest rates of 0 and 1 percent. Table 5 shows the percentage increase in real system life-cycle costs over the current estimates that could be recovered by the 1.0 mill per kWh fee.

Table 5. Percentage Increase in Real System Cost Allocated to Civilian Waste That Can Be Recovered by the 1.0 Mill per Net kWh Disposal Fee

Alternate Program Assumptions	Program Cost Category	Annual Real Interest Rate (Percent) 0	1	3	5
Upper Reference Case	Low	19	30	48	60
	High	N/A	7	22	35
Upper Reference Case - IPS	Low	11	20	35	45
	High	N/A	0	13	23
No New Orders Case	Low	N/A	8	28	45
	High	N/A	N/A	3	19
No New Orders Case - IPS	Low	N/A	0	16	30
	High	N/A	N/A	N/A	8

IPS = Improved Performance System
N/A = No Increase Allowed

The values in Table 5 may also be interpreted as the maximum amount of uncertainty that can be accommodated in the current cost estimates. The uncertainty in both the cost and revenue projections supports the recommendation to leave the fee unchanged until the program costs can be more accurately estimated as the program matures beyond the conceptual design stage.

The final program balances are also extremely sensitive to the effects of compounded annual inflation. With no inflation, or if the fee is indexed to inflation, the final program balance is positive for all of the low-cost cases discussed in this report, as well as for all but 3 of the high-cost cases when real interest rates are 1 percent or more, as shown in Table 3 above. However, as the assumed rate of inflation rises, the estimated final program balance declines if the disposal fee is not increased accordingly, even if the current real cost estimates are accurate. Table 6 illustrates the potential for end-of-program balances for assumed real interest rates of 3 and 1 percent. If inflation rates are near zero, the final program balance would be positive for most cases. If inflation rates are 2 percent or more, then the final program balance would be negative in most cases.

Table 6. Final Nuclear Waste Program Balances with Continuous Inflation, Constant 1.0 Mill per Net KWh Fee and 3 Percent and 1 Percent Real Interest

(Billions of 1986 dollars)

Alternate Program Assumptions	Program Cost Category	Annual Rate of Inflation (Percent) 0	2	4
		(3 percent real interest)		
Upper Reference Case	Low	111	31	-21
	High	63	-18	-69
Upper Reference Case - IPS	Low	88	8	-43
	High	39	-42	-93
No New Orders Case	Low	60	9	-25
	High	9	-42	-76
No New Orders Case - IPS	Low	38	-13	-47
	High	-15	-65	-100
		(1 percent real interest)		
Upper Reference Case	Low	15	-3	-14
	High	4	-14	-25
Upper Reference Case - IPS	Low	11	-7	-18
	High	0	-18	-30
No New Orders Case	Low	4	-7	-14
	High	-8	-18	-26
No New Orders Case - IPS	Low	0	-11	-18
	High	-12	-23	-30

With continuing inflation, the fee will need to be increased to avoid the deficits discussed above. Indexing, or automatic fee adjustment at the rate of inflation, represents a method of fee adjustment that would levelize the fee over time in real terms. Smaller annual fee adjustments could be achieved by, for instance, beginning fee indexing at an earlier date but indexing to some fraction of an inflation rate or cost index. The margin of revenues over estimated program costs in the constant dollar analysis described above provides a buffer so that indexing at the inflation rate would not need to start immediately. The date that indexing will be needed to avoid program deficits varies with the inflation rate, the system configuration, and the nuclear-electric growth rate. Table 7 identifies, for

several assumed rates of inflation and for 1 and 3 percent real interest rates, the year in which fee indexing at the rate of inflation should begin to maintain full cost recovery. If indexing is not initiated at the prescribed times, full cost recovery could still be accomplished by larger fee adjustments at a later time. For a number of cases, an immediate increase in the ongoing fee rate, plus indexing, would be required to assure fee adequacy.

Table 7. Year to Begin Indexing the Waste Disposal Fee to Insure Full Cost Recovery For Various Assumed Inflation Rates

Alternate Program Assumptions	Program Cost Category	Annual Rate of Inflation (Percent) 2	3	4
		(3 percent real interest)		
Upper Reference Case	Low	N/R	N/R	2004
	High	2003	1996	1993
Upper Reference Case - IPS	Low	N/R	2003	1998
	High	1995	1992	1990
No New Orders Case	Low	N/R	2003	1997
	High	1989	1988	1988
No New Orders Case - IPS	Low	1999	1994	1992
	High	*	*	*
		(1 percent real interest)		
Upper Reference Case	Low	2007	1998	1995
	High	1990	1989	1988
Upper Reference Case - IPS	Low	1999	1994	1992
	High	*	*	*
No New Orders Case	Low	1992	1990	1989
	High	*	*	*
No New Orders Case - IPS	Low	*	*	*
	High	*	*	*

N/R = Not Required

* = 1.0 mill/kWh will not recover cost, even with no inflation, so an immediate fee increase plus indexing would be required.

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