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STORAGE FEE ANALYSIS FOR A NUCLEAR WASTE TERMINAL STORAGE FACILITY

FINAL REPORT

PREPARED FOR THE
OFFICE OF WASTE ISOLATION
UNION CARBIDE NUCLEAR DIVISION

SEPTEMBER 1976

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EXECUTIVE SUMMARY

At the request of the Office of Waste Isolation, Science Applications, Inc. (SAI) has developed a model for determining a pricing schedule designed to recover Federal Government costs incurred in the development, design, construction, operation, decommissioning, and surveillance of a Federal Repository for high level waste generated by the commercial nuclear power industry. As currently constructed, the model will compute current dollar prices on a yearly basis for a single unit charge or a split fee based upon two user-provided quantity flows. Over the period of facility operation, the computed cost schedule shows variability on a year-to-year basis only within specified ranges.

The model uses as basic input data four kinds of information:

- cost schedule for the Federal Repository,
- quantity flow schedule for each factor to be charged,
- schedule for escalation rate, discount rate, and interest rate,
- fraction of costs to be recovered on each quantity flow if the split fee option is used.

The model allows testing of these variables in order to determine the relative significance of each component with regard to cost to, and impact on, the nuclear power industry.

Another feature of the model is its versatility. Not only is the user able to specify the percent of total costs to be covered by each method of fee assessment listed above but also the user can specify a revenue-cost ratio, an option which would prove useful in trying to assess the general uncertainty involved when dealing in the future. In addition, the model accepts either current dollar or constant dollar cost measures, and in the case of the latter escalates the costs with user-provided assumptions.

The following recommendations are made for improvement and utilization of the cost calculation model:

1. Restructure the model into a main program with several supporting subprograms to facilitate future model modification such as the testing of various cost recovery policies.
2. Test the effects of both discrete and continuous variables on the cost to industry. These variables cover the areas of
 - general business (interest rates, inflation rates, etc.)
 - Terminal Storage Program (costs and timing)
 - nuclear power industry (size, internal material flows, etc.)
 - Federal policies (method of cost recovery, timing of cost recovery, etc.)
3. Estimate the impact on industry of these price and policy variations.

INTRODUCTION

The U. S. Energy Research and Development Administration is charged with the responsibility to establish and operate repositories for the disposal of radioactive wastes generated by the commercial nuclear power industry. The nuclear power industry will be charged a fee by the Federal Government designed to cover all the costs associated with disposal and perpetual surveillance.

The establishment of this charge to industry, and its level and method of levying are problems being investigated by the Office of Waste Isolation as part of its task to develop National Waste Terminal Storage Sites (Federal Repository). To support it in this effort, OWI contracted SAI to develop a preliminary model capable of determining the charge to industry and evaluating how this changed as a function of many terminal storage program, nuclear industry, policy and general business variables.

The range of these variables is addressed briefly by way of illustrating the required model versatility. Terminal storage program variables include all costs which are to be recovered by a charge to the user industry. These cost numbers and their timing can vary significantly depending on success in the research and development program and on policy decisions regarding costs to be recovered.

The nuclear power industry of its very nature influences the unit price through its material flows and timing of these flows. Potential industry flows which could be selected for cost recovery are illustrated in a general fashion in Figure 1. Variations in these industry flows or their timing will have a significant influence on prices charged to industry by affecting direct charges as well as finance charges.

FIGURE 1.

NUCLEAR FUEL CYCLE

The preliminary model described in this report was designed to allow the controlling agency to examine the effects of the variations in industry flows under alternative business condition scenarios on the operation of a waste storage facility. As indicated in Figure 1, several quantity flows can be identified in this industry; however, it is left to the model user to determine which flows will be potential revenue sources. The only limitation is the number of revenue sources must be less than two.

What follows is a description of the model developed and used by the SAI team, with the documentation needed to implement this model by a potential user. The time horizon covers fifty years, beginning in 1977.

DISCUSSION OF THE MODEL

The model developed by SAI and presented here utilizes standard cost evaluation and financing assumptions. It permits the user to calculate prices levied on the nuclear power industry for a wide variety of input variables which cover such areas as general business factors, terminal storage program and nuclear industry growth rate.

Within the framework of the model, revenue can be derived by charging either one or two (split fee) quantity flows specified by the user. The limiting factor in this case lies in the fact the model user must supply the quantity to be taxed or charged, necessitating a quantity measure of some type for each revenue source.

Once the appropriate flows are determined, the model then relates costs and quantity in such a manner to provide current dollar prices for each quantity on a yearly basis. These prices are fairly stable over the life of the facility, allowing firms dealing with the facility to have a fairly constant flow of information. This allows future investment decisions to be made by these firms with a minimum amount of uncertainty resulting from the storage facility operation in this industry. This information does not guarantee profits, but instead it guarantees the risk for firms will not be unnecessarily large due to government indecision.

By utilizing this model to determine costs and estimating industry impact over the range of these variables a realistic frame of reference can be established. This will allow OWI and ERDA to give more detailed and accurate information to the nuclear power industry and also provide ERDA with a better basis for making policy decisions.

In developing an economic model to determine the dollar charge to the nuclear power industry for the development, operation, decommissioning and surveillance of the Federal Repository several pieces of information must be considered as basic input:

1. Cost schedule of Terminal Storage Program to be charged back to the user industry,
2. Size of the user (nuclear power) industry and its projected material flows as a function of time,
3. Rates of escalation, discount and interest for the Terminal Storage Program and the industry.

Each item listed is specified by the model user, except in those cases where it may be advantageous to use internal values for escalation, interest, and discount rates (see information supplied by user).

While this data is basic to the economic evaluation, it must be recognized that this is not totally predictable and effects of changes in this input data are as important as calculated price. Therefore, it is a user option to provide rates of flow for quantities and costs, allowing the user to draw conclusions on the basis of input data changes and to test the sensitivity of facility operation when basic assumptions are altered.

The Model Logic

The model is graphically represented in Figure 2. Cost breakdowns are identified for ten cost centers, with the abbreviations used throughout, as follows: (1) research and development (RD), (2) engineering and design (ENG), (3) land acquisition (AND), (4) initial construction costs of the pilot facility (CI), (5) expansion construction costs of the permanent facility (CE), (6) operations (OP), (7) decommissioning of the pilot facility (DEC), (8) surveillance (SUR), (9) transportation (TRA), and (10) other costs not included above (OTH).

As noted in Figure 2 the first step in determining a stable pricing schedule for cost recovery is to have the user specify costs for each year of the simulation. These costs must fall into one of the ten cost center categories as specified, with the number of cost categories allowed under each center given in parenthesis. These costs may be given in either constant dollar or current dollar terms, but when they are given in constant dollars the user must specify projected rates of cost change. These costs are then totaled by cost center and combined with the user-specified escalation and discount rates to produce current dollar and present value costs for each year of facility operation, by cost center. The current dollar costs are then summed by year and cost center to obtain the total current dollar cost of operating the facility. This total is combined with the projected quantity flows and price schedule change rate (provided internally to equal 5 percent) to determine a base price pricing schedule which shows the current dollar price which must be charged for each quantity flow to cover costs considered to this point over the life of the facility. The amount of total costs to be covered by each method of charging quantity flows is specified by the model user.

At this point all user-provided costs have been covered with the stated prices resulting from the previous step. Interest costs are now calculated based on the differences between revenue and costs for each year and the finance charges added to direct charges. Therefore, the base pricing schedule is combined with the prevailing rate of interest and the yearly costs of facility operation to obtain the total dollar volume of bonds outstanding and the yearly interest charges. The pricing schedule is then adjusted to reflect interest charges and deficit operation, with the maximum allowable price increase specified by the user and the minimum increase given internally at 5 percent. The final result will be a pricing schedule in current dollar terms which increases in a fairly stable manner and still allows the controlling agency to recover all costs incurred over the life of the facility.

A GRAPHICAL PRESENTATION OF THE MODEL

Figure 2.

Information Supplied by User

When operating this simulation model, the user is allowed a great deal of freedom in preparing scenarios. and has almost complete control over all policy variables. The final solution to be derived is the storage fee charge on canisters of high-level wastes and/or the price measure for the second quantity flow chosen to be evaluated. In order to complete the model, the user must supply the following information:

- 1.) Cost by year for each cost center being considered (either in current or constant dollars),
- 2.) The year in which each cost begins (on a cost center basis) and the number of years the cost continues,
- 3.) The escalation rates for each cost center, the discount rate, and the rate of interest.
 - A.) Three options are provided in the program
 - (1) All escalation rates are 5%
Discount rate = interest rate = 6%
 - (2) All escalation rates are 0%
Discount rate = interest rate = 6%
 - (3) User specifies all rates for each year of the analysis
- 4.) The desired surveillance payment from a sinking fund established for this purpose. This allows the user to place initial surveillance costs in the cost center, with the continuing costs covered by the sinking fund payment.
- 5.) The percentage of costs to be covered by charging the reprocessor. It is assumed the remaining costs are to be covered by charging alternative two.

- 6.) The quantities of canisters and the second alternative which will be charged.
- 7.) The year in which each quantity flow begins and the number of years the flow for each item continues.

Formulation of the Model

To facilitate the construction of a model to determine storage fees and assessment levels, several assumptions were made:

- 1.) it is desirable to have a fairly stable price schedule,
- 2.) the controlling agency for the waste facility sells bonds in the market to cover deficits,
- 3.) all financing is done on a year-to-year basis,
- 4.) any excess of revenues over costs is invested in the market in the same year the excess occurred, then added to a sinking fund designed to provide a degree of flexibility in cost estimates in the future.

By using these assumptions, the solution for storage fee costs and assessment levels can be derived from the information provided. A stable price schedule is incorporated in the following manner:

- 1.) A relation is established between P_1 , the price in period one, and P_i , the price in period i , where $i \leq 50$.

$$P_i = P_1(1 + p)^{i-1}$$

2.) Since p , the growth or escalation rate of price, is constant, this expression simply states price increases at a constant rate from period one.

Using this assumption of a fairly stable price schedule, the general form of a price solution is as follows:

Step 1.

$$P_1(1 + p)^0 Q_1 + P_1(1 + p) Q_2 + \dots + P_1(1 + p)^{n-1} Q_n = \\ C_1 + C_2 + \dots + C_n$$

where C_i = current dollar cost in any year i

Therefore,

$$P_1 = \frac{C_1 + C_2 + \dots + C_n}{(1 + p)^0 Q_1 + (1 + p) Q_2 + \dots + (1 + p)^{n-1} Q_n}$$

and

$$P_i = P_1(1 + p)^{i-1}$$

At this point, it is now possible to determine the amount of bonds which the controlling agency will have to sell in order to finance any deficits which will occur, most probably in the earlier years of operation. The cost of these bonds, however, was not included in the price schedule computation just completed, meaning the computed prices will need to be adjusted in the following manner to reflect this new cost.

Step 2.

Price is adjusted in period $i + 1$ to cover the interest costs incurred in period i . When the facility is financially able (revenues greater than current costs plus those expenses carried from previous years) outstanding debt is retired.

Step 3.

When all bonds are retired, the difference between revenues and costs is used to establish and maintain a sinking fund which will be used to cover surveillance and other contingency costs.

Two alterations are possible from the procedure just outlined, both options available to the user. First, if the split fee approach is specified, the sequence of steps is done two times, once to compute the storage fee and once to compute the assessment level. The difference in this case will lie in the fact the costs used to determine each price will be the percent of total costs each method of charging is designed to cover. This percent is user-specified.

The second alteration allows the user to adjust the cost totals to reflect either unforeseen contingencies or the possibility the facility may not have to return all costs. This adjustment to cost takes place before the price computations in order that the computed price may reflect this factor. Again, this option is user-specified.

Solutions are derived by using cost numbers measured in current dollars. This admits the problem of comparison across years, however, the computed prices are consistent with cost recovery when costs are stated in this manner. The advantages of this approach include the computation of a current dollar price schedule which reflects the user's assumptions about general business trends and their effects upon the cost structure of the facility. In this way inflation is considered by the model, but the

restriction of a constant rate of price increase for all costs is removed. Inflation is handled in the more realistic manner of allowing costs to vary at different rates, a fact of the real world oftentimes overlooked.

Another advantage of operating the model with all dollar and price measures in current dollar terms lies in the fact the assumptions made by the controlling facility about the future are visible. The business sector can then examine these assumptions and make decisions about the future in a more informed manner, knowing a risk exists of making the wrong choice. However, in this case, the risk borne by the firm would be no more than a normal business risk. If the controlling agency desires to establish a firm basis for operating a waste disposal facility with the minimum of industry disruption, a pricing schedule known to all parties is the first major step. By providing a firm foundation (consisting of a set of logical rules parties realize will remain stable), the controlling agency will be making progress toward the establishment of a viable policy.

SAMPLE PROBLEM

For illustrative purposes only, a sample scenario was constructed and simulated with the cost recovery model. The quantity flow to be combined with high level waste canisters was chosen to be U_3O_8 since projections of both these flows were available from the same source.* It should be emphasized these choices were a matter of convenience, not of policy, with neither quantity flow representing the final word for cost recovery on the storage facility. However, these selections do prove illuminating due to the fact each flow occurs at an extreme in the nuclear fuel cycle, with the choice of one over the other a fairly dramatic policy shift.

When available costs were obtained from the OWI program plan or projections made by the OWI staff. When not available, probable cost levels were estimated by the SAI team. These cost numbers are also provided for illustration, not recitation. Relevant policy decisions have not been made at this point in time, meaning the assumptions will change continually until policy decisions are firm. A complete listing of costs used for this simulation is given by year and cost center in the appendix.

This sample problem uses the following parameters:

- 1.) split fee
50% of total costs recovered on U_3O_8
50% of total costs recovered on canisters
- 2.) revenue-cost ratio = 1.0
- 3.) no surveillance sinking fund
- 4.) interest rate = discount rate = 6%
- 5.) maximum price increase = 8%
- 6.) canister flow 1988 - 2010
 U_3O_8 flow 1977 - 2010

A complete listing of all the results is given in the appendix; however, a listing of the pricing schedule is given Table 1. If the controlling agency began charging U_3O_8 in 1977, the table shows the charge would need to be approximately \$0.38/lb., a charge which would increase over the life of the facility to \$3.45/lb. On the other hand, the high level waste canister charge would be in the area of \$32,400 in 1988, the first year these canisters are assumed to arrive at the facility. In the year 2010, this canister charge would be \$176,000. The total projected current dollar cost of the facility is \$8.4 billion, meaning each method of charging is covering approximately \$4.2 billion plus interest over the period the flow is assessed. Several interesting points can be noted from the results of this sample problem. As a result of the cost structure, costs exceed revenues through the year 1994, and then approach revenues in 2009 (see Table 2.). During the first years of facility operation, costs exceed revenues for several reasons - no charge is levied on canisters until 1988, large R & D expenses are being covered, construction costs of the pilot facility are being covered, etc. However, the situation in 2009 occurs due to surveillance, decommissioning, and permanent plant construction costs beginning in 2006 and partially continuing through 2010. This causes the costs of operation to escalate dramatically during this period.

*Blomeke, J. O. and Kee, C. W. Projections of Wastes to be Generated. ORNL. This document was prepared by the authors for presentation at the International Symposium on the Management of Wastes from the LWR Fuel Cycle. Denver, Colorado, July 11-16, 1976. (Report CONF/760701)

TABLE 1.

PRICING SCHEDULE
(\$1,000,000 Current Dollars)

<u>YEAR</u>	<u>PRICE/CANISTER</u>	<u>PRICE/ALT2</u>
1977	0.0	0.76
1978	0.0	0.82
1979	0.0	0.89
1980	0.0	0.96
1981	0.0	1.04
1982	0.0	1.12
1983	0.0	1.21
1984	0.0	1.31
1985	0.0	1.41
1986	0.0	1.52
1987	0.0	1.64
1988	0.03	1.78
1989	0.04	1.92
1990	0.04	2.07
1991	0.04	2.24
1992	0.04	2.42
1993	0.05	2.61
1994	0.05	2.82
1995	0.06	3.04
1996	0.06	3.29
1997	0.06	3.55
1998	0.07	3.83
1999	0.08	4.03
2000	0.08	4.23
2001	0.09	4.44
2002	0.10	4.66
2003	0.10	4.89
2004	0.11	5.14
2005	0.12	5.40
2006	0.13	5.67
2007	0.14	5.95
2008	0.15	6.25
2009	0.16	6.56
2010	0.18	6.89

TABLE 2.

REVENUE - COST SCHEDULE
(\$1,000,000 Current Dollars)

<u>YEAR</u>	<u>REVENUE</u>	<u>COST</u>
1977	7.8	38.4
1978	8.3	88.1
1979	11.7	118.3
1980	15.4	135.7
1981	19.9	167.5
1982	22.9	167.5
1983	29.6	200.7
1984	37.2	225.2
1985	45.3	160.6
1986	50.6	347.8
1987	59.4	412.9
1988	76.7	580.8
1989	98.4	641.8
1990	129.8	273.0
1991	156.0	238.6
1992	176.7	241.2
1993	201.2	242.0
1994	241.0	253.0
1995	280.0	263.4
1996	326.5	274.4
1997	386.5	289.5
1998	415.3	280.9
1999	465.9	291.2
2000	527.1	301.6
2001	589.3	315.7
2002	657.6	325.6
2003	738.9	334.7
2004	822.7	336.7
2005	922.0	336.1
2006	1031.9	582.6
2007	1153.6	631.3
2008	1288.2	977.4
2009	1437.1	1127.4
2010	1591.7	722.5

APPENDIX I.

User's Guide

The following will provide the user of this program a set of well-defined instructions needed to implement scenarios. All dollars are measured in millions, with results in current dollar terms unless otherwise specified. Current dollars are dollars measured in terms of the year in question, while present value dollars are dollars measured in terms of the base year 1977. Various options available to the user will be discussed at the appropriate point in the presentation.

A typical deck will have the following structure.

Instruction Cards

1. When dealing with cost centers, data is provided in the following order:

<u>Cost Center</u>	<u>Number of Sub-Categories</u>	<u>Format for each Card</u>
RD	20	(5X,5F10.4)
ENG	20	(5X,5F10.4)
AND	5	(5X,5F10.4)
CI	20	(5X,5F10.4)
CE	20	(5X,5F10.4)
OP	20	(5X,5F10.4)
DEC	20	(5X,5F10.4)
SUR	5	(5X,5F10.4)
OTH	20	(5X,5F10.4)
TRA	20	(5X,5F10.4)

Note each cost center will need four cards per year, except land acquisition and surveillance which need only one. Zeros must be in the appropriate columns for any sub-category not used. If an entire cost center is not considered, no cards should appear.

2. When dealing with quantity flows, data is provided in the following order.

<u>Flow</u>	<u>Measurement</u>	<u>Format for each Card</u>
Alternative Two		5F10.4
Canisters	Per Canister	5F10.4

Note five observations to a card. Also, if one flow is not considered, no cards should appear.

3. Information to be provided on instruction cards:

<u>Card No.</u>	<u>Column</u>	<u>Information</u>	<u>Format</u>
1		Year in which cost flows begin*	
	1-5	RD	15
	6-10	ENG	15
	11-15	AND	15
	16-20	CI	15
	21-25	CE	15
	26-30	OP	15
	31-35	DEC	15
	36-40	SUR	15
	41-45	TRA	15
	46-50	OTH	15

2

Number of years for the cost to continue*

1-5	RD	I5
6-10	ENG	I5
11-15	AND	I5
16-20	CI	I5
21-25	CE	I5
26-30	OP	I5
31-35	DEC	I5
36-40	SUR	I5
41-45	TRA	I5
46-50	OTH	I5

*A zero must be used if the cost center is not considered.

3	1-5	Business Cycle Option (Value of 1,2 or 3 - See introduction)	I5
	6-10	Surveillance Sinking Fund Option 1 - Costs given in current dollars 0 - Cost given in 1977 dollars	I5
	11-15	Year in which fund will begin operations*	I5
4	1-10	Revenue - Cost ratio	F10.2
	11-20	Percent of costs to be covered by charging canisters	F10.2
	21-30	Dollar amount of surveillance revenue desired in the first year of operation of the sinking fund.	F10.2
	31-40	Maximum allowable price increase	F10.2
5	1-5	Year in which alternative flow begins*	I5
	6-10	Number of years alternative flow continues*	I5
	11-15	Year in which canister flow begins*	I5
	16-20	Number of years canister flow continues*	I5
	21-25	Number of years for facility simulation	I5

*Must be zero if this option not specified.

4. Price ranges:

The computed prices are kept in certain well-defined ranges through the use of two parameters. First, the maximum price increase is determined by the value of the MAX parameter. And second, the minimum price increase is determined by use of the price escalation rate, normally 5 percent. If the sinking fund

value is zero the last year of facility operation, the maximum price increase parameter has been given a value too small. At no point will revenues exceed costs and all bonds have been retired. The solution is to re-run the simulation with a higher value specified for this parameter in order to insure internal consistency of all assumptions.

5. Surveillance Sinking Fund:

If this option is specified, contributions to this sinking fund are assessed on a yearly basis by adjusting price to cover the necessary expense. If the split fee option is specified, the computations are done twice. The solution will take the following form:

- 1) Assume contributions to the sinking fund grow at the same rate prices grow:

$$X_i = X_1(1+p)^{i-1}$$

where X_i = contribution in year i

- 2) Growth of the sinking fund will depend upon two factors, the escalation rate(e) and the rate of interest(i) earned each year. As an example, the total dollar volume of the sinking fund in the third year would be as follows:

$$\text{Value} = X_1(1+e)^2 + X_1(1+i)^2 + X_2(1+e) + X_2(1+i) + X_3$$

- 3) By using the assumption above, this can be re-written as follows:

$$V = X_1(1+e)^2 + X_1(1+i)^2 + X_1(1+p)(1+e) + X_1(1+p)(1+i) + X_1(1+p)^2$$

- 4) By extending this formulation for the number of years the simulation covers (and repeating if the split fee option is specified), a solution can be found for X_1 , and thereby for the schedule of contributions. Price is then adjusted accordingly.

- 5) At this stage, price does not have to be re-adjusted to cover any interest charges for two reasons: (1) interest charges have been recovered from previous adjustments, and (2) the contributions are incurred only in those years in which revenue is received.
6. User-Specified Escalation, Discount, and Interest Rates

When using this option, the user is required to specify eleven rates for each year the facility is in operation in the following manner:

<u>Order on Card</u>	<u>Column</u>	<u>Format</u>
RD	6-10	F5.3
ENG	11-15	F5.3
CI	16-20	F5.3
CE	21-25	F5.3
OP	26-30	F5.3
DEC	31-35	F5.3
TRA	36-40	F5.3
OTH	41-45	F5.3
AND	46-50	F5.3
Discount Rate	51-55	F5.3
Interest Rate	56-60	F5.3

Zeros must be included if the cost center is not considered or if the user desires to use escalated dollars for this cost center. The escalation rate used for surveillance costs is 5%, as is the price escalation rate used to determine the original structure of the price schedule.

7. Year numbers begin with 1977 = 1. The simulation model provides for a fifty year time frame, although if the user simulates over fifty years the program time parameter could possibly exceed thirty seconds of CPU time. The user must be careful to specify the correct year on the instruction cards.

APPENDIX II.

Program Listing

This program was written for an IBM 360/91, in basic Fortran. The following represent the program parameters:

- 1.) Core size - 450k
- 2.) Computation time - 25 seconds

COMPILER OPTIONS - NAME= MAIN,CFT=C2,LINECNT=60,SIZE=COOCHK,
SOURCE,ESCDIC,NCLIST,NCDECK,LCAC,MAP,NOEDIT,IC,XREF

```

ISN 0002      REAL *4      INT,INTCE,INTCT,INTCT,INTCTE
ISN 0003      DIMENSION RD(50,20), ENG(50,20), CI(50,20), CE(50,20), TRA(50,20)
ISN 0004      DIMENSION OP(50,20), DEC(50,20), SUR(50,5), AND(50,5), OTF(50,20)
ISN 0005      DIMENSION RDA(50), ENGA(50), CIA(50), CEA(50), OPA(50), DECA(50)
ISN 0006      DIMENSION ANDA(50), DISC(50), CTHA(50), TRAA(50)
ISN 0007      DIMENSION RDTCT(50), ENGCT(50), CITCT(50), CETOT(50)
ISN 0008      DIMENSION CPTCT(50), DECTCT(50), SURTCT(50), ANDTOT(50)
ISN 0009      DIMENSION SUM(10,2), CHTCT(50), Z(18,50), ZS(2,50)
ISN 0010      DIMENSION TRATGT(50), K(20), AC(4), NCC(5)
ISN 0011      DIMENSION SLMA(50), SUNE(50), TC1(50), TC2(50), TC3(50)
ISN 0012      DIMENSION INTCT(50), INTCTE(50)
ISN 0013      DIMENSION TC4(50), U3C8(50), FRA(50), PR(50), FR1(50)
ISN 0014      DIMENSION PR2(50), CWE(50), INT(50), REV(50)
ISN 0015      DIMENSION CAN(50), FRCA(50), FR11(50), FR22(50), CWEE(50)
ISN 0016      DIMENSION SLMAA(50)
ISN 0017      DIMENSION TCTREV(50), FVTR(50), FVFR(50), PVFRCA(50)
ISN 0018      DIMENSION TCC(50), TCCTE(50)
ISN 0019      DIMENSION SLMBE(50)
ISN 0020      DIMENSION BONDS(50), BCCST(50)
ISN 0021      DIMENSION SINFD1(50), SINFC2(50), SINT(50)
ISN 0022      DIMENSION CCNTA(50), CCNTE(50), CCNTC(50)
ISN 0023      DATA CCNTA/50*0.0/, CCNTE/50*0.0/, CCNTC/50*0.0/
ISN 0024      DATA SINFD1/50*0.0/, SINFC2/50*0.0/, SINT/50*0.0/
ISN 0025      DATA BONDS/50*0.0/, BCCST/50*0.0/
ISN 0026      DATA SLMBB/50*0.0/
ISN 0027      DATA TUCT/50*0.0/, TUCTE/50*0.0/
ISN 0028      DATA SLMA/50*0.0/, SUNE/50*0.0/, TC1/50*0.0/, TC2/50*0.0/
ISN 0029      DATA TC3/50*0.0/, TC4/50*0.0/, U3C8/50*0.0/
ISN 0030      DATA PR/50*0.0/, FR1/50*0.0/, FR2/50*0.0/, CWE/50*0.0/
ISN 0031      DATA INT/50*0.0/, CAN/50*0.0/
ISN 0032      DATA FRCA/50*0.0/, FR11/50*0.0/, FR22/50*0.0/, CWEE/50*0.0/
ISN 0033      DATA INTCT/50*0.0/, INTCTE/50*0.0/
ISN 0034      DATA PVPR/50*0.0/, PVFRCA/50*0.0/
ISN 0035      DATA RD/1000*0.0/, ENG/1000*0.0/, CI/1000*0.0/, CE/1000*0.0/
ISN 0036      DATA TRA/1000*0.0/, CF/1000*0.0/, DEC/1000*0.0/, SUR/250*0.0/
ISN 0037      DATA AND/250*0.0/, CTH/1000*0.0/, RDA/50*0.0/, ENGA/50*0.0/
ISN 0038      DATA CIA/50*0.0/, CEA/50*0.0/, OPA/50*0.0/, DECA/50*0.0/
ISN 0039      DATA ANDA/50*0.0/, DISC/50*0.0/, CTHA/50*0.0/, TRAA/50*0.0/
ISN 0040      DATA RDTGT/50*0.0/, ENGCT/50*0.0/, CITCT/50*0.0/, CETOT/50*0.0/
ISN 0041      DATA CPTGT/50*0.0/, DECTGT/50*0.0/, SURTGT/50*0.0/, ANDTOT/50*0.0/
ISN 0042      DATA SUM/20*0.0/, CHTCT/50*0.0/, Z/900*0.0/, ZS/100*0.0/
ISN 0043      DATA TRATGT/50*0.0/
ISN 0044      READ(5,401) (K(I), I=1,23)
ISN 0045      401 FORMAT(10I5)
ISN 0046      READ(5,9991) (AC(I), I=1,4)
ISN 0047      9991 FORMAT(4F10.2)
ISN 0048      READ(5,9992) (NCC(I), I=1,5)
ISN 0049      9992 FORMAT(5I5)
ISN 0050      IA=K(1)
ISN 0051      IB=K(2)
ISN 0052      IC=K(3)
ISN 0053      ID=K(4)
ISN 0054      IE=K(5)
ISN 0055      IFF=K(6)
ISN 0056      IG=K(7)
ISN 0057      IH=K(8)

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ISN 0058      IJ=K( 9)
ISN 0059      IK=K(10)
ISN 0060      KA=K(11)
ISN 0061      KB=K(12)
ISN 0062      KC=K(13)
ISN 0063      KD=K(14)
ISN 0064      KE=K(15)
ISN 0065      KF=K(16)
ISN 0066      KG=K(17)
ISN 0067      KH=K(18)
ISN 0068      KJ=K(19)
ISN 0069      KI=K(20)
ISN 0070      BC=K(21)
ISN 0071      SR=K(22)
ISN 0072      KZ=K(23)
ISN 0073      JA=NCC(1)
ISN 0074      JB=NCC(3)
ISN 0075      NA=NCC(2)
ISN 0076      NB=NCC(4)
ISN 0077      N=NCC(5)
ISN 0078      C=AC(1)
ISN 0079      AB=AC(2)
ISN 0080      SRA=AC(3)
ISN 0081      RMAX=AC(4)
ISN 0082      IF(BC.EQ.1) GC TC 6650
ISN 0084      IF(BC.EQ.2) GC TC 6651
ISN 0086      IF(BC.EQ.3) GC TC 6652
ISN 0088      6650 DO 665 I=1,N
ISN 0089          RDA(I)=0.05
ISN 0090          ENGA(I)=0.05
ISN 0091          CIA(I)=0.05
ISN 0092          CEA(I)=0.05
ISN 0093          CFA(I)=0.05
ISN 0094          DECA(I)=0.05
ISN 0095          CTHA(I)=0.05
ISN 0096          ANDA(I)=0.05
ISN 0097          PRA(I)=0.05
ISN 0098          DISC(I)=0.06
ISN 0099          INT(I)=0.06
ISN 0100          TRAA(I)=0.05
ISN 0101      665 CONTINUE
ISN 0102          SURA=C.05
ISN 0103          GO TO 99
ISN 0104      6651 DO 666 I=1,N
ISN 0105          DISC(I)=0.06
ISN 0106          INT(I)=0.06
ISN 0107          PRA(I)=0.05
ISN 0108      666 CONTINUE
ISN 0109          SURA=C.0
ISN 0110          GO TO 99
ISN 0111      6652 DO 667 I=1,N
ISN 0112          READ(6,668) RDA(I),ENGA(I),CIA(I),CEA(I),CFA(I),DECA(I),TRAA(I),
1          OTHA(I),ANDA(I),DISC(I),INT(I)
ISN 0113      668 FORMAT(5X,11F5.3)
ISN 0114      667 CONTINUE
ISN 0115          DO 4478 I=1,N
ISN 0116          PRA(I)=0.05
ISN 0117      4478 CONTINUE

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ISN C118      SURA=C.05
ISN C119      GO TC 99
C READING DATA
SS IF(IA.EQ.C) GC TC 100
DO 3 I=1,IA
ISN C120      READ(S,4) (RD(KA+I-1,J),J=1,20)
ISN C121      FORMAT(SX,SF10.4)
ISN C122      4
ISN C123      3 CONTINUE
ISN C124      100 IF(IB.EQ.C) GC TC 200
ISN C125      DO 5 I=1,IB
ISN C126      READ(S,6) (ENG(KB+I-1,J),J=1,20)
ISN C127      6 FORMAT(SX,SF10.4)
ISN C128      5 CONTINUE
ISN C129      200 IF(IC.EQ.C) GC TC 300
ISN C130      DO 7 I=1,IC
ISN C131      READ(S,8) (AND(KC+I-1,J),J=1,5)
ISN C132      8 FORMAT(SX,SF10.4)
ISN C133      7 CONTINUE
ISN C134      300 IF(ID.EQ.C) GC TC 400
ISN C135      DO 9 I=1,ID
ISN C136      READ(S,10) (CI(KD+I-1,J),J=1,20)
ISN C137      10 FORMAT(SX,SF10.4)
ISN C138      9 CONTINUE
ISN C139      400 IF(IE.EQ.C) GC TC 500
ISN C140      DO 11 I=1,IE
ISN C141      READ(S,12) (CE(KE+I-1,J),J=1,20)
ISN C142      12 FORMAT(SX,SF10.4)
ISN C143      11 CONTINUE
ISN C144      500 IF(IE.EQ.C) GC TC 600
ISN C145      DO 13 I=1,IE
ISN C146      READ(S,14) (CF(KF+I-1,J),J=1,20)
ISN C147      14 FORMAT(SX,SF10.4)
ISN C148      13 CONTINUE
ISN C149      600 IF(IG.EQ.C) GC TC 700
ISN C150      DO 15 I=1,IG
ISN C151      READ(S,16) (DEC(KG+I-1,J),J=1,20)
ISN C152      16 FORMAT(SX,SF10.4)
ISN C153      15 CONTINUE
ISN C154      700 IF(IH.EQ.C) GC TC 800
ISN C155      DO 17 I=1,IH
ISN C156      READ(S,18) (SLF(KH+I-1,J),J=1,5)
ISN C157      18 FORMAT(SX,SF10.4)
ISN C158      17 CONTINUE
ISN C159      800 IF(IK.EQ.C) GC TC 9001
ISN C160      DO 19 I=1,IK
ISN C161      READ(S,20) (CTH(KI+I-1,J),J=1,20)
ISN C162      20 FORMAT(SX,SF10.4)
ISN C163      19 CONTINUE
ISN C164      9001 IF(IJ.EQ.C) GC TC 900
ISN C165      DO 191 I=1,IJ
ISN C166      READ(S,201) (TRA(KJ+I-1,J),J=1,20)
ISN C167      201 FORMAT(SX,SF10.4)
ISN C168      191 CONTINUE
C AT THIS POINT ALL DATA HAS BEEN READ
C THE NEXT STEP IS TO SUM FOR EACH CCST CENTER BY YEAR
SSC IF(IA.EQ.C) GC TC 1000
DO 2000 I=1,IA
DO 2000 J=1,20

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ISN C184      RD TCT(KA+I-1)=RD TCT(KA+I-1)+RD(KA+I-1,J)
ISN C185      2000 CONTINUE
ISN C186      1000 IF(1B.EQ.0) GC TC 101
ISN C188      DO 21 I=1,1B
ISN C189      DO 21 J=1,20
ISN C190      ENGTCT(KB+I-1)=ENGTCT(KB+I-1)+ENG(KB+I-1,J)
ISN C191      21 CONTINUE
ISN C192      101 IF(1C.EQ.0) GC TC 102
ISN C194      DO 22 I=1,1C
ISN C195      DO 22 J=1,5
ISN C196      ANDTCT(KC+I-1)=ANDTCT(KC+I-1)+AND(KC+I-1,J)
ISN C197      22 CONTINUE
ISN C198      102 IF(1D.EQ.0) GC TC 103
ISN C200      DO 23 I=1,1D
ISN C201      DO 23 J=1,20
ISN C202      CITCT(KD+I-1)=CITCT(KD+I-1)+CI(KD+I-1,J)
ISN C203      23 CONTINUE
ISN C204      103 IF(1E.EQ.0) GC TC 104
ISN C206      DO 24 I=1,1E
ISN C207      DO 24 J=1,20
ISN C208      CETCT(KE+I-1)=CETCT(KE+I-1)+CE(KE+I-1,J)
ISN C209      24 CONTINUE
ISN C210      104 IF(1FF.EQ.0) GC TC 105
ISN C212      DO 25 I=1,1FF
ISN C213      DO 25 J=1,20
ISN C214      CPTCT(KF+I-1)=CPTCT(KF+I-1)+CF(KF+I-1,J)
ISN C215      25 CONTINUE
ISN C216      105 IF(1G.EQ.0) GC TC 106
ISN C218      DO 26 I=1,1G
ISN C219      DO 26 J=1,20
ISN C220      DECTCT(KG+I-1)=DECTCT(KG+I-1)+DEC(KG+I-1,J)
ISN C221      26 CONTINUE
ISN C222      106 IF(1H.EQ.0) GC TC 107
ISN C224      DO 27 I=1,1H
ISN C225      DO 27 J=1,5
ISN C226      SLRTCT(KH+I-1)=SLRTCT(KH+I-1)+SUR(KH+I-1,J)
ISN C227      27 CONTINUE
ISN C228      107 IF(1K.EQ.0) GC TC 108
ISN C230      DO 28 I=1,1K
ISN C231      DO 28 J=1,20
ISN C232      CHTCT(KI+I-1)=CHTCT(KI+I-1)+CTH(KI+I-1,J)
ISN C233      28 CONTINUE
ISN C234      108 IF(1J.EQ.0) GC TC 109
ISN C236      DO 281 I=1,1J
ISN C237      DO 281 J=1,20
ISN C238      TRATCT(KJ+I-1)=TRATCT(KJ+I-1)+TRA(KJ+I-1,J)
ISN C239      281 CONTINUE
C COST CENTER DATA HAS BEEN TOTALED BY YEAR
C THE FOLLOWING IS THE DISCOUNT ROUTINE
ISN C240      109 IF(1A.EQ.0) GC TC 109
ISN C242      KAA=KA-1
ISN C243      DO 29 I=1,1A
ISN C244      Z(1,KAA+I)=RD TCT(KAA+I)*((1.0+RDA(KAA+I))* (KAA+I))
ISN C245      SUM(1,2)=SUM(1,2)+Z(1,KAA+I)
ISN C246      Z(2,KAA+I)=Z(1,KAA+I)/((1.0+DISC(KAA+I))* (KAA+I))
ISN C247      SUM(1,1)=SUM(1,1)+Z(2,KAA+I)
ISN C248      29 CONTINUE
ISN C249      109 IF(1D.EQ.0) GC TC 110

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ISN C251      KBB=KB-1
ISN C252      DO 30 I=1,IB
ISN C253      Z(3,KBB+1)=ENGTC1(KBB+1)*((1.0+ENGA(KBB+1))* (KBB+1))
ISN C254      SUM(2,2)=SUM(2,2)+Z(3,KBB+1)
ISN C255      Z(4,KBB+1)=Z(3,KBB+1)/((1.0+DISC(KBB+1))* (KBB+1))
ISN C256      SUM(2,1)=SUM(2,1)+Z(4,KBB+1)
ISN C257      30 CONTINUE
ISN C258      110 IF(1C.EQ.0) GC TC 111
ISN C260      KCC=KC-1
ISN C261      DO 31 I=1,IC
ISN C262      Z(5,KCC+1)=ANDTCT(KCC+1)*((1.0+ANCA(KCC+1))* (KCC+1))
ISN C263      SUM(3,2)=SUM(3,2)+Z(5,KCC+1)
ISN C264      Z(6,KCC+1)=Z(5,KCC+1)/((1.0+DISC(KCC+1))* (KCC+1))
ISN C265      SUM(3,1)=SUM(3,1)+Z(6,KCC+1)
ISN C266      31 CONTINUE
ISN C267      111 IF(1D.EQ.0) GC TC 112
ISN C269      KDD=KD-1
ISN C270      DO 32 I=1,ID
ISN C271      Z(7,KDD+1)=CITCT(KDD+1)*((1.0+CIA(KDD+1))* (KDD+1))
ISN C272      SUM(4,2)=SUM(4,2)+Z(7,KDD+1)
ISN C273      Z(8,KDD+1)=Z(7,KDD+1)/((1.0+DISC(KDD+1))* (KDD+1))
ISN C274      SUM(4,1)=SUM(4,1)+Z(8,KDD+1)
ISN C275      32 CONTINUE
ISN C276      112 IF(1E.EQ.0) GC TC 113
ISN C278      KEE=KE-1
ISN C279      DO 33 I=1,IE
ISN C280      Z(9,KEE+1)=CECTCT(KEE+1)*((1.0+CEA(KEE+1))* (KEE+1))
ISN C281      SUM(5,2)=SUM(5,2)+Z(9,KEE+1)
ISN C282      Z(10,KEE+1)=Z(9,KEE+1)/((1.0+DISC(KEE+1))* (KEE+1))
ISN C283      SUM(5,1)=SUM(5,1)+Z(10,KEE+1)
ISN C284      33 CONTINUE
ISN C285      113 IF(1FF.EQ.0) GC TC 114
ISN C287      KFF=KF-1
ISN C288      DO 34 I=1,IFF
ISN C289      Z(11,KFF+1)=OFTCT(KFF+1)*((1.0+CFA(KFF+1))* (KFF+1))
ISN C290      SUM(6,2)=SUM(6,2)+Z(11,KFF+1)
ISN C291      Z(12,KFF+1)=Z(11,KFF+1)/((1.0+DISC(KFF+1))* (KFF+1))
ISN C292      SUM(6,1)=SUM(6,1)+Z(12,KFF+1)
ISN C293      34 CONTINUE
ISN C294      114 IF(1G.EQ.0) GC TC 115
ISN C296      KGG=KG-1
ISN C297      DO 35 I=1,IG
ISN C298      Z(13,KGG+1)=DECTCT(KGG+1)*((1.0+DECA(KGG+1))* (KGG+1))
ISN C299      SUM(7,2)=SUM(7,2)+Z(13,KGG+1)
ISN C300      Z(14,KGG+1)=Z(13,KGG+1)/((1.0+DISC(KGG+1))* (KGG+1))
ISN C301      SUM(7,1)=SUM(7,1)+Z(14,KGG+1)
ISN C302      35 CONTINUE
ISN C303      115 IF(1H.EQ.0) GC TC 116
ISN C305      KHH=KH-1
ISN C306      DO 36 I=1,IH
ISN C307      ZS(1,KHH+1)=SURICT(KHH+1)*((1.0+SURA))* (KHH+1))
ISN C308      SUM(8,2)=SUM(8,2)+ZS(1,KHH+1)
ISN C309      ZS(2,KHH+1)=ZS(1,KHH+1)/((1.0+DISC(KHH+1))* (KHH+1))
ISN C310      SUM(8,1)=SUM(8,1)+ZS(2,KHH+1)
ISN C311      36 CONTINUE
ISN C312      116 IF(1K.EQ.0) GC TC 117
ISN C314      KII=KI-1
ISN C315      DO 37 I=1,KI

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ISN 0316      Z(15,KII+1)=OTHCT(KII+1)*((1.0+CTHA(KII+1))*(KII+1))
ISN 0317      SUM(9,2)=SUM(9,2)+Z(15,KII+1)
ISN 0318      Z(16,KII+1)=Z(15,KII+1)/((1.0+DISC(KII+1))*(KII+1))
ISN 0319      SUM(9,1)=SUM(9,1)+Z(16,KII+1)
ISN 0320      37  CONTINUE
ISN 0321      1171 IF(IJ.EQ.C) GO TO 117
ISN 0322      KJJ=KJ-1
ISN 0323      DO 371 I=1,IJ
ISN 0324      Z(17,KJJ+1)=TRATCT(KJJ+1)*((1.0+TRAA(KJJ+1))*(KJJ+1))
ISN 0325      SUM(10,1)=SUM(10,1)+Z(17,KJJ+1)
ISN 0326      Z(18,KJJ+1)=Z(17,KJJ+1)/((1.0+DISC(KJJ+1))*(KJJ+1))
ISN 0327      SUM(10,2)=SUM(10,2)+Z(18,KJJ+1)
ISN 0328      371 CONTINUE
ISN 0329      117 D=1.C-AB
ISN 0330      WRITE(6,8881)  AB,D,C
ISN 0331      8881 FORMAT('1','THE FOLLOWING REPRESENTS ALL RESULTS FOR THIS SIMULATI
ISN 0332      1CN OF THE COST RECOVERY MODEL'//5X,'THE PERCENT OF CCSTS COVERED B
ISN 0333      1Y CHARGING REPROCESS',5X,F10.4/5X,'THE PERCENT OF COSTS COVERED BY
ISN 0334      1CHARGINGALIT28',5X,F10.4/5X,'THE REVENUE-CCSTS RATIO',5X,F10.4//)
ISN 0335      118 WRITE(6,44)
ISN 0336      44  FORMAT('1',30X,'TOTAL CCSTS'//15X,'CURRENT COLLAR',10X,
ISN 0337      1  'PRESENT VALLE'//)
ISN 0338      WRITE(6,441)  SUM(1,2), SUM(1,1)
ISN 0339      441  FORMAT(1X,'R AND D',10X,F10.4,14X,F10.4/)
ISN 0340      WRITE(6,442)  SUM(2,2),SUM(2,1)
ISN 0341      442  FORMAT(1X,'ENG',14X,F10.4,14X,F10.4/)
ISN 0342      WRITE(6,443)  SUM(3,2), SUM(3,1)
ISN 0343      443  FORMAT(1X,'LAND',13X,F10.4,14X,F10.4/)
ISN 0344      WRITE(6,444)  SUM(4,2), SUM(4,1)
ISN 0345      444  FORMAT(1X,'INT CT',11X,F10.4,14X,F10.4/)
ISN 0346      WRITE(6,445)  SUM(5,2),SUM(5,1)
ISN 0347      445  FORMAT(1X,'EXP CT',11X,F10.4,14X,F10.4/)
ISN 0348      WRITE(6,446)  SUM(6,2), SUM(6,1)
ISN 0349      446  FORMAT(1X,'COPER',13X,F10.4,14X,F10.4/)
ISN 0350      WRITE(6,447)  SUM(7,2),SUM(7,1)
ISN 0351      447  FORMAT(1X,'DEC',14X,F10.4,14X,F10.4/)
ISN 0352      WRITE(6,448)  SUM(8,2), SUM(8,1)
ISN 0353      448  FORMAT(1X,'SUR',14X,F10.4,14X,F10.4/)
ISN 0354      WRITE(6,449)  SUM(10,2), SUM(10,1)
ISN 0355      449  FORMAT(1X,'TRAN',13X,F10.4,14X,F10.4/)
ISN 0356      WRITE(6,450)  SUM(9,2),SUM(9,1)
ISN 0357      450  FORMAT(1X,'OTHER',12X,F10.4,14X,F10.4/)
ISN 0358      IF(IA.EQ.C) GO TO 161
ISN 0359      WRITE(6,431)
ISN 0360      431  FORMAT('1',10X,'R AND C CCSTS EY YEAR'//)
ISN 0361      WRITE(6,432)
ISN 0362      432  FORMAT(6X,'YEAR',15X,'CURRENT',15X,'FV'//)
ISN 0363      DO 433 I=1,IA
ISN 0364      YEAR=KAA+I+1976.C
ISN 0365      WRITE(6,434)  YEAR,Z(1,KAA+I),Z(2,KAA+I)
ISN 0366      434  FORMAT(5X,F5.C,10X,F10.4,10X,F10.4)
ISN 0367      433  CONTINUE
ISN 0368      161  IF(IB.EQ.C) GO TO 162
ISN 0369      WRITE(6,4310)
ISN 0370      4310 FORMAT('1',10X,'ENG CCSTS EY YEAR'//)
ISN 0371      WRITE(6,4320)
ISN 0372      4320 FORMAT(6X,'YEAR',15X,'CURRENT',15X,'FV'//)
ISN 0373      DO 4330 I=1,IB

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ISN 0373      YEAR=K00+I+1976.0
ISN 0374      WRITE(6,4340)  YEAR,Z(3,KEE+I),Z(4,KEE+I)
ISN 0375      4340 FORMAT(5X,FS.0,10X,F10.4,10X,F10.4)
ISN 0376      4330 CONTINUE
ISN 0377      162  IF(IC.EQ.0) GO TO 163
ISN 0379      WRITE(6,4311)
ISN 0380      4311 FORMAT('1',10X,'LAND CCSTS BY YEAR'///)
ISN 0381      WRITE(6,4321)
ISN 0382      4321 FORMAT(6X,'YEAR',15X,'CURRENT',15X,'FV'///)
ISN 0383      DO 4331 I=1,IC
ISN 0384      YEAR=KCC+I+1976.0
ISN 0385      WRITE(6,4341)  YEAR,Z(5,KCC+I),Z(6,KCC+I)
ISN 0386      4341 FORMAT(5X,FS.0,10X,F10.4,10X,F10.4)
ISN 0387      4331 CONTINUE
ISN 0388      163  IF(ID.EQ.0) GO TO 164
ISN 0390      WRITE(6,4312)
ISN 0391      4312 FORMAT('1',10X,'INITIAL CONST CCSTS BY YEAR'///)
ISN 0392      WRITE(6,4322)
ISN 0393      4322 FORMAT(6X,'YEAR',15X,'CURRENT',15X,'FV'///)
ISN 0394      DO 4332 I=1,ID
ISN 0395      YEAR=KDD+I+1976.0
ISN 0396      WRITE(6,4342)  YEAR,Z(7,KDD+I),Z(8,KDD+I)
ISN 0397      4342 FORMAT(5X,FS.0,10X,F10.4,10X,F10.4)
ISN 0398      4332 CONTINUE
ISN 0399      164  IF(IE.EQ.0) GO TO 165
ISN 0401      WRITE(6,4313)
ISN 0402      4313 FORMAT('1',10X,'EXPANSION CONST CCSTS BY YEAR'///)
ISN 0403      WRITE(6,4323)
ISN 0404      4323 FORMAT(6X,'YEAR',15X,'CURRENT',15X,'FV'///)
ISN 0405      DO 4333 I=1,IE
ISN 0406      YEAR=KEE+I+1976.0
ISN 0407      WRITE(6,4343)  YEAR,Z(9,KEE+I),Z(10,KEE+I)
ISN 0408      4343 FORMAT(5X,FS.0,10X,F10.4,10X,F10.4)
ISN 0409      4333 CONTINUE
ISN 0410      165  IF(IFF.EQ.0) GO TO 166
ISN 0412      WRITE(6,4314)
ISN 0413      4314 FORMAT('1',10X,'OPERATION CCSTS BY YEAR'///)
ISN 0414      WRITE(6,4324)
ISN 0415      4324 FORMAT(6X,'YEAR',15X,'CURRENT',15X,'FV'///)
ISN 0416      DO 4334 I=1,IFF
ISN 0417      YEAR=KFF+I+1976.0
ISN 0418      WRITE(6,4344)  YEAR,Z(11,KFF+I),Z(12,KFF+I)
ISN 0419      4344 FORMAT(5X,FS.0,10X,F10.4,10X,F10.4)
ISN 0420      4334 CONTINUE
ISN 0421      166  IF(IG.EQ.0) GO TO 167
ISN 0423      WRITE(6,4315)
ISN 0424      4315 FORMAT('1',10X,'DECOM CCSTS BY YEAR'///)
ISN 0425      WRITE(6,4325)
ISN 0426      4325 FORMAT(6X,'YEAR',15X,'CURRENT',15X,'FV'///)
ISN 0427      DO 4335 I=1,IG
ISN 0428      YEAR=KGG+I+1976.0
ISN 0429      WRITE(6,4345)  YEAR,Z(13,KGG+I),Z(14,KGG+I)
ISN 0430      4345 FORMAT(5X,FS.0,10X,F10.4,10X,F10.4)
ISN 0431      4335 CONTINUE
ISN 0432      167  IF(IH.EQ.0) GO TO 168
ISN 0434      WRITE(6,4316)
ISN 0435      4316 FORMAT('1',10X,'SLAV CCSTS BY YEAR'///)
ISN 0436      WRITE(6,4326)

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ISN C437 4326 FORMAT(6X,'YEAR',15X,'CURRENT',15X,'FV'//)
ISN C438 DO 4336 I=1,IH
ISN C439 YEAR=KHH+I+1976.0
ISN C440 WRITE(6,4346) YEAR,Z(1,KHH+I),Z(2,KHH+I)
ISN C441 4346 FORMAT(5X,FS.C,10X,F10.4,10X,F10.4)
ISN C442 4336 CONTINUE
ISN C443 168 IF(IJ.EQ.C) GO TO 169
ISN C444 WRITE(6,4317)
ISN C445 4317 FORMAT('1',10X,'TRANS COSTS BY YEAR'//)
ISN C446 WRITE(6,4327)
ISN C447 4327 FORMAT(6X,'YEAR',15X,'CURRENT',15X,'FV'//)
ISN C448 DO 4337 I=1,IJ
ISN C449 YEAR=KJJ+I+1976.0
ISN C450 WRITE(6,4347) YEAR,Z(17,KJJ+I),Z(18,KJJ+I)
ISN C451 4347 FORMAT(5X,FS.C,10X,F10.4,10X,F10.4)
ISN C452 4337 CONTINUE
ISN C453 169 IF(IK.EQ.C) GO TO 170
ISN C454 WRITE(6,4318)
ISN C455 4318 FORMAT('1',10X,'OTHER COSTS BY YEAR'//)
ISN C456 WRITE(6,4328)
ISN C457 4328 FORMAT(6X,'YEAR',15X,'CURRENT',15X,'FV'//)
ISN C458 DO 4338 I=1,IK
ISN C459 YEAR=KII+I+1976.0
ISN C460 WRITE(6,4348) YEAR,Z(15,KII+I),Z(16,KII+I)
ISN C461 4348 FORMAT(5X,FS.C,10X,F10.4,10X,F10.4)
ISN C462 4338 CONTINUE
ISN C463 170 CONTINUE
ISN C464 TC SUM1=SUM(1,2)+SUM(2,2)+SUM(3,2)+SUM(4,2)+SUM(5,2)+
ISN C465 1 SUM(6,2)+SUM(7,2)+SUM(8,2)+SUM(9,2)+SUM(10,2)
ISN C466 TC SUM2=SUM(1,1)+SUM(2,1)+SUM(3,1)+SUM(4,1)+SUM(5,1)+
ISN C467 1 SUM(6,1)+SUM(7,1)+SUM(8,1)+SUM(9,1)+SUM(10,1)
ISN C468 WRITE(6,402)
ISN C469 402 FORMAT('1',5X,'TCTAL CURRENT COSTS',10X,'TCTAL FV COSTS'//)
ISN C470 WRITE(6,403) TC SUM1, TC SUM2
ISN C471 403 FORMAT(3X,F10.4,20X,F10.4)
ISN C472 WRITE(6,2783)
ISN C473 2783 FORMAT(///15X,'THESE CC NOT INCLUDE INTEREST CHARGES')
ISN C474 DO 1222 I=1,N
ISN C475 SUMAA(I)=(Z(1,I)+Z(3,I)+Z(5,I)+Z(7,I)+Z(9,I)+Z(11,I)+
ISN C476 1 Z(13,I)+Z(15,I)+Z(17,I)+Z(19,I))
ISN C477 SUMBB(I)=(Z(2,I)+Z(4,I)+Z(6,I)+Z(8,I)+Z(10,I)+Z(12,I)+Z(14,I)+
ISN C478 1 Z(16,I)+Z(18,I)+Z(20,I))
ISN C479 SUMA(I)=SUMAA(I)*C
ISN C480 SUMB(I)=SUMBB(I)*C
ISN C481 1222 CONTINUE
ISN C482 IF(AB.EQ.1.0) GO TO 5742
ISN C483 READ(5,9993) (LC(I,JA+I-1),I=1,NA)
ISN C484 9993 FORMAT(5F10.4)
ISN C485 IF(AB.EQ.C.C) GO TO 5744
ISN C486 5742 READ(5,9994) (CAN(I,JE+I-1),I=1,NE)
ISN C487 9994 FORMAT(5F10.4)
ISN C488 5744 DO 1333 I=1,N
ISN C489 TC1(I)=SUMA(I)+AB
ISN C490 TC2(I)=SUMA(I)+AB
ISN C491 TC3(I)=SUMB(I)+AB
ISN C492 TC4(I)=SUMB(I)+AB
ISN C493 1333 CONTINUE
ISN C494 TC5=C.C

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ISN 0455      TC6=0.0
ISN 0456      TC7=0.0
ISN 0457      TC8=0.0
ISN 0458      DO 4549 I=1,N
ISN 0459          TC5=TC5+TC1(I)
ISN 0500      TC6=TC6+TC2(I)
ISN 0501      TC7=TC7+TC3(I)
ISN 0502      TC8=TC8+TC4(I)
ISN 0503      4549 CONTINUE
ISN 0504      TR=0.0
ISN 0505      TRCAN=0.0
ISN 0506      IF(AB.EQ.1.0) GC TC 5999
ISN 0507      DO 1001 I=1,NA
ISN 0508          TR=TR+U3C8(JA+I-1)*((1.0+FRA(JA+I-1))* (JA+I-2))
ISN 0509      1001 CONTINUE
ISN 0510          PRICE=TC5/TR
ISN 0511      DO 1002 I=1,NA
ISN 0512          PR(JA+I-1)=PRICE*((1.0+FRA(JA+I-1))* (JA+I-2))
ISN 0513      1002 CONTINUE
ISN 0514      IF(AB.EQ.0.0) GC TC 4751
ISN 0515      5999 DO 1011 I=1,NB
ISN 0516          TRCAN=TRCAN+CAN(JE+I-1)*((1.0+FRA(JE+I-1))* (JE+I-2))
ISN 0517      1011 CONTINUE
ISN 0518          PRCAN=TC6/TRCAN
ISN 0519      DO 1022 I=1,NB
ISN 0520          PRCA(JE+I-1)=PRCAN*((1.0+FRA(JE+I-1))* (JE+I-2))
ISN 0521      1022 CONTINUE
ISN 0522      4751 ALCAN=0.0
ISN 0523          COSTA=0.0
ISN 0524          ALCANB=0.0
ISN 0525          COSTC=0.0
ISN 0526          INTC1=0.0
ISN 0527          TCTC1=0.0
ISN 0528          INTCB=0.0
ISN 0529          TCTCB=0.0
ISN 0530          IF(AB.EQ.1.0) GC TC 5998
ISN 0531          IF(JA.EQ.1) GC TC 1050
ISN 0532          JAA=JA-1
ISN 0533      DO 1051 I=1,JAA
ISN 0534          COSTA=COSTA+TC1(I)
ISN 0535          INTC1(I+1)=COSTA*INT(I)
ISN 0536          TCTC1(I+1)=TC1(I+1)+INTC1(I+1)
ISN 0537          TCTC1=TCTC1+TCTC1(I+1)
ISN 0538      1051 CONTINUE
ISN 0539          TCTC1=TCTC1+TC1(1)
ISN 0540      1050 NAA=NA-1
ISN 0541      DO 1005 I=1,NAA
ISN 0542          PR1(JA+I-1)=PR(JA+I-1)+U3C8(JA+I-1)
ISN 0543          PR2(JA+I-1)=PR1(JA+I-1)-TC1(JA+I-1)-TCTC1
ISN 0544          IF(PR2(JA+I-1).LT.0.0) GC TC 1003
ISN 0545          IF(PR2(JA+I-1).GE.0.0) GC TC 1004
ISN 0546      1003 ALCAN=ALCAN-PR2(JA+I-1)
ISN 0547          QVE(JA+I)=INT(JA+I-1)*ALCAN
ISN 0548          PR(JA+I)=PR(JA+I)+QVE(JA+I)/U3C8(JA+I)
ISN 0549          TEST=PR(JA+I-1)*RMAX
ISN 0550          IF(PR(JA+I).GT.TEST) ALCAN=ALCAN+(PR(JA+I)-TEST)*U3C8(JA+I)
ISN 0551          IF(PR(JA+I).GT.TEST) PR(JA+I)=TEST
ISN 0552          IF(ALCAN.GT.0.0) PR(JA+I)=TEST

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ISN 0562      TO TC 1=0.0
ISN 0563      GO TC 1005
ISN 0564      1004 DIFF=FR2(JA+I-1)
ISN 0565      ALCAN=ALCAN-DIFF
ISN 0566      IF(ALCAN.LT.0.0)      GC TC 1006
ISN 0566      IF(ALCAN.GE.0.0)      GC TC 1007
ISN 0570      1006 ALCAN=-ALCAN
ISN 0571      TO TC 1=0.0
ISN 0572      PR(JA+I)=(1.0+PRA(JA+I-1))*PR(JA+I-1)
ISN 0573      SINFD1(JA+I)=ALCAN
ISN 0574      ALCAN=0.0
ISN 0575      GO TC 1005
ISN 0576      1007 QWE(JA+I)=INT(JA+I-1)*ALCAN
ISN 0577      PR(JA+I)=PR(JA+I)+QWE(JA+I)/U3CB(JA+I)
ISN 0578      TOTCI=C.0
ISN 0579      TEST=PR(JA+I-1)*RMAX
ISN 0580      IF(PR(JA+I).GT.TEST)  ALCAN=ALCAN+(PR(JA+I)-TEST)*U3CE(JA+I)
ISN 0582      IF(PR(JA+I).GT.TEST)  PR(JA+I)=TEST
ISN 0584      IF(ALCAN.GT.0.0)  PR(JA+I)=TEST
ISN 0586      GO TC 1005
ISN 0587      1008 CONTINUE
ISN 0588      IF(AB.EQ.0.0)  GC TC 1056
ISN 0590      9998 IF(JB.EQ.1) GC TC 1060
ISN 0592      JBB=JB-1
ISN 0593      DO 1061 I=1,JBB
ISN 0594      COSTC=COSTC+TC2(I)
ISN 0595      INTCB(I+1)=COSTC+INT(I)
ISN 0596      TOTCB(I+1)=TC2(I+1)+INTCB(I+1)
ISN 0597      TOTCTB=TOTCTB+TOTCB(I+1)
ISN 0598      1061 CONTINUE
ISN 0599      TOTCTB=TOTCTB+TC2(1)
ISN 0600      1060 NBB=NB-1
ISN 0601      DO 1055 I=1,NBB
ISN 0602      PR11(JB+I-1)=PRCA(JE+I-1)*CAN(JE+I-1)
ISN 0603      PR22(JB+I-1)=PR11(JE+I-1)-TC2(JB+I-1)-TOTCTE
ISN 0604      IF(PR22(JB+I-1).LT.0.0)  GC TC 1033
ISN 0606      IF(PR22(JB+I-1).GE.0.0)  GC TC 1044
ISN 0608      1033 ALCANB=ALCANB-PR22(JE+I-1)
ISN 0609      QWEB(JB+I)=INT(JB+I-1)*ALCANB
ISN 0610      PRCA(JB+I)=PRCA(JE+I)+QWEB(JB+I)/CAN(JE+I)
ISN 0611      TEST=PRCA(JB+I-1)*RMAX
ISN 0612      IF(PRCA(JB+I).GT.TEST)  ALCANB=ALCANB+(PRCA(JE+I)-TEST)*CAN(JB+I)
ISN 0614      IF(PRCA(JB+I).GT.TEST)  PRCA(JE+I)=TEST
ISN 0616      IF(ALCANB.GT.0.0)  PRCA(JE+I)=TEST
ISN 0618      TOTCTB=C.0
ISN 0619      GO TC 1055
ISN 0620      1044 DIFF=PR22(JB+I-1)
ISN 0621      ALCANB=ALCANB-DIFF
ISN 0622      IF(ALCANB.LT.0.0)  GC TC 1066
ISN 0624      IF(ALCANB.GE.0.0)  GC TC 1077
ISN 0626      1066 ALCANB=-ALCANB
ISN 0627      TOTCTB=C.0
ISN 0628      PRCA(JB+I)=(1.0+PRA(JE+I-1))*PRCA(JB+I-1)
ISN 0629      SINFD2(JB+I)=ALCANB
ISN 0630      ALCANB=C.0
ISN 0631      GO TC 1055
ISN 0632      1077 QWEB(JB+I)=INT(JE+I-1)*ALCANB
ISN 0633      PRCA(JB+I)=PRCA(JB+I)+QWEB(JE+I)/CAN(JE+I)

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ISN 0634      TO TC IB=0.0
ISN 0635      TEST=PRCA(JB+I-1)*FMAX
ISN 0636      IF (PRCA(JB+I).GT.TEST)  ALCANE=ALCANB+(PRCA(JE+I)-TEST)*CAN(JB+I)
ISN 0638      IF (PRCA(JB+I).GT.TEST)  FFCA(JE+I)=TEST
ISN 0640      IF (ALCANB.GT.C.C)  PRCA(JE+I)=TEST
ISN 0642      GO TO 1055
ISN 0643      1055 CONTINUE
ISN 0644      1056 IF (KZ.EQ.0)  GO TO 4951
ISN 0646      IF (SR.EQ.0)  TCISLR=SFA*((1.0+SURA)**KZ)
ISN 0648      IF (SR.EQ.1)  TCISLR=SFA
ISN 0650      SINKFD=TCISLR/INT(KZ)
ISN 0651      IF (AB.EQ.0.0)  GO TO 5552
ISN 0653      IF (AB.EQ.1.0)  GO TO 5551
ISN 0655      SFD1=SINKFD*AB
ISN 0656      SFD2=SINKFD*(1.0-AE)
ISN 0657      DENOM1=0.0
ISN 0658      DENOM2=0.0
ISN 0659      DO 5553 M=1,NA
ISN 0660      DO 5553 J=1,NB
ISN 0661      DO 5553 I=1,NA
ISN 0662      DENOM1=DENOM1+((1.0+FFA(I))** (I-1))*((1.0+SURA)** (J-1))*
1      ((1.0+INT(M))** (N-1))
ISN 0663      5553 CONTINUE
ISN 0664      DO 5554 M=1,NB
ISN 0665      DO 5554 J=1,NB
ISN 0666      DO 5554 I=1,NB
ISN 0667      DENOM2=DENOM2+((1.0+FFA(I))** (I-1))*((1.0+SURA)** (J-1))*
1      ((1.0+INT(M))** (N-1))
ISN 0668      5554 CONTINUE
ISN 0669      CONT1=SFD1/DENOM1
ISN 0670      CONT2=SFD2/DENOM2
ISN 0671      DO 5555 I=1,NA
ISN 0672      CONTA(JA+I-1)=CONT1*((1.0+FFA(JA+I-1))** (JA+I-2))
ISN 0673      5555 CONTINUE
ISN 0674      DO 5556 I=1,NB
ISN 0675      CONTB(JB+I-1)=CONT2*((1.0+FFA(JE+I-1))** (JE+I-2))
ISN 0676      5556 CONTINUE
ISN 0677      DO 5557 I=1,NA
ISN 0678      PR(JA+I-1)=PR(JA+I-1)+CONTA(JA+I-1)/UECB(JA+I-1)
ISN 0679      5557 CONTINUE
ISN 0680      DO 5558 I=1,NB
ISN 0681      PRCA(JB+I-1)=PRCA(JE+I-1)+CONTE(JE+I-1)/CAN(JE+I-1)
ISN 0682      5558 CONTINUE
ISN 0683      GO TO 4952
ISN 0684      5551 DENOM=0.0
ISN 0685      DO 5559 M=1,NB
ISN 0686      DO 5559 J=1,NB
ISN 0687      DO 5559 I=1,NB
ISN 0688      DENOM=DENOM+((1.0+FFA(I))** (I-1))*((1.0+SURA)** (J-1))*
1      ((1.0+INT(M))** (N-1))
ISN 0689      5559 CONTINUE
ISN 0690      CONT=SINKFD/DENOM
ISN 0691      DO 5560 I=1,NB
ISN 0692      CONTC(JB+I-1)=CONT*((1.0+FFA(JE+I-1))** (JE+I-2))
ISN 0693      PRCA(JB+I-1)=PRCA(JE+I-1)+CONTC(JB+I-1)/CAN(JE+I-1)
ISN 0694      5560 CONTINUE
ISN 0695      GO TO 4952
ISN 0696      5552 DENOM=0.0

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ISN 0697      DO 5561 M=1,NA
ISN 0698      DO 5561 J=1,NA
ISN 0699      DO 5561 I=1,NA
ISN 0700      DENOM=DENOM+((1.0+FRA(I))*((I-1))*((1.0+SURA))*((J-1))*
1 ((1.0+INT(M))*((M-1)))
ISN 0701      5561 CONTINUE
ISN 0702      CONT=SINKFD/DENOM
ISN 0703      DO 5562 I=1,NA
ISN 0704      CUNTC(JA+I-1)=CUNTC+((1.0+FRA(JA+I-1))*((JA+I-2)))
ISN 0705      FR(JA+I-1)=FR(JA+I-1)+CUNTC(JA+I-1)/U3C8(JA+I-1)
ISN 0706      5562 CONTINUE
ISN 0707      GO TO 4952
ISN 0708      4952 IYEAR=1976+KZ
ISN 0709      WRITE(6,4445) IYEAR,SINKFD
ISN 0710      4445 FORMAT('1',5X,'THE SURV SINK FUND IN',2X,'IS',2X,'IS',2X,'F10.4//
1 10X,'THE YEARLY CONTRIBUTIONS ARE GIVEN BELOW'//)
ISN 0711      IF(AB.EQ.0.0) GO TO 4446
ISN 0712      IF(AB.EQ.1.0) GO TO 4446
ISN 0713      DO 4448 I=1,N
ISN 0714      IYEAR=1976+I
ISN 0715      WRITE(6,4449) IYEAR,CUNTC(I),CUNTC(I)
ISN 0716      4449 FORMAT(5X,15,5X,F10.4,5X,F10.4)
ISN 0717      4448 CONTINUE
ISN 0718      GO TO 4951
ISN 0719      4446 DO 4473 I=1,N
ISN 0720      IYEAR=1976+I
ISN 0721      WRITE(6,4450) IYEAR,CUNTC(I)
ISN 0722      4450 FORMAT(5X,15,5X,F10.4)
ISN 0723      4473 CONTINUE
ISN 0724      GO TO 4951
ISN 0725      4951 DO 1111 I=1,N
ISN 0726      TOTREV(I)=PR(I)*U3CE(I)+FFCA(I)*CAN(I)
ISN 0727      PVTR(I)=TOTREV(I)/(((1.0+DISC(I))*I))
ISN 0728      1111 CONTINUE
ISN 0729      DO 1112 I=1,N
ISN 0730      PVPR(I)=PR(I)/(((1.0+DISC(I))*I))
ISN 0731      PVPRCA(I)=PRCA(I)/(((1.0+DISC(I))*I))
ISN 0732      1112 CONTINUE
ISN 0733      WRITE(6,8882)
ISN 0734      8882 FORMAT('1',10X,'PRICING SCHEDULE WITH REVENUES AND COSTS'//15X,'(A
111 NUMBERS ARE IN TERMS OF ONE MILLION CURRENT DOLLARS)'//5X,'YEA
1R',5X,'PRICE/CANIS',2X,'PRICE/ALT2',5X,'REVENUES',5X,'COSTS'/12X,
1'(PER CANISTER)')
ISN 0735      DO 8883 I=1,N
ISN 0736      SUMAA(I)=SUMAA(I)+CWE(I)+CWE(I)+INTCT(I)+INTCTE(I)
ISN 0737      IYEAR=1976+I
ISN 0738      WRITE(6,8884) IYEAR,FFCA(I),FF(I),TOTREV(I),SUMAA(I)
ISN 0739      8884 FORMAT(5X,15,5X,F10.4,6X,F10.4,5X,F10.4,3X,F10.4)
ISN 0740      8883 CONTINUE
ISN 0741      BONDS(1)=SUMAA(1)-TOTREV(1)
ISN 0742      IF(BONDS(1).LT.0.0) BONDS(1)=0.0
ISN 0743      NN=N-1
ISN 0744      DO 4743 I=1,NN
ISN 0745      IF(TOTREV(I+1).LT.SUMAA(I+1)) BONDS(I+1)=SUMAA(I+1)-
1 TOTREV(I+1)+BONDS(I)
ISN 0746      IF(TOTREV(I+1).GT.SUMAA(I+1)) BONDS(I+1)=BONDS(I)-TOTREV(I+1)
1 +SUMAA(I+1)
ISN 0747      IF(BONDS(I+1).LT.0.0) BONDS(I+1)=0.0
ISN 0748
ISN 0750
ISN 0752

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      BDCST(I+1)=BONDS(I)*INT(I)
      4743 CONTINUE
      WRITE(6,8223)
      8223 FORMAT('1',5X,'THE FOLLOWING REPRESENTS BONDS OUTSTANDING AND INTE
      REST COSTS BY YEAR'//19X,'TOTAL BONDS OUT',6X,'INTEREST PAYMENTS'
      1//)
      DO 8224 I=1,N
      IYEAR=1976+I
      WRITE(6,8225) IYEAR,BONDS(I),BDCST(I)
      8225 FORMAT(5X,15,6X,F15.4,10X,F10.4)
      8224 CONTINUE
      NN=N-1
      DO 2211 I=1,NN
      SINT(I+1)=SINT(I)+SINT(I)*INT(I)+SINFC1(I)+SINFC2(I)+
      1 (SINFD1(I)+SINFD2(I))*INT(I)
      2211 CONTINUE
      WRITE(6,2212)
      2212 FORMAT('1',10X,'CUMULATIVE SINKING FUND BY YEAR'//)
      DO 2213 I=1,N
      IYEAR=1976+I
      WRITE(6,2214) IYEAR,SINT(I)
      2214 FORMAT(5X,15,10X,F10.4)
      2213 CONTINUE
      WRITE(6,2215)
      2215 FORMAT('//5X,'IF THE SINKING FUND FOR YEAR N IS ZERO, MAX VALUE IS
      1TGC SMALL'//)
      WRITE(6,8885)
      8885 FORMAT('1',10X,'A COMPARISON OF CURRENT DOLLAR AND PRESENT VALUE REVEN
      UE AND COSTS'//15X,'(IN MILLIONS OF DOLLARS)'//)
      WRITE(6,8886)
      8886 FORMAT(15X,'PV REV',8X,'PV COSTS',7X,'CC REV',8X,'CC COSTS'//)
      DO 8887 I=1,N
      SUMBE(I)=SUMAA(I)/((1.0+DISC(I))*I)
      IYEAR=1976+I
      WRITE(6,8888) IYEAR,FVTS(I),SUMBE(I),TCTREV(I),SUMAA(I)
      8888 FORMAT(3X,15,5X,F10.4,5X,F10.4,5X,F10.4,5X,F10.4)
      8887 CONTINUE
      WRITE(6,8889)
      8889 FORMAT('1',10X,'A COMPARISON OF CURRENT DOLLAR AND PV PRICES'//15X,'(IN
      1 MILLIONS OF DOLLARS)'//)
      WRITE(6,8890)
      8890 FORMAT(19X,'PV ALT2',8X,'FV CAN',9X,'CC ALT2',8X,'CC CAN'//)
      DO 8891 I=1,N
      IYEAR=1976+I
      WRITE(6,8892) IYEAR,FVFS(I),FVFRCA(I),PR(I),PRCA(I)
      8892 FORMAT(5X,15,5X,F10.4,5X,F10.4,5X,F10.4,5X,F10.4)
      8891 CONTINUE
      STOP
      END

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APPENDIX III
Sample Problem

This sample problem uses the following parameters:

- 1.) split fee
50% of total costs recovered on U_3O_8
50% of total costs recovered on canisters
- 2.) revenue - cost ratio = 1.0
- 3.) no surveillance sinking fund
- 4.) interest rate = discount rate = 6%
- 5.) maximum price increase = 8%

THE FOLLOWING REPRESENTS ALL RESULTS FOR THIS SIMULATION OF THE COST RECOVERY MODEL

THE PERCENT OF COSTS COVERED BY CHARGING REPROSS

0.5000

THE PERCENT OF COSTS COVERED BY CHARGING U308

0.5000

THE REVENUE-COSTS RATIO 1.0000

TOTAL COSTS

CURRENT DOLLAR

PRESENT VALUE

R AND D	687.4993	517.5713
ENG	40.0000	31.9349
LAND	10.0000	8.5977
INT CT	1800.0000	956.2747
EXP CT	1500.0000	235.2215
OPER	3494.0999	828.8206
DEC	400.0000	58.1123
SUR	500.0000	72.3176
TRAN	0.0	0.0
OTHER	0.0	0.0

R AND D COSTS BY YEAR

YEAR	CURRENT	PV
1977.	37.9800	35.7547
1978.	79.6000	70.8438
1979.	95.0000	79.7640
1980.	97.0000	76.8334
1981.	91.4000	68.2997
1982.	77.4000	54.5643
1983.	70.4000	46.8203
1984.	71.4000	44.7976
1985.	67.4000	39.8943

ENG COSTS BY YEAR

YEAR

CURRENT

PV

1979.
1980.
1981.

10.0000
25.0000
5.0000

8.3962
19.8024
3.7363

EXAMPLE

LAND COSTS BY YEAR

YEAR

CURRENT

PV

1978.

4.0000

3.5600

1979.

6.0000

5.0377

INITIAL CONST COSTS BY YEAR

YEAR	CURRENT	PV
1981.	50.0000	37.3631
1982.	60.0000	42.2979
1983.	90.0000	59.8555
1984.	90.0000	56.4675
1985.	100.0000	5.9190
1986.	280.0000	139.6000
1987.	300.0000	158.0379
1988.	450.0000	223.6389
1989.	450.0000	210.9801
1990.	50.0000	22.1154

EXPANSION CONST COSTS BY YEAR

YEAR

CURRENT

PV

2006.	250.0000	43.5288
2007.	300.0000	49.2779
2008.	450.0000	69.7330
2009.	450.0000	65.7859
2010.	50.0000	6.8958

EXAMPLE

OPERATION COSTS BY YEAR

YEAR	CURRENT	PV
1977.	0.5000	0.4717
1978.	0.7000	0.6230
1979.	0.9000	0.7557
1980.	1.1000	0.8713
1981.	1.8000	1.3451
1982.	2.7000	1.9034
1983.	5.4000	3.5913
1984.	20.0000	12.5483
1985.	30.0000	17.7571
1986.	40.0000	22.3360
1987.	40.0000	21.0717
1988.	40.0000	19.8790
1989.	46.0000	21.5668
1990.	46.0000	20.3461
1991.	55.0000	22.9499
1992.	55.0000	21.6509
1993.	55.0000	20.4254
1994.	67.0000	23.4734
1995.	80.0000	26.4475
1996.	95.0000	29.6220
1997.	116.0000	34.1227
1998.	116.0000	32.1913
1999.	128.0000	33.5108
2000.	138.0000	34.0838
2001.	154.0000	35.8827
2002.	169.0000	37.1488
2003.	187.0000	38.7788
2004.	203.0000	39.7140
2005.	221.0000	40.7882
2006.	240.0000	41.7877
2007.	258.0000	42.3790
2008.	277.0000	42.9245
2009.	295.0000	43.1263
2010.	310.0000	42.7540

DECON COSTS BY YEAR

YEAR

CURRENT

PV

2008.

100.0000

15.4962

2009.

150.0000

21.9286

2010.

150.0000

20.6874

EXAMPLE

SURV COSTS BY YEAR

YEAR	CURRENT	PV
2008.	100.0000	15.4962
2009.	200.0000	29.2382
2010.	200.0000	27.5832

EXAMPLE

TOTAL CURRENT COSTS

8431.5977

TOTAL FV COSTS

2708.8499

THESE DO NOT INCLUDE INTEREST CHARGES

SAMPLE

PRICING SCHEDULE WITH REVENUES AND COSTS

(ALL NUMBERS ARE IN TERMS OF ONE MILLION CURRENT DOLLARS)

YEAR	PRICE/CANIS (PER CANISTER)	PRICE/ALT2	REVENUES	COSTS
1977	0.0	0.7618	7.7701	38.4000
1978	0.0	0.8227	8.3095	86.1378
1979	0.0	0.8885	11.7287	118.3245
1980	0.0	0.9596	15.4498	135.6608
1981	0.0	1.0364	19.8936	167.4761
1982	0.0	1.1193	22.9456	167.4596
1983	0.0	1.2068	29.6166	200.7390
1984	0.0	1.3055	37.2081	225.1671
1985	0.0	1.4100	45.2607	160.5838
1986	0.0	1.5228	50.5566	347.7673
1987	0.0	1.6446	59.3705	412.9395
1988	0.0324	1.7762	76.7387	580.7761
1989	0.0350	1.9183	98.4304	641.7705
1990	0.0378	2.0717	129.7759	272.9517
1991	0.0408	2.2375	158.9648	238.6347
1992	0.0441	2.4165	176.6579	241.1501
1993	0.0476	2.6098	201.2297	242.0019
1994	0.0514	2.8186	240.9649	252.9584
1995	0.0555	3.0441	279.9861	263.4277
1996	0.0600	3.2876	326.4692	274.4255
1997	0.0648	3.5506	386.4973	289.4736
1998	0.0699	3.8346	415.3345	280.8601
1999	0.0755	4.0264	465.8923	291.2263
2000	0.0816	4.2277	527.1377	301.6394
2001	0.0881	4.4351	589.3257	315.6124
2002	0.0952	4.6610	657.6196	325.5874
2003	0.1028	4.8940	738.8525	334.6584
2004	0.1110	5.1367	822.6917	336.7112
2005	0.1199	5.3957	921.9695	336.1057
2006	0.1295	5.6655	1031.9124	582.6404
2007	0.1398	5.9487	1153.5939	631.2998
2008	0.1510	6.2462	1288.2122	577.4485
2009	0.1631	6.5565	1437.0503	1127.4463
2010	0.1761	6.8864	1591.6726	722.5215

THE FOLLOWING REPRESENTS BONDS OUTSTANDING AND INTEREST COSTS BY YEAR

TOTAL BONDS OUT

INTEREST PAYMENTS

1977	30.6299	0.0
1978	108.4582	1.8378
1979	215.5540	6.5075
1980	335.2649	12.9032
1981	482.1423	20.1159
1982	627.5562	28.9705
1983	798.4785	37.6414
1984	986.4375	47.9087
1985	1101.7605	59.1862
1986	1398.5712	66.1056
1987	1752.5400	83.9383
1988	2256.5774	105.1524
1989	2799.5172	135.3946
1990	2943.0928	167.9550
1991	3025.7627	176.5856
1992	3190.2546	181.5457
1993	3131.0266	185.4153
1994	3143.0200	187.8616
1995	3126.4617	188.8612
1996	3074.4180	187.5877
1997	2977.3943	184.4651
1998	2846.5199	178.6436
1999	2668.2339	170.5752
2000	2442.7556	160.0952
2001	2169.1023	146.5653
2002	1837.0701	130.1461
2003	1432.8760	110.2242
2004	946.8955	65.9725
2005	361.0317	56.8137
2006	0.0	21.6619
2007	0.0	0.0
2008	0.0	0.0
2009	0.0	0.0
2010	0.0	0.0

CUMULATIVE SINKING FUND BY YEAR

1977	0.0
1978	0.0
1979	0.0
1980	0.0
1981	0.0
1982	0.0
1983	0.0
1984	0.0
1985	0.0
1986	0.0
1987	0.0
1988	0.0
1989	0.0
1990	0.0
1991	0.0
1992	0.0
1993	0.0
1994	0.0
1995	0.0
1996	0.0
1997	0.0
1998	0.0
1999	0.0
2000	154.5703
2001	405.7478
2002	657.0654
2003	1019.6055
2004	1376.5630
2005	1769.8950
2006	2204.2639
2007	2682.6621
2008	3076.3630
2009	3468.5732
2010	3762.7349

IF THE SINKING FUND FOR YEAR N IS ZERO, MAX VALUE IS TOO SMALL

A COMPARISON OF CURRENT DOLLAR AND PRESENT VALUE REVENUE AND COSTS
(IN MILLIONS OF DOLLARS)

	PV REV	PV COSTS	CD REV	CD COSTS
1977	7.3203	36.2264	7.7701	38.4000
1978	7.3954	76.6624	8.3095	86.1378
1979	8.8476	99.3477	11.7287	118.3245
1980	12.2378	107.4565	15.4498	135.6608
1981	14.8699	125.1484	19.8936	167.4761
1982	16.1753	118.0531	22.9456	167.4596
1983	18.6969	133.5087	29.6166	200.7390
1984	22.3490	141.2737	37.2081	225.1671
1985	26.7500	95.4501	45.2607	160.5838
1986	38.2308	194.1933	50.5566	347.7673
1987	31.2759	217.5332	59.3705	412.9395
1988	38.372	228.6313	76.7387	580.7761
1989	46.4466	300.8916	98.4304	641.7705
1990	57.4008	120.7265	129.7759	272.9517
1991	69.0799	99.5753	155.9648	238.6347
1992	69.5418	94.9293	176.6579	241.1501
1993	74.7507	89.2723	201.2297	242.0019
1994	84.4220	88.6238	240.9649	252.9584
1995	92.6407	87.0679	279.9861	263.4277
1996	101.7566	85.5685	326.4692	274.4255
1997	113.6926	88.1519	386.4973	289.4736
1998	115.2599	77.9418	413.3345	280.8601
1999	121.9720	76.2439	425.8923	291.2263
2000	130.1947	74.5022	527.1377	301.6394
2001	137.3154	73.5530	589.3257	315.6724
2002	144.5550	71.5692	657.6796	329.5874
2003	153.2183	69.3992	738.8525	334.6584
2004	160.9477	65.8727	822.6917	376.7112
2005	170.1604	62.0323	921.9699	336.1057
2006	179.6718	101.4466	1031.9124	582.6404
2007	189.4898	103.6971	1153.5989	631.2998
2008	199.6243	151.4676	1288.2122	977.4485
2009	210.0837	164.8224	1437.0503	1127.4463
2010	219.5173	99.6474	1591.6726	722.5215

A COMPARISON OF CURRENT DOLLAR AND PV PRICES
(IN MILLIONS OF DOLLARS)

	PV ALT2	PV CAN	CD ALT2	CD CAN
1977	0.7187	0.0	0.7618	0.0
1978	0.7322	0.0	0.8227	0.0
1979	0.7460	0.0	0.8885	0.0
1980	0.7601	0.0	0.9596	0.0
1981	0.7745	0.0	1.0364	0.0
1982	0.7891	0.0	1.1193	0.0
1983	0.8040	0.0	1.2088	0.0
1984	0.8191	0.0	1.3055	0.0
1985	0.8346	0.0	1.4100	0.0
1986	0.8503	0.0	1.5228	0.0
1987	0.8664	0.0	1.6446	0.0
1988	0.8827	0.0161	1.7762	0.0324
1989	0.8994	0.0164	1.9183	0.0350
1990	0.9163	0.0167	2.0717	0.0378
1991	0.9336	0.0170	2.2375	0.0408
1992	0.9512	0.0174	2.4165	0.0441
1993	0.9692	0.0177	2.6098	0.0476
1994	0.9875	0.0180	2.8186	0.0514
1995	1.0061	0.0184	3.0441	0.0555
1996	1.0251	0.0187	3.2876	0.0600
1997	1.0444	0.0191	3.5506	0.0648
1998	1.0642	0.0194	3.8346	0.0699
1999	1.0841	0.0198	4.0264	0.0755
2000	1.0442	0.0202	4.2277	0.0816
2001	1.0343	0.0205	4.4391	0.0881
2002	1.0246	0.0208	4.6610	0.0952
2003	1.0149	0.0213	4.8940	0.1028
2004	1.0053	0.0217	5.1387	0.1110
2005	0.9958	0.0221	5.3957	0.1199
2006	0.9864	0.0225	5.6653	0.1295
2007	0.9771	0.0230	5.9487	0.1398
2008	0.9679	0.0234	6.2462	0.1510
2009	0.9588	0.0238	6.5585	0.1631
2010	0.9497	0.0243	6.8864	0.1761

IFCCC21 STOP

C

APPENDIX IV.
Cost Centers

The cost centers identified in the discussion of the cost recovery model were decided upon after several meetings between members of the SAI team and the OWI staff. The purpose was to be flexible, not definitive. Therefore, the final cost centers used in the computation offer the user the most flexible framework with the least amount of disruption to an already-existing accounting system. However, it may be mentioned the user is free to re-name any or all cost centers, but this shifts the burden of identification of each cost center from the program to the user. When simulating with the sample scenario outlined in this report, no attempt was made to identify categories of costs within any cost center. Expenses incurred were distributed only by cost center.

Cost Centers for OWI Cost Recovery Model
with possible breakdowns for each center

I. Research and Development

- a. Administration
- b. Criteria Preparation and Conceptual Design
- c. Generic Environmental Impact Statement
- d. Geologic/Hydrologic Investigation
- e. Program Support Studies
- f. Public Relations
- g. Waste Form Development
- h. Transportation Studies

II. Land Acquisition

III. Facility Design

- a. A/E
- b. Administration
- c. Contracted Support
- d. Environmental Impact Report
- e. Geologic/Hydrologic Support
- f. License (regulatory compliance)

IV. Construction - Pilot Facility

- a. Acceptance Testing
- b. Construction Materials
- c. Engineering Support
- d. Fabricated Equipment

IV. Construction - Pilot Facility Continued

- e. Labor
- f. License (regulatory compliance)
- g. Public Relations
- h. Mining Waste Disposal
- i. QA/QC

V. Construction - Permanent Storage Facility

- a. Acceptance Testing
- b. Construction Materials
- c. Engineering Support
- d. Fabricated Equipment
- e. Labor
- f. License (regulatory compliance)
- g. Public Relations
- h. Mining Waste Disposal
- i. QA/QC

VI. Operation

- a. Administration
- b. Contracted Support
- c. Geologic/Hydrologic Support
- d. Labor
- e. License (regulatory compliance)
- f. Maintenance
- g. Public Relations

VI. Operation - Continued

- h. QA/QC
- i. Records
- j. Security
- k. Taxes/Insurance
- l. Utility

VII. Decommissioning

- a. Administration
- b. Contracted Support
- c. Engineering/Geologic/Hydrologic Support
- d. Labor
- e. License
- f. Materials
- g. Public Relations
- h. Taxes/Insurance

VIII. Surveillance

IX. Transportation

X. Other (user-specified)