Spent Fuel Management Fee Methodology and Computer Code User's Manual

**R. L. Engel
M. K. White**

January 1982

**Prepared for the U.S. Department of Energy
under Contract DE-AC06-76RLO 1830**

**Pacific Northwest Laboratory
Operated for the U.S. Department of Energy
by Battelle Memorial Institute**

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PACIFIC NORTHWEST LABORATORY
operated by
BATTELLE
for the
UNITED STATES DEPARTMENT OF ENERGY
under Contract DE-AC06-76RLO 1830

Printed in the United States of America
Available from
National Technical Information Service
United States Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22151

NTIS Price Codes
Microfiche A01

Printed Copy

Pages	Price Codes
001-025	A02
026-050	A03
051-075	A04
076-100	A05
101-125	A06
126-150	A07
151-175	A08
176-200	A09
201-225	A010
226-250	A011
251-275	A012
276-300	A013

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1.0 INTRODUCTION

The methodology and computer model described here were developed to analyze the cash flows for the federal government taking title to and managing spent nuclear fuel. The methodology has been used by the U. S. Department of Energy (DOE) to estimate the spent fuel disposal fee that will provide full cost recovery.^(1,2,3) Although the methodology was designed to analyze interim storage followed by spent fuel disposal, it could be used to calculate a fee for reprocessing spent fuel and disposing of the waste.

The methodology consists of two phases. The first phase estimates government expenditures for spent fuel management. The second phase determines the fees that will result in revenues such that the government attains full cost recovery assuming various revenue collection philosophies. These two phases are discussed in detail in subsequent sections of this report. Each of the two phases constitute a computer module, called SPADE (Spent fuel Analysis and Disposal Economics) and FEAN (FEE Analysis) respectively.

The fee methodology and computer model are quite flexible, having evolved as the philosophy for recovering spent fuel management costs changed. Initially, it was assumed that all users of spent fuel management services should pay an equal fee at the time spent fuel is delivered. Later it was decided that if a reactor operator could store his fuel until the repository was able to accept it, he should not share the costs of the interim storage required for other reactors. Thus, the fee was divided into two components to be paid at time of delivery, one for disposal directly and the other for interim storage plus disposal. Payment at

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(1) U.S. Department of Energy. 1978. Preliminary Estimates of the Charge for Spent-Fuel Storage and Disposal Services. DOE/ET-0055 U.S. Government Printing Office, Washington, D.C.

(2) White, M.K., M.A. Lewallen, E.T. Merrill and R.M. Fleischman 1978. Sensitivity of the Federal Fee for Managing Spent Fuel to Financial and Logistical Variations. PNL-2637, Pacific Northwest Laboratory, Richland, Washington.

(3) U.S. Department of Energy. 1980. Department of Energy Report on Fee for Spent Nuclear Fuel Storage and Disposal Services. DOE/SR-0006 U.S. Government Printing Office, Washington, D.C.

time of delivery results in a large expenditure of government funds before any revenue is generated. Therefore, the capability to calculate fees for payment prior to delivery was added. Various methods of early payment can be specified, including payment at time of fuel discharge, payment at time of energy generation, or payments made at an arbitrary time before delivery of spent fuel. Payment of fees before delivery stimulated concern about inflation and the possibility of levying incorrect fees, so the capability of calculating fees indexed to specified inflation assumptions was added to the model. Finally, the concept of installment payments was developed. This fee simulates levying a fee prior to spent fuel delivery to reduce government outlays followed by an adjustment payment at time of delivery to correct for inconsistencies due to changes in projected costs. The computer model has the capability to compute any of these fees.

2.0 SPENT FUEL MANAGEMENT SYSTEM ACTIVITIES

The basic spent fuel management activities assumed for the model are shown in Figure 1. Spent fuel can be delivered either directly to the repository, or to an interim storage facility located away from the reactor. It is assumed that fuel is placed in interim storage only if repository receipt capability is unavailable or inadequate. Spent fuel that is placed in interim storage is later transferred to the repository. The encapsulation facility is assumed to be located at the repository.

FIGURE 1. Spent Fuel Flow Diagram

The model does not calculate spent fuel logistics. The spent fuel logistics must be completely specified by the user. The logistics are specified as annual spent fuel receipts at each interim storage facility, the annual spent fuel transferred from each interim storage facility, and the annual spent fuel receipts at each repository. Logistics may be specified separately for PWR and BWR spent fuel.

3.0 METHODOLOGY DESCRIPTION

The computer model used to calculate the spent fuel fee or fees consists of two modules. The first module, called SPADE, calculates annual program expenditures and calculates simple levelized unit costs or fees based on fuel delivery to spent fuel facilities. The second module, FEAN, uses the cash flow and logistics data from SPADE to calculate fees for more complex circumstances. FEAN can be used to calculate fees which vary with time, fees paid at times other than fuel delivery, and installment fees. The following sections describe these two modules.

3.1 SPADE Module

The SPADE module combines user specified cost parameters and logistics data to project spent fuel program costs. The projected costs are used to calculate simple fees based on spent fuel receipts. The expense projections are calculated for three levels of aggregation. The lowest level is the cost center. The cost center is the smallest accounting entity in SPADE for which costs and throughputs can be specified. A cost center represents an individual facility or service or some other cost category that the model user chooses to separate. For the second level of expense forecast, costs from the cost centers of the same type are aggregated. Each such group of cost centers represents a fuel management activity. Costs for five activities are aggregated in SPADE. They are labeled: AFR (interim storage facilities), PACKAGING (encapsulation facilities), REPOSITORY (disposal facilities), TRANSPORTATION (transferring spent fuel from interim storage facility to the encapsulation and disposal facility), and MISCELLANEOUS (typically used for R&D expenses and government overhead). A TRANSPORTATION cost center must be defined for each AFR cost center, and a PACKAGING cost center must be defined for each REPOSITORY cost center. The total system expense forecast is the third and final level of aggregation. These calculations are described in the following sections.

3.1.1 Cost Parameters

Projected costs for each cost center are defined by a cost model. Several cost models, or cost data sets may be input for each activity, and a cost model or data set may apply to more than one cost center. A cost model contains three basic categories of cost; capital, fixed operating, and variable operating. Capital costs are costs that are amortized over all of the users of a facility or service. These include construction costs, equipment costs, and decommissioning costs. These costs are input indexed to facility startup or shutdown. The timing of the cash flows associated with these costs are then determined by the logistics data described in the next section. Fixed operating costs are those costs that do not depend on throughput which occur during the operation of a facility or while providing a service. Examples are utility costs and some labor costs. This category of costs can be specified as constant over time or variable over time. These costs are also indexed to the beginning or end of facility or service operation so that the logistics data will allow scheduling of these costs. Variable operating costs depend on facility throughput. These may be specified separately for PWR and BWR fuel. Variable operating costs may be constant for the facility life or may vary annually. Cost data input formats for SPADE are described in Appendix A. A sample SPADE case is discussed in section 4. Its required input is shown in Appendix C, Table C-1.

3.1.2 Logistics Data

The logistics data input for the SPADE module defines the operation period for each cost center and specifies which cost model or cost data set applies to each cost center. Annual spent fuel throughput is specified for each cost center of the AFR, TRANSPORTATION, and REPOSITORY type. It is assumed that each encapsulation facility has the same throughput as the corresponding disposal facility. Annual throughput may be specified separately for PWR and BWR fuel to allow modeling differences between the variable operating costs.

No throughput data are input for the MISCELLANEOUS cost centers. Instead, one of five allowed throughput options is selected as the assumed throughput for each MISCELLANEOUS cost model. The five options are: total system receipts; total interim storage facility receipts;

total disposal facility receipts; first interim storage facility receipts; or first disposal facility receipts.

Instructions for preparing logistics data for the SPADE module are given in Appendix A. A sample SPADE case is discussed in section 4.0. Input required for the sample case is shown in Appendix C, Table C-1.

3.1.3 Cash Flow and Facility Use Factor Calculations

The SPADE module combines the previously discussed cost and logistics data to schedule cash outflows for each cost center. The SPADE module will output these projections for each cost center and will aggregate the cash outflows for each of the five fuel management activities and for the total system. Examples of these outputs are found in Appendix D. These results are used in the simple SPADE fee calculations described in section 3.1.4, or are input to the FEAN module as data for more complex fee calculations, as discussed in section 3.2.

In addition to cash outflows for each cost center, SPADE calculates a Use Factor for each year of operation. This factor is defined as the fraction of total facility throughput which will occur in future years. This factor declines from 1.0 to 0.0 as the cost center matures. The Use Factor is used in modeling the amortization of capital costs in both the SPADE and FEAN calculations.

3.1.4 SPADE Fee Calculations

SPADE may be used to perform simple fee calculations for each cost center based on its own throughput, the fuel management activity throughput, or the total system throughput. The fee represents a levelized, or uniform, charge per unit throughput that will recover the appropriate actual and interest costs for a cost center over a specified period. The actual costs represent the cash outflow for the period, minus a correction for any capital costs to be amortized to cost center users in following periods. This correction is called the "Ending Book Value", and will be discussed below. The levelized cost, or fee, for a facility or service is calculated by equating discounted costs and discounted throughput based revenues for the period:

$$\sum_{i=1}^N \frac{E_i}{(1+r)^{i-1}} - \frac{EBV_N}{(1+r)^N} = \sum_{i=1}^N \frac{t_i U}{(1+r)^{i-1}}$$

or,

$$U = \frac{\sum_{i=1}^N \frac{E_i}{(1+r)^{i-1}} - \frac{EBV_N}{(1+r)^N}}{\sum_{i=1}^N \frac{t_i}{(1+r)^{i-1}}}$$

where: U = levelized cost
 r = interest or discount rate
 N = number of years in the levelization period
 E_i = expenditure in year i
 t_i = throughput in year i
 EBV_N = Ending Book Value after year N .

As previously noted, the annual throughput (t_i) for the calculation can be the cost center throughput, the fuel management activity throughput, or the system throughput. If the cost center throughput is selected, the fee represents a levelized unit cost for that cost center's throughput. If the activity throughput is used, the unit cost represents the contribution of that cost center to an overall fuel management facility fee. For example, if the costs of the first interim storage facility are levelized over the throughput of all interim storage facilities, the result represents the portion of an overall interim storage fee attributable to the first facility. Summing such fees for all interim storage facilities would give the overall uniform interim storage or AFR cost center fee. Similarly, using the system throughput as the basis for levelizing the costs of the first interim storage facility will result in the component of an overall uniform system fee attributable to the first interim storage facility. Using the system throughput to determine a uniform fee in this manner is illustrated in the first sample case in section 4.0. The SPADE module output associated with these three levelization outputs is illustrated in Appendix D.

The Ending Book Value (EBV) used in the above calculation represents the unamortized capital cost at the end of the levelization period. There are two components to this cost correction. The first component represents the share of construction or equipment costs attributable to future throughput of the facility or services. The second component represents the share of eventual decommissioning liability which should be accumulated during the levelization period. These components are defined in the equation below:

$$EBV_N = \sum_{i=1}^M \frac{U_N}{U_i} C_i - (1-U_N) \sum_{i=K}^Z C_i / (1+r)^{i-K}$$

- where: N = Year for which EBV is being calculated
- C_i = Capital cost in year i
- U_i = Use Factor for year i, fraction of throughput which will occur after year i
- M = Minimum (N, L-1), where L is the last year of facility operation
- K = Maximum (L+1, N+1)
- Z = Last year a capital cost occurs

The first term represents the fraction of construction or equipment costs unamortized through year N. The use factor ratio in the first term is required so that capital cost incurred after startup are amortized over remaining throughput. The second term represents the portion of the equivalent single decommissioning cost, or trust fund, required in year N+1.

3.2 FEAN Module

The FEAN module uses the cash flow data and Use Factors from SPADE as the basis for more complex fee calculations. The FEAN module will model fee collection schemes based on revenue collection at times other than delivery, such as prepayment a fixed number of years prior to fuel delivery, payment at fuel discharge, or payment at power generation. This module will also calculate time dependent fees for cases where costs are assumed to increase in time from the original estimate. The most complex application of FEAN models an installment payment fee collection scheme.

In addition to calculating the fee, FEAN decomposes the fee into components. The direct component and indirect (interest related) components are determined for four cost categories (capital, fixed operating, variable operating, and decommissioning) for each cost center or activity.

Another important FEAN function is to summarize the spent fuel management program cash flow for the fee calculated. A cash flow balance, which includes interest is presented.

These calculations are described below. Appendix B describes the FEAN input formats. Section 4.2 describes six FEAN sample cases and their results. The input required for the six cases is listed in Appendix C. Appendix D contains selected FEAN output for the cases discussed in section 4.2.

3.2.1 Alternative Fee Basis

FEAN will calculate fees and revenues on bases other than fuel receipt schedule. Examples are fees based on power generation, fuel discharge, and varying degrees of prepayment. The model will allow up to five alternative bases to be specified. The fee for each cost center is calculated using the basis specified by the model user. The fees for all of the cost centers that use the same fee basis are combined to obtain a single fee for that basis. This capability has been used to obtain separate fees for interim storage and for final disposal.

The fee calculation is performed by levelizing costs for each cost center over the specified basis using the equation:

$$U = \frac{\sum_{i=1}^N \frac{E_i}{(1+r)^{i-1}} - \frac{EBV_N}{(1+r)^N}}{\sum_{i=1}^N \frac{b_i}{(1+r)^{i-1}}}$$

where: U = fee for selected cost center
 r = discount rate
 N = levelization period endpoint
 E_i = expenditure in year i
 EBV_N = book value at end of year N (discussed in section 3.1.4)
 b_i = fee basis value for year i .

This equation is identical to the equation discussed in section 3.1 except the selected fee basis replaces throughput in the denominator.

3.2.2 Time Dependent Fees

The FEAN module will update or recalculate fees at various times throughout the levelization period. In this mode, an initial fee is calculated. Then revenues and cash flow balances are projected to the time end point, assuming that fee value is constant. At the time of an update, the fee is recalculated using the best information known at that time. For instance, costs and revenues up to that update time are fixed. The fee levelization period may end at the same point as the original fee calculation or extend to include the same number of years as the original calculation. The fee update calculated in year k can be written as:

$$U_k = \frac{\sum_{i=1}^{N_k} \frac{E_i}{(1+r)^{i-1}} - \sum_{i=1}^{k-1} \frac{R_i}{(1+r)^{i-1}} - \frac{EBV_{N_k}}{(1+r)^{N_k}}}{\sum_{i=k}^{N_k} \frac{b_i}{(1+r)^{i-1}}}$$

where: U_k = updated fee in year k
 N_k = original end of levelization period N or $(N+k-1)$,
where N is constant number of years in levelization period.
 R_i = revenue generated in year i . It is equal to
the fee in year i multiplied by the basis
value in year i .

3.2.3 Time Dependent Fees with Escalating Costs

It is assumed that the fee remains constant between updates, so if costs are escalating, the escalation of the fee will lag the escalation of costs. This model can be used to analyze the effect of escalation on the fee and on the cash flow balance. The model allows a different escalation rate for capital costs and for operating costs. With escalation, the fee update calculation can be written as:

$$U_k = \frac{\sum_{i=1}^N \frac{X_i^C C_i + X_i^O O_i}{(1+r)^{i-1}} - \sum_{i=1}^{k-1} \frac{R_i}{(1+r)^{i-1}} - \frac{EEBV_N}{(1+r)^N}}{\sum_{i=k}^N \frac{b_i}{(1+r)^{i-1}}}$$

where: C_i = capital expenditure in year i
 O_i = operating cost in year i
 X_i^C, X_i^O = capital cost or operating escalation factor
respectively for year i . It is the compounded
escalation observed from year 1 to year i or
 $k-1$, whichever is less, i.e., when updating fee
in year k , the model does not recognize escalation
beyond year $k-1$. It can be written:

$$X_i^C, X_i^O = \prod_{i=1}^{\text{Min}(i, k-1)} (1+e_i)$$

where: $\prod$ = product notation

e_i = the appropriate (capital or operating)
annual escalation rate.

$EEBV_N$ = escalated ending book value. The above capital escalation factors also apply in the calculation of the $EEBV$, namely escalating is recognized up to the earlier, either the time the cost occurs or to the time of update.

3.2.4 Time Dependent Fee with Installment Payments

The most complex fee alternative FEAN calculates is based on multiple or installment payments. This allows for advance payments to lower the government cash outlay followed by an adjustment payment at delivery to correct for any changes in cost estimates after the early fee determination. This option may represent either all customers paying in installments or part of the customers making full payment in advance. The FEAN arithmetic is identical in the two cases.

Variations of the installment payment methodology are allowed in FEAN. In the first installment variation, the fee calculation is identical to the time dependent fee calculations discussed in previous sections and would most likely be based on the spent fuel delivery schedule. The fee is calculated as if it will be collected at delivery, but a portion is collected early. An early installment consists of a fraction of the time-of-delivery fee discounted to installment payment date to account for interest saved. The final payment equals the difference between the fee current at that later time and the early payment (without the discounting). This type of fee reduces the government cash flow deficit, each customer pays the equivalent of the best estimate of the fee at the time their fuel is delivered, and the customer receives the interest benefit of prepayment. These payments may be written:

$$P_{i-k} = \frac{f b_i U_{i-k}}{(1+r)^k}$$

$$F_i = b_i U_i - f b_i U_{i-k}$$

where: f = fraction prepaid

k = number of years prepaid

P_{i-k} = payment received in year $i-k$ for spent fuel delivered in year i

F_i = final adjustment payments for fuel delivered in year i .

The above equation is written for a single prepayment but multiple installments are allowed in FEAN.

In the remaining installment payment variations, the installment payments are recognized in the initial fee calculation. The fee is based on the payment schedule. In this case, the basis terms comprising the denominator in the fee equation reflect the timing of the fractional payment. Thus, the benefit of interest saved is shared by all users. The effective basis term for year i is written:

$$b_i^* = f b_{i+k} + (1-f)b_i$$

where: b_i^* = calculated effective basis term for year i
 b_i = input basis term for year i .

This variation also allows more than one prepayment but the equations shown include only one. The early payment is again a fraction of the fee recognized at the time of the payment. The settlement payment is the non prepaid fraction of the fee current when the final payment is made plus an escalation adjustment to the early payment, calculated in a manner specified by the user.

The first step in the methodology for this variation is to compute the original fee estimate using non-escalated costs and the computed effective basis discussed above. All future revenues and cash flow balances are forecasted with the original fee. When a fee update is being calculated, revenues for spent fuel received since the last fee determination are escalated using pre-specified adjustment factors. The adjustment to the settlement portion of the fee for fuel delivered in year i is:

$$ADJ_i = f b_i \left[\prod_{j=i-k}^{i-1} (1+a_j) - 1.0 \right] U_{i-k}$$

where: ADJ_i = the adjustment for early payments in year i for fuel delivered in year i .

a_j = the fee adjustment factor in year i .

$\prod$ = product notation.

U_{i-k} = the fee recognized when the advance payment is made.

The adjustment factor determines the extent that prepayments exempts customers from the effects of inflation. For example, if all a_j are zero, then there is no adjustment to the settlement fee for cost changes which occur between the initial installment and fuel delivery. If all a_j are greater than zero, then some correction is made for inflation effects. When this installment variation is used to perform the updated fee calculation in year k , the anticipated future revenue adjustment for any spent fuel for which an advance payment has been made prior to year k are estimated and enter into the fee calculation. The fee update calculation can then be written as:

$$U_k = \frac{\sum_{i=1}^N \frac{E_i^C C_i + E_i^O O_i}{(1+r)^{i-1}} - \sum_{i=1}^{k-1} \frac{R_i}{(1+r)^{i-1}} - \sum_{i=k}^N \frac{ANT_i}{(1+r)^{i-1}} - \frac{EEBV_N}{(1+r)^N}}{\sum_{i=k}^N \frac{b_i^*}{(1+r)^{i-1}}}$$

where: b_i^* = the computed basis reflecting the payment timing
 R_i = the revenue collected in year i including any adjustment payments
 ANT_i = the future revenue adjustment that will be collected in year i as anticipated in year k from spent fuel which has made partial payment. This calculation assumes that future adjustment factors (year k and later) are not known but will be estimated in one of three ways as specified by FEAN user:

- 1) Future annual adjustments are zero
- 2) All future annual adjustment factors are equal to the current year k
- 3) The future factors compounded for n years are equal to the past n years compounded to the current year k .

All other factors in this equation have been previously defined.

The fee is first calculated assuming future costs and basis are completely determined. Then an updated fee can be calculated at the beginning of any year.

This update calculation assumes the escalation has occurred up to that time. Revenues collected up to that time, likewise include fee adjustments for all fuel delivered by that time. Escalation is not estimated beyond that time, but spent fuel delivery schedule is assumed to be known, so anticipated fee adjustment revenues are estimated in the fee calculation. This fee updating may be repeated as often as once per year. Each time the fee is calculated, future revenue streams and cash flow balances are calculated assuming that the fee will remain fixed to the end of the analysis. The pre-specified fee adjustment factors are applied only to the period of time between updates.

3.2.5 Cash Flow Summary

An important feature of FEAN is the cash flow analysis. It estimates the annual cash inflow to the government or cash outflow when negative. This analysis presents for each year the calculated fee, the cost to provide the fuel management service, the revenue collected for the service, the net cash flow (revenue less expenses), the interest earned on the previous balance, the cash flow including interest, and the present balance.

Sometimes the cash flow analysis is of primary importance. Consequently, the capability has been implemented in FEAN to pre-specify the fees over time to analyze the resulting cash flow position, bypassing the fee calculation. The fee can be pre-specified for part of the time and FEAN will compute the fee for the other times.

3.2.6 Fee Decomposition

In addition to the escalated costs, revenues, and cash flow balances, FEAN also segregates the fee into direct and indirect components. The indirect component results from the interest and reflects timing of expenditures and basis values. The direct cost component results from the basic fee calculation modified to remove the present value (discounting) terms. This breakdown is presented for four cost categories (capital, fixed operating, variable operating, and decommissioning as well as the total). This breakdown is presented for each cost center as well as system total, but only on the original cost estimates, prior to any fee updating calculations. A negative indirect cost component can occur. This indicates that the effective revenue stream occurs prior to the expense stream for the category, resulting in earned interest.

4.0 SAMPLE CASES

This section describes the sample cases that illustrate the fee calculation alternatives. A single SPADE case is presented in section 4.1. It provides the expenditure forecast that is used in all of the six alternative fee calculations, which are discussed in section 4.2.

The input required for the cases is listed in Appendix C, Table C-1 through C-7. Excerpts from the computer printout are shown in Appendix D.

4.1 Sample Case for SPADE

SPADE generates the expenditure forecasts used by FEAN in alternative fee calculations. In addition, SPADE calculates the levelized unit cost, which is the fee that should be charged if the fee is paid at the time fuel is delivered.

The basic spent fuel logistics and cost data used in the sample cases are the same as those used in the most recent DOE spent fuel fee calculation.⁽¹⁾ Costs are in constant 1980 dollars. A 3% discount rate is used in the sample cases. The following facility installation schedule was used:

<u>Facility</u>	<u>Opening Date</u>
AFR No. 1	1985
AFR No. 2	1991
AFR No. 3	1997
Repository No. 1	1997
Repository No. 2	2000
Repository No. 3	2003

The spent fuel logistics are shown in Table 4.1. The basic cost parameters are shown in Table 4.2.

⁽¹⁾U.S. Department of Energy, "Report on Fee for Spent Nuclear Fuel Storage and Disposal Services", October 1980. DOE/SR-0006.

TABLE 4.1. Spent Fuel Flows^a (Metric Tons Uranium)

<u>Year</u>	<u>Total to Government</u>	<u>AFR 1</u> ^b	<u>AFR 2</u>	<u>AFR 3</u>	<u>REP 1</u> ^c	<u>REP 2</u> ^c	<u>REP 3</u> ^c
1985	1,000	1,000	0	0	0	0	0
1986	615	615	0	0	0	0	0
1987	515	515	0	0	0	0	0
1988	675	675	0	0	0	0	0
1989	665	665	0	0	0	0	0
1990	740	740	0	0	0	0	0
1991	990	210	780	0	0	0	0
1992	1,260	0	1,260	0	0	0	0
1993	1,470	0	1,470	0	0	0	0
1994	1,730	0	1,730	0	0	0	0
1995	2,090	90	2,000	0	0	0	0
1996	2,490	490	2,000	0	0	0	0
1997	2,810	0	760	1,150	900	0	0
1998	3,170	0	0	1,370	1,800	0	0
1999	3,480	0	0	1,680	1,800	0	0
2000	3,890	0	0	1,190	1,800	900	0
2001	4,230	0	0	630	1,800	1,800	0
2002	4,410	-1,000	-290	0	3,900	1,800	0
2003	4,530	-1,000	-2,000	-1,170	6,000	1,800	900
2004	4,740	-1,000	-2,000	-1,860	6,000	1,800	1,800
2005	4,860	-1,000	-2,000	-2,000	4,160	3,900	1,800
2006	4,925	-1,000	-2,000	-990	3,600	3,515	1,800
2007	4,985	0	-1,710	0	2,495	2,400	1,800
2008	5,020	0	0	0	1,680	1,670	1,670
2009	5,020	0	0	0	1,680	1,670	1,670
2010	5,020	0	0	0	1,680	1,670	1,670
Cumulative Maximum		5,000	10,000	6,020	39,295	22,925	13,110

^aOne-third of the reactors are assumed to be BWR that generate about 38 percent of the spent fuel tonnage while two-thirds are PWR that generate the remaining 62 percent of the tonnage.

^bReceipt rate at AFR 2 is 2,000 MTU/yr. Fuel is not shipped to AFR 1 from 1992 through 1994 so that it can receive fuel in 1995 and 1996 when the receipt rate is slightly higher than 2,000 MTU/yr.

^cMaximum receipt rate at the repositories is 1,800 MTU per year for the first 5 years of operation and 6,000 MTU per year thereafter. Repositories will open midyear and, therefore, the first year receipts will be 900 MTU.

TABLE 4.2. Summary of Cost Estimates (Millions of 1980 Dollars)

<u>Cost Center</u>	<u>Description</u>	<u>Annual Operating</u>	<u>Capital</u>	<u>Other</u>
AFR	5,000 MTU capacity at a receipt rate 1,000 MTU/yr	7 or 10 ^a	265	27 for decommission and 0.0063/MTU for storage baskets
	10,000 MTU capacity at a receipt rate of 2,000 MTU/yr	7 or 12 ^a	500	50 for decommission and 0.0063/MTU for storage baskets
Packaging	6,000 MTU/yr	29	460	40 for decommission and 0.0063/canister
Repository	68,000 MTU	18	980	0.009/canister, 21 for capital equipment and 150 for decommission
Transportation	AFR to repository	-		0.022-0.052/MTU
Research and Development	Storage	-		100 through the year 1983
	Disposal	-		4,000 through the year 2003
Government Overhead	Storage	4		
	Disposal	16		

^aOperating cost is the higher value during periods when fuel is being received or transferred and \$7 million per year during periods of storage only.

In most of the sample alternative fee calculations, two different fees will be calculated. The spent fuel delivered prior to the availability of spent fuel disposal will pay a fee that will recover expenses for interim storage (storage fee) and a fee that will recover expenses for disposal service (disposal fee). The spent fuel delivered after disposal is available will pay only the disposal fee. The storage fee will be calculated to recover all interim storage R&D expenses, all interim storage overhead expenses, all costs incurred to provide storage for the spent fuel delivered prior to disposal availability, and the transportation costs of transferring that spent fuel to the repository. The disposal fee is calculated to recover all other spent fuel management expenses, including costs for interim storage that may be required for any fuel delivered after the first repository opens. The following cost centers were defined to facilitate the separate fee calculations:

AFR 1. A 5000 MT AFR starting in 1985 with logistics as shown in Table 6.1.

AFR 2. A 10,000 MT AFR starting in 1991 with logistics the same as Table 6.1 through 1996, the last year disposal is not available. The 760 MT received in 1997 will be treated as input to a separate cost center, AFR 4, so the operating costs for storing fuel delivered in 1997 can be included in the disposal fee.

AFR 3. A 10,000 MT AFR starting to receive fuel in 1997. The logistics are shown in Table 6.1.

AFR 4. An artificial cost center to treat AFR 2 operating costs that are incurred to store spent fuel delivered after the repository opens. This cost center was defined to facilitate the calculation of the separate fees.

TRANSPORTATION 1 through 4. Cost centers allocating the transportation costs of transferring spent fuel from the four AFR cost centers to repositories.

PACKAGING 1 through 3. Identical 6000 MT/yr encapsulation plants starting in 1997, 2000, and 2003 with throughput as shown in Table 4.1 and costs as show in Table 4.2.

REPOSITORY 1 through 3. Identical 68,000 MT repositories starting in 1997, 2000, and 2003 with disposal rates as shown in Table 4.1 and costs as shown in Table 4.2.

MISCELLANEOUS 1. Storage R&D costs totaling \$100 million through 1983.

MISCELLANEOUS 2. Government overhead for storage service of \$4 million/year from 1984 through 2007, the last year fuel is stored in an AFR.

MISCELLANEOUS 3. Repository R&D totaling \$4 billion from 1980 through 2003.

MISCELLANEOUS 4. Government overhead for disposal services of \$14 million/year starting in 1997.

The input data required by SPADE for the sample case is listed in Table C-1 in Appendix C. Appendix A contains the input data description for SPADE.

There are three basic forms of printed output generated by SPADE. These are shown in Appendix D, Tables 1 through 6. The first output form is a listing of the input data describing each cost center cost model. Table D-1 is the listing of the input data that describes the repository cost model. This printed output is merely an echo of the input data for editing purposes.

The second basic form of printed output generated by SPADE is the expenditure forecast, which is generated for each cost center. This table also includes cost center spent fuel input, total system spent fuel input, and the book value at the end of each year. This output is presented in Table D-2 for the first repository cost center in the sample case. The expenditure forecasts are also aggregated for all cost centers

in each major activity and for the total system. The sample case's aggregated expenditures for all repositories is shown in Table D-3 and the total system aggregate expenditure is shown in Table D-4. All expenditures are shown, even though the cost levelization period ends in 2010. At the end of 2010, total system expenditure is \$15.4 billion (1980 dollars) and the system ending book value is \$5.17 billion.

The third basic form of output generated by SPADE presents the levelized unit cost. This form is illustrated in Table D-5 for the first repository cost center. For all cost center types except miscellaneous, the cost center costs are levelized over three bases, the cost center throughput, the total throughput of all cost centers in that activity, and over total spent fuel receipts (total system input). The levelized unit cost for Repository 1 are \$55.01/kg, \$29.52/kg, and 26.76/kg when levelized over facility input, total repository input and total system input, respectively. The total discounted costs and total discounted throughput (numerator and denominator respectively in the levelization formula) are also printed. The miscellaneous cost centers do not represent a facility and do not have a facility throughput, so the costs are levelized over only one basis, specified by the user in the cost center control card (see card type 1 in Appendix A). Table D-6 illustrates the third miscellaneous cost center (repository R&D) levelized over total system input. Its levelized unit cost is \$50.67 per kg of spent fuel delivered to the government (i.e. system input). The total system levelized cost for the sample case is \$190.02/kg consisting of each cost center's levelized cost as shown in Table 4.3.

4.2 Sample Alternative Fee Calculation Cases for FEAN

Six FEAN cases demonstrating various fee alternatives were run. This section describes those cases and presents the results. The card input data required for these cases are shown in Appendix C, Tables C-2 through C-7. Appendix B is the FEAN input description.

There are two major forms of printed output generated by FEAN. The first is a breakdown of the fee into direct and indirect components for

TABLE 4.3. Sample Case Levelized Unit Cost for Each
Cost Center as Calculated by SPADE

<u>Cost Center</u>	<u>Cost Levelized Over System Input (\$/KG)</u>
AFR 1	10.25
AFR 2	13.74
AFR 3	10.78
AFR 4	.15
Transportation 1	1.24
Transportation 2	2.25
Transportation 3	1.48
Transportation 4	.17
Packaging 1	18.17
Packaging 2	11.89
Packaging 3	7.62
Repository 1	26.76
Repository 2	17.34
Repository 3	11.13
Miscellaneous 1	2.39*
Miscellaneous 2	1.54*
Miscellaneous 3	50.67
Miscellaneous 4	<u>2.45</u>
TOTAL	190.02

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*Miscellaneous cost center 1 & 2 unit cost was levelized over total AFR input rather than total system input. The unit cost was adjusted to total system input by multiplying by the total AFR discounted input and dividing by total system discounted input.

capital costs, fixed operating cost, variable operating cost, decommissioning costs, and total costs. This fee breakdown is calculated for each cost center and then aggregated for each basis. Table D-7 exhibits the fee breakdown for the first repository cost center and for the total system fee. The direct cost components are attributable to the expenses as forecasted by SPADE (levelized with a "0" discount rate). The indirect cost is the difference between the unit cost at the designated discount rate and the direct component. A negative indirect unit cost component indicates the revenue attributed to costs are collected more rapidly than the costs occur, resulting in interest earned. For example, the total system fee breakdown in Table D-7 has indirect components of -1.24 and -3.22 for fixed and variable operating costs, respectively. These are negative because temporary storage creates early revenue collection for spent fuel delivered to AFR.

The other form of FEAN printed output, illustrated in Tables D-8 through D-29, reports the cash flow summary. This form shows, for each year, the calculated fee, the annual cost, two revenues (advanced payment and settlement payment), government cash flow, the balance of government cash flow, and the interest on the previous years balance. The final balance of cash flows is compared to the ending book value. This table is written for the original cost estimate (titled ORIGINAL ESTIMATE), a historical summary of the calculations made during fee updating (titled INTERIM ESTIMATE), and the levelized fee that would have been charged if all cost escalation had been known (titled FINAL ESTIMATE). These tables are always printed for each basis (i.e. aggregated for all cost centers that levelize over the same basis) and for system total (i.e. the aggregate of all bases) when more than one basis has been specified.

4.2.1 FEAN Sample Case 1

FEAN sample case 1 calculates a single fee for all spent fuel services to be paid at delivery. The case was intended merely to validate the basic calculation in the two modules, SPADE and FEAN. The discount rate is three percent.

The case 1 input required by FEAN is listed in Table C-2 in Appendix C. The cash flow summary for FEAN sample case 1 is shown in Table D-8. Since no fee updating is required, the original estimate, interim estimate, and final estimate tables are identical. The single levelized fee is \$190.03/kg which agrees (within rounding accuracy) with the SPADE levelized unit cost shown in Table 4.3. The largest annual government outlay is \$598 million in year 1995 and the peak government cumulative deficit is \$6.9 billion in year 2000. The ending book value for all storage and disposal facilities at the end of year 2010 is \$5.1 billion.

4.2.2 FEAN Sample Case 2

FEAN sample case 2 illustrates separate storage fee and disposal fees paid at delivery. The card input required by FEAN for case 2 is listed in Table C-3. All costs of the first two AFR cost centers (including transportation of fuel from AFR to repository) and all storage R&D and overhead (MISCELLANEOUS 1 and 2 cost centers) are allocated to the spent fuel delivered before the repository opens in 1997. This is the storage fee. All other costs are allocated to all spent fuel delivered to the government, from 1985 on. This is the disposal fee.

The storage fee and cash flow summary are presented in Table D-9, the disposal fee and cash flow summary are presented in Table D-10, and the combined cash flow summary is shown in Table D-11. Again since there is no fee updating, the original estimate, interim estimate, and final estimate are identical.

The fee for spent fuel delivered prior to the availability of disposal services is \$126/kg for storage plus \$159/kg for eventual disposal, or a total of \$280/kg. The fee for spent fuel delivered later is \$159/kg for the disposal services. This case has a maximum annual outlay of \$490 million in 1998 and a maximum cumulative deficit of \$5.9 billion in year 2005.

4.2.3 FEAN Sample Case 3

FEAN sample case 3 again calculates separate storage fee and disposal fees, but assumes that the fee will be collected five years before spent

fuel delivery. The fees were recalculated every year to illustrate the fee update feature. The card input required by FEAN for case 3 is listed in Table C-4.

The storage fee and cash flow summary are shown in Table D-12, the disposal fee and cash flow summary are shown in Table D-13, and the combined total system cash flow summary is shown in Table D-14. Again, since there is no escalation, the Original Estimate, Interim Estimate, and Final Estimate were identical. In this sample run, the fee was recalculated each year (controlled by input array LFEE) but the fee does not change with time. This illustrates one aspect of the fee levelization methodology. If the rolling time horizon concept (always levelizing cost for a constant number of years) is used, the fee would change over time, but as long as there is no escalation and the time endpoint is fixed, the fee will be constant.

This case results in a storage fee of \$109/kg and a disposal fee of \$137/kg. These fees are the same as those from case 2 except the indirect component is reduced by the equivalent of five years of interest (interest rate equals discount rate). The main impact of prepayment is its effect on government outlay. The peak annual government expenditure, prior to 1995 (after which revenues are not calculated for this case) is \$455 million in 1995. The maximum cumulative deficit is \$2.3 billion in year 2000. Collecting the fee five years before delivery results in a reduction of sixty percent in the maximum deficit.

4.2.4 FEAN Sample Case 4

Cases 4 through 6 were developed to illustrate the effects of escalation on the levelized fees and on future cash flows. Case 4 assumes annual escalation of 5%. The nominal discount rate was increased to 8.15% to reflect increased interest rates that prevail in periods of high escalation ($1.0815 = 1.03 \times 1.05$). Separate storage and disposal fees were assumed collected when spent fuel is delivered.

The card input required by FEAN for case 4 is listed in Table C-5. The escalation factors are defined by arrays CAPMOD for capital costs and OPMOD for operating costs. The fees are recalculated each year. The

storage fee and cash flow summaries are shown in Tables D-15, -16, -17 (Original Estimate, Interim Estimate, and Final Estimate, respectively). All three are included to illustrate the differences in the three estimates. The Original Estimate does not recognize escalation, the Interim Estimate is the historical calculation and recognizes escalation only up to the time the fee is calculated, and the Final Estimate fee is calculated after all escalation has been realized. The Interim Estimate reflects the actual cash flows that would occur if the postulated scenario occurs. Tables D-18 through D-20 present the three estimates for the disposal fee and cash flows, and D-21 through D-23 presents the three estimates for the combined cash flow projection.

The original estimate for the storage fee is \$139/KG. This is eleven percent higher than the \$126/KG calculated in case 2 even though case 2 had identical expenditures and throughput. The increased fee is caused by the higher discount rate. The storage fee would increase from \$168/KG in 1985 (the first year of delivery) to \$241/KG in 1996 (the last year for the storage fee) if the fee is updated every year while recognizing escalation up to that time (see Table D-16). The levelized storage fee would be \$219/KG if all escalation were known before any fuel is received (see Table D-17). Similarly, the original estimate for the disposal fee is \$249/KG (Table D-18), an increase of 56 percent from case 2 due to the higher discount rate. The disposal fee increases from \$307/KG in 1985 up to \$660/kg in 2010. If all escalation could be anticipated before any spent fuel was delivered, the levelized disposal fee would be \$489/kg (Table D-20), almost double the disposal fee without inflation (original estimate) and triple the disposal fee with the lower discount rate and within inflation in case 2.

If the fee is updated each year (Table D-22), the maximum annual government outlay is \$1.2 billion in 1998 and the peak deficit is \$12.5 billion in 2006. The government fails to recover \$1 billion due to continued cost escalation after all storage fee revenues have been collected. This is the difference between the final cash flow balance plus one years interest and the ending book value.

4.2.5 FEAN Sample Case 5

In case 5, 5% escalation is assumed again with an 8.15% discount rate. This time the separate storage and disposal fees will be collected five years before delivery. The fee will be recalculated each year.

The card input required by FEAN for case 5 is listed in Table C-6. It differs from case 4 only by the 5 year shift of spent fuel receivals in array BASIS. The Interim Estimate of storage fee, disposal fee, and total system cash flows are shown in Tables D-24, -25, and -26, respectively. The initial estimate, without escalation, for the storage fee is \$94/kg. Here the higher discount rate results in a 14 percent lower fee (from case 3) because the costs occur later than revenue collection. If the storage fee is calculated every year (recognizing escalation up to that time) it increases from \$94/kg when paid in 1980 (for spent fuel delivered in 1985) to \$170/kg when paid in 1991 (for spent fuel delivered in 1996).

The initial estimate (without escalation) for the disposal fee is \$168/kg, up 23 percent from case 3. This increase is due to the higher discount rate. If the disposal fee is calculated each year while recognizing escalation up to that time, it increases from \$168/kg in 1980 (for fuel delivered in 1985) up to \$601/kg in 2005 (for fuel delivered in 2010), as shown in Table D-25.

As shown in Table D-26, again ignoring the last 5 years where end effects of no revenues occur, peak annual government outlay is \$807 million in 1995. The peak government deficit is \$3.4 billion in year 2000, again excluding the last five years. The final government shortage is \$3.1 billion which is the difference between the ending cash balance plus interest and the ending book values of all facilities. This shortage is due to continued cost escalation after the collection of all fees. \$1.7 billion of the shortage is in the storage facilities and \$2.4 billion is in the disposal facilities. The latter shortage occurs after all revenue is collected in the model ignoring spent fuel deliveries after 2010, and would be delayed in actual practice until the final facility is shutdown.

4.2.6 FEAN Sample Case 6

In case 6, 5% escalation is assumed again with an 8.15% discount rate. The separate storage and disposal fees will be collected in installments, with 60% of the fee paid 5 years before delivery and the balance paid at delivery. This fee methodology applied in this case is the first variation of the installment fee discussed in section 3.2.4. The reported fee is based on spent fuel delivery, not on the payment schedule. Each customer receives a payment reduction for the interest saved by the prepayment. All corrections required because of incorrect information about the ultimate fee at delivery are collected directly from each customer. The fee will be recalculated every year.

The card input required by FEAN for case 6 is listed in Table C-7. Here the array BASIS represents the spent fuel delivery schedule. The installment scenario is described by LADJSW, LDEL, DEL, ADJ, and LADJ as described in Appendix B. The Interim Estimate of storage fee, disposal fee, and combined cash flows for case 6 are shown in Tables D-27, -28, and -29, respectively. The reported fees are identical to those in case 4, where fee is based on spent fuel delivery. The storage fee ranges from \$139/kg in 1980 for fuel delivered in 1985 (only 60 percent is paid in 1980) up to \$241/kg when fuel is delivered in 1996 (only 40 percent is paid). The disposal fee ranges from \$249/kg in 1980 up to \$660/kg in 2010.

As shown in Table D-29, if the last five years is ignored, the maximum annual government outlay is \$826 million in 1995. The peak government deficit is \$5.7 billion in 2001, again ignoring the last five years where the end effect is caused when no advance payments are received. The final government shortage is \$1.0 billion, due to continued cost escalation after all storage fees have been collected.

4.2.7 FEAN Case Summary

Table 4.3 is a summary of the results from the six FEAN sample cases.

TABLE 4.3. Summary of FEAN Results

	<u>Case 1</u>	<u>Case 2</u>	<u>Case 3</u>	<u>Case 4</u>	<u>Case 5</u>	<u>Case 6</u>
Years before delivery that payment is made	0	0	5	0	5	60%-5 40%-6
Discount Percentage	3	3	3	8.15	8.15	8.15
Escalation Percentage	0	0	0	5	5	5
Storage Fee (\$/KG)						
Original Estimate		126	109	139	94	139
Yearly Update	(a)			168-241	94-170	139-241
Final Estimate				219	148	219
Disposal Fee (\$/KG)						
Original Estimate	190	159	137	249	168	249
Yearly Estimate				307-660	168-601	249-660
Final Estimate				489	331	489
Maximum Annual Expenditure						
\$ Million	698	490	455	1204	807	826
Year	1995	1998	1995	1998	1995	1995
Peak Cash Flow Deficit						
\$ Billion	6.9	5.9	2.3	12.5	3.4	5.7
Year	2000	2005	2000	2006	2000	2001
Final Government Shortage (\$ Billion) (Cash Flow Balance less Facility Book Value)	--	--	--	1.0	3.1	1.0

(a) Single fee only for case 1.

APPENDIX A

Module 1 (SPADE) Input Requirements

APPENDIX A

Module 1 (SPADE) Input Requirements

SPADE is the first of two modules in the spent fuel fee model. SPADE computes cash expenditures and use based levelized fee for spent fuel management services. SPADE can be processed independently or can be used to generate a file of expenditures and facility use factors for input to module 2 (FEAN), which calculates fees defined in alternate ways. SPADE calculates expenditures for individual cost centers. A cost center is an accounting entity for which expenses may be separated (commonly some facility) and allocated to some basis (commonly the facility throughput). SPADE calculates levelized unit cost for each cost center.

Basically, four groups of data are required as input to SPADE. The first group is merely a case title. The second group defines when facilities are built and various other economic parameters. The third group is the spent fuel logistics. The fourth group specifies various cost models for the various cost centers. A cost model is a set of data that completely describes all expense for a cost center. Table C-1 in Appendix C is a listing of the input data for the sample SPADE run.

GROUP 1 Input Requirements

The first data group is a single card containing a case title.

GROUP 2 Input Requirements

The second data group describes the economic lifetimes for the cost centers and various economic factors that define the expenditure pattern and cost allocation. This data group uses the standard FORTRAN input technique called namelist. A single read statement allows inputting values for all variables included in a namelist statement in the FORTRAN program. Only those variables that require values different from the preset value need to be specified. This namelist set name is INDAT. The following variables are included in the namelist set INDAT. If the variable is a dimensioned array, the dimensions are shown in parentheses.

IYEAR is the initial calendar year of analysis. Default value is 1977. The fourth year of data is presently the first year of data written out for use in FEAN.

IP1 is a print control variable. Default value is 2.

If IP1 is 0, only the aggregated total system cash flows are printed.

If IP1 is 1, aggregated cash flows for each cost center type is printed as well as the system total.

If IP1 is 2, cash flows for each cost center as well as the aggregated cash flows are printed.

DSCFT is the discount fraction, 7.5% is input as .075. Default value is .065.

NYEAR is the number of years in the analysis. Default value is 100. Maximum is 100.

LEVB is the first calendar year for levelization. Default value is 1977.

LEVE is the last calendar year for levelization. Default value is 2076.

LEVP is the number of years of costs and throughputs entering in the levelization calculation. Default value is 10. Maximum is 100. If LEVP is non zero, a constant length period will be used in the levelization. If LEVP is zero, the cost will always be levelized using the same end time, LEVE.

LEVR is the update frequency, in years, for the cost levelization. The levelization calculation is repeated every LEVR years, starting in year LEVB through year LEVE. Default value is 1.

IAL indicates the basis for ending book value. The default value is 2.

If IAL is 1, the ending book value is based on the ratio of time remaining divided by facility lifetime.

If IAL is 2, the ending book value is based on the ratio of future throughput divided by total lifetime throughput.

ILEN is a variable used only with type 5 capital costs, those that are throughput related. ILEN is the number of years of useful lifetime for that capital. This is used in the ending book value determination. (See card type 2 discussion below)

ASMWT (2) is the spent fuel weight per package disposed (Kg/package). Default is 450 and 400 for PWR and BWR, respectively.

NAFRT is the number of AFR and Transportation cost models that will be input in the group 4 data which follows. The maximum allowed is 5.

NAFRB is the number of AFR and Transportation cost centers that will be modeled. Twenty is the maximum number allowed in SPADE but the next module, FEAN, allows only five at the present time.

NAFRD (20,5) are parameters that describe the cost centers modeled. The first subscript is the AFR cost center index. The second subscript indicates NAFRD parameter function.

- 1 - Index of cost model (see group 4 data) to use (must be an integer value from 1 to NAFRT)
- 2 - Initial year of operation (such as 1980)
- 3 - Final year of operation (such as 1995)
- 4,5 - Used internally, no input required.

NREPT, NREPB, and NREPD define the Repository and Packaging cost centers. They provide the same functions as NAFRT, NAFRB, and NAFRD do for AFR and Transportation cost centers.

NMIST, NMISB, and NMISD define the miscellaneous cost centers. They provide the same functions as NAFRT, NAFRB, and NAFRD do for AFR and Transportation cost centers.

GROUP 3 Input Requirements

The third data group describes the spent fuel logistics. This group also uses the standard FORTRAN namelist input technique. This namelist set name is MSFLWS. The following variables (array dimensions are again shown in parentheses) are included in namelist set MSFLWS.

AFRT (100,2,20) AFR spent fuel receiving rate (MT/yr).

TRTHP (100,2,20) AFR spent fuel extraction rate (MT/yr).

REPT (100,2,20) Packaging and repository spent fuel receiving rate
(MT/yr)

In all three arrays above the first subscript is year index,
the second subscript is reactor type,

1 - PWR

2 - BWR

The third subscript is the cost center index.

GROUP 4 Input Requirements

The last data group defines the cost center models. The cost data are described relative to a reference time, so a cost center model may be used more than once to define separate cost centers. The reference times are specified in arrays NAFRD, NREPD, or NMISD above. Several sets of cards are read, each set describes a cost model. The sets must be input in the following order:

AFR cost models 1 through NAFRT

Packaging facility cost models 1 through NREPT

Repository cost models 1 through NREPT

Transportation cost models 1 through NAFRT

Miscellaneous cost models 1 through NMIST.

Each set of cards that describe a cost model consists of a cost model control card, followed by the number of capital cost detail cards that are specified on the control card, followed by the number of fixed operating cost detail cards that are specified on the control card, followed by the number of variable operating cost detail cards that are specified on the control card. Each detail card contains a single cost factor with parameters which define when the cost occurs. A single cost factor may be used to specify a cost repeated in more than one year.

This data group is input using standard FORTRAN formatted read statements. The following variable names are used only in this text and are not necessarily used internally in the FORTRAN program. The following formats are required:

CARD TYPE 1 - COST MODEL CONTROL CARD

<u>Format</u>	<u>Variable Name and Description</u>
A72	TITLES - Description of cost model
I2	N1 - Number of capital cost detail cards to follow (maximum = 25)
I2	N2 - Number of fixed operating cost detail cards to follow (maximum = 25)
I2	N3 - Number of variable operating cost detail cards to follow (maximum = 25)
I2	N4 - Specifies levelization basis for miscellaneous cost models only. Not used for other types of cost models. 1 - Total system receipts (MT) AFR receipts plus repository receipts minus AFR extraction 2 - Total AFR receipts (MT) 3 - Total repository receipts (MT) 4 - First AFR receipts (MT) 5 - First repository receipts (MT)

CARD TYPE 2 - CAPITAL COST DETAIL CARDS (N1 Cards are Needed)

<u>Format</u>	<u>Variable Name and Description</u>
A20	A1 - Capital cost title
E16	A2 - Capital cost, \$ million or \$ million per unit throughput if IA3 equals 5.
1X13	IA3 - Switch indicating the year(s) in which the cost occurs The next variable in this card, IA4 is used to determine year of occurrence. If IA3 is 1, the cost occurs in the first year of operation plus IA4. If IA3 is 2, the cost occurs in the last year of operation plus IA4. If IA3 is 3, the cost occurs in every year of operation. If IA3 is 4, the cost occurs in the year that the cost center's cumulative throughput equals variable A5 in this card.

For AFR cost centers, the throughput is MT of spent fuel received, for transportation cost centers, the throughput is MT of spent fuel removed from AFR, for packaging and repository cost centers, the throughput is containers disposed, and for miscellaneous cost centers, the throughput is dependent on N4 defined in card type 1.

If IA3 is 5, the cost in each year of operation is A2 multiplied by the facility throughput. This type of capital cost is then amortized ILEN years in the ending book value calculation. ILEN was input in namelist INDAT. Throughput is defined immediately above.

If IA3 is 6, then A2 is a decommissioning cost occurring in last year of operation plus IA4.

1XI3   IA4 - Year increment used to specify year the cost occurs. Its significance is dictated by the value IA3. IA4 may be negative.

1XE15   A5 - The cumulative cost center throughput at which the capital cost will occur. A5 is used only when IA4 is equal to 4.

CARD TYPE 3 - FIXED OPERATING COST DETAIL CARD (N2 Cards are Needed)

<u>Format</u>	<u>Variable Name and Description</u>
A20	B1 - Fixed cost title
E16	B2 - Cost, \$ million/year
1XI3	IB3 - Switch indicating the year(s) in which the cost occurs. The next variables in this card, IB4 and IB5 may be used to determine year of occurrence. If IB3 is 1, the cost occurs in each year of operation. If IB3 is 2, the cost occurs in each year from the first year of operation plus IB4 to the first year of operation plus IB5. IB5 equal to zero implies last year of operation. If IB3 is 3, the cost occurs in last year of operation plus IB4.
1XI3	IB4 - Year increment used to specify year the cost occurs in. Its significance is dictated by the value IB3.
1XI3	IB5 - Year increment used to specify year the cost occurs in. Its significance is dictated by the value IB3.

CARD TYPE 4 - VARIABLE OPERATING COST DETAIL CARD (N3 Cards are Needed)

<u>Format</u>	<u>Variable Name and Description</u>
A20	C1 - Variable cost title
E16	C2 - Variable operating costs, \$ million per unit throughput; or \$ million per year if IC5 is equal to 4 and either input or output throughput is not zero. IC5 is specified later in this input card. For AFR cost center, input is MT of spent fuel received at AFR facility, output is MT of spent fuel extracted from AFR facility. For packaging and repository facility, throughput is packages of spent fuel disposed. For transportation cost centers, throughput is MT of spent fuel extracted from AFR facility. For miscellaneous cost center, throughput is dependent on N4 defined in Card Type 1.
1XI3	IC3 - Beginning year relative to facility startup for which this variable cost applies.
1XI3	IC4 - Last year relative to facility startup for which this variable cost applies. IC4 equal to zero implies last year of operation.
1XI3	IC5 - An indicator specifying cost center throughput the variable unit cost applies to. If IC5 is 1, unit cost is applied to cost center input. If IC5 is 2, unit cost is applied to cost center output. This can be used only for AFR cost centers. If IC5 is 3, unit cost is applied to cost center input plus output. This can be used only for AFR cost centers. If IC5 is 4, then C2 is an annual cost occurring any year there is throughput. If the cost center is an AFR, throughput is either receipt or extraction of spent fuel. IC6 - Spent fuel type IC6 = 1 for PWR IC6 = 2 for BWR

APPENDIX B

Module 2 (FEAN) Input Requirements

APPENDIX B

Module 2 (FEAN) Input Requirements

FEAN is the second computer module in the spent fuel fee model. It can calculate spent fuel management fees in several prescribed ways. A file of cost center expenditure information and use factors must be generated by SPADE before FEAN can be run. This file is read by FEAN from logical unit 25 by a series of standard FORTRAN unformatted read statements. The user normally is not concerned with inputting this file, but the capability exists to modify this data with namelist CFDAT, discussed below.

The cost center data is on an annual basis, and FEAN assumes the first year is 1980. Fifty years of data are read from the SPADE file, but FEAN uses only up to 2010. These first and last year choices were made arbitrarily and are set in the FEAN main program.

FEAN Punched Card Input

The FEAN data is input on cards using the FORTRAN standard input technique called namelist. With the namelist technique, only the values that are changed from preset values need to be specified. Even if no values are to be changed, the namelist ID card and END control card must still be present in the card deck. Two sets of namelist data are used and they are named CFDAT and CARD.

The namelist CFDAT set includes the cost center expenses in arrays ACD, PCD, RCD, TCD, XCD, and the number of cost centers NAFRB, NPAKB, NREPB, NTRNB, and NMISB, for cost center types AFR's, packaging facilities, repositories, transportation, and miscellaneous respectively. These values are read from the file created by SPADE, but this namelist input allows the user to make minor changes to the spade data without rerunning SPADE. This capability has rarely been used.

The dimensions on the arrays are (50,6,5); where:

The first subscript is year index.

The second subscript controls what the value represents

- 1 is capital cost (\$ million)
- 2 is fixed operating cost (\$ million)
- 3 is variable operating cost (\$ million)
- 4 is use factors ranging from 1. at startup to 0. at shutdown
- 5 and 6 are not used in FEAN

The third subscript is cost center index.

The namelist set CARD includes the parameters that control the alternative fee calculations. For annual data, the first year is 1980. The following variables may be specified by namelist CARD. If the variable is a dimensioned array, the dimensions are shown in parentheses.

BASIS (50,5) - Up to five bases that may be used for the levelized fee calculation. The sum of the present valued basis is the denominator in the basic levelization equation. The expenses for all cost centers that use the same basis are grouped together and an aggregated fee and revenues are determined for each basis. Throughout the FEAN data and fee calculations, parameters are keyed to basis index, so different fee specifications can apply to the five bases. These values must be specified in the correct units to compute the fee in the desired unit, i.e. SPADE costs are in \$ million so if desired units for fee is in \$/kg, the bases must be specified in million kg.

The first subscript is year.

The second subscript is basis index. (5 maximum)

NBAS - Number of bases input in BASIS. (5 maximum)

LBAS (10,5) - A value is input for each cost center which specifies which basis is to be used by each cost center for the fee and revenue calculations. A non zero value must be input for each cost center defined in SPADE. Maximum value is NBAS. Default value is 1.

First subscript is cost center index within cost center type.

Second subscript is cost center type:

- 1 = AFR
- 2 = Packaging
- 3 = Repository
- 4 = Transportation
- 5 = Miscellaneous

CAPMOD (50), OPMOD (50) - Annual escalation factors for capital and operating costs, respectively. At the time a fee calculation is being made, only the compounded escalation rates up to that time are recognized. No future escalation is assumed. The factor is applied at the beginning of the year, so if SPADE costs are in 1980 constant dollars, the escalation factor for 1980 should be 1.0. The default value is 1.0. If the escalation rate is 3%, the value specified is 1.03

LFEE (50) - The years in which the fee will be updated, input as year such as 1980. The first and last year should always be specified. The years must be listed in ascending order, i.e. (1980, 1990, 2010). The fee and resulting revenues will only be recalculated in the years so specified.

DSCFT is the discount rate. If discount rate is 7%, then the value should be .07.

LDEBUG is used to obtain additional printed output. If LDEBUG is greater than 0, the calculated fee and cash flow tables will be generated for each cost center. If LDEBUG is less than zero, the cost center tables will be printed each time fee is updated. If LDEBUG equals zero, only cash flow tables aggregated for each basis are printed. The default value is zero.

LOOK is the number of years of cost data to use in the cost levelization, i.e. a rolling planning horizon. If LOOK is zero, then all data up to the last year (presently 2010) is used in all fee calculations. If LOOK is not zero, LOOK is the number of years of costs and throughputs included in each fee calculation, starting with the update year specified in LFEE.

If the rolling horizon is used with payments prior to delivery, then the BASIS array should represent the payment schedule. In this case, the number of years prepaid should be input in LDEL (1,I) where I is the basis index. This is necessary to align cost terms with basis terms.

LFIX is the number of years the levelized fee may be fixed (pre-specified).

FIX (50,6,5) is the pre-specified fee, if the FIX value is greater than zero and if year index is less than or equal to LFIX. If FIX is zero, then the fee is calculated. This FIX capability may be used to bypass the fee calculation but still perform a financial analysis of the spent fuel management program or to initialize for introductory years.

The first subscript is year index.

The second subscript is cost center index within cost center type.

The third subscript is the cost center type index:

- 1 = AFR
- 2 = Packaging
- 3 = Repository
- 4 = Transportation
- 5 = Miscellaneous

LSM (2,5) is used to allow installment payments of the amount due in a specified year. This option was intended to relieve reactor operators of a painful large payment when the government first starts taking delivery of spent fuel. LSM (1,I) is the year index and LSM (2,I) is the number of years over which payment may be smeared. This option is ignored in the fee calculation, so interest is added to the delayed payments as revenue is generated.

The second subscript is basis index, so the option is keyed to all cost centers using the basis schedule.

The remaining variables discussed in this section are used to specify a fee alternative where pre-payments are made with a final adjustment at time of delivery. This option may be used to model either installment payments for all reactor operators or the concept of some operators contracting and paying for fuel management services in advance. The arithmetic is identical in both cases.

LADJSW (5) is an array of switches to initiate the pre-payment with fee adjustment at delivery option. The subscript is basis index, so all cost centers levelizing costs on the same basis use the same pre-payment scheme. When this method is used, the input BASIS array represents the spent fuel delivery schedule, not the apyment schedule. Except when LADJ = 3, the effective levelization basis is then calculated from the delivery schedule and the prepayment factors (LDEL and DEL discussed below). The value LADJSW is the number of entries in each of the arrays LDEL and DEL discussed below and is the number of partial payments that will be made. Default is zero, which indicates this option will not be used.

LDEL (6,5) and DEL (6,5) are pairs of parameters used to describe when payments will be made. The first subscript represents the installment index and the second subscript is the basis index, so all cost centers levelizing costs on the same basis use the same payment schedule. The value in LDEL is the number of years before delivery (0 indicates payment made at delivery) the installment will be made and the value in DEL is the fraction of the fee that will be paid in the installment. The number of LDEL and DEL values required for each basis is equal to the number input in array LADJSW. The DEL values for each basis should sum to 1.0. Except when LADJ = 3, the effective levelization basis is based on this payment schedule, not on the fuel delivery schedule. Each payment is based on the fee as perceived at the time of payment. Then when fuel is delivered, an adjustment payment is calculated based on fee adjustment factors (ADJ) discussed below.

ADJ (50) is the fee adjustment factors, where the subscript is the year index. ADJ is initialized to 1.0. If the adjustment factor is 4% per year, the value should be input as 1.04. The ADJ array is used in two ways. Adjustment fee revenues are collected when spent fuel is delivered, based on the ADJ factors the fee perceived when the payment is made. The ADJ factors are also used when the fee is calculated to estimate anticipated future revenues for adjustments, but only for spent fuel that has already made partial payment. In the levelized fee calculation both the adjustment payments and the anticipated future adjustments are deducted from the expenses to be recovered. It is assumed at the update time that future values of ADJ are not known, so the anticipated future revenue adjustments are estimated using past values of ADJ in one of 3 prescribed ways. Variable LADJ specifies which of the 3 estimates will be used and is described below.

LADJ is a switch controlling the estimation of anticipated future fee adjustment revenue, when the fee is being updated, as discussed below. These anticipated payments are based on previous adjustment factors (ADJ), since it is assumed that future adjustments (ADJ) are not known. Three possible estimating scenarios are available, depending on the value of LADJ.

If LADJ is 0, all future values of ADJ are assumed to be 1.0, i.e. no adjustment.

If LADJ is 1, all future values of ADJ are assumed to be equal to the ADJ value for the last year before fee update.

If LADJ is 2, the compounded adjustment factor for the next N years from year of update is assumed to be equal to the compounded adjustment factor for the last N years, ending at the year before fee update.

If LADJ is 3, a different prepayment scheme is used.

This is the first installment fee variation discussed in section 3.2.4. In this case, the effective fee basis is the spent fuel delivery schedule, i.e. costs are levelized over the terms specified in BASIS. The payments are made in advance as specified by the DEL and LDEL arrays.

INDFR is the index of the first year of revenue collection when the prepayment scheme is used. If applying the LDEL, DEL arrays indicates payment before year INDFR, the payment occurs in year INDFR. This is used to keep all revenues in the future. The early fee payments are based on the fee recognized at time of payment, reduced by an interest credit for early payment. The adjustment at delivery is the difference between the fee recognized at time of delivery and the amount prepaid. The adjustment factors (array ADJ) are not used in this case.

APPENDIX C

SAMPLE CASE INPUTS

TABLE C-1. SPADE Input for Sample Case

CARD NO.	CARD ENTRY	COMMENTS
1.	SPENT FUEL CHARGE CALCULATIONS (1 JULY 80)	TITLE CARD
2.	SIN DAY	START 'INDAT' NAMELIST DATA
3.	USCFI = 0.030,	
4.	LEVPR = 31, LEVR = 31,	
5.	LEVPR = 1980, LEVR = 2010,	
6.	NAFRI = 3, NAFRI = 4,	
7.	NAFRD = 1, 2, 3, 16*0,	
8.	1985, 1991, 1997, 1997, 16*0,	
9.	2006, 2007, 2007, 2007,	
10.	NHEPT = 1, NHEPT = 3,	
11.	NHEPDR = 3*1, 17*0,	
12.	1997, 2000, 2003, 17*0,	
13.	3*2021,	
14.	NHISL = 4, NHISL = 4,	
15.	NHISD = 1, 2, 3, 4, 16*0,	
16.	1980, 1984, 1980, 1997, 16*0,	
17.	2010, 2007, 2021, 2021,	
18.	SEND	END 'INDAT' NAMELIST DATA
19.	MSFLWS	START 'MSFLWS' NAMELIST DATA
20.	AFRT(1,1,1)=7*0., 0., 620., 381., 319., 419., 412., 459., 130., 3*0., 56., 304., 80*0.,	
21.	AFRT(1,2,1)=7*0., 0., 380., 234., 196., 258., 253., 281., 80., 3*0., 34., 186., 80*0.,	
22.	AFRT(1,1,2)=14*0., 484., 781., 411., 1073., 1240., 1240., 80*0.,	
23.	AFRT(1,2,2)=14*0., 296., 479., 559., 657., 760., 760., 80*0.,	
24.	AFRT(1,1,3)=20*0., 713., 849., 1042., 738., 391., 75*0.,	
25.	AFRT(1,2,3)=20*0., 437., 521., 630., 452., 239., 75*0.,	
26.	AFRT(1,1,4)=20*0., 471., 79*0.,	
27.	AFRT(1,2,4)=20*0., 289., 74*0.,	
28.	INTMP(1,1,1)=25*0., 5*620., 76*0.,	
29.	INTMP(1,2,1)=25*0., 5*380., 76*0.,	
30.	INTMP(1,1,2)=25*0., 180., 4*1240., 609., 69*0.,	
31.	INTMP(1,2,2)=25*0., 110., 4*760., 341., 69*0.,	
32.	INTMP(1,1,3)=26*0., 723., 1153., 1240., 614., 70*0.,	
33.	INTMP(1,2,3)=26*0., 448., 707., 760., 376., 70*0.,	
34.	INTMP(1,1,4)=30*0., 471., 74*0.,	
35.	INTMP(1,2,4)=30*0., 289., 74*0.,	
36.	HEPT(1,1,1)=20*0., 558., 4*1116., 2418., 3720., 3720., 2579., 2232., 1547., 6*1042.,	
37.	1054., 1041., 1141., 1184., 1234., 1283., 1327., 6358., 55*0.,	
38.	HEPT(1,2,1)=20*0., 342., 4*660., 1402., 2200., 2200., 1581., 1364., 946., 6*638.,	
39.	646., 669., 699., 726., 736., 707., 613., 3847., 55*0.,	
40.	HEPT(1,1,2)=21*0., 558., 4*1116., 2418., 2179., 1488., 6*1035., 1042., 1091.,	
41.	1141., 1184., 1234., 1277., 1327., 16505., 55*0.,	
42.	HEPT(1,2,2)=23*0., 342., 4*660., 1402., 1336., 912., 6*635., 638., 669., 699.,	
43.	726., 736., 783., 813., 10140., 55*0.,	
44.	HEPT(1,1,3)=26*0., 559., 4*1116., 6*1035., 1042., 1091., 1141., 1184., 1234.,	
45.	1277., 1327., 22630., 55*0.,	
46.	HEPT(1,2,3)=26*0., 342., 4*660., 6*635., 638., 669., 699., 726., 736., 783.,	
47.	813., 13870., 55*0.,	
48.	SEND	END 'MSFLWS' NAMELIST DATA
49.	AFR 1 5000 01	AFR 1 DATA
50.	CAPITAL CONSTRUCTION 1.000 E+02, 1, -4, 0.	
51.	CAPITAL CONSTRUCTION 1.000 E+02, 1, -3, 0.	
52.	CAPITAL CONSTRUCTION 6.500 E+01, 1, -2, 0.	
53.	CAPITAL CONSTRUCTION 3.000 E+01, 1, -1, 0.	

TABLE C-1. (Continued)

CARD NO.	CARD ENTRY	COMMENTS
54.	DECOMMISSIONING 2.650 E+01, 6, 1, 0.	
55.	FIXED COST 7.00 E+00, 1, 0, 0	
56.	HASKETS PER 5.8 E+00, 1, 0, 1, 1	
57.	HASKETS PER 7.2 E+00, 1, 0, 1, 2	
58.	OPERATING DELTA 3.00 E+00, 1, 0, 4, 1	
59.	AFR 2 10000 BT	6 1 3 AFR 2 AND 3 DATA
60.	CAPITAL CONSTRUCTION 2.00 E+01, 1, -5, 0.	
61.	CAPITAL CONSTRUCTION 5.00 E+01, 1, -4, 0.	
62.	CAPITAL CONSTRUCTION 1.40 E+02, 1, -3, 0.	
63.	CAPITAL CONSTRUCTION 2.00 E+02, 1, -2, 0.	
64.	CAPITAL CONSTRUCTION 4.00 E+01, 1, -1, 0.	
65.	DECOMMISSIONING 5.00 E+01, 6, 1, 0	
66.	FIXED COST 7.00 E+00, 1, 0, 0	
67.	HASKETS PER 5.8 E+00, 1, 0, 1, 1	
68.	HASKETS PER 7.2 E+00, 1, 0, 1, 2	
69.	OPERATING DELTA 3.00 E+00, 1, 0, 4, 1	
70.	AFR 4 OPER COST ONLY	0 1 2 AFR 4 DATA
71.	FIXED COST 3.00 E+00, 2, 1, 1	
72.	HASKETS PER 5.8 E+00, 1, 0, 1, 1	
73.	HASKETS PER 7.2 E+00, 1, 0, 1, 2	
74.	ENCAPSULATION PLANT 7/11/00	11 1 2 PACKAGING PLANT DATA
75.	CAPITAL CONST. 5.9 E+00, 1, -7, 0.	
76.	CAPITAL CONST. 3.84 E+01, 1, -6, 0.	
77.	CAPITAL CONST. 3.46 E+01, 1, -5, 0.	
78.	CAPITAL CONST. 6.19 E+01, 1, -4, 0.	
79.	CAPITAL CONST. 1.337 E+02, 1, -3, 0.	
80.	CAPITAL CONST. 4.55 E+01, 1, -2, 0.	
81.	CAPITAL CONST. 4.61 E+01, 1, -1, 0.	
82.	DECOMMISSIONING 4.2 E+00, 6, 1, 0	
83.	DECOMMISSIONING 1.46 E+01, 6, 2, 0	
84.	DECOMMISSIONING 1.69 E+01, 6, 3, 0	
85.	DECOMMISSIONING 6.3 E+00, 6, 4, 0	
86.	FIXED COST 2.40 E+01, 1, 0, 0	
87.	VARIABLE COST PER 6.30 E+03, 1, 0, 1, 1	
88.	VARIABLE COST PER 6.30 E+03, 1, 0, 1, 2	
89.	GENERAL REPOSITORY 7/11/00	13 1 2 REPOSITORY DATA
90.	CAPITAL CONST. 5.96 E+01, 1, -7, 0.	
91.	CAPITAL CONST. 1.005 E+02, 1, -6, 0.	
92.	CAPITAL CONST. 2.587 E+02, 1, -5, 0.	
93.	CAPITAL CONST. 2.160 E+02, 1, -4, 0.	
94.	CAPITAL CONST. 1.401 E+02, 1, -3, 0.	
95.	CAPITAL CONST. 1.422 E+02, 1, -2, 0.	
96.	CAPITAL CONST. 9.100 E+00, 1, -1, 0.	
97.	CAPITAL EQUIP. 2.14 E+01, 4, 0, 9.0	E+04
98.	DECOMMISSIONING 7.8 E+00, 6, 1, 0	
99.	DECOMMISSIONING 2.04 E+01, 6, 2, 0	
100.	DECOMMISSIONING 4.04 E+01, 6, 3, 0	
101.	DECOMMISSIONING 4.81 E+01, 6, 4, 0	
102.	DECOMMISSIONING 3.26 E+01, 6, 5, 0	
103.	FIXED COST 1.82 E+01, 1, 0, 0	
104.	VARIABLE COST PER 4.03 E+03, 1, 0, 1, 1	
105.	VARIABLE COST PER 4.03 E+03, 1, 0, 1, 2	
106.	BASE TRANSPORTATION	2 TRANSPORTATION 1 DATA
107.	TRANSPORTATION PER 2.027 E+05, 1, 0, 1, 1	
108.	TRANSPORTATION PER 2.027 E+05, 1, 0, 1, 2	
109.	BASE TRANSPORTATION	2 TRANSPORTATION 2 AND 3 DATA
110.	TRANSPORTATION PER 2.027 E+05, 1, 0, 1, 1	

TABLE C-1. (Continued)

CARD NO.	CARD ENTRY	COMMENTS
111.	TRANSPORTATION BWH 2.027 E+05, 1, 0, 1, 2	
112.	BASE TRANSPORTATION	2 TRANSPORTATION 4 DATA
113.	TRANSPORTATION FWH 2.027 E+05, 1, 0, 1, 1	
114.	TRANSPORTATION BWH 2.027 E+05, 1, 0, 1, 2	
115.	AFM N+D 9/6/79	4 2 MISCELLANEOUS 1 DATA
116.	N+D CUST 1980 3.4 E+01, 1, 0, 0.	
117.	N+D CUST 1981 2.2 E+01, 1, 1, 0.	
118.	N+D CUST 1982 2.2 E+01, 1, 2, 0.	
119.	N+D CUST 1983 2.2 E+01, 1, 3, 0.	
120.	GOVERNMENT OVERHEAD CUST	1 2 MISCELLANEOUS 2 DATA
121.	ANNUAL COST 4.0 E+00, 1, 0, 0	
122.	ENGINEERING AND DEVELOPMENT COSTS 7/11/80	24 1 MISCELLANEOUS 3 DATA
123.	N+D CUST 1980 1.584 E+02, 1, 0, 0.	
124.	N+D CUST 1981 1.757 E+02, 1, 1, 0.	
125.	N+D CUST 1982 2.606 E+02, 1, 2, 0.	
126.	N+D CUST 1983 3.461 E+02, 1, 3, 0.	
127.	N+D CUST 1984 3.413 E+02, 1, 4, 0.	
128.	N+D CUST 1985 3.010 E+02, 1, 5, 0.	
129.	N+D CUST 1986 2.506 E+02, 1, 6, 0.	
130.	N+D CUST 1987 1.031 E+02, 1, 7, 0.	
131.	N+D CUST 1988 .956 E+02, 1, 8, 0.	
132.	N+D CUST 1989 1.076 E+02, 1, 9, 0.	
133.	N+D CUST 1990 1.348 E+02, 1, 10, 0.	
134.	N+D CUST 1991 1.463 E+02, 1, 11, 0.	
135.	N+D CUST 1992 1.546 E+02, 1, 12, 0.	
136.	N+D CUST 1993 1.539 E+02, 1, 13, 0.	
137.	N+D CUST 1994 1.554 E+02, 1, 14, 0.	
138.	N+D CUST 1995 1.624 E+02, 1, 15, 0.	
139.	N+D CUST 1996 1.627 E+02, 1, 16, 0.	
140.	N+D CUST 1997 1.723 E+02, 1, 17, 0.	
141.	N+D CUST 1998 1.335 E+02, 1, 18, 0.	
142.	N+D CUST 1999 1.333 E+02, 1, 19, 0.	
143.	N+D CUST 2000 1.149 E+02, 1, 20, 0.	
144.	N+D CUST 2001 .764 E+02, 1, 21, 0.	
145.	N+D CUST 2002 .745 E+02, 1, 22, 0.	
146.	N+D CUST 2003 .560 E+02, 1, 23, 0.	
147.	GOVERNMENT OVERHEAD CUST	1 1 MISCELLANEOUS 4 DATA
148.	ANNUAL COST 1.4 E+01, 1, 0, 0	

END OF SPADE INPUT

TABLE C-2. FEAN Card Input for Sample Case 1

CARD NO.	CARD ENTRY	COMMENTS
1.	\$CFDAT	NO ENTRIES FOR 'CFDAT'
2.	\$END	NAMelist
3.	\$CAHU	START NAMelist 'CARD'
4.	NBAS=1,	NAMelist 'CARD' DATA
5.	USCFI=.03,	
6.	LDAS=5041,	
7.	LFEE = 1980,2010,	
8.	UASIS =	
9.	540., 1.000, .615, .515, .675, .565, .74, .99, 1.26, 1.47, 1.73,	
10.	2.09, 2.49, 2.81, 3.17, 3.48, 3.89, 4.23, 4.41, 4.53,	
11.	4.74, 4.86, 4.925, 4.965, 5.02, 5.02, 5.02,	
12.	\$END	END NAMelist 'CARD'
13.	SAMPLE CASE 1 = SINGLE DISPOSAL FEE	TITLES
14.	5/KG STG AND DISP	

TABLE C-3. FEAN Card Input for Sample Case 2

CARD NO.	CARD ENTRY	COMMENTS
1.	*CFDAT	NO ENTRIES FOR NAMELIST 'CFDAT'
2.	*END	
3.	*CARD	START NAMELIST 'CARD'
4.	NSAS = 2,	NAMELIST 'CARD' DATA
5.	NSCFI=.03,	
6.	LUAS = 1,1,2,2,0*0, 2,2,4,7*0, 2,2,2,7*0, 1,1,2,2,6*0, 1,1,2,2,	
7.	LFEE = 19*0,2010,	
8.	BASIS = 5*0.,	
9.	1.000,.615,.515,.675,.665,.74,.99,1.26,1.47,1.73,	
10.	2.09, 2.49, 3.50.,	
11.	5*0., 1.000,.615,.515,.675,.665,.74,.99,1.26,1.47,1.73,	
12.	2.09, 2.49, 2.81, 3.17, 3.48, 3.89, 4.23, 4.41, 4.53,	
13.	4.74, 4.86, 4.923, 4.983, 5.02, 5.02, 5.02,	
14.	*END	END NAMELIST 'CARD'
15.	SAMPLE CASE 2 = SEPARATE STORAGE AND DISPOSAL FEE PAID AT DELIVERY	TITLES
16.	S/KG STORAGE FEE	
17.	S/KG DISPOSAL FEE	

TABLE C-4. FEAN Card Input for Sample Case 3

CARD NO.	CARD ENTRY	COMMENTS
1.	SCFDAT	NO ENTRIES FOR NAMELIST 'CFDAT'
2.	SEND	
3.	SCARD	START NAMELIST 'CARD'
4.	NHAS = 2,	
5.	DSCFI=.03,	
6.	LHAS = 1,1,2,2,6*0, 2,2,4,7*0, 2,2,2,7*0, 1,1,2,2,6*0, 1,1,2,2,	
7.	LFEED=1980,1981,1982,1983,1984,1985,1986,1987,1988,1989,1990,1991,1992,	
8.	1993,1994,1995,1996,1997,1998,1999,2000,2001,2002,2003,2004,2005,	
9.	2006,2007,2008,2009,2010,	
10.	BASIS =	
11.	1.000, .615, .515, .675, .665, .74, .99, 1.26, 1.47, 1.73,	
12.	2.09, 2.49, 3.80,	
13.	1.000, .615, .515, .675, .665, .74, .99, 1.26, 1.47, 1.73,	
14.	2.09, 2.49, 2.81, 3.17, 3.48, 3.89, 4.23, 4.41, 4.53,	
15.	4.74, 4.86, 4.925, 4.985, 5.02, 5.02, 5.02,	
16.	SEND	END NAMELIST 'CARD'
17.	SAMPLE CASE 3 = SEPARATE STORAGE AND DISPOSAL FEE PAID 5 YEARS BEFORE DELIVERY	TITLES
18.	\$/KG STORAGE FEE	
19.	\$/KG DISPOSAL FEE	

TABLE C-5. FEAN Card Input for Sample Case 4

CARD NO.	CARD ENTRY	COMMENTS
1.	3CFDAT	NO ENTRIES FOR 'CFDAT' NAMELIST
2.	3END	
3.	3CARD	START NAMELIST 'CARD'
4.	NDAG = 2,	
5.	DSCFI=.0015,	
6.	LHAG = 1,1,2,2,6*0, 2,2,4,7*0, 2,2,2,7*0, 1,1,2,2,6*0, 1,1,2,2,	
7.	LPEE=1980,1981,1982,1983,1984,1985,1986,1987,1988,1989,1990,1991,1992,	
8.	1993,1994,1995,1996,1997,1998,1999,2000,2001,2002,2003,2004,2005,	
9.	2006,2007,2008,2009,2010,	
10.	HAS18 = 3*0.,	
11.	1.000, .615, .515, .675, .665, .74, .99, 1.26, 1.47, 1.73,	
12.	2.09, 2.49, 3*0.,	
13.	3*0., 1.000, .615, .515, .675, .665, .74, .99, 1.26, 1.47, 1.73,	
14.	2.09, 2.49, 2.81, 3.17, 3.48, 3.89, 4.23, 4.41, 4.53,	
15.	4.74, 4.86, 4.925, 4.985, 5.02, 5.02, 5.02,	
16.	CAPHUD(2)=30*1.05,	
17.	UPHOD(2) = 30*1.05,	
18.	3ENN	END NAMELIST 'CARD'
19.	SAMPLE CASE 4 = STON AND DISP FEE PAID AT DELIVERY 5 PCT ESCALATION	
20.	\$/KG STORAGE FEE	TITLES
21.	\$/KG DISPOSAL FEE	

TABLE C-6. FEAN Card Input for Sample Case 5

CARD NO.	CARD ENTRY	COMMENTS
1.	SCFDT	NO ENTRIES FOR 'CFDAT' NAMELIST
2.	SEND	
3.	SCARD	START NAMELIST 'CARD'
4.	NBAS = 2,	
5.	USCFI=.0813,	
6.	LBAS = 1,1,2,2,6*0, 2,2,2,7*0, 2,2,2,7*0, 1,1,2,2,6*0, 1,1,2,2,	
7.	LFE=1980,1981,1982,1983,1984,1985,1986,1987,1988,1989,1990,1991,1992,	
8.	1993,1994,1995,1996,1997,1998,1999,2000,2001,2002,2003,2004,2005,	
9.	2006,2007,2008,2009,2010,	
10.	BASJS =	
11.	1.000,.615,.515,.675,.665,.74,.99,1.26,1.47,1.73,	
12.	2.09, 2.49, 3.8*0.,	
13.	1.000,.615, .515, .675, .665, .74, .99, 1.26, 1.47, 1.73,	
14.	2.09, 2.49, 2.81, 3.17, 3.48, 3.89, 4.23, 4.41, 4.53,	
15.	4.74, 4.86, 4.925, 4.985, 5.02, 5.02, 5.02,	
16.	CAPMU(2)=30*1.05,	
17.	UPMU(2) = 30*1.05,	
18.	SEND	END NAMELIST 'CARD' TITLES
19.	SAMPLE CASE 5 = STON AND DISP FEES PAID 5 YRS BEFORE UEL 5 PCT EXCALATION	
20.	\$/KG STONAGE FEE	
21.	\$/KG DISPOSAL FEE	

TABLE C-7. FEAN Card Input for Sample Case 6

CARD NO.	CARD ENTRY	COMMENTS
1.	SCFDAT	NO ENTRIES FOR 'CFDAT' NAMELIST
2.	SENO	
3.	SCANU	START NAMELIST 'CARD'
4.	NHAB = 2,	
5.	DSCF! = .0015,	
6.	LHAB = 1,1,2,2,6*0, 2,2,2,7*0, 2,2,2,7*0, 1,1,2,2,6*0, 1,1,2,2,	
7.	LFEF = 1980,1981,1982,1983,1984,1985,1986,1987,1988,1989,1990,1991,1992,	
8.	1993,1994,1995,1996,1997,1998,1999,2000,2001,2002,2003,2004,2005,	
9.	2006,2007,2008,2009,2010,	
10.	HABIS = 5*0.,	
11.	1.000,.615,.515,.675,.665,.74,.99,1.26,1.47,1.73,	
12.	2.09, 2.49, 3.40.,	
13.	5*0., 1.000,.615,.515,.675,.665,.74,.99,1.26,1.47,1.73,	
14.	2.09, 2.49, 2.41, 3.17, 3.48, 3.89, 4.23, 4.41, 4.53,	
15.	4.74, 4.86, 4.925, 4.985, 5.02, 5.02, 5.02,	
16.	CAPMU(2) = 30*1.05,	
17.	UPMU(2) = 30*1.05,	
18.	LAHJRW = 2,2,	
19.	LOEL = 5.5*0.5,	
20.	DEL = .60,.40, 4*0., .60,.40,	
21.	AUJ(2) = 30*1.05,	
22.	LAUJ = 1,	
23.	SENO	END NAMELIST 'CARD' TITLES
24.	SAMPLE CASE 6 = STUK AND DISF FEES 60 PCT 5 YRS BEFORE UEL 5 PCT ESCALATION	
25.	3/KG STORAGE FEE	
26.	3/KG DISPOSAL FEE	

APPENDIX D

SAMPLE CASE OUTPUTS

TABLE D-1. Input Data Listing for Repository Cost Model

CASE = SPENT FUEL CHANGE CALCULATIONS (1 JULY 80)

SPACE OUTPUT = PAGE 5

INPUT DATA EDIT = GENERAL REPOSITORY 7/11/80

```

-----CAPITAL COST -----FIXED COST -----VARIABLE COST -----
-----
CAPITAL CONST.      59.6000  1 -7  0.  FIXED COST      18.2000  1  0  0  VARIABLE COST PWR      .903-002  1  0  1  1
CAPITAL CONST.      100.5000  1 -6  0.  VARIABLE COST HWH      .903-002  1  0  1  2
CAPITAL CONST.      258.7000  1 -5  0.
CAPITAL CONST.      216.0000  1 -4  0.
CAPITAL CONST.      190.1000  1 -3  0.
CAPITAL CONST.      142.2000  1 -2  0.
CAPITAL CONST.       9.1000  1 -1  0.
CAPITAL EQUIP.      21.4000  4  0  90000.
DECOMMISSIONING      7.8000  6  1  0.
DECOMMISSIONING     20.4000  6  2  0.
DECOMMISSIONING     40.4000  6  3  0.
DECOMMISSIONING     48.1000  6  4  0.
DECOMMISSIONING     32.6000  6  5  0.

```

TABLE D-2. SPADE Output - Expenditure Forecast Data for Repository 1 Cost Center

CASE - SPENT FUEL CHANGE CALCULATIONS (1 JULY 84)

SPADE OUTPUT - PAGE 24

BASIS - INDIVIDUAL FACILITIES

TABLE C1 CASH FLOW DATA (MILLIONS OF DOLLARS)

FACILITY TYPE REPOSITORY NUMBER 1										
YEAR	FACILITY INPUT, (KG-MM)	FACILITY OUTPUT (KG-MM)	SYSTEM INPUT (KG-MM)	ANNUAL CAPITAL EXPENSES	ANNUAL FIXED EXPENSES	ANNUAL VARIABLE EXPENSES	ANNUAL TOTAL EXPENSES	CUMULATIVE TOTAL EXPENSES	BUCK VALUE	YEAR
1990	0.	0.	740000.	59.6000	.0000	.0000	59.6000	59.6000	59.6000	1990
1991	0.	0.	490000.	100.5000	.0000	.0000	100.5000	160.1000	160.1000	1991
1992	0.	0.	1260000.	258.7000	.0000	.0000	258.7000	418.8000	418.8000	1992
1993	0.	0.	1470000.	210.0000	.0000	.0000	210.0000	634.8000	634.8000	1993
1994	0.	0.	1730000.	190.1000	.0000	.0000	190.1000	824.9000	824.9000	1994
1995	0.	0.	2090000.	142.2000	.0000	.0000	142.2000	967.1000	967.1000	1995
1996	0.	0.	2470000.	9.1000	.0000	.0000	9.1000	976.2000	976.2000	1996
1997	900000.	0.	2810000.	.0000	18.2000	18.9178	37.1178	1013.3178	961.4443	1997
1998	1800000.	0.	3170000.	.0000	18.2000	37.8357	56.0357	1069.3535	931.9329	1998
1999	1800000.	0.	3480000.	.0000	18.2000	37.8357	56.0357	1125.3892	902.4216	1999
2000	1800000.	0.	3890000.	.0000	18.2000	37.8357	56.0357	1181.4249	872.9102	2000
2001	1800000.	0.	4230000.	.0000	18.2000	37.8357	56.0357	1237.4606	843.3988	2001
2002	3900000.	0.	4410000.	.0000	18.2000	81.9773	100.1773	1337.6379	779.4576	2002
2003	6000000.	0.	4527000.	.0000	18.2000	126.1190	144.3190	1481.9569	681.0764	2003
2004	6000000.	0.	4740000.	.0000	18.2000	126.1190	144.3190	1626.2759	562.7152	2004
2005	4160000.	0.	4860000.	.0000	18.2000	87.4430	105.6430	1731.9189	510.5107	2005
2006	3600000.	0.	4925000.	.0000	18.2000	75.6714	93.8714	1825.7903	455.4880	2006
2007	2495000.	0.	4985000.	.0000	18.2000	52.4442	70.6442	1896.4345	410.5822	2007
2008	1680000.	0.	5020000.	.0000	18.2000	35.3123	53.5123	1949.9469	387.0391	2008
2009	1680000.	0.	5020000.	.0000	18.2000	35.3123	53.5123	2003.4592	359.4959	2009
2010	1680000.	0.	5020000.	21.4000	18.2000	35.3123	74.9123	2078.3715	352.1696	2010
2011	1680000.	0.	5020000.	.0000	18.2000	35.3123	53.5123	2131.8838	323.4432	2011
2012	1680000.	0.	5020000.	.0000	18.2000	35.3123	53.5123	2185.3961	294.7169	2012
2013	1680000.	0.	5020000.	.0000	18.2000	35.3123	53.5123	2238.9084	265.9905	2013
2014	1700000.	0.	5060000.	.0000	18.2000	35.7337	53.9337	2292.8421	236.9214	2014
2015	1760000.	0.	5280000.	.0000	18.2000	36.9954	55.1954	2348.0375	206.8259	2015
2016	1840000.	0.	5520000.	.0000	18.2000	38.6760	56.8760	2404.9135	175.3632	2016
2017	1910000.	0.	5730000.	.0000	18.2000	40.1484	58.3484	2463.2618	142.7028	2017
2018	1990000.	0.	5970000.	.0000	18.2000	41.8240	60.0240	2523.2858	108.6752	2018
2019	2070000.	0.	6190000.	.0000	18.2000	43.5121	61.7121	2585.0028	73.2784	2019
2020	2140000.	0.	6420000.	.0000	18.2000	44.9819	63.1819	2648.1847	36.6859	2020
2021	10255000.	0.	73440000.	.0000	18.2000	215.5586	233.7586	2881.9434	-138.6497	2021
2022	0.	0.	0.	7.8000	.0000	.0000	7.8000	2889.7433	-134.7958	2022
2023	0.	0.	0.	20.4000	.0000	.0000	20.4000	2910.1433	-117.8277	2023
2024	0.	0.	0.	40.4000	.0000	.0000	40.4000	2950.5433	-79.7505	2024
2025	0.	0.	0.	40.1000	.0000	.0000	40.1000	2990.6433	-32.6000	2025
2026	0.	0.	0.	32.6000	.0000	.0000	32.6000	3031.2433	.0000	2026
TOTAL	68.0000*	.0000*	200.5270*	1146.90	455.00	1429.34				

TABLE D-3. SPADE Output - Expenditure Forecast for all Repositories

CASE - SPENT FUEL CHANGE CALCULATIONS (1 JULY 80)

SPADE OUTPUT - PAGE 34

BASIS - REPOSITORY TOTAL

TABLE C1 CASH FLOW DATA (MILLIONS OF DOLLARS)

YEAR	FACILITY INPUT, (KG=MM)	FACILITY OUTPUT (KG=MM)	SYSTEM INPUT (KG=MM)	ANNUAL CAPITAL EXPENSES	ANNUAL FIXED EXPENSES	ANNUAL VARIABLE EXPENSES	ANNUAL TOTAL EXPENSES	CUMULATIVE TOTAL EXPENSES	BOOK VALUE	YEAR
1990	0.	0.	740000.	59.6000	.0000	.0000	59.6000	59.6000	59.6000	1990
1991	0.	0.	990000.	100.5000	.0000	.0000	100.5000	160.1000	160.1000	1991
1992	0.	0.	1260000.	258.7000	.0000	.0000	258.7000	418.8000	418.8000	1992
1993	0.	0.	1470000.	275.6000	.0000	.0000	275.6000	694.4000	694.4000	1993
1994	0.	0.	1730000.	290.6000	.0000	.0000	290.6000	985.0000	985.0000	1994
1995	0.	0.	2090000.	400.9000	.0000	.0000	400.9000	1385.9000	1385.9000	1995
1996	0.	0.	2490000.	284.7000	.0000	.0000	284.7000	1670.6000	1670.6000	1996
1997	900000.	0.	2910000.	290.6000	18.2000	18.9178	327.7178	1998.3178	1998.3178	1997
1998	1800000.	0.	3170000.	400.9000	18.2000	37.8357	456.9357	2455.2535	2317.8329	1998
1999	1800000.	0.	3480000.	225.1000	18.2000	37.8357	281.1357	2736.3892	2513.4215	1999
2000	2700000.	0.	3890000.	190.1000	36.4000	56.7535	283.2535	3019.6428	2654.2546	2000
2001	3600000.	0.	4230000.	142.2000	36.4000	75.6714	254.2714	3273.9142	2742.4321	2001
2002	5700000.	0.	4410000.	9.1000	36.4000	114.8130	160.3130	3439.2272	2658.0796	2002
2003	8700000.	0.	4527000.	.0000	54.6000	182.8725	237.4725	3676.6997	2515.4417	2003
2004	9600000.	0.	4740000.	.0000	54.6000	201.7904	256.3904	3933.0901	2358.0482	2004
2005	9860000.	0.	4860000.	.0000	54.6000	207.2561	261.8561	4194.9461	2196.3918	2005
2006	8915000.	0.	4925000.	.0000	54.6000	187.3926	241.9926	4436.9387	2050.2266	2006
2007	6695000.	0.	4985000.	.0000	54.6000	140.7275	195.3275	4632.2662	1940.4634	2007
2008	5020000.	0.	5020000.	.0000	54.6000	105.5206	160.1206	4792.3867	1858.1591	2008
2009	5020000.	0.	5020000.	.0000	54.6000	105.5206	160.1206	4952.5073	1775.8548	2009
2010	5020000.	0.	5020000.	21.4000	54.6000	105.5206	181.5206	5134.0278	1713.7673	2010
2011	5020000.	0.	5020000.	.0000	54.6000	105.5206	160.1206	5294.1483	1630.2799	2011
2012	5020000.	0.	5020000.	.0000	54.6000	105.5206	160.1206	5454.2689	1546.7924	2012
2013	5020000.	0.	5020000.	.0000	54.6000	105.5206	160.1206	5614.3894	1463.3049	2013
2014	5060000.	0.	5060000.	.0000	54.6000	106.3583	160.9583	5775.3477	1379.1498	2014
2015	5280000.	0.	5280000.	.0000	54.6000	110.9862	165.5862	5940.9339	1291.3428	2015
2016	5520000.	0.	5520000.	.0000	54.6000	116.0280	170.6280	6111.5618	1199.5470	2016
2017	5730000.	0.	5730000.	.0000	54.6000	120.4451	175.0451	6286.6069	1104.2966	2017
2018	5470000.	0.	5470000.	.0000	54.6000	125.4869	180.0869	6466.6938	1004.9773	2018
2019	6190000.	0.	6190000.	21.4000	54.6000	130.1148	206.1148	6672.8085	922.0047	2019
2020	6420000.	0.	6420000.	.0000	54.6000	134.9458	189.5458	6862.3543	813.7592	2020
2021	73440000.	0.	73440000.	21.4000	54.6000	1543.6960	1619.6960	8482.0503	-416.0091	2021
2022	0.	0.	0.	23.4000	.0000	.0000	23.4000	8505.4502	-404.3873	2022
2023	0.	0.	0.	61.2000	.0000	.0000	61.2000	8566.6501	-353.4830	2023
2024	0.	0.	0.	121.2000	.0000	.0000	121.2000	8687.8501	-239.2515	2024
2025	0.	0.	0.	144.3000	.0000	.0000	144.3000	8832.1500	-97.8000	2025
2026	0.	0.	0.	97.8000	.0000	.0000	97.8000	8929.9500	.0000	2026
TOTAL	204.000+6	.000+6	200.527+6	3480.70	1201.20	4288.05				

TABLE D-4. SPADE Output - Expenditure Forecast for Total System

CASE - SPENT FUEL CHANGE CALCULATIONS (1 JULY 80)

SPADE OUTPUT - PAGE 36

BASIS - SYSTEM TOTAL

TABLE C1 CASH FLOW DATA (MILLIONS OF DOLLARS)

YEAR	FACILITY INPUT (KG=MM)	FACILITY OUTPUT (KG=MM)	SYSTEM INPUT (KG=MM)	ANNUAL CAPITAL EXPENSES	ANNUAL FIXED EXPENSES	ANNUAL VARIABLE EXPENSES	ANNUAL TOTAL EXPENSES	CUMULATIVE TOTAL EXPENSES	BOOK VALUE	YEAR
1977	0.	0.	0.	.0000	.0000	.0000	.0000	.0000	.0000	1977
1978	0.	0.	0.	.0000	.0000	.0000	.0000	.0000	.0000	1978
1979	0.	0.	0.	.0000	.0000	.0000	.0000	.0000	.0000	1979
1980	0.	0.	0.	194.4000	.0000	.0000	194.4000	194.4000	194.4000	1980
1981	0.	0.	0.	267.7000	.0000	.0000	267.7000	460.1000	460.1000	1981
1982	0.	0.	0.	382.6000	.0000	.0000	382.6000	842.7000	842.7000	1982
1983	0.	0.	0.	433.1000	.0000	.0000	433.1000	1275.8000	1275.8000	1983
1984	0.	0.	0.	371.3000	4.0000	.0000	375.3000	1651.1000	1647.1000	1984
1985	1000000.	0.	1000000.	301.0000	11.0000	9.3320	321.3320	1972.4320	1677.2822	1985
1986	615000.	0.	615000.	270.6000	11.0000	6.8946	288.4946	2260.9266	2103.5700	1986
1987	515000.	0.	515000.	153.1000	11.0000	6.2614	170.3614	2431.2879	2219.3007	1987
1988	615000.	0.	615000.	235.6000	11.0000	7.2734	253.8734	2685.1613	2405.6018	1988
1989	665000.	0.	665000.	307.6000	11.0000	7.2112	325.8112	3010.9725	2664.2777	1989
1990	740000.	0.	740000.	290.3000	11.0000	7.6894	308.9894	3319.9619	2899.6384	1990
1991	990000.	0.	990000.	285.2000	18.0000	14.2684	317.4684	3637.4263	3109.6589	1991
1992	1260000.	0.	1260000.	494.3000	18.0000	12.9786	525.2786	4160.7048	3904.9677	1992
1993	1470000.	0.	1470000.	567.3000	18.0000	14.3086	599.6086	4760.3134	4957.9661	1993
1994	1750000.	0.	1750000.	758.1000	18.0000	13.9538	790.0538	5552.3672	4580.1767	1994
1995	2090000.	0.	2090000.	917.6000	18.0000	21.2336	956.8336	6509.2007	5331.9733	1995
1996	2490000.	0.	2490000.	691.3000	18.0000	23.7664	733.0664	7242.2671	5823.8994	1996
1997	2810000.	0.	2810000.	635.0000	91.2000	49.2107	775.4107	8017.6778	6275.6633	1997
1998	3170000.	0.	3170000.	688.7000	86.2000	77.9081	852.8081	8870.4858	6733.8658	1998
1999	3480000.	0.	3480000.	488.4000	86.2000	79.8694	652.4694	9522.9557	6951.9878	1999
2000	3890000.	0.	3890000.	438.7000	133.4000	108.8838	680.9838	10203.9395	7138.1041	2000
2001	4230000.	0.	4230000.	314.6000	133.4000	137.4540	585.4540	10789.3934	7224.2497	2001
2002	4410000.	0.	4410000.	129.7000	133.4000	237.5518	500.6518	11290.0452	7130.7485	2002
2003	4527000.	0.	4527000.	35.0000	180.6000	408.0448	644.6447	11934.6898	6808.4379	2003
2004	4740000.	0.	4740000.	.0000	180.6000	454.0866	634.6866	12569.3763	6564.4352	2004
2005	4860000.	0.	4860000.	.0000	180.6000	466.8033	646.8033	13216.1796	6231.8268	2005
2006	4925000.	0.	4925000.	.0000	180.6000	414.0089	594.6089	13808.7883	5920.3524	2006
2007	4985000.	0.	4985000.	29.5000	173.6000	278.5712	476.6712	14287.4595	5686.9037	2007
2008	5020000.	0.	5020000.	100.0000	155.6000	174.1396	434.7396	14722.1990	5566.0371	2008
2009	5020000.	0.	5020000.	.0000	155.6000	174.1396	334.7396	15056.9385	5345.1705	2009
2010	5020000.	0.	5020000.	21.4000	155.6000	174.1396	356.1396	15413.0780	5144.5208	2010
2011	5020000.	0.	5020000.	.0000	155.6000	174.1396	334.7396	15747.8175	4922.4709	2011
2012	5020000.	0.	5020000.	.0000	155.6000	174.1396	334.7396	16082.5570	4700.4212	2012
2013	5020000.	0.	5020000.	.0000	155.6000	179.1346	334.7396	16417.2964	4478.3715	2013
2014	5060000.	0.	5060000.	.0000	155.6000	180.3618	336.1618	16753.4580	4254.5511	2014
2015	5280000.	0.	5280000.	.0000	155.6000	188.4185	344.0185	17097.4763	4021.0552	2015
2016	5520000.	0.	5520000.	.0000	155.6000	196.9777	352.5777	17450.0540	3776.8470	2016
2017	5730000.	0.	5730000.	.0000	155.6000	204.4766	360.0766	17810.1304	3523.3967	2017
2018	5970000.	0.	5970000.	.0000	155.6000	213.0359	368.6359	18178.7661	3259.3342	2018
2019	6190000.	0.	6190000.	21.4000	155.6000	220.3925	397.8925	18576.6584	3005.5045	2019
2020	6420000.	0.	6420000.	.0000	155.6000	229.6941	384.6941	18961.3523	2720.0549	2020
2021	73440000.	0.	73440000.	21.4000	155.6000	2620.6933	2797.6932	21754.0454	-536.8017	2021
2022	0.	0.	0.	38.0000	.0000	.0000	38.0000	21795.0452	-515.8257	2022
2023	0.	0.	0.	105.6000	.0000	.0000	105.6000	21900.6450	-422.5325	2023

TABLE D-5. SPADE Calculation - Unit Cost for Repository 1 Cost Center

CASE - SPENT FUEL CHANGE CALCULATIONS (1 JULY 80)

SPADE OUTPUT - PAGE 48

TABLE C4 LEVELIZED CHARGES

FACILITY TYPE DEPOSITORY NUMBER 1				FACILITY CHANGE (\$/KG-HH)	COMPONENT CHANGE (\$/KG-HH)	SYSTEM CHANGE (\$/KG-HH)
PERIOD	TOTAL COSTS IN MILLIONS					
	CAPITAL	FIXED	VARIABLE			
-----				-----	-----	-----
ENDING BOOK VALUE(MILLIONS)				352.170		
DISCOUNTED THROUGHPUTS(MT-HH)				19536.372	36413.974	40169.441
1980 In 2010	470.922	128.116	410.692			
1980				.00	.00	26.76
1981				.00	.00	26.76
1982				.00	.00	26.76
1983				.00	.00	26.76
1984				.00	.00	26.76
1985				.00	.00	26.76
1986				.00	.00	26.76
1987				.00	.00	26.76
1988				.00	.00	26.76
1989				.00	.00	26.76
1990				.00	29.52	26.76
1991				.00	29.52	26.76
1992				.00	29.52	26.76
1993				.00	29.52	26.76
1994				.00	29.52	26.76
1995				.00	29.52	26.76
1996				.00	29.52	26.76
1997				55.01	29.52	26.76
1998				55.01	29.52	26.76
1999				55.01	29.52	26.76
2000				55.01	29.52	26.76
2001				55.01	29.52	26.76
2002				55.01	29.52	26.76
2003				55.01	29.52	26.76
2004				55.01	29.52	26.76
2005				55.01	29.52	26.76
2006				55.01	29.52	26.76
2007				55.01	29.52	26.76
2008				55.01	29.52	26.76
2009				55.01	29.52	26.76
2010				55.01	29.52	26.76

TABLE D-6. SPADE Calculation - Unit Cost for Miscellaneous 3 Cost Center

CASE - SPENT FUEL CHANGE CALCULATIONS (1 JULY 89)

SPADE OUTPUT - PAGE 53

TABLE CCM LEVELIZED CHARGES				

FACILITY TYPE NUMBER	MISCELLANEOUS SYSTEM	TOTAL COSTS IN MILLIONS		
THROUGHPUT BASIS	SYSTEM			
CAPITAL	FIXED	VARIABLE	(10**6\$)	CHANGE (\$/KG=HM)

ENDING BOOK VALUE(MILLIONS)	2604.577			
DISCOUNTED THROUGHPUTS(M=HM)			40169.441	
1780 IN 2010	3070.963	.000	.000	
1780				50.67
1781				50.67
1782				50.67
1783				50.67
1784				50.67
1785				50.67
1786				50.67
1787				50.67
1788				50.67
1789				50.67
1790				50.67
1791				50.67
1792				50.67
1793				50.67
1794				50.67
1795				50.67
1796				50.67
1797				50.67
1798				50.67
1799				50.67
2000				50.67
2001				50.67
2002				50.67
2003				50.67
2004				50.67
2005				50.67
2006				50.67
2007				50.67
2008				50.67
2009				50.67
2010				50.67

TABLE D-7. FEAN Calculation - Fee Breakdown - Sample Case 1

REPOSITORY 1 FEE BASIS 1					
FEE BREAKDOWN FOR ORIGINAL ESTIMATE					
	CAPITAL	FIXED	VARIABLE	DECOMMISSIONING	TOTAL
DIRECT	7.50	3.38	10.96	1.15	23.00
INDIRECT	5.04	0.19	0.74	0.35	6.32
TOTAL	12.54	3.57	11.70	1.50	29.31

SUMMARY OF BASIS 1 FEE BREAKDOWN

FEE BREAKDOWN FOR ORIGINAL ESTIMATE					
	CAPITAL	FIXED	VARIABLE	DECOMMISSIONING	TOTAL
DIRECT	57.68	29.27	45.06	4.50	136.51
INDIRECT	59.13	1.24	3.22	1.14	65.73
TOTAL	116.81	30.51	48.28	5.64	201.24

TABLE D-8. FEAN Calculation - Cash Flow Summary for Sample Case 1

ORIGINAL ESTIMATE

SAMPLE CASE 1 - SINGLE DISPOSAL FEE

092981   143504

GROUP 1   FEE IS IN   8/KG STG AND DIS

PAGE 1

YEAR	FEE	ANNUAL COST	ANNUAL ADVANCE PAYMT	ANNUAL SETTLEMENT PAYMT	NET CASH FLOW	ACCUH NET CASH FLOW	INTEREST COST	CHANGE IN BALANCE	BALANCE
1980	190.000	192.	0.	0.	-192.	-192.	0.	-192.	-192.
1981	190.000	268.	0.	0.	-268.	-460.	6.	-273.	-466.
1982	190.000	383.	0.	0.	-383.	-843.	14.	-397.	-862.
1983	190.000	433.	0.	0.	-433.	-1276.	26.	-459.	-1321.
1984	190.000	575.	0.	0.	-375.	-1651.	40.	-415.	-1736.
1985	190.000	321.	0.	190.	-131.	-1782.	52.	-183.	-1920.
1986	190.000	288.	0.	117.	-172.	-1954.	58.	-229.	-2149.
1987	190.000	170.	0.	98.	-72.	-2027.	64.	-137.	-2286.
1988	190.000	254.	0.	128.	-126.	-2152.	69.	-194.	-2480.
1989	190.000	326.	0.	126.	-199.	-2352.	74.	-274.	-2754.
1990	190.000	309.	0.	141.	-168.	-2520.	83.	-251.	-3005.
1991	190.000	317.	0.	188.	-129.	-2649.	90.	-219.	-3224.
1992	190.000	523.	0.	239.	-284.	-2933.	97.	-381.	-3605.
1993	190.000	600.	0.	279.	-320.	-3253.	108.	-428.	-4033.
1994	190.000	792.	0.	329.	-463.	-3717.	121.	-584.	-4618.
1995	190.000	457.	0.	397.	-560.	-4276.	134.	-698.	-5316.
1996	190.000	733.	0.	473.	-260.	-4536.	154.	-419.	-5735.
1997	190.000	775.	0.	534.	-241.	-4778.	172.	-413.	-6149.
1998	190.000	453.	0.	602.	-250.	-5028.	184.	-435.	-6584.
1999	190.000	652.	0.	661.	9.	-5019.	198.	-189.	-6772.
2000	190.000	681.	0.	739.	58.	-4961.	203.	-145.	-6917.
2001	190.000	585.	0.	804.	218.	-4743.	208.	11.	-6906.
2002	190.000	501.	0.	838.	337.	-4405.	207.	130.	-6776.

TABLE D-8. (Continued)

2003	190.000	649.	0.	861.	216.	-4189.	203.	13.	-4763.
2004	190.000	635.	0.	901.	266.	-3923.	203.	63.	-6700.
2005	190.000	647.	0.	924.	277.	-3646.	201.	76.	-6624.
2006	190.000	593.	0.	936.	343.	-3303.	199.	149.	-6480.
2007	190.000	479.	0.	947.	469.	-2834.	194.	274.	-6206.
2008	190.000	435.	0.	954.	519.	-2315.	186.	333.	-5873.
2009	190.000	335.	0.	954.	619.	-1696.	176.	443.	-5430.
2010	190.000	336.	0.	954.	598.	-1098.	163.	435.	-4995.
ENDING BALANCE PLUS ONE YEAR INTEREST =				-5145.					
ENDING BOOK VALUE =				5145.					

TABLE D-9. FEAN Calculation - Storage Fee and Cash Flow Summary for Sample Case 2

O R I G I N A L   E S T I M A T E

SAMPLE CASE 2 - SEPARATE STORAGE AND DISPOSAL FEE PAID AT DELIVERY

PAGE 1

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GROUP 1   FEE IS IN   \$/KG STORAGE FEE

YEAR	FEE	ANNUAL COST	ANNUAL ADVANCE PAYMT	ANNUAL SETTLEMENT PAYMT	NET CASH FLOW	ACCUM NET CASH FLOW	INTEREST COST	CHANGE IN BALANCE	BALANCE
1980	125.978	54.	0.	0.	-34.	-34.	0.	-34.	-34.
1981	125.978	92.	0.	0.	-92.	-126.	1.	-93.	-127.
1982	125.978	122.	0.	0.	-122.	-248.	4.	-126.	-253.
1983	125.978	87.	0.	0.	-87.	-335.	8.	-95.	-347.
1984	125.978	54.	0.	0.	-34.	-369.	10.	-44.	-392.
1985	125.978	20.	0.	126.	106.	-263.	12.	94.	-298.
1986	125.978	34.	0.	77.	40.	-224.	9.	31.	-267.
1987	125.978	67.	0.	69.	-2.	-226.	8.	-10.	-278.
1988	125.978	158.	0.	85.	-73.	-300.	8.	-82.	-359.
1989	125.978	218.	0.	84.	-134.	-434.	11.	-145.	-505.
1990	125.978	109.	0.	93.	-16.	-450.	15.	-31.	-535.
1991	125.978	32.	0.	125.	92.	-357.	18.	76.	-459.
1992	125.978	31.	0.	159.	128.	-229.	14.	114.	-345.
1993	125.978	32.	0.	185.	153.	-77.	10.	142.	-203.
1994	125.978	34.	0.	218.	184.	107.	8.	178.	-25.
1995	125.978	39.	0.	263.	224.	331.	1.	223.	198.
1996	125.978	42.	0.	314.	272.	603.	-8.	278.	476.
1997	125.978	14.	0.	0.	-18.	585.	-14.	-4.	472.
1998	125.978	18.	0.	0.	-18.	567.	-14.	-4.	468.
1999	125.978	18.	0.	0.	-18.	549.	-14.	-4.	465.
2000	125.978	14.	0.	0.	-18.	531.	-14.	-4.	460.
2001	125.978	14.	0.	0.	-18.	513.	-14.	-4.	456.
2002	125.978	52.	0.	0.	-52.	461.	-14.	-38.	418.

TABLE D-9. (Continued)

2003	125.978	87.	0.	0.	-87.	374.	-13.	-74.	344.
2004	125.978	87.	0.	0.	-87.	287.	-10.	-77.	287.
2005	125.978	87.	0.	0.	-87.	200.	-6.	-79.	188.
2006	125.978	87.	0.	0.	-87.	114.	-6.	-81.	107.
2007	125.978	62.	0.	0.	-62.	52.	-3.	-59.	49.
2008	125.978	30.	0.	0.	-30.	2.	-1.	-44.	0.
2009	125.978	0.	0.	0.	0.	2.	0.	0.	0.
2010	125.978	0.	0.	0.	0.	2.	0.	0.	0.
ENDING BALANCE PLUS ONE YEAR INTEREST				0.					
ENDING BOOK VALUE				0.					

TABLE D-10. FEAN Calculation - Disposal Fee and Cash Flow Summary for Sample Case 2

ORIGINAL ESTIMATE

SAMPLE CASE 2 - SEPARATE STORAGE AND DISPOSAL FEE PAID AT DELIVERY

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GROUP 2 FEE IS IN \$/KG DISPOSAL FEE

YEAR	FEE	ANNUAL COST	ANNUAL ADVANCE PAYMT	ANNUAL SETTLEMENT PAYMT	NET CASH FLOW	ACCUM NET CASH FLOW	INTEREST COST	CHANGE IN BALANCE	BALANCE
1980	158.601	158.	0.	0.	-158.	-158.	0.	-158.	-158.
1981	158.601	176.	0.	0.	-176.	-334.	3.	-180.	-339.
1982	158.601	261.	0.	0.	-261.	-595.	10.	-271.	-610.
1983	158.601	336.	0.	0.	-346.	-941.	18.	-364.	-974.
1984	158.601	341.	0.	0.	-341.	-1282.	29.	-371.	-1345.
1985	158.601	301.	0.	159.	-142.	-1444.	40.	-183.	-1527.
1986	158.601	231.	0.	98.	-133.	-1578.	46.	-149.	-1726.
1987	158.601	103.	0.	82.	-21.	-1599.	32.	-73.	-1799.
1988	158.601	94.	0.	107.	11.	-1588.	34.	-43.	-1842.
1989	158.601	108.	0.	103.	-2.	-1590.	35.	-57.	-1899.
1990	158.601	200.	0.	117.	-83.	-1673.	37.	-140.	-2039.
1991	158.601	285.	0.	137.	-128.	-1801.	61.	-189.	-2229.
1992	158.601	472.	0.	200.	-292.	-2093.	67.	-359.	-2588.
1993	158.601	567.	0.	233.	-334.	-2427.	78.	-412.	-3000.
1994	158.601	758.	0.	274.	-484.	-2911.	90.	-574.	-3573.
1995	158.601	918.	0.	331.	-586.	-3497.	107.	-693.	-4267.
1996	158.601	691.	0.	393.	-296.	-3794.	128.	-424.	-4691.
1997	158.601	737.	0.	446.	-312.	-4105.	141.	-452.	-5144.
1998	158.601	635.	0.	503.	-332.	-4437.	154.	-486.	-5630.
1999	158.601	634.	0.	552.	-83.	-4520.	164.	-251.	-5881.
2000	158.601	653.	0.	617.	-46.	-4566.	176.	-222.	-6104.
2001	158.601	567.	0.	671.	103.	-4463.	183.	-80.	-6183.
2002	158.601	449.	0.	699.	231.	-4232.	184.	65.	-6118.

TABLE D-10. (Continued)

2003	158.601	558.	0.	718.	161.	-4051.	184.	-23.	-6141.
2004	158.601	548.	0.	752.	204.	-3847.	184.	20.	-6121.
2005	158.601	560.	0.	771.	211.	-3616.	184.	27.	-6094.
2006	158.601	506.	0.	781.	275.	-3361.	183.	92.	-6002.
2007	158.601	417.	0.	791.	374.	-2987.	180.	194.	-5808.
2008	158.601	545.	0.	796.	411.	-2576.	174.	237.	-5571.
2009	158.601	535.	0.	796.	461.	-2114.	167.	294.	-5276.
2010	158.601	536.	0.	796.	440.	-1674.	158.	282.	-4995.
ENDING BALANCE PLUS ONE YEAR INTEREST				•	-5145.				
ENDING BOOK VALUE				•	5145.				

TABLE D-11. FEAN Calculation - Total System Cash Flow Summary for Sample Case 2

O R I G I N A L   E S T I M A T E

SAMPLE CASE 2 - SEPARATE STORAGE AND DISPOSAL FEE PAID AT DELIVERY

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S U M M E D   O V E R   A L L   B A S E S

YEAR	FEE	ANNUAL COST	ANNUAL ADVANCE PAYMT	ANNUAL SETTLEMENT PAYMT	NET CASH FLOW	ACCUM NET CASH FLOW	INTEREST COST	CHANGE IN BALANCE	BALANCE
1980		192.	0.	0.	-192.	-192.	0.	-192.	-192.
1981		208.	0.	0.	-208.	-400.	6.	-273.	-466.
1982		303.	0.	0.	-303.	-843.	14.	-397.	-862.
1983		433.	0.	0.	-433.	-1276.	26.	-459.	-1321.
1984		575.	0.	0.	-575.	-1651.	40.	-415.	-1736.
1985		521.	0.	285.	-37.	-1688.	52.	-89.	-1825.
1986		288.	0.	173.	-114.	-1801.	55.	-168.	-1994.
1987		170.	0.	147.	-84.	-1885.	60.	-84.	-2077.
1988		230.	0.	192.	-62.	-1947.	62.	-124.	-2201.
1989		326.	0.	189.	-137.	-2084.	66.	-203.	-2404.
1990		309.	0.	211.	-98.	-2182.	72.	-171.	-2575.
1991		317.	0.	282.	-36.	-2218.	77.	-113.	-2688.
1992		523.	0.	358.	-165.	-2383.	81.	-245.	-2933.
1993		406.	0.	418.	-181.	-2504.	88.	-269.	-3202.
1994		792.	0.	492.	-300.	-2804.	96.	-346.	-3598.
1995		437.	0.	545.	-362.	-3166.	108.	-470.	-4068.
1996		733.	0.	708.	-85.	-3251.	122.	-147.	-4215.
1997		775.	0.	446.	-330.	-3580.	126.	-456.	-4671.
1998		453.	0.	503.	-350.	-3930.	140.	-490.	-5161.
1999		652.	0.	552.	-101.	-4031.	155.	-255.	-5417.
2000		481.	0.	617.	-64.	-4095.	163.	-227.	-5643.
2001		589.	0.	671.	85.	-3990.	169.	-84.	-5727.
2002		501.	0.	699.	199.	-3791.	172.	27.	-5700.

TABLE D-11. (Continued)

2003	645.	0.	714.	74.	-3677.	171.	-97.	-5797.
2004	635.	0.	752.	117.	-3560.	174.	-57.	-5854.
2005	647.	0.	771.	124.	-3436.	176.	-52.	-5906.
2006	593.	0.	781.	189.	-3247.	177.	11.	-5895.
2007	479.	0.	791.	312.	-2935.	177.	135.	-5759.
2008	435.	0.	796.	361.	-2574.	173.	189.	-5571.
2009	335.	0.	796.	461.	-2113.	167.	294.	-5276.
2010	336.	0.	796.	440.	-1673.	158.	282.	-4995.
ENDING BALANCE PLUS ONE YEAR INTEREST =			-5145.					
ENDING BOOK VALUE =			5145.					

TABLE D-12. FEAN Calculation - Storage Fee and Cash Flow Summary for Sample Case 3

I N I T I A L   E S T I M A T E

SAMPLE CASE 3 - SEPARATE STORAGE AND DISPOSAL FEE PAID 5 YEARS BEFORE DELIVERY

042981   192635

GROUP   1   FEE IS IN   \$/KG STORAGE FEE

YEAR	FEE	ANNUAL COST	ANNUAL ADVANCE PAYMT	ANNUAL SETTLEMENT PAYMT	NET CASH FLOW	ACCUM NET CASH FLOW	INTEREST COST	CHANGE IN BALANCE	BALANCE
1980	108.678	34.	0.	109.	75.	75.	0.	75.	75.
1991	108.678	42.	0.	67.	-25.	49.	-2.	-23.	52.
1982	108.678	122.	0.	56.	-66.	-17.	-2.	-65.	-13.
1983	108.678	87.	0.	73.	-14.	-30.	0.	-14.	-27.
1984	108.678	34.	0.	72.	38.	8.	1.	37.	11.
1985	108.678	20.	0.	80.	60.	68.	-0.	60.	71.
1986	108.678	38.	0.	108.	70.	138.	-2.	72.	143.
1987	108.678	67.	0.	137.	70.	207.	-4.	74.	217.
1988	108.678	158.	0.	160.	1.	209.	-6.	8.	224.
1989	108.678	218.	0.	188.	-30.	178.	-7.	-24.	201.
1990	108.678	109.	0.	227.	118.	297.	-6.	124.	325.
1991	108.678	32.	0.	270.	238.	535.	-10.	248.	573.
1992	.000	31.	0.	0.	-31.	504.	-17.	-14.	559.
1993	.000	32.	0.	0.	-32.	472.	-17.	-16.	544.
1994	.000	34.	0.	0.	-34.	438.	-16.	-18.	526.
1995	.000	39.	0.	0.	-39.	398.	-16.	-23.	503.
1996	.000	42.	0.	0.	-42.	357.	-15.	-27.	476.
1997	.000	18.	0.	0.	-18.	339.	-14.	-4.	472.
1998	.000	18.	0.	0.	-18.	321.	-14.	-4.	468.
1999	.000	18.	0.	0.	-18.	303.	-14.	-4.	465.
2000	.000	18.	0.	0.	-18.	285.	-14.	-4.	460.
2001	.000	18.	0.	0.	-18.	267.	-14.	-4.	456.
2002	.000	52.	0.	0.	-52.	214.	-14.	-38.	418.

TABLE D-12. (Continued)

2003	.000	87.	0.	0.	-87.	128.	-13.	-74.	344.
2004	.000	87.	0.	0.	-87.	41.	-10.	-77.	267.
2005	.000	87.	0.	0.	-87.	-46.	-8.	-79.	188.
2006	.000	87.	0.	0.	-87.	-133.	-6.	-81.	107.
2007	.000	62.	0.	0.	-62.	-195.	-3.	-59.	49.
2008	.000	30.	0.	0.	-30.	-245.	-1.	-49.	0.
2009	.000	0.	0.	0.	0.	-245.	0.	0.	0.
2010	.000	0.	0.	0.	0.	-245.	0.	0.	0.
ENDING BALANCE PLUS ONE YEAR INTEREST = 0.									
ENDING BOOK VALUE = 0.									

TABLE D-13. FEAN Calculation - Disposal Fee and Cash Flow Summary for Sample Case 3

INTERIM ESTIMATE

SAMPLE CASE 3 - SEPARATE STORAGE AND DISPOSAL FEE PAID 5 YEARS BEFORE DELIVERY

092981 192636

GROUP 2 FEE IS IN \$/KG DISPOSAL FE

YEAR	FEE	ANNUAL COST	ANNUAL ADVANCE PAYMT	ANNUAL SETTLEMENT PAYMT	NET CASH FLOW	ACCUH NET CASH FLOW	INTEREST COST	CHANGE IN BALANCE	BALANCE
1990	136.871	158.	0.	137.	-22.	-22.	0.	-22.	-22.
1991	136.871	176.	0.	84.	-92.	-113.	1.	-92.	-114.
1992	136.871	261.	0.	70.	-190.	-303.	3.	-194.	-307.
1993	136.871	346.	0.	92.	-254.	-557.	9.	-263.	-570.
1994	136.871	341.	0.	91.	-250.	-807.	17.	-267.	-838.
1995	136.871	301.	0.	101.	-200.	-1007.	25.	-225.	-1063.
1996	136.871	251.	0.	135.	-115.	-1122.	32.	-147.	-1210.
1997	136.871	103.	0.	172.	69.	-1053.	36.	33.	-1177.
1998	136.871	96.	0.	201.	106.	-947.	39.	70.	-1106.
1999	136.871	108.	0.	237.	129.	-818.	33.	96.	-1011.
1990	136.871	200.	0.	286.	86.	-733.	30.	55.	-955.
1991	136.871	285.	0.	341.	55.	-677.	29.	27.	-928.
1992	136.871	492.	0.	384.	-108.	-785.	24.	-136.	-1064.
1993	136.871	567.	0.	434.	-134.	-919.	32.	-166.	-1230.
1994	136.871	758.	0.	476.	-282.	-1201.	37.	-319.	-1549.
1995	136.871	918.	0.	532.	-385.	-1586.	46.	-432.	-1980.
1996	136.871	691.	0.	579.	-113.	-1699.	59.	-172.	-2152.
1997	136.871	757.	0.	603.	-154.	-1853.	65.	-219.	-2371.
1998	136.871	835.	0.	620.	-215.	-2068.	71.	-286.	-2657.
1999	136.871	634.	0.	648.	14.	-2054.	80.	-66.	-2723.
2000	136.871	663.	0.	665.	2.	-2052.	82.	-80.	-2803.
2001	136.871	567.	0.	674.	106.	-1946.	84.	22.	-2781.
2002	136.871	449.	0.	682.	233.	-1712.	83.	150.	-2630.

TABLE D-13. (Continued)

2003	136,871	558.	0.	687.	129.	-1583.	74.	50.	-2580.
2004	136,871	548.	0.	687.	139.	-1444.	77.	62.	-2519.
2005	136,871	560.	0.	687.	127.	-1317.	76.	51.	-2468.
2006	.000	506.	0.	0.	-506.	-1823.	74.	-580.	-3048.
2007	.000	417.	0.	0.	-417.	-2240.	91.	-508.	-3556.
2008	.000	385.	0.	0.	-385.	-2625.	107.	-491.	-4047.
2009	.000	335.	0.	0.	-335.	-2960.	121.	-456.	-4503.
2010	.000	356.	0.	0.	-356.	-3316.	133.	-491.	-4995.
ENDING BALANCE PLUS ONE YEAR INTEREST =				5145.					
ENDING BOOK VALUE =				5145.					

TABLE D-14. FEAN Calculation - Total System Cash Flow Summary for Sample Case 3

I N T E R I M   E S T I M A T E

SAMPLE CASE 3 - SEPARATE STORAGE AND DISPOSAL FEE PAID 5 YEARS BEFORE DELIVERY

PAGE 8

092991   192636

S U M M E D   O V E R   A L L   B A S E S

YEAR	FEE	ANNUAL COST	ANNUAL ADVANCE PAYMT	ANNUAL SETTLEMENT PAYMT	NET CASH FLOW	ACCUM NET CASH FLOW	INTEREST COST	CHANGE IN BALANCE	BALANCE
1930		192.	0.	245.	53.	53.	0.	53.	53.
1931		268.	0.	131.	-117.	-64.	-2.	-115.	-62.
1932		383.	0.	126.	-256.	-320.	2.	-258.	-320.
1933		433.	0.	166.	-267.	-587.	10.	-277.	-597.
1934		375.	0.	163.	-212.	-799.	18.	-230.	-827.
1935		321.	0.	182.	-140.	-939.	23.	-165.	-992.
1936		288.	0.	243.	-46.	-985.	30.	-75.	-1067.
1937		170.	0.	309.	139.	-846.	32.	107.	-960.
1938		254.	0.	361.	107.	-739.	29.	76.	-882.
1939		324.	0.	425.	99.	-640.	26.	72.	-810.
1940		309.	0.	513.	204.	-436.	24.	180.	-630.
1941		317.	0.	611.	294.	-143.	19.	275.	-355.
1942		323.	0.	384.	-139.	-281.	11.	-150.	-505.
1943		600.	0.	434.	-166.	-447.	15.	-181.	-686.
1944		792.	0.	476.	-316.	-763.	21.	-337.	-1022.
1945		957.	0.	532.	-425.	-1188.	31.	-455.	-1478.
1946		733.	0.	579.	-154.	-1342.	44.	-199.	-1676.
1947		775.	0.	603.	-172.	-1514.	50.	-222.	-1899.
1948		853.	0.	620.	-233.	-1747.	57.	-240.	-2189.
1949		652.	0.	648.	-4.	-1751.	66.	-70.	-2258.
2000		651.	0.	665.	-16.	-1767.	68.	-84.	-2342.
2001		595.	0.	674.	88.	-1679.	70.	18.	-2324.
2002		501.	0.	682.	181.	-1498.	70.	112.	-2213.

TABLE D-14. (Continued)

2003	649.	0.	687.	42.	-1456.	66.	-24.	-2237.
2004	639.	0.	687.	52.	-1403.	67.	-19.	-2252.
2005	647.	0.	687.	40.	-1363.	68.	-28.	-2279.
2006	593.	0.	0.	-593.	-1956.	68.	-661.	-2940.
2007	479.	0.	0.	-479.	-2435.	88.	-567.	-3507.
2008	435.	0.	0.	-435.	-2870.	105.	-540.	-4047.
2009	339.	0.	0.	-339.	-3204.	121.	-456.	-4503.
2010	356.	0.	0.	-356.	-3560.	135.	-491.	-4995.
ENDING BALANCE PLUS ONE YEAR INTEREST = -5145.								
ENDING BOOK VALUE = 5145.								

TABLE D-15. FEAN Calculation - Storage Fee and Cash Flow Summary - Original Estimate - Sample Case 4

ORIGINAL ESTIMATE									
SAMPLE CASE 4 - STOR AND DISP FEES PAID AT DELIVERY 5 PCI ESCALATION									
092981 191000									
GROUP 1 FEE IS IN \$/KQ STORAGE FEE									
YEAR	FEE	ANNUAL COST	ANNUAL ADVANCE PAYMT	ANNUAL SETTLEMENT PAYMT	NET CASH FLOW	ACCUM NET CASH FLOW	INTEREST COST	CHANGE IN BALANCE	BALANCE
1980	139.242	34.	0.	0.	-34.	-34.	0.	-34.	-34.
1981	139.242	92.	0.	0.	-92.	-126.	3.	-95.	-129.
1982	139.242	122.	0.	0.	-122.	-248.	10.	-132.	-261.
1983	139.242	87.	0.	0.	-87.	-335.	21.	-108.	-370.
1984	139.242	54.	0.	0.	-34.	-369.	30.	-64.	-434.
1985	139.242	20.	0.	139.	119.	-250.	35.	84.	-350.
1986	139.242	58.	0.	86.	48.	-202.	29.	19.	-331.
1987	139.242	67.	0.	72.	4.	-198.	27.	-23.	-353.
1988	139.242	158.	0.	94.	-64.	-262.	29.	-93.	-447.
1989	139.242	218.	0.	93.	-126.	-388.	36.	-162.	-609.
1990	139.242	109.	0.	103.	-6.	-393.	50.	-55.	-664.
1991	139.242	32.	0.	138.	106.	-288.	54.	51.	-612.
1992	139.242	31.	0.	175.	144.	-143.	50.	95.	-518.
1993	139.242	32.	0.	205.	172.	-29.	42.	130.	-388.
1994	139.242	54.	0.	241.	207.	256.	32.	175.	-212.
1995	139.242	59.	0.	291.	252.	488.	17.	234.	22.
1996	139.242	42.	0.	347.	305.	793.	-2.	307.	329.
1997	139.242	18.	0.	0.	-18.	775.	-27.	4.	338.
1998	139.242	18.	0.	0.	-18.	757.	-28.	10.	347.
1999	139.242	18.	0.	0.	-18.	739.	-28.	10.	357.
2000	139.242	18.	0.	0.	-18.	721.	-29.	11.	369.
2001	139.242	18.	0.	0.	-18.	703.	-30.	12.	381.
2002	139.242	52.	0.	0.	-52.	650.	-31.	-21.	360.

TABLE D-15. (Continued)

2003	139.272	87.	0.	0.	-87.	364.	-29.	-58.	302.
2004	139.272	87.	0.	0.	-87.	477.	-25.	-62.	240.
2005	139.272	87.	0.	0.	-87.	340.	-20.	-67.	173.
2006	139.272	87.	0.	0.	-87.	303.	-14.	-73.	100.
2007	139.272	62.	0.	0.	-62.	241.	-8.	-54.	46.
2008	139.272	50.	0.	0.	-50.	191.	-4.	-46.	0.
2009	139.272	0.	0.	0.	0.	191.	0.	0.	0.
2010	139.272	0.	0.	0.	0.	191.	0.	0.	0.
ENDING BALANCE PLUS ONE YEAR INTEREST = 0.									
ENDING BOOK VALUE = 0.									

TABLE D-16. FEAN Calculation - Storage Fee and Cash Flow Summary - Interim Estimate - Sample Case 4

INTERIM ESTIMATE

SAMPLE CASE 4 - 810R AND 010P FEES PAID AT DELIVERY   5 PC1 ESCALATION

092981   191000

GROUP 1   FEE IS IN \$/KG STORAGE FEE

YEAR	FEE	ANNUAL COST	ANNUAL ADVANCE PAYMT	ANNUAL SETTLEMENT PAYMT	NET CASH FLOW	ACCU NET CASH FLOW	INTEREST COST	CHANGE IN BALANCE	BALANCE
1980	139.242	38.	0.	0.	-34.	-34.	0.	-34.	-34.
1981	145.884	97.	0.	0.	-97.	-131.	3.	-99.	-133.
1982	152.153	135.	0.	0.	-135.	-265.	11.	-145.	-279.
1983	157.641	101.	0.	0.	-101.	-366.	23.	-123.	-402.
1984	162.784	41.	0.	0.	-41.	-407.	33.	-74.	-476.
1985	167.901	26.	0.	168.	142.	-265.	39.	103.	-373.
1986	173.876	51.	0.	107.	56.	-209.	30.	26.	-347.
1987	180.196	95.	0.	93.	-2.	-211.	28.	-30.	-378.
1988	186.758	234.	0.	126.	-108.	-319.	31.	-139.	-516.
1989	192.622	339.	0.	128.	-210.	-529.	42.	-252.	-769.
1990	197.171	177.	0.	146.	-31.	-560.	63.	-94.	-862.
1991	201.193	55.	0.	199.	144.	-416.	70.	74.	-789.
1992	205.679	56.	0.	259.	203.	-213.	64.	139.	-650.
1993	210.723	61.	0.	310.	249.	36.	53.	196.	-454.
1994	217.025	67.	0.	376.	308.	344.	37.	271.	-182.
1995	225.644	42.	0.	472.	390.	734.	15.	375.	193.
1996	241.127	31.	0.	600.	509.	1244.	-16.	525.	718.
1997	000	41.	0.	0.	-41.	1202.	-59.	17.	735.
1998	000	43.	0.	0.	-43.	1159.	-60.	17.	752.
1999	000	45.	0.	0.	-45.	1114.	-61.	16.	768.
2000	000	48.	0.	0.	-48.	1066.	-63.	15.	782.
2001	000	50.	0.	0.	-50.	1016.	-64.	14.	796.
2002	000	153.	0.	0.	-153.	863.	-65.	-88.	708.

TABLE D-16. (Continued)

2003	.000	267.	0.	0.	-267.	547.	-58.	-209.	499.
2004	.000	280.	0.	0.	-280.	317.	-41.	-239.	260.
2005	.000	298.	0.	0.	-294.	23.	-21.	-273.	-13.
2006	.000	309.	0.	0.	-309.	-286.	1.	-310.	-322.
2007	.000	231.	0.	0.	-231.	-517.	26.	-257.	-579.
2008	.000	196.	0.	0.	-196.	-713.	47.	-243.	-822.
2009	.000	0.	0.	0.	0.	-713.	67.	-67.	-890.
2010	.000	0.	0.	0.	0.	-713.	72.	-72.	-962.
ENDING BALANCE PLUS ONE YEAR INTEREST =					-1040.				
ENDING BOOK VALUE =		0.							

TABLE D-17. FEAN Calculation - Storage Fee and Cash Flow Summary - Final Estimate - Sample Case 4

FINAL ESTIMATE

SAMPLE CASE 4 - SJUN AND UIHP FEES PAID AT DELIVERY   5 PCT ESCALATION

092981   191000

GROUP 1   FEE IS IN \$/KW STORAGE FEE

PAGE 3

YEAR	FEE	ANNUAL CUST	ANNUAL ADVANCE PAYMT	ANNUAL SETTLEMENT PAYMT	NET CASH FLOW	ACCUM NET CASH FLOW	INTEREST CUST	CHANGE IN BALANCE	BALANCE
1980	.000	34.	0.	0.	-34.	-34.	0.	-34.	-34.
1981	.000	47.	0.	0.	-97.	-131.	3.	-99.	-133.
1982	.000	135.	0.	0.	-135.	-265.	11.	-145.	-279.
1983	.000	101.	0.	0.	-101.	-366.	23.	-123.	-402.
1984	.000	41.	0.	0.	-41.	-407.	33.	-74.	-476.
1985	219.188	26.	0.	219.	193.	-214.	39.	154.	-322.
1986	219.188	51.	0.	135.	84.	-130.	26.	58.	-264.
1987	219.188	95.	0.	113.	18.	-112.	22.	-3.	-267.
1988	219.188	234.	0.	148.	-86.	-198.	22.	-108.	-375.
1989	219.188	339.	0.	146.	-193.	-390.	31.	-223.	-598.
1990	219.188	177.	0.	162.	-15.	-405.	49.	-64.	-662.
1991	219.188	55.	0.	217.	162.	-243.	54.	108.	-554.
1992	219.188	56.	0.	276.	221.	-23.	45.	175.	-379.
1993	219.188	61.	0.	322.	261.	238.	31.	230.	-148.
1994	219.188	67.	0.	379.	312.	550.	12.	300.	152.
1995	219.188	82.	0.	458.	377.	927.	-12.	369.	540.
1996	219.188	91.	0.	546.	455.	1382.	-44.	499.	1039.
1997	.000	41.	0.	0.	-41.	1340.	-85.	43.	1083.
1998	.000	43.	0.	0.	-43.	1297.	-88.	45.	1127.
1999	.000	45.	0.	0.	-45.	1252.	-92.	46.	1174.
2000	.000	48.	0.	0.	-48.	1204.	-96.	48.	1222.
2001	.000	50.	0.	0.	-50.	1154.	-100.	49.	1271.
2002	.000	153.	0.	0.	-153.	1001.	-104.	-49.	1222.

TABLE D-17. (Continued)

2003	.000	267.	0.	0.	-267.	734.	-100.	-167.	1055.
2004	.000	280.	0.	0.	-280.	454.	-86.	-194.	861.
2005	.000	294.	0.	0.	-294.	161.	-70.	-224.	637.
2006	.000	309.	0.	0.	-309.	-148.	-52.	-237.	301.
2007	.000	231.	0.	0.	-231.	-379.	-31.	-200.	181.
2008	.000	196.	0.	0.	-196.	-375.	-13.	-181.	0.
2009	.000	0.	0.	0.	0.	-375.	0.	0.	0.
2010	.000	0.	0.	0.	0.	-375.	0.	0.	0.
ENDING BALANCE PLUS ONE YEAR INTEREST = 0.									
ENDING BUDX VALUE = 0.									

TABLE D-18. FEAN Calculation - Disposal Fee and Cash Flow Summary - Initial Estimate - Sample Case 4

O N I G I N A L E S T I M A T E

SAMPLE CASE 4 - STOR AND DISP FEES PAID AT DELIVERY   5 PCT ESCALATION   PAGE 4

092981   191001

GROUP 2   FEE IS IN   3/KG DISPOSAL FE

YEAR	FEE	ANNUAL COST	ANNUAL ADVANCE PAYMT	ANNUAL SETTLEMENT PAYMT	NET CASH FLOW	ACCUM NET CASH FLOW	INTEREST COST	CHANGE IN BALANCE	BALANCE
1980	248.505	158.	0.	0.	-158.	-158.	0.	-158.	-158.
1981	248.505	176.	0.	0.	-176.	-334.	13.	-169.	-347.
1982	248.505	261.	0.	0.	-261.	-595.	28.	-289.	-636.
1983	248.505	346.	0.	0.	-346.	-941.	52.	-398.	-1034.
1984	248.505	341.	0.	0.	-341.	-1282.	84.	-426.	-1459.
1985	248.505	501.	0.	249.	-52.	-1335.	119.	-171.	-1631.
1986	248.505	251.	0.	153.	-98.	-1432.	133.	-231.	-1861.
1987	248.505	103.	0.	128.	25.	-1407.	152.	-127.	-1988.
1988	248.505	96.	0.	168.	72.	-1335.	162.	-90.	-2078.
1989	248.505	108.	0.	165.	58.	-1278.	169.	-112.	-2190.
1990	248.505	200.	0.	184.	-16.	-1294.	178.	-195.	-2385.
1991	248.505	285.	0.	246.	-39.	-1333.	194.	-233.	-2618.
1992	248.505	442.	0.	313.	-179.	-1512.	213.	-343.	-3011.
1993	248.505	567.	0.	365.	-202.	-1714.	245.	-447.	-3458.
1994	248.505	758.	0.	430.	-328.	-2042.	282.	-610.	-4068.
1995	248.505	918.	0.	519.	-398.	-2440.	332.	-730.	-4798.
1996	248.505	691.	0.	619.	-72.	-2513.	391.	-463.	-5261.
1997	248.505	757.	0.	698.	-59.	-2572.	424.	-488.	-5749.
1998	248.505	435.	0.	788.	-47.	-2619.	464.	-515.	-6264.
1999	248.505	634.	0.	865.	230.	-2388.	511.	-280.	-6544.
2000	248.505	863.	0.	967.	304.	-2084.	533.	-224.	-6774.
2001	248.505	567.	0.	1051.	484.	-1601.	552.	-68.	-6842.
2002	248.505	449.	0.	1046.	648.	-953.	558.	40.	-6752.

TABLE D-18. (Continued)

2003	248.585	554.	0.	1126.	568.	-385.	550.	18.	-6734.
2004	248.585	548.	0.	1178.	630.	245.	549.	81.	-6653.
2005	248.585	560.	0.	1208.	648.	893.	542.	106.	-6547.
2006	248.585	506.	0.	1224.	716.	1612.	534.	185.	-6362.
2007	248.585	417.	0.	1239.	822.	2434.	519.	304.	-6059.
2008	248.585	385.	0.	1248.	863.	3297.	494.	369.	-5690.
2009	248.585	335.	0.	1248.	913.	4210.	464.	449.	-5240.
2010	248.585	356.	0.	1248.	892.	5101.	427.	464.	-4776.
ENDING BALANCE PLUS ONE YEAR INTEREST =				5165.					
ENDING BOOK VALUE =				5165.					

TABLE D-19. FEAN Calculation - Disposal Fee and Cash Flow Summary - Interim Estimate - Sample Case 4

INTERIM ESTIMATE									
SAMPLE CASE 4 - STUN AND DISP FEES PAID AT DELIVERY 5 PCT ESCALATION									
042481 141001									
GROUP 2 FEE IS IN \$/KG DISPOSAL FE									
YEAR	FEE	ANNUAL COST	ANNUAL ADVANCE PAYMT	ANNUAL SETTLEMENT PAYMT	NET CASH FLOW	ACCUM NET CASH FLOW	INTEREST COST	CHANGE IN BALANCE	BALANCE
1980	248.5 ₄₃	158.	0.	0.	-158.	-158.	0.	-158.	-158.
1981	260.4 ₈₇	184.	0.	0.	-184.	-343.	13.	-147.	-356.
1982	272.9 ₃₁	207.	0.	0.	-207.	-630.	29.	-316.	-672.
1983	284.3 ₈₄	401.	0.	0.	-401.	-1031.	55.	-455.	-1126.
1984	295.9 ₃₁	415.	0.	0.	-415.	-1446.	92.	-507.	-1634.
1985	307.0 ₈₆	384.	0.	307.	-77.	-1523.	133.	-210.	-1845.
1986	318.5 ₈₀	336.	0.	196.	-140.	-1663.	150.	-290.	-2135.
1987	330.2 ₈₃	145.	0.	170.	25.	-1638.	174.	-149.	-2284.
1988	342.5 ₈₆	141.	0.	231.	90.	-1548.	188.	-96.	-2380.
1989	355.5 ₈₃	167.	0.	236.	70.	-1478.	194.	-124.	-2504.
1990	369.2 ₈₃	326.	0.	273.	-53.	-1531.	204.	-237.	-2762.
1991	383.4 ₈₄	488.	0.	380.	-108.	-1639.	223.	-333.	-3095.
1992	398.2 ₈₆	884.	0.	502.	-382.	-2022.	252.	-635.	-3729.
1993	413.0 ₈₂	1070.	0.	607.	-463.	-2484.	304.	-766.	-4496.
1994	427.8 ₈₀	1501.	0.	740.	-761.	-3245.	366.	-1127.	-5623.
1995	442.2 ₈₃	1908.	0.	924.	-983.	-4228.	458.	-1442.	-7065.
1996	455.7 ₈₂	1509.	0.	1135.	-374.	-4603.	576.	-950.	-8015.
1997	469.1 ₈₉	1736.	0.	1318.	-418.	-5020.	653.	-1071.	-9086.
1998	482.3 ₈₃	2009.	0.	1529.	-480.	-5500.	740.	-1220.	-10306.
1999	495.2 ₈₀	1603.	0.	1723.	120.	-5380.	840.	-720.	-11026.
2000	508.2 ₈₃	1759.	0.	1977.	218.	-5162.	894.	-681.	-11707.
2001	521.3 ₈₄	1501.	0.	2205.	625.	-4538.	954.	-329.	-12036.
2002	535.0 ₈₄	1512.	0.	2360.	1048.	-3490.	981.	67.	-11969.

TABLE D-19. (Continued)

2003	549.504	1713.	0.	4490.	776.	-2714.	975.	-199.	-12164.
2004	564.321	1767.	0.	4675.	908.	-1806.	992.	-84.	-12252.
2005	574.170	1844.	0.	4815.	918.	-887.	999.	-80.	-12332.
2006	543.776	1798.	0.	4924.	1126.	238.	1005.	121.	-12212.
2007	608.242	1557.	0.	5032.	1476.	1714.	995.	480.	-11731.
2008	623.249	1508.	0.	5129.	1621.	3335.	956.	664.	-11067.
2009	639.471	1378.	0.	5210.	1832.	5167.	902.	930.	-10136.
2010	660.040	1539.	0.	5313.	1774.	6941.	826.	948.	-9188.
ENDING BALANCE PLUS ONE YEAR INTEREST				= 9937.					
ENDING BOOK VALUE				= 9937.					

TABLE D-20. FEAN Calculation - Disposal Fee and Cash Flow Summary - Final Estimate - Sample Case 4

F I N A L   E S T I M A T E

SAMPLE CASE 4 - STUR AND DISP FEES PAID AT DELIVERY   5 PCI ESCALATION

092981   191001

GROUP   2   FEE IS IN   \$/KG DISPOSAL FE

YEAR	FEE	ANNUAL COST	ANNUAL ADVANCE PAYMT	ANNUAL SETTLEMENT PAYMT	NET CASH FLOW	ACCUM NET CASH FLOW	INTEREST COST	CHANGE IN BALANCE	BALANCE
1980	.000	158.	0.	0.	-158.	-158.	0.	-158.	-158.
1981	.000	164.	0.	0.	-164.	-343.	13.	-197.	-356.
1982	.000	287.	0.	0.	-287.	-630.	29.	-316.	-672.
1983	.000	401.	0.	0.	-401.	-1031.	55.	-455.	-1128.
1984	.000	415.	0.	0.	-415.	-1446.	92.	-507.	-1634.
1985	489.4q2	388.	0.	489.	103.	-1340.	133.	-24.	-1662.
1986	489.4q2	336.	0.	301.	-35.	-1375.	135.	-170.	-1832.
1987	489.4q2	145.	0.	252.	107.	-1268.	149.	-42.	-1875.
1988	489.4q2	141.	0.	330.	189.	-1079.	153.	36.	-1838.
1989	489.4q2	167.	0.	326.	159.	-920.	150.	9.	-1830.
1990	489.4q2	326.	0.	362.	36.	-884.	149.	-113.	-1943.
1991	489.4q2	488.	0.	485.	-3.	-888.	158.	-162.	-2104.
1992	489.4q2	884.	0.	617.	-267.	-1155.	171.	-439.	-2543.
1993	489.4q2	1070.	0.	720.	-350.	-1505.	207.	-557.	-3101.
1994	489.4q2	1501.	0.	847.	-654.	-2159.	253.	-907.	-4007.
1995	489.4q2	1908.	0.	1023.	-885.	-3044.	327.	-1211.	-5219.
1996	489.4q2	1509.	0.	1219.	-290.	-3334.	425.	-715.	-5934.
1997	489.4q2	1736.	0.	1375.	-361.	-3695.	484.	-844.	-6778.
1998	489.4q2	2009.	0.	1552.	-457.	-4152.	552.	-1010.	-7788.
1999	489.4q2	1603.	0.	1703.	100.	-4052.	635.	-535.	-8323.
2000	489.4q2	1754.	0.	1904.	145.	-3907.	676.	-533.	-8856.
2001	489.4q2	1581.	0.	2071.	490.	-3417.	722.	-232.	-9088.
2002	489.4q2	1512.	0.	2154.	847.	-2570.	741.	106.	-8982.

TABLE D-20. (Continued)

2003	489.4q2	1713.	0.	4217.	504.	-2066.	732.	-228.	-9210.
2004	489.4q2	1767.	0.	4320.	553.	-1513.	751.	-197.	-9407.
2005	489.4q2	1846.	0.	4379.	483.	-1031.	767.	-284.	-9691.
2006	489.4q2	1798.	0.	4411.	612.	-418.	790.	-178.	-9869.
2007	489.4q2	1557.	0.	4440.	884.	465.	804.	79.	-9790.
2008	489.4q2	1508.	0.	4457.	949.	1414.	798.	151.	-9639.
2009	489.4q2	1578.	0.	4457.	1079.	2494.	786.	294.	-9345.
2010	489.4q2	1539.	0.	4457.	918.	3412.	762.	156.	-9188.
ENDING BALANCE PLUS ONE YEAR INTEREST = 9937.									
ENDING BOOK VALUE = 7937.									

TABLE D-21. FEAN Calculation - Total System Cash Flow Summary - Initial Estimate - Sample Case 4

O R I G I N A L   E S T I M A T E

S A M P L E   C A S E   4   =   S T U D   A N D   D I S P   F E E S   P A I D   A T   D E L I V E R Y   S   P C I   E S C A L A T I O N

092481   191001

S U M M E D   O V E R   A L L   B A S E S

YEAR	FPE	ANNUAL COST	ANNUAL ADVANCE PAYMT	ANNUAL SETTLEMENT PAYMT	NET CASH FLOW	ACCUM NET CASH FLOW	INTEREST COST	CHANGE IN BALANCE	BALANCE
1980		192.	0.	0.	-192.	-192.	0.	-192.	-192.
1981		258.	0.	0.	-258.	-450.	16.	-283.	-476.
1982		383.	0.	0.	-383.	-843.	39.	-421.	-897.
1983		433.	0.	0.	-433.	-1276.	73.	-506.	-1403.
1984		575.	0.	0.	-575.	-1651.	114.	-490.	-1693.
1985		521.	0.	388.	66.	-1585.	154.	-88.	-1981.
1986		248.	0.	238.	-50.	-1635.	161.	-211.	-2192.
1987		170.	0.	200.	29.	-1605.	179.	-149.	-2342.
1988		258.	0.	262.	4.	-1597.	191.	-183.	-2525.
1989		526.	0.	258.	-68.	-1665.	206.	-274.	-2798.
1990		509.	0.	287.	-22.	-1687.	228.	-250.	-3048.
1991		517.	0.	384.	66.	-1621.	248.	-182.	-3230.
1992		523.	0.	489.	-35.	-1656.	263.	-248.	-3528.
1993		600.	0.	570.	-30.	-1685.	288.	-317.	-3846.
1994		792.	0.	671.	-121.	-1806.	313.	-435.	-4280.
1995		957.	0.	810.	-146.	-1953.	344.	-495.	-4775.
1996		733.	0.	966.	232.	-1720.	364.	-157.	-4932.
1997		775.	0.	648.	-77.	-1797.	402.	-479.	-5411.
1998		453.	0.	788.	-65.	-1862.	441.	-506.	-5917.
1999		652.	0.	865.	212.	-1650.	482.	-270.	-6187.
2000		681.	0.	967.	286.	-1364.	504.	-218.	-6403.
2001		585.	0.	1051.	466.	-898.	522.	-56.	-6461.
2002		501.	0.	1046.	595.	-303.	527.	69.	-6392.

TABLE D-21. (Continued)

2003	645.	0.	1126.	481.	179.	521.	-40.	-6432.
2004	635.	0.	1178.	543.	722.	524.	19.	-6413.
2005	647.	0.	1208.	561.	1283.	523.	38.	-6374.
2006	593.	0.	1224.	631.	1913.	520.	112.	-6262.
2007	479.	0.	1239.	760.	2675.	510.	250.	-6013.
2008	435.	0.	1248.	813.	3488.	490.	323.	-5690.
2009	335.	0.	1248.	913.	4401.	464.	449.	-5240.
2010	356.	0.	1248.	892.	5292.	427.	464.	-4776.
ENDING BALANCE PLUS ONE YEAR INTEREST = 5165.								
ENDING BOOK VALUE = 5165.								

TABLE D-22. FEAN Calculation - Total System Cash Flow Summary - Interim Estimate - Sample Case 4

INTERIM ESTIMATE									
SAMPLE CASE 4 - STOR AND DISP FEES PAID AT DELIVERY 5 PCI ESCALATION									
092981 191001									
SUMMED OVER ALL BASES									
YEAR	PER	ANNUAL COST	ANNUAL ADVANCE PAYMT	ANNUAL SETTLEMENT PAYMT	NET CASH FLOW	ACCUM NET CASH FLOW	INTEREST COST	CHANGE IN BALANCE	BALANCE
1980		192.	0.	0.	-192.	-192.	0.	-192.	-192.
1981		281.	0.	0.	-281.	-473.	16.	-297.	-489.
1982		422.	0.	0.	-422.	-895.	40.	-462.	-951.
1983		501.	0.	0.	-501.	-1397.	77.	-579.	-1530.
1984		456.	0.	0.	-456.	-1853.	123.	-581.	-2111.
1985		410.	0.	475.	65.	-1788.	172.	-107.	-2218.
1986		387.	0.	303.	-64.	-1872.	181.	-265.	-2482.
1987		240.	0.	263.	23.	-1849.	202.	-179.	-2661.
1988		375.	0.	357.	-18.	-1866.	217.	-235.	-2896.
1989		505.	0.	365.	-141.	-2007.	236.	-377.	-3273.
1990		503.	0.	419.	-84.	-2091.	267.	-351.	-3624.
1991		543.	0.	579.	36.	-2056.	295.	-259.	-3883.
1992		940.	0.	761.	-179.	-2235.	317.	-445.	-4379.
1993		1131.	0.	917.	-214.	-2448.	357.	-571.	-4949.
1994		1568.	0.	1116.	-453.	-2901.	403.	-856.	-5805.
1995		1989.	0.	1396.	-593.	-3494.	473.	-1066.	-6872.
1996		1600.	0.	1735.	135.	-3359.	560.	-425.	-7297.
1997		1777.	0.	1318.	-459.	-3818.	595.	-1054.	-8350.
1998		2052.	0.	1529.	-523.	-4341.	681.	-1204.	-9554.
1999		1649.	0.	1723.	75.	-4267.	779.	-704.	-10258.
2000		1807.	0.	1977.	170.	-4096.	836.	-666.	-10924.
2001		1631.	0.	2205.	574.	-3522.	890.	-316.	-11240.
2002		1465.	0.	2360.	895.	-2627.	916.	-21.	-11261.

TABLE D-22. (Continued)

2003	1980.	0.	2490.	510.	-2117.	918.	-408.	-11669.
2004	2047.	0.	4675.	628.	-1489.	451.	-323.	-11992.
2005	2190.	0.	4815.	624.	-865.	477.	-353.	-12345.
2006	2107.	0.	4924.	817.	-48.	1006.	-189.	-12534.
2007	1787.	0.	5032.	1245.	1197.	1022.	223.	-12310.
2008	1704.	0.	5129.	1425.	2622.	1003.	421.	-11889.
2009	1378.	0.	5210.	1832.	4454.	969.	863.	-11026.
2010	1559.	0.	5313.	1774.	6228.	899.	876.	-10150.
ENDING BALANCE PLUS ONE YEAR INTEREST			-10978.					
ENDING BOOK VALUE			4937.					

TABLE D-23. FEAN Calculation - Total System Cash Flow Summary - Final Estimate - Sample Case 4

FINAL ESTIMATE									
SAMPLE CASE 4 - 810R AND 110R FLEES PAID AT DELIVERY 5 PCI ESCALATION									
092981 191001									
R U N N E D O V E R A L L B A S E S									
YEAR	FPE	ANNUAL COST	ANNUAL ADVANCE PAYMT	ANNUAL SETTLEMENT PAYMT	NET CASH FLOW	ACCUM NET CASH FLOW	INTEREST COST	CHANGE IN BALANCE	BALANCE
1980		192.	0.	0.	-192.	-192.	0.	-192.	-192.
1981		241.	0.	0.	-241.	-433.	16.	-297.	-489.
1982		422.	0.	0.	-422.	-855.	40.	-462.	-951.
1983		501.	0.	0.	-501.	-1357.	77.	-579.	-1530.
1984		456.	0.	0.	-456.	-1813.	125.	-581.	-2111.
1985		410.	0.	709.	299.	-1514.	172.	127.	-1984.
1986		387.	0.	436.	49.	-1505.	162.	-112.	-2096.
1987		240.	0.	365.	125.	-1380.	171.	-46.	-2142.
1988		375.	0.	478.	103.	-1277.	175.	-71.	-2213.
1989		505.	0.	471.	-34.	-1311.	180.	-215.	-2428.
1990		503.	0.	524.	21.	-1290.	198.	-177.	-2605.
1991		543.	0.	702.	159.	-1131.	212.	-54.	-2658.
1992		940.	0.	893.	-47.	-1178.	217.	-263.	-2922.
1993		1131.	0.	1042.	-89.	-1267.	238.	-327.	-3249.
1994		1368.	0.	1226.	-342.	-1609.	263.	-607.	-3856.
1995		1489.	0.	1481.	-508.	-2117.	314.	-822.	-4678.
1996		1800.	0.	1765.	-164.	-1952.	381.	-217.	-4895.
1997		1777.	0.	1375.	-402.	-2354.	399.	-801.	-5696.
1998		2052.	0.	1552.	-501.	-2855.	464.	-965.	-6661.
1999		1639.	0.	1703.	55.	-2800.	543.	-488.	-7149.
2000		1807.	0.	1904.	97.	-2703.	583.	-485.	-7634.
2001		1631.	0.	2071.	439.	-2263.	622.	-183.	-7817.
2002		1465.	0.	2159.	694.	-1569.	637.	57.	-7760.

TABLE D-23. (Continued)

2003	1440.	0.	4217.	237.	-1332.	632.	-345.	-8155.
2004	2047.	0.	4320.	273.	-1059.	665.	-391.	-8546.
2005	2190.	0.	4379.	189.	-870.	697.	-508.	-9054.
2006	2107.	0.	4411.	304.	-966.	738.	-434.	-9488.
2007	1787.	0.	4440.	653.	87.	773.	-120.	-9609.
2008	1704.	0.	4457.	753.	840.	783.	-30.	-9639.
2009	1378.	0.	4457.	1079.	1919.	786.	244.	-9345.
2010	1539.	0.	4457.	918.	2837.	762.	156.	-9188.
ENDING BALANCE PLUS ONE YEAR INTEREST			-9937.					
ENDING BOOK VALUE			9937.					

TABLE D-24. FEAN Calculation - Storage Fee and Cash Flow Summary - Interim Estimate - Sample Case 5

INTERIM ESTIMATE

SAMPLE CASE 5 - 810M AND DISP FEES PAID 5 YRS BEFORE DEL 5 PCT EXCALATION

092481 191503

GROUP 1 FEE IS IN \$/KG STORAGE FEE

PAGE 2

YEAR	FEE	ANNUAL COST	ANNUAL ADVANCE PAYMT	ANNUAL SETTLEMENT PAYMT	NET CASH FLOW	ACCUM NET CASH FLOW	INTEREST COST	CHANGE IN BALANCE	BALANCE
1980	94.164	38.	0.	98.	60.	60.	0.	60.	60.
1981	99.209	97.	0.	61.	-36.	25.	-5.	-31.	29.
1982	104.385	135.	0.	58.	-81.	-56.	-2.	-78.	-49.
1983	109.282	101.	0.	74.	-27.	-83.	4.	-51.	-80.
1984	114.107	41.	0.	76.	35.	-49.	7.	28.	-52.
1985	119.582	26.	0.	88.	63.	18.	4.	58.	7.
1986	125.584	51.	0.	124.	74.	87.	-1.	74.	81.
1987	132.449	95.	0.	167.	72.	160.	-7.	79.	159.
1988	140.354	234.	0.	206.	-28.	132.	-13.	-15.	145.
1989	148.602	339.	0.	257.	-81.	51.	-12.	-69.	75.
1990	157.004	177.	0.	328.	151.	202.	-6.	157.	233.
1991	169.980	55.	0.	423.	368.	570.	-19.	387.	620.
1992	0.000	56.	0.	0.	-56.	514.	-51.	-5.	615.
1993	0.000	51.	0.	0.	-61.	454.	-50.	-11.	604.
1994	0.000	67.	0.	0.	-67.	386.	-49.	-18.	586.
1995	0.000	82.	0.	0.	-82.	305.	-48.	-34.	552.
1996	0.000	91.	0.	0.	-91.	214.	-45.	-46.	506.
1997	0.000	41.	0.	0.	-41.	172.	-41.	0.	506.
1998	0.000	43.	0.	0.	-43.	129.	-41.	-2.	503.
1999	0.000	45.	0.	0.	-45.	84.	-41.	-4.	499.
2000	0.000	48.	0.	0.	-48.	36.	-41.	-7.	492.
2001	0.000	50.	0.	0.	-50.	-14.	-40.	-10.	482.
2002	0.000	153.	0.	0.	-153.	-167.	-39.	-113.	369.

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TABLE D-24. (Continued)

2003	000	267.	0.	0.	-267.	-454.	-30.	-257.	132.
2004	000	240.	0.	0.	-280.	-714.	-11.	-269.	-137.
2005	000	294.	0.	0.	-294.	-1008.	11.	-305.	-442.
2006	000	509.	0.	0.	-309.	-1316.	36.	-345.	-787.
2007	000	231.	0.	0.	-231.	-1547.	64.	-295.	-1082.
2008	000	196.	0.	0.	-196.	-1743.	88.	-284.	-1366.
2009	000	0.	0.	0.	0.	-1743.	111.	-111.	-1477.
2010	000	0.	0.	0.	0.	-1743.	120.	-120.	-1598.
ENDING BALANCE PLUS ONE YEAR INTEREST					-1728.				
ENDING BOOK VALUE					0.				

TABLE D-25. FEAN Calculation - Disposal Fee and Cash Flow Summary - Interim Estimate - Sample Case 5

INTERIM ESTIMATE

SAMPLE CASE 5 - 810R AND DISP FEES PAID 3 YRS BEFORE DEL 5 PCT EXCALATION

092981 191504

GROUP 2 FEE IS IN \$/KG DISPOSAL FE

YEAR	FEE	ANNUAL COST	ANNUAL ADVANCE PAYM	ANNUAL SETTLEMENT PAYM	NET CASH FLOW	ACCUM NET CASH FLOW	INTEREST COST	CHANGE IN BALANCE	BALANCE
1980	167.986	158.	0.	168.	10.	10.	0.	10.	10.
1981	176.457	188.	0.	189.	-76.	-66.	-1.	-75.	-66.
1982	185.151	207.	0.	208.	-192.	-258.	5.	-197.	-263.
1983	193.952	201.	0.	231.	-270.	-528.	21.	-291.	-554.
1984	202.772	215.	0.	235.	-280.	-808.	43.	-325.	-879.
1985	211.457	204.	0.	256.	-228.	-1036.	72.	-299.	-1179.
1986	220.169	234.	0.	218.	-118.	-1154.	96.	-214.	-1393.
1987	229.282	145.	0.	289.	144.	-1010.	113.	30.	-1362.
1988	238.850	141.	0.	351.	210.	-800.	111.	99.	-1264.
1989	249.281	167.	0.	431.	264.	-536.	103.	161.	-1102.
1990	260.479	226.	0.	544.	218.	-318.	90.	128.	-974.
1991	272.581	288.	0.	679.	191.	-127.	79.	111.	-863.
1992	285.585	384.	0.	802.	-82.	-209.	70.	-152.	-1015.
1993	299.152	1070.	0.	948.	-121.	-330.	83.	-204.	-1219.
1994	313.484	1501.	0.	1091.	-410.	-740.	99.	-510.	-1728.
1995	327.970	1908.	0.	1276.	-632.	-1373.	141.	-773.	-2501.
1996	342.484	1599.	0.	1448.	-61.	-1433.	204.	-265.	-2766.
1997	357.689	1736.	0.	1577.	-159.	-1592.	225.	-384.	-3150.
1998	373.773	2009.	0.	1693.	-316.	-1908.	257.	-573.	-3722.
1999	390.585	1503.	0.	1851.	248.	-1660.	303.	-55.	-3778.
2000	409.187	1739.	0.	1989.	230.	-1430.	308.	-78.	-3856.
2001	430.085	1581.	0.	2118.	537.	-893.	314.	223.	-3633.
2002	454.687	1512.	0.	2266.	954.	61.	290.	658.	-2975.

TABLE D-25. (Continued)

2003	485.476	1713.	0.	4439.	726.	787.	242.	483.	-2492.
2004	528.074	1767.	0.	4651.	884.	1671.	203.	681.	-1811.
2005	601.082	1896.	0.	5017.	1121.	2792.	148.	973.	-838.
2006	600.0	1798.	0.	0.	-1798.	993.	68.	-1867.	-2705.
2007	600.0	1537.	0.	0.	-1537.	-963.	220.	-1777.	-4481.
2008	600.0	1508.	0.	0.	-1508.	-2071.	363.	-1873.	-6355.
2009	600.0	1378.	0.	0.	-1378.	-3449.	518.	-1896.	-8251.
2010	600.0	1539.	0.	0.	-1539.	-4989.	672.	-2212.	-10462.
ENDING BALANCE PLUS ONE YEAR INTEREST =				11315.					
ENDING BOOK VALUE =				9937.					

TABLE D-26. FEAN Calculation - Total System Cash Flow Summary - Interim Estimate - Sample Case 5

INTERIM ESTIMATE									
SAMPLE CASE 5 - \$100 ANNUAL DISB FEES PAID 3 YRS BEFORE DEL 5 PCT EXCALATION									
092981 191504									
SUMMED OVER ALL BARS									
YEAR	FE	ANNUAL COST	ANNUAL ADVANCE PAYMT	ANNUAL SETTLEMENT PAYMT	NET CASH FLOW	ACCUM NET CASH FLOW	INTEREST COST	CHANGE IN BALANCE	BALANCE
1980		192.	0.	262.	70.	70.	0.	70.	70.
1981		211.	0.	170.	-112.	-42.	-6.	-106.	-36.
1982		422.	0.	149.	-273.	-313.	3.	-276.	-312.
1983		501.	0.	205.	-297.	-611.	25.	-322.	-636.
1984		456.	0.	211.	-245.	-857.	52.	-297.	-931.
1985		410.	0.	245.	-165.	-1022.	76.	-241.	-1172.
1986		387.	0.	342.	-44.	-1066.	96.	-140.	-1312.
1987		240.	0.	456.	216.	-850.	107.	109.	-1203.
1988		375.	0.	557.	182.	-668.	98.	64.	-1119.
1989		505.	0.	688.	183.	-485.	91.	92.	-1027.
1990		503.	0.	873.	369.	-116.	84.	286.	-741.
1991		543.	0.	1102.	559.	443.	60.	498.	-243.
1992		940.	0.	802.	-137.	306.	20.	-157.	-400.
1993		1131.	0.	948.	-182.	123.	33.	-215.	-615.
1994		1568.	0.	1091.	-478.	-354.	50.	-528.	-1143.
1995		1489.	0.	1276.	-714.	-1068.	93.	-807.	-1949.
1996		1600.	0.	1448.	-152.	-1220.	154.	-311.	-2260.
1997		1777.	0.	1577.	-200.	-1419.	184.	-384.	-2644.
1998		2052.	0.	1693.	-359.	-1779.	216.	-575.	-3219.
1999		1649.	0.	1851.	201.	-1576.	262.	-60.	-3279.
2000		1807.	0.	1989.	182.	-1394.	287.	-85.	-3364.
2001		1631.	0.	2114.	487.	-907.	274.	213.	-3151.
2002		1465.	0.	2266.	802.	-105.	257.	545.	-2606.

TABLE D-26. (Continued)

2003	1980.	0.	4439.	459.	354.	212.	247.	-2360.
2004	2047.	0.	4651.	604.	957.	192.	411.	-1948.
2005	2190.	0.	5017.	827.	1784.	154.	668.	-1280.
2006	2107.	0.	0.	-2107.	-323.	104.	-2211.	-3492.
2007	1787.	0.	0.	-1787.	-2110.	285.	-2072.	-5563.
2008	1704.	0.	0.	-1704.	-3814.	453.	-2158.	-7721.
2009	1378.	0.	0.	-1378.	-5192.	629.	-2007.	-9728.
2010	1539.	0.	0.	-1539.	-6731.	793.	-2332.	-12060.
ENDING BALANCE PLUS ONE YEAR INTEREST = -13043.								
ENDING BOOK VALUE = 9937.								

TABLE D-27. FEAN Calculation - Storage Fee and Cash Flow Summary - Interim Estimate - Sample Case 6

INTERIM ESTIMATE

SAMPLE CASE 6 - STOR AND DISP FEES - 60 PCT PAID 3 YEARS BEFORE DELIVERY

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GROUP 1 FEE IS IN \$/KG STORAGE FEE

YEAR	FEE	ANNUAL COST	ANNUAL ADVANCE PAYMT	ANNUAL SETTLEMENT PAYMT	NET CASH FLOW	ACCU NET CASH FLOW	INTEREST COST	CHANGE IN BALANCE	BALANCE
1980	139.242	34.	56.	0.	22.	22.	0.	22.	22.
1981	145.899	97.	36.	0.	-60.	-38.	-2.	-58.	-36.
1982	152.153	135.	32.	0.	-103.	-140.	3.	-106.	-142.
1983	157.641	101.	43.	0.	-58.	-198.	12.	-69.	-211.
1984	162.784	41.	44.	0.	3.	-195.	17.	-15.	-225.
1985	167.901	26.	30.	64.	109.	-87.	18.	90.	-135.
1986	173.876	51.	70.	53.	72.	-15.	11.	61.	-74.
1987	180.196	95.	92.	48.	43.	29.	6.	37.	-37.
1988	186.758	234.	111.	62.	-80.	-32.	3.	-63.	-100.
1989	192.642	339.	135.	63.	-140.	-172.	4.	-148.	-248.
1990	197.171	177.	167.	71.	61.	-110.	20.	41.	-207.
1991	201.193	55.	203.	96.	244.	133.	17.	227.	20.
1992	205.679	56.	0.	123.	47.	201.	-2.	69.	89.
1993	210.743	61.	0.	145.	84.	285.	-7.	91.	180.
1994	217.043	67.	0.	176.	108.	393.	-15.	123.	303.
1995	225.644	82.	0.	224.	143.	536.	-25.	168.	471.
1996	241.147	91.	0.	300.	209.	745.	-38.	247.	718.
1997	.000	41.	0.	0.	-41.	703.	-59.	17.	735.
1998	.000	43.	0.	0.	-43.	660.	-60.	17.	752.
1999	.000	45.	0.	0.	-45.	615.	-61.	16.	768.
2000	.000	48.	0.	0.	-48.	567.	-63.	15.	782.
2001	.000	50.	0.	0.	-50.	517.	-64.	14.	796.
2002	.000	153.	0.	0.	-153.	364.	-65.	-88.	708.

TABLE D-27. (Continued)

2003	.000	267.	0.	0.	-267.	47.	-58.	-209.	499.
2004	.000	280.	0.	0.	-280.	-183.	-41.	-239.	260.
2005	.000	294.	0.	0.	-294.	-476.	-21.	-273.	-13.
2006	.000	309.	0.	0.	-309.	-785.	1.	-310.	-322.
2007	.000	231.	0.	0.	-231.	-1016.	26.	-257.	-579.
2008	.000	196.	0.	0.	-196.	-1212.	47.	-243.	-822.
2009	.000	0.	0.	0.	0.	-1212.	67.	-67.	-890.
2010	.000	0.	0.	0.	0.	-1212.	72.	-72.	-962.
ENDING BALANCE PLUS ONE YEAR INTEREST =					-1040.				
ENDING BOOK VALUE =					0.				

TABLE D-28. FEAN Calculation - Disposal Fee and Cash Flow Summary - Interim Estimate - Sample Case 6

INTERIM ESTIMATE

SAMPLE CASE 6 - SJUR AND DISP FEES - 60 PCT PAID 5 YEARS BEFORE DELIVERY

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GROUP 2 FEE IS IN 3/KG DISPOSAL FEE

YEAR	FEE	ANNUAL COST	ANNUAL ADVANCE PAYMT	ANNUAL SETTLEMENT PAYMT	NET CASH FLOW	ACCUM NET CASH FLOW	INTEREST COST	CHANGE IN BALANCE	BALANCE
1980	248.5 ₅	158.	101.	0.	-58.	-58.	0.	-58.	-58.
1981	260.4 ₇	184.	85.	0.	-120.	-177.	3.	-124.	-182.
1982	272.5 ₇	287.	57.	0.	-230.	-408.	15.	-245.	-427.
1983	284.3 ₄	401.	78.	0.	-323.	-730.	39.	-358.	-785.
1984	295.9 ₁	415.	80.	0.	-335.	-1065.	64.	-399.	-1184.
1985	307.0 ₆	584.	92.	158.	-134.	-1199.	96.	-231.	-1414.
1986	318.5 ₀	556.	128.	100.	-108.	-1308.	115.	-223.	-1638.
1987	330.2 ₅	145.	189.	86.	110.	-1198.	133.	-24.	-1661.
1988	342.5 ₆	141.	204.	116.	179.	-1019.	135.	48.	-1618.
1989	355.5 ₅	167.	249.	118.	201.	-818.	132.	69.	-1549.
1990	369.2 ₅	526.	313.	137.	124.	-695.	126.	-3.	-1552.
1991	383.4 ₄	488.	387.	190.	90.	-605.	126.	-37.	-1588.
1992	398.2 ₆	888.	454.	252.	-178.	-783.	129.	-308.	-1896.
1993	413.0 ₂	1070.	531.	305.	-234.	-1017.	155.	-388.	-2284.
1994	427.8 ₀	1501.	604.	371.	-528.	-1545.	186.	-712.	-2996.
1995	442.2 ₅	1908.	698.	461.	-749.	-2292.	244.	-993.	-3989.
1996	455.7 ₂	1509.	782.	562.	-165.	-2457.	325.	-491.	-4480.
1997	469.1 ₉	1736.	839.	647.	-250.	-2707.	365.	-615.	-5095.
1998	482.3 ₅	2009.	886.	744.	-379.	-3086.	415.	-795.	-5890.
1999	495.2 ₈	1603.	952.	830.	179.	-2908.	480.	-301.	-6191.
2000	508.2 ₃	1759.	1002.	945.	187.	-2720.	505.	-317.	-6508.
2001	521.3 ₄	1581.	1041.	1049.	509.	-2211.	530.	-21.	-6529.
2002	535.0 ₄	1512.	1082.	1118.	888.	-1323.	532.	356.	-6173.

TABLE D-28. (Continued)

2003	549.584	1713.	1119.	1179.	384.	-739.	503.	81.	-6093.
2004	564.321	1767.	1149.	1267.	648.	-91.	497.	152.	-5941.
2005	579.170	1896.	1179.	1333.	615.	525.	484.	131.	-5809.
2006	593.776	1798.	0.	1384.	-415.	110.	473.	-888.	-6698.
2007	608.222	1597.	0.	1432.	-125.	-19.	546.	-671.	-7368.
2008	623.244	1508.	0.	1473.	-35.	-50.	601.	-635.	-8004.
2009	639.471	1378.	0.	1510.	133.	83.	652.	-520.	-8523.
2010	660.020	1539.	0.	1569.	30.	113.	695.	-665.	-9188.
ENDING BALANCE PLUS ONE YEAR INTEREST = -9937.									
ENDING BOOK VALUE = 9937.									

TABLE D-29. FEAN Calculation - Total System Cash Flow Summary - Interim Estimate - Sample Case 6

INTERIM ESTIMATE									
SAMPLE CASE 6 - 810R AND DISP FEES - 60 PCT PAID 5 YEARS BEFORE DELIVERY									
101981 080834									
SUMMED OVER ALL BASES									
YEAR	FPE	ANNUAL COST	ANNUAL ADVANCE PAYMT	ANNUAL SETTLEMENT PAYMT	NET CASH FLOW	ACCU NET CASH FLOW	INTEREST COST	CHANGE IN BALANCE	BALANCE
1980		192.	157.	0.	-35.	-35.	0.	-35.	-35.
1981		281.	101.	0.	-180.	-215.	3.	-183.	-218.
1982		422.	89.	0.	-333.	-548.	18.	-351.	-569.
1983		501.	121.	0.	-380.	-928.	46.	-427.	-995.
1984		456.	144.	0.	-332.	-1261.	81.	-414.	-1409.
1985		410.	143.	242.	-25.	-1286.	115.	-140.	-1549.
1986		387.	198.	193.	-36.	-1322.	126.	-162.	-1711.
1987		240.	261.	132.	153.	-1169.	139.	13.	-1698.
1988		375.	316.	178.	119.	-1051.	138.	-20.	-1718.
1989		505.	385.	182.	61.	-990.	140.	-79.	-1797.
1990		503.	480.	208.	185.	-805.	146.	39.	-1759.
1991		543.	590.	286.	334.	-471.	143.	190.	-1568.
1992		940.	454.	375.	-111.	-582.	128.	-259.	-1807.
1993		1131.	531.	450.	-150.	-732.	147.	-297.	-2104.
1994		1568.	604.	547.	-418.	-1150.	171.	-589.	-2693.
1995		1989.	698.	686.	-606.	-1756.	219.	-826.	-3518.
1996		1800.	782.	862.	43.	-1712.	287.	-243.	-3762.
1997		1777.	839.	647.	-291.	-2009.	307.	-598.	-4360.
1998		2052.	886.	744.	-423.	-2426.	355.	-778.	-5138.
1999		1649.	952.	830.	133.	-2293.	419.	-286.	-5423.
2000		1807.	1002.	945.	140.	-2154.	442.	-302.	-5726.
2001		1631.	1041.	1049.	459.	-1694.	467.	-8.	-5733.
2002		1465.	1082.	1118.	735.	-959.	467.	268.	-5465.

TABLE D-29. (Continued)

2003	1986.	1119.	1179.	317.	-642.	445.	-128.	-5593.
2004	2047.	1149.	1267.	369.	-273.	456.	-87.	-5681.
2005	2196.	1179.	1333.	322.	48.	463.	-141.	-5822.
2006	2107.	0.	1184.	-723.	-675.	474.	-1198.	-7020.
2007	1787.	0.	1432.	-355.	-1031.	572.	-928.	-7948.
2008	1704.	0.	1473.	-231.	-1261.	648.	-879.	-8026.
2009	1578.	0.	1510.	133.	-1129.	719.	-587.	-9413.
2010	1539.	0.	1869.	30.	-1099.	767.	-737.	-10150.
ENDING BALANCE PLUS ONE YEAR INTEREST = -10978.								
ENDING BOOK VALUE = 9937.								

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