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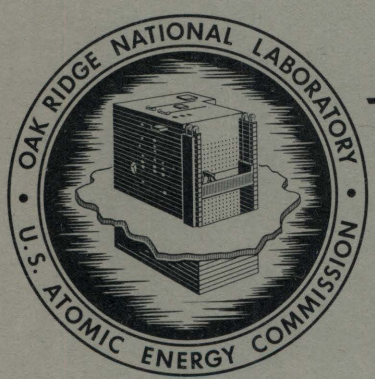
A REVISION OF COMPUTER CODE POWERCO (COST OF ELECTRICITY PRODUCED BY NUCLEAR POWER STATIONS) TO INCLUDE BREAKDOWNS OF POWER COST AND FIXED CHARGE RATES

Royes Salmon



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ABSTRACT

A previous report, ORNL-3944, described a computer code, POWERCO-25, for calculating the levelized cost of electricity produced by nuclear power stations. The calculation was made by a discounted cash flow technique, rather than by the fixed charge rate procedure. Required input data included a schedule of all cash expenditures over the life of the project, except for federal income taxes, which were calculated internally. State and local taxes, interim replacements, and insurance costs had to be precalculated externally and treated as part of the annual cash expenditures. The output from the code included a tabulation of the cash flows over the project lifetime, and showed the gradual reduction of the outstanding investment to zero.

The present report describes a new version of the code, POWERCO-50, which contains several changes. The calculation of state and local taxes, interim replacements, and property insurance is now made internally; tax rates and other necessary constants for the calculation of these items are now required as part of the input data. The fixed charge rates on capital now include the effects of state and local taxes, interim replacements, and property insurance, in accordance with general usage. This permits the fixed charge rates generated by the code to be compared directly with those given in other sources.

In POWERCO-50 the power cost is separated into four components, representing the cost contributions due to plant capital, nonfuel working capital, fuel cycle costs, and reactor operating and maintenance expense. Fixed charge rates on depreciable and nondepreciable capital are also broken down into their components. The maximum number of time periods in the project lifetime has been increased from 180 to 500.

A FORTRAN listing of POWERCO-50 and the results of example problems are included.

1. INTRODUCTION

The computer code POWERCO-25, described in ORNL-3944, used a present-worthed cash flow procedure to determine the levelized cost of electricity produced by a nuclear power station.[1] The procedure was based on the fundamental requirement that the incomes received must provide for the recovery of investment, return on investment, and all cash expenses of the project. The output of the code included a tabulation of the annual cash flows associated with the project, and showed the gradual reduction of the outstanding investment to zero.

The input data required by the code included a complete schedule of all cash expenditures over the life of the project, except for federal income taxes, which were calculated internally. State and local taxes, interim replacements, and insurance costs had to be precalculated externally and treated as part of the annual cash expenditures. One method for doing this is to assume that the annual cash amount for each of these items is some fixed percentage of the original investment. This type of approximation is usually made in reactor evaluation studies. The requirement that these items be estimated externally, however, did represent a limitation on the usefulness of the code.

The output of POWERCO-25 also included calculated fixed charge rates on depreciable and nondepreciable capital. These rates were defined in a rather special way; they included only recovery of investment, return on investment, and federal income taxes. The more conventionally accepted definition includes, in addition to the foregoing items, state and local taxes, interim replacements, and property insurance. Because the fixed charge rates calculated by the code used the more limited definition, they could not conveniently be compared with rates given in various other sources.[2-4]

The present report describes a revised version of the code, POWERCO-50, which corrects the limitations mentioned above and incorporates several additional improvements. The main changes in the new version of the code are as follows:

1. The fixed charge rates have been redefined to include the effects of state and local taxes, interim replacements, and property insurance.

2. The breakdowns of the fixed charge rates into their various components are calculated and shown.
3. The code now calculates and displays a complete year-by-year schedule of state and local taxes, interim replacements, and property insurance. The user must supply appropriate state and local tax rates and other input factors needed for this calculation. Federal income taxes are calculated internally in both versions of the code.
4. The code now calculates a breakdown of the total power cost into four components, representing the costs due to depreciable capital, nonfuel working capital, fuel cycle costs, and reactor operating and maintenance expense. The fuel cycle cost includes the effect of carrying charges on fuel working capital, in accordance with the usual practice.

The redefinition of the fixed charge rates (item 1 above) and the breakdowns of these rates (item 2) should make the code more useful as a means of comparison with evaluation studies made by the conventional fixed charge rate method. Additional useful information on taxes is provided by item 3; the detailed annual breakdown of federal, state, and local taxes should be of interest to those concerned with the effects of varying tax rates.

A fixed charge rate definition that is applicable to the case of variable annual income is discussed. This definition is different from that given in ORNL-3944, in that the latter was applicable to the case of constant annual income only. The relationship between these rates is developed in Sect. 4.3.

The breakdown of the power cost into its components (item 4) was added in response to requests from several users. The code calculates the component costs simply by applying the cost equation four times, once for each of the cost categories mentioned. It does this automatically when the breakdown option is selected. It is expected that this feature will be especially useful in fuel cycle cost studies.

There is no change in the basic method used; for the same input data, the new code will give exactly the same power cost as the old, provided the precalculated taxes in the old version correspond to the internally

calculated taxes in the new version. Practically, of course, exact agreement in these taxes would be very difficult to achieve.

The Appendix of this report includes a description of the procedure for preparing input data for POWERCO-50, as well as a FORTRAN listing of the code. Also included are reproductions of the computer input and output of a complete example problem. An example fuel cycle cost calculation is given in Section 3.3.

A complete table of symbols used in the report is given on a foldout page at the back. The notation used in ORNL-3944 has been preserved throughout, so that symbols appearing in both reports have the same meaning.

2. CALCULATION OF TAXES, INTERIM REPLACEMENTS, AND INSURANCE

This section describes the basis and simplifying assumptions used in POWERCO-50 for the calculation of taxes, interim replacements, and insurance.

2.1 Taxes

In the United States, state and local taxes may vary considerably from one location to another. The variation includes differences not only in tax rates, but in the types of taxes levied and in the methods prescribed for their calculation. Federal income tax is, of course, uniform in all states.

Provision has been made in POWERCO-50 for four taxes: federal income tax, state income tax, state gross revenues tax, and local property tax (usually collected by the county in which the property is located). The basis used in the code for the calculation of these taxes is given in this section. The methods used here may not necessarily apply in a particular location of interest; however, such disagreement is unavoidable in view of the wide variation in tax structures. It is believed that this deficiency can be compensated for, where necessary, by appropriate adjustments in the tax rate constants. In each case, the subscript n denotes the year in which the tax is paid.

2.1.1 Federal Income Tax

The federal income tax paid in year n is obtained by multiplying the federal taxable income, M_n, by the federal income tax rate, k_t:

$$T_n = k_t M_n \quad . \tag{2.1}$$

State income taxes, revenue taxes, and local property taxes are considered to be deductible in calculating the taxable income, M_n. Various other cash expenses, depreciation allowance, and prorated fuel expense are also deductible. Further details of this calculation are given later.

If a time period is less than one year, depreciation is calculated on an annual basis, and then divided equally among the number of periods in each year.

2.1.2 State Income Tax

The state income tax, $T_{a,n}$, is obtained by multiplying the state taxable income by the state income tax rate, k_s:

$$T_{a,n} = k_s M_{a,n} \quad . \tag{2.2}$$

In calculating the state taxable income, it is assumed that the gross revenue tax, $T_{b,n}$, the local property tax, $T_{c,n}$, the interim replacements, $I_{r,n}$, and the property insurance, $I_{i,n}$, are deductible items. Depreciation, D_n, bond interest, B_n, and prorated fuel expense, F_n, are also assumed to be deductible. The depreciation is assumed to be calculated by the same method used for federal income tax purposes. Federal accelerated depreciation methods are permitted in all states that have state income taxes.[5] In calculating the state taxable income, it is assumed that federal income taxes are not deductible. (Twelve states, however, do permit this deduction; they are Alabama, Arizona, Iowa, Kansas, Kentucky, Louisiana, Minnesota, Missouri, New Mexico, North Dakota, Utah, and Wisconsin.[5])

2.1.3 State Gross Revenues Tax

The gross revenues tax is obtained by multiplying the gross sales revenues, S_n, by the revenue tax rate, k_r:

$$T_{b,n} = k_r S_n \quad . \tag{2.3}$$

Here, the assumption is made that the only revenues involved are those from the sale of electricity.

2.1.4 Local Property Tax

The local property tax is obtained by multiplying the value of the property by the property tax rate, k_v. Complications arise here because there are several kinds of property to be considered. The first of these is the plant capital investment. Its value for tax purposes is assumed to be on an after-depreciation basis. Depreciation for this purpose was assumed to be calculated by the straight-line method, using the project life of m years. If f_n denotes the fraction of the original value remaining at the start of year n, then

$$f_n = \frac{m + 1 - n}{m} . \tag{2.4}$$

If the original plant investment is denoted by V_p, the tax on the plant property value is then given by:

$$T_{c,n} = k_v f_n V_p . \tag{2.5}$$

The initial reactor core, V_o, is assumed to be taxed at the same basic rate, k_v, but its depreciated value evidently cannot be calculated in the same way as the plant. As an approximation, the value of the core is assumed to be constant for tax purposes; this value is assumed to be some fraction, f_c, of the original core value. The fraction f_c must be supplied by the user. It represents the present-worthed average ratio of the core value to the initial core value for property tax purposes.

On this basis, the annual property tax on the core is given by:

$$T_{d,n} = k_v f_c V_o . \tag{2.6}$$

The final component of the local property tax is that on the nonfuel working capital. Provision is made here for a different input tax rate, k_p, since the normal property tax rate, k_v, may not be applicable in some cases. Typical nonfuel working capital items encountered in reactor evaluation studies are D_2O inventory, sodium inventory in LMFBR's, etc. The total value of the nonfuel working capital is denoted by W_p, and this is assumed

to remain constant over the life of the project. The annual tax is given by:

$$T_{p,n} = k_p W_p \quad . \tag{2.7}$$

One reason for having different values for k_v and k_p is that the nonfuel working capital includes cash on hand, and, in some cases, this cash is not taxed. To give an approximate representation of this situation, k_p can be made smaller than k_v.

2.2 Interim Replacements

The cost of interim replacements is represented in the code as an equivalent constant annual operating expense. It is recognized that this is an approximation and that the interim replacements are actually capitalized. The approximation was felt to be justified in view of the small difference involved and the complicated depreciation relationships that would be needed if each year's replacements were capitalized. The equivalent annual amount spent for interim replacements is thus given by:

$$I_{r,n} = k_a V_p \quad . \tag{2.8}$$

Since the annual amount is not actually constant in practice, the input constant k_a should be chosen to represent an approximate present-worthed average equivalent expense.

2.3 Insurance

The annual amount spent for property insurance is assumed to be constant, and to be given by the equation

$$I_{i,n} = k_b(V_p + V_o + W_p) \quad . \tag{2.9}$$

Property insurance is thus assumed to cover the plant, the core, and the nonfuel working capital. This follows from the basic assumption that all property inside the plant fence should be insured. The rate k_b should be adjusted to reflect any anticipated reduction in insurable value throughout the life of the project. Since the annual amount, $I_{i,n}$, is treated as a

constant, the value of k_b should be chosen to give an approximate present-worthed average annual cost.

Liability insurance, in accordance with the usual practice, is assumed to be part of the reactor operating and maintenance expense. The user should include liability insurance in the annual operating expense EEE(N) or in the fixed expenses D(14).

Because liability insurance is not calculated on the basis of the plant investment, it is not made part of the investment-related items that enter into the fixed charge rate on depreciable capital.

2.4. Income Tax Calculations

Expressions will now be developed for the federal and state income taxes. The federal taxable income, M_n, is the total sales income, S_n, minus the allowable deductions:

$$M_n = S_n - X_n - F_n - D_n - B_n . \tag{2.10}$$

The nonfuel cash expenses, X_n, include cash payments made for state taxes, local taxes, interim replacements, property insurance, liability insurance, and all other reactor operating and maintenance expenses, but not federal income tax.

The basis for the deductible fuel expense, F_n, is assumed to be the same as that given in ORNL-3944. The amount deductible in a given year is assumed to be proportional to the total electricity produced in that year. The pro rata fuel expense per kilowatt-hour is obtained by dividing the total project fuel expenditure, F_t, by the total project lifetime electrical production, Z_t. Thus, as in ORNL-3944,

$$F_n = \frac{Z_n F_t}{Z_t} .$$

G_n was defined in ORNL-3944 as the total annual cash expenses, exclusive of federal income tax. Thus G_n is the sum of the nonfuel expense, X_n, and the actual cash fuel expenditure, J_n. Replacing X_n by $G_n - J_n$ in Eq. (2.10) yields:

$$M_n = S_n - G_n + J_n - F_n - D_n - B_n . \tag{2.11}$$

The quantity G'_n will now be defined; it is the total annual cash expenses exclusive of federal income tax, state income tax, state gross revenues tax, local property tax, interim replacements, and property insurance. From this definition,

$$G'_n = G_n - T_{a,n} - T_{b,n} - T_{c,n} - T_{d,n} - T_{p,n} - I_{r,n} - I_{i,n} . \tag{2.12}$$

This substitution becomes necessary in POWERCO-50 because the annual cash expenses are inputted as G'_n rather than as G_n. For convenience, the sum of the last seven terms of Eq. (2.12) will be denoted by $T_{t,n}$:

$$T_{t,n} = T_{a,n} + T_{b,n} + T_{c,n} + T_{d,n} + T_{p,n} + I_{r,n} + I_{i,n} , \tag{2.13}$$

so that

$$G'_n = G_n - T_{t,n} . \tag{2.14}$$

The federal taxable income is then given by:

$$M_n = S_n - G'_n - T_{t,n} + J_n - F_n - D_n - B_n , \tag{2.15}$$

and the federal income tax is:

$$T_n = k_t (S_n - G'_n - T_{t,n} + J_n - F_n - D_n - B_n) . \tag{2.16}$$

The calculation of the state taxable income is similar to that of the federal taxable income, except that the state income tax, $T_{a,n}$, is not allowed as a deduction. Therefore,

$$M_{a,n} = S_n - G'_n - T_{t,n} + T_{a,n} + J_n - F_n - D_n - B_n , \tag{2.17}$$

and the state income tax is given by

$$T_{a,n} = k_s(S_n - G'_n - T_{t,n} + T_{a,n} + J_n - F_n - D_n - B_n) \tag{2.18}$$

or

$$T_{a,n} = \frac{k_s(S_n - G'_n - T_{t,n} + J_n - F_n - D_n - B_n)}{1 - k_s} . \tag{2.19}$$

From this, it follows that

$$T_{a,n} = \frac{k_s T_n}{k_t(1 - k_s)} . \tag{2.20}$$

3. POWER COST CALCULATION

The fundamental requirement for the calculation of power cost, as stated in ORNL-3944, is that the annual incomes must be just sufficient to recover the capital investment, pay the required returns on investment, and pay all of the cash expenses and taxes in connection with the operation of the facility. This applies whether the power cost is levelized or not. The construction of a payout tabulation, which shows the portion of the annual income allocated to expenses, return on equity, interest on bonds, and recovery of investment, was described in ORNL-3944. This tabulation also shows the gradual decline of the outstanding investment to zero. The calculation of the levelized power cost could be based on a method similar to the construction of a payout tabulation, using the criterion that the investment must be reduced to zero at the end of the project life. This would require a trial-and-error determination of the power cost. It was shown in ORNL-3944, however, that the payout method is mathematically equivalent to requiring that the total present worth of the cash incomes be equal to the total present worth of the cash expenditures (the present-worth criterion). This criterion makes it possible to express the levelized power cost explicitly in terms of the input data, and thus eliminates the need for a trial-and-error calculation.

Equations are developed in this section for the calculation of power cost under the new conditions assumed in this report, that is, assuming that input constants are supplied to permit the internal calculation of state and local taxes, interim replacements, and property insurance. As before, two modes of bond repayment are considered, the fixed payment case and the proportional case. The treatment is condensed somewhat to avoid duplication of the discussion in ORNL-3944.

3.1 Fixed Payment Case

In this case, the bonds are repaid in accordance with a predetermined fixed schedule. By using the temporary device of considering bond-interest payments, B_n, and bond-principal reductions, Q_n, as part of the annual cash

expenses, A_n, the present-worth criterion may be formulated in terms of recovery of equity capital only:

$$P_{m,e}W_p + 10^{-9}U_p \sum P_{n,e}Z_n = (1 - b)W_p + \sum P_{n,e}A_n \ . \qquad (3.1)$$

It should be noted that the treatment of B_n and Q_n as "expenses" is only a calculational device used for convenience, and does not imply that Q_n is treated as an expense in the tax calculations. The total annual cash expenses, A_n, may then be expressed as follows, using Eq. (3.6) of ORNL-3944:

$$A_n = k_t S_n + G_n - k_t(G_n - J_n + F_n + D_n + B_n) + B_n + Q_n \ . \qquad (3.2)$$

As in ORNL-3944, the quantity G_n denotes the annual cash expenses excluding federal income tax; thus in both reports, G_n includes state and local taxes, interim replacements, and property insurance. Now, however, since the latter items are to be calculated separately, G_n will be eliminated in favor of G'_n, using the equations developed in Sect. 2. Making use of Eqs. (2.2) through (2.9), the expression for $T_{t,n}$ (Eq. 2.13) is expanded to:

$$T_{t,n} = k_s M_{a,n} + k_r S_n + k_v f_n V_p + k_v f_c V_o + k_p W_p + k_a V_p + k_b(V_p + V_o + W_p) \ . \qquad (3.3)$$

$M_{a,n}$ is then replaced by means of Eq. (2.17), yielding

$$T_{t,n} = S_n(k_x - k_r k_s + k_r) + V_p(k_v f_n + k_a + k_b - k_v f_n k_s - k_a k_s - k_b k_s) + k_s(-G'_n + J_n - F_n - D_n - B_n) + V_o(k_v f_c + k_b - k_v f_c k_s - k_b k_s) + W_p(k_p + k_b - k_p k_s - k_b k_s) \ . \qquad (3.4)$$

To reduce the size of this expression, the following combinations of constants are defined:

$$k_w = k_s - k_r k_s + k_r \qquad (3.5)$$

$$k_i = k_a + k_b \qquad (3.6)$$

$$k_g = k_v f_n + k_i - k_s k_v f_n - k_i k_s \qquad (3.7)$$

$$k_c = k_v f_c + k_b - k_v f_c k_s - k_b k_s \qquad (3.8)$$

$$k_d = k_p + k_b - k_p k_s - k_b k_s \ . \qquad (3.9)$$

Equation (3.4) then becomes:

$$T_{t,n} = k_w S_n + k_g V_p + k_c V_o + k_d W_p + k_s(-G'_n + J_n - F_n - D_n - B_n) . \quad (3.10)$$

Combining Eqs. (2.14) and (3.2) gives:

$$A_n = k_t S_n + G'_n + T_{t,n} - k_t(G'_n + T_{t,n} - J_n + F_n + D_n + B_n) + B_n + Q_n . \quad (3.11)$$

Replacing $T_{t,n}$ by means of Eq. (3.10) yields:

$$\begin{aligned} A_n = {} & [k_t + (1 - k_t)k_w]S_n + (1 - k_t)k_g V_p \\ & + (1 - k_t)k_c V_o + (1 - k_t)k_d W_p + G'_n \\ & - [k_t + (1 - k_t)k_s](G'_n - J_n + F_n + D_n + B_n + Q_n) . \end{aligned} \quad (3.12)$$

For convenience, the following new constants are defined:

$$k_e = k_t + (1 - k_t)k_w \quad (3.13)$$

$$k_m = k_t + (1 - k_t)k_s . \quad (3.14)$$

Equation (3.12) then reduces to:

$$\begin{aligned} A_n = {} & k_e S_n + (1 - k_t)k_g V_p + (1 - k_t)k_c V_o \\ & + (1 - k_t)k_d W_p - k_m(G'_n - J_n + F_n + D_n + B_n) \\ & + B_n + Q_n + G'_n . \end{aligned} \quad (3.15)$$

Equation (3.7) from ORNL-3944 is used to express the annual income in terms of the levelized power cost and the units of electricity produced:

$$S_n = 10^{-9} U_p Z_n .$$

This expression replaces S_n in Eq. (3.15). The resulting expression for A_n is inserted into Eq. (3.1), and the equation is then solved for the power cost, U_p. The lengthy expression that results is shortened by defining the following new constants:

$$k_u = (1 - b) + (1 - k_t)\sum P_{n,e} k_g \tag{3.16}$$

$$k_x = (1 - b) + (1 - k_t)k_c\sum P_{n,e} \tag{3.17}$$

$$k_z = (1 - b - P_{m,e}) + (1 - k_t)k_d\sum P_{n,e} \tag{3.18}$$

The final result of these substitutions is:

$$U_p = \frac{k_u V_p + k_x V_o + k_z W_p}{10^{-9}(1 - k_e)\sum P_{n,e} Z_n} + \frac{\sum P_{n,e}[G'_n - k_m(G'_n - J_n + F_n + D_n + B_n) + B_n + Q_n]}{10^{-9}(1 - k_e)\sum P_{n,e} Z_n} . \tag{3.19}$$

This is the equation used in POWERCO-50 for the calculation of the levelized power cost in the fixed payment case.

3.2 Proportional Case

The proportional case is the case in which the outstanding investments in bonds and equity remain in the same ratio throughout the project life. It was shown in ORNL-3944 that a straightforward present-worth approach to the power cost calculation led to an equation that could only be solved by trial and error, because of the presence of the undetermined annual bond interest, B_n. It was then shown that the B_n term could be eliminated by using the modified weighted-average interest rate, i_v, which contains a correction for the income tax deduction due to bond interest. This made possible a direct solution for the power cost. The same approach is followed here; the expression for the modified interest rate, however, is slightly different because of the state income tax.

As shown in ORNL-3944, the total cash expenditures in year n are given by:

$$A_n = G_n + k_t S_n - k_t(G_n - J_n + F_n + D_n + B_n) . \tag{3.20}$$

G_n is now eliminated in favor of G'_n, using the same procedure as in the fixed payment case. This leads to:

$$A_n = k_e S_n + (1 - k_t)k_g V_p + (1 - k_t)k_c V_o + (1 - k_t)k_d W_p$$
$$- k_m(G'_n - J_n + F_n + D_n + B_n) + G'_n \ . \qquad (3.21)$$

The present-worth criterion is now applied, using the form which states that the present worth of the cash incomes is equal to the present worth of the cash expenditures. The interest rate required here is the simple weighted-average interest rate for bonds and equity, i_a, since actual cash expenditures are being used at this point. The present-worth equation thus becomes:

$$P_{m,a}W_p + \sum P_{n,a}S_n = V_b + W_p + \sum P_{n,a}A_n \ . \qquad (3.22)$$

A_n is now replaced by means of Eq. (3.21):

$$P_{m,a}W_p + \sum P_{n,a}S_n = V_b + W_p$$
$$+ \sum P_{n,a}[k_e S_n + (1 - k_t)k_g V_p + (1 - k_t)k_c V_o + (1 - k_t)k_d W_p]$$
$$+ \sum P_{n,a}[G'_n - k_m(G'_n - J_n + F_n + D_n + B_n)] \ . \qquad (3.23)$$

Replacing S_n by $10^{-9}U_p Z_n$, and V_b by $V_p + V_o$ yields:

$$P_{m,a}W_p + 10^{-9}U_p\sum P_{n,a}Z_n = V_p + V_o + W_p$$
$$+ 10^{-9}k_e U_p \sum P_{n,a}Z_n$$
$$+ \sum P_{n,a}[(1 - k_t)k_g V_p + (1 - k_t)k_c V_o + (1 - k_t)k_d W_p]$$
$$+ \sum P_{n,a}[G'_n - k_m(G'_n - J_n + F_n + D_n + B_n)] \ . \qquad (3.24)$$

Solving for the power cost, U_p, gives:

$$U_p = \frac{V_p + V_o + (1 - P_{m,a})W_p}{10^{-9}(1 - k_e)\sum P_{n,a}Z_n}$$
$$+ \frac{\sum P_{n,a}[(1 - k_t)k_g V_p + (1 - k_t)k_c V_o + (1 - k_t)k_d W_p]}{10^{-9}(1 - k_e)\sum P_{n,a}Z_n}$$
$$+ \frac{\sum P_{n,a}[G'_n - k_m(G'_n - J_n + F_n + D_n + B_n)]}{10^{-9}(1 - k_e)\sum P_{n,a}Z_n} \ . \qquad (3.25)$$

Equation (3.25) is the direct representation of the present-worth criterion in terms of actual cash expenditures and incomes. As in ORNL-3944, however, a direct solution for U_p cannot be made, because of the presence of the undetermined bond interest term, B_n. This term is present in the form of an income tax deduction, $-k_m B_n$. The difficulty, in other words, is that the actual income taxes cannot be calculated until the bond interest, B_n, has been determined, and the latter is not known until the payout schedule has been established. As before, the difficulty can be eliminated by using a modified average interest rate, i_{vs}, which is defined as follows:

$$i_{vs} = (1 - b)i_e + (1 - k_m)bi_b . \tag{3.26}$$

The modified interest rate, i_{vs}, is analogous to the rate i_v used in ORNL-3944; the only difference is that the federal income tax rate, k_t, has been replaced by the combined tax rate, k_m.

As in ORNL-3944, the pseudo cash expenditures are defined as the cash expenditures if the tax deductions due to bond interest were not claimed. It can then be shown that the present worths of the pseudo cash expenditures and the actual cash incomes are equal at the interest rate i_{vs}. This will be referred to as the modified present-worth criterion. The proof of this criterion will not be given in detail here, since it is essentially identical to that given on pages 46-52 of ORNL-3944. Again, the only difference is that the federal income tax constant, k_t, is replaced by the combined federal-state income tax constant, k_m. Because of the income tax difference, the pseudo cash expenditures for year n exceed the actual cash expenditures by the amount $k_m B_n$. The modified present-worth criterion can, therefore, be written by adding $k_m B_n$ to the right-hand side of Eq. (3.23), and changing the interest rate to i_{vs}:

$$\begin{aligned} P_{m,vs}W_p + \sum P_{n,vs}S_n &= V_b + W_p \\ &+ \sum P_{n,vs}[k_e S_n + (1 - k_t)k_g V_p + (1 - k_t)k_c V_o + (1 - k_t)k_d W_p] \\ &+ \sum P_{n,vs}[G'_n - k_m(G'_n - J_n + F_n + D_n)] . \end{aligned} \tag{3.27}$$

Again, S_n is replaced by $10^{-9}U_p Z_n$, and the following new constants are defined:

$$k_y = 1 + (1 - k_t)\sum P_{n,vs} k_g$$

$$k_f = 1 + (1 - k_t)k_c \sum P_{n,vs}$$

$$k_h = 1 - P_{m,vs} + (1 - k_t)k_d \sum P_{n,vs}$$

By making these substitutions, Eq. (3.27) becomes:

$$10^{-9}U_p(1 - k_e)\sum P_{n,vs} Z_n = k_y V_p + k_f V_o + k_h W_p + \sum P_{n,vs}[G'_n - k_m(G'_n - J_n + F_n + D_n)] \quad . \tag{3.28}$$

Equation (3.28) is solved for the levelized power cost, U_p:

$$U_p = \frac{k_y V_p + k_f V_o + k_h W_p}{10^{-9}(1 - k_e)\sum P_{n,vs} Z_n} + \frac{\sum P_{n,vs}[G'_n - k_m(G'_n - J_n + F_n + D_n)]}{10^{-9}(1 - k_e)\sum P_{n,vs} Z_n} \quad . \tag{3.29}$$

Equation (3.29) is the one used in POWERCO-50 to calculate the levelized power cost in the proportional case. After the power cost has been determined, the annual cash incomes can be calculated, and the entire payout tabulation can be constructed year by year. In doing this, of course, the actual taxes and expenditures are used, rather than the pseudo quantities, since the latter are of no interest once the power cost has been determined.

3.3 Power Cost Breakdown

The code separates the power cost into four components: (1) plant capital, (2) nonfuel working capital, (3) fuel cycle cost, and (4) reactor operating and maintenance cost. Each component includes its share of the income taxes, other taxes, and miscellaneous expenses that apply to its portion of the cost. Fuel cycle cost includes the investment in the initial core, as well as property insurance and property taxes on the core. Since the initial core is financed by bonds and equity, the effect of bond interest shows up in the fuel cycle income tax payments.

As stated earlier, the breakdown is made by applying the cost equation four times, once for each of the cost categories above. In the proportional case, for example, the four sets of conditions for the solution of Eq. (3.29) would be as follows:

1. V_p and D_n, nonzero; V_o, W_p, G'_n, J_n, and F_n, zero.
2. W_p, nonzero; V_p, V_o, G'_n, J_n, F_n, and D_n, zero.
3. V_o, G'_n, J_n, and F_n, nonzero; V_p, W_p, and D_n, zero.
4. G'_n, nonzero; V_p, V_o, W_p, J_n, F_n, and D_n, zero.

In the fuel cycle cost calculation (case 3), the only expenditures entered in G'_n are fuel cycle costs; thus there is no overlapping with case 4, in which the only costs in G'_n are operating and maintenance expenses. The sum of the components of the cost breakdown, therefore, will be equal to the total power cost calculated from Eq. (3.29). The same conclusion applies in the fixed payment case, where Eq. (3.19) would be used.

Table 1 summarizes the equations used for calculating the levelized power cost and its components in both the proportional bond repayment and fixed bond repayment cases.

3.3.1 Fuel Cycle Cost

Because of the widespread interest in methods of calculating the fuel cycle cost, this part of the calculation will be described in greater detail. To obtain the fuel cycle cost in the proportional case, Eq. (3.29) is solved with all items other than fuel cycle expenditures omitted. The plant investment, V_p, and nonfuel working capital, W_p, are zero. The depreciation allowance, D_n, is also zero, because it is based only on the depreciable investment, V_p. Since G'_n can now be replaced by the cash fuel expenditure, J_n, Eq. (3.29) reduces to:

$$U_F = \frac{k_f V_o + \sum P_{n,vs}(J_n - k_m F_n)}{10^{-9}(1 - k_e)\sum P_{n,vs} Z_n} \quad . \tag{3.30}$$

The fuel cycle cost given by this equation includes all the necessary interest, taxes, returns on investment, and other items ordinarily referred to as carrying charges on fuel working capital. Inventory or carrying charges do not enter into the cost equation explicitly, but are fully

Table 1. Equations for Power Cost and Power Cost Breakdown

Proportional Bond/Equity Repayment	Fixed Bond Repayment
A. Levelized power cost (Eq. 3.29)	A. Levelized power cost (Eq. 3.19)
$U_P = \frac{k_y V_p + k_f V_o + k_h W_p + \sum P_{n,vs}[G'_n - k_m(G'_n - J_n + F_n + D_n]}{10^{-9}(1 - k_e)\sum P_{n,vs} Z_n}$	$U_P = \frac{k_u V_p + k_x V_o + k_z W_p + \sum P_{n,e}[G'_n - k_m(G'_n - J_n + F_n + D_n + B_n) + B_n + Q_n]}{10^{-9}(1 - k_e)\sum P_{n,e} Z_n}$
B. Power cost breakdown	B. Power cost breakdown[a]
1. Plant capital component	1. Plant capital component
$U_C = \frac{k_y V_p - k_m \sum P_{n,vs} D_n}{10^{-9}(1 - k_e)\sum P_{n,vs} Z_n}$	$U_C = \frac{k_u V_p + \sum P_{n,e}[B'_n + Q'_n - k_m(D_n + B'_n)]}{10^{-9}(1 - k_e)\sum P_{n,e} Z_n}$
2. Nonfuel working capital component	2. Nonfuel working capital component
$U_W = \frac{k_h W_p}{10^{-9}(1 - k_e)\sum P_{n,vs} Z_n}$	$U_W = \frac{k_z W_p + \sum P_{n,e}(B''_n + Q''_n - k_m B''_n)}{10^{-9}(1 - k_e)\sum P_{n,e} Z_n}$
3. Fuel cycle cost (Eq. 3.30)	3. Fuel cycle cost
$U_F = \frac{k_f V_o + \sum P_{n,vs}(J_n - k_m F_n)}{10^{-9}(1 - k_e)\sum P_{n,vs} Z_n}$	$U_F = \frac{k_x V_o + \sum P_{n,e}(B'''_n + Q'''_n - k_m B'''_n)}{10^{-9}(1 - k_e)\sum P_{n,e} Z_n}$
4. Operating and maintenance cost	4. Operating and maintenance cost
$U_M = \frac{\sum P_{n,vs}(G'_n - J_n)}{10^{-9}(1 - k_r)\sum P_{n,vs} Z_n}$	$U_M = \frac{\sum P_{n,e}(G'_n - J_n)}{10^{-9}(1 - k_r)\sum P_{n,e} Z_n}$

[a] B'_n, B''_n, and B'''_n are the portions of B_n assignable to plant capital, nonfuel working capital, and initial core, respectively. For example, $B'_n = B_n \frac{V_p}{V_p + W_p + V_o}$, $B''_n = \frac{W_p}{V_p + W_p + V_o}$, etc. Q'_n, Q''_n, and Q'''_n are the corresponding portions of Q_n.

accounted for through the discounting of the cash flows and of the electrical energy produced. Inventory charges ahead of the core are accounted for through the timing of cash payments to the fuel fabricator and other suppliers. The value of material held in inventory in the core does not enter into the calculation until such time as this material is sold for cash, at which point it appears as a negative J_n.

The noncash quantity, F_n, appears in the equation because of its effect on the cash income tax payments. As discussed in Sect. 2.4, F_n represents that portion of the total fuel cycle expenditure considered to be legally deductible for income tax purposes in period n. The code currently calculates F_n by prorating the total fuel expense according to the kilowatt-hours produced in each period.

An example of a fuel cycle cost calculation, using Eq. (3.30), is shown in Table 2; the computer solution is shown in Table B-2 (Appendix B).

4. FIXED CHARGE RATE METHOD

Using the same method as in ORNL-3944, equations are derived here for fixed charge rates on depreciable and nondepreciable capital. Table 3 summarizes the equations and shows how the fixed charge rate method is used. These rates differ from those in ORNL-3944 in that they now include state and local taxes, interim replacements, and property insurance.

The definition of fixed charge rate adopted in ORNL-3944 was designed specifically for the calculation of the levelized power cost. For this purpose, a hypothetical constant annual income was calculated that would recover the capital investment and pay for the capital-related expenses. The fixed charge rate was then defined as that quantity which, when multiplied by the original capital investment, would give the required constant annual income. The same procedure is followed in Sects. 4.1 and 4.2. In Sect. 4.3, however, a new fixed charge rate definition is presented, based on the case of variable annual income. It can be seen from Table 3 that both definitions give the same power cost, regardless of whether the annual income is constant or variable. The advantage of the new definition is that it gives internally consistent breakdowns of the fixed charge rates for both constant and variable annual income cases. This is discussed more fully in Sects. 4.3 and 4.4.

Table 2. Example of Fuel Cycle Cost Calculation Using the Discounted Cash Flow Method

Year n	Discount Factor $P_{n,vs}$	Capacity Factor	Kilowatt Hours $Z_n \times 10^{-9}$	$P_{n,vs}Z_n \times 10^{-9}$	Cash Expenditures at End of Year	Cash Credits at End of Year	Net Cash Expenditures J_n	Prorata Expense F_n	$J_n - k_m F_n$	$P_{n,vs}(J_n - k_m F_n)$
1	0.94458	0.85	7.4460	7.0333	9.48	0.00	9.48	10.3103	4.1702	3.9391
2	0.89224	0.85	7.4460	6.6436	13.25	5.12	8.13	10.3103	2.8202	2.5163
3	0.84279	0.85	7.4460	6.2754	9.27	0.00	9.27	10.3103	3.9602	3.3376
4	0.79609	0.83	7.2708	5.7882	12.63	0.00	12.63	10.0677	7.4451	5.9270
5	0.75197	0.81	7.0956	5.3357	9.12	4.93	4.19	9.8251	-0.8699	-0.6541
6	0.71030	0.79	6.9204	4.9156	8.47	1.01	7.46	9.5825	2.5250	1.7935
7	0.67094	0.77	6.7452	4.5256	11.34	0.00	11.34	9.3399	6.5300	4.3812
8	0.63376	0.75	6.5700	4.1638	9.88	5.17	4.71	9.0973	0.0249	0.0158
9	0.59863	0.73	6.3948	3.8281	10.16	2.61	7.55	8.8547	2.9898	1.7898
10	0.56546	0.71	6.2196	3.5169	7.32	0.00	7.32	8.6121	2.8848	1.6312
			69.5544	52.0262	100.92	18.84	82.08			24.6774

Vo = Initial core expenditure at start of year 1 — 14.23 — $k_f V_o$ = 15.4211

Total fuel cycle expenditures — 96.31 — 40.0985

Prorata expense per kwhr = 96.31/69.5544 = 1.385 mills/kwhr

Fuel cycle cost $U_F = \dfrac{k_f V_o + \sum P_{n,vs}(J_n - k_m F_n)}{10^{-9}(1 - k_e)\sum P_{n,vs} Z_n} = \dfrac{40.0985}{(0.4656)(52.0262)} = 1.655$ mills/kwhr

Input data: $i_b = 0.0423$, $i_e = 0.1000$, $b = 0.52$, $k_t = 0.50$, $k_s = 0.03$, $k_r = 0.04$
$k_v = 0.032$, $k_b = 0.0025$, $f_c = 0.65$, $V_o = 14.23$, project life = 10 years.

Calculated data: $i_a = 0.0700$, $i_{vs} = 0.05867$, $k_e = 0.5344$, $k_f = 1.0837$, $k_m = 0.515$.

Table 3. Equations for the Fixed Charge Rate Method in the Proportional Bond/Equity Repayment Case[a]

A. Using variable-income fixed charge rates

1. Fixed charge rates

$$L'_D = \frac{\sum P_{n,a} Z_n}{\sum P_{n,vs} Z_n} \cdot \frac{k_y - k_m \sum P_{n,vs} \frac{D_n}{V_p}}{(1 - k_e) K(m, i_a)}$$

$$L'_N = \frac{\sum P_{n,a} Z_n}{\sum P_{n,vs} Z_n} \cdot \frac{k_h}{(1 - k_e) K(m, i_a)}$$

2. Levelized annual income[b]

$$S_a = L'_D V_p + L'_N W_p + \frac{\sum P_{n,a} Z_n}{\sum P_{n,vs} Z_n} \cdot \frac{k_f V_o + \sum P_{n,vs} (J_n - k_m F_n)}{(1 - k_e) K(m, i_a)} + \frac{\sum P_{n,a} Z_n}{\sum P_{n,vs} Z_n} \cdot \frac{\sum P_{n,vs} (G'_n - J_n)}{(1 - k_r) K(m, i_a)}$$

3. Levelized power cost[d]

$$U_p = \frac{S_a K(m, i_a)}{10^{-9} \sum P_{n,a} Z_n}$$

4. Sales income for year n

$$S_n = 10^{-9} U_p Z_n$$

B. Using constant-income fixed charge rates

1. Fixed charge rates

$$L_D = \frac{k_y - k_m \sum P_{n,vs} \frac{D_n}{V_p}}{(1 - k_e) K(m, i_{vs})}$$

$$L_N = \frac{k_h}{(1 - k_e) K(m, i_{vs})}$$

2. Constant annual income[c]

$$S_c = L_D V_p + L_N W_p + \frac{k_f V_o + \sum P_{n,vs} (J_n - k_m F_n)}{(1 - k_e) K(m, i_{vs})} + \frac{\sum P_{n,vs} (G'_n - J_n)}{(1 - k_r) K(m, i_{vs})}$$

3. Levelized power cost[d]

$$U_p = \frac{S_c K(m, i_{vs})}{10^{-9} \sum P_{n,vs} Z_n}$$

4. Sales income for year n

$$S_n = 10^{-9} U_p Z_n$$

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[a] Calculation of the levelized power cost U_p is made by applying steps 1, 2, and 3 in that order. Either the variable-income or the constant-income fixed charge rates can be used.

[b] Definition of levelized annual income: $S_a = \frac{\sum P_{n,a} S_n}{\sum P_{n,a}}$.

[c] S_c is a hypothetical annual income which, if received each year, would pay out the project. The relationship between S_c and S_a is: $\frac{S_a}{S_c} = \frac{\sum P_{n,a} Z_n}{\sum P_{n,vs} Z_n} \cdot \frac{K(m, i_{vs})}{K(m, i_a)} = R'$.

[d] The two methods shown give the same value for U_p. The breakdown of the power cost is also the same by both methods.

4.1 Proportional Case with Constant Annual Income

S_c is defined as the constant annual sales income that is equivalent to the nonuniform series of annual incomes, S_n. Therefore, the present worth of the S_c series is the same as that of the S_n series, at the interest rate i_{vs}:

$$\sum P_{n,vs} S_c = \sum P_{n,vs} S_n \quad . \tag{4.1}$$

Using the definition of $K(m,i_{vs})$ and substituting $10^{-9} U_p Z_n$ for S_n,

$$S_c K(m,i_{vs}) = 10^{-9} U_p \sum P_{n,vs} Z_n \quad . \tag{4.2}$$

Combining Eqs. (4.2) and (3.27),

$$S_c = \frac{k_y V_p + k_f V_o + k_h W_p}{(1 - k_e)K(m,i_{vs})} + \frac{\sum P_{n,vs}[G'_n - k_m(G'_n - J_n + F_n + D_n)]}{(1 - k_e)K(m,i_{vs})} \quad . \tag{4.3}$$

Now, as in ORNL-3944, this expression for S_c is separated into four terms, which show, respectively, the contributions of plant capital, nonfuel working capital, fuel cycle working capital, and present-worthed average annual expenses. The last term includes the allocated fuel expense, H_n, which may be allocated in accordance with any desired procedure. Making this separation, the expression for S_c becomes:

$$\begin{aligned} S_c = {} & \frac{k_y V_p - k_m V_p \sum P_{n,vs} \frac{D_n}{V_p}}{(1 - k_e)K(m,i_{vs})} \\ & + \frac{k_h W_p}{(1 - k_e)K(m,i_{vs})} \\ & + \frac{k_f V_o + \sum P_{n,vs}[(k_e - k_m)G'_n + (1 - k_e)(J_n - H_n) + k_m(J_n - F_n)]}{(1 - k_e)K(m,i_{vs})} \\ & + \frac{\sum P_{n,vs}(G'_n - J_n + H_n)}{K(m,i_{vs})} \quad . \end{aligned} \tag{4.4}$$

The fixed charge rates on depreciable and nondepreciable capital are, therefore, given by:

$$L_D = \frac{k_y - k_m \sum P_{n,vs} \frac{D_n}{V_p}}{(1 - k_e)K(m,i_{vs})} \tag{4.5}$$

$$L_N = \frac{k_h}{(1 - k_e)K(m,i_{vs})} . \tag{4.6}$$

It can be shown without much difficulty that Eq. (4.6) reduces to:

$$L_N = \frac{k_p + k_b}{1 - k_r} + \frac{i_{vs}}{1 - k_e} .$$

In other words, the plot of L_N versus i_{vs}, for a given set of tax constants, is a straight line. Plots of this type are shown in Appendix C.

If the average fuel working capital is defined and used as in ORNL-3944, then the magnitude of the average fuel working capital may be determined by dividing the third term on the right-hand side of Eq. (4.4) by L_N.

4.2 Fixed Payment Case with Constant Annual Income

The constant annual income, S_c, in this case is given by:

$$S_c K(m,i_e) = 10^{-9} U_p \sum P_{n,e} Z_n . \tag{4.7}$$

Combining Eq. (4.7) with Eq. (3.19) gives:

$$S_c = \frac{k_u V_p + k_x V_o + k_z W_p}{(1 - k_e)K(m,i_e)} + \frac{\sum P_{n,e}[G'_n - J_n + F_n + D_n + B_n) + B_n + Q_n]}{(1 - k_e)K(m,i_e)} . \tag{4.8}$$

For convenience, the quantity Φ is now defined:

$$\Phi = 1 + \sum P_{n,e} \frac{(1 - k_m)B_n + Q_n}{k_u V_p + k_x V_o + k_z W_p} .$$

The right-hand side of Eq. (4.8) can then be separated into the four desired terms, as follows:

$$S_c = \frac{k_u V_p \Phi - k_m V_p \sum P_{n,e} \frac{D_n}{V_p}}{(1 - k_e)K(m,i_e)}$$

$$+ \frac{k_z W_p \Phi}{(1 - k_e)K(m,i_e)}$$

$$+ \frac{k_x V_o \Phi + \sum P_{n,e}[(k_e - k_m)G'_n + (1 - k_e)(J_n - H_n) + k_m(J_n - F_n)]}{(1 - k_e)K(m,i_e)}$$

$$+ \frac{\sum P_{n,e}(G'_n - J_n + H_n)}{K(m,i_e)} . \qquad (4.9)$$

The fixed charge rates on depreciable and nondepreciable capital are, therefore, given by:

$$L_D = \frac{k_u \Phi - \frac{k_m}{V_p} \sum P_{n,e} D_n}{(1 - k_e)K(m,i_e)} \qquad (4.10)$$

$$L_N = \frac{k_z \Phi}{(1 - k_e)K(m,i_e)} . \qquad (4.11)$$

As before, the average fuel working capital can be determined by dividing the third term on the right-hand side of Eq. (4.9) by L_N.

4.3 Fixed Charge Rate for the Case of Variable Annual Income

In ORNL-3944, and thus far in this report, the fixed charge rate has been defined in terms of a constant annual income. In cases where the actual annual income is variable (corresponding to variable electrical production), an equivalent constant annual income that gave the same levelized power cost was determined. The fixed charge rate thus defined gave the correct power cost, regardless of whether the actual annual income was constant or variable.

When attempts were made to separate this fixed charge rate into its component parts, satisfactory breakdowns were obtained for the case of constant annual income. For the case of variable annual income, however, an internally consistent breakdown could not be obtained. Since the latter case is of the greater practical interest, it was decided to adopt a new fixed charge rate definition that would give internally consistent breakdowns for this case.

The problem of defining a fixed charge rate for the case of variable annual income will now be considered. The discussion will be restricted to the proportional case (constant bond/equity ratio).

The first step will be to define a new levelized annual income, S_a, in which the levelizing is done by means of the interest rate, i_a. That is,

$$S_a = \frac{\sum P_{n,a} S_n}{\sum P_{n,a}} \tag{4.12}$$

Since $S_n = 10^{-9} U_p Z_n$, we have:

$$S_a = \frac{\sum P_{n,a} S_n}{\sum P_{n,a}} = 10^{-9} U_p \frac{\sum P_{n,a} Z_n}{\sum P_{n,a}} . \tag{4.13}$$

Now Eq. (3.29) is used to replace U_p in the above equation, yielding

$$S_a = \left(\frac{1}{\sum P_{n,a}}\right)\left(\frac{\sum P_{n,a} Z_n}{\sum P_{n,vs} Z_n}\right)\left(\frac{1}{1 - k_e}\right)\Big(k_y V_p + k_f V_o + k_h W_p + \sum P_{n,vs}[G'_n - k_m(G'_n - J_n + F_n + D_n)]\Big) . \tag{4.14}$$

Equation (4.1) gives the value of S_c:

$$S_c = \frac{\sum P_{n,vs} S_n}{\sum P_{n,vs}} . \tag{4.1}$$

Combining this with Eq. (4.12) yields:

$$S_a = S_c \frac{\sum P_{n,a} S_n}{\sum P_{n,a}} \cdot \frac{\sum P_{n,vs}}{\sum P_{n,vs} S_n} . \tag{4.15}$$

Now, since $S_n = 10^{-9} U_p Z_n$,

$$S_a = S_c \frac{\sum P_{n,a} Z_n}{\sum P_{n,a}} \cdot \frac{\sum P_{n,vs}}{\sum P_{n,vs} Z_n} . \tag{4.16}$$

For convenience, the ratio R′ is defined:

$$R' = \frac{\sum P_{n,a} Z_n}{\sum P_{n,a}} \cdot \frac{\sum P_{n,vs}}{\sum P_{n,vs} Z_n} . \tag{4.17}$$

That is, R′ is the ratio of the levelized capacity factor at the interest rate i_a to the levelized capacity factor at the interest rate i_{vs}. Then

$$S_a = R' S_c . \tag{4.18}$$

Now Eq. (4.4) is used to replace S_c, yielding

$$\begin{aligned} S_a = {} & R' \frac{k_y V_p - k_m V_p \sum P_{n,vs} \frac{D_n}{V_p}}{(1 - k_e) K(m, i_{vs})} \\ & + R' \frac{k_h W_p}{(1 - k_e) K(m, i_{vs})} \\ & + R' \frac{k_f V_o + \sum P_{n,vs} [(k_e - k_m) G'_n + (1 - k_e)(J_n - H_n) + k_m (J_n - F_n)]}{(1 - k_e) K(m, i_{vs})} \\ & + R' \frac{\sum P_{n,vs} (G'_n - J_n + H_n)}{K(m, i_{vs})} . \end{aligned} \tag{4.19}$$

New fixed charge rates, L'_D and L'_N, are now defined, making use of the first and second terms on the right-hand side of the preceding equation:

$$L'_D = R' \frac{k_y - k_m \sum P_{n,vs} \frac{D_n}{V_p}}{(1 - k_e) K(m, i_{vs})} \tag{4.20}$$

$$L'_N = R' \frac{k_h}{(1 - k_e) K(m, i_{vs})} . \tag{4.21}$$

It is evident from these equations that the new fixed charge rates are related to the old ones by the ratio R′; that is,

$$L'_D = R'L_D \tag{4.22}$$

and $$L'_N = R'L_N \tag{4.23}$$

For the constant capacity factor (constant annual income) case, the ratio R′ is unity; thus the new fixed charge rates and the old ones are identical. For the case of variable capacity factor, the new fixed charge rates are slightly different. Examples of this are given in Appendix C.

Table 3 summarizes the relationships between the constant-income and the variable-income fixed charge rates and shows how they are used in the power cost calculation. To clarify the differences between these rates, the following definitions are given:

1. The constant income fixed charge rate, when multiplied by the original investment, indicates the annual income that, if received each year of the project life, will just pay out the investment and the investment-related expenses.
2. The variable income fixed charge rate, multiplied by the original investment, gives the present-worthed average of the annual incomes that must be received in order to pay out the investment and the investment-related expenses. Present-worthing is done at the interest rate i_a (weighted average of bonds and equity).

4.3.1 Fixed Bond Repayment Case, Variable Capacity Factor

The fixed payment case, which is less amenable to calculation than the proportional case, will be treated very briefly. The average interest rate, i_f, will be defined as that rate that makes the present worth of the cash incomes equal to the present worth of the cash expenditures. The average interest rate is not as easy to calculate in the fixed payment case as it is in the proportional case. Assuming it has been determined, however, then the fixed charge rate in the fixed-payment variable capacity factor case could be defined in a manner analogous to that in the proportional

case. The fixed charge rate, multiplied by the original capital investment, would give the present-worthed average annual payment for capital recovery and capital-related items. However, the determination of i_f generally requires a trial-and-error calculation; for this reason, and because of its small practical usefulness, this case will not be studied further.

4.3.2 The 100% Equity Case

L'_D and L_D are related by the ratio of the levelized annual power productions at the interest rates i_a and i_{vs}. From the definitions of these interest rates,

$$i_a = (1 - b)i_e + bi_b$$

$$i_{vs} = (1 - b)i_e + (1 - k_m)bi_b,$$

it can be seen that they will be equal for 100% equity financing. The same is true of L'_N and L_N. The fixed charge rates are thus independent of annual capacity variation in this case. Also (but of less practical significance), L'_D reduces to L_D, and L'_N reduces to L_N, if the tax constant k_m is zero, since i_{vs} is then equal to i_a.

4.4 Fixed Charge Rate Breakdowns

There continues to be widespread interest in methods of synthesizing fixed charge rates by summing the estimated contributions of the individual components. Because of this, a subroutine that calculates and displays breakdowns of the fixed charge rates into their component parts has been added to POWERCO-50. The fixed charge rates referred to here are those calculated by the equations given earlier in this section. However, because the determination of the average interest rate is somewhat complicated in the fixed payment case, the code calculates the fixed charge rate breakdown only in the proportional case. Both the constant-income and the variable-income fixed charge rates are shown.

The breakdown of the fixed charge rate on depreciable capital consists of the following items:

1. interest or return on investment (cost of money)
2. recovery of investment (sinking fund depreciation)
3. federal income tax
4. state income tax
5. state revenue tax
6. local property tax
7. interim replacements
8. property insurance.

The breakdown of the fixed charge rate on nondepreciable capital is similar, except that recovery of investment and interim replacements are omitted.

Typical fixed charge rate breakdowns calculated by the code are given in Appendix C.

In presenting a method for determining a quantitative breakdown of a fixed charge rate, it is first necessary to define what such a breakdown is supposed to mean. Obviously, the sum of the components must be equal to the calculated fixed charge rate; but beyond that, what are the quantitative requirements that the individual components are supposed to be able to satisfy? For the proportional case, the definition adopted in this report was as follows: Assume that a capital investment is made, and that there are no expenses except those for taxes and other capital-related items. Then each component of the breakdown shall be equal to the ratio of the present-worthed average expenditure for that item to the original capital investment, when the present-worth calculations are made at the interest rate i_a. It can then be shown that the sum of the components will be equal to L'_D for depreciable investments, or to L'_N for nondepreciable investments. This proof is given in Appendix D.

To obtain a breakdown of the fixed charge rate on depreciable capital, the code makes a run in which the only input cost is a plant investment of one dollar. The fuel cycle costs, the cost of the initial core, operating and maintenance expenses, and nonfuel working capital are entered as zeros. The run is first made at constant load factor. Equation (4.4) shows that under these conditions the last three terms on the right-hand side

disappear, so that the required annual income is simply the plant capital multiplied by the fixed charge rate, L_D. The present-worthed average expenditures for federal income tax, state and local taxes, etc., are then calculated, and entered as components of the fixed charge rate, L_D. The first item in the breakdown, cost of money, is simply i_a. The second item, the sinking fund depreciation, is given by:

$$\frac{i_a}{(1 + i_a)^m - 1} .$$

It should be pointed out that the use of the sinking fund depreciation factor does not imply that a sinking fund is actually established. The first two items in the breakdown are merely intended to represent the constant annual revenue needed for recovery of investment and interest on investment. As shown in ORNL-3944, the amount needed for this purpose, for an investment of one dollar, is $1/K(m,i_a)$, the "capital recovery factor." Since i_a and the sinking fund depreciation factor add up to $1/K(m,i_a)$, their sum is conventionally shown as the amount needed. It would be equally correct to replace the first two items with a single item labeled "recovery of capital with interest," and show the amount of this item as $1/K(m,i_a)$. For nondepreciable investment, since its recovery is provided for (by definition) at the end of the project, the annual interest is the only item needed.

To obtain the next four components (the tax components), the code calculates the present-worthed average annual expenditure for each of the four taxes. These are then divided by the original plant investment, giving the corresponding tax components of the fixed charge rate.

Interim replacements and property insurance were assumed to be constant annual expenses and were supplied as a fraction of the original plant investment. The corresponding components of the fixed charge rate, therefore, are equal to the input values for these items. For the fixed charge rate on nondepreciable capital, interim replacements are not applicable and are omitted.

4.5 Federal Income Tax Component of Fixed Charge Rate

The federal income tax component illustrates the difficulties that can be encountered if the methods used in calculating the fixed charge rate breakdown are not carefully defined. If the federal income tax paid by a utility company in a given year is divided by its outstanding plant investment, it might be supposed that this would give the corresponding tax component of the fixed charge rate. Unfortunately, it does not, for two reasons. First, the real tax-reducing effect of accelerated depreciation on new projects is obscured by the inclusion of older projects. Second, there are other capital items, such as fuel working capital, that are generating income, and are, therefore, contributing to the total income tax. Both of these factors tend to make historical taxes higher than those that would apply to a single new plant investment using accelerated depreciation. For this reason, the federal income tax component of the fixed charge rate, as calculated by POWERCO, is frequently lower than that anticipated on the basis of historical data. This factor can be significant when alternatives, one of which requires an appreciably larger investment than the other, are compared.

5. RESULTS AND EXAMPLES

5.1 Complete Power Cost Calculation with Breakdowns

Problem 13 illustrates the use of POWERCO-50 in making a complete power cost calculation, with breakdown of power cost and fixed charge rates. Computer input and output for this problem are given in Appendix B. (Note: Costs used in this problem are for illustration purposes only and are not meant to approximate those of an actual reactor.) Major inputs used in this example were as follows:

Bond repayment method	proportional
Reactor output, Mw (electrical) (net)	1000
Plant capital investment, $\$10^6$	140
Nonfuel working capital, $\$10^6$	2

Initial core cost, $\$10^6$	25
Project life, years	30
Fraction of investment in bonds	0.52
Interest rate on bonds	0.0423
Earning rate on equity	0.10
Federal income tax rate	0.50
State income tax rate	0.03
State revenue tax rate	0.04
Local property tax rate	0.032
Interim replacement factor	0.0035
Property insurance factor	0.0025
Fraction of core used for tax purposes	0.65
Tax rate on nonfuel working capital	0.030
Fixed annual operating cost, $\$10^6$	2.5
Variable annual operating cost, $\$10^6$	1.0

Table B-1 shows the input schedule of annual cash expenditures for fuel purposes for each year of the project life. The cost of the initial core, which is not shown, is considered to be part of the fuel expenditures during the calculations.

The plant load factor was 0.85 for the first ten years, and declined at 0.02 per year thereafter, reaching 0.45 at the end of the 30-year life. The annual operating and maintenance expenditures (shown as "reactor operating cost" in the output) are calculated by the code as follows:

$$TEH(N) = D(14) + D(10) \times PFW(N) + EEE(N) ,$$

in which, for a given year N,

TEH(N) = reactor operating cost,
D(14) = fixed cost ($\$2.5 \times 10^6$ in this problem),
D(10) = variable cost ($\$1.0 \times 10^6$ in this problem),
PFW(N) = load factor,
EEE(N) = other operating costs, if any.

In the present problem, all the EEE(N) are zero. Since the load factor for the first year is 0.85, the reactor operating cost for that year is $\$2.5 \times 10^6 + 0.85(1.0 \times 10^6) = \$3.35 \times 10^6$.

The tax depreciation option chosen was the sum-of-the-years'-digits method, using a depreciable life of 30 years. Annual fuel expense for tax purposes was obtained by prorating the entire fuel expense of the project according to the kilowatt-hours produced each year, as described in ORNL-3944.

5.1.1 Results – Problem 13

Power Cost. – The levelized power cost was 5.04 mills/kwhr. The breakdown by components was as follows:

	mills/kwhr (electrical)
Fuel cycle cost	1.67
Plant capital component	2.81
Nonfuel working capital component	0.05
Operating and maintenance costs	0.51
Total	5.04

Average Interest Rates. – The weighted-average interest rate i_a (average cost of money) was 7.00%:

$$0.52(0.0423) + 0.48(0.10) = 0.0700 .$$

The modified average interest rate, i_{vs}, was 5.87%:

$$k_m = k_t + (1 - k_t)k_s = 0.50 + 0.50(0.03) = 0.515$$

$$i_{vs} = (1 - b)i_e + (1 - k_m)bi_b$$

$$= (0.48)(0.10) + (0.485)(0.52)(0.0423) = 0.0587 .$$

Total Present Worth of Incomes and Expenditures. – The code calculates the total present worth of the cash flows (annual cash income minus annual cash expenses) at the interest rate i_a. The result, as shown on the fifth page of Table B-1, was $167 million. In this calculation, the code does not count the original investments as part of the cash expenses. These investments also total $167 million (cost of plant, $140 million; nonfuel working capital, $2 million; initial core, $25 million). The result thus shows that, in this case,

$$\begin{pmatrix}\text{present worth}\\ \text{of cash incomes}\end{pmatrix} - \begin{pmatrix}\text{present worth}\\ \text{of cash expenses}\end{pmatrix} = \begin{pmatrix}\text{original}\\ \text{cash investment}\end{pmatrix}.$$

This equation may be rewritten as:

$$\begin{pmatrix}\text{present worth}\\ \text{of cash incomes}\end{pmatrix} = \begin{pmatrix}\text{present worth of all cash}\\ \text{expenditures, including investments}\end{pmatrix}.$$

This, of course, is the familiar present-worth criterion, and it is seen that this criterion is satisfied at the interest rate of 7% (i_a). The cash expenses include the actual taxes paid, rather than the pseudo taxes. If the pseudo taxes had been used, the present-worth criterion would have been satisfied at the interest rate i_{vs}.

Fixed Charge Rate Calculations. — As shown on page 6 of the output, the calculated fixed charge rates were as follows:

Constant-income fixed charge rates

$L_D = 13.53\%$

$L_N = 15.99\%$

Variable-income fixed charge rates

$L'_D = 13.68\%$

$L'_N = 16.17\%$

In this problem, the annual incomes and annual load factors are variable. Accordingly, the code calculates an equivalent constant annual income case that gives the same power cost. The equivalent constant annual income required was \$33.943 million. The three tables following the fixed charge rate calculations show the expenses, taxes, and payout of investment for this constant income.

Calculation of Levelized Power Cost by the Fixed Charge Rate Method. — It will be shown that the calculated power cost is the same, regardless of whether the constant-income or the variable-income fixed charge rates are used:

Constant income

kwhr per year at 100% load = $1000 \times 10^3 \times 365 \times 24 = 8.760 \times 10^9$

$$\text{Levelized kwhr per year} = \frac{\sum P_{n,vs} Z_n}{\sum P_{n,vs}} = 6.7349 \times 10^9$$

$$\text{Constant annual income required} = \$33.943 \times 10^6$$

$$\text{Levelized power cost [Eq. (4.7)]} = \frac{33.943 \times 10^6 \times 10^3}{6.7349 \times 10^9} = 5.0399 \text{ mills/kwhr}.$$

Variable income

$$\text{Levelized kwhr per year} = \frac{\sum P_{n,a} Z_n}{\sum P_{n,a}} = 6.8136 \times 10^9$$

$$\text{Levelized annual income required} = S_a = \frac{\sum P_{n,a} S_n}{\sum P_{n,a}} = \$34.340 \times 10^6$$

$$\text{Levelized power cost [Eq. (4.13)]} = \frac{34.340 \times 10^6 \times 10^3}{6.8136 \times 10^9} = 5.0399 \text{ mills/kwhr}.$$

Fixed Charge Rate Breakdowns. – The next 12 tables of the output show the expenses, taxes, and payout of investment for the 4 subcases used in determining the fixed charge rate breakdowns. These subcases are as follows:

A. Using load factors specified in the problem:
   1. plant capital, 1.0; working capital, 0 (gives L'_D).
   2. working capital, 1.0; plant capital, 0 (gives L'_N).

B. Using constant load factor of 1.00:
   3. plant capital, 1.0; working capital, 0 (gives L_D).
   4. working capital, 1.0; plant capital, 0 (gives L_N).

The fixed charge rate breakdown table (twenty-second page of Table B-2) shows the present-worthed average amounts resulting from these four cases. It can be seen that the total in each case is equal to the corresponding calculated fixed charge rate.

6. APPLICATIONS AND FUTURE DEVELOPMENT

Some potential applications of POWERCO in reactor evaluation studies were mentioned in ORNL-3944, and several of these have already been made. J. H. Nail[6] has integrated POWERCO with a reactor fuel cycle code, PACTOLUS, to obtain the levelized power cost. The PACTOLUS-POWERCO combination was used in the AEC Systems Analysis program to calculate cost coefficients for use in a linear programming study of reactor growth patterns.

E. O. Smith[7] has used POWERCO in a fuel management code, NUFCO, to calculate the fuel cycle cost of a reactor.

In connection with the work of the Fuel Recycle Task Force,[8] it became necessary to determine fixed charge rates applicable to the fuel preparation, fabrication, and chemical reprocessing industries. After establishing appropriate values for bond-equity ratio, rates of return, tax constants, project life, etc., these values were inserted into POWERCO and the desired fixed charge rates on depreciable and nondepreciable capital were obtained. These were then used in the ORNL computer code FUELCO to calculate the projected unit costs of fuel cycle operations as a function of time.

With respect to detailed tax calculations, the present code could be further improved by including provisions for deferred income taxes, investment credits, fuel leasing plans, and additional options in the calculations of deductible fuel expense.

APPENDIX A

A-1. FORTRAN Listing of Program POWERCO-50

POWERCO-50 was written in FORTRAN-63 for the CDC 1604-A computer. The complete FORTRAN listing of the code is given in Table A-1.

A-2. Preparation of Input Data

The preparation of input data for POWERCO-50 is very similar to that described in ORNL-3944 for POWERCO-25. For clarity, a complete description is given here. The data required for running a problem are generally as follows (some shortcuts are possible in certain options):

Project Parameters

D(1) = Plant investment, 10^6 \$
D(2) = Project life, periods
D(3) = Nonfuel working capital, 10^6 \$
D(4) = Fraction of investment in bonds
D(5) = Interest rate on bonds, fractional, per period
D(6) = Earning rate on equity, fractional, per period
D(7) = Federal income tax rate, fractional (k_t)
D(8) = Design capacity, Mw (electrical)
D(9) = Depreciable life, years
D(10) = Variable operating cost, 10^6 \$/period
D(11) = Cost of initial core, 10^6 \$
D(12) = Number of periods per year
D(13) = Not used
D(14) = Fixed operating cost, 10^6 \$/period
D(15) = State income tax rate, fractional (k_s)
D(16) = State gross revenues tax rate, fractional (k_r)
D(17) = Local property tax rate, fractional (k_v), per period
D(18) = Interim replacements factor, fraction (k_a) of original plant investment per period
D(19) = Property insurance cost, fraction (k_b) of original investment per period

D(20) = Not used

D(21) = Not used

D(22) = Fraction of initial core assessed for property tax purposes (f_c)

D(23) = Local property tax rate on nonfuel working capital (k_p), per period

D(24) = Initial load factor (plant operating factor)

D(25) = Straight-line decline in load factor per period

D(26) = Number of years of operation at initial load factor

D(27)-D(35) = Not used

Period Data (Required for each period of the project life)

PFW(N) = Load factor, fractional

CURA(N) = Cash expenditures for uranium (or other fuel substance), 10^6 $

CFAB(N) = Cash expenditures for fuel fabrication, 10^6 $

CREP(N) = Cash expenditures for chemical reprocessing and shipping, 10^6 $

CPLU(N) = Cash received for recovered uranium and plutonium, 10^6 $

EEE(N) = Nonfuel cash operating base expenditures, not including income tax, 10^6 $

BRP(N) = Bond principal repayment, if precalculated, 10^6 $

The nonfuel operating costs per period are calculated within the code by the following equation:

$$TEH(N) = D(10)*PFW(N) + EEE(N) + D(14) .$$

The first term on the right-hand side, that is, the product of D(10) and PFW(N), gives the portion of the cost that is proportional to the load factor. The second term, EEE(N), can be different for each year, and thus provides for any costs that may vary irregularly. The final term, D(14), is constant for each period of the project.

Input Formats

The first card controls options and contains the problem identification. The format is 10I2, 8A6. The first 20 columns contain the following control variables:

LL1 Bond repayment option

01 = proportional case

02 = uniform principal reduction

03 = uniform annual payment

04 = per input schedule

05 = delayed uniform principal reduction

LL2 Depreciation option

01 = straight line

02 = sum-of-years'-digits

LL3 Data bypass option

00 = read full set of data

01 = read changed data only

02 = no new data - only control card is changed

LL4 Data change option

The number entered here indicates the number of nonannual data change cards to be read (changes in the D's).

LL5 Data change option - annual data

The number entered here indicates the number of annual data change cards to be read.

LL6 Delayed bond repayment option

The number entered here indicates the year in which bond repayment is to start. This is used only if LL1 = 05.

LL7 Fixed charge rate breakdown option

00 = omit breakdown

01 = include breakdown, but omit detailed printout of expense and payout tabulations used in obtaining breakdowns

02 = include both breakdowns and detailed printouts

LL8 Annual data bypass option

00 = read annual data card for each year of project, or supply the information by means of data change cards

01 = omit all annual data cards. Annual data is automatically zeroed. Load factors are handled by LL10, D(24), D(25), and D(26). LL10 must be 01. (Note: If LL3 is not 00, LL8 will be bypassed and its value will be of no concern. LL10, however, will still be operative.)

LL9 Power cost breakdown option

00 = omit power cost breakdown

01 = include power cost breakdown

LL10 Load factor option

00 = load factors supplied via annual data cards or data change cards

01 = load factors are calculated from D(24), D(25), and D(26), regardless of whether annual data cards are included or not. The load factor starts at D(24) and is constant for D(26) years, after which it declines at D(25) per year.

Columns 21-68 of the control card can be used for problem identification; this identification is reproduced at the top of each output table.

The next five cards contain D(N), N = 1,35. Format is 7E10.0. D(27) to D(35), which are not currently used, are left blank. These are reserved for future expansion.

The next group of cards supplies the annual cash expenses and credits. There is one card for each year (or period) of the project life; the periods must be in order. The seven items on each card contain the annual data for that year, in the order shown previously. Format is 7E10.0.

Data change cards, if used, have the format I4, E20.0. The first four columns give the subscript of the data being changed. The next 20 columns give the new value.

Annual data change cards have the format 2I4, E12.0. On each, the first four columns give the year, the next four give the identification, and the next 12 give the new value. The identification symbols are as follows:

0001 plant load factor

0002 uranium purchases

0003 fabrication cost

0004 reprocessing and shipping

0005 recovered U and Pu credit (+)

0006 EEE

0007 bond principal repayment

A-3. Computer Output

The computer output of each problem comes in the following order:

1. Input data (first six cards)
2. Input data (annual data)
3. Calculated cash expenses
4. Tax calculations and total expenditures
5. Payout tabulation and power cost; levelized annual taxes are also shown
6. Fixed charge rates and constant annual income requirements
7. Cash expenses using constant annual income
8. Tax calculations using constant annual income
9. Payout tabulation using constant annual income

At this point, if LL7 = 02, there will be 12 pages giving details of the fixed charge rate breakdown calculations. There are four cases of three tables each; for each case, the tables are similar to items 3, 4, and 5 listed above. The four cases are:

Using the input load factors

1. Plant capital, 1.0; working capital, 0.
2. Working capital, 1.0; plant capital, 0.

Using constant load factor of 1.00

3. Plant capital, 1.0; working capital, 0.
4. Working capital, 1.0; plant capital, 0.

The next table gives the fixed charge rate breakdowns, summarizing the results of the four cases above. The breakdowns are obtained if LL7 = 01 or 02, and are omitted if LL7 = 00.

After this, the code prints the power cost breakdown calculations, if LL9 = 01. Again, there are four cases:

1. Fuel cycle cost
2. Plant capital component
3. Nonfuel working capital component
4. Operating and maintenance cost

In each case, there are three tables showing cash expenses, tax calculations, and payout tabulation.

Finally, a table is produced that shows the breakdown of the power cost into its four components. This completes the output.

Table A-1. FORTRAN Listing of Program POWERCO-50.

```
      PROGRAM POWERCO
C     THIS VERSION OF THE CODE IS POWERCO-50

      COMMON FITX,SITX,SRTX,PRTX,REP,PINS,SUMLA,SUMLV
      COMMON CORE,FCRD,FCRN,RP,BKMA
      COMMON TXRI,TXRW,TXRC,TXRD,BKME,BKMV,TXRG,TXRU
      COMMON TXRY,TXRX,TXRZ,TXFR,TXRH
      COMMON EEE(500),TAA(500),TAB(500),TAC(500),TAD(500),TAE(500),
     1  TAG(500),TEH(500),TEQ(500),TAJ(500),TAK(500),TAL(500),TAM(500),
     2  TEA(500),TEB(500),TEE(500),CFAB(500),CURA(500),U(500),
     3  CSHP(500),CREP(500),CPLU(500),PFW(500),DES(8),EB(500),EFU(500),
     4  EDU(500),EP(500),WPY(500),SYD(500),BRP(500),PWV(500),Z(500),
     5  ELM(500),PWE(500),XEP(500),XEPW(500),XTU(500),XTUW(500),
     6  D(35),LL1,LL2,LL3,LL4,LL5,L5,LL7,LL8,LL9,
     7  LL10,YRD,TXR,DMW,VOU,PLT,YRS,WC,BND,RRE,RRB,RRW,RRV,NY,
     8  SSH,SREP,SPLU,P,BOT,TOP
      COMMON TLSA(500),TLSB(500),T_SC(500),TLS(500),
     1  TLSQ(500),EGP(500),TGG(500),PWW(500)
      COMMON TXRM,TXRE,TXRJ,TXNT,TXRV,PGNA,PGNB

C     NKN=1  TOTAL POWER COST
C     NKN=2  FUEL CYCLE COST
C     NKN=3  PLANT CAPITAL COMPONENT
C     NKN=4  NONFUEL WORKING CAPITAL COMPONENT
C     NKN=5  OPERATING AND MAINTENANCE COST

C     GLOSSARY OF VARIABLES USED IN POWERCO-50

C     ANNUAL QUANTITIES, FOR YEAR N

C     BRP(N)    = BOND REPAYMENT                          , $MM
C     CFAB(N)   = FABRICATION EXPENDITURE                 , $MM
C     CPLU(N)   = RECOVERED U-PU CREDIT                   , $MM
C     CREP(N)   = REPROCESSING EXPENDITURE                , $MM
C     CSHP(N)   = SHIPPING EXPENDITURE                    , $MM
C     CURA(N)   = URANIUM EXPENDITURE                     , $MM
C     EB(N)     = CASH EXPENDITURES BEFORE TAXES          , $MM
C     EDU(N)    = URANIUM DEPLETION CHARGE                , $MM
C     EEE(N)    = PORTION OF ANNUAL OPERATING COST        , $MM
C     EFU(N)    = FUEL EXPENDITURES                       , $MM
C     EGP(N)    = TOTAL EXPENSES G PRIME
C     ELM(N)    = TOTAL EXPENSES EXCEPT FUEL AND TAXES
C     EP(N)     = PRORATED FUEL EXPENSE                   , $MM
C     PFW(N)    = LOAD FACTOR (PLANT FACTOR)
C     PWE(N)    = PRESENT WORTH FACTOR AT I SUB E
C     PWV(N)    = PRESENT WORTH FACTOR AT I SUB V
C     PWW(N)    = PRESENT WORTH FACTOR AT I SUB A
C     SYD(N)    = DEPRECIATION ALLOWANCE (FOR TAXES)      , $MM
C     TAA(N)    = BONDS OUTSTANDING
C     TAB(N)    = EQUITY OUTSTANDING
C     TAC(N)    = TOTAL DEDUCTIONS FOR FEDERAL INCOME TAX
C     TAD(N)    = SALES INCOME
C     TAE(N)    = RECOVERED WORKING CAPITAL               , $MM
```

```
C     TAG(N)    = TOTAL INCOME                                  , $MM
C     TAJ(N)    = BOND INTEREST
C     TAK(N)    = EARNINGS ON EQUITY
C     TAL(N)    = BOND RETIREMENT
C     TAM(N)    = EQUITY RETIREMENT
C     TEA(N)    = FEDERAL INCOME TAX
C     TEB(N)    = FEDERAL TAXABLE INCOME
C     TEE(N)    = URANIUM CREDIT                                , $MM
C     TEH(N)    = TOTAL ANNUAL OPERATING COST                   , $MM
C     TEQ(N)    = TOTAL CASH EXPENSES
C     TGG(N)    = CASH INCOME MINUS CASH EXPENDITURES
C     TLS(N)    = TOTAL STATE AND LOCAL TAXES
C     TLSA(N)   = STATE INCOME TAX
C     TLSB(N)   = STATE REVENUE TAX
C     TLSC(N)   = PROPERTY TAX
C     TLSQ(N)   = TOTAL DEDUCTIONS FOR STATE INCOME TAX
C     U(N)      = KWHR OF ELECTRICITY PRODUCED
C     XEP(N)    = G - J + F
C     XEPW(N)   = PRESENT WORTHED G - J + F
C     XTU(N)    = J - F
C     XTUW(N)   = PRESENT WORTHED J - F
C     WPY(N)    = KGU CHARGED TO REACTOR

C     BKME      = SUMMATION OF PWE(N)
C     BKMV      = SUMMATION OF PWV(N)
C     BND       = FRACTION OF INVESTMENT IN BONDS
C     BOT       = DENOMINATOR OF POWER COST
C     CORE      = COST OF INITIAL CORE, $MM
C     D(7)      = K SUB T   = FEDERAL INCOME TAX RATE
C     D(14)     = CONSTANT ANNUAL EXPENSE, $MM
C     D(15)     = K SUB S   = STATE INCOME TAX RATE
C     D(16)     = K SUB R   = STATE GROSS REVENUE TAX RATE
C     D(17)     = K SUB V   = LOCAL PROPERTY TAX RATE
C     D(18)     = K SUB A   = INTERIM REPLACEMENT FACTOR
C     D(19)     = K SUB B   = PROPERTY INSURANCE FACTOR
C     D(22)     = F SUB C   = FRAC OF CORE VALUE FOR TAX PURPOSES
C     D(23)     = K SUB P   = PROPERTY TAX RATE ON NONFUEL WORK CAP
C     DEPR      = SINKING FUND DEPRECIATION FACTOR
C     DES       = PROBLEM IDENTIFICATION
C     DESN      = OUTPUT TABLE IDENTIFICATION
C     DMW       = REACTOR CAPACITY                              , MW(E)
C     FCRD      = FIXED CHARGE RATE ON DEPRECIABLE CAPITAL
C     FCRN      = FIXED CHARGE RATE ON NONDEPRECIABLE CAPITAL
C     FITX      = LEVELIZED FEDERAL INCOME TAX, $MM
C     NY        = PROJECT LIFE                                  , YEARS
C     P         = POWER COST                                    , MILLS/KWHR(E)
C     PGNA      = INTERIM REPLACEMENTS                          , $MM/YR
C     PGNB      = PROPERTY INSURANCE                            , $MM/YR
C     PJFC      = FUEL CYCLE COST                               , MILLS/KWHR(E)
C     PLT       = PLANT CAPITAL INVESTMENT                      , $MM
C     PNFW      = NONFUEL WORKING CAPITAL COST                  , MILLS/KWHR(E)
C     POPM      = OPERATING AND MAINTENANCE COST                , MILLS/KWHR(E)
C     PPLT      = PLANT CAPITAL COMPONENT                       , MILLS/KWHR(E)
C     PRTX      = LEVELIZED LOCAL PROPERTY TAX, $MM
C     PTOT      = TOTAL POWER COST                              , MILLS/KWHR(E)
```

```
C       RFN         = F SUB N   = FRACT UNDEPR INVEST FOR LOCAL PROP TAX
C       RRB         = INTEREST RATE ON BONDS
C       RRE         = RATE OF RETURN ON EQUITY
C       RRV         = I SUB VS  = MODIF WEIGHTED AVG INTEREST RATE
C       RRW         = WEIGHTED AVERAGE INTEREST RATE
C       SITX        = LEVELIZED STATE INCOME TAX, $MM
C       SPLU        = CONSTANT ANNUAL INCOME                , $MM
C       SRTX        = LEVELIZED STATE REVENUE TAX, $MM
C       TOP         = NUMERATOR OF POWER COST
C       TXFR        = K SUB F
C       TXR         = FEDERAL INCOME TAX RATE
C       TXRC        = K SUB C  =  (1 - KS)(KV FC + KB)
C       TXRD        = K SUB D  =  (1 - KS)(KP + KB)
C       TXRE        = K SUB E   = KT+(1-KT)KW
C       TXRG        = K SUB G   = (1-KS)(KV FN +KI)
C       TXRH        = K SUB H
C       TXRI        = K SUB I   = KA + K3
C       TXRJ        = TAX RATE CONSTANT J SUB J
C       TXRM        = K SUB M   = KT +(1-KT)KS
C       TXRU        = K SUB U
C       TXRW        = K SUB W   = KR +(1-KR)KS
C       TXRX        = K SUB X
C       TXRY        = K SUB Y
C       TXRZ        = K SUB Z
C       VOU         = VARIABLE OPERATING COST D(10)
C       WC          = NONFUEL WORKING CAPITAL               , $MM
C       WEX         = SUM OF LOAD FACTORS
C       WRX         = SUM OF ANNUAL FUEL EXPENSES
C       YRD         = DEPRECIABLE LIFE                      , YEARS
C       YRS         = PROJECT LIFE                          , YEARS


      PTOT=0.
      PJFC=0.
      PPLT=0.
      PNFW=0.
      POPM=0.

C     TOTAL POWER COST CALCULATION

    1 CALL INPUT
      CALL DATACHK
      CALL FACTORS
    2 CALL DEPREC
      CALL EXPENSES(1)
      CALL BONDPAY
      CALL COSTEQ
      PTOT=P
      CALL PAYOUT(1.,0.)
      CALL OUTPUT(1)
      CALL FCR
      IF(LL9)60,60,3
```

```
C     NEXT DO FUEL CYCLE COST
    3 PLT=0.
      WC=0.
      DO 5 N=1,NY
    5 SYD(N)=0.
    6 CALL EXPENSES(2)
      CALL BONDPAY
      CALL COSTEQ
      PJFC=P
      CALL PAYOUT(1.,0.)
      CALL OUTPUT(2)

C     NEXT DO PLANT CAPITAL COST COMPONENT

   10 PLT=D(1)
      WC=0.  $  CORE=0.
      CALL DEPREC
      CALL EXPENSES(3)
      CALL BONDPAY
      CALL COSTEQ
      PPLT=P
      CALL PAYOUT(1.,0.)
      CALL OUTPUT(3)

C     NEXT DO NONFUEL WORKING CAPITAL COST

   20 PLT=0.
      WC=D(3)  $  CORE=0.
      DO 25 N=1,NY
   25 SYD(N)=0.
   26 CALL EXPENSES(4)
      CALL BONDPAY
      CALL COSTEQ
      PNFW=P
      CALL PAYOUT(1.,0.)
      CALL OUTPUT(4)

C     NEXT DO OPERATING AND MAINTENANCE COST

   30 WC=0.  $  CORE=0.  $  PLT=0.
      CALL EXPENSES(5)
      CALL BONDPAY
      CALL COSTEQ
      POPM=P
      CALL PAYOUT(1.,0.)
      CALL OUTPUT(5)
```

```
   50 CONTINUE

      PADD=PJFC+PPLT+PNFW+POPM

      WRITE(51,500)(DES(I),I=1,8)
      WRITE(51,501)
      WRITE(51,502)PJFC
      WRITE(51,503)PPLT
      WRITE(51,504)PNFW
      WRITE(51,505)POPM
      WRITE(51,506)PADD
      WRITE(51,507)PTOT

   60 PLT=D(1)
      WC=D(3)
      CORE=D(11)

  500 FORMAT(30H1PROBLEM IDENTIFICATION      ,8A6///)
  501 FORMAT(40H COST SUMMARY, MILLS/KWHR(E)          ,///)
  502 FORMAT(40H0FUEL CYCLE COST                      ,F12.4)
  503 FORMAT(40H PLANT CAPITAL COMPONENT              ,F12.4)
  504 FORMAT(40H NONFUEL WORKING CAPITAL COMPONENT    ,F12.4)
  505 FORMAT(40H OPERATING AND MAINTENANCE COMPONENT  ,F12.4)
  506 FORMAT(40H0SUM OF THE ABOVE COSTS               ,F12.4///)
  507 FORMAT(40H0CALCULATED TOTAL POWER COST (COMPARE),F12.4)

      GO TO 1
      END POWERCO
```

```
      SUBROUTINE INPUT

      COMMON FITX,SITX,SRTX,PRTX,REP_,PINS,SUMLA,SUMLV
      COMMON CORE,FCRD,FCRN,RP,BKMA
      COMMON TXRI,TXRW,TXRC,TXRD,BKME,BKMV,TXRG,TXRU
      COMMON TXRY,TXRX,TXRZ,TXFR,TXRH
      COMMON EEE(500),TAA(500),TAB(500),TAC(500),TAD(500),TAE(500),
     1  TAG(500),TEH(500),TEQ(500),TAJ(500),TAK(500),TAL(500),TAM(500),
     2  TEA(500),TEB(500),TEE(500),CFAB(500),CURA(500),U(500),
     3  CSHP(500),CREP(500),CPLU(500),PFW(500),DES(8),EB(500),EFU(500),
     4  EDU(500),EP(500),WPY(500),SYD(500),BRP(500),PWV(500),Z(500),
     5  ELM(500),PWE(500),XEP(500),XEPW(500),XTU(500),XTUW(500),
     6  D(35),LL1,LL2,LL3,LL4,LL5,LL6,LL7,LL8,LL9,
     7  LL10,YRD,TXR,DMW,VOU,PLT,YRS,WC,BND,RRE,RRB,RRW,RRV,NY,
     8  SSH,SREP,SPLU,P,BOT,TOP
      COMMON TLSA(500),TLSB(500),TLSC(500),TLS(500),
     1  TLSQ(500),EGP(500),TGG(500),PWW(500)
      COMMON TXRM,TXRE,TXRJ,TXNT,TXRN,PGNA,PGNB


C     LL3=00, NORMAL INPUT DATA ROUTINE
C     LL3=04, READ DATA CHANGE CARDS ONLY, ANNUAL OR NONANNUAL
C     LL3=02, READ CONTROL CARD ONLY
C     LL4 IS THE NUMBER OF NONANNUAL DATA CHANGE CARDS
C     LL5 IS THE NUMBER OF ANNUAL DATA CHANGE CARDS
C     IF LL8 IS 01, OMIT ANNUAL DATA INPUT CARDS AND ZERO ANNUAL DATA


     1 READ(50,401)LL1,LL2,LL3,LL4,LL5,LL6,LL7,LL8,
     1LL9,LL10,(DES(I),I=1,8)
       IF(LL3-1)5,90,900

     5 READ(50,402)(D(N),N=1,35)
       NY=D(2)
       IF(LL8)10,10,40

    10 DO 12 K=1,NY
    12 READ(50,402)PFW(K),CURA(K),CFAB(K),CREP(K),CPLU(K),EEE(K),BRP(K)
       GO TO 150

    40 DO 41 K=1,NY
       CURA(K)=CFAB(K)=CREP(K)=CPLU(K)=EEE(K)=BRP(K)=0.
    41 CONTINUE
       GO TO 150

    90 IF(LL4)97,97,92
    92 DO 93 N=1,LL4
    93 READ(50,404)J,D(J)
       IF(LL5)150,150,97
    97 DO 120 N=1,LL5
       READ(50,405)M,K,AD
       GO TO (101,102,103,104,105,106,107),K
   101 PFW(M)=AD  $  GO TO 120
   102 CURA(M)=AD $  GO TO 120
```

```
103 CFAB(M)=AD $  GO TO 120
104 CREP(M)=AD $  GO TO 120
105 CPLU(M)=AD $  GO TO 120
106 EEE(M)=AD  $  GO TO 120
107 BRP(M)=AD
120 CONTINUE

150 PLT=D(1)  $  YRS=D(2)  $  WC=D(3)  $  BND=D(4)  $  RRB=D(5)
    RRE=D(6)  $  TXR=D(7)  $  DMW=D(8)  $  YRD=D(9)  $  VOU=D(10)
    CORE=D(11)   $  NY=YRS

C     IF LL+0 EXCEEDS ZERO, THE LOAD FACTORS ARE CALCULATED AS FOLLOWS

      IF(LL+0)900,900,160
160 ND26=D(26)
      ND27=ND26+1
      DO 162 N=1,ND26
162 PFW(N)=D(24)
      IF(ND27-NY)163,163,900
163 DO 164 N=ND27,NY
164 PFW(N)=D(24)-(N-ND26)*D(25)


401 FORMAT(10I2,8A6)
402 FORMAT(7E10.0)
403 FORMAT(I4,E16.0,5E10.0)
404 FORMAT(I4,E20.0)
405 FORMAT(2I4,E12.0)

900 RETURN
      END
```

```
      SUBROUTINE DATACHK

      COMMON FITX,SITX,SRTX,PRTX,REP_,PINS,SUMLA,SUMLV
      COMMON CORE,FCRD,FCRN,RP,BKMA
      COMMON TXRI,TXRW,TXRC,TXRD,BKME,BKMV,TXRG,TXRU
      COMMON TXRY,TXRX,TXRZ,TXFR,TXRH
      COMMON EEE(500),TAA(500),TAB(500),TAC(500),TAD(500),TAE(500),
     1  TAG(500),TEH(500),TEQ(500),TAJ(500),TAK(500),TAL(500),TAM(500),
     2  TEA(500),TEB(500),TEE(500),CFAB(500),CURA(500),U(500),
     3  CSHP(500),CREP(500),CPLU(500),PFW(500),DES(8),EB(500),EFU(500),
     4  EDU(500),EP(500),WPY(500),SYD(500),BRP(500),PWV(500),Z(500),
     5  ELM(500),PWE(500),XEP(500),XEPW(500),XTU(500),XTUW(500),
     6  D(35),LL1,LL2,LL3,LL4,LL5,_L5,LL7,LL8,LL9,
     7  LL10,YRD,TXR,DMW,V0U,PLT,YRS,WC,BND,RRE,RRB,RRW,RRV,NY,
     8  SSH,SREP,SPLU,P,B0T,T0P
      COMMON TLSA(500),TLSB(500),TLSC(500),TLS(500),
     1  TLSU(500),EGP(500),TGG(500),PWW(500)
      COMMON TXRM,TXRE,TXRJ,TXNT,TXRV,PGNA,PGNB


      WRITE(51,511)(DES(I),I=1,8)
      WRITE(51,512)
      WRITE(51,549)LL1,LL2,LL3,L_4,L_5
      WRITE(51,550)LL6,LL7,LL8,L_9,L_10
      GO TO (91,92,93,94,45),LL1
   91 WRITE(51,513)
      GO TO 95
   92 WRITE(51,514)
      GO TO 95
   93 WRITE(51,515)
      GO TO 95
   94 WRITE(51,516)
      GO TO 95
   45 WRITE(51,545)LL6
   95 IF(LL2-1)96,96,97
   96 WRITE(51,517)
      GO TO 101
   97 WRITE(51,518)
  101 WRITE(51,521)
      WRITE(51,522)PLT
      WRITE(51,523)YRS
      WRITE(51,524)WC
      WRITE(51,525)BND
      WRITE(51,526)RRB
      WRITE(51,527)RRE
      WRITE(51,528)TXR
      WRITE(51,529)
      WRITE(51,530)DMW
      WRITE(51,531)YRD
      WRITE(51,533)V0U
      WRITE(51,541)D(11)
      WRITE(51,620)D(12)
      WRITE(51,621)D(13)
      WRITE(51,548)D(14)
      WRITE(51,601)
```

```
      WRITE(51,602)D(15)
      WRITE(51,603)D(16)
      WRITE(51,604)D(17)
      WRITE(51,605)D(18)
      WRITE(51,606)D(19)
      WRITE(51,622)D(20)
      WRITE(51,623)D(21)
      WRITE(51,607)
      WRITE(51,608)D(22)
      WRITE(51,609)D(23)
      WRITE(51,610)D(24)
      WRITE(51,611)D(25)
      WRITE(51,612)D(26)
      WRITE(51,624)D(27)
      WRITE(51,625)D(28)
      WRITE(51,537)
      WRITE(51,538)
      WRITE(51,539)
      DO 102 N=1,NY
  102 WRITE(51,540)N,PFW(N),CURA(N),CFAB(N),CREP(N),CPLU(N),EEE(N),
     1   BRP(N)
  511 FORMAT(15H1INPUT DATA    ,8A6)
  512 FORMAT(40H0CARD 1 (CONTROL CARD)                    )
  513 FORMAT(4H     "BOND REPAYMENT PROPORTIONAL")
  514 FORMAT(4H     "BOND REPAYMENT UNIFORM PRINCIPAL REDUCTION")
  515 FORMAT(4H     "BOND REPAYMENT UNIFORM TOTAL PAYMENT")
  516 FORMAT(4H     "BOND REPAYMENT AS SCHEDULED BELOW")
  517 FORMAT(4H     "STRAIGHT LINE DEPRECIATION")
  518 FORMAT(4H     "SUM OF YEARS DIGITS DEPRECIATION")
  521 FORMAT(7H0CARD 2)
  522 FORMAT(48H  D(1)  PLANT INVESTMENT, $MM                    ,F12.6)
  523 FORMAT(48H  D(2)  PROJECT LIFE, PERIODS                    ,F12.6)
  524 FORMAT(48H  D(3)  NONFUEL WORKING CAPITAL, $MM             ,F12.6)
  525 FORMAT(48H  D(4)  FRACTION OF INVESTMENT IN BONDS          ,F12.6)
  526 FORMAT(48H  D(5)  BOND INTEREST RATE PER PERIOD            ,F12.6)
  527 FORMAT(48H  D(6)  EQUITY EARNING RATE PER PERIOD           ,F12.6)
  528 FORMAT(48H  D(7)  FEDERAL INCOME TAX RATE                  ,F12.6)
  529 FORMAT(7H0CARD 3)
  530 FORMAT(48H  D(8)  REACTOR POWER, MW ELECTRIC               ,F12.6)
  531 FORMAT(48H  D(9)  DEPRECIABLE LIFE, YEARS                  ,F12.6)
  533 FORMAT(48H  D(10) VARIABLE OPERATING COST, $MM/PERIOD      ,F12.6)
  537 FORMAT(48H1 INPUT DATA     EXPENSES IN $MM PER PERIOD      /)
  538 FORMAT(1H0,2HPD,6X,4HCAPY,7X,4HFUEL,7X,4HFABR,7X,
     1   4HREPR,8X,4HU-PU,5X,4HOPER,8X,4HBOND)
  539 FORMAT(1H ,7X,6HFACTOR,5X,5HPURCH,7X,4HCOST,7X,
     1   4HCOST,7X,4HCRED,7X,4HBASE,7X,5HPAYMT/)
  540 FORMAT(1H ,I3,9F11.5)
  541 FORMAT(48H  D(11) INITIAL CORE INVESTMENT, $MM             ,F12.6)
  545 FORMAT(4H     "BOND REPAYMENT UNIFORM PRINCIPAL REDUCTION,"
     1"STARTING IN YEAR",2X,I2)
  548 FORMAT(48H  D(14) FIXED OPERATING COST, $MM/PERIOD         ,F12.6)
  549 FORMAT(4H     ,4HLL1 ,I4,4X,4HLL2 ,I4,4X,4HLL3 ,I4,4X,4HLL4 ,
     1I4,4X,4HLL5 ,I4)
  550 FORMAT(4H     ,4HLL6 ,I4,4X,4HLL7 ,I4,4X,4HLL8 ,I4,4X,4HLL9 ,
     1I4,4X,4HLL10,I4)
  601 FORMAT(7H0CARD 4)
```

```
602 FORMAT(48H  D(15) STATE INCOME TAX RATE                          ,F12.6)
603 FORMAT(48H  D(16) STATE GROSS REVENUES TAX RATE                  ,F12.6)
604 FORMAT(48H  D(17) LOCAL PROPERTY TAX RATE PER PERIOD             ,F12.6)
605 FORMAT(48H  D(18) INTERIM REPLACEMENTS FACTOR PER PERIOD         ,F12.6)
606 FORMAT(48H  D(19) PROPERTY INSURANCE FACTOR PER PERIOD           ,F12.6)
607 FORMAT(7H0CARD 5)
608 FORMAT(48H  D(22) FRACTION OF CORE FOR TAX ASSESSMENT            ,F12.6)
609 FORMAT(48H  D(23) PROP TAX ON NONFUEL WORK CAP PER PD            ,F12.6)
610 FORMAT(48H  D(24) INITIAL CAPACITY FACTOR                        ,F12.6)
611 FORMAT(48H  D(25) CAPACITY FACTOR DECLINE PER PERIOD             ,F12.6)
612 FORMAT(48H  D(26) PERIODS AT INITIAL CAPACITY FACTOR             ,F12.6)
620 FORMAT(48H  D(12) NUMBER OF PERIODS PER YEAR                     ,F12.6)
621 FORMAT(48H  D(13) NOT USED                                       ,F12.6)
622 FORMAT(48H  D(20) NOT USED                                       ,F12.6)
623 FORMAT(48H  D(21) NOT USED                                       ,F12.6)
624 FORMAT(48H  D(27) NOT USED                                       ,F12.6)
625 FORMAT(48H  D(28) NOT USED                                       ,F12.6)
    RETURN
    END
```

```
      SUBROUTINE FACTORS
      COMMON FITX,SITX,SRTX,PRTX,REPL,PINS,SUMLA,SUMLV
      COMMON CORE,FCRD,FCRN,RP,BKMA
      COMMON TXRI,TXRW,TXRC,TXRD,BKME,BKMV,TXRG,TXRU
      COMMON TXRY,TXRX,TXRZ,TXFR,TXRH
      COMMON EEE(500),TAA(500),TAB(500),TAC(500),TAD(500),TAE(500),
     1  TAG(500),TEH(500),TEQ(500),TAJ(500),TAK(500),TAL(500),TAM(500),
     2  TEA(500),TEB(500),TEE(500),CFAB(500),CURA(500),U(500),
     3  CSHP(500),CREP(500),CPLU(500),PFW(500),DES(8),EB(500),EFU(500),
     4  EDU(500),EP(500),WPY(500),SYD(500),BRP(500),PWV(500),Z(500),
     5  ELM(500),PWE(500),XEP(500),XEPW(500),XTU(500),XTUW(500),
     6  D(35),LL1,LL2,LL3,LL4,LL5,LL6,LL7,LL8,LL9,
     7  LL10,YRD,TXR,DMW,VOU,PLT,YRS,WC,BND,RRE,RRB,RRW,RRV,NY,
     8  SSH,SREP,SPLU,P,BOT,TOP
      COMMON TLSA(500),TLSB(500),TLSC(500),TLS(500),
     1  TLSQ(500),EGP(500),TGG(500),PWW(500)
      COMMON TXRM,TXRE,TXRJ,TXNT,TXRV,PGNA,PGNB

      DR5=1.-D(15)
      DT6=1.-TXR
      TXRI=D(18)+D(19)
      TXRW=D(15)+D(16)-D(15)*D(16)
      TXRC=DR5*(D(17)*D(22)+D(19))
      TXRD=DR5*(D(19)+D(23))
      TXRM=TXR+D(15)-TXR*D(15)
      TXRE=(1.-TXR)*(D(15)+D(16)-D(15)*D(16))+TXR
      RRW=BND*RRB+(1.-BND)*RRE
    3 RRV=BND*RRB*(1.-TXRM)+(1.-BND)*RRE
      PWE(1)=1./(1.+RRE)
      PWW(1)=1./(1.+RRW)
   10 PWV(1)=1./(1.+RRV)
      DO 11 N=2,NY
      PWE(N)=PWE(1)*PWE(N-1)
      PWW(N)=PWW(1)*PWW(N-1)
   11 PWV(N)=PWV(1)*PWV(N-1)
      TXRU=1.-BND
      TXRY=1.
      BKMA=0.
      SUMLA=0.
      SUMLV=0.
      BKME=0.
      BKMV=0.
      DO 20 N=1,NY
      DRFN=D(17)*(NY+1-N)
      DRFN=DRFN/NY
      TXRG=DR5*(DRFN+TXRI)
      TXRU=TXRU+DT6*TXRG*PWE(N)
      TXRY=TXRY+DT6*TXRG*PWV(N)
      BKMA=BKMA+PWW(N)
      BKME=BKME+PWE(N)
      BKMV=BKMV+PWV(N)
      SUMLA=SUMLA+PWW(N)*PFW(N)
      SUMLV=SUMLV+PWV(N)*PFW(N)
   20 CONTINUE
```

```
      TXRX=1.-BND+DT6*TXRC*BKME
      TXRZ=1.-BND-PWE(NY)+DT6*TXRD*BKME
      TXFR=1.+DT6*TXRC*BKMV
      TXRH=1.-PWV(NY)+DT6*TXRD*BKMV
      RP=SUMLA*BKMV/(BKMA*SUMLV)
      WRITE(51,501)
      WRITE(51,502)TXRI,TXRW,TXRC,TXRD,TXRM
      WRITE(51,503)TXRE,TXRX,TXRZ,TXFR,TXRH
      WRITE(51,504)TXRU,TXRY,RRW,RRV,BKMA
      WRITE(51,505)BKMV,BKME,SUMLA,SUMLV,RP
  501 FORMAT(40H0MISCELLANEOUS CALCULATED QUANTITIES      ,5E14.6)
  502 FORMAT(40H0TXRI   TXRW   TXRC   TXR4   TXRM        ,5E14.6)
  503 FORMAT(40H0TXRE   TXRX   TXRZ   TXFR   TXRH        ,5E14.6)
  504 FORMAT(40H0TXRU   TXRY   RRW    RRV    BKMA        ,5E14.6)
  505 FORMAT(40H0BKMV   BKME   SUMLA  SUMLV  RP          ,5E14.6)
      RETURN
      END
```

```
      SUBROUTINE DEPREC

      COMMON FITX,SITX,SRTX,PRTX,REP_,PINS,SUMLA,SUMLV
      COMMON CORE,FCRD,FCRN,RP,BKMA
      COMMON TXRI,TXRW,TXRC,TXRD,BKME,BKMV,TXRG,TXRU
      COMMON TXRY,TXRX,TXRZ,TXFR,TXRH
      COMMON EEE(500),TAA(500),TAB(500),TAC(500),TAD(500),TAE(500),
     1  TAG(500),TEH(500),TEQ(500),TAJ(500),TAK(500),TAL(500),TAM(500),
     2  TEA(500),TEB(500),TEE(500),CFA3(500),CURA(500),U(500),
     3  CSHP(500),CREP(500),CPLU(500),PFW(500),DES(8),EB(500),EFU(500),
     4  EDU(500),EP(500),WPY(500),SYD(500),BRP(500),PWV(500),Z(500),
     5  ELM(500),PWE(500),XEP(500),XEPW(500),XTU(500),XTUW(500),
     6  D(35),LL1,LL2,LL3,LL4,LL5,LL6,LL7,LL8,LL9,
     7  LL10,YRD,TXR,DMW,VOU,PLT,YRS,WC,BND,RRE,RRB,RRW,RRV,NY,
     8  SSH,SREP,SPLU,P,BOT,TOP
      COMMON TLSA(500),TLSB(500),TLSC(500),TLS(500),
     1  TLSQ(500),EGP(500),TGG(500),PWW(500)
      COMMON TXRM,TXRE,TXRJ,TXNT,TXRV,PGNA,PGNB


      LDE=YRD
      NMM=D(12)
      LDEM=LDE*NMM
      DO 2 N=1,NY
    2 SYD(N)=0. $ LDE=YRD
      GO TO (5,7),LL2
    5 SLD=PLT/(YRD*D(12))
      DO 6 N=1,LDEM
    6 SYD(N)=SLD
      RETURN
    7 ABB=PLT*2./(YRD*(YRD+1.))
      DO 10 N=1,LDE
      AA22=ABB*(LDE+1-N)
      DO 8 NRP=1,NMM
      NXA=(N-1)*NMM+NRP
    8 SYD(NXA)=AA22/D(12)
   10 CONTINUE
      RETURN
      END
```

```
      SUBROUTINE EXPENSES(NKN)

      COMMON FITX,SITX,SRTX,PRTX,REPL,PINS,SUMLA,SUMLV
      COMMON CORE,FCRD,FCRN,RP,BKMA
      COMMON TXRI,TXRW,TXRC,TXRD,BKME,BKMV,TXRG,TXRU
      COMMON TXRY,TXRX,TXRZ,TXFR,TXRH
      COMMON EEE(500),TAA(500),TAB(500),TAC(500),TAD(500),TAE(500),
     1  TAG(500),TEH(500),TEQ(500),TAJ(500),TAK(500),TAL(500),TAM(500),
     2  TEA(500),TEB(500),TEE(500),CFAB(500),CURA(500),U(500),
     3  CSHP(500),CREP(500),CPLU(500),PFW(500),DES(8),EB(500),EFU(500),
     4  EDU(500),EP(500),WPY(500),SYD(500),BRP(500),PWV(500),Z(500),
     5  ELM(500),PWE(500),XEP(500),XEPW(500),XTU(500),XTUW(500),
     6  D(35),LL1,LL2,LL3,LL4,LL5,LL6,LL7,LL8,LL9,
     7  LL10,YRD,TXR,DMW,VOU,PLT,YRS,WC,BND,RRE,RRB,RRW,RRV,NY,
     8  SSH,SREP,SPLU,P,BOT,TOP
      COMMON TLSA(500),TLSB(500),TLSC(500),TLS(500),
     1  TLSQ(500),EGP(500),TGG(500),PWW(500)
      COMMON TXRM,TXRE,TXRJ,TXNT,TXRN,PGNA,PGNB

C     NKN=1  TOTAL POWER COST
C     NKN=2  FUEL CYCLE COST
C     NKN=3  PLANT CAPITAL COMPONENT
C     NKN=4  NONFUEL WORKING CAPITAL COMPONENT
C     NKN=5  OPERATING AND MAINTENANCE COST
C     NKN=6  POWER COST, CONSTANT LOAD FACTOR OF 1.00

      DM67=DMW*1000.*24.*365./D(12)
      GO TO(1,5,10,10,20,40),NKN

    1 WEX=0.
      WRX=CORE
      DO 4 M=1,NY
      TEH(M)=D(10)*PFW(M)+EEE(M)+D(14)
      EGP(M)=CURA(M)+CFAB(M)+CREP(M)-CPLU(M)+TEH(M)
      EFU(M)=EGP(M)-TEH(M)
      ELM(M)=TEH(M)
      U(M)=PFW(M)*DM67
      Z(M)=U(M)*1.0E-09
      WRX=WRX+EFU(M)
    4 WEX=WEX+PFW(M)
      DO 3 M=1,NY
    3 EP(M)=WRX*PFW(M)/WEX
      RETURN

C     THIS ROUTINE FOR FUEL CYCLE COST ONLY
    5 WEX=0.
      WRX=CORE
      DO 6 M=1,NY
      TEH(M)=0.
      EGP(M)=CURA(M)+CFAB(M)+CREP(M)-CPLU(M)
      EFU(M)=EGP(M)
      ELM(M)=0.
```

```
      U(M)=PFW(M)*DM67
      Z(M)=U(M)*1.0E-09
      WRX=WRX+EFU(M)
    6 WEX=WEX+PFW(M)
      TE7=WRX/WEX
      DO 7 M=1,NY
    7 EP(M)=TE7*PFW(M)
      RETURN

C     THIS ROUTINE FOR PLANT OR NONFUEL CAPITAL
   10 DO 15 N=1,NY
      EGP(N)=0.
      TEH(N)=0.
      EP(N)=0.
      EFU(N)=0.
   15 ELM(N)=0.
      RETURN

C     THIS ROUTINE FOR OPERATING AND MNTNC EXPENSE
   20 DO 25 N=1,NY
      TEH(N)=D(10)*PFW(N)+EEE(N)+D(14)
      EGP(N)=TEH(N)
      EFU(N)=0.
      EP(N)=0.
   25 ELM(N)=TEH(N)
      RETURN


   40 DO 41 M=1,NY
      EGP(M)=0.
      EP(M) =0.
      EFU(M)=0.
      TEH(M)=0.
      ELM(M)=0.
      U(M)=DM67
   41 Z(M)=U(M)*1.0E-09

      RETURN


      END
```

```
      SUBROUTINE BONDPAY

      COMMON FITX,SITX,SRTX,PRTX,REP,PINS,SUMLA,SUMLV
      COMMON CORE,FCRD,FCRN,RP,BKMA
      COMMON TXRI,TXRW,TXRC,TXRD,BKME,BKMV,TXRG,TXRU
      COMMON TXRY,TXRX,TXRZ,TXFR,TXRH
      COMMON EEE(500),TAA(500),TAB(500),TAC(500),TAD(500),TAE(500),
     1  TAG(500),TEH(500),TEQ(500),TAJ(500),TAK(500),TAL(500),TAM(500),
     2  TEA(500),TEB(500),TEE(500),CFAB(500),CURA(500),U(500),
     3  CSHP(500),CREP(500),CPLU(500),PFW(500),DES(8),EB(500),EFU(500),
     4  EDU(500),EP(500),WPY(500),SYD(500),BRP(500),PWV(500),Z(500),
     5  ELM(500),PWE(500),XEP(500),XEPW(500),XTU(500),XTUW(500),
     6  D(35),LL1,LL2,LL3,LL4,LL5,LL6,LL7,LL8,LL9,
     7  LL10,YRD,TXR,DMW,VOU,PLT,YRS,WC,BND,RRE,RRB,RRW,RRV,NY,
     8  SSH,SREP,SPLU,P,BOT,TOP
      COMMON TLSA(500),TLSB(500),TLSC(500),TLS(500),
     1  TLSW(500),EGP(500),TGG(500),PWW(500)
      COMMON TXRM,TXRE,TXRJ,TXNT,TXRN,PGNA,PGNB


      TAA(1)=BND*(PLT+CORE+WC)
      TAB(1)=PLT+CORE+WC-TAA(1)
   32 GO TO (31,41,51,61,81),LL1
   41 AUR=TAA(1)/YRS
      DO 42 N=1,NY
      TAL(N)=AUR
      TAA(N+1)=TAA(N)-TAL(N)
   42 TAJ(N)=TAA(N)*RRB
      RETURN
   51 BBR=(1.+RRB)**YRS
      PBR=(BBR-1.)/(RRB*BBR)
      ANP=TAA(1)/PBR
      DO 52 N=1,NY
      TAJ(N)=TAA(N)*RRB
      TAL(N)=ANP-TAJ(N)
   52 TAA(N+1)=TAA(N)-TAL(N)
      RETURN
   61 DO 62 N=1,NY
      TAL(N)=BRP(N)
      TAJ(N)=TAA(N)*RRB
   62 TAA(N+1)=TAA(N)-TAL(N)
      RETURN
   81 DO 82 N=1,NY $ TAJ(N)=0.
   82 TAL(N)=0.  $  DTL=NY+1-LL6  $  TALT=TAA(1)/DTL
      DO 84 N=LL6,NY
   84 TAL(N)=TALT $  DO 85 N=1,NY $ TAJ(N)=TAA(N)*RRB
   85 TAA(N+1)=TAA(N)-TAL(N)
   31 RETURN
      END
```

```
      SUBROUTINE COSTEQ

      COMMON FITX,SITX,SRTX,PRTX,REP,PINS,SUMLA,SUMLV
      COMMON CORE,FCRD,FCRN,RP,BKMA
      COMMON TXRI,TXRW,TXRC,TXRD,BKME,BKMV,TXRG,TXRU
      COMMON TXRY,TXRX,TXRZ,TXFR,TXRH
      COMMON EEE(500),TAA(500),TAB(500),TAC(500),TAD(500),TAE(500),
     1  TAG(500),TEH(500),TEQ(500),TAJ(500),TAK(500),TAL(500),TAM(500),
     2  TEA(500),TEB(500),TEE(500),CFAB(500),CURA(500),U(500),
     3  CSHP(500),CREP(500),CPLU(500),PFW(500),DES(8),EB(500),EFU(500),
     4  EDU(500),EP(500),WPY(500),SYD(500),BRP(500),PWV(500),Z(500),
     5  ELM(500),PWE(500),XEP(500),XEPW(500),XTU(500),XTUW(500),
     6  D(35),LL1,LL2,LL3,LL4,LL5,LL6,LL7,LL8,LL9,
     7  LL10,YRD,TXR,DMW,VOU,PLT,YRS,WC,BND,RRE,RRB,RRW,RRV,NY,
     8  SSH,SREP,SPLU,P,BOT,TOP
      COMMON TLSA(500),TLSB(500),TLSC(500),TLS(500),
     1  TLSQ(500),EGP(500),TGG(500),PWW(500)
      COMMON TXRM,TXRE,TXRJ,TXNT,TXRV,PGNA,PGNB


      BOT=0.
      IF(LL1-1)71,10,71
   10 TOP=PLT*TXRY+CORE*TXFR+WC*TXRH
      DO 12 N=1,NY
      TOP=TOP+PWV(N)*(EGP(N)-TXRM*(EGP(N)-EFU(N)+EP(N)+SYD(N)))
   12 BOT=BOT+PWV(N)*U(N)
   15 P=TOP/(BOT*(1.-TXRE))*1.0E+09
      RETURN
   71 TOP=PLT*TXRU+CORE*TXRX+WC*TXRZ
      DO 72 N=1,NY
      DTB=EGP(N)-EFU(N)+EP(N)+SYD(N)+TAJ(N)
      TOP=TOP+PWE(N)*(EGP(N)-TXRM*DTB+TAJ(N)+TAL(N))
   72 BOT=BOT+PWE(N)*U(N)
   73 P=TOP/(BOT*(1.-TXRE))*1.0E+09
      RETURN
      END
```

```
      SUBROUTINE PAYOUT(RED,RAD)

      COMMON FITX,SITX,SRTX,PRTX,REP_,PINS,SUMLA,SUMLV
      COMMON CORE,FCRD,FCRN,RP,BKMA
      COMMON TXRI,TXRW,TXRC,TXRD,BKME,BKMV,TXRG,TXRU
      COMMON TXRY,TXRX,TXRZ,TXFR,TXR4
      COMMON EEE(500),TAA(500),TAB(500),TAC(500),TAD(500),TAE(500),
     1  TAG(500),TEH(500),TEQ(500),TAJ(500),TAK(500),TAL(500),TAM(500),
     2  TEA(500),TEB(500),TEE(500),CFAB(500),CURA(500),U(500),
     3  CSHP(500),CREP(500),CPLU(500),PFW(500),DES(8),EB(500),EFU(500),
     4  EDU(500),EP(500),WPY(500),SYD(500),BRP(500),PWV(500),Z(500),
     5  ELM(500),PWE(500),XEP(500),XEPW(500),XTU(500),XTUW(500),
     6  D(35),LL1,LL2,LL3,LL4,LL5,_L6,_L7,LL8,LL9,
     7  LL10,YRD,TXR,DMW,V0U,PLT,YRS,WC,BND,RRE,RRB,RRW,RRV,NY,
     8  SSH,SREP,SPLU,P,BOT,TOP
      COMMON TLSA(500),TLSB(500),TLSC(500),TLS(500),
     1  TLSW(500),EGP(500),TGG(500),PWW(500)
      COMMON TXRM,TXRE,TXRJ,TXNT,TXRV,PGNA,PGNB

      PGNA=D(18)*PLT
      PGNB=D(19)*(PLT+CORE+WC)
      DO 16 N=1,NY
      TAE(N)=0.
      TAD(N)=RED*(U(N)*P*1.0E-09)+RAD*SPLU
   16 TAG(N)=TAD(N)
      TAG(NY)=TAD(NY)+WC
      TAE(NY)=WC
      DO 17 N=1,NY
      TAJ(N)=TAA(N)*RRB
      TAK(N)=TAB(N)*RRE
      TLSB(N)=D(16)*TAD(N)
      TLSC(N)=D(17)*PLT*(NY-N+1)/NY+D(17)*D(22)*CORE +D(23)*WC
      TLSQ(N)=TEH(N)+TLSB(N)+TLSC(N)+PGNA+PGNB+EP(N)+SYD(N)+TAJ(N)
      TLSA(N)=D(15)*(TAD(N)-TLSQ(N))
      TLS(N)=TLSA(N)+TLSB(N)+TLSC(N)
      TAC(N)=TLSQ(N)+TLSA(N)
      TEB(N)=TAD(N)-TAC(N)
      TEA(N)=TEB(N)*TXR
      TEQ(N)=EGP(N)+TLS(N)+TEA(N)+PGNA+PGNB
      TGG(N)=TAG(N)-TEQ(N)
      IF(LL1-1)15,12,15
   12 TAL(N)=BND*(TAG(N)-TEQ(N)-TAJ(N)-TAK(N))
      TAA(N+1)=TAA(N)-TAL(N)
   15 TAM(N)=TAG(N)-TEQ(N)-TAJ(N)-TAK(N)-TAL(N)
   17 TAB(N+1)=TAB(N)-TAM(N)

      SUMV=SUME=TLSBA=TLSCA=TLSAA=TEAA=0
      IF(LL1-1)50,50,60
   50 DO 51 N=1,NY
      SUMV=SUMV+PWW(N)
      TLSBA=TLSBA+PWW(N)*TLSB(N)
      TEAA=TEAA+PWW(N)*TEA(N)
      TLSCA=TLSCA+PWW(N)*TLSC(N)
   51 TLSAA=TLSAA+PWW(N)*TLSA(N)
```

```
      FITX=TEAA/SUMV
      SITX=TLSAA/SUMV
      SRTX=TLSBA/SUMV
      PRTX=TLSCA/SUMV
      GO TO 70
   60 DO 61 N=1,NY    $  SUME=SUME+PWE(N)
      TEAA=TEAA+PWE(N)*TEA(N)
      TLSBA=TLSBA+PWE(N)*TLSB(N)
      TLSCA=TLSCA+PWE(N)*TLSC(N)
   61 TLSAA=TLSAA+PWE(N)*TLSA(N)
      FITX=TEAA/SUME
      SITX=TLSAA/SUME
      SRTX=TLSBA/SUME
      PRTX=TLSCA/SUME

   70 RETURN
      END
```

```
      SUBROUTINE OUTPUT(MGM)

      COMMON FITX,SITX,SRTX,PRTX,REP_,PINS,SUMLA,SUMLV
      COMMON CORE,FCRD,FCRN,RP,BKMA
      COMMON TXRI,TXRW,TXRC,TXRD,BKME,BKMV,TXRG,TXRU
      COMMON TXRY,TXRX,TXRZ,TXFR,TXRH
      COMMON EEE(500),TAA(500),TAB(500),TAC(500),TAD(500),TAE(500),
     1  TAG(500),TEH(500),TEQ(500),TAJ(500),TAK(500),TAL(500),TAM(500),
     2  TEA(500),TEB(500),TEE(500),CFAB(500),CURA(500),U(500),
     3  CSHP(500),CREP(500),CPLU(500),PFW(500),DES(8),EB(500),EFU(500),
     4  EDU(500),EP(500),WPY(500),SYD(500),BRP(500),PWV(500),Z(500),
     5  ELM(500),PWE(500),XEP(500),XEPW(500),XTU(500),XTUW(500),
     6  D(35),LL1,LL2,LL3,LL4,LL5,_L5,LL7,LL8,LL9,
     7  LL10,YRD,TXR,DMW,VOU,PLT,YRS,WC,BND,RRE,RRB,RRW,RRV,NY,
     8  SSH,SREP,SPLU,P,BOT,TOP
      COMMON TLSA(500),TLSB(500),T_SC(500),TLS(500),
     1  TLSQ(500),EGP(500),TGG(500),PWW(500)
      COMMON TXRM,TXRE,TXRJ,TXNT,TXRN,PGNA,PGNB

      DIMENSION DESN(5,12)

      DATA(DESN(1, 1)=8HTOTAL PO,8HWER COST,8H WITH IN,
     18HPUT LOAD,8H FACTORS)
      DATA(DESN(1,2)=8HFUEL CYC,8HLE COST ,8HONLY     ,8H        ,
     18H         )
      DATA(DESN(1,3)=8HPLANT CA,8HPITAL CO,8HMPONENT ,8HONLY     ,
     18H         )
      DATA(DESN(1,4)=8HNONFUEL ,8HWORKING ,8HCAPITAL ,8HCOMPONEN,
     18HT ONLY   )
      DATA(DESN(1,5)=8HOPERATIN,8HG AND MA,8HINTENANC,8HE COST O,
     18HNLY      )
      DATA(DESN(1, 6)=8HUSING CA,8HLCULATED,8H CONSTAN,
     18HT ANNUAL,8H INCOME )
      DATA(DESN(1, 7)=8HPLT CAPI,8HTAL WITH,8H INPUT L,
     18HOAD FACT,8HORS      )
      DATA(DESN(1, 8)=8HWKG CAPI,8HTAL WITH,8H INPUT L,
     18HOAD FACT,8HORS      )
      DATA(DESN(1, 9)=8HPLT CAPI,8HTAL WITH,8H CONST L,
     18HOAD FACT,8HORS      )
      DATA(DESN(1,10)=8HWKG CAPI,8HTAL WITH,8H CONST L,
     18HOAD FACT,8HORS      )


C     MGM=1  TOTAL POWER COST
C     MGM=2  FUEL CYCLE COST
C     MGM=3  PLANT CAPITAL COMPONENT
C     MGM=4  NONFUEL WORKING CAPITAL COMPONENT
C     MGM=5  OPERATING AND MAINTENANCE COST


C     TABLE 1  CASH EXPENSES BEFORE INCOME TAX

   20 WRITE(51,505)
      WRITE(51,800)(DES(I),I=1,8)
      WRITE(51,553)(DESN(I,MGM),I=1,5)
```

```
      WRITE(51,641) $ WRITE(51,642) $ DO 16 N=1,NY
   16 WRITE(51,643)N,Z(N),TEH(N),TLSB(N),TLSC(N),PGNA,PGNB,EP(N),SYD(N),
     1  TAJ(N),TLSQ(N)

C     TABLE 2  CALCULATION OF INCOME TAX

      WRITE(51,508)
      WRITE(51,800)(DES(I),I=1,8)
      WRITE(51,553)(DESN(I,MGM),I=1,5)
      WRITE(51,610) $ WRITE(51,611) $ WRITE(51,612)
      DO 25 N=1,NY
   25 WRITE(51,645)N,TAD(N),TLSQ(N),TLSA(N),TAC(N),TEB(N),
     1  TEA(N),TLS(N),TEQ(N)

C     TABLE 3  PAYOUT OF INVESTMENTS

   40 WRITE(51,506) $ WRITE(51,800)(DES(I),I=1,8)
      WRITE(51,553)(DESN(I,MGM),I=1,5)
      PW26=0.
      WRITE(51,546) $ WRITE(51,547) $ DO 18 N=1,NY
      PW22=PWE(N)*(LL1-1)+PWW(N)*(2-LL1)
      PW25=PW22*TGG(N)
      PW26=PW26+PW25
   18 WRITE(51,543)N,TAA(N),TAB(N),TGG(N),TAJ(N),TAK(N),TAL(N),TAM(N),
     1      PW25
      WRITE(51,548)P
   70 TT66=RRE*(LL1-1)+RRW*(2-LL1)
      WRITE(51,650)TT66,PW26
      WRITE(51,651)TT66
      WRITE(51,652)FITX
      WRITE(51,653)SITX
      WRITE(51,654)SRTX
      WRITE(51,655)PRTX

  505 FORMAT(32H1CASH EXPENSES BEFORE INCOME TAX//)
  506 FORMAT(23H1PAYOUT OF INVESTMENTS //)
  508 FORMAT(26H1CALCULATION OF INCOME TAX//)
  541 FORMAT(1H0,2HPD,8X,5HPOWER,9X,5HTOTAL,6X,8HNON-FUEL,
     1 10X,4HFUEL,8X,6HDEPREC,10X,4HBOND,9X,5HTOTAL)
  542 FORMAT(1H ,10X,5HUNITS,6X,10HBEFORE TAX,6X,7HEXPENSE,
     1 6X,8HPRO-RATA,23X,3HINT,7X,10HDEDUCTIBLE/)
  543 FORMAT(1H ,I3,8F14.5)
  544 FORMAT(1H0,2HPD,8X,5HTOTAL,9X,5HTOTAL,8X,
     1 7HTAXABLE,8X,6HINCOME,7X,9HTOTAL EXP,8X,2HPW,8X,8HWORK CAP)
  545 FORMAT(1H ,10X,5HSALES,6X,10HDEDUCTIBLE,7X,
     1 6HINCOME,9X,3HTAX,9X,9HAFTER TAX,6X,6HFACTOR,6X,8HRECOVERY/)
  546 FORMAT(1H0,2HPD,8X,5HOUTST,9X,5HOUTST,10X,5H CASH,9X,4HBOND,
     1 8X,8HEARNINGS,8X,5HBONDS,7X,5HEQUITY,8X,5HPW OF)
  547 FORMAT(1H ,10X,5HBONDS,9X,6HEQUITY,8X,6H FLOW ,6X,8HINTEREST,
     1 7X,8HON STOCK,7X,6HREPAID,6X,8HRECOVERY,6X,9HCASH FLOW/)
  548 FORMAT(22H0POWER COST,MILLS/KWHE,F18.6)
  552 FORMAT(23H0FIT  SIT  SRT  PROP   ,4F12.6)
  553 FORMAT(1H0,5A8//)
```

```
 610 FORMAT(1H0,2HPD,5X,5HTOTAL,6X,5HTOTAL,6X,5HSTATE,6X,
     15HTOTAL,4X,7HTAXABLE,4X,7HFEDERAL,6X,5HTOTAL,3X,8HTOT CASH)
 611 FORMAT(1H ,7X,5HSALES,3X,8HDEDUCTBL,5X,6HINCOME,3X,
     18HDEDUCTBL,5X,6HINCOME,5X,6HINCOME,2X,9HSTATE AND,4X,
     27HEXPENDS)
 612 FORMAT(1H ,12X,4X,7H(STATE),8X,3HTAX,6X,5H(FED),6X,
     15H(FED),8X,3HTAX,2X,9HLOCAL TAX/)
 641 FORMAT(1H0,2HPD,5X,5HPOWER,4X,7HREACTOR,6X,5HSTATE,
     16X,5HLOCAL,4X,7HINTERIM,3X,8HPROPERTY,7X,4HFUEL,
     26X,6HDEPREC,5X,4HBOND,6X,5HTOTAL)
 642 FORMAT(1H ,7X,5HUNITS,2X,9HOPER COST,6X,5HREVEN,
     13X,8HPROPERTY,3X,8HREPLCMTS,3X,8HINSURNCE,4X,
     27HPRORATA,11X,3X,8HINTEREST,3X,9HDEDUCTBLE/)
 643 FORMAT(1H ,I3,10F11.4)
 645 FORMAT(1H ,I3,8F11.4,F11.5)
 650 FORMAT(46H0TOTAL PRES WORTH OF CASH FLOWS AT INT RATE OF,
     1      F10.6,F16.5)
 651 FORMAT(40H0LEVELIZED TAXES AT INTEREST RATE OF     ,F12.6)
 652 FORMAT(40H     FEDERAL INCOME TAX                  ,F12.6)
 653 FORMAT(40H     STATE INCOME TAX                    ,F12.6)
 654 FORMAT(40H     STATE REVENUE TAX                   ,F12.6)
 655 FORMAT(40H     LOCAL PROPERTY TAX                  ,F12.6)
 800 FORMAT(27H0PROBLEM IDENTIFICATION     ,8A6//)
     RETURN
     END
```

```
      SUBROUTINE FCR

      COMMON FITX,SITX,SRTX,PRTX,REP_,PINS,SUMLA,SUMLV
      COMMON CORE,FCRD,FCRN,RP,BKMA
      COMMON TXRI,TXRW,TXRC,TXRD,BKME,BKMV,TXRG,TXRU
      COMMON TXRY,TXRX,TXRZ,TXFR,TXRH
      COMMON EEE(500),TAA(500),TAB(500),TAC(500),TAD(500),TAE(500),
     1  TAG(500),TEH(500),TEQ(500),TAJ(500),TAK(500),TAL(500),TAM(500),
     2  TEA(500),TEB(500),TEE(500),CEAB(500),CURA(500),U(500),
     3  CSHP(500),CREP(500),CPLU(500),PFW(500),DES(8),EB(500),EFU(500),
     4  EDU(500),EP(500),WPY(500),SYD(500),BRP(500),PWV(500),Z(500),
     5  ELM(500),PWE(500),XEP(500),XEPW(500),XTU(500),XTUW(500),
     6  D(35),LL1,LL2,LL3,LL4,LL5,_L6,LL7,LL8,LL9,
     7  LL10,YRD,TXR,DMW,VOU,PLT,YRS,WC,BND,RRE,RRB,RRW,RRV,NY,
     8  SSH,SREP,SPLU,P,BOT,TOP
      COMMON TLSA(500),TLSB(500),TLSC(500),TLS(500),
     1  TLSQ(500),EGP(500),TGG(500),PWW(500)
      COMMON TXRM,TXRE,TXRJ,TXNT,TXRV,PGNA,PGNB


      WRITE(51,510)
      WRITE(51,800)(DES(I),I=1,8)
   10 TT2=(1.-TXRE)*BKME
      TT3=1.-TXRM
      TT4=TXRU*PLT
      TT5=TXRX*CORE
      TT6=TXRZ*WC
      TT7=TT4+TT5+TT6
      XXHH=TXRE-TXRM
      XXJJ=1.-XXHH
      TT8=(1.-TXRE)*BKMV
      TT9=0.
      XTUT=0.
      XEPT=0.
      XTAT=0.
      IF(PLT)15,12,15
   12 LDE=YRD
      ABBS=2./(YRD*(YRD+1.))
      SLD=1./YRD
      ST24=0.
      ST25=0.
      DO 13 N=1,LDE
      ST33=(LL2-1)*(LDE+1-N)*ABBS+(2-LL2)*SLD
      ST24=ST24+PWV(N)*ST33
   13 ST25=ST25+PWE(N)*ST33
   15 IF(LL4-1)30,30,60


C     PROPORTIONAL CASE

   30 DO 35 N=1,NY
      AN=PWV(N)
      XTAT=XTAT+AN*SYD(N)
      XEPT=XEPT+AN*(ELM(N)+EP(N))
      XTU(N)=EGP(N)*XXHH+(EFU(N)-EP(N))*XXJJ
   35 XTUT=XTUT+AN*XTU(N)
```

```
      WRITE(51,511)
      IF(PLT)38,36,38
   36 FCRD=(TXRY-TXRM*ST24)/TT8
      GO TO 40
   38 FCRD=(TXRY-TXRM*XTAT/PLT)/TT8
   40 TERM1=FCRD*PLT
      FCRN=TXRH/TT8
      TERM2=FCRN*WC
      TERM3=(TXFR*CORE+XTUT)/TT8
      TERM4=XEPT/BKMV
      SPLU=TERM1+TERM2+TERM3+TERM4
      PPW=BOT/BKMV
      PX=1.0E+09*SPLU/PPW
      FCRDP=FCRD*RP
      FCRNP=FCRN*RP
      TERM1P=FCRDP*PLT
      TERM2P=FCRNP*WC
      TERM3P=TERM3*RP
      TERM4P=TERM4*RP
      SPLUP=TERM1P+TERM2P+TERM3P+TERM4P
      PPWA=PPW*RP
      AFC=TERM3/FCRN
      AFCP=TERM3P/FCRNP
      PLEVA=SUMLA*8.760/BKMA
      PLEVV=SUMLV*8.760/BKMV
      PXP=1.0E+09*SPLUP/PPWA
      WRITE(51,512)FCRD,FCRDP
      WRITE(51,513)FCRN,FCRNP
      WRITE(51,522)TERM1,TERM1P
      WRITE(51,523)TERM2,TERM2P
      WRITE(51,524)TERM3,TERM3P
      WRITE(51,525)TERM4,TERM4P
      WRITE(51,515)SPLU,SPLUP
      WRITE(51,521)PLEVV,PLEVA
      WRITE(51,516)PX,PXP
      WRITE(51,517)RRW
      WRITE(51,518)RRV
      WRITE(51,519)RP
      WRITE(51,520)AFC,AFCP
      WRITE(51,526)RRV,RRW
      GO TO 70

C     FIXED PAYMENT CASE

   60 DO 65 N=1,NY
      AN=PWE(N)
      XTAT=XTAT+AN*SYD(N)
      XEPT=XEPT+AN*(ELM(N)+EP(N))
      TT90=TT90+AN*(TAJ(N)*TT3+TAL(N))
      XTU(N)=EGP(N)*XXHH+(EFU(N)-EP(N))*XXJJ
   65 XTUT=XTUT+AN*XTU(N)
      TT91=TT90/TT7
      IF(PLT)67,66,67
   66 FCRD=(TXRU-TXRM*ST25+TXRU*TT91)/TT2
      GO TO 68
```

```
   67 FCRD=(TXRU-TXRM*XTAT/PLT+TXRJ*TT91)/TT2
   68 TERM1=FCRD*PLT
      TM6=TXRZ+TXRZ*TT91
      FCRN=TM6/TT2
      TERM2=FCRN*WC
      TRM3A=TXRX*CORE*(1.+TT91)/TT2
      TRM3B=XTUT/TT2
      TERM3=TRM3A+TRM3B
      TERM4=XEPT/BKME
      SPLU=TERM1+TERM2+TERM3+TERM4
      PPW=BUT/BKME
      PX=1.0E+09*SPLU/PPW

      WRITE(51,512)FCRD
      WRITE(51,513)FCRN
      WRITE(51,522)TERM1
      WRITE(51,523)TERM2
      WRITE(51,524)TERM3
      WRITE(51,525)TERM4
      WRITE(51,515)SPLU
      WRITE(51,516)PX
   70 CALL PAYOUT(0.,1.)
      CALL OUTPUT(6)

      IF(LL7)900,900,80
   80 IF(LL1-1)81,81,900
   81 CALL FCRBRKDN
  900 RETURN


  510 FORMAT(26H1FIXED CHARGE CALCULATIONS//)
  511 FORMAT(1H0,54X,15HCONSTANT INCOME,5X,15HVARIABLE INCOME,///)
  512 FORMAT(48H0FIXED CHARGE RATE ON DEPRECIABLE CAPITAL          ,2F20.8)
  513 FORMAT(48H0FIXED CHARGE RATE ON NONDEPR CAPITAL              ,2F20.8)
  515 FORMAT(48H0LEVELIZED ANNUAL INCOME REQUIRED, MILLION $       ,2F20.8)
  516 FORMAT(48H0POWER COST,MILLS/KWHE                             ,2F20.8)
  517 FORMAT(48H0WEIGHTED AVERAGE INTEREST RATE        RRW         ,F20.8)
  518 FORMAT(48H MODIFIED AVERAGE INTEREST RATE        RRV         ,F20.8)
  519 FORMAT(48H FIXED CHARGE RATE RATIO, R PRIME                  ,F20.8)
  520 FORMAT(48H0AVERAGE FUEL WORKING CAPITAL, MILLION $           ,2F20.8)
  521 FORMAT(48H0LEVELIZED POWER PRODUCTION, BILLION KWHR/YR       ,2F20.8)
  522 FORMAT(48H0TERM 1     LD*PLT                                 ,2F20.8)
  523 FORMAT(48H TERM 2     LN*WC                                  ,2F20.8)
  524 FORMAT(48H TERM 3     LN*FWC                                 ,2F20.8)
  525 FORMAT(48H TERM 4     PRES WORTH AVERAGE EXPENSE             ,2F20.8)
  526 FORMAT(48H0INTEREST RATE USED IN LEVELIZING                  ,2F20.8)
  800 FORMAT(27H0PROBLEM IDENTIFICATION     ,9A6//)

      END
```

```
      SUBROUTINE FCRBRKDN

      DIMENSION TTL(3,13),BRKDN(13,4)

      COMMON FITX,SITX,SRTX,PRTX,REPL,PINS,SUMLA,SUMLV
      COMMON CORE,FCRD,FCRN,RP,BKMA
      COMMON TXRI,TXRW,TXRC,TXRD,BKME,BKMV,TXRG,TXRU
      COMMON TXRY,TXRX,TXRZ,TXFR,TXRH
      COMMON EEE(500),TAA(500),TAB(500),TAC(500),TAD(500),TAE(500),
     1  TAG(500),TEH(500),TEQ(500),TAJ(500),TAK(500),TAL(500),TAM(500),
     2  TEA(500),TEB(500),TEE(500),CFAB(500),CURA(500),U(500),
     3  CSHP(500),CREP(500),CPLU(500),PFW(500),DES(8),EB(500),EFU(500),
     4  EDU(500),EP(500),WPY(500),SYD(500),BRP(500),PWV(500),Z(500),
     5  ELM(500),PWE(500),XEP(500),XEPW(500),XTU(500),XTUW(500),
     6  D(32),LL1,LL2,LL3,LL4,LL5,LL6,LL7,LL8,LL9,
     7  LL10,YRD,TXR,DMW,VOU,PLT,YRS,WC,BND,RRE,RRB,RRW,RRV,NY,
     8  SSH,SREP,SPLU,P,BOT,TOP
      COMMON TLSA(500),TLSB(500),TLSC(500),TLS(500),
     1  TLSW(500),EGP(500),TGG(500),PWW(500)
      COMMON TXRM,TXRE,TXRJ,TXNT,TXRV,PGNA,PGNB

      DATA(TTL(1, 1)=8HPLANT IN,8HVESTMENT,8H         )
      DATA(TTL(1, 2)=8HINITIAL ,8HCORE    ,8H         )
      DATA(TTL(1, 3)=8HNONFUEL ,8HWORKING ,8HCAPITAL  )
      DATA(TTL(1, 4)=8HAVERAGE ,8HINTEREST,8H RATE    )
      DATA(TTL(1, 5)=8HSINK FND,8H DEPRECI,8HATION    )
      DATA(TTL(1, 6)=8HFEDERAL ,8HINCOME T,8HAX       )
      DATA(TTL(1, 7)=8HSTATE IN,8HCOME TAX,8H         )
      DATA(TTL(1, 8)=8HSTATE RE,8HVENUE TA,8HX        )
      DATA(TTL(1, 9)=8HLOCAL PR,8HOPERTY T,8HAX       )
      DATA(TTL(1,10)=8HTOTAL ST,8HATE AND ,8HLOC TAX  )
      DATA(TTL(1,11)=8HINTERIM ,8HREPLACEM,8HENTS     )
      DATA(TTL(1,12)=8HPROPERTY,8H INSURAN,8HCE       )
      DATA(TTL(1,13)=8HTOTAL OF,8H ABOVE I,8HTEMS     )

      IF(RRW)10,10,12
   10 DEPR=1./NY
      GO TO 15
   12 DEPR=RRW/((1.+RRW)**NY-1.)

   15 CORE=0.

   50 PLT=1.0
      WC=0.
      KOLUM=1
      NKN=3
      MGM=7

  100 CALL DEPREC
      CALL EXPENSES(NKN)
      CALL BONDPAY
      CALL COSTEQ
      CALL PAYOUT(1.,0.)
      IF(LL7-1)103,103,102
```

```
102 CALL OUTPUT(MGM)
103 BRKDN( 1,KOLUM)=PLT
    BRKDN( 2,KOLUM)=CORE
    BRKDN( 3,KOLUM)=WC
    BRKDN( 4,KOLUM)=0.
    BRKDN( 5,KOLUM)=0.
    TSLX=SITX+SRTX+PRTX
    BRKDN( 6,KOLUM)=FITX
    BRKDN( 7,KOLUM)=SITX
    BRKDN( 8,KOLUM)=SRTX
    BRKDN( 9,KOLUM)=PRTX
    BRKDN(10,KOLUM)=TSLX
    BRKDN(11,KOLUM)=PGNA
    BRKDN(12,KOLUM)=PGNB
106 GO TO(110,120,130,140),KOLUM


110 PLT=0.
    WC=1.0
    KOLUM=2
    NKN=3
    MGM=8
    GO TO 100

120 PLT=1.0
    WC=0.
    KOLUM=3
    NKN=6
    MGM=9
    GO TO 100

130 PLT=0.
    WC=1.0
    KOLUM=4
    NKN=6
    MGM=10
    GO TO 100


140 WRITE(51,501)
    WRITE(51,800)(DES(I),I=1,8)
    WRITE(51,604)
    WRITE(51,606)
    SUM1=RRW+DEPR+BRKDN(6,1)+BRKDN(10,1)+BRKDN(11,1)+BRKDN(12,1)
    SUM2=RRW     +BRKDN(6,2)+BRKDN(10,2)+BRKDN(11,2)+BRKDN(12,2)
    SUM3=RRW+DEPR+BRKDN(6,3)+BRKDN(10,3)+BRKDN(11,3)+BRKDN(12,3)
    SUM4=RRW     +BRKDN(6,4)+BRKDN(10,4)+BRKDN(11,4)+BRKDN(12,4)


    LINE=4
205 WRITE(51,601)(TTL(LX,LINE),LX=1,3),RRW,RRW
```

```
      LINE=5
      ZERO=0.
  206 WRITE(51,601)(TTL(LX,LINE),LX=1,3),DEPR,ZERO
      DO 210 LINE=6,12
  210 WRITE(51,601)(TTL(LX,LINE),LX=1,3),
     1(BRKDN(LINE,KOLUM),KOLUM=1,2)
      LINE=13
  212 WRITE(51,603)(TTL(LX,LINE),LX=1,3),SUM1,SUM2

      WRITE(51,605)

      LINE=4
  271 WRITE(51,601)(TTL(LX,LINE),LX=1,3),RRW,RRW
      LINE=5
  272 WRITE(51,601)(TTL(LX,LINE),LX=1,3),DEPR,ZERO
      DO 273 LINE=6,12
  273 WRITE(51,601)(TTL(LX,LINE),LX=1,3),
     1(BRKDN(LINE,KOLUM),KOLUM=3,4)
      LINE=13
  274 WRITE(51,603)(TTL(LX,LINE),LX=1,3),SUM3,SUM4


  501 FORMAT(40HIFIXED CHARGE RATE BREAKDOWNS          ,///)
  601 FORMAT(1H ,5X,3A8,6X,5F16.5)
  603 FORMAT(1H ,5X,3A8,6X,5F16.5,///)
  604 FORMAT(47H0FIXED CHARGE RATES BASED ON INPUT LOAD FACTORS,///)
  605 FORMAT(50H0FIXED CHARGE RATES BASED ON CONSTANT LOAD FACTOR ,///)
  606 FORMAT(1H0,42X,11HDEPRECIABLE,4X,14HNONDEPRECIABLE,///)
  800 FORMAT(27H0PROBLEM IDENTIFICATION    ,8A6//)


  900 PLT=D(1)
      WC=D(3)
      CORE=D(11)

      RETURN
      END
```

APPENDIX B

B-1. Example Problem 13: Input and Output

Table B-1 shows the computer input and output for the problem described in Section 5.

B-2. Fuel Cycle Cost - Example Problem 901

Table B-2 shows the computer input and output for Problem 901. The fuel cycle cost portion of this problem is the same as that referred to in Section 3 (p. 19) and Table 2 (p. 20).

Table B-1. Input and Output Data for Example Problem 13.

INPUT DATA PROBLEM 13 ORNL-4116

CARD 1 (CONTROL CARD)

LL1	1	LL2	2	LL3	0	LL4	0	LL5	0
LL6	0	LL7	2	LL8	0	LL9	1	LL10	0

BOND REPAYMENT PROPORTIONAL
SUM OF YEARS DIGITS DEPRECIATION

CARD 2		
D(1)	PLANT INVESTMENT, $MM	140.000000
D(2)	PROJECT LIFE, PERIODS	30.000000
D(3)	NONFUEL WORKING CAPITAL, $MM	2.000000
D(4)	FRACTION OF INVESTMENT IN BONDS	.520000
D(5)	BOND INTEREST RATE PER PERIOD	.042300
D(6)	EQUITY EARNING RATE PER PERIOD	.100000
D(7)	FEDERAL INCOME TAX RATE	.500000
CARD 3		
D(8)	REACTOR POWER, MW ELECTRIC	1000.000000
D(9)	DEPRECIABLE LIFE, YEARS	30.000000
D(10)	VARIABLE OPERATING COST, $MM/PERIOD	1.000000
D(11)	INITIAL CORE INVESTMENT, $MM	25.000000
D(12)	NUMBER OF PERIODS PER YEAR	1.000000
D(13)	NOT USED	0
D(14)	FIXED OPERATING COST, $MM/PERIOD	2.500000
CARD 4		
D(15)	STATE INCOME TAX RATE	.030000
D(16)	STATE GROSS REVENUES TAX RATE	.040000
D(17)	LOCAL PROPERTY TAX RATE PER PERIOD	.032000
D(18)	INTERIM REPLACEMENTS FACTOR PER PERIOD	.003500
D(19)	PROPERTY INSURANCE FACTOR PER PERIOD	.002500
D(20)	NOT USED	0
D(21)	NOT USED	0
CARD 5		
D(22)	FRACTION OF CORE FOR TAX ASSESSMENT	.650000
D(23)	PROP TAX ON NONFUEL WORK CAP PER PD	.030000
D(24)	INITIAL CAPACITY FACTOR	0
D(25)	CAPACITY FACTOR DECLINE PER PERIOD	0
D(26)	PERIODS AT INITIAL CAPACITY FACTOR	0
D(27)	NOT USED	0
D(28)	NOT USED	0

INPUT DATA EXPENSES IN $MM PER PERIOD

PD	CAPY FACTOR	FUEL PURCH	FABR COST	REPR COST	U-PU CRED	OPER BASE	BOND PAYMT
1	.85000	0	0	0	0	0	0
2	.85000	14.40000	4.30000	.93000	2.40000	0	0
3	.85000	7.20000	2.10000	.90000	2.40000	0	0
4	.85000	7.10000	2.00000	.88000	2.30000	0	0
5	.85000	7.00000	1.90000	.87000	2.60000	0	0
6	.85000	7.00000	1.80000	.87000	2.50000	0	0
7	.85000	6.90000	1.70000	.85000	2.50000	0	0
8	.85000	6.80000	1.60000	1.72000	5.00000	0	0
9	.85000	13.50000	3.00000	.84000	2.50000	0	0
10	.85000	6.80000	1.50000	.81000	2.60000	0	0
11	.83000	6.80000	1.50000	.80000	2.50000	0	0
12	.81000	6.80000	1.40000	1.54000	2.50000	0	0
13	.79000	13.50000	2.80000	.77000	5.00000	0	0
14	.77000	6.90000	1.40000	1.49000	2.50000	0	0
15	.75000	12.50000	2.70000	.74000	5.00000	0	0
16	.73000	6.00000	1.30000	1.34000	2.40000	0	0
17	.71000	12.00000	2.60000	.67000	4.80000	0	0
18	.69000	6.00000	1.30000	1.30000	2.40000	0	0
19	.67000	12.00000	2.50000	.65000	4.80000	0	0
20	.65000	6.00000	1.30000	1.18000	2.40000	0	0
21	.63000	12.00000	2.40000	.59000	4.80000	0	0
22	.61000	6.00000	1.20000	.58000	2.40000	0	0
23	.59000	6.00000	1.20000	1.16000	2.40000	0	0
24	.57000	12.00000	2.40000	.56000	4.80000	0	0
25	.55000	6.00000	1.20000	.55000	2.40000	0	0
26	.53000	6.00000	1.20000	.54000	2.40000	0	0
27	.51000	6.00000	1.20000	.52000	4.80000	0	0
28	.49000	6.00000	1.20000	.50000	2.40000	0	0
29	.47000	6.00000	1.20000	.50000	2.40000	0	0
30	.45000	6.00000	1.10000	1.50000	7.50000	0	0

MISCELLANEOUS CALCULATED QUANTITIES

TXRI	TXRW	TXRC	TXR4	TXRM	5.000000E-03	6.880000E-02	2.260100E-02	3.152500E-02	5.150100E-01
TXRE	TXRX	TXRZ	TXFR	TXRH	5.344000E-01	5.865288E-01	5.712832E-01	1.157792E+00	1.039293E+00
TXRU	TXRY	RRW	RRV	BKMA	6.138638E-01	1.182045E+00	6.999600E-02	5.866806E-02	1.240954E+01
BKMV	BKME	SUMLA	SUMLV	RP	1.396325E+01	9.426914E+00	9.652293E+00	1.073524E+01	1.011695E+00

CASH EXPENSES BEFORE INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

TOTAL POWER COST WITH INPUT LOAD FACTORS

PD	POWER UNITS	REACTOR OPER COST	STATE REVEN	LOCAL PROPERTY	INTERIM REPLCMTS	PROPERTY INSURNCE	FUEL PRORATA	DEPREC	BOND INTEREST	TOTAL DEDUCTBLE
1	7.4460	3.3500	1.5011	5.0600	.4900	.4175	9.8149	9.0323	3.6753	33.3391
2	7.4460	3.3500	1.5011	4.9107	.4900	.4175	9.8149	8.7312	3.3914	32.6058
3	7.4460	3.3500	1.5011	4.7613	.4900	.4175	9.8149	8.4301	3.4717	32.2366
4	7.4460	3.3500	1.5011	4.5120	.4900	.4175	9.8149	8.1290	3.3522	31.6667
5	7.4460	3.3500	1.5011	4.4627	.4900	.4175	9.8149	7.8280	3.2248	31.0889
6	7.4460	3.3500	1.5011	4.3133	.4900	.4175	9.8149	7.5269	3.0815	30.4942
7	7.4460	3.3500	1.5011	4.1640	.4900	.4175	9.8149	7.2258	2.9276	29.8929
8	7.4460	3.3500	1.5011	4.0147	.4900	.4175	9.8149	6.9247	2.7671	29.2800
9	7.4460	3.3500	1.5011	3.8653	.4900	.4175	9.8149	6.6237	2.5963	28.6188
10	7.4460	3.3500	1.5011	3.7160	.4900	.4175	9.8149	6.3226	2.5488	28.1609
11	7.2708	3.3300	1.4658	3.5667	.4900	.4175	9.5840	6.0215	2.3595	27.2349
12	7.0956	3.3100	1.4304	3.4173	.4900	.4175	9.3530	5.7204	2.1743	26.3130
13	6.9204	3.2900	1.3951	3.2680	.4900	.4175	9.1221	5.4194	2.0055	25.4076
14	6.7452	3.2700	1.3598	3.1187	.4900	.4175	8.8912	5.1183	1.9464	24.6118
15	6.5700	3.2500	1.3245	2.9693	.4900	.4175	8.6602	4.8172	1.7917	23.7205
16	6.3948	3.2300	1.2892	2.8200	.4900	.4175	8.4293	4.5161	1.7217	22.9138
17	6.2196	3.2100	1.2538	2.6707	.4900	.4175	8.1983	4.2151	1.5575	22.0129
18	6.0444	3.1900	1.2185	2.5213	.4900	.4175	7.9674	3.9140	1.4899	21.2087
19	5.8692	3.1700	1.1832	2.3720	.4900	.4175	7.7365	3.6129	1.3378	20.3198
20	5.6940	3.1500	1.1479	2.2227	.4900	.4175	7.5055	3.3118	1.2812	19.5266
21	5.5188	3.1300	1.1126	2.0733	.4900	.4175	7.2746	3.0108	1.1417	18.6494
22	5.3436	3.1100	1.0772	1.9240	.4900	.4175	7.0436	2.7097	1.0955	17.8676
23	5.1684	3.0900	1.0419	1.7747	.4900	.4175	6.8127	2.4086	.9552	16.9906
24	4.9932	3.0700	1.0066	1.6253	.4900	.4175	6.5818	2.1075	.8327	16.1315
25	4.8180	3.0500	.9713	1.4760	.4900	.4175	6.3508	1.8065	.8087	15.3708
26	4.6428	3.0300	.9360	1.3267	.4900	.4175	6.1199	1.5054	.6917	14.5161
27	4.4676	3.0100	.9006	1.1773	.4900	.4175	5.8889	1.2043	.5748	13.6675
28	4.2924	2.9900	.8653	1.0280	.4900	.4175	5.6580	.9032	.4214	12.7725
29	4.1172	2.9700	.8300	.8787	.4900	.4175	5.4271	.6022	.3183	11.9337
30	3.9420	2.9500	.7947	.7293	.4900	.4175	5.1961	.3011	.2265	11.1022

CALCULATION OF INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

TOTAL POWER COST WITH INPUT LOAD FACTORS

PD	TOTAL SALES	TOTAL DEDUCTBL (STATE)	STATE INCOME TAX	TOTAL DEDUCTBL (FED)	TAXABLE INCOME (FED)	FEDERAL INCOME TAX	TOTAL STATE AND LOCAL TAX	TOT CASH EXPENDS
1	37.5271	33.3391	.1256	33.4647	4.0624	2.0312	6.6867	12.9754
2	37.5271	32.6058	.1476	32.7534	4.7737	2.3868	6.5594	30.4337
3	37.5271	32.2366	.1587	32.3953	5.1317	2.5659	6.4211	21.0445
4	37.5271	31.6667	.1758	31.8425	5.6846	2.8423	6.2889	21.0687
5	37.5271	31.0889	.1931	31.2820	6.2450	3.1225	6.1569	20.7069
6	37.5271	30.4942	.2110	30.7052	6.8219	3.4109	6.0254	20.8638
7	37.5271	29.8929	.2290	30.1219	7.4051	3.7026	5.8941	20.8142
8	37.5271	29.2800	.2474	29.5274	7.9997	3.9999	5.7632	19.1405
9	37.5271	28.6188	.2672	28.8860	8.6410	4.3205	5.6337	29.0517
10	37.5271	28.1609	.2810	28.4419	9.0852	4.5426	5.4981	20.8082
11	36.6441	27.2349	.2823	27.5172	9.1269	4.5635	5.3147	20.7157
12	35.7611	26.3130	.2834	25.5965	9.1646	4.5823	5.1312	21.1710
13	34.8781	25.4076	.2841	25.6917	9.1864	4.5932	4.9472	25.8079
14	33.9951	24.6118	.2815	24.8933	9.1018	4.5509	4.7600	20.7684
15	33.1121	23.7205	.2818	24.0022	9.1099	4.5550	4.5756	24.2280
16	32.2291	22.9138	.2795	23.1932	9.0359	4.5179	4.3886	19.2841
17	31.3461	22.0129	.2800	22.2929	9.0533	4.5266	4.2045	23.3186
18	30.4632	21.2087	.2776	21.4863	8.9769	4.4884	4.0175	18.8034
19	29.5802	20.3198	.2778	20.5976	8.9825	4.4913	3.8330	22.7518
20	28.6972	19.5266	.2751	19.8017	8.8955	4.4477	3.6457	18.2309
21	27.8142	18.6494	.2749	18.9243	8.8898	4.4449	3.4608	22.1333
22	26.9312	17.8676	.2719	18.1395	8.7917	4.3958	3.2732	17.0665
23	26.0482	16.9906	.2717	17.2624	8.7858	4.3929	3.0883	17.4387
24	25.1652	16.1315	.2710	16.4025	8.7627	4.3814	2.9030	21.4218
25	24.2822	15.3708	.2673	15.5381	8.6441	4.3221	2.7146	16.3442
26	23.3992	14.5161	.2665	14.7826	8.6167	4.3083	2.5291	16.1150
27	22.5162	13.6675	.2655	13.9330	8.5832	4.2916	2.3434	13.4726
28	21.6333	12.7725	.2658	13.0383	8.5950	4.2975	2.1592	15.6541
29	20.7503	11.9337	.2645	12.1982	8.5521	4.2760	1.9732	15.4267
30	19.8673	11.1022	.2630	11.3652	8.5021	4.2511	1.7870	10.9955

PAYOUT OF INVESTMENTS

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

TOTAL POWER COST WITH INPUT LOAD FACTORS

PD	OUTST BONDS	OUTST EQUITY	CASH FLOW	BOND INTEREST	EARNINGS ON STOCK	BONDS REPAID	EQUITY RECOVERY	PW OF CASH FLOW
1	86.84000	80.16000	24.55168	3.67333	8.01600	6.68842	6.17392	22.94558
2	80.15158	73.98608	7.09334	3.39041	7.39861	-1.92175	-1.77392	6.19565
3	82.07333	75.76000	16.48258	3.47170	7.57600	2.82614	2.60874	13.45485
4	79.24720	73.15126	16.45839	3.35216	7.31513	3.01138	2.77976	12.55621
5	76.23582	70.37153	16.82016	3.22478	7.03715	3.41028	3.14790	11.99277
6	72.82554	67.22357	16.65324	3.08052	6.72236	3.58739	3.29297	11.10367
7	69.25815	63.93060	16.71290	2.92962	6.39306	3.84291	3.54731	10.40823
8	65.41524	60.38329	18.38656	2.76706	6.03833	4.98221	4.59895	10.70146
9	60.43303	55.78434	8.47540	2.55632	5.57843	.17714	.16351	4.61021
10	60.25589	55.62083	16.71891	2.54882	5.56208	4.47616	4.13184	8.49936
11	55.77973	51.48698	15.92842	2.35948	5.14890	4.37842	4.04162	7.56779
12	51.40131	47.44737	14.59006	2.17428	4.74474	3.98894	3.68211	6.47845
13	47.41237	43.76527	9.07018	2.00554	4.37653	1.39782	1.29029	3.76398
14	46.01456	42.47497	13.22675	1.94642	4.24750	3.62707	3.37576	5.12983
15	42.35748	39.09928	8.88410	1.79172	3.90992	1.65488	1.52758	3.22019
16	40.70261	37.57164	12.94507	1.72172	3.75716	3.80241	3.58377	4.38520
17	36.82019	33.98787	8.02751	1.55749	3.39879	1.59704	1.47419	2.54147
18	35.22315	32.51368	11.65974	1.48994	3.25137	3.59758	3.32085	3.44993
19	31.62557	29.19283	6.82838	1.33776	2.91928	1.33710	1.23424	1.88824
20	30.28847	27.95859	10.45628	1.28120	2.79586	3.32239	3.06682	2.70489
21	26.96608	24.89177	5.68092	1.14067	2.48918	1.06656	.98452	1.37212
22	25.89952	23.90725	9.85470	1.09555	2.39073	3.31678	3.06165	2.22678
23	22.58274	20.84560	8.60947	.95525	2.08456	2.89622	2.67344	1.81630
24	19.68652	18.17217	3.74339	.83274	1.81722	.56859	.52485	.73806
25	19.11793	17.64732	7.93803	.80869	1.76473	2.78960	2.57501	1.46271
26	16.32833	15.07231	7.29428	.69069	1.50723	2.64491	2.44145	1.25444
27	13.68343	12.63086	9.04358	.57881	1.26309	3.74493	3.45686	1.45555
28	9.93850	9.17400	5.97912	.42040	.91740	2.41348	2.22783	.89937
29	7.52501	6.94617	5.32356	.31831	.69462	2.24153	2.06910	.74838
30	5.28349	4.87706	10.87175	.22349	.48771	5.28349	4.87706	1.42835

POWER COST, MILLS/KWHE 5.039898

TOTAL PRES WORTH OF CASH FLOWS AT INT RATE OF .069996 167.00000

LEVELIZED TAXES AT INTEREST RATE OF .069996

FEDERAL INCOME TAX	3.17966
STATE INCOME TAX	.229977
STATE REVENUE TAX	1.37360
LOCAL PROPERTY TAX	3.50462

FIXED CHARGE CALCULATIONS

PROBLEM IDENTIFICATION PROBLEM 13 5RVL-4116

	CONSTANT INCOME	VARIABLE INCOME
FIXED CHARGE RATE ON DEPRECIABLE CAPITA	.13525089	.13683270
FIXED CHARGE RATE ON NONDEPR CAPITAL	.15985945	.16172907
TERM 1 LD*PLT	18.93512438	19.15657764
TERM 2 LN*WC	.31971890	.32345813
TERM 3 LN*FWC	2.54185276	2.57158066
TERM 4 PRES WORTH AVERAGE EXPENSE	12.14635296	12.28840903
LEVELIZED ANNUAL INCOME REQUIRED, MILLION $	33.94304899	34.34002546
LEVELIZED POWER PRODUCTION, BILLION KWHR/YR	6.73486887	6.81363564
POWER COST, MILLS/KWHE	5.03989753	5.03989753
WEIGHTED AVERAGE INTEREST RATE RRW	.06999600	
MODIFIED AVERAGE INTEREST RATE RRV	.05866806	
FIXED CHARGE RATE RATIO, R PRIME	1.01169537	
AVERAGE FUEL WORKING CAPITAL, MILLION $	15.90054734	15.90054734
INTEREST RATE USED IN LEVELIZING	.05866806	.06999600

CASH EXPENSES BEFORE INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

USING CALCULATED CONSTANT ANNUAL INCOME

PD	POWER UNITS	REACTOR OPER COST	STATE REVEN	LOCAL PROPERTY	INTERIM REPLCMTS	PROPERTY INSURNCE	FUEL PRORATA	DEPREC	BOND INTEREST	TOTAL DEDUCTBLE
1	7.4460	3.3500	1.3577	5.0600	.4900	.4175	9.8149	9.0323	3.6733	33.1957
2	7.4460	3.3500	1.3577	4.9107	.4900	.4175	9.8149	8.7312	3.4271	32.4991
3	7.4460	3.3500	1.3577	4.7613	.4900	.4175	9.8149	8.4301	3.5473	32.1688
4	7.4460	3.3500	1.3577	4.6120	.4900	.4175	9.8149	8.1290	3.4689	31.6400
5	7.4460	3.3500	1.3577	4.4627	.4900	.4175	9.8149	7.8280	3.3850	31.1058
6	7.4460	3.3500	1.3577	4.3133	.4900	.4175	9.8149	7.5269	3.2869	30.5572
7	7.4460	3.3500	1.3577	4.1640	.4900	.4175	9.8149	7.2258	3.1848	30.0047
8	7.4460	3.3500	1.3577	4.0147	.4900	.4175	9.8149	6.9247	3.0759	29.4434
9	7.4460	3.3500	1.3577	3.8653	.4900	.4175	9.8149	6.6237	2.9679	28.8370
10	7.4460	3.3500	1.3577	3.7160	.4900	.4175	9.8149	6.3226	2.9683	28.4370
11	7.2708	3.3300	1.3577	3.5667	.4900	.4175	9.5840	6.0215	2.8403	27.6076
12	7.0956	3.3100	1.3577	3.4173	.4900	.4175	9.3530	5.7204	2.7109	26.7769
13	6.9204	3.2900	1.3577	3.2680	.4900	.4175	9.1221	5.4194	2.5923	25.9570
14	6.7452	3.2700	1.3577	3.1187	.4900	.4175	8.8912	5.1183	2.5772	25.2405
15	6.5700	3.2500	1.3577	2.9693	.4900	.4175	8.6602	4.8172	2.4600	24.4220
16	6.3948	3.2300	1.3577	2.8200	.4900	.4175	8.4293	4.5161	2.4207	23.6813
17	6.2196	3.2100	1.3577	2.6707	.4900	.4175	8.1983	4.2151	2.2799	22.8392
18	6.0444	3.1900	1.3577	2.5213	.4900	.4175	7.9674	3.9140	2.2282	22.0861
19	5.8692	3.1700	1.3577	2.3720	.4900	.4175	7.7365	3.6129	2.0837	21.2403
20	5.6940	3.1500	1.3577	2.2227	.4900	.4175	7.5055	3.3118	2.0262	20.4814
21	5.5188	3.1300	1.3577	2.0733	.4900	.4175	7.2746	3.0108	1.8756	19.6295
22	5.3436	3.1100	1.3577	1.9240	.4900	.4175	7.0436	2.7097	1.8109	18.8634
23	5.1684	3.0900	1.3577	1.7747	.4900	.4175	6.8127	2.4086	1.6407	17.9919
24	4.9932	3.0700	1.3577	1.6253	.4900	.4175	6.5818	2.1075	1.4776	17.1274
25	4.8180	3.0500	1.3577	1.4760	.4900	.4175	6.3508	1.8065	1.4015	16.3500
26	4.6428	3.0300	1.3577	1.3267	.4900	.4175	6.1199	1.5054	1.2193	15.4665
27	4.4676	3.0100	1.3577	1.1773	.4900	.4175	5.8889	1.2043	1.0305	14.5763
28	4.2924	2.9900	1.3577	1.0280	.4900	.4175	5.6580	.9032	.7815	13.6260
29	4.1172	2.9700	1.3577	.8787	.4900	.4175	5.4271	.6022	.5746	12.7177
30	3.9420	2.9500	1.3577	.7293	.4900	.4175	5.1961	.3011	.3597	11.8014

CALCULATION OF INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

USING CALCULATED CONSTANT ANNUAL INCOME

PD	TOTAL SALES	TOTAL DEDUCTBL (STATE)	STATE INCOME TAX	TOTAL DEDUCTBL (FED)	TAXABLE INCOME (FED)	FEDERAL INCOME TAX	TOTAL STATE AND LOCAL TAX	TOT CASH EXPENDS
1	33.9430	33.1957	.0224	33.2181	.7249	.3625	6.4401	11.0601
2	33.9430	32.4991	.0433	32.5424	1.4006	.7003	6.3117	28.4995
3	33.9430	32.1688	.0532	32.2221	1.7210	.8605	6.1723	19.0903
4	33.9430	31.6400	.0691	31.7091	2.2339	1.1170	6.0388	19.0933
5	33.9430	31.1058	.0851	31.1909	2.7521	1.3761	5.9055	18.7091
6	33.9430	30.5572	.1016	30.6588	3.2842	1.6421	5.7726	18.8423
7	33.9430	30.0047	.1181	30.1229	3.8202	1.9101	5.6399	18.7675
8	33.9430	29.4434	.1350	29.5784	4.3646	2.1823	5.5074	17.0672
9	33.9430	28.8370	.1532	28.9902	4.9529	2.4764	5.3762	26.9502
10	33.9430	28.4370	.1652	28.5022	5.3409	2.6704	5.2389	18.6768
11	33.9430	27.6076	.1901	27.7977	6.1454	3.0727	5.1145	19.0246
12	33.9430	26.7769	.2150	26.9919	6.9511	3.4756	4.9900	19.9231
13	33.9430	25.9570	.2396	25.1966	7.7465	3.8732	4.8653	25.0061
14	33.9430	25.2405	.2611	25.5016	8.4415	4.2207	4.7375	20.4157
15	33.9430	24.4220	.2856	24.7076	9.2354	4.6177	4.6127	24.3279
16	33.9430	23.6813	.3079	23.9892	9.9539	4.9769	4.4856	19.8400
17	33.9430	22.8392	.3331	23.1723	10.7707	5.3854	4.3615	24.3344
18	33.9430	22.0861	.3557	22.4418	11.5012	5.7506	4.2348	20.2829
19	33.9430	21.2403	.3811	21.5213	12.3217	6.1609	4.1108	24.6992
20	33.9430	20.4814	.4038	20.8853	13.0578	6.5289	3.9842	20.6506
21	33.9430	19.6295	.4294	20.0589	13.8841	6.9421	3.8605	25.0300
22	33.9430	18.8634	.4524	19.3158	14.6272	7.3136	3.7341	20.4452
23	33.9430	17.9919	.4785	18.4705	15.4726	7.7363	3.6109	21.3047
24	33.9430	17.1274	.5045	17.6319	16.3111	8.1556	3.4875	25.7806
25	33.9430	16.3500	.5278	16.8778	17.0653	8.5326	3.3615	21.2017
26	33.9430	15.4665	.5543	15.0208	17.9223	8.9611	3.2387	21.4773
27	33.9430	14.5763	.5810	15.1573	18.7858	9.3929	3.1161	19.3464
28	33.9430	13.6260	.6095	14.2355	19.7076	9.8538	2.9952	22.0465
29	33.9430	12.7177	.6368	13.3544	20.5886	10.2943	2.8732	22.3450
30	33.9430	11.8014	.6642	12.4657	21.4774	10.7387	2.7513	18.4475

PAYOUT OF INVESTMENTS

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

USING CALCULATED CONSTANT ANNUAL INCOME

PD	OUTST BONDS	OUTST EQUITY	CASH FLOW	BOND INTEREST	EARNINGS ON STOCK	BONDS REPAID	EQUITY RECOVERY	PW OF CASH FLOW
1	86.84000	80.16000	22.88295	3.67333	8.01600	5.82068	5.37294	21.38602
2	81.01932	74.78706	5.44352	3.42712	7.47871	2.84040	-2.62190	4.75462
3	83.85971	77.40697	14.83277	3.54727	7.74090	1.85360	1.71101	12.12442
4	82.00612	75.69795	14.84977	3.46886	7.56980	1.98178	1.82933	11.32899
5	80.02434	73.86862	15.23397	3.38503	7.38686	2.32028	2.14180	10.86181
6	77.70406	71.72682	15.10079	3.28688	7.17268	2.41344	2.22779	10.06252
7	75.29062	69.49903	15.17559	3.18479	6.94990	2.62127	2.41963	9.45084
8	72.66935	67.07940	16.87586	3.07391	6.70794	3.68888	3.40512	9.82220
9	68.98047	63.67428	6.99287	2.91787	6.36743	-1.19206	-1.10037	3.80379
10	70.17253	64.77464	15.25622	2.96830	6.47746	3.02664	2.79382	7.76086
11	67.14590	61.98083	14.91842	2.84027	6.19808	3.05763	2.82243	7.08793
12	64.08826	59.15839	14.01995	2.71093	5.91584	2.80445	2.58873	6.22531
13	61.28381	56.56967	8.93700	2.59231	5.65697	.35762	.33011	3.70872
14	60.92619	56.23956	13.52735	2.57718	5.62396	2.76963	2.55658	5.24641
15	58.15656	53.68298	9.61515	2.46002	5.36830	.92915	.85768	3.48517
16	57.22741	52.82530	14.10305	2.42072	5.28253	3.32790	3.07191	4.77748
17	53.89951	49.75340	9.60869	2.27995	4.97534	1.22377	1.12963	3.04206
18	52.67575	48.62376	13.65017	2.22818	4.86238	3.41620	3.15341	4.04182
19	49.25955	45.47035	9.24399	2.08368	4.54704	1.35885	1.25432	2.55619
20	47.90070	44.21603	13.29243	2.02620	4.42160	3.55921	3.28542	3.43527
21	44.34149	40.93061	8.91303	1.87565	4.09306	1.58105	1.41328	2.15278
22	42.81044	39.51733	13.49752	1.81088	3.95173	4.02231	3.71290	3.04689
23	38.78814	35.80443	12.63833	1.64074	3.58044	3.85692	3.56023	2.66625
24	34.93122	32.24420	8.15245	1.47759	3.22442	1.79943	1.66101	1.60934
25	33.13179	30.58319	12.74139	1.40147	3.05832	4.30643	3.97517	2.34781
26	28.82536	26.60802	12.46572	1.21931	2.66080	4.46451	4.12109	2.14675
27	24.36084	22.48693	14.59660	1.03046	2.24869	5.88507	5.43237	2.34927
28	18.47577	17.05456	11.89654	.78153	1.70546	4.89297	4.51659	1.78945
29	13.58280	12.53797	11.59808	.57455	1.25380	5.08026	4.68947	1.63044
30	8.50254	7.84850	17.49555	.35966	.78485	8.50254	7.84850	2.29860

POWER COST, MILLS/KWHE 5.039898

TOTAL PRES WORTH OF CASH FLOWS AT INT RATE OF .069996 167.00000

LEVELIZED TAXES AT INTEREST RATE OF .069996

FEDERAL INCOME TAX	3.35968
STATE INCOME TAX	.20777
STATE REVENUE TAX	1.357722
LOCAL PROPERTY TAX	3.604162

CASH EXPENSES BEFORE INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

PLT CAPITAL WITH INPUT LOAD FACTORS

PD	POWER UNITS	REACTOR OPER COST	STATE REVEN	LOCAL PROPERTY	INTERIM REPLCMTS	PROPERTY INSURNCE	FUEL PRORATA	DEPREC	BOND INTEREST	TOTAL DEDUCTBLE
1	7.4460	0	.0060	.0320	.0035	.0025	0	.0645	.0220	.1305
2	7.4460	0	.0060	.0309	.0035	.0025	0	.0624	.0214	.1267
3	7.4460	0	.0060	.0299	.0035	.0025	0	.0602	.0208	.1229
4	7.4460	0	.0060	.0288	.0035	.0025	0	.0581	.0202	.1191
5	7.4460	0	.0060	.0277	.0035	.0025	0	.0559	.0196	.1152
6	7.4460	0	.0060	.0267	.0035	.0025	0	.0538	.0189	.1114
7	7.4460	0	.0060	.0256	.0035	.0025	0	.0516	.0183	.1075
8	7.4460	0	.0060	.0245	.0035	.0025	0	.0495	.0176	.1035
9	7.4460	0	.0060	.0235	.0035	.0025	0	.0473	.0168	.0996
10	7.4460	0	.0060	.0224	.0035	.0025	0	.0452	.0161	.0956
11	7.2708	0	.0058	.0213	.0035	.0025	0	.0430	.0153	.0914
12	7.0956	0	.0057	.0203	.0035	.0025	0	.0409	.0145	.0873
13	6.9204	0	.0056	.0192	.0035	.0025	0	.0387	.0137	.0831
14	6.7452	0	.0054	.0181	.0035	.0025	0	.0366	.0129	.0790
15	6.5700	0	.0053	.0171	.0035	.0025	0	.0344	.0121	.0748
16	6.3948	0	.0051	.0160	.0035	.0025	0	.0323	.0113	.0707
17	6.2196	0	.0050	.0149	.0035	.0025	0	.0301	.0105	.0666
18	6.0444	0	.0049	.0139	.0035	.0025	0	.0280	.0097	.0624
19	5.8692	0	.0047	.0128	.0035	.0025	0	.0258	.0090	.0583
20	5.6940	0	.0046	.0117	.0035	.0025	0	.0237	.0082	.0542
21	5.5188	0	.0044	.0107	.0035	.0025	0	.0215	.0074	.0500
22	5.3436	0	.0043	.0096	.0035	.0025	0	.0194	.0067	.0459
23	5.1684	0	.0042	.0085	.0035	.0025	0	.0172	.0059	.0418
24	4.9932	0	.0040	.0075	.0035	.0025	0	.0151	.0051	.0377
25	4.8180	0	.0039	.0064	.0035	.0025	0	.0129	.0044	.0336
26	4.6428	0	.0037	.0053	.0035	.0025	0	.0108	.0036	.0295
27	4.4676	0	.0036	.0043	.0035	.0025	0	.0086	.0029	.0254
28	4.2924	0	.0034	.0032	.0035	.0025	0	.0065	.0022	.0213
29	4.1172	0	.0033	.0021	.0035	.0025	0	.0043	.0014	.0172
30	3.9420	0	.0032	.0011	.0035	.0025	0	.0022	.0007	.0131

CALCULATION OF INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

PLT CAPITAL WITH INPUT LOAD FACTORS

PD	TOTAL SALES	TOTAL DEDUCTBL (STATE)	STATE INCOME TAX	TOTAL DEDUCTBL (FED)	TAXABLE INCOME (FED)	FEDERAL INCOME TAX	TOTAL STATE AND LOCAL TAX	TOT CASH EXPENDS
1	.1495	.1305	.0006	.1311	.0185	.0092	.0386	.0538
2	.1495	.1267	.0007	.1274	.0221	.0111	.0376	.0547
3	.1495	.1229	.0008	.1237	.0258	.0129	.0366	.0556
4	.1495	.1191	.0009	.1200	.0295	.0148	.0357	.0565
5	.1495	.1152	.0010	.1163	.0333	.0166	.0347	.0574
6	.1495	.1114	.0011	.1125	.0370	.0185	.0338	.0583
7	.1495	.1075	.0013	.1087	.0408	.0204	.0328	.0592
8	.1495	.1035	.0014	.1049	.0446	.0223	.0319	.0602
9	.1495	.0996	.0015	.1011	.0484	.0242	.0309	.0612
10	.1495	.0956	.0016	.0972	.0523	.0262	.0300	.0622
11	.1460	.0914	.0016	.0931	.0529	.0265	.0288	.0613
12	.1425	.0873	.0017	.0889	.0535	.0268	.0276	.0604
13	.1390	.0831	.0017	.0848	.0542	.0271	.0264	.0595
14	.1355	.0790	.0017	.0807	.0548	.0274	.0252	.0586
15	.1319	.0748	.0017	.0766	.0554	.0277	.0241	.0577
16	.1284	.0707	.0017	.0724	.0560	.0280	.0229	.0569
17	.1249	.0666	.0018	.0683	.0566	.0283	.0217	.0560
18	.1214	.0624	.0018	.0642	.0572	.0286	.0205	.0551
19	.1179	.0583	.0018	.0601	.0578	.0289	.0193	.0542
20	.1143	.0542	.0018	.0560	.0584	.0292	.0181	.0533
21	.1108	.0500	.0018	.0519	.0590	.0295	.0169	.0524
22	.1073	.0459	.0018	.0478	.0596	.0298	.0157	.0515
23	.1038	.0418	.0019	.0437	.0601	.0301	.0145	.0506
24	.1003	.0377	.0019	.0396	.0607	.0304	.0134	.0497
25	.0968	.0336	.0019	.0355	.0613	.0306	.0122	.0488
26	.0932	.0295	.0019	.0314	.0619	.0309	.0110	.0479
27	.0897	.0254	.0019	.0273	.0624	.0312	.0098	.0470
28	.0862	.0213	.0019	.0232	.0630	.0315	.0086	.0461
29	.0827	.0172	.0020	.0191	.0635	.0318	.0074	.0452
30	.0792	.0131	.0020	.0151	.0641	.0320	.0062	.0443

PAYOUT OF INVESTMENTS

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

PLT CAPITAL WITH INPUT LOAD FACTORS

PD	OUTST BONDS	OUTST EQUITY	CASH FLOW	BOND INTEREST	EARNINGS ON STOCK	BONDS REPAID	EQUITY RECOVERY	PW OF CASH FLOW
1	.52000	.48000	.09575	.02200	.04800	.01339	.01236	.08948
2	.50661	.46764	.09436	.02143	.04676	.01387	.01280	.08286
3	.49274	.45484	.09397	.02084	.04548	.01438	.01327	.07671
4	.47837	.44157	.09307	.02023	.04416	.01491	.01376	.07100
5	.46345	.42780	.09215	.01960	.04278	.01548	.01429	.06571
6	.44797	.41352	.09123	.01895	.04135	.01608	.01484	.06079
7	.43189	.39867	.09029	.01827	.03987	.01672	.01543	.05623
8	.41518	.38324	.08933	.01756	.03832	.01739	.01605	.05199
9	.39778	.36719	.08836	.01683	.03672	.01810	.01671	.04806
10	.37968	.35047	.08738	.01606	.03505	.01886	.01741	.04442
11	.36082	.33306	.08474	.01526	.03331	.01881	.01736	.04026
12	.34201	.31570	.08210	.01447	.03157	.01875	.01731	.03646
13	.32326	.29839	.07946	.01367	.02984	.01869	.01726	.03298
14	.30457	.28114	.07683	.01288	.02811	.01863	.01721	.02980
15	.28593	.26394	.07419	.01209	.02639	.01857	.01714	.02689
16	.26737	.24680	.07156	.01131	.02468	.01850	.01707	.02424
17	.24887	.22973	.06893	.01053	.02297	.01842	.01701	.02182
18	.23045	.21272	.05630	.00975	.02127	.01835	.01693	.01962
19	.21210	.19579	.05367	.00897	.01958	.01826	.01686	.01761
20	.19384	.17893	.05105	.00820	.01789	.01818	.01678	.01578
21	.17566	.16215	.05842	.00743	.01622	.01808	.01669	.01411
22	.15758	.14546	.05580	.00667	.01455	.01799	.01660	.01260
23	.13960	.12886	.05318	.00590	.01289	.01788	.01651	.01122
24	.12171	.11235	.05056	.00515	.01124	.01777	.01640	.00997
25	.10394	.09595	.04795	.00440	.00959	.01766	.01630	.00883
26	.08629	.07965	.04533	.00365	.00796	.01753	.01618	.00781
27	.06875	.06346	.04272	.00291	.00635	.01740	.01606	.00688
28	.05135	.04740	.04011	.00217	.00474	.01727	.01594	.00603
29	.03408	.03146	.03751	.00144	.00315	.01712	.01580	.00527
30	.01696	.01566	.03491	.00072	.00157	.01696	.01566	.00459

POWER COST, MILLS/KWHE .020082

TOTAL PRES WORTH OF CASH FLOWS AT INT RATE OF .069996 1.00000

LEVELIZED TAXES AT INTEREST RATE OF .069996

FEDERAL INCOME TAX	.021825
STATE INCOME TAX	.001350
STATE REVENUE TAX	.005473
LOCAL PROPERTY TAX	.021601

CASH EXPENSES BEFORE INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 13 SRVL-4116

WKG CAPITAL WITH INPUT LOAD FACTORS

PD	POWER UNITS	REACTOR OPER COST	STATE REVEN	LOCAL PROPERTY	INTERIM REPLCMTS	PROPERTY INSURNCE	FUEL PRORATA	DEPREC	BOND INTEREST	TOTAL DEDUCTBLE
1	7.4460	0	.0071	.0300	0	.0025	0	0	.0220	.0616
2	7.4460	0	.0071	.0300	0	.0025	0	0	.0218	.0614
3	7.4460	0	.0071	.0300	0	.0025	0	0	.0216	.0612
4	7.4460	0	.0071	.0300	0	.0025	0	0	.0214	.0610
5	7.4460	0	.0071	.0300	0	.0025	0	0	.0212	.0608
6	7.4460	0	.0071	.0300	0	.0025	0	0	.0210	.0606
7	7.4460	0	.0071	.0300	0	.0025	0	0	.0208	.0604
8	7.4460	0	.0071	.0300	0	.0025	0	0	.0206	.0601
9	7.4460	0	.0071	.0300	0	.0025	0	0	.0203	.0599
10	7.4460	0	.0071	.0300	0	.0025	0	0	.0200	.0596
11	7.2708	0	.0069	.0300	0	.0025	0	0	.0197	.0591
12	7.0956	0	.0067	.0300	0	.0025	0	0	.0195	.0587
13	6.9204	0	.0066	.0300	0	.0025	0	0	.0192	.0583
14	6.7452	0	.0064	.0300	0	.0025	0	0	.0190	.0579
15	6.5700	0	.0062	.0300	0	.0025	0	0	.0188	.0576
16	6.3948	0	.0061	.0300	0	.0025	0	0	.0187	.0573
17	6.2196	0	.0059	.0300	0	.0025	0	0	.0186	.0570
18	6.0444	0	.0057	.0300	0	.0025	0	0	.0185	.0568
19	5.8692	0	.0056	.0300	0	.0025	0	0	.0185	.0566
20	5.6940	0	.0054	.0300	0	.0025	0	0	.0185	.0564
21	5.5188	0	.0052	.0300	0	.0025	0	0	.0185	.0563
22	5.3436	0	.0051	.0300	0	.0025	0	0	.0186	.0562
23	5.1684	0	.0049	.0300	0	.0025	0	0	.0188	.0562
24	4.9932	0	.0047	.0300	0	.0025	0	0	.0190	.0562
25	4.8180	0	.0046	.0300	0	.0025	0	0	.0192	.0563
26	4.6428	0	.0044	.0300	0	.0025	0	0	.0195	.0564
27	4.4676	0	.0042	.0300	0	.0025	0	0	.0199	.0566
28	4.2924	0	.0041	.0300	0	.0025	0	0	.0203	.0569
29	4.1172	0	.0039	.0300	0	.0025	0	0	.0208	.0572
30	3.9420	0	.0037	.0300	0	.0025	0	0	.0214	.0576

CALCULATION OF INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

WKG CAPITAL WITH INPUT LOAD FACTORS

PD	TOTAL SALES	TOTAL DEDUCTBL (STATE)	STATE INCOME TAX	TOTAL DEDUCTBL (FED)	TAXABLE INCOME (FED)	FEDERAL INCOME TAX	TOTAL STATE AND LOCAL TAX	TOT CASH EXPENDS
1	.1767	.0616	.0035	.0650	.1117	.0559	.0405	.0989
2	.1767	.0614	.0035	.0649	.1119	.0559	.0405	.0990
3	.1767	.0612	.0035	.0647	.1121	.0560	.0405	.0991
4	.1767	.0610	.0035	.0645	.1123	.0561	.0405	.0992
5	.1767	.0608	.0035	.0643	.1125	.0562	.0405	.0993
6	.1767	.0606	.0035	.0641	.1127	.0563	.0406	.0994
7	.1767	.0604	.0035	.0639	.1129	.0564	.0406	.0995
8	.1767	.0601	.0035	.0636	.1131	.0566	.0406	.0996
9	.1767	.0599	.0035	.0634	.1134	.0567	.0406	.0998
10	.1767	.0596	.0035	.0631	.1136	.0568	.0406	.0999
11	.1726	.0591	.0034	.0625	.1100	.0550	.0403	.0978
12	.1684	.0587	.0033	.0620	.1064	.0532	.0400	.0957
13	.1643	.0583	.0032	.0615	.1028	.0514	.0397	.0936
14	.1601	.0579	.0031	.0610	.0991	.0496	.0395	.0915
15	.1559	.0576	.0030	.0605	.0954	.0477	.0392	.0894
16	.1518	.0573	.0028	.0601	.0917	.0458	.0389	.0872
17	.1476	.0570	.0027	.0597	.0879	.0440	.0386	.0851
18	.1435	.0568	.0026	.0594	.0841	.0421	.0383	.0829
19	.1393	.0566	.0025	.0590	.0803	.0401	.0381	.0807
20	.1352	.0564	.0024	.0588	.0764	.0382	.0378	.0785
21	.1310	.0563	.0022	.0585	.0725	.0362	.0375	.0762
22	.1268	.0562	.0021	.0583	.0685	.0343	.0372	.0740
23	.1227	.0562	.0020	.0582	.0645	.0323	.0369	.0717
24	.1185	.0562	.0019	.0581	.0604	.0302	.0366	.0693
25	.1144	.0563	.0017	.0580	.0563	.0282	.0363	.0670
26	.1102	.0564	.0016	.0580	.0522	.0261	.0360	.0646
27	.1060	.0566	.0015	.0581	.0479	.0240	.0357	.0622
28	.1019	.0569	.0014	.0582	.0437	.0218	.0354	.0598
29	.0977	.0572	.0012	.0584	.0393	.0197	.0351	.0573
30	.0936	.0576	.0011	.0587	.0349	.0174	.0348	.0548

PAYOUT OF INVESTMENTS

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

WKG CAPITAL WITH INPUT LOAD FACTORS

PD	OUTST BONDS	OUTST EQUITY	CASH FLOW	BOND INTEREST	EARNINGS ON STOCK	BONDS REPAID	EQUITY RECOVERY	PW OF CASH FLOW
1	.52000	.48000	.07736	.02200	.04800	.00409	.00377	.07276
2	.51591	.47623	.07777	.02182	.04762	.00433	.00399	.06792
3	.51159	.47223	.07767	.02164	.04722	.00458	.00423	.06340
4	.50701	.46801	.07757	.02145	.04680	.00485	.00448	.05918
5	.50216	.46353	.07747	.02124	.04635	.00513	.00474	.05523
6	.49702	.45879	.07735	.02102	.04588	.00543	.00502	.05155
7	.49159	.45377	.07724	.02079	.04538	.00575	.00531	.04810
8	.48584	.44846	.07711	.02055	.04485	.00609	.00562	.04488
9	.47974	.44284	.07698	.02029	.04428	.00645	.00595	.04187
10	.47330	.43689	.07684	.02002	.04369	.00683	.00631	.03906
11	.46647	.43059	.07475	.01973	.04306	.00622	.00574	.03552
12	.46025	.42485	.07258	.01947	.04248	.00558	.00515	.03227
13	.45467	.41970	.07052	.01923	.04197	.00490	.00452	.02931
14	.44977	.41517	.05858	.01903	.04152	.00418	.00386	.02660
15	.44559	.41132	.05655	.01885	.04113	.00342	.00315	.02412
16	.44217	.40816	.05454	.01870	.04082	.00261	.00241	.02186
17	.43956	.40575	.05255	.01859	.04058	.00176	.00162	.01980
18	.43780	.40413	.05057	.01852	.04041	.00085	.00079	.01792
19	.43695	.40334	.05852	.01848	.04033	-.00010	-.00009	.01621
20	.43705	.40343	.05659	.01849	.04034	-.00112	-.00103	.01465
21	.43817	.40446	.05477	.01853	.04045	-.00219	-.00202	.01323
22	.44036	.40648	.05289	.01863	.04065	-.00332	-.00307	.01194
23	.44368	.40955	.05102	.01877	.04095	-.00452	-.00418	.01076
24	.44820	.41373	.04916	.01896	.04137	-.00580	-.00535	.00970
25	.45400	.41908	.04737	.01920	.04191	-.00714	-.00659	.00873
26	.46114	.42567	.04559	.01951	.04257	-.00857	-.00791	.00785
27	.46971	.43358	.04384	.01987	.04336	-.01008	-.00930	.00706
28	.47979	.44289	.04213	.02030	.04429	-.01168	-.01078	.00634
29	.49147	.45366	.04045	.02079	.04537	-.01337	-.01234	.00569
30	.50484	.46601	1.03880	.02135	.04660	.50484	.46601	.13648

POWER COST, MILLS/KWHE .023736

TOTAL PRES WORTH OF CASH FLOWS AT INT RATE OF .069996 1.00000

LEVELIZED TAXES AT INTEREST RATE OF .069996

FEDERAL INCOME TAX	.04969
STATE INCOME TAX	.00374
STATE REVENUE TAX	.00469
LOCAL PROPERTY TAX	.030000

CASH EXPENSES BEFORE INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

PLT CAPITAL WITH CONST LOAD FACTORS

PD	POWER UNITS	REACTOR OPER COST	STATE REVEN	LOCAL PROPERTY	INTERIM REPLCMTS	PROPERTY INSURNCE	FUEL PRORATA	DEPREC	BOND INTEREST	TOTAL DEDUCTBLE
1	8.7600	0	.0054	.0320	.0035	.0025	0	.0645	.0220	.1299
2	8.7600	0	.0054	.0309	.0035	.0025	0	.0624	.0216	.1263
3	8.7600	0	.0054	.0299	.0035	.0025	0	.0602	.0211	.1226
4	8.7600	0	.0054	.0288	.0035	.0025	0	.0581	.0207	.1190
5	8.7600	0	.0054	.0277	.0035	.0025	0	.0559	.0202	.1153
6	8.7600	0	.0054	.0267	.0035	.0025	0	.0538	.0198	.1116
7	8.7600	0	.0054	.0256	.0035	.0025	0	.0516	.0193	.1079
8	8.7600	0	.0054	.0245	.0035	.0025	0	.0495	.0188	.1042
9	8.7600	0	.0054	.0235	.0035	.0025	0	.0473	.0183	.1005
10	8.7600	0	.0054	.0224	.0035	.0025	0	.0452	.0177	.0967
11	8.7600	0	.0054	.0213	.0035	.0025	0	.0430	.0172	.0929
12	8.7600	0	.0054	.0203	.0035	.0025	0	.0409	.0166	.0891
13	8.7600	0	.0054	.0192	.0035	.0025	0	.0387	.0160	.0853
14	8.7600	0	.0054	.0181	.0035	.0025	0	.0366	.0154	.0815
15	8.7600	0	.0054	.0171	.0035	.0025	0	.0344	.0148	.0776
16	8.7600	0	.0054	.0160	.0035	.0025	0	.0323	.0141	.0738
17	8.7600	0	.0054	.0149	.0035	.0025	0	.0301	.0134	.0699
18	8.7600	0	.0054	.0139	.0035	.0025	0	.0280	.0127	.0659
19	8.7600	0	.0054	.0128	.0035	.0025	0	.0258	.0119	.0620
20	8.7600	0	.0054	.0117	.0035	.0025	0	.0237	.0112	.0580
21	8.7600	0	.0054	.0107	.0035	.0025	0	.0215	.0104	.0539
22	8.7600	0	.0054	.0096	.0035	.0025	0	.0194	.0095	.0499
23	8.7600	0	.0054	.0085	.0035	.0025	0	.0172	.0086	.0458
24	8.7600	0	.0054	.0075	.0035	.0025	0	.0151	.0077	.0416
25	8.7600	0	.0054	.0064	.0035	.0025	0	.0129	.0068	.0375
26	8.7600	0	.0054	.0053	.0035	.0025	0	.0108	.0058	.0333
27	8.7600	0	.0054	.0043	.0035	.0025	0	.0086	.0047	.0290
28	8.7600	0	.0054	.0032	.0035	.0025	0	.0065	.0036	.0247
29	8.7600	0	.0054	.0021	.0035	.0025	0	.0043	.0025	.0203
30	8.7600	0	.0054	.0011	.0035	.0025	0	.0022	.0013	.0159

CALCULATION OF INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

PLT CAPITAL WITH CONST LOAD FACTORS

PD	TOTAL SALES	TOTAL DEDUCTBL (STATE)	STATE INCOME TAX	TOTAL DEDUCTBL (FED)	TAXABLE INCOME (FED)	FEDERAL INCOME TAX	TOTAL STATE AND LOCAL TAX	TOT CASH EXPENDS
1	.1353	.1299	.0002	.1301	.0052	.0026	.0376	.0462
2	.1353	.1263	.0003	.1256	.0087	.0043	.0366	.0470
3	.1353	.1226	.0004	.1230	.0122	.0061	.0357	.0478
4	.1353	.1190	.0005	.1195	.0158	.0079	.0347	.0486
5	.1353	.1153	.0006	.1159	.0194	.0097	.0337	.0494
6	.1353	.1116	.0007	.1123	.0229	.0115	.0328	.0503
7	.1353	.1079	.0008	.1087	.0265	.0133	.0318	.0511
8	.1353	.1042	.0009	.1051	.0301	.0151	.0309	.0519
9	.1353	.1005	.0010	.1015	.0338	.0169	.0299	.0528
10	.1353	.0967	.0012	.0979	.0374	.0187	.0290	.0537
11	.1353	.0929	.0013	.0942	.0410	.0205	.0280	.0545
12	.1353	.0891	.0014	.0905	.0447	.0224	.0271	.0554
13	.1353	.0853	.0015	.0868	.0484	.0242	.0261	.0563
14	.1353	.0815	.0016	.0831	.0521	.0261	.0252	.0572
15	.1353	.0776	.0017	.0794	.0559	.0279	.0242	.0581
16	.1353	.0738	.0018	.0756	.0596	.0298	.0233	.0591
17	.1353	.0699	.0020	.0718	.0634	.0317	.0223	.0600
18	.1353	.0659	.0021	.0680	.0672	.0336	.0214	.0610
19	.1353	.0620	.0022	.0642	.0711	.0355	.0204	.0620
20	.1353	.0580	.0023	.0603	.0750	.0375	.0195	.0629
21	.1353	.0539	.0024	.0554	.0789	.0394	.0185	.0640
22	.1353	.0499	.0026	.0524	.0828	.0414	.0176	.0650
23	.1353	.0458	.0027	.0485	.0868	.0434	.0166	.0660
24	.1353	.0416	.0028	.0445	.0908	.0454	.0157	.0671
25	.1353	.0375	.0029	.0404	.0948	.0474	.0147	.0682
26	.1353	.0333	.0031	.0363	.0989	.0495	.0138	.0693
27	.1353	.0290	.0032	.0322	.1031	.0515	.0129	.0704
28	.1353	.0247	.0033	.0280	.1073	.0536	.0119	.0716
29	.1353	.0203	.0034	.0238	.1115	.0557	.0110	.0727
30	.1353	.0159	.0036	.0195	.1158	.0579	.0101	.0739

PAYOUT OF INVESTMENTS

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

PLT CAPITAL WITH CONST LOAD FACTORS

PD	OUTST BONDS	OUTST EQUITY	CASH FLOW	BOND INTEREST	EARNINGS ON STOCK	BONDS REPAID	EQUITY RECOVERY	PW OF CASH FLOW
1	.52000	.48000	.09910	.02200	.04800	.00993	.00917	.08327
2	.51007	.47083	.09829	.02158	.04708	.01021	.00942	.07712
3	.49986	.46141	.09748	.02114	.04614	.01050	.00969	.07141
4	.48936	.45172	.09666	.02070	.04517	.01081	.00998	.06611
5	.47855	.44174	.09583	.02024	.04417	.01114	.01028	.06120
6	.46741	.43146	.09500	.01977	.04315	.01148	.01061	.05664
7	.45593	.42086	.09416	.01929	.04209	.01185	.01094	.05241
8	.44408	.40992	.09331	.01878	.04099	.01224	.01130	.04849
9	.43184	.39862	.09245	.01827	.03986	.01265	.01168	.04485
10	.41919	.38695	.09159	.01773	.03869	.01308	.01208	.04148
11	.40611	.37487	.09071	.01718	.03749	.01354	.01250	.03835
12	.39256	.36237	.07993	.01661	.03624	.01403	.01295	.03545
13	.37853	.34941	.07893	.01601	.03494	.01455	.01343	.03276
14	.36398	.33598	.07803	.01540	.03360	.01510	.01393	.03026
15	.34889	.32205	.07711	.01476	.03220	.01567	.01447	.02795
16	.33321	.30758	.07617	.01409	.03076	.01629	.01505	.02580
17	.31693	.29255	.07523	.01341	.02925	.01694	.01563	.02382
18	.29999	.27691	.07427	.01269	.02769	.01762	.01627	.02198
19	.28237	.26065	.07330	.01194	.02606	.01835	.01694	.02027
20	.26402	.24371	.07231	.01117	.02437	.01912	.01765	.01869
21	.24490	.22606	.07130	.01036	.02261	.01993	.01840	.01722
22	.22496	.20766	.07028	.00952	.02077	.02080	.01920	.01586
23	.20417	.18846	.05923	.00864	.01885	.02171	.02004	.01461
24	.18246	.16842	.05817	.00772	.01684	.02268	.02093	.01344
25	.15978	.14749	.05708	.00676	.01475	.02370	.02188	.01236
26	.13608	.12561	.05598	.00576	.01256	.02478	.02288	.01136
27	.11130	.10274	.05485	.00471	.01027	.02593	.02394	.01044
28	.08537	.07880	.05369	.00361	.00788	.02715	.02506	.00958
29	.05822	.05374	.05251	.00246	.00537	.02843	.02624	.00879
30	.02979	.02750	.05130	.00126	.00275	.02979	.02751	.00805

POWER COST, MILLS/KWHE .015440

TOTAL PRES WORTH OF CASH FLOWS AT INT RATE OF .069996 1.00000

LEVELIZED TAXES AT INTEREST RATE OF .069996

FEDERAL INCOME TAX	.020395
STATE INCOME TAX	.001262
STATE REVENUE TAX	.005410
LOCAL PROPERTY TAX	.021601

CASH EXPENSES BEFORE INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

WKG CAPITAL WITH CONST LOAD FACTORS

PD	POWER UNITS	REACTOR OPER COST	STATE REVEN	LOCAL PROPERTY	INTERIM REPLCMTS	PROPERTY INSURNCE	FUEL PRORATA	DEPREC	BOND INTEREST	TOTAL DEDUCTBLE
1	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
2	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
3	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
4	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
5	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
6	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
7	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
8	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
9	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
10	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
11	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
12	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
13	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
14	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
15	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
16	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
17	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
18	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
19	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
20	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
21	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
22	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
23	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
24	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
25	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
26	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
27	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
28	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
29	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609
30	8.7600	0	.0064	.0300	0	.0025	0	0	.0220	.0609

CALCULATION OF INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

WKG CAPITAL WITH CONST LOAD FACTORS

PD	TOTAL SALES	TOTAL DEDUCTBL (STATE)	STATE INCOME TAX	TOTAL DEDUCTBL (FED)	TAXABLE INCOME (FED)	FEDERAL INCOME TAX	TOTAL STATE AND LOCAL TAX	TO CASH EXPENDS
1	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
2	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
3	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
4	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
5	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
6	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
7	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
8	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
9	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
10	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
11	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
12	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
13	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
14	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
15	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
16	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
17	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
18	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
19	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
20	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
21	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
22	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
23	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
24	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
25	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
26	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
27	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
28	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
29	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899
30	.1599	.0609	.0030	.0639	.0960	.0480	.0394	.0899

PAYOUT OF INVESTMENTS

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

WKG CAPITAL WITH CONST LOAD FACTORS

PD	OUTST BONDS	OUTST EQUITY	CASH FLOW	BOND INTEREST	EARNINGS ON STOCK	BONDS REPAID	EQUITY RECOVERY	PW OF CASH FLOW
1	.52000	.48000	.07000	.02200	.04800	=0	=0	.06542
2	.52000	.48000	.07000	.02200	.04800	=0	=0	.06114
3	.52000	.48000	.07000	.02200	.04800	=0	=0	.05714
4	.52000	.48000	.07000	.02200	.04800	=0	=0	.05340
5	.52000	.48000	.07000	.02200	.04800	=0	=0	.04991
6	.52000	.48000	.07000	.02200	.04800	=0	=0	.04664
7	.52000	.48000	.07000	.02200	.04800	=0	=0	.04359
8	.52000	.48000	.07000	.02200	.04800	=0	=0	.04074
9	.52000	.48000	.07000	.02200	.04800	=0	=0	.03807
10	.52000	.48000	.07000	.02200	.04800	=0	=0	.03558
11	.52000	.48000	.07000	.02200	.04800	=0	=0	.03326
12	.52000	.48000	.07000	.02200	.04800	=0	=0	.03108
13	.52000	.48000	.07000	.02200	.04800	=0	=0	.02905
14	.52000	.48000	.07000	.02200	.04800	=0	=0	.02715
15	.52000	.48000	.07000	.02200	.04800	=0	=0	.02537
16	.52000	.48000	.07000	.02200	.04800	=0	=0	.02371
17	.52000	.48000	.07000	.02200	.04800	=0	=0	.02216
18	.52000	.48000	.07000	.02200	.04800	=0	=0	.02071
19	.52000	.48000	.07000	.02200	.04800	=0	=0	.01936
20	.52000	.48000	.07000	.02200	.04800	=0	=0	.01809
21	.52000	.48000	.07000	.02200	.04800	=0	=0	.01691
22	.52000	.48000	.07000	.02200	.04800	=0	=0	.01580
23	.52000	.48000	.07000	.02200	.04800	=0	=0	.01477
24	.52000	.48000	.07000	.02200	.04800	=0	=0	.01380
25	.52000	.48000	.07000	.02200	.04800	=0	=0	.01290
26	.52000	.48000	.07000	.02200	.04800	=0	=0	.01205
27	.52000	.48000	.07000	.02200	.04800	=0	=0	.01127
28	.52000	.48000	.07000	.02200	.04800	=0	=0	.01053
29	.52000	.48000	.07000	.02200	.04800	=0	=0	.00984
30	.52000	.48000	.07000	.02200	.04800	.52000	.48000	.14058

POWER COST, MILLS/KWHE .018249

TOTAL PRES WORTH OF CASH FLOWS AT INT RATE OF .069996 1.00000

LEVELIZED TAXES AT INTEREST RATE OF .069996

FEDERAL INCOME TAX	.048000
STATE INCOME TAX	.002969
STATE REVENUE TAX	.006394
LOCAL PROPERTY TAX	.030000

FIXED CHARGE RATE BREAKDOWNS

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

FIXED CHARGE RATES BASED ON INPUT LOAD FACTORS

	DEPRECIABLE	NONDEPRECIABLE
AVERAGE INTEREST RATE	.07000	.07000
SINK FND DEPRECIATION	.01059	0
FEDERAL INCOME TAX	.02183	.04969
STATE INCOME TAX	.00135	.00307
STATE REVENUE TAX	.00547	.00647
LOCAL PROPERTY TAX	.02160	.03000
TOTAL STATE AND LOC TAX	.02842	.03954
INTERIM REPLACEMENTS	.00350	0
PROPERTY INSURANCE	.00250	.00250
TOTAL OF ABOVE ITEMS	.13683	.16173

FIXED CHARGE RATES BASED ON CONSTANT LOAD FACTOR

AVERAGE INTEREST RATE	.07000	.07000
SINK FND DEPRECIATION	.01059	0
FEDERAL INCOME TAX	.02039	.04800
STATE INCOME TAX	.00126	.00297
STATE REVENUE TAX	.00541	.00639
LOCAL PROPERTY TAX	.02160	.03000
TOTAL STATE AND LOC TAX	.02827	.03936
INTERIM REPLACEMENTS	.00350	0
PROPERTY INSURANCE	.00250	.00250
TOTAL OF ABOVE ITEMS	.13525	.15986

CASH EXPENSES BEFORE INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

FUEL CYCLE COST ONLY

PD	POWER UNITS	REACTOR OPER COST		STATE REVEN	LOCAL PROPERTY	INTERIM REPLCMTS	PROPERTY INSURNCE	FUEL PRORATA	DEPREC	BOND INTEREST	TOTAL DEDUCTBLE
1	7.4460		0	.4990	.5200	0	.0625	9.8149	0	.5499	11.4463
2	7.4460		0	.4990	.5200	0	.0625	9.8149	0	.3494	11.2458
3	7.4460		0	.4990	.5200	0	.0625	9.8149	0	.5162	11.4126
4	7.4460		0	.4990	.5200	0	.0625	9.8149	0	.4853	11.3817
5	7.4460		0	.4990	.5200	0	.0625	9.8149	0	.4500	11.3464
6	7.4460		0	.4990	.5200	0	.0625	9.8149	0	.4014	11.2978
7	7.4460		0	.4990	.5200	0	.0625	9.8149	0	.3499	11.2463
8	7.4460		0	.4990	.5200	0	.0625	9.8149	0	.2908	11.1872
9	7.4460		0	.4990	.5200	0	.0625	9.8149	0	.1878	11.0842
10	7.4460		0	.4990	.5200	0	.0625	9.8149	0	.2925	11.1889
11	7.2708		0	.4872	.5200	0	.0625	9.5840	0	.2211	10.8738
12	7.0956		0	.4755	.5200	0	.0625	9.3530	0	.1511	10.5621
13	6.9204		0	.4638	.5200	0	.0625	9.1221	0	.0978	10.2661
14	6.7452		0	.4520	.5200	0	.0625	8.8912	0	.1531	10.0788
15	6.5700		0	.4403	.5200	0	.0625	8.6602	0	.1120	9.7950
16	6.3948		0	.4285	.5200	0	.0625	8.4293	0	.1546	9.5949
17	6.2196		0	.4168	.5200	0	.0625	8.1983	0	.1019	9.2996
18	6.0444		0	.4051	.5200	0	.0625	7.9674	0	.1448	9.0998
19	5.8692		0	.3933	.5200	0	.0625	7.7365	0	.1020	8.8142
20	5.6940		0	.3816	.5200	0	.0625	7.5055	0	.1535	8.6231
21	5.5188		0	.3698	.5200	0	.0625	7.2746	0	.1197	8.3466
22	5.3436		0	.3581	.5200	0	.0625	7.0436	0	.1800	8.1642
23	5.1684		0	.3464	.5200	0	.0625	6.8127	0	.1436	7.8852
24	4.9932		0	.3346	.5200	0	.0625	6.5818	0	.1265	7.6224
25	4.8180		0	.3229	.5200	0	.0625	6.3508	0	.2002	7.4564
26	4.6428		0	.3111	.5200	0	.0625	6.1199	0	.1813	7.1948
27	4.4676		0	.2994	.5200	0	.0625	5.8889	0	.1666	6.9374
28	4.2924		0	.2876	.5200	0	.0625	5.6580	0	.1054	6.6316
29	4.1172		0	.2759	.5200	0	.0625	5.4271	0	.0945	6.3800
30	3.9420		0	.2642	.5200	0	.0625	5.1961	0	.0918	6.1336

CALCULATION OF INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

FUEL CYCLE COST ONLY

PD	TOTAL SALES	TOTAL DEDUCTBL (STATE)	STATE INCOME TAX	TOTAL DEDUCTBL (FED)	TAXABLE INCOME (FED)	FEDERAL INCOME TAX	TOTAL STATE AND LOCAL TAX	TOT CASH EXPENDS
1	12.4746	11.4463	.0308	11.4771	.9974	.4987	1.0498	1.6110
2	12.4746	11.2458	.0369	11.2827	1.1919	.5959	1.0558	18.9443
3	12.4746	11.4126	.0319	11.4445	1.0301	.5151	1.0508	9.4284
4	12.4746	11.3817	.0328	11.4145	1.0601	.5300	1.0518	9.3243
5	12.4746	11.3464	.0338	11.3802	1.0943	.5472	1.0528	8.8325
6	12.4746	11.2978	.0353	11.3331	1.1415	.5707	1.0543	8.8575
7	12.4746	11.2463	.0368	11.2832	1.1914	.5957	1.0558	8.6740
8	12.4746	11.1872	.0386	11.2258	1.2487	.6244	1.0576	6.8645
9	12.4746	11.0842	.0417	11.1259	1.3487	.6743	1.0607	16.6375
10	12.4746	11.1889	.0386	11.2275	1.2471	.6236	1.0576	8.2536
11	12.1811	10.8738	.0392	10.9131	1.2680	.6340	1.0465	8.3430
12	11.8875	10.5621	.0398	10.5019	1.2856	.6428	1.0353	8.9806
13	11.5940	10.2661	.0398	10.3059	1.2881	.6440	1.0236	13.8001
14	11.3005	10.0788	.0367	10.1154	1.1851	.5925	1.0087	8.9437
15	11.0070	9.7950	.0364	9.8313	1.1756	.5878	.9966	12.5870
16	10.7135	9.5949	.0336	9.6285	1.0850	.5425	.9821	7.8271
17	10.4199	9.2996	.0336	9.3332	1.0868	.5434	.9704	12.0463
18	10.1264	9.0998	.0308	9.1306	.9958	.4979	.9559	7.7163
19	9.8329	8.8142	.0306	8.8448	.9881	.4941	.9439	11.8504
20	9.5394	8.6231	.0275	8.6506	.8888	.4444	.9291	7.5160
21	9.2459	8.3466	.0270	8.3736	.8723	.4361	.9168	11.6054
22	8.9523	8.1642	.0236	8.1879	.7645	.3822	.9017	6.7265
23	8.6588	7.8852	.0232	7.9084	.7504	.3752	.8896	7.2873
24	8.3653	7.6224	.0223	7.6447	.7206	.3603	.8769	11.4597
25	8.0718	7.4564	.0185	7.4749	.5969	.2985	.8613	6.5723
26	7.7783	7.1948	.0175	7.2123	.5660	.2830	.8486	6.5341
27	7.4847	6.9374	.0164	6.9538	.5309	.2655	.8358	4.0838
28	7.1912	6.6316	.0168	6.6484	.5429	.2714	.8244	6.4584
29	6.8977	6.3800	.0155	6.3955	.5022	.2511	.8114	6.4250
30	6.6042	6.1336	.0141	6.1477	.4565	.2283	.7983	2.1890

PAYOUT OF INVESTMENTS

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

FUEL CYCLE COST ONLY

PD	OUTST BONDS	OUTST EQUITY	CASH FLOW	BOND INTEREST	EARNINGS ON STOCK	BONDS REPAID	EQUITY RECOVERY	PW OF CASH FLOW
1	13.00000	12.00000	10.85352	.54990	1.20000	4.73908	4.37454	10.15286
2	8.26092	7.62546	-6.46972	.34944	.76255	-3.94248	-3.63922	-5.65094
3	12.20340	11.26468	3.04617	.51620	1.12647	.72982	.67368	2.48661
4	11.47358	10.59100	3.15027	.48533	1.05910	.83504	.77080	2.40336
5	10.63855	9.82020	3.64208	.45001	.98202	1.14923	1.06082	2.59680
6	9.48932	8.75937	3.61704	.40140	.87594	1.21665	1.12306	2.41024
7	8.27267	7.63631	3.80054	.34993	.76363	1.39723	1.28975	2.36685
8	6.87545	6.34657	5.61010	.29083	.63466	2.43600	2.24861	3.26523
9	4.43945	4.09795	-4.16297	.18779	.40980	-2.47549	-2.28506	-2.26445
10	6.91493	6.38301	4.22096	.29250	.63830	1.71088	1.57928	2.14580
11	5.20405	4.80374	3.83810	.22013	.48037	1.63155	1.50604	1.82353
12	3.57250	3.29769	2.90696	.15112	.32977	1.26156	1.16451	1.29078
13	2.31095	2.13318	-2.20612	.09775	.21332	-1.30894	-1.20825	-.91551
14	3.61989	3.34143	2.35690	.15312	.33414	.97216	.89738	.91405
15	2.64773	2.44406	-1.57998	.11200	.24441	-1.00692	-.92946	-.57269
16	3.65465	3.37352	2.89636	.15459	.33735	1.24510	1.14932	.97777
17	2.40955	2.22420	-1.62636	.10192	.22242	-1.01437	-.93634	-.51490
18	3.42392	3.16054	2.41014	.14483	.31605	1.01361	.93564	.71312
19	2.41030	2.22489	-2.01753	.10196	.22249	-1.21783	-1.12415	-.55790
20	3.62813	3.34904	2.02340	.15347	.33490	.79821	.73681	.52292
21	2.82992	2.61223	-2.35959	.11971	.26122	-1.42507	-1.31545	-.56992
22	4.25499	3.92768	2.22536	.17999	.39277	.85962	.79349	.50245
23	3.39537	3.13419	1.37154	.14362	.31342	.47554	.43896	.28935
24	2.91983	2.69523	-3.09442	.12351	.26952	-1.81347	-1.67397	-.61011
25	4.73330	4.36920	1.49949	.20022	.43692	.44842	.41393	.27631
26	4.28488	3.95527	1.24413	.18125	.39553	.34702	.32033	.21425
27	3.93786	3.63494	3.40097	.16657	.36349	1.49287	1.37804	.54738
28	2.44498	2.25691	.73286	.10342	.22569	.20995	.19380	.11023
29	2.23504	2.06311	.47259	.09454	.20631	.08935	.08248	.06645
30	2.14569	1.98063	4.41514	.09076	.19806	2.14569	1.98063	.58007

POWER COST, MILLS/KWHE 1.675338

TOTAL PRES WORTH OF CASH FLOWS AT INT RATE OF .069996 25.00000

LEVELIZED TAXES AT INTEREST RATE OF .069996

FEDERAL INCOME TAX	.53554
STATE INCOME TAX	.03326
STATE REVENUE TAX	.45606
LOCAL PROPERTY TAX	.52000

CASH EXPENSES BEFORE INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

PLANT CAPITAL COMPONENT ONLY

PD	POWER UNITS	REACTOR OPER COST		STATE REVEN	LOCAL PROPERTY	INTERIM REPLCMTS	PROPERTY INSURNCE	FUEL PRORATA		DEPREC	BOND INTEREST	TOTAL DEDUCTBLE
1	7.4460		0	.8374	4.4800	.4900	.3500		0	9.0323	3.0794	18.2691
2	7.4460		0	.8374	4.3307	.4900	.3500		0	8.7312	3.0001	17.7394
3	7.4460		0	.8374	4.1813	.4900	.3500		0	8.4301	2.9180	17.2068
4	7.4460		0	.8374	4.0320	.4900	.3500		0	8.1290	2.8359	16.6713
5	7.4460		0	.8374	3.8827	.4900	.3500		0	7.8280	2.7446	16.1326
6	7.4460		0	.8374	3.7333	.4900	.3500		0	7.5269	2.6529	15.5905
7	7.4460		0	.8374	3.5840	.4900	.3500		0	7.2258	2.5577	15.0449
8	7.4460		0	.8374	3.4347	.4900	.3500		0	6.9247	2.4587	14.4955
9	7.4460		0	.8374	3.2853	.4900	.3500		0	6.6237	2.3557	13.9420
10	7.4460		0	.8374	3.1360	.4900	.3500		0	6.3226	2.2485	13.3844
11	7.2708		0	.8177	2.9867	.4900	.3500		0	6.0215	2.1368	12.8026
12	7.0956		0	.7980	2.8373	.4900	.3500		0	5.7204	2.0204	12.2211
13	6.9204		0	.7783	2.6880	.4900	.3500		0	5.4194	1.9143	11.6400
14	6.7452		0	.7586	2.5387	.4900	.3500		0	5.1183	1.8086	11.0592
15	6.5700		0	.7389	2.3893	.4900	.3500		0	4.8172	1.6983	10.4787
16	6.3948		0	.7192	2.2400	.4900	.3500		0	4.5161	1.5863	9.8986
17	6.2196		0	.6995	2.0907	.4900	.3500		0	4.2151	1.4758	9.3190
18	6.0444		0	.6798	1.9413	.4900	.3500		0	3.9140	1.3647	8.7398
19	5.8692		0	.6601	1.7920	.4900	.3500		0	3.6129	1.2561	8.1610
20	5.6940		0	.6403	1.6427	.4900	.3500		0	3.3118	1.1479	7.5828
21	5.5188		0	.6206	1.4933	.4900	.3500		0	3.0108	1.0413	7.0050
22	5.3436		0	.6009	1.3440	.4900	.3500		0	2.7097	.9352	6.4278
23	5.1684		0	.5812	1.1947	.4900	.3500		0	2.4086	.8267	5.8512
24	4.9932		0	.5615	1.0453	.4900	.3500		0	2.1075	.7218	5.2752
25	4.8180		0	.5418	.8960	.4900	.3500		0	1.8065	.6155	4.6998
26	4.6428		0	.5221	.7467	.4900	.3500		0	1.5054	.5110	4.1252
27	4.4676		0	.5024	.5973	.4900	.3500		0	1.2043	.4072	3.5512
28	4.2924		0	.4827	.4480	.4900	.3500		0	.9032	.3041	2.9780
29	4.1172		0	.4630	.2987	.4900	.3500		0	.6022	.2018	2.4057
30	3.9420		0	.4433	.1493	.4900	.3500		0	.3011	.1005	1.8342

CALCULATION OF INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

PLANT CAPITAL COMPONENT ONLY

PD	TOTAL SALES	TOTAL DEDUCTBL (STATE)	STATE INCOME TAX	TOTAL DEDUCTBL (FED)	TAXABLE INCOME (FED)	FEDERAL INCOME TAX	TOTAL STATE AND LOCAL TAX	TOT CASH EXPENDS
1	20.9345	18.2691	.0800	18.3490	2.5854	1.2927	5.3973	7.5301
2	20.9345	17.7394	.0959	17.8352	3.0992	1.5496	5.2639	7.6535
3	20.9345	17.2068	.1118	17.3187	3.6158	1.8079	5.1305	7.7784
4	20.9345	16.6713	.1279	15.7992	4.1353	2.0676	4.9973	7.9049
5	20.9345	16.1326	.1441	15.2756	4.6578	2.3289	4.8641	8.0330
6	20.9345	15.5905	.1603	15.7508	5.1837	2.5918	4.7310	8.1629
7	20.9345	15.0449	.1767	15.2215	5.7129	2.8565	4.5981	8.2945
8	20.9345	14.4955	.1932	14.6886	6.2459	3.1229	4.4652	8.4281
9	20.9345	13.9420	.2098	14.1518	6.7827	3.3913	4.3325	8.5638
10	20.9345	13.3844	.2265	13.6109	7.3235	3.6618	4.1999	8.7017
11	20.4419	12.8026	.2292	13.0318	7.4101	3.7050	4.0335	8.5786
12	19.9493	12.2211	.2318	12.4530	7.4963	3.7482	3.8672	8.4553
13	19.4567	11.6400	.2345	11.8745	7.5823	3.7911	3.7008	8.3319
14	18.9642	11.0592	.2372	11.2963	7.6679	3.8339	3.5344	8.2083
15	18.4716	10.4787	.2398	10.7185	7.7531	3.8766	3.3680	8.0845
16	17.9790	9.8986	.2424	10.1411	7.8380	3.9190	3.2016	7.9606
17	17.4864	9.3190	.2450	9.5640	7.9224	3.9612	3.0351	7.8364
18	16.9939	8.7398	.2476	8.9874	8.0065	4.0032	2.8687	7.7119
19	16.5013	8.1610	.2502	8.4112	8.0901	4.0450	2.7023	7.5873
20	16.0087	7.5828	.2528	7.8355	8.1732	4.0866	2.5358	7.4624
21	15.5161	7.0050	.2553	7.2603	8.2558	4.1279	2.3693	7.3372
22	15.0236	6.4278	.2579	6.6857	8.3379	4.1689	2.2028	7.2118
23	14.5310	5.8512	.2604	6.1116	8.4194	4.2097	2.0363	7.0860
24	14.0384	5.2752	.2629	5.5381	8.5003	4.2502	1.8698	6.9599
25	13.5458	4.6998	.2654	4.9652	8.5806	4.2903	1.7032	6.8335
26	13.0533	4.1252	.2678	4.3930	8.6603	4.3301	1.5366	6.7068
27	12.5607	3.5512	.2703	3.8215	8.7392	4.3696	1.3700	6.5796
28	12.0681	2.9780	.2727	3.2507	8.8174	4.4087	1.2034	6.4521
29	11.5755	2.4057	.2751	2.6808	8.8948	4.4474	1.0368	6.3242
30	11.0830	1.8342	.2775	2.1117	8.9713	4.4857	.8701	6.1958

PAYOUT OF INVESTMENTS

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

PLANT CAPITAL COMPONENT ONLY

PD	OUTST BONDS	OUTST EQUITY	CASH FLOW	BOND INTEREST	EARNINGS ON STOCK	BONDS REPAID	EQUITY RECOVERY	PW OF CASH FLOW
1	72.80000	67.20000	13.40442	3.07944	6.72000	1.87459	1.73039	12.52754
2	70.92541	65.46964	13.28095	3.00014	6.54696	1.94160	1.79225	11.60018
3	68.98381	63.67737	13.15603	2.91802	6.36774	2.01254	1.85774	10.73936
4	66.97127	61.81963	13.02956	2.83288	6.18196	2.08765	1.92700	9.94034
5	64.88362	59.89257	12.90145	2.74458	5.98926	2.16716	2.00046	9.19873
6	62.71646	57.89212	12.77152	2.65291	5.78921	2.25134	2.07816	8.51046
7	60.46512	55.81396	12.63994	2.55767	5.58140	2.34045	2.16042	7.87173
8	58.12467	53.65654	12.50633	2.45867	5.36535	2.43480	2.24751	7.27902
9	55.68987	51.40603	12.37056	2.35568	5.14060	2.53468	2.33974	6.72905
10	53.15519	49.06633	12.23282	2.24846	4.90663	2.64042	2.43731	6.21878
11	50.51478	46.62902	11.86333	2.13678	4.66290	2.65310	2.43055	5.63641
12	47.88168	44.19847	11.49400	2.02539	4.41985	2.62535	2.42340	5.10370
13	45.25632	41.77507	11.12484	1.91434	4.17751	2.61715	2.41583	4.61664
14	42.63917	39.35924	10.75585	1.80364	3.93592	2.60847	2.40782	4.17152
15	40.03070	36.95142	10.38706	1.69330	3.69514	2.59928	2.39934	3.76496
16	37.43142	34.55208	10.01846	1.58335	3.45521	2.58955	2.39035	3.39380
17	34.84187	32.16173	9.65008	1.47381	3.21617	2.57925	2.38085	3.05516
18	32.26262	29.78088	9.28192	1.36471	2.97809	2.56835	2.37078	2.74637
19	29.69427	27.41010	8.91400	1.25607	2.74101	2.55680	2.36012	2.46497
20	27.13747	25.04998	8.54633	1.14792	2.50500	2.54458	2.34884	2.20870
21	24.59290	22.70113	8.17893	1.04028	2.27011	2.53164	2.33691	1.97547
22	22.06126	20.36424	7.81181	.93319	2.03642	2.51794	2.32425	1.76337
23	19.54332	18.03998	7.44499	.82668	1.80400	2.50344	2.31087	1.57063
24	17.03988	15.72912	7.07848	.72079	1.57291	2.48809	2.29667	1.39562
25	14.55179	13.43242	6.71231	.61554	1.34324	2.47183	2.28169	1.23685
26	12.07996	11.15073	6.34649	.51098	1.11507	2.45463	2.26581	1.09294
27	9.62533	8.88492	5.98105	.40715	.88849	2.43641	2.24899	.96263
28	7.18892	6.63593	5.61600	.30409	.66359	2.41712	2.23119	.84475
29	4.77180	4.40474	5.25137	.20185	.44047	2.39671	2.21235	.73823
30	2.37509	2.19239	4.88719	.10047	.21924	2.37509	2.19239	.64209

POWER COST, MILLS/KWHE 2.811506

TOTAL PRES WORTH OF CASH FLOWS AT INT RATE OF .069996 140.00000

LEVELIZED TAXES AT INTEREST RATE OF .069996

FEDERAL INCOME TAX	3.055509
STATE INCOME TAX	.189001
STATE REVENUE TAX	.766263
LOCAL PROPERTY TAX	3.024162

CASH EXPENSES BEFORE INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

NONFUEL WORKING CAPITAL COMPONENT ONLY

PD	POWER UNITS	REACTOR OPER COST		STATE REVEN	LOCAL PROPERTY	INTERIM REPLCMTS	PROPERTY INSURNCE	FUEL PRORATA		DEPREC	BOND INTEREST	TOTAL DEDUCTBLE
1	7.4460		0	.0141	.0600	0	.0050	0	0		.0440	.1231
2	7.4460		0	.0141	.0600	0	.0050	0	0		.0436	.1228
3	7.4460		0	.0141	.0600	0	.0050	0	0		.0433	.1224
4	7.4460		0	.0141	.0600	0	.0050	0	0		.0429	.1220
5	7.4460		0	.0141	.0600	0	.0050	0	0		.0425	.1216
6	7.4460		0	.0141	.0600	0	.0050	0	0		.0420	.1212
7	7.4460		0	.0141	.0600	0	.0050	0	0		.0416	.1207
8	7.4460		0	.0141	.0600	0	.0050	0	0		.0411	.1202
9	7.4460		0	.0141	.0600	0	.0050	0	0		.0406	.1197
10	7.4460		0	.0141	.0600	0	.0050	0	0		.0400	.1192
11	7.2708		0	.0138	.0600	0	.0050	0	0		.0395	.1183
12	7.0956		0	.0135	.0600	0	.0050	0	0		.0389	.1174
13	6.9204		0	.0131	.0600	0	.0050	0	0		.0385	.1166
14	6.7452		0	.0128	.0600	0	.0050	0	0		.0381	.1159
15	6.5700		0	.0125	.0600	0	.0050	0	0		.0377	.1152
16	6.3948		0	.0121	.0600	0	.0050	0	0		.0374	.1146
17	6.2196		0	.0118	.0600	0	.0050	0	0		.0372	.1140
18	6.0444		0	.0115	.0600	0	.0050	0	0		.0370	.1135
19	5.8692		0	.0111	.0600	0	.0050	0	0		.0370	.1131
20	5.6940		0	.0108	.0600	0	.0050	0	0		.0370	.1128
21	5.5188		0	.0105	.0600	0	.0050	0	0		.0371	.1125
22	5.3436		0	.0101	.0600	0	.0050	0	0		.0373	.1124
23	5.1684		0	.0098	.0600	0	.0050	0	0		.0375	.1123
24	4.9932		0	.0095	.0600	0	.0050	0	0		.0379	.1124
25	4.8180		0	.0091	.0600	0	.0050	0	0		.0384	.1126
26	4.6428		0	.0088	.0600	0	.0050	0	0		.0390	.1128
27	4.4676		0	.0085	.0600	0	.0050	0	0		.0397	.1132
28	4.2924		0	.0082	.0600	0	.0050	0	0		.0406	.1137
29	4.1172		0	.0078	.0600	0	.0050	0	0		.0416	.1144
30	3.9420		0	.0075	.0600	0	.0050	0	0		.0427	.1152

CALCULATION OF INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

NONFUEL WORKING CAPITAL COMPONENT ONLY

PD	TOTAL SALES	TOTAL DEDUCTBL (STATE)	STATE INCOME TAX	TOTAL DEDUCTBL (FED)	TAXABLE INCOME (FED)	FEDERAL INCOME TAX	TOTAL STATE AND LOCAL TAX	TOT CASH EXPENDS
1	.3535	.1231	.0069	.1300	.2234	.1117	.0810	.1978
2	.3535	.1228	.0069	.1297	.2238	.1119	.0811	.1979
3	.3535	.1224	.0069	.1294	.2241	.1121	.0811	.1981
4	.3535	.1220	.0069	.1290	.2245	.1123	.0811	.1983
5	.3535	.1216	.0070	.1286	.2249	.1125	.0811	.1985
6	.3535	.1212	.0070	.1282	.2253	.1127	.0811	.1988
7	.3535	.1207	.0070	.1277	.2258	.1129	.0811	.1990
8	.3535	.1202	.0070	.1272	.2262	.1131	.0811	.1993
9	.3535	.1197	.0070	.1267	.2267	.1134	.0812	.1995
10	.3535	.1192	.0070	.1262	.2273	.1136	.0812	.1998
11	.3452	.1183	.0068	.1251	.2201	.1100	.0806	.1957
12	.3368	.1174	.0066	.1240	.2128	.1064	.0801	.1915
13	.3285	.1166	.0064	.1230	.2056	.1028	.0795	.1873
14	.3202	.1159	.0061	.1220	.1982	.0991	.0789	.1830
15	.3119	.1152	.0059	.1211	.1908	.0954	.0784	.1788
16	.3036	.1146	.0057	.1202	.1834	.0917	.0778	.1745
17	.2953	.1140	.0054	.1194	.1758	.0879	.0772	.1702
18	.2869	.1135	.0052	.1187	.1682	.0841	.0767	.1658
19	.2786	.1131	.0050	.1181	.1605	.0803	.0761	.1614
20	.2703	.1128	.0047	.1175	.1528	.0764	.0755	.1569
21	.2620	.1125	.0045	.1170	.1450	.0725	.0750	.1524
22	.2537	.1124	.0042	.1166	.1370	.0685	.0744	.1479
23	.2454	.1123	.0040	.1163	.1290	.0645	.0738	.1433
24	.2370	.1124	.0037	.1161	.1209	.0604	.0732	.1387
25	.2287	.1126	.0035	.1160	.1127	.0563	.0726	.1340
26	.2204	.1128	.0032	.1161	.1043	.0522	.0720	.1292
27	.2121	.1132	.0030	.1162	.0959	.0479	.0714	.1244
28	.2038	.1137	.0027	.1164	.0873	.0437	.0709	.1195
29	.1955	.1144	.0024	.1168	.0786	.0393	.0702	.1146
30	.1871	.1152	.0022	.1174	.0698	.0349	.0696	.1095

PAYOUT OF INVESTMENTS

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

NONFUEL WORKING CAPITAL COMPONENT ONLY

PD	OUTST BONDS	OUTST EQUITY	CASH FLOW	BOND INTEREST	EARNINGS ON STOCK	BONDS REPAID	EQUITY RECOVERY	PW OF CASH FLOW
1	1.04000	.96000	.15571	.04399	.09600	.00817	.00754	.14552
2	1.03183	.95246	.15553	.04365	.09525	.00865	.00799	.13585
3	1.02317	.94447	.15534	.04328	.09445	.00916	.00846	.12681
4	1.01401	.93601	.15514	.04289	.09360	.00970	.00895	.11836
5	1.00431	.92706	.15493	.04248	.09271	.01027	.00948	.11047
6	.99405	.91758	.15471	.04205	.09176	.01087	.01003	.10309
7	.98318	.90755	.15447	.04159	.09075	.01151	.01062	.09620
8	.97167	.89693	.15422	.04110	.08969	.01218	.01125	.08976
9	.95949	.88568	.15396	.04059	.08857	.01290	.01190	.08374
10	.94659	.87378	.15368	.04004	.08738	.01365	.01260	.07812
11	.93294	.86117	.14951	.03946	.08612	.01244	.01148	.07103
12	.92050	.84969	.14536	.03894	.08497	.01116	.01030	.06455
13	.90934	.83939	.14125	.03847	.08394	.00980	.00904	.05862
14	.89954	.83035	.13716	.03805	.08303	.00836	.00772	.05320
15	.89118	.82263	.13311	.03770	.08226	.00684	.00631	.04825
16	.88435	.81632	.12908	.03741	.08163	.00522	.00482	.04373
17	.87913	.81150	.12510	.03719	.08115	.00352	.00325	.03961
18	.87561	.80825	.12115	.03704	.08083	.00171	.00158	.03585
19	.87390	.80668	.11724	.03697	.08067	-.00020	-.00019	.03242
20	.87411	.80687	.11337	.03697	.08069	-.00223	-.00206	.02930
21	.87634	.80893	.10955	.03707	.08089	-.00438	-.00404	.02646
22	.88071	.81296	.10577	.03725	.08130	-.00665	-.00613	.02388
23	.88736	.81910	.10204	.03754	.08191	-.00905	-.00835	.02153
24	.89641	.82745	.09837	.03792	.08275	-.01159	-.01070	.01939
25	.90800	.83815	.09475	.03841	.08382	-.01429	-.01319	.01746
26	.92229	.85134	.09119	.03901	.08513	-.01714	-.01582	.01570
27	.93943	.86716	.08769	.03974	.08672	-.02016	-.01861	.01411
28	.95959	.88577	.08425	.04059	.08858	-.02335	-.02156	.01267
29	.98294	.90733	.08089	.04158	.09073	-.02674	-.02468	.01137
30	1.00968	.93201	2.07750	.04271	.09320	1.00968	.93201	.27296

POWER COST, MILLS/KWHE .047472

TOTAL PRES WORTH OF CASH FLOWS AT INT RATE OF .069996 2.00000

LEVELIZED TAXES AT INTEREST RATE OF .069996

FEDERAL INCOME TAX	.09938
STATE INCOME TAX	.00647
STATE REVENUE TAX	.012938
LOCAL PROPERTY TAX	.060000

CASH EXPENSES BEFORE INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

OPERATING AND MAINTENANCE COST ONLY

PD	POWER UNITS	REACTOR OPER COST	STATE REVEN	LOCAL PROPERTY	INTERIM REPLCMTS	PROPERTY INSURNCE	FUEL PRORATA	DEPREC	BOND INTEREST	TOTAL DEDUCTBLE
1	7.4460	3.3500	.1506	0	0	0	0	0	0	3.5006
2	7.4460	3.3500	.1506	0	0	0	0	0	-.0028	3.4978
3	7.4460	3.3500	.1506	0	0	0	0	0	-.0058	3.4948
4	7.4460	3.3500	.1506	0	0	0	0	0	-.0090	3.4916
5	7.4460	3.3500	.1506	0	0	0	0	0	-.0123	3.4883
6	7.4460	3.3500	.1506	0	0	0	0	0	-.0158	3.4847
7	7.4460	3.3500	.1506	0	0	0	0	0	-.0196	3.4810
8	7.4460	3.3500	.1506	0	0	0	0	0	-.0235	3.4770
9	7.4460	3.3500	.1506	0	0	0	0	0	-.0277	3.4728
10	7.4460	3.3500	.1506	0	0	0	0	0	-.0322	3.4684
11	7.2708	3.3300	.1470	0	0	0	0	0	-.0369	3.4402
12	7.0956	3.3100	.1435	0	0	0	0	0	-.0412	3.4123
13	6.9204	3.2900	.1400	0	0	0	0	0	-.0450	3.3849
14	6.7452	3.2700	.1364	0	0	0	0	0	-.0484	3.3580
15	6.5700	3.2500	.1329	0	0	0	0	0	-.0513	3.3316
16	6.3948	3.2300	.1293	0	0	0	0	0	-.0536	3.3057
17	6.2196	3.2100	.1258	0	0	0	0	0	-.0554	3.2804
18	6.0444	3.1900	.1222	0	0	0	0	0	-.0566	3.2556
19	5.8692	3.1700	.1187	0	0	0	0	0	-.0572	3.2315
20	5.6940	3.1500	.1152	0	0	0	0	0	-.0572	3.2080
21	5.5188	3.1300	.1116	0	0	0	0	0	-.0564	3.1852
22	5.3436	3.1100	.1081	0	0	0	0	0	-.0549	3.1632
23	5.1684	3.0900	.1045	0	0	0	0	0	-.0526	3.1419
24	4.9932	3.0700	.1010	0	0	0	0	0	-.0495	3.1215
25	4.8180	3.0500	.0974	0	0	0	0	0	-.0455	3.1020
26	4.6428	3.0300	.0939	0	0	0	0	0	-.0406	3.0833
27	4.4676	3.0100	.0903	0	0	0	0	0	-.0347	3.0657
28	4.2924	2.9900	.0868	0	0	0	0	0	-.0277	3.0491
29	4.1172	2.9700	.0833	0	0	0	0	0	-.0197	3.0336
30	3.9420	2.9500	.0797	0	0	0	0	0	-.0104	3.0193

CALCULATION OF INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

OPERATING AND MAINTENANCE COST ONLY

PD	TOTAL SALES	TOTAL DEDUCTBL (STATE)	STATE INCOME TAX	TOTAL DEDUCTBL (FED)	TAXABLE INCOME (FED)	FEDERAL INCOME TAX	TOTAL STATE AND LOCAL TAX	TOTAL CASH EXPENDS
1	3.7646	3.5006	.0079	3.5085	.2561	.1280	.1585	3.6365
2	3.7646	3.4978	.0080	3.5058	.2588	.1294	.1586	3.6380
3	3.7646	3.4948	.0081	3.5029	.2617	.1308	.1587	3.6395
4	3.7646	3.4916	.0082	3.4998	.2647	.1324	.1588	3.6411
5	3.7646	3.4883	.0083	3.4966	.2680	.1340	.1589	3.6429
6	3.7646	3.4847	.0084	3.4931	.2714	.1357	.1590	3.6447
7	3.7646	3.4810	.0085	3.4895	.2750	.1375	.1591	3.6466
8	3.7646	3.4770	.0086	3.4857	.2789	.1394	.1592	3.6487
9	3.7646	3.4728	.0088	3.4816	.2830	.1415	.1593	3.6508
10	3.7646	3.4684	.0089	3.4773	.2873	.1436	.1595	3.6531
11	3.7670	3.4402	.0071	3.4472	.2288	.1144	.1541	3.5985
12	3.5874	3.4123	.0053	3.4176	.1698	.0849	.1487	3.5437
13	3.4988	3.3849	.0034	3.3894	.1105	.0552	.1434	3.4886
14	3.4102	3.3580	.0016	3.3596	.0507	.0253	.1380	3.4333
15	3.3217	3.3316	-.0003	3.3313	-.0096	-.0048	.1326	3.3778
16	3.2331	3.3057	-.0022	3.3035	-.0704	-.0352	.1271	3.3219
17	3.1445	3.2804	-.0041	3.2763	-.1318	-.0659	.1217	3.2658
18	3.0559	3.2556	-.0060	3.2496	-.1937	-.0968	.1162	3.2094
19	2.9674	3.2315	-.0079	3.2235	-.2562	-.1281	.1108	3.1527
20	2.8788	3.2080	-.0099	3.1981	-.3193	-.1597	.1053	3.0956
21	2.7902	3.1852	-.0119	3.1734	-.3832	-.1916	.0998	3.0382
22	2.7016	3.1632	-.0138	3.1493	-.4477	-.2239	.0942	2.9804
23	2.6130	3.1419	-.0159	3.1261	-.5130	-.2565	.0887	2.9221
24	2.5245	3.1215	-.0179	3.1036	-.5791	-.2896	.0831	2.8635
25	2.4359	3.1020	-.0200	3.0820	-.6461	-.3230	.0775	2.8044
26	2.3473	3.0833	-.0221	3.0613	-.7139	-.3570	.0718	2.7448
27	2.2587	3.0657	-.0242	3.0415	-.7828	-.3914	.0661	2.6848
28	2.1702	3.0491	-.0264	3.0227	-.8526	-.4263	.0604	2.6241
29	2.0816	3.0336	-.0286	3.0050	-.9235	-.4617	.0547	2.5630
30	1.9930	3.0193	-.0308	2.9885	-.9955	-.4977	.0489	2.5012

PAYOUT OF INVESTMENTS

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

OPERATING AND MAINTENANCE COST ONLY

PD	OUTST BONDS	OUTST EQUITY	CASH FLOW	BOND INTEREST	EARNINGS ON STOCK	BONDS REPAID	EQUITY RECOVERY	PW OF CASH FLOW
1	0	0	.12803	0	0	.06657	.06145	.11965
2	-.06657	-.06145	.12658	-.00282	-.00615	.07048	.06506	.11056
3	-.13705	-.12651	.12504	-.00580	-.01265	.07461	.06888	.10207
4	-.21167	-.19539	.12342	-.00895	-.01954	.07899	.07292	.09415
5	-.29066	-.26830	.12170	-.01229	-.02683	.08363	.07719	.08677
6	-.37429	-.34550	.11987	-.01583	-.03455	.08853	.08172	.07988
7	-.46282	-.42722	.11794	-.01958	-.04272	.09373	.08652	.07345
8	-.55655	-.51374	.11590	-.02354	-.05137	.09923	.09159	.06746
9	-.65577	-.60533	.11374	-.02774	-.06053	.10505	.09697	.06187
10	-.76082	-.70230	.11145	-.03218	-.07023	.11121	.10266	.05666
11	-.87203	-.80495	.07749	-.03689	-.08050	.10133	.09354	.03682
12	-.97336	-.89849	.04374	-.04117	-.08985	.09088	.08389	.01942
13	-1.06424	-.98237	.01022	-.04502	-.09824	.07981	.07367	.00424
14	-1.14405	-1.05604	-.02306	-.04839	-.10560	.06809	.06285	-.00894
15	-1.21213	-1.11889	-.05609	-.05127	-.11189	.05568	.05140	-.02033
16	-1.26781	-1.17029	-.08884	-.05363	-.11703	.04254	.03927	-.03010
17	-1.31035	-1.20956	-.12131	-.05543	-.12096	.02864	.02643	-.03841
18	-1.33899	-1.23599	-.15348	-.05664	-.12360	.01392	.01285	-.04541
19	-1.35291	-1.24884	-.18532	-.05723	-.12488	-.00167	-.00154	-.05125
20	-1.35124	-1.24730	-.21683	-.05716	-.12473	-.01817	-.01677	-.05604
21	-1.33307	-1.23053	-.24797	-.05639	-.12305	-.03564	-.03290	-.05989
22	-1.29743	-1.19763	-.27874	-.05488	-.11976	-.05413	-.04997	-.06292
23	-1.24330	-1.14767	-.30910	-.05259	-.11477	-.07371	-.06804	-.06521
24	-1.16960	-1.07963	-.33904	-.04947	-.10796	-.09443	-.08717	-.06685
25	-1.07517	-.99246	-.36852	-.04548	-.09925	-.11637	-.10742	-.06791
26	-.95879	-.88504	-.39753	-.04056	-.08850	-.13960	-.12886	-.06846
27	-.81919	-.75617	-.42603	-.03465	-.07562	-.16420	-.15156	-.06857
28	-.65499	-.60461	-.45399	-.02771	-.06046	-.19023	-.17563	-.06829
29	-.46476	-.42901	-.48139	-.01966	-.04290	-.21779	-.20104	-.06767
30	-.24697	-.22797	-.50819	-.01045	-.02280	-.24697	-.22797	-.06677

POWER COST, MILLS/KWHE .503581

TOTAL PRES WORTH OF CASH FLOWS AT INT RATE OF .069996 -.00000

LEVELIZED TAXES AT INTEREST RATE OF .069996

FEDERAL INCOME TAX	.027535
STATE INCOME TAX	.001703
STATE REVENUE TAX	.137794
LOCAL PROPERTY TAX	0

PROBLEM IDENTIFICATION PROBLEM 13 ORNL-4116

COST SUMMARY, MILLS/KWHR(E)

FUEL CYCLE COST	1.6753
PLANT CAPITAL COMPONENT	2.8115
NONFUEL WORKING CAPITAL COMPONENT	.0475
OPERATING AND MAINTENANCE COMPONENT	.5056
SUM OF THE ABOVE COSTS .	5.0399
CALCULATED TOTAL POWER COST (COMPARE)	5.0399

Table B-2. Input and Output Data for Example Problem 901.

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INPUT DATA      PROBLEM 901 FUEL CYCLE COST EXAMPLE

CARD 1 (CONTROL CARD)
   LL1    1    LL2    2    LL3    0    LL4    0    LL5    0
   LL6    0    LL7    1    LL8    0    LL9    1    LL10   0
   BOND REPAYMENT PROPORTIONAL
   SUM OF YEARS DIGITS DEPRECIATION

CARD 2
  D(1)  PLANT INVESTMENT, $MM                          100.000000
  D(2)  PROJECT LIFE, PERIODS                           10.000000
  D(3)  NONFUEL WORKING CAPITAL, $MM                     2.000000
  D(4)  FRACTION OF INVESTMENT IN BONDS                   .520000
  D(5)  BOND INTEREST RATE PER PERIOD                     .042300
  D(6)  EQUITY EARNING RATE PER PERIOD                    .100000
  D(7)  FEDERAL INCOME TAX RATE                           .500000

CARD 3
  D(8)  REACTOR POWER, MW ELECTRIC                     1000.000000
  D(9)  DEPRECIABLE LIFE, YEARS                         10.000000
  D(10) VARIABLE OPERATING COST, $MM/PERIOD              1.000000
  D(11) INITIAL CORE INVESTMENT, $MM                    14.230000
  D(12) NUMBER OF PERIODS PER YEAR                       1.000000
  D(13) NOT USED                                                0
  D(14) FIXED OPERATING COST, $MM/PERIOD                 1.000000

CARD 4
  D(15) STATE INCOME TAX RATE                             .030000
  D(16) STATE GROSS REVENUES TAX RATE                     .040000
  D(17) LOCAL PROPERTY TAX RATE PER PERIOD                .032000
  D(18) INTERIM REPLACEMENTS FACTOR PER PERIOD            .003500
  D(19) PROPERTY INSURANCE FACTOR PER PERIOD              .002500
  D(20) NOT USED                                                0
  D(21) NOT USED                                                0

CARD 5
  D(22) FRACTION OF CORE FOR TAX ASSESSMENT               .650000
  D(23) PROP TAX ON NONFUEL WORK CAP PER PD               .030000
  D(24) INITIAL CAPACITY FACTOR                                 0
  D(25) CAPACITY FACTOR DECLINE PER PERIOD                      0
  D(26) PERIODS AT INITIAL CAPACITY FACTOR                      0
  D(27) NOT USED                                                0
  D(28) NOT USED                                                0
```

INPUT DATA EXPENSES IN $MM PER PERIOD

PD	CAPY FACTOR	FUEL PURCH	FABR COST	REPR COST	U-PU CRED	OPER BASE	BOND PAYMT
1	.85000	9.48000	-0	-0	0	-0	-0
2	.85000	15.25000	-0	-0	5.12000	-0	-0
3	.85000	9.27000	-0	-0	0	-0	-0
4	.83000	12.63000	-0	-0	0	-0	-0
5	.81000	9.12000	-0	-0	4.93000	-0	-0
6	.79000	8.47000	-0	-0	1.01000	-0	-0
7	.77000	14.34000	-0	-0	0	-0	-0
8	.75000	9.88000	-0	-0	5.17000	-0	-0
9	.73000	10.16000	-0	-0	2.61000	-0	-0
10	.71000	7.32000	-0	-0	0	-0	-0

MISCELLANEOUS CALCULATED QUANTITIES

TXRI	TXRW	TXRC	TXR4	TXRM	5.000000E-03	6.880000E-02	2.260100E-02	3.152500E-02	5.150000E-01
TXRE	TXRX	TXRZ	TXFR	TXRH	5.344000E-01	5.494367E-01	1.913104E-01	1.083700E+00	5.512490E-01
TXRU	TXRY	RRW	RRV	BKMA	5.577170E-01	1.090155E+00	6.999600E-02	5.866806E-02	7.023711E+00
BKMV	BKME	SUMLA	SUMLV	RP	7.405756E+00	6.144567E+00	5.641925E+00	5.939073E+00	1.001775E+00

CASH EXPENSES BEFORE INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 901 FUEL CYCLE COST EXAMPLE

TOTAL POWER COST WITH INPUT LOAD FACTORS

PD	POWER UNITS	REACTOR OPER COST	STATE REVEN	LOCAL PROPERTY	INTERIM REPLCMTS	PROPERTY INSURNCE	FUEL PRORATA	DEPREC	BOND INTEREST	TOTAL DEDUCTBLE
1	7.4460	1.8500	1.4177	3.5560	.3500	.2906	10.3103	18.1818	2.5566	38.5129
2	7.4460	1.8500	1.4177	3.2360	.3500	.2906	10.3103	16.3636	2.2939	36.1120
3	7.4460	1.8500	1.4177	2.9160	.3500	.2906	10.3103	14.5455	2.0052	33.6832
4	7.2708	1.8300	1.3843	2.5960	.3500	.2906	10.0677	12.7273	1.7378	30.9836
5	7.0956	1.8100	1.3510	2.2750	.3500	.2906	9.8251	10.9091	1.5590	28.3707
6	6.9204	1.7900	1.3176	1.9560	.3500	.2906	9.5825	9.0909	1.2123	25.5898
7	6.7452	1.7700	1.2842	1.6360	.3500	.2906	9.3399	7.2727	.9454	22.8888
8	6.5700	1.7500	1.2509	1.3160	.3500	.2906	9.0973	5.4545	.7765	20.2857
9	6.3948	1.7300	1.2175	.9960	.3500	.2906	8.8547	3.6364	.4810	17.5552
10	6.2196	1.7100	1.1842	.6760	.3500	.2906	8.6121	1.8182	.2570	14.8980

CALCULATION OF INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 901 FJE. CYCLE COST EXAMPLE

TOTAL POWER COST WITH INPUT LOAD FACTORS

PD	TOTAL SALES	TOTAL DEDUCTBL (STATE)	STATE INCOME TAX	TOTAL DEDUCTBL (FED)	TAXABLE INCOME (FED)	FEDERAL INCOME TAX	TOTAL STATE AND LOCAL TAX	TOT CASH EXPENDS
1	35.4419	38.5129	-.0921	38.4208	-2.9789	-1.4894	4.8815	15.3627
2	35.4419	36.1120	-.0201	35.0919	-.6500	-.3250	4.6336	14.9291
3	35.4419	33.6832	.0528	33.7360	1.7060	.8530	4.3864	17.0000
4	34.6080	30.9836	.1087	31.0924	3.5156	1.7578	4.0890	20.9474
5	33.7741	28.3707	.1621	28.5328	5.2413	2.6206	3.7890	13.0503
6	32.9401	25.5898	.2205	25.8103	7.1298	3.5649	3.4941	16.9496
7	32.1062	22.8888	.2765	23.1653	8.9409	4.4704	3.1968	21.4178
8	31.2723	20.2857	.3296	20.6153	10.6569	5.3285	2.8965	15.3255
9	30.4384	17.5552	.3865	17.9417	12.4967	6.2483	2.6000	18.7689
10	29.6044	14.8980	.4412	15.3392	14.2652	7.1326	2.3014	19.1046

PAYOUT OF INVESTMENTS

PROBLEM IDENTIFICATION PROBLEM 901 FJE. CYCLE COST EXAMPLE

TOTAL POWER COST WITH INPUT LOAD FACTORS

PD	OUTST BONDS	OUTST EQUITY	CASH FLOW	BOND INTEREST	EARNINGS ON STOCK	BONDS REPAID	EQUITY RECOVERY	PW OF CASH FLOW
1	60.43960	55.79040	20.07924	2.55660	5.57904	6.21068	5.73293	18.76572
2	54.22892	50.05747	20.51278	2.29388	5.00575	6.87084	6.34231	17.91679
3	47.35808	43.71515	18.44194	2.00325	4.37152	6.27493	5.79225	15.05429
4	41.08315	37.92291	13.65057	1.73782	3.79229	4.22784	3.90262	10.42174
5	36.85531	34.02029	20.72379	1.55898	3.40203	8.19665	7.56614	14.77605
6	28.65866	26.45415	15.99056	1.21226	2.64541	6.30910	5.82378	10.65542
7	22.34956	20.63037	10.69844	.94539	2.06304	3.99361	3.68641	6.65640
8	18.35596	16.94396	15.94676	.77646	1.69440	7.00747	6.46844	9.28144
9	11.34848	10.47552	11.65943	.48004	1.04755	5.27376	4.86804	6.34761
10	6.07473	5.60744	12.49987	.25696	.56074	6.07473	5.60744	6.35454

POWER COST, MILLS/KWHE 4.759860

TOTAL PRES WORTH OF CASH FLOWS AT INT RATE OF .069996 116.23000

LEVELIZED TAXES AT INTEREST RATE OF .069996

FEDERAL INCOME TAX	2.493785
STATE INCOME TAX	.154255
STATE REVENUE TAX	1.339735
LOCAL PROPERTY TAX	2.293232

FIXED CHARGE CALCULATIONS

PROBLEM IDENTIFICATION PROBLEM 901 FUEL CYCLE COST EXAMPLE

	CONSTANT INCOME	VARIABLE INCOME
FIXED CHARGE RATE ON DEPRECIABLE CAPITAL	.19609892	.19644693
FIXED CHARGE RATE ON NONDEPR CAPITAL	.15985945	.16014315
TERM 1 LD*PLT	19.60989204	19.64469318
TERM 2 LN*WC	.31971890	.32028630
TERM 3 LN*FWC	1.97642478	1.97993229
TERM 4 PRES WORTH AVERAGE EXPENSE	11.52800774	11.54846617
LEVELIZED ANNUAL INCOME REQUIRED, MILLION $	33.43404346	33.49337794
LEVELIZED POWER PRODUCTION, BILLION KWHR/YR	7.02416558	7.03663117
POWER COST, MILLS/KWHE	4.75985982	4.75985982
WEIGHTED AVERAGE INTEREST RATE RRW	.06999600	
MODIFIED AVERAGE INTEREST RATE RRV	.05866806	
FIXED CHARGE RATE RATIO, R PRIME	1.00177467	
AVERAGE FUEL WORKING CAPITAL, MILLION $	12.36351544	12.36351544
INTEREST RATE USED IN LEVELIZING	.05866806	.06999600

CASH EXPENSES BEFORE INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 901 FUEL CYCLE COST EXAMPLE

USING CALCULATED CONSTANT ANNUAL INCOME

PD	POWER UNITS	REACTOR OPER COST	STATE REVEN	LOCAL PROPERTY	INTERIM REPLCMTS	PROPERTY INSURNCE	FUEL PRORATA	DEPREC	BOND INTEREST	TOTAL DEDUCTBLE
1	7.4460	1.8500	1.3374	3.5560	.3500	.2906	10.3103	18.1818	2.5566	38.4326
2	7.4460	1.8500	1.3374	3.2360	.3500	.2906	10.3103	16.3636	2.3144	36.0523
3	7.4460	1.8500	1.3374	2.9160	.3500	.2906	10.3103	14.5455	2.0456	33.6452
4	7.2708	1.8300	1.3374	2.5960	.3500	.2906	10.0677	12.7273	1.8052	31.0021
5	7.0956	1.8100	1.3374	2.2760	.3500	.2906	9.8251	10.9091	1.6412	28.4383
6	6.9204	1.7900	1.3374	1.9560	.3500	.2906	9.5825	9.0909	1.3017	25.6991
7	6.7452	1.7700	1.3374	1.6360	.3500	.2906	9.3399	7.2727	1.0351	23.0316
8	6.5700	1.7500	1.3374	1.3160	.3500	.2906	9.0973	5.4545	.8578	20.4536
9	6.3948	1.7300	1.3374	.9960	.3500	.2906	8.8547	3.6364	.5440	17.7390
10	6.2196	1.7100	1.3374	.6760	.3500	.2906	8.6121	1.8182	.2940	15.0882

CALCULATION OF INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 901 FUEL CYCLE COST EXAMPLE

USING CALCULATED CONSTANT ANNUAL INCOME

PD	TOTAL SALES	TOTAL DEDUCTBL (STATE)	STATE INCOME TAX	TOTAL DEDUCTBL (FED)	TAXABLE INCOME (FED)	FEDERAL INCOME TAX	TOTAL STATE AND LOCAL TAX	TOT CASH EXPENDS
1	33.4340	38.4326	.1500	38.2826	-4.8486	-2.4243	4.7434	14.2897
2	33.4340	36.0523	.0785	35.9737	-2.5397	-1.2698	4.4948	13.8455
3	33.4340	33.6452	.0063	33.6389	-.2048	-.1024	4.2470	15.9052
4	33.4340	31.0021	.0730	31.0750	2.3590	1.1795	4.0063	20.2864
5	33.4340	28.4383	.1499	28.5882	4.8459	2.4229	3.7632	12.8267
6	33.4340	25.6991	.2320	25.9311	7.5029	3.7515	3.5254	17.1674
7	33.4340	23.0316	.3121	23.3437	10.0904	5.0452	3.2854	22.0812
8	33.4340	20.4536	.3894	20.8430	12.5911	6.2955	3.0428	16.4389
9	33.4340	17.7390	.4709	18.2098	15.2242	7.6121	2.8042	20.3369
10	33.4340	15.0882	.5504	15.5386	17.7955	8.8977	2.5637	21.1320

PAYOUT OF INVESTMENTS

PROBLEM IDENTIFICATION PROBLEM 901 FJE. CYCLE COST EXAMPLE

USING CALCULATED CONSTANT ANNUAL INCOME

PD	OUTST BONDS	OUTST EQUITY	CASH FLOW	BOND INTEREST	EARNINGS ON STOCK	BONDS REPAID	EQUITY RECOVERY	PW OF CASH FLOW
1	60.43960	55.79040	19.14438	2.55660	5.57904	5.72455	5.28420	17.89201
2	54.71505	50.50620	19.53851	2.31445	5.05062	6.35619	5.86725	17.10949
3	48.35886	44.63895	17.52838	2.04558	4.46390	5.75009	5.28931	14.30895
4	42.62877	39.34964	13.14755	1.80320	3.93496	3.85294	3.55656	10.03043
5	38.77584	35.79308	20.60732	1.64022	3.57931	8.00165	7.38614	14.69301
6	30.77419	28.40694	16.25651	1.30175	2.84069	6.30456	5.81960	10.83937
7	24.46962	22.58734	11.35286	1.03507	2.25873	4.19071	3.86835	7.07018
8	20.27891	18.71899	16.99517	.85780	1.87190	7.41805	6.84743	9.89164
9	12.86086	11.87156	13.09717	.54401	1.18716	5.91032	5.45568	7.12423
10	6.95054	6.41588	14.30202	.29401	.64159	6.95054	6.41588	7.27069

POWER COST, MILLS/KWHE 4.759860

TOTAL PRES WORTH OF CASH FLOWS AT INT RATE OF .069996 116.23000

LEVELIZED TAXES AT INTEREST RATE OF .069996

FEDERAL INCOME TAX	2.440142
STATE INCOME TAX	.150937
STATE REVENUE TAX	1.337362
LOCAL PROPERTY TAX	2.293232

FIXED CHARGE RATE BREAKDOWNS

PROBLEM IDENTIFICATION PROBLEM 901 FUEL CYCLE COST EXAMPLE

FIXED CHARGE RATES BASED ON INPUT LOAD FACTORS

	DEPRECIABLE	NONDEPRECIABLE
AVERAGE INTEREST RATE	.07000	.07000
SINK FND DEPRECIATION	.07238	0
FEDERAL INCOME TAX	.01963	.04826
STATE INCOME TAX	.00121	.00298
STATE REVENUE TAX	.00786	.00641
LOCAL PROPERTY TAX	.01937	.03000
TOTAL STATE AND LOC TAX	.02844	.03939
INTERIM REPLACEMENTS	.00350	0
PROPERTY INSURANCE	.00250	.00250
TOTAL OF ABOVE ITEMS	.19645	.16014

FIXED CHARGE RATES BASED ON CONSTANT LOAD FACTOR

AVERAGE INTEREST RATE	.07000	.07000
SINK FND DEPRECIATION	.07238	0
FEDERAL INCOME TAX	.01931	.04800
STATE INCOME TAX	.00119	.00297
STATE REVENUE TAX	.00784	.00639
LOCAL PROPERTY TAX	.01937	.03000
TOTAL STATE AND LOC TAX	.02841	.03936
INTERIM REPLACEMENTS	.00350	0
PROPERTY INSURANCE	.00250	.00250
TOTAL OF ABOVE ITEMS	.19610	.15986

CASH EXPENSES BEFORE INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 901 FUEL CYCLE COST EXAMPLE

FUEL CYCLE COST ONLY

YR	POWER UNITS	REACTOR OPER COST	STATE REVEN	LOCAL PROPERTY	INTERIM REPLCMTS	PROPERTY INSURNCE	FUEL PRORATA	DEPREC	BOND INTEREST	TOTAL DEDUCTBLE
1	7.4460	0	.4930	.2960	0	.0356	10.3103	0	.3150	11.4479
2	7.4460	0	.4930	.2960	0	.0356	10.3103	0	.3004	11.4353
3	7.4460	0	.4930	.2960	0	.0356	10.3103	0	.2574	11.3922
4	7.2708	0	.4814	.2950	0	.0356	10.0677	0	.2369	11.1175
5	7.0956	0	.4698	.2960	0	.0356	9.8251	0	.2948	10.9213
6	6.9204	0	.4582	.2950	0	.0356	9.5825	0	.1762	10.5485
7	6.7452	0	.4466	.2950	0	.0356	9.3399	0	.1283	10.2464
8	6.5700	0	.4350	.2950	0	.0356	9.0973	0	.1687	10.0325
9	6.3948	0	.4234	.2950	0	.0356	8.8547	0	.0713	9.6809
10	6.2196	0	.4118	.2960	0	.0356	8.6121	0	.0363	9.3918

CALCULATION OF INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 901 FUEL CYCLE COST EXAMPLE

FUEL CYCLE COST ONLY

PD	TOTAL SALES	TOTAL DEDUCTBL (STATE)	STATE INCOME TAX	TOTAL DEDUCTBL (FED)	TAXABLE INCOME (FED)	FEDERAL INCOME TAX	TOTAL STATE AND LOCAL TAX	TOT CASH EXPENDS
1	12.3258	11.4479	.0263	11.4742	.8516	.4258	.8154	10.7567
2	12.3258	11.4353	.0267	11.4620	.8638	.4319	.8157	9.4132
3	12.3258	11.3922	.0280	11.4202	.9056	.4528	.8170	10.5754
4	12.0358	11.1175	.0275	11.1451	.8907	.4453	.8050	13.9159
5	11.7658	10.9213	.0247	10.9460	.7998	.3999	.7905	5.4160
6	11.4557	10.5485	.0272	10.5757	.8800	.4400	.7814	8.7170
7	11.1657	10.2464	.0276	10.2740	.8918	.4459	.7702	12.5916
8	10.8757	10.0325	.0253	10.0578	.8179	.4089	.7563	5.9108
9	10.5857	9.6809	.0271	9.7081	.8776	.4388	.7466	8.7709
10	10.2957	9.3918	.0271	9.4189	.8767	.4384	.7349	8.5289

PAYOUT OF INVESTMENTS

PROBLEM IDENTIFICATION PROBLEM 901 FJE. CYCLE COST EXAMPLE

FUEL CYCLE COST ONLY

PD	OUTST BONDS	OUTST EQUITY	CASH FLOW	BOND INTEREST	EARNINGS ON STOCK	BONDS REPAID	EQUITY RECOVERY	PW OF CASH FLOW
1	7.3996$_0$	6.83$_0$40$_0$	1.559$_0$7	.31300	.68304	.29797	.27505	1.46642
2	7.10163	6.55535	2.91258	.30040	.65553	1.01745	.93919	2.54398
3	6.08417	5.61616	1.75041	.25736	.56162	.48435	.44709	1.42887
4	5.59983	5.16907	-1.88011	.23687	.51691	-1.36962	-1.26427	-1.43435
5	6.96945	6.43334	6.32976	.2948	.64333	2.80364	2.58798	4.51312
6	4.1658	3.84536	2.7387	.1762	.38454	1.13254	1.04542	1.82496
7	3.03326	2.79994	-1.42593	.1283	.27999	-.95380	-.88043	-.88802
8	3.98706	3.68037	4.96488	.16865	.36804	2.30266	2.12553	2.88969
9	1.68440	1.55483	1.81475	.07125	.15548	.82577	.76225	.98714
10	.85863	.79258	1.75679	.03632	.07926	.85863	.79258	.89818

POWER COST,MILLS/KWHE 1.655358

TOTAL PRES WORTH OF CASH FLOWS AT INT RATE OF .069996 14.23000

LEVELIZED TAXES AT INTEREST RATE OF .069996

FEDERAL INCOME TAX	.432838
STATE INCOME TAX	.026773
STATE REVENUE TAX	.465926
LOCAL PROPERTY TAX	.295984

CASH EXPENSES BEFORE INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 901 FUEL CYCLE COST EXAMPLE

PLANT CAPITAL COMPONENT ONLY

PD	POWER UNITS	REACTOR OPER COST	STATE REVEN	LOCAL PROPERTY	INTERIM REPLCMTS	PROPERTY INSURNCE	FUEL PRORATA	DEPREC	BOND INTEREST	TOTAL DEDUCTBLE
1	7.4460	0	.8315	3.2000	.3500	.2500	0	18.1818	2.1996	25.0129
2	7.4460	0	.8315	2.8800	.3500	.2500	0	16.3636	1.9503	22.6255
3	7.4460	0	.8315	2.5600	.3500	.2500	0	14.5455	1.7036	20.2406
4	7.2708	0	.8119	2.2400	.3500	.2500	0	12.7273	1.4596	17.8388
5	7.0956	0	.7924	1.9200	.3500	.2500	0	10.9091	1.2235	15.4450
6	6.9204	0	.7728	1.6000	.3500	.2500	0	9.0909	.9957	13.0594
7	6.7452	0	.7532	1.2800	.3500	.2500	0	7.2727	.7767	10.6827
8	6.5700	0	.7337	.9600	.3500	.2500	0	5.4545	.5671	8.3153
9	6.3948	0	.7141	.6400	.3500	.2500	0	3.6364	.3674	5.9579
10	6.2196	0	.6945	.3200	.3500	.2500	0	1.8182	.1782	3.6109

CALCULATION OF INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 901 FJE. CYCLE COST EXAMPLE

PLANT CAPITAL COMPONENT ONLY

PD	TOTAL SALES	TOTAL DEDUCTBL (STATE)	STATE INCOME TAX	TOTAL DEDUCTBL (FED)	TAXABLE INCOME (FED)	FEDERAL INCOME TAX	TOTAL STATE AND LOCAL TAX	TOT CASH EXPENDS
1	20.7876	25.0129	-.1268	24.3862	-4.0986	-2.0493	3.9047	2.4554
2	20.7876	22.6255	-.0551	22.5703	-1.7828	-.8914	3.6564	3.3650
3	20.7876	20.2406	.0164	20.2570	.5306	.2653	3.4079	4.2732
4	20.2984	17.8388	.0738	17.9126	2.3858	1.1929	3.1257	4.9186
5	19.8093	15.4450	.1309	15.5759	4.2334	2.1167	2.8433	5.5600
6	19.3202	13.0594	.1878	13.2472	6.0730	3.0365	2.5606	6.1971
7	18.8311	10.6827	.2445	10.9272	7.9039	3.9520	2.2777	6.8297
8	18.3420	8.3153	.3008	8.6161	9.7258	4.8629	1.9945	7.4574
9	17.8528	5.9579	.3568	6.3147	11.5381	5.7691	1.7110	8.0800
10	17.3637	3.6109	.4126	4.0235	13.3403	6.6701	1.4271	8.6973

PAYOUT OF INVESTMENTS

PROBLEM IDENTIFICATION PROBLEM 901 FUEL CYCLE COST EXAMPLE

PLANT CAPITAL COMPONENT ONLY

PD	OUTST BONDS	OUTST EQUITY	CASH FLOW	BOND INTEREST	EARNINGS ON STOCK	BONDS REPAID	EQUITY RECOVERY	PW OF CASH FLOW
1	52.00000	48.00000	18.33212	2.19960	4.80000	5.89291	5.43961	17.13288
2	46.10709	42.56039	17.42258	1.95033	4.25604	5.83243	5.38378	15.21767
3	40.27466	37.17661	16.51436	1.70362	3.71766	5.76840	5.32468	13.48079
4	34.50626	31.85193	15.37980	1.45961	3.18519	5.58220	5.15280	11.73335
5	28.92406	26.69913	14.24930	1.22349	2.66991	5.38507	4.97083	10.15974
6	23.53900	21.72830	13.12309	.99570	2.17283	5.17637	4.77819	8.74466
7	18.36263	16.95012	12.00143	.77674	1.69501	4.95543	4.57424	7.47408
8	13.40719	12.37587	10.88458	.56712	1.23759	4.72153	4.35834	6.33511
9	8.68566	8.01754	9.77282	.36740	.80175	4.47391	4.12976	5.31595
10	4.21176	3.88777	8.65647	.17816	.38878	4.21176	3.88777	4.40576

POWER COST, MILLS/KWHE 2.791775

TOTAL PRES WORTH OF CASH FLOWS AT INT RATE OF .069996 100.00000

LEVELIZED TAXES AT INTEREST RATE OF .069996

FEDERAL INCOME TAX	1.962763
STATE INCOME TAX	.121408
STATE REVENUE TAX	.785788
LOCAL PROPERTY TAX	1.937248

CASH EXPENSES BEFORE INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 901 FUEL CYCLE COST EXAMPLE

NONFUEL WORKING CAPITAL COMPONENT ONLY

PD	POWER UNITS	REACTOR OPER COST		STATE REVEN	LOCAL PROPERTY	INTERIM REPLCMTS	PROPERTY INSURNCE	FUEL PRORATA	DEPREC	BOND INTEREST	TOTAL DEDUCTBLE
1	7.4460		0	.0136	.0600	0	.0050	0	0	.0440	.1225
2	7.4460		0	.0136	.0600	0	.0050	0	0	.0438	.1224
3	7.4460		0	.0136	.0600	0	.0050	0	0	.0436	.1221
4	7.2708		0	.0132	.0600	0	.0050	0	0	.0434	.1216
5	7.0956		0	.0129	.0600	0	.0050	0	0	.0432	.1211
6	6.9204		0	.0126	.0600	0	.0050	0	0	.0431	.1207
7	6.7452		0	.0123	.0600	0	.0050	0	0	.0431	.1204
8	6.5700		0	.0120	.0600	0	.0050	0	0	.0432	.1202
9	6.3948		0	.0116	.0600	0	.0050	0	0	.0434	.1200
10	6.2196		0	.0113	.0600	0	.0050	0	0	.0436	.1200

CALCULATION OF INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 901 FJE CYCLE COST EXAMPLE

NONFUEL WORKING CAPITAL COMPONENT ONLY

PD	TOTAL SALES	TOTAL DEDUCTBL (STATE)	STATE INCOME TAX	TOTAL DEDUCTBL (FED)	TAXABLE INCOME (FED)	FEDERAL INCOME TAX	TOTAL STATE AND LOCAL TAX	TOT CASH EXPENDS
1	.3389	.1225	.0065	.1290	.2099	.1049	.0800	.1900
2	.3389	.1224	.0065	.1288	.2101	.1050	.0801	.1901
3	.3389	.1221	.0065	.1286	.2103	.1051	.0801	.1902
4	.3309	.1216	.0063	.1279	.2031	.1015	.0795	.1860
5	.3230	.1211	.0061	.1272	.1958	.0979	.0790	.1819
6	.3150	.1207	.0058	.1256	.1884	.0942	.0784	.1776
7	.3070	.1204	.0056	.1250	.1810	.0905	.0779	.1734
8	.2990	.1202	.0054	.1255	.1735	.0868	.0773	.1691
9	.2911	.1200	.0051	.1252	.1659	.0830	.0768	.1647
10	.2831	.1200	.0049	.1249	.1582	.0791	.0762	.1603

PAYOUT OF INVESTMENTS

PROBLEM IDENTIFICATION PROBLEM 901 FJE. CYCLE COST EXAMPLE

NONFUEL WORKING CAPITAL COMPONENT ONLY

PD	OUTST BONDS	OUTST EQUITY	CASH FLOW	BOND INTEREST	EARNINGS ON STOCK	BONDS REPAID	EQUITY RECOVERY	PW OF CASH FLOW
2	1.03535	.95574	.14893	.04380	.09557	.00492	.00454	.13000
3	1.03043	.95117	.14872	.04359	.09512	.00521	.00481	.12140
4	1.02522	.94636	.14490	.04337	.09464	.00359	.00331	.11054
5	1.02163	.94305	.14111	.04322	.09430	.00186	.00172	.10061
6	1.01977	.94133	.13735	.04314	.09413	.00004	.00004	.09153
7	1.01973	.94129	.13354	.04313	.09413	-.00188	-.00174	.08323
8	1.02161	.94303	.12997	.04321	.09430	-.00393	-.00362	.07564
9	1.02554	.94665	.12634	.04338	.09467	-.00609	-.00562	.06872
10	1.03162	.95227	2.12276	.04364	.09523	1.03162	.95227	1.07914

POWER COST, MILLS/KWHE .045517

TOTAL PRES WORTH OF CASH FLOWS AT INT RATE OF .069996 2.00000

LEVELIZED TAXES AT INTEREST RATE OF .069996

FEDERAL INCOME TAX	.096513
STATE INCOME TAX	.005970
STATE REVENUE TAX	.012811
LOCAL PROPERTY TAX	.060000

CASH EXPENSES BEFORE INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 901 FUEL CYCLE COST EXAMPLE

OPERATING AND MAINTENANCE COST ONLY

PD	POWER UNITS	REACTOR OPER COST	STATE REVEN	LOCAL PROPERTY	INTERIM REPLCMTS	PROPERTY INSURNCE	FUEL PRORATA	DEPREC	BOND INTEREST	TOTAL DEDUCTBLE
1	7.4460	1.8500	.0796	0	0	0	0	0	0	1.9296
2	7.4460	1.8500	.0796	0	0	0	0	0	-.0006	1.9289
3	7.4460	1.8500	.0796	0	0	0	0	0	-.0013	1.9283
4	7.2708	1.8300	.0777	0	0	0	0	0	-.0020	1.9057
5	7.0956	1.8100	.0758	0	0	0	0	0	-.0025	1.8833
6	6.9204	1.7900	.0740	0	0	0	0	0	-.0028	1.8612
7	6.7452	1.7700	.0721	0	0	0	0	0	-.0028	1.8393
8	6.5700	1.7500	.0702	0	0	0	0	0	-.0025	1.8177
9	6.3948	1.7300	.0683	0	0	0	0	0	-.0020	1.7964
10	6.2196	1.7100	.0665	0	0	0	0	0	-.0012	1.7753

CALCULATION OF INCOME TAX

PROBLEM IDENTIFICATION PROBLEM 901 FJE. CYCLE COST EXAMPLE

OPERATING AND MAINTENANCE COST ONLY

PD	TOTAL SALES	TOTAL DEDUCTBL (STATE)	STATE INCOME TAX	TOTAL DEDUCTBL (FED)	TAXABLE INCOME (FED)	FEDERAL INCOME TAX	TOTAL STATE AND LOCAL TAX	TOT CASH EXPENDS
1	1.9896	1.9296	.0018	1.9314	.0583	.0291	.0814	1.9605
2	1.9896	1.9289	.0018	1.9308	.0589	.0294	.0814	1.9608
3	1.9896	1.9283	.0018	1.9301	.0595	.0298	.0814	1.9612
4	1.9428	1.9057	.0011	1.9058	.0360	.0180	.0788	1.9268
5	1.8960	1.8833	.0004	1.8837	.0123	.0062	.0762	1.8924
6	1.8492	1.8612	-.0004	1.8608	-.0116	-.0058	.0736	1.8578
7	1.8024	1.8393	-.0011	1.8382	-.0358	-.0179	.0710	1.8231
8	1.7556	1.8177	-.0019	1.8158	-.0603	-.0301	.0684	1.7882
9	1.7087	1.7964	-.0026	1.7937	-.0850	-.0425	.0657	1.7532
10	1.6619	1.7753	-.0034	1.7719	-.1100	-.0550	.0631	1.7181

PAYOUT OF INVESTMENTS

PROBLEM IDENTIFICATION PROBLEM 901 FJE. CYCLE COST EXAMPLE

OPERATING AND MAINTENANCE COST ONLY

PD	OUTST BONDS	OUTST EQUITY	CASH FLOW	BOND INTEREST	EARNINGS ON STOCK	BONDS REPAID	EQUITY RECOVERY	PW OF CASH FLOW
1	0	0	.02913	0	0	.01515	.01398	.02722
2	-.01515	-.01398	.02880	-.00064	-.00140	.01603	.01480	.02515
3	-.03118	-.02878	.02845	-.00132	-.00288	.01698	.01567	.02322
4	-.04816	-.04445	.01598	-.00204	-.00445	.01168	.01078	.01219
5	-.05984	-.05523	.00353	-.00253	-.00552	.00608	.00561	.00259
6	-.06591	-.06084	-.00850	-.00279	-.00608	.00014	.00013	-.00573
7	-.06605	-.06097	-.02070	-.00279	-.00610	-.00614	-.00567	-.01289
8	-.05991	-.05530	-.03266	-.00253	-.00553	-.01279	-.01181	-.01901
9	-.04712	-.04349	-.04448	-.00199	-.00435	-.01983	-.01831	-.02420
10	-.02729	-.02519	-.05615	-.00115	-.00252	-.02729	-.02519	-.02854

POWER COST,MILLS/KWHE .267209

TOTAL PRES WORTH OF CASH FLOWS AT INT RATE OF .069996 -.00000

LEVELIZED TAXES AT INTEREST RATE OF .069996

FEDERAL INCOME TAX	.001671
STATE INCOME TAX	.000103
STATE REVENUE TAX	.075210
LOCAL PROPERTY TAX	0

PROBLEM IDENTIFICATION PROBLEM 901 FUEL CYCLE COST EXAMPLE

COST SUMMARY, MILLS/KWHR(E)

FUEL CYCLE COST	1.6554
PLANT CAPITAL COMPONENT	2.7918
NONFUEL WORKING CAPITAL COMPONENT	.0455
OPERATING AND MAINTENANCE COMPONENT	.2672
SUM OF THE ABOVE COSTS	4.7599

CALCULATED TOTAL POWER COST (COMPARE) 4.7599

APPENDIX C

C-1. Fixed Charge Rates and Fixed Charge Rate Breakdowns (Proportional Case)

This appendix gives the results of several problems run, using POWERCO-50, for the purpose of determining fixed charge rates and their component breakdowns under various conditions. Only the proportional case was studied here.

Figure C-1 shows the values of L_D and L_N plotted against the modified average interest rate, i_{vs}, using sum-of-the-years'-digits tax depreciation. Equations (4.5) and (4.6) were used to calculate the fixed charge rates. Figure C-2 shows the same plots using straight-line tax depreciation.

Tax constants used in these calculations were as follows:

Federal income tax	0.50
State income tax	0.03
State revenue tax	0.04
Local property tax	0.032
Interim replacements	0.0035
Property insurance	0.0025

The curves in Figs. C-1 and C-2 illustrate the well-known fact that the fixed charge rate on nondepreciable capital can exceed the rate on depreciable capital. That is, the tax deductions due to depreciation allowances, on a present-worth basis, can more than offset the cost of depreciation itself. Table C-1 presents component breakdowns of some of the fixed charge rates shown in Fig. C-1 under certain specified conditions. For a given project life and a given set of tax constants, the fixed charge rates depend only on i_{vs}; but the breakdown by components depends on the relative interest rates used for bonds and equity. This can be seen by comparing the results of Problems 17 and 18. These problems used the same value of i_{vs}, and hence had the same fixed charge rates. The breakdowns, however, are different, because the bond and equity interest rates are different in the two cases.

Table C-2 shows fixed charge rate breakdowns for project lifetimes of 20, 30, and 40 years, all other conditions being constant. The fixed charge rate on nondepreciable capital, and its breakdown, do not change with project life. The fixed charge rate on depreciable capital decreases as project life increases; the tax component, however, increases.

Problems 15 through 20 were run in a total time of 68 seconds on a CDC 1604-A computer. They were run at a constant plant capacity factor of 1.00, but any constant capacity factor would give the same result.

Tables C-3 and C-4 show examples illustrating the difference between constant-income and variable-income fixed charge rates when the plant is operated at variable capacity factor.

ORNL DWG 69-4940

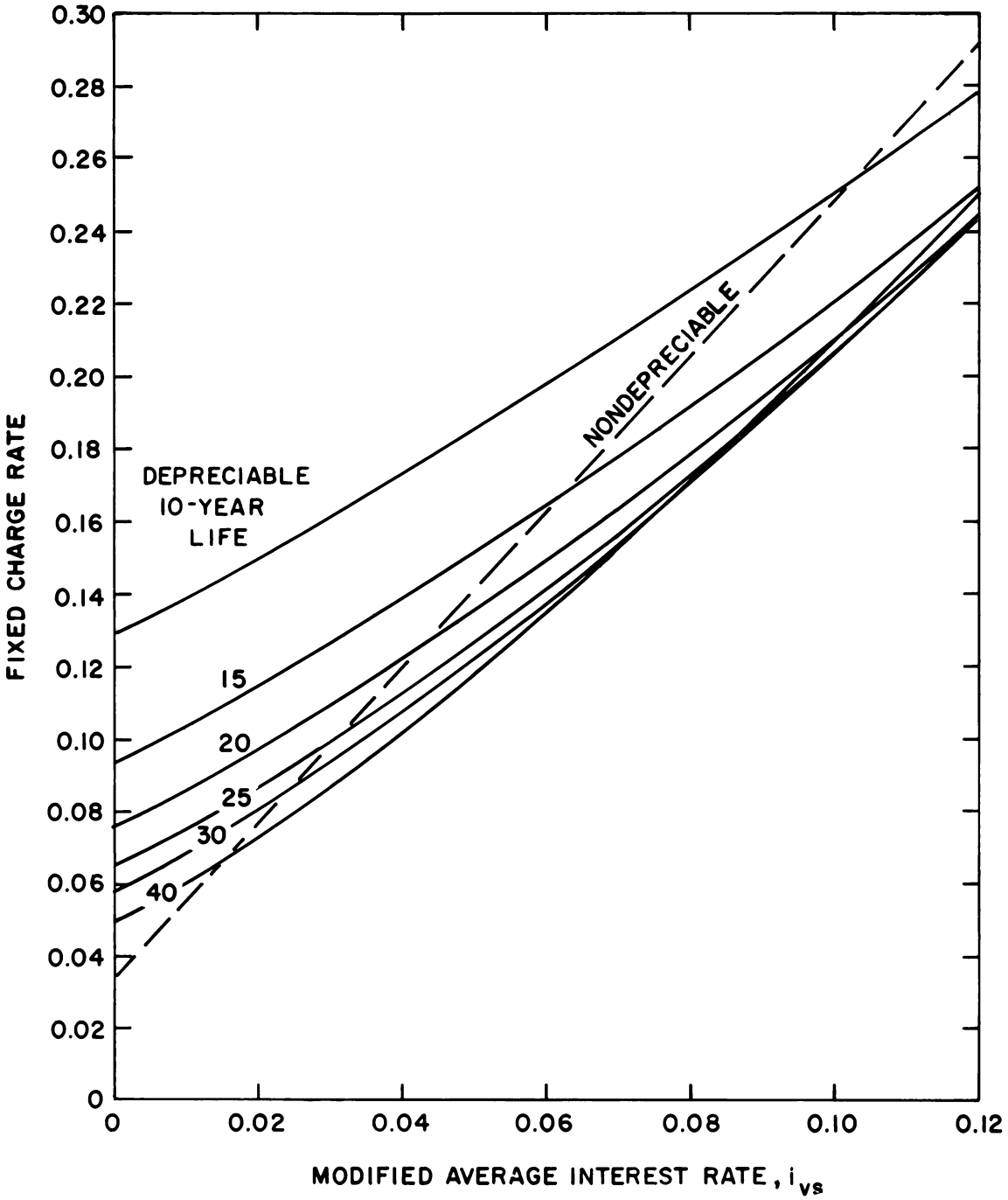


Fig. C-1. Fixed Charge Rates on Depreciable and Nondepreciable Capital. Sum-of-years'-digits tax depreciation; constant load factor.

ORNL DWG 69-4941

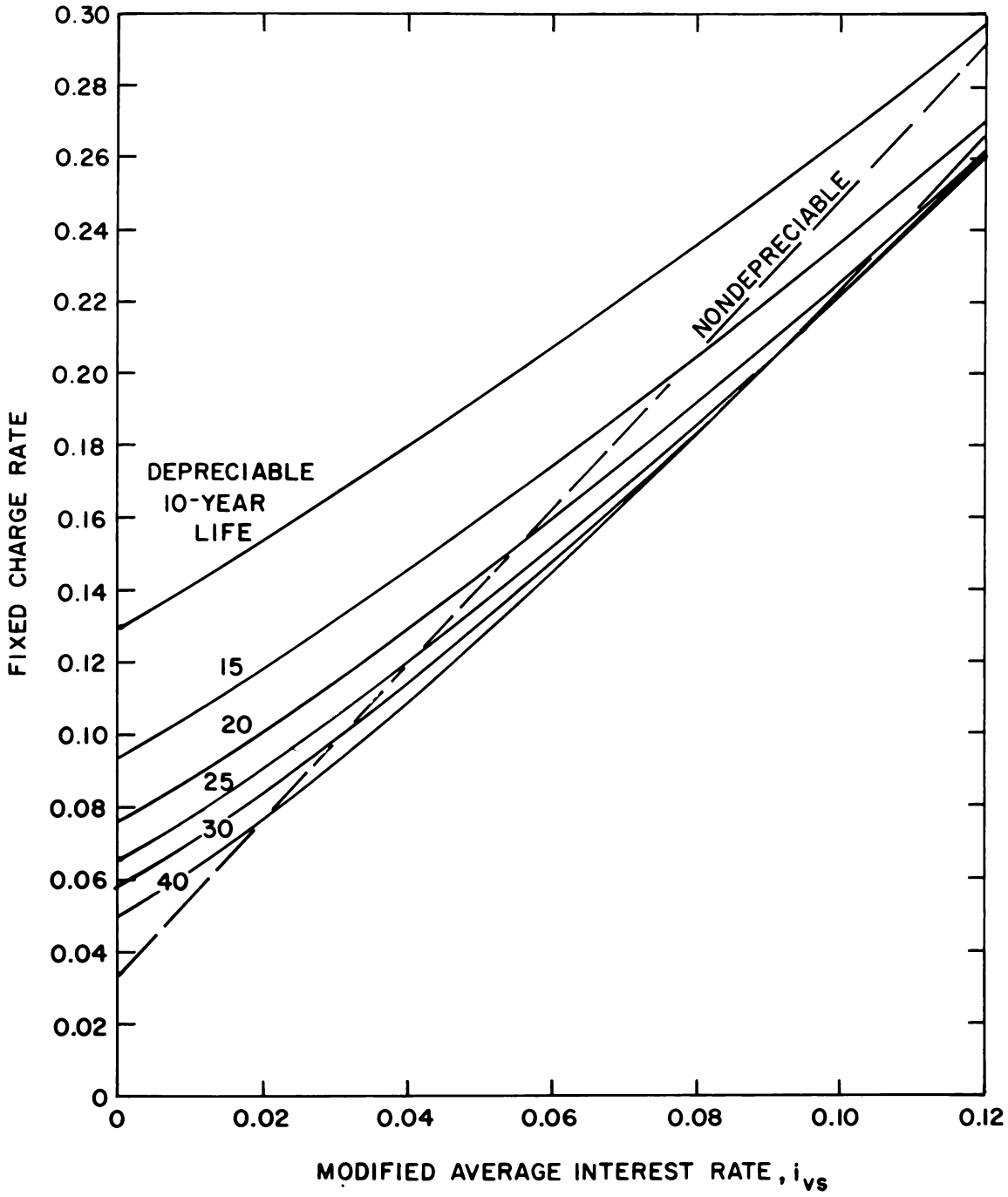


Fig. C-2. Fixed Charge Rates on Depreciable and Nondepreciable Capital. Straight-line tax depreciation; constant load factor.

Table C-1. Fixed Charge Rate Breakdowns for Various Interest Rates[a]

(Constant Annual Load Factor)

	Problem 16	Problem 15	Problem 17	Problem 18
Return on equity	0.0800	0.1000	0.1200	0.1000
Bond interest rate	0.0423	0.0423	0.0423	0.0804
Average cost of money, i_a	0.0604	0.0700	0.0796	0.0898
Modified interest rate, i_{vs}	0.0491	0.0587	0.0683	0.0683
Depreciable Capital				
Cost of money	0.0604	0.0700	0.0796	0.0898
Depreciation	0.0126	0.0106	0.0089	0.0074
Federal income tax	0.0148	0.0204	0.0265	0.0178
State income tax	0.0009	0.0013	0.0016	0.0011
State revenue tax	0.0048	0.0054	0.0060	0.0060
Local property tax	0.0210	0.0216	0.0222	0.0227
Interim replacements	0.0035	0.0035	0.0035	0.0035
Property insurance	0.0025	0.0025	0.0025	0.0025
Total	0.1204	0.1353	0.1508	0.1508
Nondepreciable Capital				
Cost of money	0.0604	0.0700	0.0796	0.0898
Federal income tax	0.0384	0.0480	0.0576	0.0480
State income tax	0.0024	0.0030	0.0036	0.0030
State revenue tax	0.0056	0.0064	0.0072	0.0072
Local property tax	0.0300	0.0300	0.0300	0.0300
Property insurance	0.0025	0.0025	0.0025	0.0025
Total	0.1393	0.1599	0.1805	0.1805

[a]Proportional case, 30-year life, sum-of-years'-digits tax depreciation. Bonds, 52%; equity, 48%. Tax rates: federal income, 50%; state income, 3%; state revenue, 4%; local property, 3.2%. Interim replacements, 0.35%; property insurance, 0.25%.

Table C-2. Fixed Charge Rate Breakdowns for Different Project Lifetimes[a]

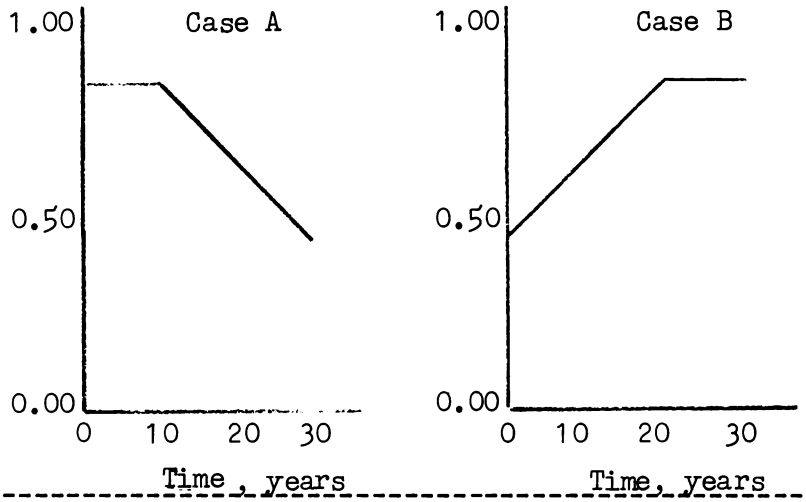
(Constant Annual Load Factor)

	Problem 20	Problem 15	Problem 19
Return on equity	0.1000	0.1000	0.1000
Bond interest rate	0.0423	0.0423	0.0423
Average cost of money, i_a	0.0700	0.0700	0.0700
Modified interest rate, i_{vs}	0.0587	0.0587	0.0587
Depreciable Capital			
Cost of money	0.0700	0.0700	0.0700
Depreciation	0.0244	0.0106	0.0050
Federal income tax	0.0192	0.0204	0.0219
State income tax	0.0012	0.0013	0.0014
State revenue tax	0.0059	0.0054	0.0053
Local property tax	0.0203	0.0216	0.0229
Interim replacements	0.0035	0.0035	0.0035
Property insurance	0.0025	0.0025	0.0025
Total	0.1470	0.1353	0.1325
Nondepreciable Capital			
Cost of money	0.0700	0.0700	0.0700
Federal income tax	0.0480	0.0480	0.0480
State income tax	0.0030	0.0030	0.0030
State revenue tax	0.0064	0.0064	0.0064
Local property tax	0.0300	0.0300	0.0300
Property insurance	0.0025	0.0025	0.0025
Total	0.1599	0.1599	0.1599

[a]Proportional case, sum-of-years'-digits tax depreciation. Bonds, 52%; equity, 48%. Tax rates, interim replacements, and property insurance are same as in Table C-1. Project lifetimes are as follows: Problem 20, 20 years; Problem 15, 30 years; Problem 19, 40 years.

Table C-3. Studies of Fixed Charge Rates With Variable Load Factors[a]

Plant Load Factors:



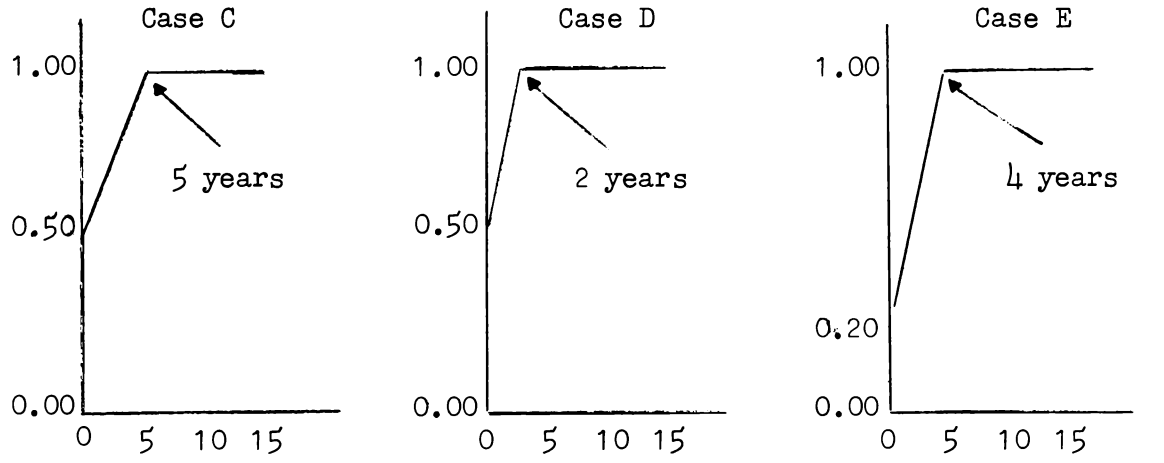
	Fixed Charge Rate Based on Constant Load Factor[b]	Fixed Charge Rate Based on Variable Load Factor	
		Case A	Case B
Depreciable Capital			
Cost of money	0.0700	0.0700	0.0700
Depreciation	0.0106	0.0106	0.0106
Federal income tax	0.0204	0.0218	0.0182
State income tax	0.0013	0.0014	0.0011
State revenue tax	0.0054	0.0055	0.0053
Local property tax	0.0216	0.0216	0.0216
Interim replacements	0.0035	0.0035	0.0035
Property insurance	0.0025	0.0025	0.0025
Total	0.1353	0.1369	0.1328
Nondepreciable Capital			
Cost of money	0.0700	0.0700	0.0700
Federal income tax	0.0480	0.0497	0.0455
State income tax	0.0030	0.0031	0.0028
State revenue tax	0.0064	0.0065	0.0063
Local property tax	0.0300	0.0300	0.0300
Property insurance	0.0025	0.0025	0.0025
Total	0.1599	0.1618	0.1571

[a] Proportional case, 30-year life, sum-of-years'-digits tax depreciation. Bonds, 52% at 4.23% interest; equity, 48% at 10.0% return. Tax rates: federal income, 50%; state income, 3%; state revenue, 4%; local property, 3.2% (depreciable) and 3.0% (nondepreciable).

[b] The load factor may have any value, provided it is constant. The column is taken from Problem 15.

Table C-4. Studies of Fixed Charge Rates With Variable Load Factors (Continued)[a]

Plant Load Factors:



	Fixed Charge Rate Based on Constant Load Factor	Fixed Charge Rate Based on Variable Load Factor		
		Case C	Case D	Case E
Depreciable Capital				
Cost of money	0.1270	0.1270	0.1270	0.1270
Depreciation	0.0254	0.0254	0.0254	0.0254
Federal income tax	0.0569	0.0557	0.0561	0.0549
State income tax	0.0035	0.0034	0.0035	0.0034
State revenue tax	0.0000	0.0000	0.0000	0.0000
Local property tax	0.0216	0.0216	0.0216	0.0216
Interim replacements	0.0035	0.0035	0.0035	0.0035
Property insurance	0.0025	0.0025	0.0025	0.0025
Total	0.2404	0.2391	0.2396	0.2383
Nondepreciable Capital				
Cost of money	0.1270	0.1270	0.1270	0.1270
Federal income tax	0.1120	0.1107	0.1112	0.1100
State income tax	0.0069	0.0068	0.0069	0.0068
State revenue tax	0.0000	0.0000	0.0000	0.0000
Local property tax	0.0300	0.0300	0.0300	0.0300
Property insurance	0.0025	0.0025	0.0025	0.0025
Total	0.2784	0.2770	0.2776	0.2763

[a] Proportional case, 15-year life, sum-of-years'-digits tax depreciation. Bonds, 30% at 5.0% interest; equity, 70% at 16.0% return after taxes. Tax rates: federal income, 50%; state income, 3%; state revenue, 0%; local property, 3.2% (depreciable) and 3.0% (nondepreciable). Interim replacements, 0.35%; property insurance, 0.25%.

APPENDIX D

D-1. Breakdown of Fixed Charge Rate on Depreciable Capital in the Proportional Case

Suppose, in the proportional case, that the initial plant investment is one dollar, and that there are no other investments or expenditures except taxes, interim replacements, and property insurance. Under these conditions, the expressions for S_c [Eq. (4.4)] and L_D [Eq. (4.5)] are equivalent, and the constant annual income, S_c, is equal to the fixed charge rate, L_D. (This fact is, of course, obvious from the definitions of these terms.) Assume now that the constant income case is the one under consideration, so that the same annual income, S_c, is received each year. For this case, the following levelized annual quantities are defined, where the levelizing is done by taking the present-worthed average at the interest rate i_a:

L_1 = levelized amount required to recover the investment and pay the return on investment,

L_2 = levelized federal income tax,

L_3 = levelized state income tax,

L_4 = levelized state revenue tax,

L_5 = levelized local property tax,

L_6 = levelized interim replacements,

L_7 = levelized property insurance.

Proof will now be given that the sum of these L's is equal to the fixed charge rate, L_D. Additional subscripts on the L's are used to denote the year; for example, $L_{2,n}$ will represent the federal income tax paid in year n, etc. Omitting the capital investment itself, the total cash expenditure in year n will be denoted by E'_n. Then

$$E'_n = L_{2,n} + L_{3,n} + L_{4,n} + L_{5,n} + L_{6,n} + L_{7,n} . \qquad (D.1)$$

The $L_{1,n}$ term is omitted here because it represents capital recovery and is not a cash expenditure.

It was shown on pages 46-50 of ORNL-3944 that the total present worth of the cash incomes is equal to the total present worth of the initial investment and other cash expenditures:

$$\sum P_{n,a} S_c = V_p + \sum P_{n,a} E'_n \ , \tag{D.2}$$

which leads to

$$S_c K(m,i_a) = V_p + \sum P_{n,a} [L_{2,n} + L_{3,n} + L_{4,n} + L_{5,n} + L_{6,n} + L_{7,n}] \tag{D.3}$$

and, therefore,

$$S_c = \frac{V_p}{K(m,i_a)} + \frac{\sum P_{n,a} L_{2,n}}{K(m,i_a)} + \frac{\sum P_{n,a} L_{3,n}}{K(m,i_a)} + \frac{\sum P_{n,a} L_{4,n}}{K(m,i_a)} + \frac{\sum P_{n,a} L_{5,n}}{K(m,i_a)}$$

$$+ \frac{\sum P_{n,a} L_{6,n}}{K(m,i_a)} + \frac{\sum P_{n,a} L_{7,n}}{K(m,i_a)} \ . \tag{D.4}$$

L_1, which is the levelized income required to retire an investment, V_p, at the interest rate, i_a, is obtained by multiplying V_p by the "capital recovery factor" $1/K(m,i_a)$:

$$L_1 = \frac{V_p}{K(m,i_a)} \ . \tag{D.5}$$

(This well-known economic relationship can be deduced from pages 46-50 of ORNL-3944.) The first term on the right-hand side of Eq. (D.4) can, therefore, be replaced by L_1. The remaining terms can be recognized as present-worthed averages of the annual L's, and can thus be replaced by L_2, L_3, etc. The result is:

$$S_c = L_1 + L_2 + L_3 + L_4 + L_5 + L_6 + L_7 \ ; \tag{D.6}$$

and, since $S_c = L_D$,

$$L_D = L_1 + L_2 + L_3 + L_4 + L_5 + L_6 + L_7 \ , \tag{D.7}$$

which completes the proof.

Use can also be made of the identity

$$\frac{1}{K(m,i_a)} \equiv i_a + \frac{i_a}{(1 + i_a)^m - 1} \ . \tag{D.8}$$

The first term of the fixed charge rate breakdown can thus be represented as the sum of the weighted-average cost of money and the sinking fund depreciation factor at this same interest rate.

The case of variable annual income will now be considered. The definition of L_D was based on the assumption that, if the annual income is variable, a corresponding constant annual income case having the same power cost can be defined. The relationship between these cases was given by Eq. (4.1):

$$\sum P_{n,vs} S_c = \sum P_{n,vs} S_n \ . \tag{4.1}$$

Since L_D and S_c are equal under the conditions used in this section, it follows that

$$L_D = \frac{\sum P_{n,vs} S_n}{\sum P_{n,vs}} = \frac{\sum P_{n,vs} S_n}{K(m,i_{vs})} \ . \tag{D.9}$$

The numerator of this expression can be evaluated by recalling that, when the interest rate i_{vs} is used, the present worth of the incomes is equal to the present worth of the pseudo cash expenditures. Therefore,

$$\sum P_{n,vs} S_n = V_p + \sum P_{n,vs} E''_n \ , \tag{D.10}$$

where E''_n represents the pseudo expenditures for taxes and other capital-related items. Combining (D.9) and (D.10), and noting that $V_p = 1$ under the conditions assumed,

$$L_D = \frac{1}{K(m,i_{vs})} + \frac{\sum P_{n,vs} E''_n}{K(m,i_{vs})} \ . \tag{D.11}$$

As before, the capital recovery factor can be shown in conventional form as the sum of two terms:

$$\frac{1}{K(m,i_{vs})} = i_{vs} + \frac{i_{vs}}{(1 + i_{vs})^m - 1} \ .$$

Equation (D.11) may, therefore, be interpreted as follows: For the variable annual income case, there is a corresponding constant annual

income case, for which L_D is defined. This value of L_D will be equal to the sum of the interest rate i_{vs}, the sinking fund depreciation factor at the rate i_{vs}, and the present-worthed average pseudo expenditures for capital-related items. The latter expenditures can be taken either from the constant or the variable income case; the rate i_{vs} is used for present-worth calculations.

D-2. Breakdown of the Variable Income Fixed Charge Rate, L'_D, in the Proportional Case

L'_D was defined in such a manner that, if the only investment is an original plant investment of one dollar, then

$$L'_D = \frac{\sum P_{n,a} S_n}{\sum P_{n,a}} . \tag{D.12}$$

The present-worth criterion for this case is:

$$\sum P_{n,a} S_n = V_p + \sum P_{n,a} E'_n . \tag{D.13}$$

In comparing Eqs. (D.2) and (D.13), it should be remembered that the values of E'_n will be different; that is, the annual expenses in the variable load factor case will not be identical to those in the corresponding constant load factor case. Combining (D.12) and (D.13), and setting $V_p = 1$, yields:

$$L'_D = \frac{1}{K(m,i_a)} + \frac{\sum P_{n,a} E'_n}{K(m,i_a)} . \tag{D.14}$$

L'_D will thus be equal to the sum of the levelized payments for capital recovery and other capital-related items.

D-3. Breakdown of the Fixed Charge Rate on Nondepreciable Capital

Using a nondepreciable capital investment of one dollar, it can be shown that the fixed charge rate, L_N, is equal to the sum of the cost of money, i_a, and the levelized nondepreciable-capital-related expenses, in the constant load factor case. It can also be shown that L'_N is equal to

the sum of i_a and the levelized nondepreciable-capital-related expenses, in either the constant or the variable income case. Levelizing is assumed to be done at the interest rate i_a. The methods used in these proofs are the same as those used in Sects. D-1 and D-2 of Appendix D and, for that reason, will not be repeated here.

NOMENCLATURE

Annual Quantities, for Year n

A_n = total cash expenses including income tax

B_n = bond interest

C_n = capital investment outstanding at start of year

D_n = depreciation allowance for tax purposes

E_n = total deductible expense for tax purposes

F_n = deductible fuel expense for tax purposes

G_n = total cash expenses actually paid, excluding income tax

G'_n = total cash expenses actually paid, exclusive of federal and state income taxes, state revenue tax, local property tax, interim replacements, and property insurance

H_n = fuel expense charged to project as an operating cost in the fixed charge rate method

$I_{i,n}$ = cash expense for property insurance

$I_{r,n}$ = annual equivalent expense for interim replacements

J_n = actual fuel expenses paid in cash

$M_{a,n}$ = taxable income for state income tax calculation

M_n = taxable income

$P_{n,a}$ = present-worth factor using interest rate i_a
$= (1 + i_a)^{-n}$

$P_{n,e}$ = present-worth factor using interest rate i_e
$= (1 + i_e)^{-n}$

$P_{n,v}$ = present-worth factor using interest rate i_v
$= (1 + i_v)^{-n}$

$P_{n,vs}$ = present-worth factor using interest rate i_{vs}
$= (1 + i_{vs})^{-n}$

Q_n = reduction of bond principal

R_n = cash flow (cash income minus cash expenditures)

S_n = total income from sales

$T_{a,n}$ = state income tax

$T_{b,n}$ = state gross revenues tax

$T_{c,n}$ = local property tax on plant investment

$T_{d,n}$ = local property tax on core investment

T_n = income tax

$T_{p,n}$ = local property tax on nonfuel working capital

$T_{t,n}$ = sum of $T_{a,n}$, $T_{b,n}$, $T_{c,n}$, $T_{d,n}$, $T_{p,n}$, $I_{i,n}$, and $I_{r,n}$

X_n = cash operating expenses = $G_n - J_n$

Z_n = kilowatt-hours of electricity sold

Notes: 1. All interest rates are on the after-tax basis.
2. All money quantities are in millions of dollars.

NOMENCLATURE (Continued)

Non-Annual Quantities

b = fraction of investment in bonds

f_c = fraction of initial core value for property tax purposes

f_n = fraction of original plant value remaining at start of year n, in the straight-line depreciation method

F_t = total fuel expense over life of project

F_w = pro rata fuel expense per kilowatt-hour

i_a = average interest rate (proportional case)

i_b = interest rate on bonds

i_e = interest rate (earning rate) on equity

i_f = average interest rate in the fixed bond repayment case

i_v = modified average interest rate

i_{vs} = modified weighted-average interest rate

$= (1 - b)i_e + (1 - k_m)bi_b$

k_a = interim replacements constant

k_b = property insurance constant

$k_c = (1 - k_s)(k_v f_c + k_b)$

$k_d = (1 - k_s)(k_b + k_p)$

$k_e = 1 - (1 - k_t)(1 - k_w)$

$k_f = 1 + (1 - k_t)k_c \sum P_{n,vs}$

$k_g = (1 - k_s)(k_v f_n + k_i)$

$k_h = 1 - P_{m,vs} + (1 - k_t)k_d \sum P_{n,vs}$

$k_i = k_a + k_b$

$k_m = 1 - (1 - k_s)(1 - k_t)$

k_p = property tax rate on nonfuel working capital

k_r = state gross revenues tax rate

k_s = state income tax rate

k_t = federal income tax rate

$k_u = 1 - b + (1 - k_t) \sum P_{n,e} k_g$

k_v = property tax rate on plant

$k_w = 1 - (1 - k_r)(1 - k_s)$

$k_x = 1 - b + (1 - k_t)k_c \sum P_{n,e}$

$k_y = 1 + (1 - k_t) \sum P_{n,vs} k_g$

$k_z = 1 - b - P_{m,e} + (1 - k_t)k_d \sum P_{n,e}$

$K(m,i)$ = series present-worth factor for m years at interest rate i

L_D = fixed charge rate on depreciable capital

L'_D = variable-income fixed charge rate on depreciable capital

L_N = fixed charge rate on nondepreciable capital

L'_N = variable-income fixed charge rate on nondepreciable capital

m = economic life of project, years

$P_{m,e}$ = present-worth factor, $(1 + i_e)^{-m}$

$P_{m,v}$ = present-worth factor, $(1 + i_v)^{-m}$

NOMENCLATURE (Continued)

Non-Annual Quantities (Continued)

R' = ratio of levelized load factor at interest rate i_a to levelized load factor at interest rate i_{vs}

S_a = present-worthed average annual sales income, using interest rate i_a

S_c = constant annual income required

t = depreciable life, years

U_p = power cost, mills/kwhr

V_b = sum of V_o and V_p

V_o = initial fuel investment

V_p = plant investment (depreciable investment)

W_F = average fuel working capital

W_p = nonfuel working capital investment

Z_t = total kilowatt-hours of electricity sold during project life

Notes: 1. All interest rates are on the after-tax basis.
2. All money quantities are in millions of dollars.

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