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CONCEPT — COMPUTERIZED CONCEPTUAL COST ESTIMATES FOR STEAM—ELECTRIC POWER PLANTS

Phase II User's Manual

H. I. Bowers
L. D. Reynolds
R. C. DeLozier
B. E. Srite

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Printed in the United States of America. Available from
National Technical Information Service
U.S. Department of Commerce
5285 Port Royal Road, Springfield, Virginia 22151
Price: Printed Copy $3.00; Microfiche $0.95

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ORNL-4809
UC-80 — Reactor Technology

Contract W-7405-eng-26

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Studies and Evaluations Program

L. L. Bennett, Director

APRIL 1973

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ACKNOWLEDGMENTS

This work was performed by members of the Capital Cost Studies Group of the ORNL Studies and Evaluations Program and the Applied Science Department of the Computing Technology Center under the sponsorship and direction of the Office of Program Analysis, Division of Reactor Development and Technology, U.S. Atomic Energy Commission. The valuable guidance and direction provided by G. M. Anderson (AEC-DRDT) is gratefully acknowledged.

The authors wish to acknowledge the contributions of I. T. Dudley and M. L. Myers of the Oak Ridge National Laboratory and R. J. Barnard and D. L. Bernstein of the Computing Technology Center, as well as the advice and guidance of L. L. Bennett and M. I. Lundin of the Oak Ridge National Laboratory.

The authors also wish to acknowledge the contribution of United Engineers & Constructors, Inc., who prepared the capital cost studies which served as the bases for the cost models for the various types of plants.

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H. I. Bowers* R. C. DeLozier†
L. D. Reynolds† B. E. Srite†

ABSTRACT

The CONCEPT computer code package was developed to provide conceptual capital cost estimates for nuclear and fossil-fueled power plants. Cost estimates can be made as a function of plant type, size, location, and date of operation. Output includes a detailed breakdown of the estimate into direct and indirect costs according to the USAEC accounting system described in document NUS-531.

Cost models are currently provided for single-unit PWR, BWR, and coal- and oil-fired plants. Work is in progress to provide cost models for single-unit HTGR and gas-fired plants and for two-unit plants.

Keywords: capital costs, power costs, power plant economics.

INTRODUCTION

Electric utilities now have an unprecedented number of power plant types available to meet growing energy requirements, and the total cost for any type of power generation depends greatly on the capital cost of the power plant. This is especially true for nuclear plants being planned at the present time, since about 75% of the energy cost will be due to fixed charges on capital investment. The selection of a plant which will provide the most economic generation of electric energy, while complying with environmental requirements, will be influenced by many factors. Thus, accurate estimates of capital costs are essential in comparing the economic merits of different types of power plants.

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Three computer programs, which are referred to as the CONCEPT package, have been developed at Oak Ridge National Laboratory (ORNL) and the Computing Technology Center (CTC). This computer package is designed to provide a rapid means of estimating future capital costs of different plants under various sets of economic and technical ground rules. For application in system expansion studies, these capital cost estimates should be based on the specific location and operating date being considered. This requires an understanding of trends in cost components, such as labor rates, labor productivity, and material and equipment prices as a function of location and time. However, cost estimates produced by CONCEPT are not intended as substitutes for detailed cost estimates for specific projects.

This report describes the second generation in the development of the CONCEPT package,* consisting of three separate computer programs as illustrated in Fig. 1. The CONTAC auxiliary program, described in Appendix A, is used to read cost model data for the various types of plants from punched cards and to generate data files on magnetic tape. The CONLAM auxiliary program, described in Appendix B, is used to read historical data for materials and labor costs at various locations from punched cards and to generate data files on a second magnetic tape. The two auxiliary programs, CONTAC and CONLAM, are important parts of the total CONCEPT package and must be used to generate, update, or modify the data files stored on magnetic tape. The main body of this report is devoted to the CONCEPT program, which retrieves cost model data and historical cost data from the two previously generated magnetic tapes and generates cost estimates based on the ground rules specified by the user at program execution time.

The programs are written in FORTRAN IV for the IBM 360 class of machines. Less than 150K of computer core are required for any one of the three programs. Computer time required for a single cost calculation is dependent on the complexity of the case, but averages only a few seconds.

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*Previous work is documented in Refs. 1 to 3.

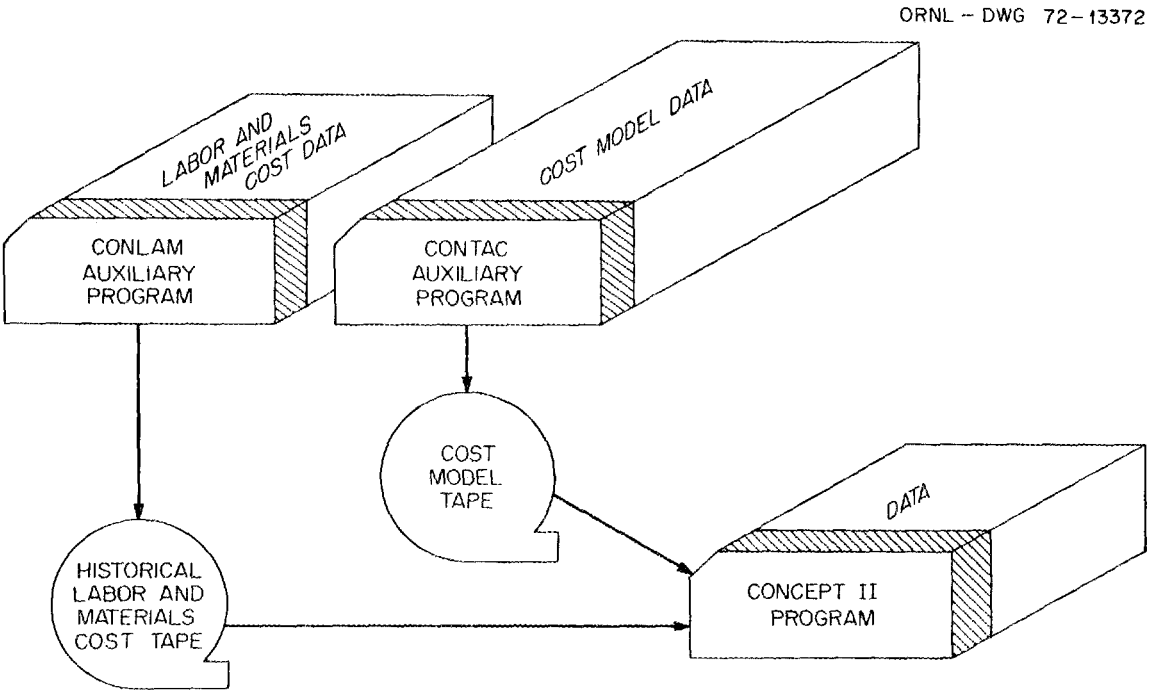

Fig. 1. CONCEPT II package.

The CONCEPT package, including auxiliary programs and cost model and historical cost data sets, will be made available from the Argonne Code Center, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, Illinois 60439. Questions regarding the details of the CONCEPT package should be directed to either H. I. Bowers or R. C. DeLozier.

GENERAL DESCRIPTION OF THE CONCEPT CODE

The procedures used in CONCEPT are based on the assumption that any central station power plant of the same type involves approximately the same major cost components, regardless of location or date of initial operation. Therefore, if the trends of these major cost components can be established as a function of time, location, and plant type and size, a cost estimate for a reference case can be adjusted to fit any case of interest.

The application of this approach requires a detailed cost model for each plant type at a reference condition and the determination of the

cost trend relationships. The generation of these data sets comprises a large effort in the continuing development of the code.

The cost model for each type of plant is based on a detailed cost estimate for a reference plant at a designated time and location. Each estimate includes a detailed breakdown of each cost account into costs for equipment, labor, and materials. The cost models are stored on magnetic tape by the auxiliary program CONTAC, described in Appendix A.

Data that reflect historical trends in economic factors (such as labor rates and prices of materials) for 23 locations are stored on a second magnetic tape by the auxiliary program CONLAM, described in Appendix B. CONCEPT uses the data stored in these historical cost data files to calculate cost indexes for translating the cost model data from the base (or reference) time and location to the selected time and location. Data defining escalation rates for equipment costs and productivity of craft labor are stored in a BLOCK DATA subprogram.

The input to CONCEPT consists of the net plant electrical capacity, plant type, plant location, date of beginning of design and construction,* date of commercial operation, length of workweek, and interest rate. Any constant, variable, or cost array stored on the cost model tape or in the BLOCK DATA subprogram can be altered by input option. In addition, the escalation rates calculated by the code from data stored on the historical cost data tape can be overridden by input option. Thus contingency cases can be examined with a minimum of effort, and the cost model can be altered at execution time to take into account known costs or factors that affect the design of the plant, such as seismic problems or availability and type of heat sink.

As an example of the procedures described above, suppose a cost estimate for the year 1971 is available for a 1000-MW(e) PWR plant located on a site near Middletown,† and a cost estimate for 1980 is desired for

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*Beginning of design and construction is defined as the date the order is placed for the nuclear steam supply system or the fossil-fueled steam generating equipment.

†Middletown represents the USAEC standard hypothetical site described in the AEC Guide for Economic Evaluations of Nuclear Reactor Plant Designs.[4]

a corresponding plant located on a similar site but near another city. The new estimate is obtained by adjusting factory and site-related costs for the Middletown plant by the ratios of the projected 1980 cost indexes for the new city to the 1971 cost indexes for Middletown.

The technique of separating the plant cost into individual components, applying appropriate cost indexes, and summing the adjusted components is the basic tool used in CONCEPT. A schematic illustration of this technique is presented in Fig. 2. Three sets of cost indexes as functions of time and location are required. These indexes are used to adjust the costs of equipment, labor, and materials. The equipment cost indexes are calculated from functional relations, and the labor cost indexes are calculated from basic parameters, which include wage rates for the various

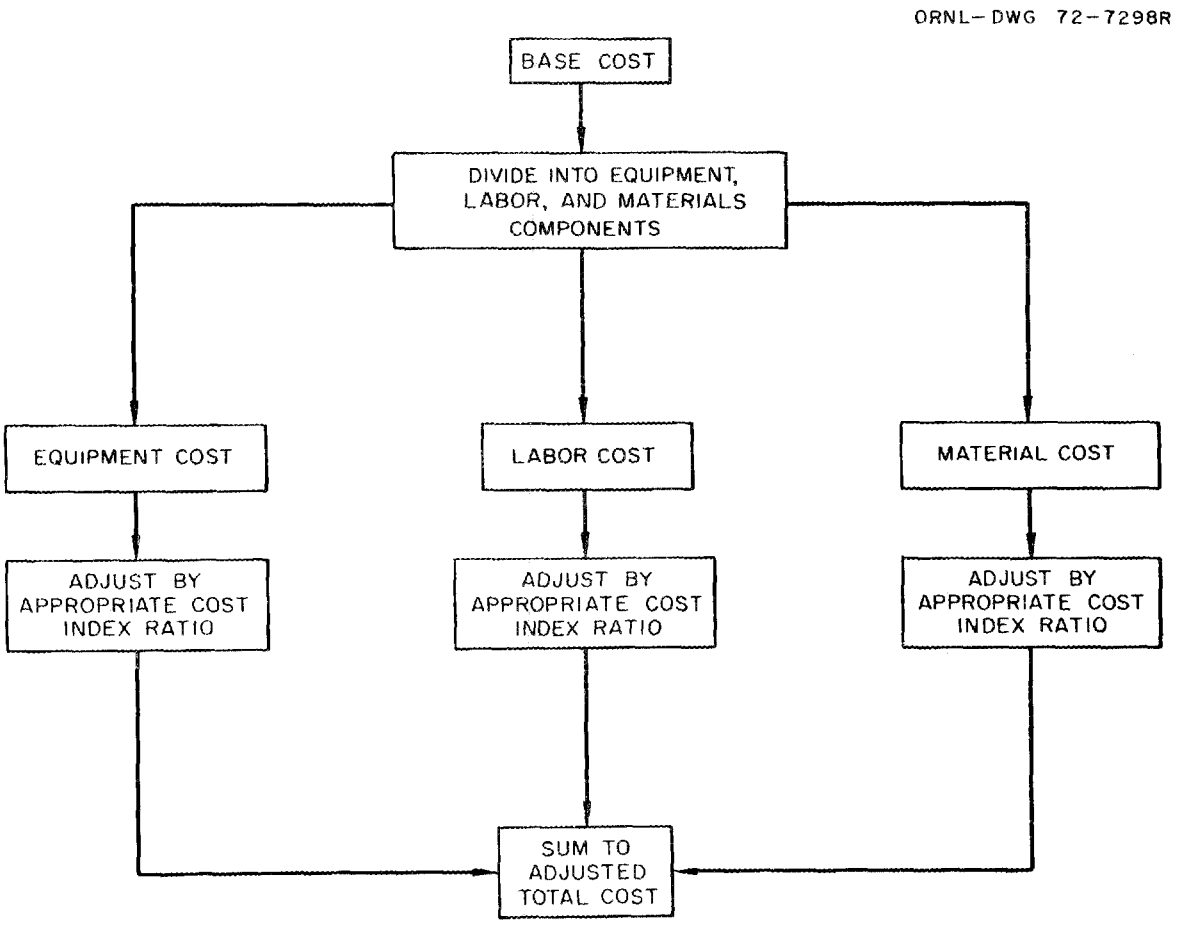

Fig. 2. Method used to adjust base costs in CONCEPT.

crafts, labor productivity, and overtime considerations. The materials cost indexes are calculated from unit costs for site-related materials, which include structural steel, reinforcing steel, concrete, and lumber. A detailed breakdown of the labor and materials categories is included in Appendix B.

Figure 3 indicates the general flow of calculations in CONCEPT. The computer code follows this procedure closely; however, the illustration is not a detailed computer program flowchart. An important feature of this arrangement is that the second block of the diagram utilizes the cost model data stored on magnetic tape for different types of power plants, and all the other blocks are independent of plant type. Therefore, when other types of plants are studied, the computational sections of the CONCEPT program remain intact, and only the cost model for a reference plant need be provided for each type of plant.

Block 1 refers to the input data stream. This input is read from punched cards and, for each case, must include the plant electrical capacity, reactor type (or fossil-fuel type), plant location (city), and design and construction period. The code will make the following assumptions if they are not overridden by input data: (1) costs are referenced to start of design and construction, (2) 40-hr workweek with no overtime, and (3) constant 7%/yr simple interest for calculating interest during construction. Cases of interest will differ from these hypothetical cases, depending on what measures need to be taken to establish a firm foundation, insure against earthquakes, provide for a heat sink, etc. Therefore, an input option is included in CONCEPT to allow any constant or factor in the cost model to be changed at the time of program execution. This option can also be used to alter escalation data used for calculating cost indexes. Changes made at this step are not permanent changes to the data used in CONCEPT, but apply to the cases in the current run, unless changed again.

In block 2 the cost model data for the type of plant specified by the input data are retrieved from the cost model tape. If a cost model for the type of plant specified is not found on the tape, a diagnostic message will be printed and a PWR cost model selected.

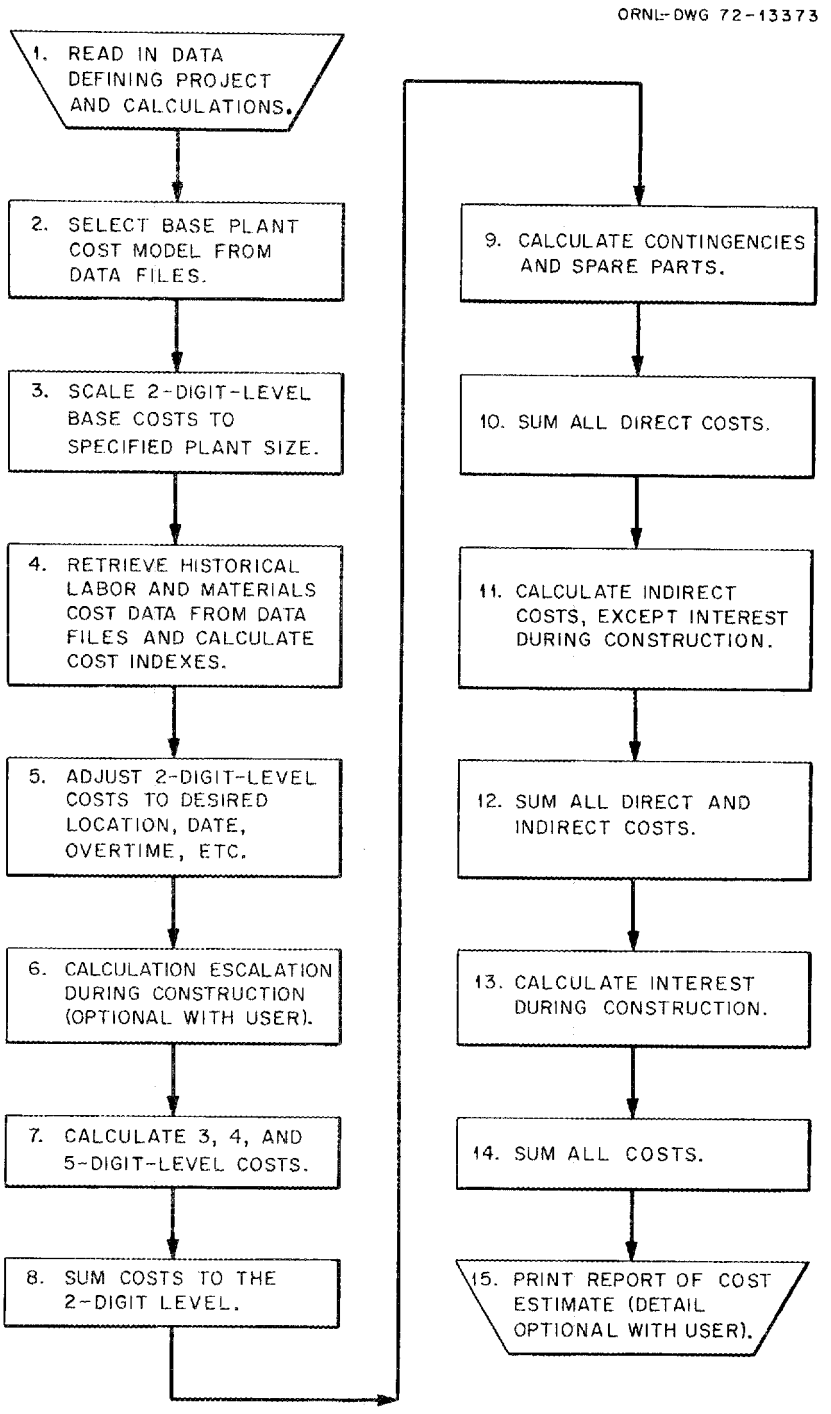

Fig. 3. CONCEPT — general flow of calculations.

In block 3 each of the two-digit direct cost accounts (e.g., account 22) is scaled to the specified plant size. These costs are calculated by using mathematical models that define each two-digit account direct cost for the reference plant as a function of size. These scaled two-digit account direct costs (called base costs) form the basis for all detailed costs estimated in succeeding calculations. The final direct cost estimates (block 8) are made by successively adjusting the base costs by use of cost indexes and multipliers developed from the cost model. The optional input feature permits the user to specify adjustments in addition to those developed by the code. In general, adjustments in cost model data should be made at the most detailed account level (three-, four-, or five-digit account) of block 7. The only exception is a change affecting an entire two-digit account, which can be made by changing the cost model data at the two-digit account level.

In block 4 the historical cost data are retrieved, and cost indexes are calculated for adjustment of costs to the specified location and for projection of costs to the specified dates. This step utilizes the historical data stored on magnetic tape by the CONLAM auxiliary program and data stored in the BLOCK DATA subprogram.

In block 5 each two-digit account direct cost estimate is first divided into three components: equipment, labor, and materials. These three components of each two-digit account are then escalated to the starting date and adjusted for location and length of workweek. Costs of equipment and materials are treated by multiplying by the ratios of the projected cost indexes for the selected location and time to the cost indexes for the cost model location and time. Labor costs are treated in a similar manner and, in addition, are adjusted for differences in productivity and overtime charges. This step utilizes the cost indexes calculated in block 4.

In block 6 the three components of each two-digit account are escalated from date of start of design and construction to date of commercial operation, if this option was selected by the user. This operation requires a cumulative cash flow curve for each two-digit account. As with other cost model data used in CONCEPT, these curves are stored on the cost model tape and are alterable during execution.

In block 7, the three-, four-, and five-digit account costs are calculated from the three components of the two-digit account costs from blocks 5 and 6. This calculation uses cost model data that allocate a fraction of each two-digit account cost component (equipment, labor, and materials) to the appropriate three-digit account. Four- and five-digit accounts are similarly allocated as fractions of three- and four-digit account cost components respectively. It is at this level that the cost model can logically be modified to reflect design differences between the base plant and the plant of interest. For example, in a high seismic risk zone, several of the four- and five-digit accounts might be increased to include the extra cost of additional concrete and reinforcing steel. Any change to a higher-level account (except to a two-digit account) must be accompanied by consistent changes to the subaccounts of that account.

In block 8 the adjusted three-, four-, and five-digit account costs from block 7 are summed to the two-digit account level.

In block 9 contingencies and spare parts are calculated for each two-digit account, using methods similar to those recommended in NUS-531.[4] These items are calculated as percentages of corresponding two-digit account costs.

In block 10 all direct costs are summed, including contingencies and spare parts.

In block 11 all indirect costs, except interest during construction, are calculated in a manner similar to the recommendations in NUS-531.[4] Cost allowances are included for construction facilities, equipment, and services; for engineering and construction management services; and for other miscellaneous items, such as taxes and insurance during construction, staff training, plant startup, owner's general and administrative services, and allowances for licensing activities and preliminary investigations and studies. However, USAEC Report NUS-531 was published in early 1969, and some of the cost allowances recommended therein are lower than actually experienced during recent years. Hence, these indirect cost allowances have been revised upward as shown later in this report. Indirect cost data can be altered at program execution time, if desired.

In block 12 all direct and indirect costs are summed.

In block 13 interest during construction is calculated. This step utilizes the same cumulative cash flow curves as the escalation calculation discussed in block 6. The user may specify either simple or compound interest calculations.

In block 14 all costs are summed to give the total capital cost of the specified plant.

In block 15 the final cost report is printed. The amount of detail is optional with the user, allowing either a one-page summary at the two-digit account level or a multipage detailed listing at the three-, four-, and five-digit levels including man-hour estimates and a total cumulative cash flow curve.

COST MODELS FOR REFERENCE PLANTS

CONCEPT provides cost models for single-unit PWR and BWR nuclear plants and coal- and oil-fired fossil plants. The detailed cost model data for the reference PWR plant are listed in Appendix A, and the output for example problem 1, discussed later in this report, reproduces this cost model. A choice of run-of-river cooling, natural draft cooling towers, or mechanical draft cooling towers is available for all plant types. Work is in progress to provide cost models for single-unit HTGR and gas-fired plants and for two-unit plants.

The present cost models were developed from investment cost studies and detailed cost estimates for hypothetical 1000-MW(e) plants which were prepared for the U.S. Atomic Energy Commission by United Engineers & Constructors, Inc.[5] The hypothetical plants are assumed to be located at the AEC Middletown site, which is described in considerable detail in the AEC guide for economic evaluation.[4] This site is favorable in all respects, including an adequate supply of cooling water, low population density, satisfactory transportation facilities, and sufficient labor supply for a 40-hr workweek. Plants using run-of-river cooling systems are assumed to be provided with 57°F cooling water, and plants using cooling towers are designed for 70°F wet bulb temperature.

The two-digit account direct costs for the reference plants as a function of plant size are described by equations fitted to cost-size

scaling curves like those shown in Fig. 4 for PWR plants. These curves and equations are estimated to be representative of capital costs for unit sizes in the range from 500 to about 1500 MW(e) and should be used with care outside this range. The coefficients defining the equations vary as a function of plant type and can be altered through the optional input data stream.

Each total two-digit direct cost account is divided into equipment, labor, and materials components using relationships calculated by the code from the detailed costs included in the cost model. These relationships are assumed to be independent of plant size in the present version of the code. The more detailed three-, four-, and five-digit costs are calculated in a similar manner also using relationships developed from the cost model.

The cost model for each type of plant includes distributions of labor and materials. These are used in calculating cost indexes for adjusting base costs to other locations and for projecting costs into the future.

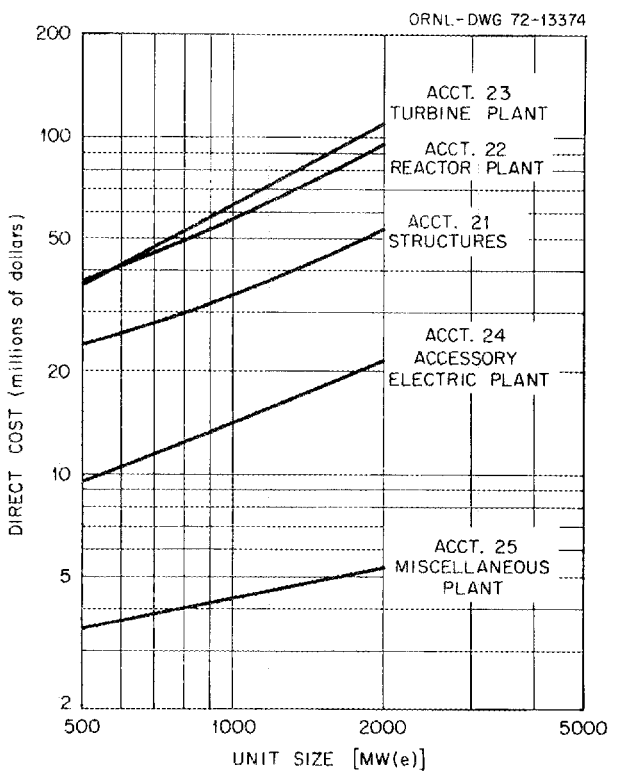

Fig. 4. Cost-size relations for PWR plants (early 1971 basis).

The calculation of interest and escalation during construction requires a cash flow curve for each two-digit account. A set of two-digit cash flow curves for each cost model is stored on the cost model tape. Typical curves for nuclear plants are illustrated in Fig. 5. These cash flow curves are assumed to be approximately the same for all similar type power plants and, like the other important parameters, can be changed with the optional input feature. The curves are normalized, so the range for both axes is from zero to one. The origin corresponds to the date of placing the order for the nuclear steam supply system (or fossil-fueled steam generators). Approximately 0.3 on the abscissa corresponds to the date of issuance of construction permit and start of actual construction, and 1.0 corresponds to date of commercial operation.

Indirect costs (accounts 91, 92, and 93) are assumed to be functions of total physical plant direct cost, including allowances for spare parts and contingencies. Equations were fitted to the curves shown in Fig. 6, and the coefficients are stored with each cost model.

The cost model for each type of plant also includes default values for several parameters, factors for calculating allowances for spare parts and contingencies, a table of interest rate as a function of time during the design and construction period, coefficients for calculating escalation of labor and materials for the base cost model, an array defining the number of accounts, and tables of account headings.

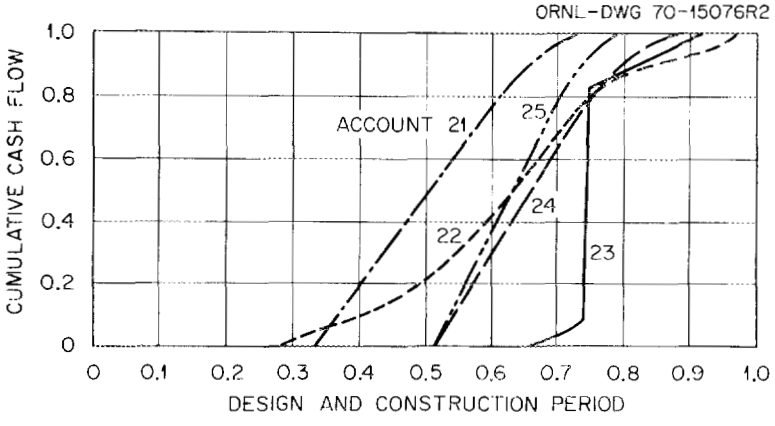

Fig. 5. Two-digit account cash flow curves.

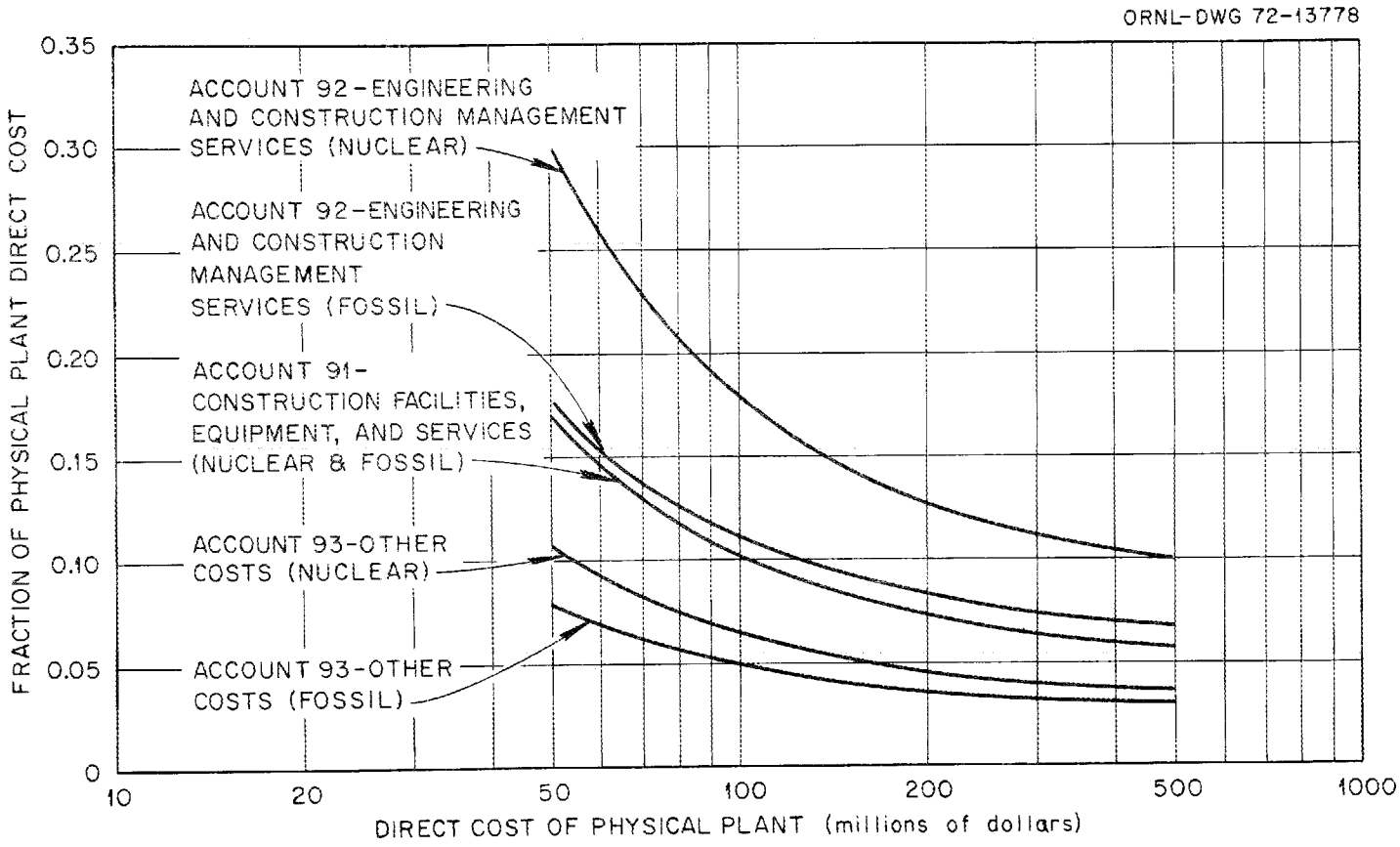

Fig. 6. Indirect costs.

All data in the cost models can be altered temporarily at program execution time through the optional input feature. This important feature is discussed in greater detail later in the section on data input and is illustrated in the example problem section. Permanent modification of cost model data is accomplished through use of the CONTAC auxiliary program described in Appendix A.

COST INDEX DATA

Historical cost data for labor and materials for 20 U.S. cities, two Canadian cities, and one special site are stored on magnetic tape by the CONLAM auxiliary program described in Appendix B. These locations are illustrated on the map in Fig. 7. These data consist of construction labor rates and materials costs that are reported monthly for 22 cities in Engineering News-Record[6] and calculated cost data for the AEC hypothetical Middletown site, making a total of 23 locations. It is also possible to enter cost data for other locations onto the tape as the data become available.

The labor cost data consist of hourly rates (including fringe benefits) for 16 classifications of craft labor. The materials cost data consist of market quotations for seven classifications of materials. The present tape includes approximately 12 years of historical cost data taken from Engineering News-Record beginning with 1960. The tape has space allocated for 30 time entries and several hundred locations. The data are normally tabulated at six-month intervals, but any time interval can be specified.

The cost data are retrieved from the historical data tape by the CONCEPT program and are used, along with the distribution of crafts and materials which are included in the cost model for each type of plant and productivity and overtime data, to calculate cost indexes for adjusting capital costs at the Middletown site to costs at any of the other 22 cities and to calculate escalation.

The productivity of craft labor is difficult to define and, in practice, varies significantly not only country-wide but within a single locale, depending on factors such as the general economy, project management,

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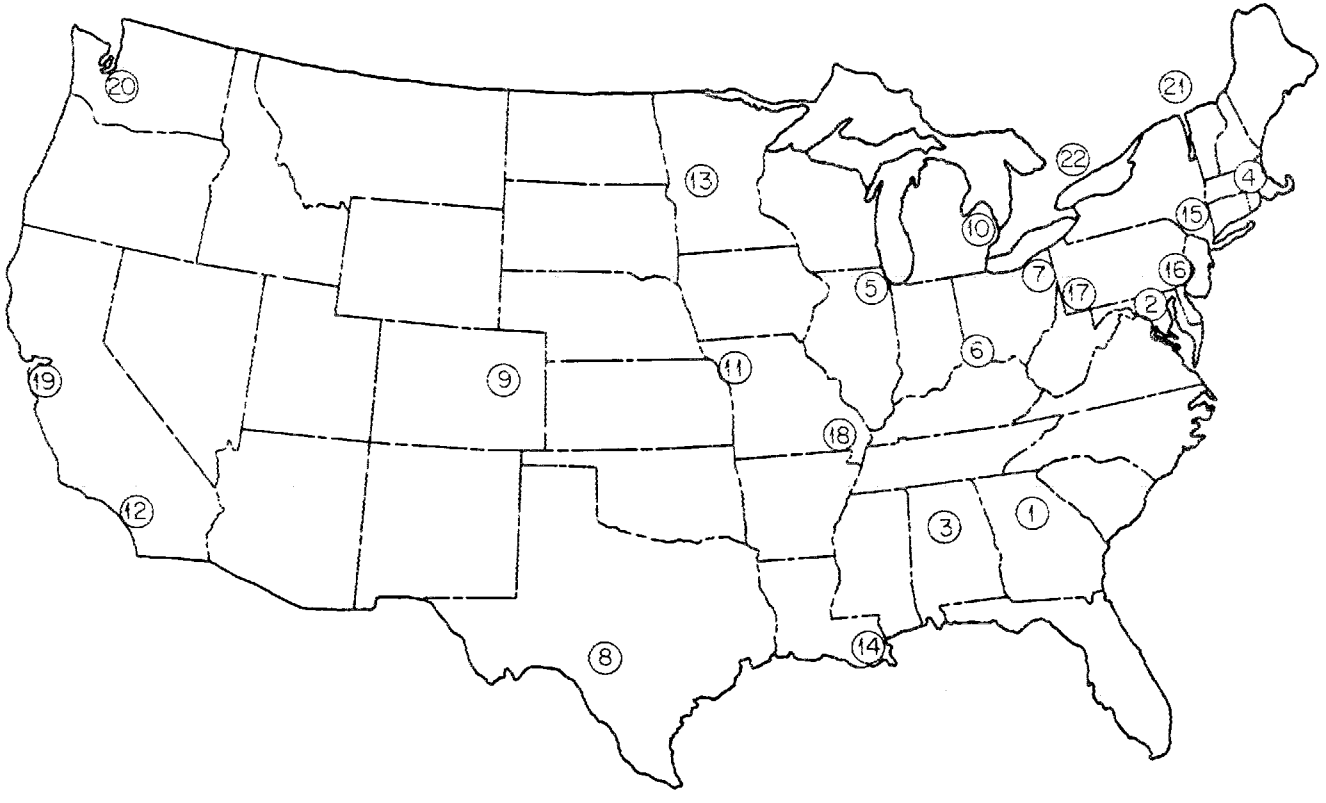

1 ATLANTA	7 CLEVELAND	13 MINNEAPOLIS	19 SAN FRANCISCO
2 BALTIMORE	8 DALLAS	14 NEW ORLEANS	20 SEATTLE
3 BIRMINGHAM	9 DENVER	15 NEW YORK	21 MONTREAL
4 BOSTON	10 DETROIT	16 PHILADELPHIA	22 TORONTO
5 CHICAGO	11 KANSAS CITY	17 PITTSBURGH	23 MIDDLETOWN
6 CINCINNATI	12 LOS ANGELES	18 ST. LOUIS	

Fig. 7. Cities for which historical labor and materials cost data are stored in CONCEPT.

labor relations, job conditions, availability of equipment, and weather. Hence, no attempt was made to include productivity factors for the normal 40-hr workweek, either as a function of location or as a function of time. However, input data to adjust productivity can be provided by the user at problem execution time.

Figure 8 shows an estimate of the effects of sustained overtime on the efficiency or productivity of craft labor. The lower curve is stored in the code in equation form and, along with overtime rates, is used to adjust labor cost indexes when overtime is specified. The data shown in Fig. 8 are based in part on information presented in Refs. 7 and 8.

Data are included in the BLOCK DATA subprogram for escalating equipment costs at historical rates, or, alternatively, the user may specify other escalation rates. There are no provisions for regional or city-to-city adjustment of costs of manufactured equipment. This approach should be valid to a first approximation, since transportation costs usually are a small part of the total cost of the plant.

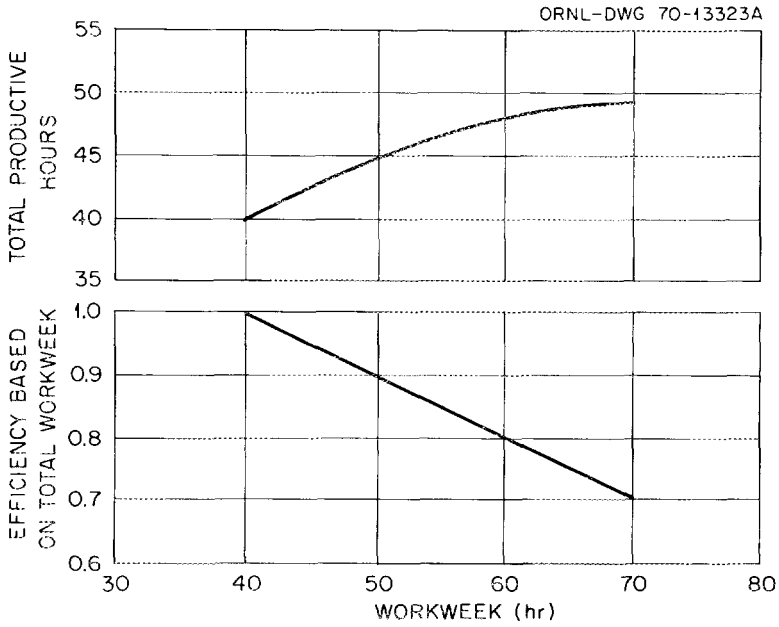

Fig. 8. Effects of sustained overtime on productivity of site labor.

DETAILED COST ANALYSIS

A more detailed treatment of the analytical method used in CONCEPT is presented below. The mathematical equations are presented for those who wish to understand the basic method and as an aid for using special options. Most of this discussion is concerned with the extrapolation of base costs (or reference costs) to other sizes, the adjustment of costs from a base year and base location to a new year and new location, the projection of cost index data, the escalation of costs during the design and construction period, and the calculation of interest during construction.

The two-digit account direct costs for the base cost model are scaled by equations that describe the costs as a function of plant capacity. These equations are of the form

$$C_i = \alpha_i + \beta_i \left(\frac{X}{X_b}\right)^{\gamma_i} , \tag{1}$$

where C_i is the total direct cost for each two-digit account i for a plant of X net electrical capacity and X_b is the base plant size. The coefficients α_i, β_i, and γ_i are determined by fitting Eq. (1) to curves like those for the PWR plant shown in Fig. 4. These coefficients are different for each type of plant and are stored on the cost model tape. For simplification, the subscript i will be omitted in most of the subsequent equations.

Each total two-digit account direct cost is subdivided into costs for equipment, labor, and materials for the base year and base location by equations of the form

$$C_j = CF_j , \tag{2}$$

where C_j is the cost component for each two-digit account direct cost at the base year and base location and F_j is a factor calculated from cost model data and is used for dividing the costs into the three components at the two-digit account level.

Each factor F_j is calculated as

$$F_j = \frac{C_{jb}}{C_b} , \tag{3}$$

where C_{jb} is the cost of equipment, labor, or materials for j = 1, 2, 3, respectively, at the two-digit account level for the base cost model and C_b is the total cost of the two-digit account for the base cost model. The base costs C_{jb} and C_b are stored on the cost model tape.

The cost index data discussed in the previous section of this report are used for adjusting the subdivided capital costs from the base time and base location to costs at other cities and for escalating costs to other years. The historical data, except labor productivity, are extrapolated exponentially by the following equation:

$$I = \overline{C}_f(1 + \overline{\epsilon})^{Y-Y_f} , \tag{4}$$

where I is a projected cost index for the year Y for each of the three cost components of each two-digit account, Y_f is a reference year for historical cost index data, and $\overline{C}_f$ and $\overline{\epsilon}$ are coefficients either retrieved from the cost model or the BLOCK DATA subprogram, supplied by the user, or determined by regression analysis of raw data retrieved from the historical data tape. Normal calculation of $\overline{C}_f$ and $\overline{\epsilon}$ is for one location, but these coefficients can be calculated for one, two, or up to five locations simultaneously. In this manner several cities can be combined via NAMELIST input to obtain average results for a region rather than for a particular location. A more detailed description of this procedure is presented in Appendix C.

The equation for projecting labor productivity indexes has the following form:

$$P = \rho + \mu(Y - Y_b) , \tag{5}$$

where P is a productivity index in the year Y for the labor component of each two-digit account, Y_b is the base year associated with the base cost

model, and ρ and μ are coefficients specified by the user at program execution time. Default values are $\rho = 1$ and $\mu = 0$, so labor productivity is constant with time and location unless otherwise specified by the user.

The subdivided costs C_j calculated by Eq. (2) for the base year Y_b and base location are adjusted to costs C_j^* for a new year Y_s and new location by using the cost and productivity indexes calculated by Eqs. (4) and (5). Equipment and materials costs ($j = 1$ and 3 respectively) are calculated by Eq. (6) and labor costs ($j = 2$) by Eq. (7):

$$C_j^* = C_j \frac{I_j^*}{I_j} , \tag{6}$$

$$C_2^* = C_2 \frac{I_2^*}{I_2} \frac{P}{P^*} \frac{B^*}{B} , \tag{7}$$

where I_j^* and I_j are cost indexes, P^* and P are labor productivity indexes, and B^* and B are factors that reflect the contractor's overhead burden on craft labor for the new year Y_s and new location and base year Y_b and base location respectively.

Site man-hours H^* for each two-digit account are calculated with the following equation:

$$H^* = \frac{C_2^*}{R^*B^*} , \tag{8}$$

where C_2^* is the labor cost component for each two-digit account from Eq. (7), R^* is the hourly wage rate for each two-digit account and is identical with the cost index I_2^* for labor in Eq. (7), and B^* is the burden factor in Eq. (7).

If an overtime workweek is specified, the labor costs for each two-digit account are adjusted by an overtime efficiency E and an average hourly wage rate ratio Φ, defined as

$$E = 1 + [\eta(W - 40)] , \tag{9}$$

and

$$\Phi = \frac{40 + [T(W - 40)]}{W} , \tag{10}$$

where W is the total workweek in hours, η is a constant determined by fitting Eq. (9) to the overtime efficiency curve illustrated previously in Fig. 8, and T is the ratio of the hourly rate for overtime to the hourly rate for straight time.

When overtime is specified, the labor cost component $C^*_{2,o}$ and man-hours H^*_o for each two-digit account for the new year and location are calculated by modifying the straight-time costs and man-hours, Eqs. (7) and (8), as follows:

$$C^*_{2,o} = C^*_2 \frac{\Phi}{E} , \tag{7a}$$

and

$$H^*_o = H^* \frac{1}{E} . \tag{8a}$$

The analysis described to this point in Eqs. (1) through (10) and (7a) and (8a) gives the direct cost components at the two-digit account level for the input plant at the year of start of the design and construction period, Y_s. The next step is to calculate escalation during the construction period. The direct cost components, equipment, labor, and materials, are each escalated separately at the two-digit account level. The calculations are accomplished by dividing the design and construction period into discrete time steps, evaluating the cash flow for each cost component in each time step, and summing the stepwise cash flows. Cumulative cash flow curves such as those shown in Fig. 5 are utilized for defining cash expenditures as a function of time.

The escalated costs C^{**}_j of both equipment and materials (j = 1 and 3) are found by multiplying the costs C^*_j at the start of construction by the ratio of the average cost index $\overline{I^{**}_j}$ during the design and construction period to the cost index I^*_j at the start of the design and construction

period, as follows:

$$C_j^{**} = C_j^{*} \frac{\overline{I_j^{**}}}{I_j^{*}} , \tag{11}$$

where

$$\overline{I_j^{**}} = \sum_{y=Y_s^{*}}^{Y_e} I_j(y)\ \Delta f(y) , \tag{12}$$

and $I_j(y)$ is the cost index for year y and $\Delta f(y)$ is an incremental cash flow at time y, as illustrated in Fig. 9; Y_e is the end of the construction period. The cash flow curve in Fig. 9 represents one of the two-digit account cash flow curves shown previously in Fig. 5. The value for Y_s^{*} is, in general, equal to Y_s, but can be modified for special applications by NAMELIST input or for unique accounts such as land and special materials.

The escalated costs C_2^{**} (or $C_{2,o}^{**}$ when overtime is specified) of labor are calculated in a similar manner, and, in addition, labor productivity P^{*} at start of design and construction and the average productivity $\overline{P^{**}}$

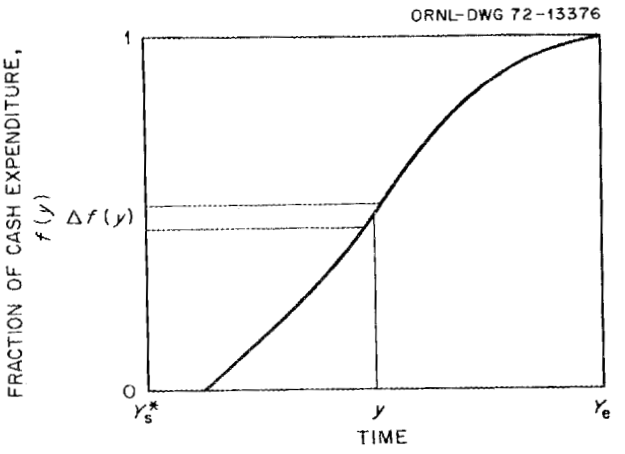

Fig. 9. Cumulative cash flow for a two-digit-level account (escalation during construction).

must be considered, as follows:

$$C_2^{**} = C_2^{*} \frac{P^{*}}{I_2^{*}} \frac{\overline{\overline{I_2^{**}}}}{\overline{\overline{P^{**}}}} , \tag{13}$$

where

$$\frac{\overline{\overline{I_2^{**}}}}{\overline{\overline{P^{**}}}} = \sum_{y=Y_s^{*}}^{Y_e} \frac{I_2(y)}{P(y)} \Delta f(y) , \tag{14}$$

where $P(y)$ is the productivity index for year y and the other terms are as defined for Eqs. (11) and (12).

The general equations for calculating the three-, four-, and five-digit account costs, which follow, are applied either to costs C_j^{*} at start of construction Y_s or to costs C_j^{**} at end of construction Y_e. The equations for end of construction are shown below; those for start of construction costs are similar.

$$C_{j,3}^{**} = C_j^{**} F_{j,3} , \tag{15}$$

$$C_{j,4}^{**} = C_{j,3}^{**} F_{j,4} , \tag{16}$$

and

$$C_{j,5}^{**} = C_{j,4}^{**} F_{j,5} , \tag{17}$$

where C_j^{**}, $C_{j,3}^{**}$, $C_{j,4}^{**}$, and $C_{j,5}^{**}$ are the cost components at the end of design and construction for equipment, labor, and materials ($j = 1, 2,$ and 3) at the two-, three-, four-, and five-digit account levels, respectively, and $F_{j,3}$, $F_{j,4}$, and $F_{j,5}$ are factors, calculated from base cost model data, which are used for defining the subdivided cost components at the three-, four-, and five-digit account levels respectively.

The factors $F_{j,3}$, $F_{j,4}$, and $F_{j,5}$ are defined as

$$F_{j,3} = \frac{C_{jb,3}}{C_{jb}} , \tag{18}$$

$$F_{j,4} = \frac{C_{jb,4}}{C_{jb,3}} , \tag{19}$$

and

$$F_{j,5} = \frac{C_{jb,5}}{C_{jb,4}} , \tag{20}$$

where C_{jb}, $C_{jb,3}$, $C_{jb,4}$, $C_{jb,5}$ are cost components for equipment, labor, and materials at the two-, three-, four-, and five-digit levels, respectively, for the base cost model.

The direct costs at the three-, four-, and five-digit account levels are now resummed to the two-digit account level. Spare parts and contingency allowances are then calculated as percentages of equipment and materials costs and labor costs for each two-digit account and summed over all two-digit direct cost accounts as follows:

$$C_k = \Sigma\, C_j^{**}\, F_{jk}, \tag{21}$$

and

$$C_{jm} = \Sigma\, C_j^{**}\, F_{jm} , \tag{22}$$

where C_k and C_{jm} are the total spare parts and contingency allowances, respectively, and F_{jk} and F_{jm} are the multiplication factors for each two-digit account.

Indirect costs, except interest during construction, are calculated by using the curves shown in Fig. 6. These curves are functions of total

direct costs and have the following general form:

$$F(Z) = \kappa + \frac{\lambda}{(\omega + Z)^{\tau}} , \tag{23}$$

where Z is the appropriate direct cost and κ, λ, ω, and τ are coefficients evaluated by fitting Eq. (23) to the appropriate curve.

The total cost I_T of interest during construction is calculated in two parts, interest on two-digit account direct costs and interest on associated indirect costs, as shown in the following procedure.

Interest I_i on each two-digit direct cost account i is calculated as a function of the cash flow of that account, using normalized cash flow curves such as those illustrated in Fig. 5. Consider the normalized cash flow curve shown in Fig. 10 for an account i. The cost ΔI_i of interest paid on an amount of money $C_i f_i(y)$ in time Δy is

$$\Delta I_i = C_i f_i(y)\ R(y)\ \Delta y , \tag{24}$$

where C_i is the total cost of account i, $f_i(y)$ is a normalized cash flow at time y, and R(y) is the interest rate as a function of time. Therefore the total interest paid on the total cost C_i of an account will be

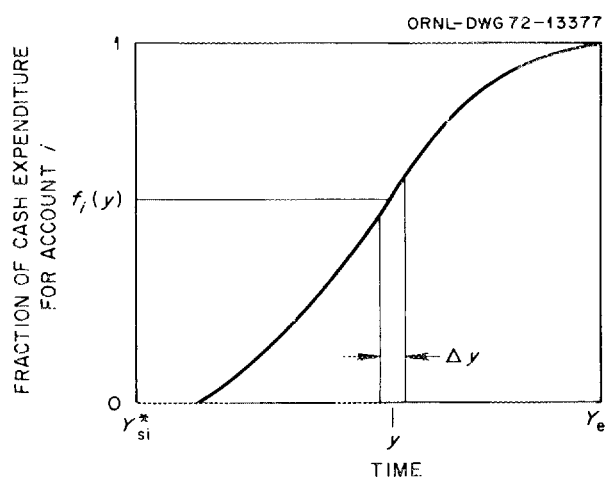

Fig. 10. Cumulative cash flow for a two-digit-level account i (interest during construction).

the sum of ΔI_i's over the applicable time period, $Y_e - Y^*_{si}$. The value for Y^*_{si} is, in general, equal to Y_s; however, the time periods for the various two-digit direct cost accounts are not necessarily the same. Hence the design and construction period, $Y_e - Y_s$, can be modified with a lead time $T_{\ell i}$ for each account, which, in the cost model is set equal to zero for all accounts except land and special materials (accounts 20 and 26). Land is assumed to be bought one year prior to the start of design and construction Y_s, and special materials, such as the helium coolant for HTGR plants, are assumed to be bought one year prior to commercial operation Y_e. The following development allows the general inclusion of lead times where a two-digit account cash flow can be modified through NAMELIST input at problem execution. The general definition of the time periods, $Y_e - Y^*_{si}$, for each two-digit account is expressed by the following equation, where T_i is equal to $Y_e - Y^*_{si}$:

$$T_i = \begin{cases} Y_e - Y_s + T_{\ell i} & T_{\ell i} \geq 0 \\ \left| T_{\ell i} \right| & T_{\ell i} < 0 \end{cases} . \tag{25}$$

The total cost of interest for each two-digit direct cost account is given by

$$I_i = C_i \sum_{y=Y^*_{si}}^{Y_e} f_i(y)\ R(y)\ \Delta y\ . \tag{26}$$

The interest can be compounded by simply adding the cost of interest, $I_i(y - \Delta y)$, for each Δy into the summation. This is an option via normal input data.

$$I_i = \sum_{y=Y^*_{si}}^{Y_e} [C_i + I_i(y - \Delta y)]\ f_i(y)\ R(y)\ \Delta y\ . \tag{26a}$$

The total cost of interest during construction is

$$I_T = \sum_{i=1}^{N} [I_i + C_i \, \bar{f} \, \overline{DR}] \, , \tag{27}$$

where for simple interest

$$\overline{DR} = \bar{R}(Y_e - Y_s) \, , \tag{28}$$

and for compound interest

$$\overline{DR} = (1 + \bar{R})^{Y_e - Y_s} - 1 \, , \tag{28a}$$

where $\bar{R}$ is the average interest rate during the period $Y_e - Y_s$, N is the number of two-digit direct cost accounts, I_i and C_i are as defined previously, and $\bar{f}$ is a multiplier developed from the two-digit account cash flow curves of Fig. 5, defined as follows:

$$\bar{f} = \frac{\sum_{i=1}^{N} C_i \sum_{y=Y_s}^{Y_e} f_i(y) \, \Delta y}{\sum_{i=1}^{N} C_i [f_i(Y_e) - f_i(Y_s)]} \, , \tag{29}$$

where $f_i(y)$ is the cumulative cash flow at year y, Δy is a differential time period, and $f_i(Y_e)$ and $f_i(Y_s)$ are cumulative cash flows at end and start of construction respectively.

Finally, all costs, including costs of land, physical plant direct costs, spare parts, contingencies, indirects, and interest during construction, are totaled to give the total capital cost of the plant.

DESCRIPTION OF CONCEPT MAIN PROGRAM AND SUBPROGRAMS

A description of the CONCEPT program is presented here, and the auxiliary programs, CONTAC and CONLAM, are described in Appendix A and Appendix B respectively.

All programs and subprograms are written in FORTRAN IV at G or H level for the third-generation class of machines, including the IBM 360/65, 360/75, and 360/91. The CONCEPT program consists of a main program and seven subprograms and requires about 150K of computer core. Primary input data are read from punched cards, support data are read from magnetic tapes, and the output report is listed by the system printer. FORTRAN listings of the CONCEPT main program and subprograms are included in Appendix D, and example output is illustrated in the section on example problems. Brief descriptions of the CONCEPT main program and all subprograms follow.

MAIN Program

The MAIN program exercises control over all logical flow and decisions concerning the calculations, including standard input, optional input, magnetic tape data retrieval, processing and collating of data, and output. The decisions for selecting alternative sites and types of power plants for cost analysis are also made in the MAIN program. For example, if the site requested is not found in the historical data file, the location is assumed to be Middletown. Similarly, if the power plant type is not found in the cost model data file, a PWR with natural draft cooling towers is selected. The optional NAMELIST input features are illustrated in a subsequent section on example problems. The flow diagram for MAIN is presented in Fig. 11, in which the bold lines indicate the normal flow path that a typical, non-Middletown problem will follow. The lighter lines indicate special options or provisions associated with input flags. "Site" refers to the site (or city) specified by the user, and "base" refers to the location associated with the cost model.

Subprograms

The CONCEPT program was made as general as possible to facilitate the extension of the program to include other types of power plants. Hence, all the subprograms are applicable to generalized calculations. Estimates for other types of plants can be generated by adding new cost models to the cost model tape by use of the CONTAC auxiliary program, and

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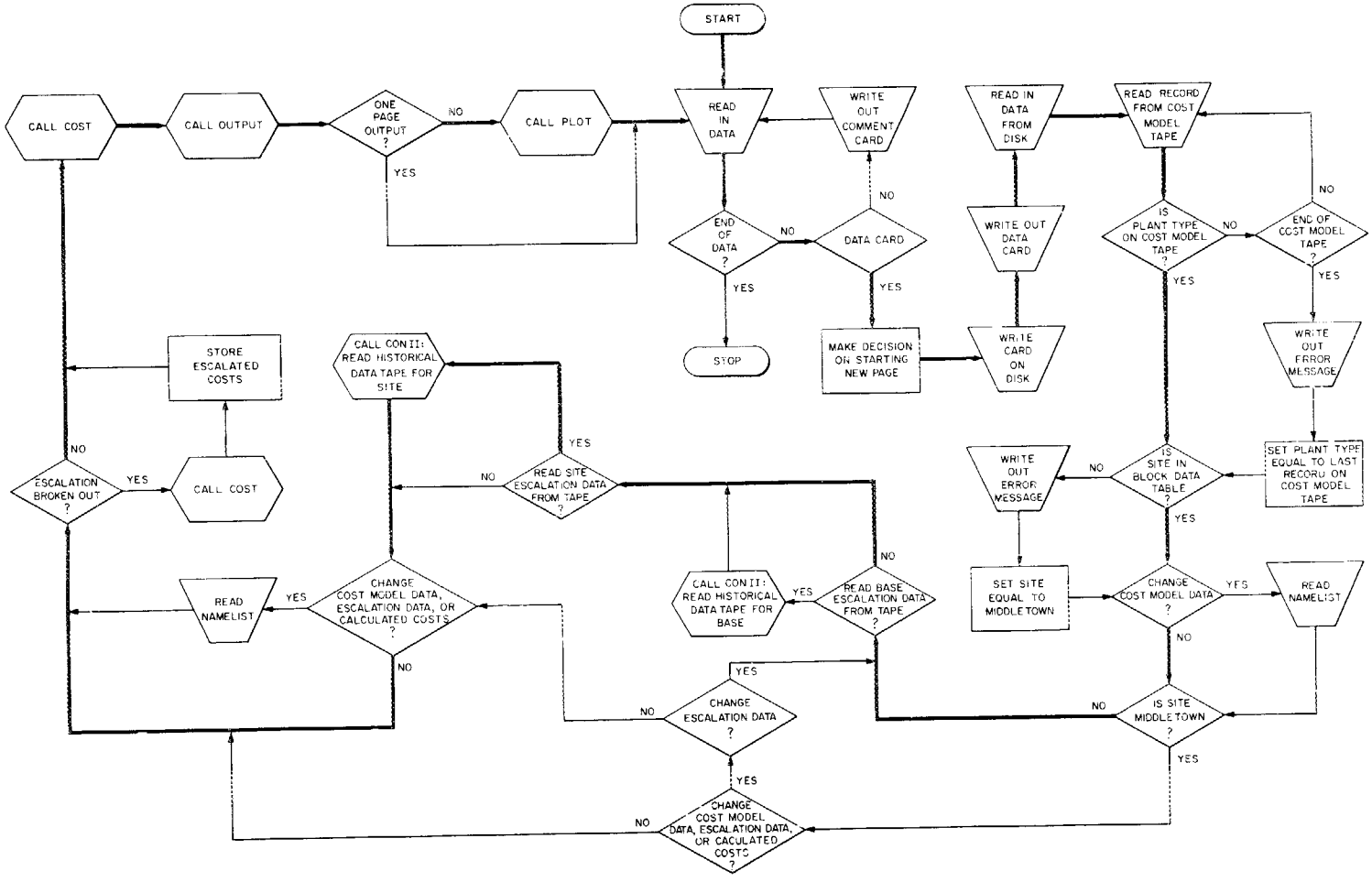

Fig. 11. CONCEPT II MAIN program.

other cities (or sites) can be studied by adding labor and materials cost data to the historical data tape by use of the CONLAM auxiliary program.

CONII

The CONII subprogram calculates the coefficients $\overline{C}_f$ and $\overline{\epsilon}$ used in Eq. (4) for projecting cost indexes for labor and materials. CONII is called by MAIN when either (1) a site other than Middletown is specified or (2) it is desired to use raw data for Middletown from the historical data tape rather than the base coefficients stored on the cost model tape.

This subprogram, in conjunction with the subordinate subprogram FITS, serves as a general weighted least-squares fitting routine for all historical labor and materials cost data. CONII calculates the coefficients associated with the escalation of materials and labor for cities other than Middletown and for Middletown when specified by the user. The CONII routine is invoked by logical decisions made in the MAIN program. This subroutine has the capacity to evaluate average constants for economic regions by weighting constants for several bases and/or sites as specified by the user. The weighting of locations is accomplished by setting input flags and reading in data through the NAMELIST option. Although the labor and materials cost data stored on the historical tape cover a time range of 1960.0 through 1972.5, it is not necessary to use all the data in the calculational procedure. The parameter YFIRST indicates the beginning of the data used. The NAMELIST input allows the program to read new values of YFIRST; if not input, the value (1969.0) read from the cost model tape will be used. Also, a maximum year restriction can be input, YLAST, which limits data to that applicable between YFIRST and YLAST. The CONII subprogram has space reserved to evaluate escalation coefficients for each of seven two-digit accounts and can combine up to five bases and/or sites for regional calculations. The flow diagram for CONII is given in Fig. 12.

FITS

Subprogram FITS performs a linear least-squares fit on the logarithmic data set generated in calling subprogram CONII and returns information used in the evaluation of the coefficients for Eq. (4). The fitting

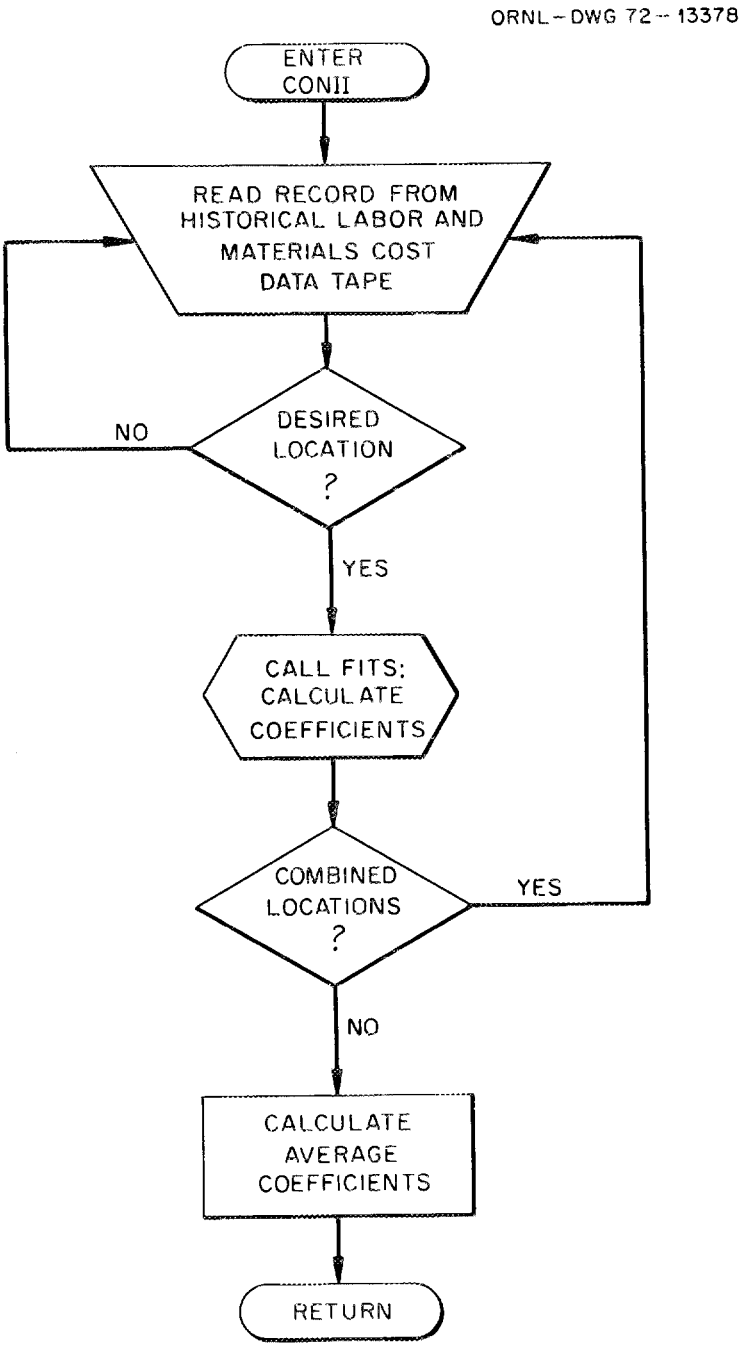

Fig. 12. Subprogram CONII.

and generation of this logarithmic data set are explained in greater detail in Appendix C. The flow diagram for FITS is shown in Fig. 13.

COST

The subprogram COST supervises the calculation of direct and indirect costs for the specified plant. The subprogram generates a factor cost model [Eqs. (2), (3), and (15)–(20)] and, along with the subordinate subprogram CLAB, projects the historical labor and materials cost data to appropriate years and calculates indexes for adjusting base plant costs. The nomenclature for COST is listed in Appendix E. The flow diagram for COST is shown in Fig. 14, and the sequence of calculations is described below.

1. All variables are initialized.

2. Each two-digit account direct cost for the base cost model case is scaled to the input plant electrical rating by Eq. (1).

3. Each two-digit account is subdivided into equipment, labor, and materials components using Eq. (2). These cost components are proportioned as in the base cost model, although the magnitude may have been changed by the size adjustment in step 2.

4. The two-digit account direct cost components are adjusted for location and time by ratioing the cost indexes for the input plant to the

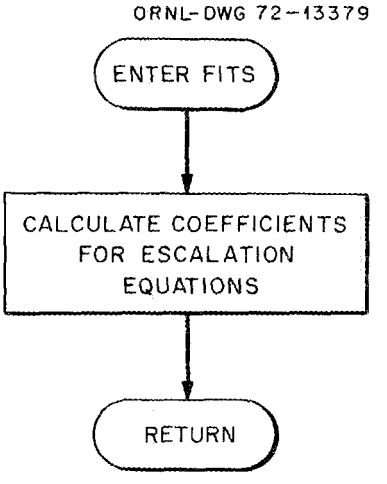

Fig. 13. Subprogram FITS.

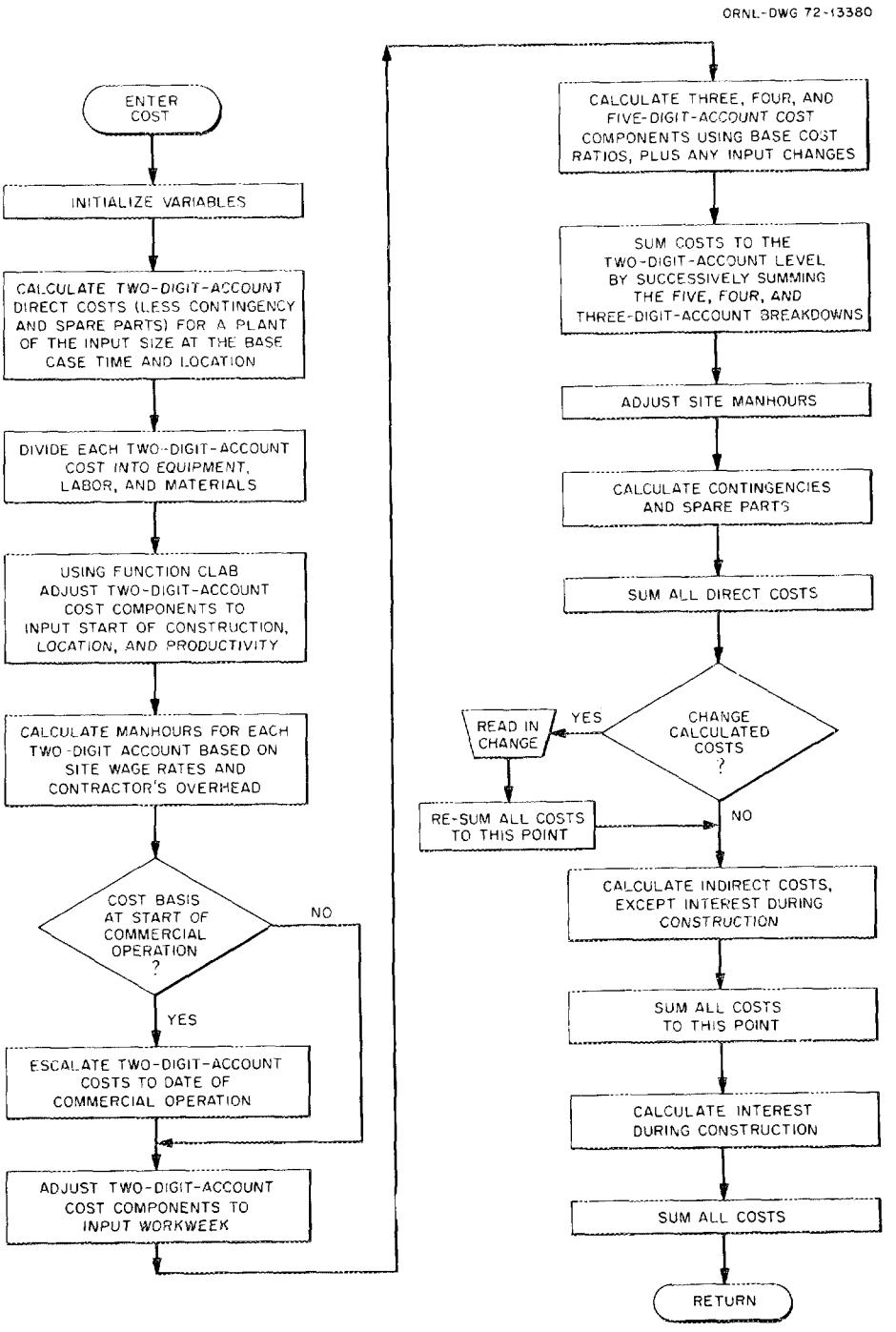

Fig. 14. Subprogram COST.

cost indexes for the base plant as described in Eqs. (6) and (7). The cost indexes are determined by calling CLAB. In addition, the labor component of each two-digit account cost is adjusted for differences in labor productivity and contractor's overhead burden as shown in Eq. (7).

5. The site man-hours required for each two-digit direct cost account are calculated by Eq. (8).

6. If specified by the input data, the two-digit account direct cost components are escalated to date of commercial operation. The cash flow curves for the two-digit accounts are retrieved from the cost model tape, and the costs at start of design and construction are escalated over finite time steps to date of start of commercial operation. The equipment and materials costs are escalated by using Eqs. (11) and (12), and labor costs are escalated by using Eqs. (13) and (14).

7. Labor costs are adjusted by Eqs. (9), (10), and (7a) to account for an extended workweek, if specified by the input data.

8. Further breakdowns of the three major cost components are made successively to the three-, four-, and five-digit account levels by Eqs. (15) to (20), again using the base cost model to proportion costs to the lower-level accounts. Differences in the design of the input plant from the base case can be simulated by reading in appropriate costs via the NAMELIST input option.

9. The detailed direct costs are summed to the two-digit account level, and at this point the entire set of direct costs, other than allowances for spare parts and contingencies, has been calculated.

10. The site man-hours required for each two-digit direct cost account are revised to reflect adjustments at the three-, four-, and five-digit account levels and length of workweek.

11. Contingencies and spare parts allowances are calculated according to Eqs. (21) and (22).

12. All direct costs, including allowances for contingencies and spare parts, are summed.

13. If a user requires a fixed cost in a particular direct cost account, it can be input at this point via NAMELIST option. This overrides any cost calculated in COST, and the input cost will be printed on the output sheet without modification. The desired cost must be input

at the lowest level (three-, four-, or five-digit account level). This step includes resumming of detailed direct costs to the two-digit level, recalculation of contingencies and spare parts allowances, and resumming of all direct costs.

14. All indirect cost accounts, except interest during construction, are calculated using Eq. (23).

15. All costs are summed to this point.

16. Interest during construction is calculated.

17. All costs are summed to give the total capital cost of the input plant.

CLAB

The function subprogram CLAB is called by subprogram COST and is used to calculate cost indexes for the adjustment of base costs to the input site and time and escalating costs to the year of commercial operation. The coefficients necessary to evaluate cost indexes by Eq. (4) are either retrieved from the BLOCK DATA subprogram or the cost model tape by MAIN or calculated in CONII. The flow diagram for CLAB is shown in Fig. 15.

OUTPUT

Subprogram OUTPUT always gives a one-page summary of the cost estimate for the input plant. Two-digit account direct and indirect costs are listed along with the total plant capital investment.

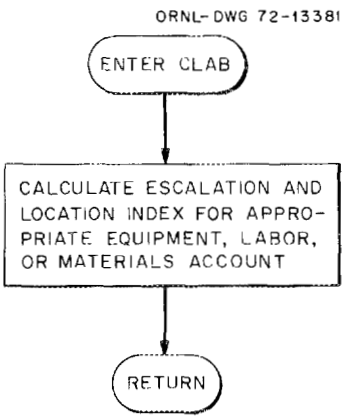

Fig. 15. Function subprogram CLAB.

If a full report is requested, the two-digit account direct costs are further broken down to equipment, labor, and materials components on the next page, and three-, four-, and five-digit account costs are printed on subsequent pages following the format presented in NUS-531.[4] These costs are also broken down into equipment, labor, and materials components. The flow diagram for OUTPUT is presented in Fig. 16.

PLOT

The subprogram PLOT uses the system printer to plot the cumulative expenditures during the design and construction period. The output consists of a one-page graphical representation of cash flow during the

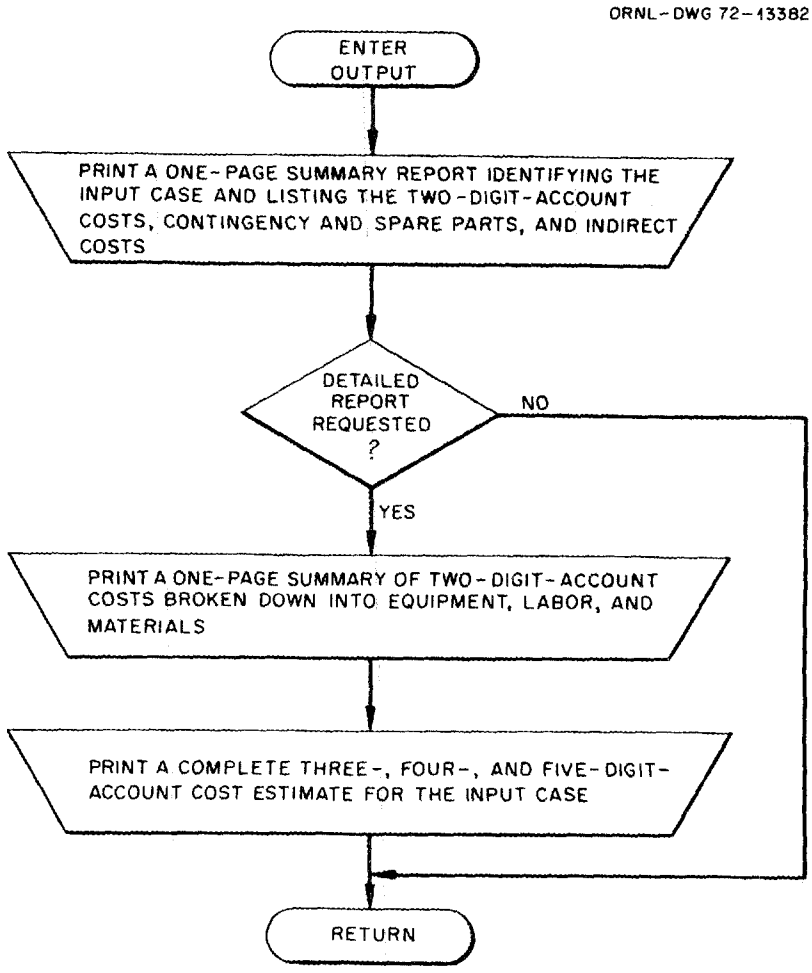

Fig. 16. Subprogram OUTPUT.

construction period. The original PLOT subprogram was obtained from the IBM Corporation[9] and extensively modified to meet the needs of CONCEPT. The flow diagram for PLOT is given in Fig. 17.

BLOCK DATA

The BLOCK DATA subprogram is used to store parameters that are passed in COMMON statements to other subprograms. These parameters include the coefficients used for calculating equipment cost indexes and productivity of site labor, the table of cities used to indicate the location of the plant requested, and tables of labor and materials classifications for the cost models. The parameters for productivity of labor belong to a class that is impractical to determine as a function of location or time, either because no consistent theory seems applicable to projection or because of inadequate data. To maintain the general approach, the mathematical variation of these quantities is included, and some users may wish to parameterize their influence in sensitivity studies. The user should always remember that when one of the BLOCK DATA coefficients is changed through NAMELIST input, all subsequent cases in the continuous set can be influenced. Therefore, it is good practice to reset variables

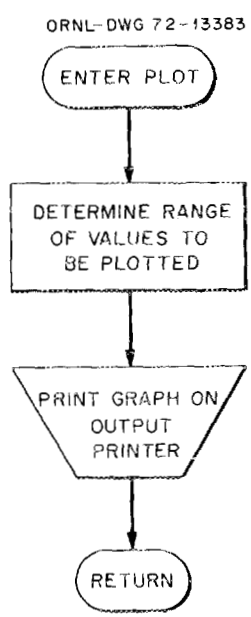

Fig. 17. Subprogram PLOT.

to desired values after any preceding case has used this feature (see example problem 4). No flow diagram is included for BLOCK DATA because this is not an executable subroutine and therefore has no logical flow.

DATA INPUT

Before the first data card of any case, any number of comment cards can be included by placing a "C" in column 1 of each card. The program will print these comments at the top of the first output page if space is available or on a separate page if more than a few lines of comments are read in. Included with these comments will be card images of all data cards for the case being run.

A blank coding form for both standard and nonstandard data input is included in Appendix F.

Standard Input

Card 1 contains the standard input for one case and the optional output and nonstandard input flags. Any number of cases can be processed in one run subject to time limitations. The entries on card 1 are the following:

Column	Variable name	Description
1–4	MWE	The nominal capacity of the desired plant, in MW(e), right justified in the field. Format I4.
6–13	TYPE	Type of power plant, left justified in the field. If omitted, PWRMET will be assumed. Format A8.
15–30	CITY	The city where the plant is to be located, left justified in the field. If omitted, Middletown will be assumed. Characters are stored in LOC(1) and LOC(2). Format 2A8.
32–47	IDENT	Any alphanumeric data, left justified in the field. Characters are stored in LOC(3) and LOC(4). Format 2A8.
50–54	YRST	Scheduled start of design and construction period. Format F5.1.

Column	Variable name	Description
56-60	YREND	Scheduled start of commercial operation. Format F5.1.
62-65	RIB	Average annual interest rate for construction period, in percent. If not input, data read from cost model tape will be used. Format F4.2.
67-69	HW	Length of workweek, in hours. If omitted, 40 hr will be assumed. Format F3.1.
71	IFLAG	Optional input flag: If greater than 0, nonstandard input (described later) will normally follow. 0 - No NAMELIST input. 1 - NAMELIST call before any calculations are made; used to change base cost model; changing final costs of specific accounts will have no effect here. 2 - NAMELIST input that overrides calculated costs, i.e., for specifying a known value for a given account; changing base cost model will have no effect here. 3 - To specify use of raw data from historical data tape for calculating escalation coefficients in Eq. (4), rather than using coefficients normally retrieved from the base cost model tape. This option is for Middletown only; other locations are done this way by default. 4 - Allows changes through NAMELIST option to escalation coefficients in Eq. (4); overrides coefficients calculated by CONII or retrieved from cost model tape. Changes to base cost model parameters can also be made at this time. 5 - Makes two NAMELIST calls. First, to allow changes through NAMELIST option to normally obtained escalation coefficients as when IFLAG=4; changes to base cost model parameters can be made in this first call. Second, overrides calculated costs of accounts as when IFLAG=2.
73	IOF	Optional output flag: 0 - Two-digit summary output only. 1 - Complete cost breakdown output.
75	IWANT	Optional escalation flag: 0 - Start of design and construction. 1 - Escalate all costs to start of commercial operation. 2 - Start of design and construction costs with escalated costs output under separate account.

Column	Variable name	Description
77	IBS	Optional location flag: 0 - User selects site or combinations of sites for regional calculations. 1 - User selects base or combinations of bases for regional calculations. 2 - Both 0 and 1 options in the same run.
79	IAC	Optional interest flag: 0 - Simple interest. 1 - Compound interest.

Nonstandard Input

Most of the data stored on the base cost model tape can be changed for one case or a series of cases by setting flags on the standard input card. A constant changed by using the NAMELIST option will retain its new value for all the following cases if it is a value unique to the BLOCK DATA subprogram unless it is reset to its original value by another NAMELIST card. The NAMELIST cards (cards 2 - last) have the following form:

Card	Column	Description
2	2–8	&CONOPT - This identifies the following as a NAMELIST named CONOPT that contains optional data.
3	2–80	Data changes start with this card in column 2; data items are separated by commas. The form of the data may be (1) variable name = constant, where the variable name may be a subscripted array name or a single variable name; (2) array name = set of constants (separated by commas). The array name is not subscripted. The number of constants must be less than or equal to the number of elements in the array. Successive occurrences of the same constant can be represented in the form k* constant. The last data entry is followed by a comma. If required, columns 2–80 of additional cards can be used with each data item separated by commas.
Last	2–5	&END must be last card for each case (see data forms).

Lists and descriptions of the variables and arrays that can be changed by the NAMELIST input option for various values of IFLAG follow. Examples

of the use of these options are presented in the following section on example problems.

When IFLAG=1, the following variables may be changed:

Variable name	Description
AA(I,J)	Coefficients for Eq. (1) for calculating the direct costs for the two-digit accounts (I=1,3 and J=1,10), where for the third account AA(1,3), AA(2,3) and AA(3,3) are α_3, β_3, γ_3, respectively, remembering that for accounts 20, 21, 22, the third account is 22.
AC2(I,J)	Alphabetic and numeric identification of two-digit accounts (I=1,8, J=1,12).
AC3(I,J)	Alphabetic and numeric identification of three-digit accounts (I=1,8, J=1,60).
AC4(I,J)	Alphabetic and numeric identification of four-digit accounts (I=1,8, J=1,150).
AC5(I,J)	Alphabetic and numeric identification of five-digit accounts (I=1,8, J=1,50).
ACC(I,J)	Auxiliary alphabetic and numeric identification of two-digit accounts (I=1,8, J=1,12).
AI(I,J)	Coefficients for Eq. (23) for calculating indirect costs (I=1,4 and J=1,10), where for the third account AI(1,3), AI(2,3), AI(3,3), and AI(4,3) are κ_3, λ_3, ω_3, and τ_3, respectively, remembering that for accounts 91, 92, 93, the third account is 93.
AFC(I)	Initial cost of equipment [coefficient $\bar{C}_I$ in Eq. (4)], (I=1,7).
BFC(I)	Escalation rate for equipment [coefficient $\bar{\epsilon}$ in Eq. (4)], (I=1,7).
APC(I)	Initial productivity of labor at input location at the base year for the cost model [coefficient ρ in Eq. (5)], (I=1,7).
BPC(I)	Change in productivity of site labor at input location per unit of time [coefficient μ in Eq. (5)], (I=1,7).
CFCA(I,J)	Cash flow curves as shown previously in Fig. 5. I=1 and J=1,50 contain the fraction of the construction period completed (0-1). I=2,8 and J=1,50 contain the cumulative fraction of the cash flow expended through the I=1 and Jth time periods.

Variable name	Description
COB	Base cost model factor for use in calculating contractor's overhead burden on labor.
CONTL(I)	Labor contingency as percentage of labor cost for two-digit cost accounts (I=1,11).
CONTM(I)	Materials and equipment contingency as percentage of materials cost and equipment cost for two-digit cost accounts (I=1,11).
COS	Input site factor for use in calculating contractor's overhead burden on labor.
D2(I,J)	Array containing the base cost model two-digit account direct costs divided into equipment, labor, and materials components (I=1,3) for two-digit accounts (J=1,10).
D3(I,J)	Array containing the base cost model three-digit account cost components divided into equipment, labor, and materials components (I=1,3) at the three-digit account level (J=1,60).
D4(I,J)	Array containing the base cost model four-digit account cost components divided into equipment, labor, and materials components (I=1,3) at the four-digit account level (J=1,150).
D5(I,J)	Array containing the base cost model five-digit account cost components divided into equipment, labor, and materials components (I=1,3) at the five-digit account level (J=1,50).
DEOT	Coefficient η for Eq. (9) for calculating the overall efficiency of an overtime workweek.
DY	Fraction of year into which design and construction period is divided for integration intervals.
FACB1(I,J)	Mixing factors for craft labor at base location associated with a particular cost model for I accounts (I=1,7) and J labor categories (J=1,16).
FACS1(I,J)	Mixing factors for craft labor at site location associated with a particular cost model for I accounts (I=1,7) and J labor categories (J=1,16).
FACB2(I,J)	Mixing factors for material at base location associated with a particular cost model for I accounts (I=1,7) and J material categories (J=1,16).

Variable name	Description
FACS2(I,J)	Mixing factor for material at site location associated with a particular cost model for I accounts (I=1,7) and J material categories (J=1,16).
FILB(J)	Mixing factors for combining base locations (J=1,5).
FILS(J)	Mixing factors for combining input sites (J=1,5).
IAR1	Number of two-digit account categories associated with a particular cost model.
IAR2(I)	Number of two-digit account categories associated with direct and indirect costs, I=1 and 2, respectively.
IAR3(I)	Number of three-digit account categories at the Ith two-digit account level associated with a particular cost model (I=1,15).
IAR4(I)	Number of four-digit account categories at the Ith three-digit account level associated with a particular cost model (I=1,60).
IAR5(I)	Number of five-digit account categories at the Ith four-digit account level associated with a particular cost model (I=1,160).
IBASE(J)	Numeric codes associated with the table of cities for combining base locations (J=1,5).
ISITE(J)	Array for site combinations up to J=5, if nonzero the ISITE value indicates site (or city) number (see Fig. 7) used in conjunction with weighting factor, FILS. If sites 12 and 16 were combined by setting ISITE(1&2)=12&16, then FILS(1&2) = .4 and .6 for 40 and 60% weighting of the sites respectively.
MIDDLE	Numeric code associated with Middletown in the table of cities in the BLOCK DATA subroutine (see number associated with Middletown in Fig. 7).
OTP	Overtime premium paid site labor for time worked in excess of standard workweek [coefficient T in Eq. (10)].
OVERS	Overall efficiency Φ of a nonstandard workweek that overrides Eq. (10).

Variable name	Description
RINT(I)	Interest rate to be applied to cumulative capital expenditures at each time period during design and construction period (I=1,100). Array will be overridden if RIB, a constant interest rate for the total design and construction period, is read in with the standard input data.
SPP(I)	Spare parts allowance as percentage of materials cost and equipment cost for two-digit account costs (I=1,11).
TIMLED(I)	Lead time, in years, as defined for Eq. (25) (I=1,7).
YBC	Year of start of design and construction period for the base cost model.
YFIRST	First year of referenced data to be retrieved from the historical labor and material data tape.
YLAST	Last year of referenced data to be retrieved from the historical labor and material data tape.

When IFLAG=3,4, or 5 (first call), the following variables can be changed in addition to all those listed for IFLAG=1:

Variable name	Description
AMB(I)	Cost of materials at year YFIRST at the base location (I=1,7).
AMS(I)	Cost of materials at year YFIRST at the input site location (I=1,7).
ALB(I)	Cost of wages at year YFIRST at the base location (I=1,7).
ALS(I)	Cost of wages at year YFIRST at the input site location (I=1,7).
BMB(I)	Escalation rate of materials at the base location per unit of time (I=1,7).
BMS(I)	Escalation rate of materials at the input site location per unit of time (I=1,7).
BLB(I)	Escalation rate of wages at the base location per unit of time (I=1,7).
BLS(I)	Escalation rate of wages at the input site location per unit of time (I=1,7).

When IFLAG=2 or 5 (second call), only the following variables can be changed:

Variable name	Description
C2(I,J)	Array containing the calculated case two-digit account direct costs divided into equipment, labor, and materials components (I=1,3) for two-digit accounts (J=1,10).
C3(I,J)	Array containing the calculated case three-digit account cost components divided into equipment, labor, and materials components (I=1,3) at the three-digit account level (J=1,60).
C4(I,J)	Array containing the calculated case four-digit account cost components divided into equipment, labor, and materials components (I=1,3) at the four-digit account level (J=1,150).
C5(I,J)	Array containing the calculated case five-digit account cost components divided into equipment, labor, and materials components (I=1,3) at the five-digit account level (J=1,50).

NAMELIST changes in costs must be made at the lowest level of any particular account. For example, changes to account 20 in example problem 6 are made at the three-digit level because no four-digit costs exist for this particular account. Example problem 6 illustrates the two NAMELIST input requirements of IFLAG=5.

EXAMPLE PROBLEMS

This section illustrates the actual use of the CONCEPT program. Several general cases are presented here that should serve to clarify previous discussions, especially concerning flag options and use of the NAMELIST input feature. Input data for all cases are shown in Fig. 18, and the output listings follow Fig. 18.

Example problem 1, for an unaltered PWR power plant at Middletown, illustrates the simplest and most rapid calculation CONCEPT will perform — the regeneration of a base cost model. For this case, which corresponds to the CONTAC data listing in Appendix A, the only specified flag is for detailed output. Note the use of comment cards preceding the problem.

The comments require a "C" in column 1 and are listed on the first output page along with a card image listing of all data input for the example.

Example problem 2 is an illustration of simply changing the site location from Middletown to Philadelphia. This case will serve as a comparison for example problems 3, 4, and 5 where other options are implemented.

Example problem 3 is an illustration of modifying the escalation analysis procedure. Normally, in calculating escalation rates, CONCEPT will evaluate historical data over the range from 1969 to the last date on the historical data tape. However, in this example the NAMELIST input flagged by a "1" in column 71 causes the data to be evaluated over the years 1960 to 1969 by changing YFIRST to 1960 and YLAST to 1969. Whenever YFIRST and YLAST are changed, the user must also set the flag IBS=2 because the escalation coefficients for both site and base are evaluated subject to the year restrictions specified by YFIRST and YLAST. Note the decrease in site escalation rates when compared with example problem 2.

Example problem 4 is an illustration of escalation to end of project (or date of commercial operation). This case is the same as example problem 2 except for the flag "1" in column 75. To avoid errors, the preceding case's NAMELIST input is overridden with a redefinition of YFIRST and YLAST to their original values, 1969 and 1999. If example problem 4 had preceded example problem 3, no NAMELIST input would have been required. However, the sequence was deliberately altered from normal setup to illustrate the importance of this procedure.

Example problem 5 is an illustration of escalation broken out into a separate account. Only a one-page summary is requested for this case because the costs are the same as for example problem 3. No NAMELIST input is required because example problem 4 has restored all data to its original form.

Example problem 6 is an illustration of multiple input changes (IFLAG=5 in column 71). Only a few changes are input relative to those possible; however, this case should indicate the procedure used when making this type of run. The first NAMELIST call makes changes to escalation coefficients and the base case cost model. The BFC array modifications are

changes in the equipment escalation rates; for example, the first entry BFC(1) = 1.06, sets the first account's factory escalation rate to 6%. This is account 20 in this particular code of accounts. The other BFC entries are similar alterations to accounts 21, 22, etc. On the second line of this example are changes to labor and material escalation rates similar to the BFC changes. The third line is a set of modifications changing the labor rates for 1969 used in each account where rates were changed. The last entries on the CFCA array are changes to the cash flow curve for account 20. The second NAMELIST call is a list of input changes to be made to site costs after calculations have been made. This specification requires the output for account 201 to be $80,000 for labor and $500,000 for materials. This second set of changes could have been made by setting IFLAG=2, assuming that the first set of changes was not required.

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DATA SHEET

CONCEPT (PHASE II)

* NOTE: ANY NON-ZERO PUNCH IN COL. 71 OR 77 REQUIRES ADDITIONAL NAMELIST INPUT ON REVERSE SIDE BE SUBMITTED TO AVOID ERRORS FROM INPUT DATA

REQUEST NO. | NAME | DATE

MWE (I4)	PLANT (A8)	CITY (2A8)	EXTRA IDENTIFICATION (2A8)	YEAR START (F5.1)	YEAR END (F5.1)	% INTEREST RATE (F4.2)	HRS. PER WEEK (F3.1)	FLAG OPTIONS* INPUT	OUTPUT	ESCALAT	COSTS	INTEREST
C												
C	EXAMPLE PRØBLEM 1											
C												
C	PWR BASE CASE, MIDDLETØWN USA,											
C	1000 MW(E), 7% SIMPLE INTEREST,											
C	40 HR. WØRK WEEK, START 1971 AND END 1978.5											
C	ESCALATED TØ START ØF CØNSTRUCTIØN.											
C												
1000	PWR	MIDDLETØWN	USA	19710	19785	70	400	0	1	0	0	0
C	EXAMPLE PRØBLEM 2											
C	PWR BASE CASE AT PHILADELPHIA											
C	1000 MW(E), 7% SIMPLE INTEREST,											
C	40 HR. WØRK WEEK, START 1971 AND END 1978.5											
C	ESCALATED TØ START ØF CØNSTRUCTIØN.											
C												
1000	PWR	PHILADELPHIA	USA	19710	19785	70	400	0	1	0	0	0
C												
C	EXAMPLE PRØBLEM 3											
C	PWR BASE CASE AT PHILADELPHIA											
C	1000 MW(E), 7% SIMPLE INTEREST,											
C	40 HR. WØRK WEEK, START 1971 AND END 1978.5											
C	ESCALATED TØ START ØF CØNSTRUCTIØN.											
C	CHANGE YEAR RANGE FØR HISTØRICAL CØST ANALYSIS TØ 1960-1969, NAMELIST INPUT											
1000	PWR	PHILADELPHIA	USA	19710	19785	70	400	1	1	0	2	0

Fig. 18. Data input for example problems.

CONCEPT (PHASE II)

NAMELIST INPUT

First Card
DATA

```
&CONDPT
YFIRST=1960.,YLAST=1969.,
&END
```

Must Be
Last Card

(LAST CARD IS NON-STANDARD IN FORTRAN NAMELIST INPUT)

Fig. 18 (continued)

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(3 8-72)

DATA SHEET

CONCEPT (PHASE II)

* NOTE: ANY NON-ZERO PUNCH IN COL. 71 OR 77 REQUIRES ADDITIONAL NAMELIST INPUT ON REVERSE SIDE BE SUBMITTED TO AVOID ERRORS FROM INPUT DATA

REQUEST NO. | NAME | DATE

MWE (I4)	PLANT (A8)	CITY (2A8)	EXTRA IDENTIFICATION (2A8)	YEAR START (F5.1)	YEAR END (F5.1)	% INTEREST RATE (F4.2)	HRS. PER WEEK (F3.1)	FLAG OPTIONS* INPUT	OUTPUT	ESCALAT.	COSTS	INTEREST
C	EXAMPLE PRØBLEM 4											
C	SAME PHILADELPHIA CASE AS EXAMPLE PRØBLEM 2											
C	BUT ESCALATED TØ END ØF PRØJECT.											
C	ØNLY ØNE PAGE ØUTPUT SPECIFIED.											
C												
C	NØTE: YEAR RANGE IS RESET WITH NAMELIST INPUT											
C	BECAUSE ØF CASE 3 TØ PREVENT ERRØRS											
C												
1000	PWR	PHILADELPHIA	CASE 4	1971.0	1978.5	7.0	40.0	1	0	1	0	0

Fig. 18 (continued)

CONCEPT (PHASE II)

NAMELIST INPUT

First Card
DATA

```
&CONOPT
YFIRST=1969.,YLAST=1999.,
```

Must Be
Last Card

```
&END
```

(LAST CARD IS NON-STANDARD IN FORTRAN NAMELIST INPUT)

Fig. 18 (continued)

CONCEPT (PHASE II)

NAMELIST INPUT

First Card
DATA

```
&CØNØPT
BFC(1)=1.06,BFC(2)=1.06,BFC(3)=1.045,BFC(4)=1.06,BFC(5)=1.06,BFC(6)=1.06,
BLS=6*1.0683,BMS(2)=1.06,BMS(3)=1.045,BMS(4)=1.06,BMS(5)=1.06,BMS(6)=1.03,
ALS(2)=4.557,ALS(3)=6.19,ALS(4)=5.635,ALS(5)=4.245,ALS(6)=4.596,
CFCA(2,1)=0.0,CFCA(2,2)=0.05,CFCA(2,3)=0.05,CFCA(2,4)=0.2,CFCA(2,5)=0.2,
CFCA(2,6)=0.2,CFCA(2,7)=0.2,CFCA(2,8)=0.2,CFCA(2,9)=0.2,CFCA(2,10)=0.2,
CFCA(2,11)=.4,CFCA(2,12)=.4,CFCA(2,13)=.4,CFCA(2,14)=.4,CFCA(2,15)=.4,
CFCA(2,16)=.4,CFCA(2,17)=.4,CFCA(2,18)=.4,CFCA(2,19)=.4,CFCA(2,20)=.4,
CFCA(2,21)=.6,CFCA(2,22)=.6,CFCA(2,23)=.6,CFCA(2,24)=.6,CFCA(2,25)=.6,
CFCA(2,26)=.6,CFCA(2,27)=.6,CFCA(2,28)=.6,CFCA(2,29)=.6,CFCA(2,30)=.6,
&END

&CØNØPT
C3(2,1)=80.,  C3(3,1)=500.,

&END
```

Must Be
Last Card

(LAST CARD IS NON-STANDARD IN FORTRAN NAMELIST INPUT)

Fig. 18 (continued)

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DATA SHEET

CONCEPT (PHASE II)

* NOTE: ANY NON-ZERO PUNCH IN COL. 71 OR 77 REQUIRES ADDITIONAL NAMELIST INPUT ON REVERSE SIDE BE SUBMITTED TO AVOID ERRORS FROM INPUT DATA

REQUEST NO. NAME DATE

MWE (I4)	PLANT (A8)	CITY (2A8)	EXTRA IDENTIFICATION (2A8)	YEAR START (F5.1)	YEAR END (F5.1)	INTEREST RATE % (F4.2)	HRS. PER WEEK (F3.1)	FLAG OPTIONS* INPUT	OUTPUT	ESCALAT	COSTS	INTEREST
C	EXAMPLE PRØBLEM 5											
C	SAME AS CASE 4											
C	BUT ESCALATIØN BRØKEN ØUT INTØ SEPERATE ACC-											
C												
C	NØTE NØ NAMELIST INPUT REQUIRED.											
C												
1000	PWR	PHILADELPHIA	CASE 5	1971.0	1978.5	7.0	40.0	0	0	2	0	0
C												
C	EXAMPLE PRØBLEM 6											
C												
C	THIS RUN ILLUSTRATES MULTIPLE ØPTIØNS:											
C	CHANGES IN											
C	1. ESCALATIØN RATES,											
C	2. CASH FLØW CURVES,											
C	3. SITE CØSTS.											
C												
C	NØTE: TWØ NAMELIST INPUTS REQUIRED FØR FLAG											
C	ØF 5 IN CØLUMN 71											
1100	PWRNET	MIDDLETØWN	USA	1974.5	1982.0	7.5	40.0	5	1	0	0	1

Fig. 18 (continued)

```
C     EXAMPLE PROBLEM 1
C
C     PWR BASE CASE, MIDDLETOWN USA,
C     1000 MW(E), 7% SIMPLE INTEREST,
C     40 HR. WORK WEEK, START 1971 AND END 1978.5
C     ESCALATED TO START OF CONSTRUCTION.
C
1000 PWR      MIDDLETOWN       USA              19710 19785  70  400 0 1 0 0 0
```

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT MIDDLETOWN , USA

BASE RATE AND ESCALATION USED IN COST PROJECTIONS YFIRST = 1969.0

	ACC NO 20		ACC NO 21		ACC NO 22		ACC NO 23		ACC NO 24		ACC NO 25		ACC NO 26	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
BASE LABOR	5.84	1.10	6.44	1.10	6.80	1.10	6.79	1.10	7.29	1.10	6.30	1.10	5.82	1.10
BASE MATERIAL	1000.00	1.00	15.39	1.05	15.39	1.05	15.39	1.05	15.39	1.05	15.39	1.05	15.39	1.05

CRAFT BASE MIXING FACTORS

LABOR	ACC NO 20	ACC NO 21	ACC NO 22	ACC NO 23	ACC NO 24	ACC NO 25	ACC NO 26
BUILDING LABOR	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HEAVY LABOR	0.40	0.26	0.14	0.10	0.13	0.28	0.50
BRICKLAYERS	0.0	0.02	0.0	0.0	0.0	0.0	0.0
CARPENTERS	0.40	0.17	0.03	0.02	0.0	0.14	0.0
STRUCT. IRON	0.0	0.21	0.03	0.02	0.06	0.0	0.0
PLASTERERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ELECT. WORKERS	0.0	0.02	0.06	0.07	0.69	0.27	0.0
STEAM FITTERS	0.0	0.08	0.35	0.59	0.0	0.28	0.50
OPER. ENGRS.	0.10	0.08	0.11	0.07	0.08	0.0	0.0
SM. TRAC. OP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LG. TRAC. OP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CRANE OPERS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AIR COMP. OPERS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TRUCK DRIVERS	0.10	0.02	0.02	0.01	0.02	0.03	0.0
BOILER MAKERS	0.0	0.0	0.23	0.10	0.0	0.0	0.0
OTHER CRAFTS	0.0	0.13	0.03	0.02	0.0	0.0	1.00

MATERIAL	ACC NO 20	ACC NO 21	ACC NO 22	ACC NO 23	ACC NO 24	ACC NO 25	ACC NO 26
CHANNELS	0.0	0.08	0.08	0.08	0.08	0.08	0.08
I BEAMS	0.0	0.08	0.08	0.08	0.08	0.08	0.08
W FLANGES	0.0	0.08	0.08	0.08	0.08	0.08	0.08
RE-BARS	0.0	0.47	0.47	0.47	0.47	0.47	0.47
REDIMIX CONCRETE	0.0	0.27	0.27	0.27	0.27	0.27	0.27
PLYFORM	0.0	0.01	0.01	0.01	0.01	0.01	0.01
LUMBER	0.0	0.01	0.01	0.01	0.01	0.01	0.01
LAND	1.00	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DATE 01-10-73 CONCEPT PHASE II

SITE RATE AND ESCALATION USED IN COST PROJECTIONS YFIRST = 1969.0

	ACC NO 20		ACC NO 21		ACC NO 22		ACC NO 23		ACC NO 24		ACC NO 25		ACC NO 26	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
SITE LABOR	5.84	1.10	6.44	1.10	6.80	1.10	6.79	1.10	7.29	1.10	6.30	1.10	5.82	1.10
SITE MATERIAL	1000.00	1.00	15.39	1.05	15.39	1.05	15.39	1.05	15.39	1.05	15.39	1.05	15.39	1.05

CRAFT SITE MIXING FACTORS

LABOR	ACC NO 20	ACC NO 21	ACC NO 22	ACC NO 23	ACC NO 24	ACC NO 25	ACC NO 26
BUILDING LABOR	0.0	0.13	0.03	0.02	0.0	0.0	0.0
HEAVY LABOR	0.40	0.26	0.14	0.10	0.13	0.28	0.50
BRICKLAYERS	0.0	0.02	0.0	0.0	0.0	0.0	0.0
CARPENTERS	0.40	0.17	0.03	0.02	0.0	0.14	0.0
STRUCT. IRON	0.0	0.21	0.03	0.02	0.08	0.0	0.0
PLASTERERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ELECT. WORKERS	0.0	0.02	0.06	0.07	0.69	0.27	0.0
STEAM FITTERS	0.0	0.08	0.35	0.59	0.0	0.28	0.50
OPER. ENGRS.	0.10	0.08	0.11	0.07	0.08	0.0	0.0
SM. TRAC. OP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LG. TRAC. OP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CRANE OPERS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AIR COMP. OPERS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TRUCK DRIVERS	0.10	0.02	0.02	0.01	0.02	0.03	0.0
BOILER MAKERS	0.0	0.0	0.23	0.10	0.0	0.0	0.0
OTHER CRAFTS	0.0	0.13	0.03	0.02	0.0	0.0	0.0

MATERIAL	ACC NO 20	ACC NO 21	ACC NO 22	ACC NO 23	ACC NO 24	ACC NO 25	ACC NO 26
CHANNELS	0.0	0.08	0.08	0.08	0.08	0.08	0.08
I BEAMS	0.0	0.08	0.08	0.08	0.08	0.08	0.08
W FLANGES	0.0	0.08	0.08	0.08	0.08	0.08	0.08
RE-BARS	0.0	0.47	0.47	0.47	0.47	0.47	0.47
REDIMIX CONCRETE	0.0	0.27	0.27	0.27	0.27	0.27	0.27
PLYFORM	0.0	0.01	0.01	0.01	0.01	0.01	0.01
LUMBER	0.0	0.01	0.01	0.01	0.01	0.01	0.01
LAND	1.00	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DATE 01-10-73

CONCEPT PHASE II
PLANT CAPITAL INVESTMENT SUMMARY
(THOUSAND DOLLARS)

1000 MWE PWR POWER PLANT MIDDLETOWN , USA
COST BASIS: AT START OF CONSTRUCTION
DESIGN + CONSTRUCTION PERIOD 1971.0-1978.5
40-HOUR WORK WEEK
STRAIGHT INTEREST RATE = 7.0

ACCOUNT NUMBER	ACCOUNT TITLE	TOTAL COST
	DIRECT COSTS	
20	LAND AND LAND RIGHTS	$ 1000.
	PHYSICAL PLANT	
21	STRUCTURES AND SITE FACILITIES	33538.
22	REACTOR PLANT EQUIPMENT	56225.
23	TURBINE PLANT EQUIPMENT	62347.
24	ELECTRIC PLANT EQUIPMENT	14470.
25	MISCELLANEOUS PLANT EQUIPMENT	4220.
	SUBTOTAL	$ 170800.
	SPARE PARTS ALLOWANCE	1154.
	CONTINGENCY ALLOWANCE	11312.
	SUBTOTAL	$ 183265.
	INDIRECT COSTS	
91	CONSTRUCTION FACILITIES, EQUIPMENT, AND SERVICES	13642.
92	ENGINEERING AND CONSTRUCTION MANAGEMENT SERVICES	24036.
93	OTHER COSTS	8607.
94	INTEREST DURING CONSTRUCTION	52671.
	SUBTOTAL	$ 98955.
	TOTAL PLANT CAPITAL INVESTMENT - ($ 283/KW)	$ 283220.

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT MIDDLETOWN , USA
BREAKDOWN OF PHYSICAL PLANT COSTS (THOUSANDS OF DOLLARS)

PHYSICAL PLANT			FACTORY EQUIPMENT COST	SITE LABOR MAN-HR	SITE LABOR COST	SITE MATERIAL COST
21	STRUCTURES AND SITE FACILITIES	33538.	1499.	(2474)	21216.	10823.
22	REACTOR PLANT EQUIPMENT	56225.	38988.	(1108)	10038.	7199.
23	TURBINE PLANT EQUIPMENT	62347.	38191.	(1761)	15920.	8236.
24	ELECTRIC PLANT EQUIPMENT	14470.	6265.	(636)	6181.	2024.
25	MISCELLANEOUS PLANT EQUIPMENT	4220.	1461.	(271)	2086.	673.
	SUBTOTAL	170800.	86403.	(6226)	55441.	23956.

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT MIDDLETOWN , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
20	LAND AND LAND RIGHTS				
201	LAND AND PRIVILEGE ACQUISITION	$ 0.	$ 0.	$ 1000.	1000.
202	RELOCATION OF BUILDINGS, UTILITIES, ETC.	$ 0.	$ 0.	$ 0.	0.
	TOTAL FOR ACCOUNT 20	$ 0.	$ 0.	$ 1000.	$ 1000.

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT MIDDLETOWN , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
21	STRUCTURES AND FACILITIES				
211	SITE IMPROVEMENTS AND FACILITIES				
.1	GENERAL YARD IMPROVEMENTS	0.	744.	392.	1136.
.2	WATERFRONT IMPROVEMENTS	0.	0.	0.	0.
.3	HIGHWAY AND RAILWAY ACCESS	0.	595.	645.	1240.
	SUBTOTAL	$ 0.	$ 1339.	$ 1037.	$ 2376.
212	REACTOR BUILDING				
.1	BASIC BUILDING STRUCTURES (IN 212.3)	0.	0.	0.	0.
.2	BUILDING SERVICES	1057.	682.	353.	2092.
.3	CONTAINMENT STRUCTURES	0.	8090.	3659.	11749.
	SUBTOTAL	$ 1057.	$ 8772.	$ 4012.	$ 13841.
213	TURBINE BUILDING				
.1	BASIC BUILDING STRUCTURES	0.	2087.	1846.	3933.
.2	BUILDING SERVICES	86.	607.	161.	854.
	SUBTOTAL	$ 86.	$ 2694.	$ 2007.	$ 4787.
214	INTAKE AND DISCHARGE STRUCTURES				
.1	INTAKE STRUCTURE	0.	1754.	844.	2598.
.2	DISCHARGE STRUCTURE (IN 232.2)	0.	0.	0.	0.
.3	UNPRESSURIZED INTAKE AND DISCHARGE CONDUITS (IN 232.2)	0.	0.	0.	0.
	SUBTOTAL	$ 0.	$ 1754.	$ 844.	$ 2598.
215	REACTOR AUXILIARIES BUILDING				
.1	BASIC BUILDING STRUCTURES	0.	2812.	999.	3811.
.2	BUILDING SERVICES	39.	224.	108.	371.
	SUBTOTAL	$ 39.	$ 3036.	$ 1107.	$ 4182.
216	RADIOACTIVE WASTE BUILDING (IN 215)				
.1	BASIC BUILDING STRUCTURES	0.	0.	0.	0.
.2	BUILDING SERVICES	0.	0.	0.	0.
	SUBTOTAL	$ 0.	$ 0.	$ 0.	$ 0.
217	FUEL STORAGE BUILDING				
.1	BASIC BUILDING STRUCTURES	0.	849.	406.	1255.
.2	BUILDING SERVICES	22.	70.	26.	118.
	SUBTOTAL	$ 22.	$ 919.	$ 432.	$ 1373.
218	OTHER				
218A	CONTROL ROOM BUILDING	45.	924.	360.	1329.
218B	DIESEL GENERATOR BUILDING	10.	437.	158.	605.
218C	ADMINISTRATION BUILDING	150.	440.	320.	910.
218D	SERVICE BUILDING	90.	547.	407.	1044.
218E	FAN ROOM BUILDING	0.	253.	79.	332.
218F	AUXILIARY FEED PUMP ENCLOSURE	0.	100.	60.	160.
	SUBTOTAL	$ 295.	$ 2701.	$ 1384.	$ 4380.
219	STACKS	$ 0.	$ 0.	$ 0.	0.
	SUBTOTAL FOR ACCOUNT	$ 1499.	$ 21216.	$ 10823.	$ 33538.
	CONTINGENCY (5.0%MTL-10.0%LABOR)	75.	2122.	541.	2738.
	SPARE PARTS (1.0%)	15.	---	108.	123.
	TOTAL FOR ACCOUNT 21	$ 1589.	$ 23337.	$ 11473.	$ 36399.

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT MIDDLETOWN , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
22	REACTOR PLANT EQUIPMENT				
221	REACTOR EQUIPMENT				
.1	REACTOR VESSELS AND ACCESSORIES	9455.	626.	152.	10233.
.2	REACTOR CONTROL DEVICES	4223.	90.	9.	4322.
.3	MODERATOR/REFLECTOR SYSTEMS	0.	0.	0.	0.
.4	REACTOR SHILLDING	12.	10.	0.	22.
	SUBTOTAL	$ 13690.	$ 726.	$ 161.	$ 14577.
222	MAIN HEAT TRANSFER AND TRANSPORT SYSTEMS				
.1	REACTOR CORE COOLANT SYSTEMS				
.11	PUMPS	$ 3612.	$ 175.	$ 154.	3941.
.12	PIPING SYSTEM	0.	1000.	2431.	3431.
.13	STEAM GENERATORS	13002.	1172.	490.	14654.
.14	PRESSURIZING SYSTEM	1156.	79.	43.	1278.
	SUBTOTAL	$ 17770.	$ 2426.	$ 3118.	$ 23314.
.2	REACTOR BLANKET COOLANT SYSTEMS				
.21	PUMPS	$ 0.	$ 0.	$ 0.	0.
.22	PIPING SYSTEM	0.	0.	0.	0.
.23	HEAT EXCHANGER EQUIPMENT	0.	0.	0.	0.
.24	PRESSURIZING SYSTEM	0.	0.	0.	0.
	SUBTOTAL	$ 0.	$ 0.	$ 0.	$ 0.
.3	INTERMEDIATE LOOP COOLANT SYSTEMS				
.31	PUMPS	$ 0.	$ 0.	$ 0.	0.
.32	PIPING SYSTEM	0.	0.	0.	0.
.33	HEAT EXCHANGER EQUIPMENT	0.	0.	0.	0.
.34	PRESSURIZING SYSTEM	0.	0.	0.	0.
	SUBTOTAL	$ 0.	$ 0.	$ 0.	$ 0.
	SUBTOTAL	$ 17770.	$ 2426.	$ 3118.	$ 23314.
223	SAFEGUARDS COOLING SYSTEMS				
.1	RESIDUAL HEAT REMOVAL SYSTEM	128.	284.	164.	576.
.2	EMERGENCY SHUTDOWN OR CORE ISOLATION COOLING SYSTEM	0.	0.	0.	0.
.3	COOLANT INJECTION AND CORE SPRAY/FLOODING SYSTEMS	117.	848.	903.	1868.
.4	CONTAINMENT HEAT ABSORPTION REJECTION SYSTEMS	66.	348.	364.	778.
	SUBTOTAL	$ 311.	$ 1480.	$ 1431.	$ 3222.
224	RADIOACTIVE WASTE TREATMENT AND DISPOSAL				
.1	LIQUID WASTE PROCESSING EQUIPMENT	675.	739.	238.	1852.
.2	GASEOUS WASTES AND OFF GAS PROCESSING EQUIPMENT	410.	277.	128.	815.
.3	SOLID WASTES PROCESSING EQUIPMENT	61.	12.	2.	75.
	SUBTOTAL	$ 1346.	$ 1028.	$ 368.	$ 2742.
225	NUCLEAR FUEL HANDLING AND STORAGE SYSTEMS				
.1	FUEL HANDLING TOOLS, EQUIPMENT, AND SYSTEMS	171.	61.	22.	254.
.2	REMOTE VIEWING EQUIPMENT	0.	0.	0.	0.
.3	SERVICE PLATFORMS	111.	27.	2.	140.
.4	FUEL STORAGE, CLEANING, AND INSPECTION EQUIPMENT	307.	498.	336.	1141.
	SUBTOTAL	$ 589.	$ 586.	$ 360.	$ 1535.
226	OTHER REACTOR PLANT EQUIPMENT				
.1	INERT GAS SYSTEMS	45.	33.	10.	88.
.2	SPECIAL HEATING SYSTEMS	0.	0.	0.	0.
.3	COOLANT RECEIVING, STORAGE, AND MAKEUP SYSTEMS	0.	0.	0.	0.
.4	COOLANT CHARGE, VOLUME CONTROL, RELIEF, ETC.	180.	168.	237.	605.
.5	COOLANT PURIFICATION & CHEMICAL TREATMENT SYSTEMS	990.	990.	625.	2605.
.6	FLUID LEAK DETECTION SYSTEMS	0.	0.	0.	0.
.7	AUXILIARIES COOLING SYSTEMS	281.	676.	361.	1256.
.8	MAINTENANCE EQUIPMENT	0.	0.	0.	0.
.9	MISCELLANEOUS SUSPENSE ITEMS	0.	900.	85.	985.
	SUBTOTAL	$ 1496.	$ 2737.	$ 1318.	$ 5551.

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT MIDDLETOWN , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
227	INSTRUMENTATION AND CONTROL				
.1	REACTOR PROCESS I&C EQUIPMENT	2200.	250.	30.	2480.
.2	COMPUTER EQUIPMENT	1585.	100.	0.	1685.
.3	RADIATION MONITORING SYSTEMS (IN 227.1)	0.	255.	153.	408.
.4	ISOLATED INDICATING AND RECORDING GAGES (IN 227.1)	0.	0.	0.	0.
.5	CONTROL AND INSTRUMENT PIPING	0.	450.	260.	710.
	SUBTOTAL	$ 3785.	$ 1055.	$ 443.	$ 5283.
228	FOSSIL FUEL BOILERS AND SUPERHEATERS				
.1	BOILERS AND/OR SUPERHEATERS	0.	0.	0.	0.
.2	DRAFT SYSTEMS	0.	0.	0.	0.
.3	FUEL HANDLING SYSTEMS	0.	0.	0.	0.
.4	ASH HANDLING SYSTEMS	0.	0.	0.	0.
	SUBTOTAL	$ 0.	$ 0.	$ 0.	$ 0.
229	IRRADIATION FACILITIES				
.1	SPECIAL STRUCTURES	0.	0.	0.	0.
.2	MATERIALS HANDLING EQUIPMENT	0.	0.	0.	0.
.3	MATERIALS RECEIVING AND STORAGE SYSTEMS	0.	0.	0.	0.
	SUBTOTAL	$ 0.	$ 0.	$ 0.	$ 0.
	SUBTOTAL FOR ACCOUNT	$ 38988.	$ 10038.	$ 7199.	$ 56225.
	CONTINGENCY (5.0%MTL-10.0%LABOR)	1949.	1004.	360.	3313.
	SPARE PARTS (1.0%)	390.	- - - -	72.	462.
	TOTAL FOR ACCOUNT 22	$ 41327.	$ 11042.	$ 7631.	$ 60000.

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT MIDDLETOWN , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
23	TURBINE PLANT EQUIPMENT				
231	TURBINE-GENERATORS				
.1	TURBINE-GENERATORS AND ACCESSORIES	29950.	2000.	200.	32150.
.2	FOUNDATIONS	0.	615.	310.	926.
.3	STANDBY EXCITERS	0.	0.	0.	0.
.4	LUBRICATING SYSTEM	39.	116.	101.	256.
.5	GAS SYSTEMS	0.	45.	67.	112.
.6	REHEATERS (IN 231.1)	0.	0.	0.	0.
.7	SHIELDING	0.	0.	0.	0.
.8	WEATHER-PROOF HOUSING	0.	0.	0.	0.
	SUBTOTAL	$ 29989.	$ 2777.	$ 678.	$ 33445.
232	HEAT REMOVAL SYSTEMS				
.1	WATER INTAKE COMMON FACILITIES	312.	155.	33.	500.
.2	CIRCULATING WATER SYSTEMS				
.21	PUMPS	$ 936.	$ 80.	$ 6.	1022.
.22	PIPING	0.	567.	389.	956.
.23	DISCHARGE TUNNEL	0.	452.	226.	678.
.24	DISCHARGE CANAL AND STRUCTURES	0.	940.	520.	1460.
.25	DEICING PUMP PIT STRUCTURES	0.	83.	47.	130.
	SUBTOTAL	$ 936.	$ 2122.	$ 1188.	$ 4246.
.3	COOLING TOWERS	0.	0.	0.	0.
.4	OTHER SYSTEMS REJECTING HEAT TO THE ATMOSPHERE	0.	0.	0.	0.
	SUBTOTAL	$ 1248.	$ 2277.	$ 1221.	$ 4746.
233	CONDENSING SYSTEMS				
.1	CONDENSERS	2900.	775.	25.	3700.
.2	CONDENSATE SYSTEM	480.	1820.	818.	3118.
.3	GAS REMOVAL SYSTEM	0.	183.	97.	280.
.4	TURBINE BYPASS SYSTEM	0.	0.	0.	0.
	SUBTOTAL	$ 3380.	$ 2778.	$ 940.	$ 7098.
234	FEED HEATING SYSTEM				
.1	REGENERATIVE HEAT EXCHANGERS	1500.	130.	40.	1670.
.2	PUMPS	1118.	126.	16.	1262.
.3	PIPING AND TANKS	0.	3140.	1975.	5115.
	SUBTOTAL	$ 2618.	$ 3398.	$ 2031.	$ 8047.
235	OTHER TURBINE PLANT EQUIPMENT				
.1	MAIN STEAM OR OTHER VAPOR PIPING	0.	2570.	1565.	4135.
.2	TURBINE AUXILIARIES	51.	410.	196.	657.
.3	AUXILIARIES COOLING SYSTEM	119.	350.	345.	814.
.4	MAKEUP TREATMENT SYSTEMS	0.	250.	1000.	1250.
.5	CHEMICAL TREATMENT AND CONDENSATE PURIFICATION SYSTEMS	0.	10.	20.	30.
.6	CENTRAL LUBRICATION SERVICE SYSTEM	0.	0.	0.	0.
.7	MISCELLANEOUS SUSPENSE ITEMS	0.	450.	50.	500.
	SUBTOTAL	$ 170.	$ 4040.	$ 3176.	$ 7386.
236	INSTRUMENTATION AND CONTROL				
.1	PROCESS I & C EQUIPMENT	785.	150.	15.	950.
.2	COMPUTER EQUIPMENT (IN 227.2)	0.	0.	0.	0.
.3	ISOLATED INDICATING AND RECORDING GAGES (IN 236.1)	0.	0.	0.	0.
.4	CONTROL AND INSTRUMENT PIPING	0.	500.	175.	675.
	SUBTOTAL	$ 785.	$ 650.	$ 190.	$ 1625.
	SUBTOTAL FOR ACCOUNT	$ 38191.	$ 15920.	$ 8236.	$ 62347.
	CONTINGENCY (5.0%MTL-10.0%LABOR)	1910.	1592.	412.	3913.
	SPARE PARTS (1.0%)	382.		82.	464.
	TOTAL FOR ACCOUNT 23	$ 40482.	$ 17512.	$ 8730.	$ 66725.

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT MIDDLETOWN , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
24	ELECTRIC PLANT EQUIPMENT				
241	SWITCHGEAR				
.1	GENERATOR CIRCUITS	15.	11.	1.	27.
.2	STATION SERVICE	1000.	180.	58.	1238.
	SUBTOTAL	$ 1015.	$ 191.	$ 59.	$ 1265.
242	STATION SERVICE EQUIPMENT				
.1	STATION SERVICE AND STARTUP TRANSFORMERS	540.	64.	6.	610.
.2	LOW VOLTAGE UNIT SUBSTATIONS AND LIGHTING TRANSFORMERS	610.	120.	3.	733.
.3	BATTERY SYSTEMS	28.	14.	2.	44.
.4	DIESEL ENGINE GENERATORS	750.	218.	48.	1016.
.5	GAS TURBINE GENERATORS	1620.	325.	142.	2087.
.6	MOTOR GENERATOR SETS	70.	15.	1.	86.
	SUBTOTAL	$ 3618.	$ 756.	$ 202.	$ 4576.
243	SWITCHBOARDS				
.1	MAIN CONTROL BOARD FOR ELECTRIC SYSTEMS	450.	75.	10.	535.
.2	AUXILIARY POWER AND SIGNAL BOARDS	9.	5.	1.	15.
	SUBTOTAL	$ 459.	$ 80.	$ 11.	$ 550.
244	PROTECTIVE EQUIPMENT				
.1	GENERAL STATION GROUNDING SYSTEM	0.	145.	95.	240.
.2	FIRE PROTECTION SYSTEM	0.	10.	7.	17.
	SUBTOTAL	$ 0.	$ 155.	$ 102.	$ 257.
245	ELECTRICAL STRUCTURES AND WIRING CONTAINERS				
.1	CONCRETE CABLE TUNNELS, TRENCHES, AND ENVELOPES	0.	65.	40.	105.
.2	CABLE TRAYS AND SUPPORTS	63.	275.	27.	365.
.3	CONDUIT	0.	830.	270.	1100.
.4	OTHER STRUCTURES	0.	18.	6.	24.
	SUBTOTAL	$ 63.	$ 1188.	$ 343.	$ 1594.
246	POWER AND CONTROL WIRING				
.1	GENERATOR CIRCUITS	495.	166.	6.	667.
.2	STATION SERVICE POWER WIRING	165.	1695.	661.	2521.
.3	CONTROL WIRING	0.	1000.	450.	1450.
.4	INSTRUMENT WIRING	0.	630.	175.	775.
.5	CONTAINMENT PENETRATIONS	450.	350.	15.	815.
	SUBTOTAL	$ 1110.	$ 3811.	$ 1307.	$ 6228.
	SUBTOTAL FOR ACCOUNT	$ 6265.	$ 6181.	$ 2024.	$ 14470.
	CONTINGENCY (5.0%MTL-10.0%LABOR)	313.	618.	101.	1033.
	SPARE PARTS (1.0%)	63.	----	20.	83.
	TOTAL FOR ACCOUNT 24	$ 6641.	$ 6799.	$ 2145.	$ 15585.

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT MIDDLETOWN , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
25	MISCELLANEOUS PLANT EQUIPMENT				
251	TRANSPORTATION AND LIFTING EQUIPMENT				
.1	CRANES, HOISTS, AND MONORAILS	495.	153.	50.	698.
.2	RAILWAY AND ROADWAY EQUIPMENT	0.	0.	0.	0.
	SUBTOTAL	$ 495.	$ 153.	$ 50.	$ 698.
252	AIR, WATER, AND STEAM SERVICE SYSTEMS				
.1	AIR SYSTEMS	62.	154.	41.	257.
.2	WATER SYSTEMS	242.	1073.	556.	1871.
.3	AUXILIARY HEATING STEAM	400.	600.	0.	1000.
	SUBTOTAL	$ 704.	$ 1827.	$ 597.	$ 3128.
253	COMMUNICATIONS EQUIPMENT				
.1	LOCAL COMMUNICATIONS SYSTEMS	25.	50.	10.	85.
.2	SIGNAL SYSTEMS	0.	25.	15.	40.
	SUBTOTAL	$ 25.	$ 75.	$ 25.	$ 125.
254	FURNISHINGS AND FIXTURES				
.1	SAFETY EQUIPMENT	10.	0.	0.	10.
.2	SHOP, LABORATORY, AND TEST EQUIPMENT	44.	5.	1.	50.
.3	OFFICE EQUIPMENT AND FURNISHINGS	50.	0.	0.	50.
.4	CHANGE ROOM EQUIPMENT	8.	1.	0.	9.
.5	ENVIRONMENTAL MONITORING EQUIPMENT	0.	0.	0.	0.
.6	DINING FACILITIES	125.	25.	0.	150.
	SUBTOTAL	$ 237.	$ 31.	$ 1.	$ 269.
	SUBTOTAL FOR ACCOUNT	$ 1461.	$ 2086.	$ 673.	$ 4220.
	CONTINGENCY (5.0%MTL-10.0%LABOR)	73.	209.	34.	315.
	SPARE PARTS (1.0%)	15.	- - -	7.	21.
	TOTAL FOR ACCOUNT 25	$ 1549.	$ 2295.	$ 713.	$ 4557.

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT MIDDLETOWN , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST($1000)
91	CONSTRUCTION FACILITIES, EQUIPMENT, AND SERVICES	
911	TEMPORARY FACILITIES	$ 4092.
912	CONSTRUCTION EQUIPMENT	$ 6820.
913	CONSTRUCTION SERVICES	$ 2728.
	TOTAL FOR ACCOUNT 91	$ 13642.

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT MIDDLETOWN , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST($1000)
92	ENGINEERING AND CONSTRUCTION MANAGEMENT SERVICES	
921	ENGINEERING SERVICES	$ 12018.
922	CONSTRUCTION MANAGEMENT SERVICES	$ 12018.
	TOTAL FOR ACCOUNT 92	$ 24036.

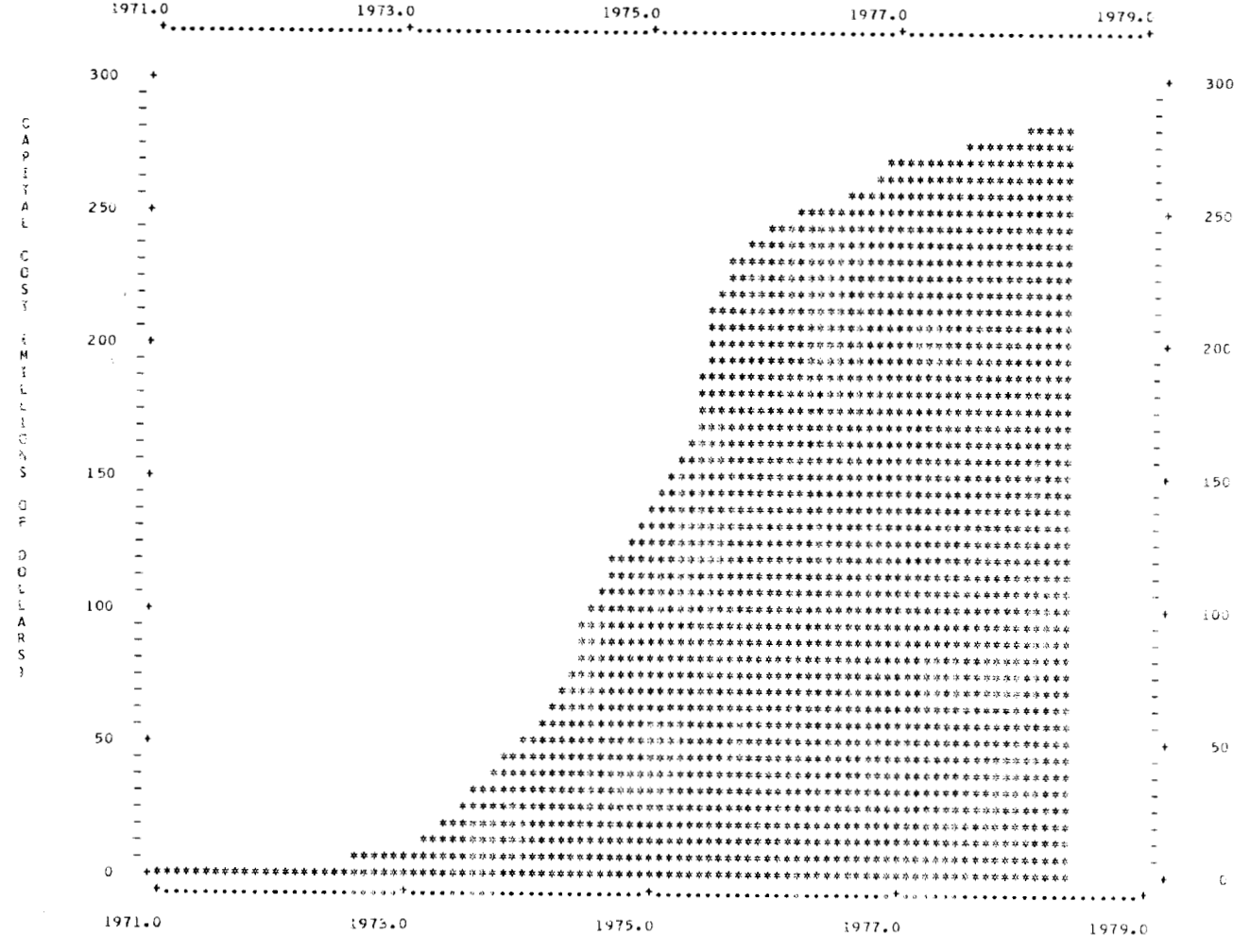
DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT MIDDLETOWN , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST($1000)
93	OTHER COSTS	
931	TAXES AND INSURANCE	$ 5491.
932	STAFF TRAINING AND PLANT STARTUP	$ 499.
933	OWNERS G&A	$ 2617.
	TOTAL FOR ACCOUNT 93	$ 8607.

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT MIDDLETOWN , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST($1000)
94	INTEREST DURING CONSTRUCTION	
941	PHYSICAL PLANT AND ASSOCIATED INDIRECT COSTS	$ 52075.
942	LAND AND LAND RIGHTS	$ 596.
	TOTAL FOR ACCOUNT 94	$ 52671.

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT MIDDLETOWN , USA



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C
C     EXAMPLE PROBLEM 2
C     PWR BASE CASE AT PHILADELPHIA
C     1000 MW(E), 7% SIMPLE INTEREST,
C     40 HR. WORK WEEK, START 1971 AND END 1978.5
C     ESCALATED TO START OF CONSTRUCTION.
C
1000 PWR      PHILADELPHIA     USA              19710 19785  70  400 0 1 0 0 0

CONIT CALLED - DATA FIT DONE ON PENNSYLVANIA    PHILADELPHIA
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DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT PHILADELPHIA , USA

BASE RATE AND ESCALATION USED IN COST PROJECTIONS YFIRST = 1969.0

	ACC NO 20		ACC NO 21		ACC NO 22		ACC NO 23		ACC NO 24		ACC NO 25		ACC NO 26	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
BASE LABOR	5.84	1.10	6.44	1.10	6.80	1.10	6.79	1.10	7.29	1.10	6.30	1.10	5.82	1.10
BASE MATERIAL	1000.00	1.00	15.39	1.05	15.39	1.05	15.39	1.05	15.39	1.05	15.39	1.05	15.39	1.05

CRAFT BASE MIXING FACTORS

LABOR	ACC NO 20	ACC NO 21	ACC NO 22	ACC NO 23	ACC NO 24	ACC NO 25	ACC NO 26
BUILDING LABOR	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HEAVY LABOR	0.40	0.26	0.14	0.10	0.13	0.28	0.50
BRICKLAYERS	0.0	0.02	0.0	0.0	0.0	0.0	0.0
CARPENTERS	0.40	0.17	0.03	0.02	0.0	0.14	0.0
STRUCT. IRON	0.0	0.21	0.03	0.02	0.08	0.0	0.0
PLASTERERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ELECT. WORKERS	0.0	0.02	0.06	0.07	0.69	0.27	0.0
STEAM FITTERS	0.0	0.08	0.35	0.59	0.0	0.28	0.50
OPER. ENGRS.	0.10	0.08	0.11	0.07	0.08	0.0	0.0
SM. TRAC. OP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LG. TRAC. OP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CRANE OPERS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AIR COMP. OPERS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TRUCK DRIVERS	0.10	0.02	0.02	0.01	0.02	0.03	0.0
BOILER MAKERS	0.0	0.0	0.23	0.10	0.0	0.0	0.0
OTHER CRAFTS	0.0	0.13	0.03	0.02	0.0	0.0	1.00

MATERIAL	ACC NO 20	ACC NO 21	ACC NO 22	ACC NO 23	ACC NO 24	ACC NO 25	ACC NO 26
CHANNELS	0.0	0.08	0.08	0.08	0.08	0.08	0.08
I BEAMS	0.0	0.08	0.08	0.08	0.08	0.08	0.08
W FLANGES	0.0	0.08	0.08	0.08	0.08	0.08	0.08
RE-BARS	0.0	0.47	0.47	0.47	0.47	0.47	0.47
REDIMIX CONCRETE	0.0	0.27	0.27	0.27	0.27	0.27	0.27
PLYFORM	0.0	0.01	0.01	0.01	0.01	0.01	0.01
LUMBER	0.0	0.01	0.01	0.01	0.01	0.01	0.01
LAND	1.00	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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SITE RATE AND ESCALATION USED IN COST PROJECTIONS YFIRST = 1969.0

	ACC NO 20		ACC NO 21		ACC NO 22		ACC NO 23		ACC NO 24		ACC NO 25		ACC NO 26	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
SITE LABOR	4.97	1.16	6.37	1.13	6.18	1.15	6.26	1.15	5.84	1.16	5.54	1.16	5.27	1.15
SITE MATERIAL	999.98	1.00	12.63	1.10	12.63	1.10	12.63	1.10	12.63	1.10	12.63	1.10	12.63	1.10

CRAFT SITE MIXING FACTORS

LABOR	ACC NO 20	ACC NO 21	ACC NO 22	ACC NO 23	ACC NO 24	ACC NO 25	ACC NO 26
BUILDING LABOR	0.0	0.13	0.03	0.02	0.0	0.0	0.0
HEAVY LABOR	0.40	0.26	0.14	0.10	0.13	0.28	0.50
BRICKLAYERS	0.0	0.02	0.0	0.0	0.0	0.0	0.0
CARPENTERS	0.40	0.17	0.03	0.02	0.0	0.14	0.0
STRUCT. IRON	0.0	0.21	0.03	0.02	0.08	0.0	0.0
PLASTERERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ELECT. WORKERS	0.0	0.02	0.06	0.07	0.69	0.27	0.0
STEAM FITTERS	0.0	0.08	0.35	0.59	0.0	0.28	0.50
OPER. ENGRS.	0.10	0.08	0.11	0.07	0.08	0.0	0.0
SM. TRAC. OP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LG. TRAC. OP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CRANE OPERS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AIR COMP. OPERS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TRUCK DRIVERS	0.10	0.02	0.02	0.01	0.07	0.03	0.0
BOILER MAKERS	0.0	0.0	0.23	0.10	0.0	0.0	0.0
OTHER CRAFTS	0.0	0.13	0.03	0.02	0.0	0.0	0.0

MATERIAL	ACC NO 20	ACC NO 21	ACC NO 22	ACC NO 23	ACC NO 24	ACC NO 25	ACC NO 26
CHANNELS	0.0	0.08	0.08	0.08	0.08	0.08	0.08
I BEAMS	0.0	0.08	0.08	0.08	0.08	0.08	0.08
W FLANGES	0.0	0.08	0.08	0.08	0.08	0.08	0.08
RE-BARS	0.0	0.47	0.47	0.47	0.47	0.47	0.47
REDIMIX CONCRETE	0.0	0.27	0.27	0.27	0.27	0.27	0.27
PLYFORM	0.0	0.01	0.01	0.01	0.01	0.01	0.01
LUMBER	0.0	0.01	0.01	0.01	0.01	0.01	0.01
LAND	1.00	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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CONCEPT PHASE II
PLANT CAPITAL INVESTMENT SUMMARY
(THOUSAND DOLLARS)

1000 MWE PWR POWER PLANT PHILADELPHIA , USA
COST BASIS: AT START OF CONSTRUCTION
DESIGN + CONSTRUCTION PERIOD 1971.0-1978.5
40-HOUR WORK WEEK
STRAIGHT INTEREST RATE = 7.0

ACCOUNT NUMBER	ACCOUNT TITLE	TOTAL COST
	DIRECT COSTS	
20	LAND AND LAND RIGHTS	$ 1000.
	PHYSICAL PLANT	
21	STRUCTURES AND SITE FACILITIES	33548.
22	REACTOR PLANT EQUIPMENT	55480.
23	TURBINE PLANT EQUIPMENT	61819.
24	ELECTRIC PLANT EQUIPMENT	13594.
25	MISCELLANEOUS PLANT EQUIPMENT	4115.
	SUBTOTAL	$ 168555.
	SPARE PARTS ALLOWANCE	1126.
	CONTINGENCY ALLOWANCE	11228.
	SUBTOTAL	$ 180908.
	INDIRECT COSTS	
91	CONSTRUCTION FACILITIES, EQUIPMENT, AND SERVICES	13538.
92	ENGINEERING AND CONSTRUCTION MANAGEMENT SERVICES	23853.
93	OTHER COSTS	8541.
94	INTEREST DURING CONSTRUCTION	52054.
	SUBTOTAL	$ 97986.
	TOTAL PLANT CAPITAL INVESTMENT - ($ 280/KW)	$ 279894.

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1000 MWE PWR POWER PLANT PHILADELPHIA , USA
BREAKDOWN OF PHYSICAL PLANT COSTS (THOUSANDS OF DOLLARS)

PHYSICAL PLANT			FACTORY EQUIPMENT COST	SITE LABOR MAN-HR	SITE LABOR COST	SITE MATERIAL COST
21	STRUCTURES AND SITE FACILITIES	33548.	1499.	(2474)	22273.	9775.
22	REACTOR PLANT EQUIPMENT	55480.	38988.	(1108)	9990.	6502.
23	TURBINE PLANT EQUIPMENT	61819.	38191.	(1761)	16189.	7439.
24	ELECTRIC PLANT EQUIPMENT	13594.	6265.	(636)	5501.	1828.
25	MISCELLANEOUS PLANT EQUIPMENT	4115.	1461.	(247)	2046.	608.
	SUBTOTAL	168555.	86403.	(6226)	56000.	26152.

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1000 MWE PWR POWER PLANT PHILADELPHIA , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
20	LAND AND LAND RIGHTS				
201	LAND AND PRIVILEGE ACQUISITION	$ 0.	$ 0.	$ 1000.	1000.
202	RELOCATION OF BUILDINGS, UTILITIES, ETC.	$ 0.	$ 0.	$ 0.	0.
	TOTAL FOR ACCOUNT 20	$ 0.	$ 0.	$ 1000.	$ 1000.

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT PHILADELPHIA , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
21	STRUCTURES AND FACILITIES				
211	SITE IMPROVEMENTS AND FACILITIES				
.1	GENERAL YARD IMPROVEMENTS	0.	781.	354.	1135.
.2	WATERFRONT IMPROVEMENTS	0.	0.	0.	0.
.3	HIGHWAY AND RAILWAY ACCESS	0.	625.	583.	1207.
	SUBTOTAL	$ 0.	$ 1406.	$ 937.	$ 2342.
212	REACTOR BUILDING				
.1	BASIC BUILDING STRUCTURES (IN 212.3)	0.	0.	0.	0.
.2	BUILDING SERVICES	1057.	716.	319.	2092.
.3	CONTAINMENT STRUCTURES	0.	8494.	3305.	11798.
	SUBTOTAL	$ 1057.	$ 9210.	$ 3624.	$ 13890.
213	TURBINE BUILDING				
.1	BASIC BUILDING STRUCTURES	0.	2191.	1667.	3858.
.2	BUILDING SERVICES	86.	637.	145.	869.
	SUBTOTAL	$ 86.	$ 2828.	$ 1813.	$ 4727.
214	INTAKE AND DISCHARGE STRUCTURES				
.1	INTAKE STRUCTURE	0.	1842.	762.	2604.
.2	DISCHARGE STRUCTURE (IN 232.2)	0.	0.	0.	0.
.3	UNPRESSURIZED INTAKE AND DISCHARGE CONDUITS (IN 232.2)	0.	0.	0.	0.
	SUBTOTAL	$ 0.	$ 1842.	$ 762.	$ 2604.
215	REACTOR AUXILIARIES BUILDING				
.1	BASIC BUILDING STRUCTURES	0.	2952.	902.	3855.
.2	BUILDING SERVICES	39.	235.	98.	372.
	SUBTOTAL	$ 39.	$ 3187.	$ 1000.	$ 4226.
216	RADIOACTIVE WASTE BUILDING (IN 215)				
.1	BASIC BUILDING STRUCTURES	0.	0.	0.	0.
.2	BUILDING SERVICES	0.	0.	0.	0.
	SUBTOTAL	$ 0.	$ 0.	$ 0.	$ 0.
217	FUEL STORAGE BUILDING				
.1	BASIC BUILDING STRUCTURES	0.	891.	367.	1258.
.2	BUILDING SERVICES	22.	73.	23.	119.
	SUBTOTAL	$ 22.	$ 965.	$ 390.	$ 1377.
218	OTHER				
218A	CONTROL ROOM BUILDING	45.	970.	325.	1340.
218B	DIESEL GENERATOR BUILDING	10.	459.	143.	612.
218C	ADMINISTRATION BUILDING	150.	462.	289.	901.
218D	SERVICE BUILDING	90.	574.	368.	1032.
218E	FAN ROOM BUILDING	0.	266.	71.	337.
218F	AUXILIARY FEED PUMP ENCLOSURE	0.	105.	54.	159.
	SUBTOTAL	$ 295.	$ 2836.	$ 1250.	$ 4381.
219	STACKS	$ 0.	$ 0.	$ 0.	0.
	SUBTOTAL FOR ACCOUNT	$ 1499.	$ 22273.	$ 9775.	$ 33548.
	CONTINGENCY (5.0%MTL-10.0%LABOR)	75.	2227.	489.	2791.
	SPARE PARTS (1.0%)	15.		98.	113.
	TOTAL FOR ACCOUNT 21	$ 1589.	$ 24501.	$ 10362.	$ 36452.

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1000 MWE PWR POWER PLANT PHILADELPHIA , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
22	REACTOR PLANT EQUIPMENT				
221	REACTOR EQUIPMENT				
.1	REACTOR VESSELS AND ACCESSORIES	9455.	623.	137.	10215.
.2	REACTOR CONTROL DEVICES	4223.	90.	8.	4321.
.3	MODERATOR/REFLECTOR SYSTEMS	0.	0.	0.	0.
.4	REACTOR SHIELDING	12.	10.	0.	22.
	SUBTOTAL	$ 13690.	$ 723.	$ 145.	$ 14558.
222	MAIN HEAT TRANSFER AND TRANSPORT SYSTEMS				
.1	REACTOR CORE COOLANT SYSTEMS				
.11	PUMPS	$ 3612.	$ 174.	$ 139.	3925.
.12	PIPING SYSTEM	0.	995.	2196.	3191.
.13	STEAM GENERATORS	13002.	1166.	443.	14611.
.14	PRESSURIZING SYSTEM	1156.	79.	39.	1273.
	SUBTOTAL	$ 17770.	$ 2414.	$ 2816.	$ 23001.
.2	REACTOR BLANKET COOLANT SYSTEMS				
.21	PUMPS	$ 0.	$ 0.	$ 0.	0.
.22	PIPING SYSTEM	0.	0.	0.	0.
.23	HEAT EXCHANGER EQUIPMENT	0.	0.	0.	0.
.24	PRESSURIZING SYSTEM	0.	0.	0.	0.
	SUBTOTAL	$ 0.	$ 0.	$ 0.	$ 0.
.3	INTERMEDIATE LOOP COOLANT SYSTEMS				
.31	PUMPS	$ 0.	$ 0.	$ 0.	0.
.32	PIPING SYSTEM	0.	0.	0.	0.
.33	HEAT EXCHANGER EQUIPMENT	0.	0.	0.	0.
.34	PRESSURIZING SYSTEM	0.	0.	0.	0.
	SUBTOTAL	$ 0.	$ 0.	$ 0.	$ 0.
	SUBTOTAL	$ 17770.	$ 2414.	$ 2816.	$ 23001.
223	SAFEGUARDS COOLING SYSTEMS				
.1	RESIDUAL HEAT REMOVAL SYSTEM	128.	283.	148.	559.
.2	EMERGENCY SHUTDOWN OR CORE ISOLATION COOLING SYSTEM	0.	0.	0.	0.
.3	COOLANT INJECTION AND CORE SPRAY/FLOODING SYSTEMS	117.	844.	816.	1777.
.4	CONTAINMENT HEAT ABSORPTION REJECTION SYSTEMS	66.	346.	329.	741.
	SUBTOTAL	$ 311.	$ 1473.	$ 1292.	$ 3076.
224	RADIOACTIVE WASTE TREATMENT AND DISPOSAL				
.1	LIQUID WASTE PROCESSING EQUIPMENT	875.	735.	215.	1825.
.2	GASEOUS WASTES AND OFF GAS PROCESSING EQUIPMENT	410.	276.	116.	801.
.3	SOLID WASTES PROCESSING EQUIPMENT	61.	12.	2.	75.
	SUBTOTAL	$ 1346.	$ 1023.	$ 332.	$ 2701.
225	NUCLEAR FUEL HANDLING AND STORAGE SYSTEMS				
.1	FUEL HANDLING TOOLS, EQUIPMENT, AND SYSTEMS	171.	61.	20.	252.
.2	REMOTE VIEWING EQUIPMENT	0.	0.	0.	0.
.3	SERVICE PLATFORMS	111.	27.	2.	140.
.4	FUEL STORAGE, CLEANING, AND INSPECTION EQUIPMENT	307.	496.	303.	1106.
	SUBTOTAL	$ 589.	$ 583.	$ 325.	$ 1497.
226	OTHER REACTOR PLANT EQUIPMENT				
.1	INERT GAS SYSTEMS	45.	33.	9.	87.
.2	SPECIAL HEATING SYSTEMS	0.	0.	0.	0.
.3	COOLANT RECEIVING, STORAGE, AND MAKEUP SYSTEMS	0.	0.	0.	0.
.4	COOLANT CHARGE, VOLUME CONTROL, RELIEF, ETC.	180.	187.	214.	581.
.5	COOLANT PURIFICATION & CHEMICAL TREATMENT SYSTEMS	990.	985.	564.	2540.
.6	FLUID LEAK DETECTION SYSTEMS	0.	0.	0.	0.
.7	AUXILIARIES COOLING SYSTEMS	281.	623.	326.	1230.
.8	MAINTENANCE EQUIPMENT	0.	0.	0.	0.
.9	MISCELLANEOUS SUSPENSE ITEMS	0.	899.	73.	972.
	SUBTOTAL	$ 1496.	$ 2724.	$ 1190.	$ 5410.

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1000 MWE PWR POWER PLANT PHILADELPHIA , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
227	INSTRUMENTATION AND CONTROL				
.1	REACTOR PROCESS I&C EQUIPMENT	2200.	249.	27.	2476.
.2	COMPUTER EQUIPMENT	1585.	100.	0.	1685.
.3	RADIATION MONITORING SYSTEMS (IN 227.1)	0.	254.	138.	392.
.4	ISOLATED INDICATING AND RECORDING GAGES (IN 227.1)	0.	0.	0.	0.
.5	CONTROL AND INSTRUMENT PIPING	0.	448.	235.	683.
	SUBTOTAL	$ 3785.	$ 1050.	$ 400.	$ 5235.
228	FOSSIL FUEL BOILERS AND SUPERHEATERS				
.1	BOILERS AND/OR SUPERHEATERS	0.	0.	0.	0.
.2	DRAFT SYSTEMS	0.	0.	0.	0.
.3	FUEL HANDLING SYSTEMS	0.	0.	0.	0.
.4	ASH HANDLING SYSTEMS	0.	0.	0.	0.
	SUBTOTAL	$ 0.	$ 0.	$ 0.	$ 0.
229	IRRADIATION FACILITIES				
.1	SPECIAL STRUCTURES	0.	0.	0.	0.
.2	MATERIALS HANDLING EQUIPMENT	0.	0.	0.	0.
.3	MATERIALS RECEIVING AND STORAGE SYSTEMS	0.	0.	0.	0.
	SUBTOTAL	$ 0.	$ 0.	$ 0.	$ 0.
	SUBTOTAL FOR ACCOUNT	$ 38988.	$ 9990.	$ 6502.	$ 55480.
	CONTINGENCY (5.0%MTL-10.0%LABOR)	1949.	999.	325.	3273.
	SPARE PARTS (1.0%)	390.	- - - -	65.	455.
	TOTAL FOR ACCOUNT 22	$ 41327.	$ 10989.	$ 6892.	$ 59208.

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1000 MWE PWR POWER PLANT PHILADELPHIA , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
23	TURBINE PLANT EQUIPMENT				
231	TURBINE-GENERATORS	29950.	2034.	181.	32165.
.1	TURBINE-GENERATORS AND ACCESSORIES	0.	626.	280.	906.
.2	FOUNDATIONS	0.	0.	0.	0.
.3	STANDBY EXCITERS	39.	118.	91.	248.
.4	LUBRICATING SYSTEM	0.	46.	61.	106.
.5	GAS SYSTEMS	0.	0.	0.	0.
.6	REHEATERS (IN 231.1)	0.	0.	0.	0.
.7	SHIELDING	0.	0.	0.	0.
.8	WEATHER-PROOF HOUSING	$ 29989.	$ 2824.	$ 612.	$ 33426.
	SUBTOTAL				
232	HEAT REMOVAL SYSTEMS	312.	158.	30.	499.
.1	WATER INTAKE COMMON FACILITIES	$ 936.	$ 81.	$ 5.	1023.
.2	CIRCULATING WATER SYSTEMS	0.	577.	351.	928.
.21	PUMPS	0.	460.	204.	664.
.22	PIPING	0.	956.	470.	1426.
.23	DISCHARGE TUNNEL	0.	84.	42.	127.
.24	DISCHARGE CANAL AND STRUCTURES	$ 936.	$ 2158.	$ 1073.	$ 4167.
.25	DEICING PUMP PIT STRUCTURES	0.	0.	0.	0.
	SUBTOTAL				
.3	COOLING TOWERS	0.	0.	0.	0.
.4	OTHER SYSTEMS REJECTING HEAT TO THE ATMOSPHERE	$ 1248.	$ 2316.	$ 1103.	$ 4666.
	SUBTOTAL				
233	CONDENSING SYSTEMS	2900.	788.	23.	3711.
.1	CONDENSERS	480.	1851.	739.	3070.
.2	CONDENSATE SYSTEM	0.	186.	88.	274.
.3	GAS REMOVAL SYSTEM	0.	0.	0.	0.
.4	TURBINE BYPASS SYSTEM	$ 3380.	$ 2825.	$ 849.	$ 7054.
	SUBTOTAL				
234	FEED HEATING SYSTEM	1500.	132.	36.	1668.
.1	REGENERATIVE HEAT EXCHANGERS	1118.	130.	14.	1263.
.2	PUMPS	0.	2193.	1784.	4977.
.3	PIPING AND TANKS	$ 2618.	$ 3456.	$ 1834.	$ 7908.
	SUBTOTAL				
235	OTHER TURBINE PLANT EQUIPMENT	0.	2613.	1413.	4027.
.1	MAIN STEAM OR OTHER VAPOR PIPING	51.	417.	177.	645.
.2	TURBINE AUXILIARIES	119.	356.	312.	787.
.3	AUXILIARIES COOLING SYSTEM	0.	254.	903.	1157.
.4	MAKEUP TREATMENT SYSTEMS	0.	10.	18.	28.
.5	CHEMICAL TREATMENT AND CONDENSATE PURIFICATION SYSTEMS	0.	0.	0.	0.
.6	CENTRAL LUBRICATION SERVICE SYSTEM	0.	458.	45.	503.
.7	MISCELLANEOUS SUSPENSE ITEMS	$ 170.	$ 4108.	$ 2868.	$ 7147.
	SUBTOTAL				
236	INSTRUMENTATION AND CONTROL	785.	153.	14.	951.
.1	PROCESS I & C EQUIPMENT	0.	0.	0.	0.
.2	COMPUTER EQUIPMENT (IN 227.2)	0.	0.	0.	0.
.3	ISOLATED INDICATING AND RECORDING GAGES (IN 236.1)	0.	508.	158.	667.
.4	CONTROL AND INSTRUMENT PIPING	$ 785.	$ 661.	$ 172.	$ 1618.
	SUBTOTAL				
	SUBTOTAL FOR ACCOUNT	$ 38191.	$ 16189.	$ 7439.	$ 61819.
	CONTINGENCY (5.0%MTL-10.0%LABOR)	1910.	1619.	372.	3900.
	SPARE PARTS (1.0%)	382.		74.	456.
	TOTAL FOR ACCOUNT 23	$ 40482.	$ 17808.	$ 7885.	$ 66175.

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT PHILADELPHIA , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
24	ELECTRIC PLANT EQUIPMENT				
241	SWITCHGEAR				
.1	GENERATOR CIRCUITS	15.	10.	1.	26.
.2	STATION SERVICE	1000.	160.	52.	1213.
	SUBTOTAL	$ 1015.	$ 170.	$ 53.	$ 1238.
242	STATION SERVICE EQUIPMENT				
.1	STATION SERVICE AND STARTUP TRANSFORMERS	540.	57.	5.	602.
.2	LOW VOLTAGE UNIT SUBSTATIONS AND LIGHTING TRANSFORMERS	610.	107.	3.	719.
.3	BATTERY SYSTEMS	28.	12.	2.	42.
.4	DIESEL ENGINE GENERATORS	750.	194.	43.	987.
.5	GAS TURBINE GENERATORS	1620.	289.	128.	2037.
.6	MOTOR GENERATOR SETS	70.	13.	1.	84.
	SUBTOTAL	$ 3618.	$ 673.	$ 182.	$ 4473.
243	SWITCHBOARDS				
.1	MAIN CONTROL BOARD FOR ELECTRIC SYSTEMS	450.	67.	9.	526.
.2	AUXILIARY POWER AND SIGNAL BOARDS	9.	4.	1.	14.
	SUBTOTAL	$ 459.	$ 71.	$ 10.	$ 540.
244	PROTECTIVE EQUIPMENT				
.1	GENERAL STATION GROUNDING SYSTEM	0.	129.	86.	215.
.2	FIRE PROTECTION SYSTEM	0.	9.	6.	15.
	SUBTOTAL	$ 0.	$ 138.	$ 92.	$ 230.
245	ELECTRICAL STRUCTURES AND WIRING CONTAINERS				
.1	CONCRETE CABLE TUNNELS, TRENCHES, AND ENVELOPES	0.	58.	36.	94.
.2	CABLE TRAYS AND SUPPORTS	63.	245.	24.	332.
.3	CONDUIT	0.	739.	244.	982.
.4	OTHER STRUCTURES	0.	16.	5.	21.
	SUBTOTAL	$ 63.	$ 1057.	$ 310.	$ 1430.
246	POWER AND CONTROL WIRING				
.1	GENERATOR CIRCUITS	495.	148.	5.	648.
.2	STATION SERVICE POWER WIRING	165.	1508.	597.	2270.
.3	CONTROL WIRING	0.	890.	406.	1296.
.4	INSTRUMENT WIRING	0.	534.	158.	692.
.5	CONTAINMENT PENETRATIONS	450.	311.	14.	775.
	SUBTOTAL	$ 1110.	$ 3391.	$ 1180.	$ 5682.
	SUBTOTAL FOR ACCOUNT	$ 6265.	$ 5501.	$ 1828.	$ 13594.
	CONTINGENCY (5.0%MTL-10.0%LABOR)	313.	550.	91.	955.
	SPARE PARTS (1.0%)	63.	---	18.	81.
	TOTAL FOR ACCOUNT 24	$ 6641.	$ 6051.	$ 1938.	$ 14629.

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT PHILADELPHIA , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
25	MISCELLANEOUS PLANT EQUIPMENT				
251	TRANSPORTATION AND LIFTING EQUIPMENT				
.1	CRANES, HOISTS, AND MONORAILS	495.	150.	45.	690.
.2	RAILWAY AND ROADWAY EQUIPMENT	0.	0.	0.	0.
	SUBTOTAL	$ 495.	$ 150.	$ 45.	$ 690.
252	AIR, WATER, AND STEAM SERVICE SYSTEMS				
.1	AIR SYSTEMS	62.	151.	37.	250.
.2	WATER SYSTEMS	242.	1053.	502.	1797.
.3	AUXILIARY HEATING STEAM	400.	589.	0.	989.
	SUBTOTAL	$ 704.	$ 1792.	$ 539.	$ 3035.
253	COMMUNICATIONS EQUIPMENT				
.1	LOCAL COMMUNICATIONS SYSTEMS	25.	49.	9.	83.
.2	SIGNAL SYSTEMS	0.	25.	14.	38.
	SUBTOTAL	$ 25.	$ 74.	$ 23.	$ 121.
254	FURNISHINGS AND FIXTURES				
.1	SAFETY EQUIPMENT	10.	0.	0.	10.
.2	SHOP, LABORATORY, AND TEST EQUIPMENT	44.	5.	1.	50.
.3	OFFICE EQUIPMENT AND FURNISHINGS	50.	0.	0.	50.
.4	CHANGE ROOM EQUIPMENT	8.	1.	0.	9.
.5	ENVIRONMENTAL MONITORING EQUIPMENT	0.	0.	0.	0.
.6	DINING FACILITIES	125.	25.	0.	150.
	SUBTOTAL	$ 237.	$ 30.	$ 1.	$ 268.
	SUBTOTAL FOR ACCOUNT	$ 1461.	$ 2046.	$ 608.	$ 4115.
	CONTINGENCY (5.0%MTL-10.0%LABOR)	73.	205.	30.	308.
	SPARE PARTS (1.0%)	15.	--	6.	21.
	TOTAL FOR ACCOUNT 25	$ 1549.	$ 2251.	$ 644.	$ 4444.

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT PHILADELPHIA , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST($1000)
91	CONSTRUCTION FACILITIES, EQUIPMENT, AND SERVICES	
911	TEMPORARY FACILITIES	$ 4061.
912	CONSTRUCTION EQUIPMENT	$ 6768.
913	CONSTRUCTION SERVICES	$ 2707.
	TOTAL FOR ACCOUNT 91	$ 13538.

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT PHILADELPHIA , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST($1000)
92	ENGINEERING AND CONSTRUCTION MANAGEMENT SERVICES	
921	ENGINEERING SERVICES	$ 11927.
922	CONSTRUCTION MANAGEMENT SERVICES	$ 11927.
	TOTAL FOR ACCOUNT 92	$ 23853.

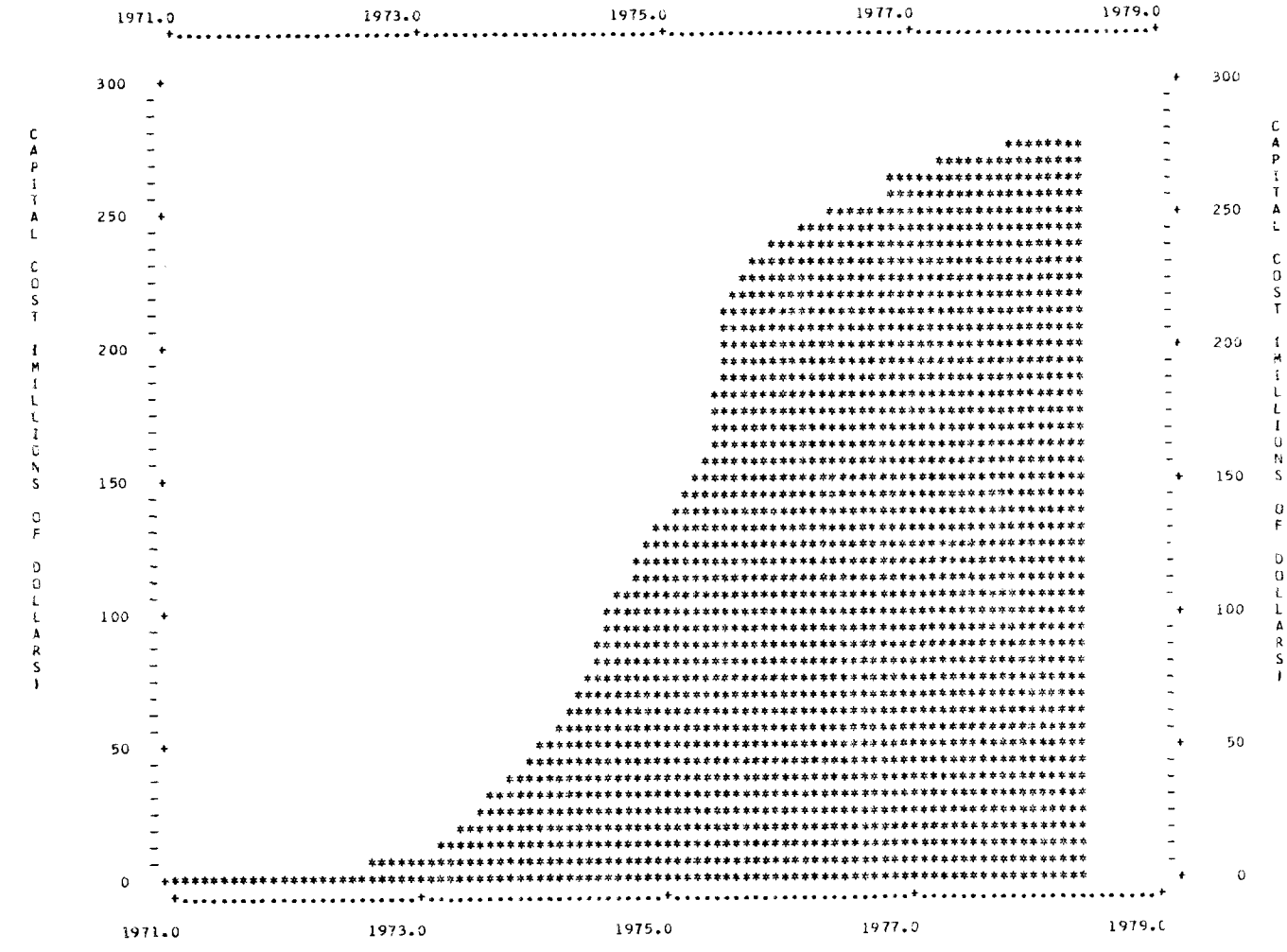
DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT PHILADELPHIA , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST($1000)
93	OTHER COSTS	
931	TAXES AND INSURANCE	$ 9449.
932	STAFF TRAINING AND PLANT STARTUP	$ 495.
933	OWNERS G&A	$ 2597.
	TOTAL FOR ACCOUNT 93	$ 8541.

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT PHILADELPHIA , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST($1000)
94	INTEREST DURING CONSTRUCTION	
941	PHYSICAL PLANT AND ASSOCIATED INDIRECT COSTS	$ 51458.
942	LAND AND LAND RIGHTS	$ 596.
	TOTAL FOR ACCOUNT 94	$ 52054.

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT PHILADELPHIA , USA



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C
C     EXAMPLE PROBLEM 3
C     PWR BASE CASE AT PHILADELPHIA
C     1000 MW(E), 7% SIMPLE INTEREST,
C     40 HR. WORK WEEK, START 1971 AND END 1978.5
C     ESCALATED TO START OF CONSTRUCTION.
C     CHANGE YEAR RANGE FOR HISTORICAL COST ANALYSIS TO 1960-1969, NAMELIST INPUT
C
1000 PWR       PHILADELPHIA      USA                19710 19785  70  400 1 1 0 2 0
&CONOPT
YFIRST=1960.,YLAST=1969.,
&END

CONII CALLED - DATA FIT DONE ON USA              MIDDLETOWN

CONII CALLED - DATA FIT DONE ON PENNSYLVANIA     PHILADELPHIA
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DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT PHILADELPHIA , USA

BASE RATE AND ESCALATION USED IN COST PROJECTIONS FIRST = 1960.0

	ACC NO 20		ACC NO 21		ACC NO 22		ACC NO 23		ACC NO 24		ACC NO 25		ACC NO 26	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
BASE LABOR	2.48	1.10	2.74	1.10	2.88	1.10	2.88	1.10	3.09	1.10	2.67	1.10	5.18	1.10
BASE MATERIAL	999.98	1.00	9.90	1.05	9.90	1.05	9.90	1.05	9.90	1.05	9.90	1.05	9.90	1.05

BASE MIXING FACTORS

CRAFT	ACC NO 20	ACC NO 21	ACC NO 22	ACC NO 23	ACC NO 24	ACC NO 25	ACC NO 26
LABOR							
BUILDING LABOR	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HEAVY LABOR	0.40	0.26	0.14	0.10	0.13	0.28	0.50
BRICKLAYERS	0.0	0.02	0.0	0.0	0.0	0.0	0.0
CARPENTERS	0.40	0.17	0.03	0.02	0.0	0.14	0.0
STRUCT. IRON	0.0	0.21	0.02	0.02	0.08	0.0	0.0
PLASTERERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ELECT. WORKERS	0.0	0.02	0.06	0.07	0.69	0.27	0.0
STEAM FITTERS	0.0	0.08	0.35	0.59	0.0	0.28	0.50
OPER. ENGRS.	0.10	0.08	0.11	0.07	0.08	0.0	0.0
SM. TRAC. OP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LG. TRAC. OP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CRANE OPERS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AIR COMP. OPERS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TRUCK DRIVERS	0.10	0.02	0.02	0.01	0.02	0.03	0.0
BOILER MAKERS	0.0	0.0	0.23	0.10	0.0	0.0	0.0
OTHER CRAFTS	0.0	0.13	0.03	0.02	0.0	0.0	1.00

MATERIAL	ACC NO 20	ACC NO 21	ACC NO 22	ACC NO 23	ACC NO 24	ACC NO 25	ACC NO 26
CHANNELS	0.0	0.08	0.08	0.08	0.08	0.08	0.08
I BEAMS	0.0	0.08	0.08	0.08	0.08	0.08	0.08
W FLANGES	0.0	0.08	0.08	0.08	0.08	0.08	0.08
RE-BARS	0.0	0.47	0.47	0.47	0.47	0.47	0.47
REDIMIX CONCRETE	0.0	0.27	0.27	0.27	0.27	0.27	0.27
PLYFORM	0.0	0.01	0.01	0.01	0.01	0.01	0.01
LUMBER	0.0	0.01	0.01	0.01	0.01	0.01	0.01
LAND	1.00	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DATE 01-10-73 CONCEPT PHASE II

SITE RATE AND ESCALATION USED IN COST PROJECTIONS YFIRST = 1960.0

	ACC NO 20		ACC NO 21		ACC NO 22		ACC NO 23		ACC NO 24		ACC NO 25		ACC NO 26	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
SITE LABOR	3.26	1.05	4.08	1.05	4.12	1.04	4.19	1.04	4.16	1.04	3.76	1.04	3.45	1.05
SITE MATERIAL	999.98	1.00	12.35	1.00	12.35	1.00	12.35	1.00	12.35	1.00	12.35	1.00	12.35	1.00

CRAFT SITE MIXING FACTORS

LABOR	ACC NO 20	ACC NO 21	ACC NO 22	ACC NO 23	ACC NO 24	ACC NO 25	ACC NO 26
BUILDING LABOR	0.0	0.13	0.03	0.02	0.0	0.0	0.0
HEAVY LABOR	0.40	0.26	0.14	0.10	0.13	0.28	0.50
BRICKLAYERS	0.0	0.02	0.0	0.0	0.0	0.0	0.0
CARPENTERS	0.40	0.17	0.03	0.02	0.0	0.14	0.0
STRUCT. IRON	0.0	0.21	0.03	0.02	0.08	0.0	0.0
PLASTERERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ELECT. WORKERS	0.0	0.02	0.06	0.07	0.09	0.27	0.0
STEAM FITTERS	0.0	0.08	0.35	0.59	0.0	0.28	0.50
OPER. ENGRS.	0.10	0.08	0.11	0.07	0.08	0.0	0.0
SM. TRAC. OP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LG. TRAC. OP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CRANE OPERS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AIR COMP. OPERS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TRUCK DRIVERS	0.10	0.02	0.02	0.01	0.02	0.03	0.0
BOILER MAKERS	0.0	0.0	0.23	0.10	0.0	0.0	0.0
OTHER CRAFTS	0.0	0.13	0.03	0.02	0.0	0.0	0.0

MATERIAL	ACC NO 20	ACC NO 21	ACC NO 22	ACC NO 23	ACC NO 24	ACC NO 25	ACC NO 26
CHANNELS	0.0	0.08	0.08	0.08	0.08	0.08	0.08
I BEAMS	0.0	0.08	0.08	0.08	0.08	0.08	0.08
W FLANGES	0.0	0.08	0.08	0.08	0.08	0.08	0.08
RE-BARS	0.0	0.47	0.47	0.47	0.47	0.47	0.47
REDIMIX CONCRETE	0.0	0.27	0.27	0.27	0.27	0.27	0.27
PLYFORM	0.0	0.01	0.01	0.01	0.01	0.01	0.01
LUMBER	0.0	0.01	0.01	0.01	0.01	0.01	0.01
LAND	1.00	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DATE 01-10-73

CONCEPT PHASE II
PLANT CAPITAL INVESTMENT SUMMARY
(THOUSAND DOLLARS)

1000 MWE PWR — POWER PLANT PHILADELPHIA , USA — NAMELIST INPUT

COST BASIS: AT START OF CONSTRUCTION
DESIGN + CONSTRUCTION PERIOD 1971.0-1978.5
40-HOUR WORK WEEK
STRAIGHT INTEREST RATE = 7.0

ACCOUNT NUMBER	ACCOUNT TITLE	TOTAL COST
	DIRECT COSTS	
20	LAND AND LAND RIGHTS	$ 1000.
	PHYSICAL PLANT	
21	STRUCTURES AND SITE FACILITIES	27941.
22	REACTOR PLANT EQUIPMENT	52403.
23	TURBINE PLANT EQUIPMENT	57205.
24	ELECTRIC PLANT EQUIPMENT	12250.
25	MISCELLANEOUS PLANT EQUIPMENT	3592.
	SUBTOTAL	$ 153391.
	SPARE PARTS ALLOWANCE	1062.
	CONTINGENCY ALLOWANCE	9929.
	SUBTOTAL	$ 164402.
	INDIRECT COSTS	
91	CONSTRUCTION FACILITIES, EQUIPMENT, AND SERVICES	12818.
92	ENGINEERING AND CONSTRUCTION MANAGEMENT SERVICES	22581.
93	OTHER COSTS	8089.
94	INTEREST DURING CONSTRUCTION	47302.
	SUBTOTAL	$ 91290.
	TOTAL PLANT CAPITAL INVESTMENT - ($ 257/KW)	$ 256692.

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT PHILADELPHIA , USA
BREAKDOWN OF PHYSICAL PLANT COSTS (THOUSANDS OF DOLLARS)

PHYSICAL PLANT			FACTORY EQUIPMENT COST	SITE LABOR MAN-HR	SITE LABOR COST	SITE MATERIAL COST
21	STRUCTURES AND SITE FACILITIES	27941.	1499.	(2470)	18296.	8146.
22	REACTOR PLANT EQUIPMENT	52403.	38988.	(1108)	7997.	5418.
23	TURBINE PLANT EQUIPMENT	57205.	38191.	(1760)	12815.	6199.
24	ELECTRIC PLANT EQUIPMENT	12250.	6265.	(636)	4462.	1523.
25	MISCELLANEOUS PLANT EQUIPMENT	3592.	1461.	(247)	1625.	507.
	SUBTOTAL	153391.	86403.	(6221)	45195.	21792.

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT PHILADELPHIA , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
20	LAND AND LAND RIGHTS				
201	LAND AND PRIVILEGE ACQUISITION	$ 0.	$ 0.	$ 1000.	1000.
202	RELOCATION OF BUILDINGS, UTILITIES, ETC.	$ 0.	$ 0.	$ 0.	0.
	TOTAL FOR ACCOUNT 20	$ 0.	$ 0.	$ 1000.	$ 1000.

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT PHILADELPHIA , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
21	STRUCTURES AND FACILITIES				
211	SITE IMPROVEMENTS AND FACILITIES				
.1	GENERAL YARD IMPROVEMENTS	0.	642.	295.	937.
.2	WATERFRONT IMPROVEMENTS	0.	0.	0.	0.
.3	HIGHWAY AND RAILWAY ACCESS	0.	513.	465.	999.
	SUBTOTAL	$ 0.	$ 1155.	$ 760.	$ 1935.
212	REACTOR BUILDING				
.1	BASIC BUILDING STRUCTURES (IN 212.3)	0.	0.	0.	0.
.2	BUILDING SERVICES	1057.	588.	266.	1911.
.3	CONTAINMENT STRUCTURES	0.	6977.	2754.	9731.
	SUBTOTAL	$ 1057.	$ 7565.	$ 3020.	$ 11642.
213	TURBINE BUILDING				
.1	BASIC BUILDING STRUCTURES	0.	1800.	1389.	3189.
.2	BUILDING SERVICES	86.	523.	121.	731.
	SUBTOTAL	$ 86.	$ 2323.	$ 1511.	$ 3920.
214	INTAKE AND DISCHARGE STRUCTURES				
.1	INTAKE STRUCTURE	0.	1513.	635.	2148.
.2	DISCHARGE STRUCTURE (IN 232.2)	0.	0.	0.	0.
.3	UNPRESSURIZED INTAKE AND DISCHARGE CONDUITS (IN 232.2)	0.	0.	0.	0.
	SUBTOTAL	$ 0.	$ 1513.	$ 635.	$ 2148.
215	REACTOR AUXILIARIES BUILDING				
.1	BASIC BUILDING STRUCTURES	0.	2425.	752.	3177.
.2	BUILDING SERVICES	39.	193.	81.	313.
	SUBTOTAL	$ 39.	$ 2618.	$ 833.	$ 3491.
216	RADIOACTIVE WASTE BUILDING (IN 215)				
.1	BASIC BUILDING STRUCTURES	0.	0.	0.	0.
.2	BUILDING SERVICES	0.	0.	0.	0.
	SUBTOTAL	$ 0.	$ 0.	$ 0.	$ 0.
217	FUEL STORAGE BUILDING				
.1	BASIC BUILDING STRUCTURES	0.	732.	306.	1038.
.2	BUILDING SERVICES	22.	60.	20.	102.
	SUBTOTAL	$ 22.	$ 793.	$ 325.	$ 1140.
218	OTHER				
218A	CONTROL ROOM BUILDING	45.	797.	271.	1113.
218B	DIESEL GENERATOR BUILDING	10.	377.	119.	506.
218C	ADMINISTRATION BUILDING	150.	379.	241.	770.
218D	SERVICE BUILDING	90.	472.	306.	868.
218E	FAN ROOM BUILDING	0.	218.	59.	278.
218F	AUXILIARY FEED PUMP ENCLOSURE	0.	86.	45.	131.
	SUBTOTAL	$ 295.	$ 2329.	$ 1042.	$ 3666.
219	STACKS	$ 0.	$ 0.	$ 0.	0.
	SUBTOTAL FOR ACCOUNT	$ 1499.	$ 18296.	$ 8146.	$ 27941.
	CONTINGENCY (5.0%MTI-10.0%LABOR)	75.	1830.	407.	2312.
	SPARE PARTS (1.0%)	15.	- - - -	81.	96.
	TOTAL FOR ACCOUNT 21	$ 1589.	$ 22126.	$ 8635.	$ 30350.

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT PHILADELPHIA , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
22	REACTOR PLANT EQUIPMENT				
221	REACTOR EQUIPMENT				
.1	REACTOR VESSELS AND ACCESSORIES	9455.	499.	114.	10068.
.2	REACTOR CONTROL DEVICES	4223.	72.	7.	4302.
.3	MODERATOR/REFLECTOR SYSTEMS	0.	0.	0.	0.
.4	REACTOR SHIELDING	12.	8.	0.	20.
	SUBTOTAL	$ 13690.	$ 578.	$ 121.	$ 14390.
222	MAIN HEAT TRANSFER AND TRANSPORT SYSTEMS				
.1	REACTOR CORE COOLANT SYSTEMS				
.11	PUMPS	$ 3612.	$ 139.	$ 116.	3867.
.12	PIPING SYSTEM	0.	797.	1830.	2626.
.13	STEAM GENERATORS	13002.	934.	369.	14305.
.14	PRESSURIZING SYSTEM	1156.	63.	32.	1251.
	SUBTOTAL	$ 17770.	$ 1933.	$ 2347.	$ 22050.
.2	REACTOR BLANKET COOLANT SYSTEMS				
.21	PUMPS	$ 0.	$ 0.	$ 0.	0.
.22	PIPING SYSTEM	0.	0.	0.	0.
.23	HEAT EXCHANGER EQUIPMENT	0.	0.	0.	0.
.24	PRESSURIZING SYSTEM	0.	0.	0.	0.
	SUBTOTAL	$ 0.	$ 0.	$ 0.	$ 0.
.3	INTERMEDIATE LOOP COOLANT SYSTEMS				
.31	PUMPS	$ 0.	$ 0.	$ 0.	0.
.32	PIPING SYSTEM	0.	0.	0.	0.
.33	HEAT EXCHANGER EQUIPMENT	0.	0.	0.	0.
.34	PRESSURIZING SYSTEM	0.	0.	0.	0.
	SUBTOTAL	$ 0.	$ 0.	$ 0.	$ 0.
	SUBTOTAL	$ 17770.	$ 1933.	$ 2347.	$ 22050.
223	SAFEGUARDS COOLING SYSTEMS				
.1	RESIDUAL HEAT REMOVAL SYSTEM	128.	226.	123.	478.
.2	EMERGENCY SHUTDOWN OR CORE ISOLATION COOLING SYSTEM	0.	0.	0.	0.
.3	COOLANT INJECTION AND CORE SPRAY/FLOODING SYSTEMS	117.	676.	680.	1472.
.4	CONTAINMENT HEAT ABSORPTION REJECTION SYSTEMS	66.	277.	274.	617.
	SUBTOTAL	$ 311.	$ 1179.	$ 1077.	$ 2567.
224	RADIOACTIVE WASTE TREATMENT AND DISPOSAL				
.1	LIQUID WASTE PROCESSING EQUIPMENT	875.	589.	179.	1643.
.2	GASEOUS WASTES AND OFF GAS PROCESSING EQUIPMENT	410.	221.	96.	727.
.3	SOLID WASTES PROCESSING EQUIPMENT	61.	10.	2.	72.
	SUBTOTAL	$ 1346.	$ 819.	$ 277.	$ 2442.
225	NUCLEAR FUEL HANDLING AND STORAGE SYSTEMS				
.1	FUEL HANDLING TOOLS, EQUIPMENT, AND SYSTEMS	171.	49.	17.	236.
.2	REMOTE VIEWING EQUIPMENT	0.	0.	0.	0.
.3	SERVICE PLATFORMS	111.	22.	2.	134.
.4	FUEL STORAGE, CLEANING, AND INSPECTION EQUIPMENT	307.	397.	253.	957.
	SUBTOTAL	$ 589.	$ 467.	$ 271.	$ 1327.
226	OTHER REACTOR PLANT EQUIPMENT				
.1	INERT GAS SYSTEMS	45.	26.	8.	79.
.2	SPECIAL HEATING SYSTEMS	0.	0.	0.	0.
.3	COOLANT RECEIVING, STORAGE, AND MAKEUP SYSTEMS	0.	0.	0.	0.
.4	COOLANT CHARGE, VOLUME CONTROL, RELIEF, ETC.	180.	150.	178.	508.
.5	COOLANT PURIFICATION & CHEMICAL TREATMENT SYSTEMS	990.	789.	470.	2249.
.6	FLUID LEAK DETECTION SYSTEMS	0.	0.	0.	0.
.7	AUXILIARIES COOLING SYSTEMS	281.	499.	272.	1051.
.8	MAINTENANCE EQUIPMENT	0.	0.	0.	0.
.9	MISCELLANEOUS SUSPENSE ITEMS	0.	717.	64.	781.
	SUBTOTAL	$ 1496.	$ 2180.	$ 992.	$ 4668.

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT PHILADELPHIA , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
227	INSTRUMENTATION AND CONTROL				
.1	REACTOR PROCESS I&C EQUIPMENT	2200.	199.	23.	2422.
.2	COMPUTER EQUIPMENT	1585.	80.	0.	1665.
.3	RADIATION MONITORING SYSTEMS (IN 227.1)	0.	203.	115.	318.
.4	ISOLATED INDICATING AND RECORDING GAGES (IN 227.1)	0.	0.	0.	0.
.5	CONTROL AND INSTRUMENT PIPING	0.	358.	196.	554.
	SUBTOTAL	$ 3785.	$ 840.	$ 333.	$ 4959.
228	FOSSIL FUEL BOILERS AND SUPERHEATERS				
.1	BOILERS AND/OR SUPERHEATERS	0.	0.	0.	0.
.2	DRAFT SYSTEMS	0.	0.	0.	0.
.3	FUEL HANDLING SYSTEMS	0.	0.	0.	0.
.4	ASH HANDLING SYSTEMS	0.	0.	0.	0.
	SUBTOTAL	$ 0.	$ 0.	$ 0.	$ 0.
229	IRRADIATION FACILITIES				
.1	SPECIAL STRUCTURES	0.	0.	0.	0.
.2	MATERIALS HANDLING EQUIPMENT	0.	0.	0.	0.
.3	MATERIALS RECEIVING AND STORAGE SYSTEMS	0.	0.	0.	0.
	SUBTOTAL	$ 0.	$ 0.	$ 0.	$ 0.
	SUBTOTAL FOR ACCOUNT	$ 38988.	$ 7997.	$ 5418.	$ 52403.
	CONTINGENCY (5.0%MIL-10.0%LABOR)	1949.	800.	271.	3020.
	SPARE PARTS (1.0%)	390.	- - -	54.	444.
	TOTAL FOR ACCOUNT 22	$ 41327.	$ 8796.	$ 5743.	$ 55867.

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1000 MWE PWR POWER PLANT PHILADELPHIA , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
23	TURBINE PLANT EQUIPMENT				
231	TURBINE-GENERATORS				
.1	TURBINE-GENERATORS AND ACCESSORIES	29950.	1610.	151.	31711.
.2	FOUNDATIONS	0.	496.	233.	729.
.3	STANDBY EXCITERS	0.	0.	0.	0.
.4	LUBRICATING SYSTEM	39.	93.	76.	208.
.5	GAS SYSTEMS	0.	36.	50.	87.
.6	REHEATERS (IN 231.1)	0.	0.	0.	0.
.7	SHIELDING	0.	0.	0.	0.
.8	WEATHER-PROOF HOUSING	0.	0.	0.	0.
	SUBTOTAL	$ 29989.	$ 2235.	$ 510.	$ 32735.
232	HEAT REMOVAL SYSTEMS				
.1	WATER INTAKE COMMON FACILITIES	312.	125.	25.	462.
.2	CIRCULATING WATER SYSTEMS				
.21	PUMPS	$ 936.	$ 64.	$ 5.	1005.
.22	PIPING	0.	456.	293.	749.
.23	DISCHARGE TUNNEL	0.	364.	170.	534.
.24	DISCHARGE CANAL AND STRUCTURES	0.	757.	391.	1148.
.25	DEICING PUMP PIT STRUCTURES	0.	67.	35.	102.
	SUBTOTAL	$ 936.	$ 1708.	$ 894.	$ 3538.
.3	COOLING TOWERS	0.	0.	0.	0.
.4	OTHER SYSTEMS REJECTING HEAT TO THE ATMOSPHERE	0.	0.	0.	0.
	SUBTOTAL	$ 1248.	$ 1833.	$ 919.	$ 4000.
233	CONDENSING SYSTEMS				
.1	CONDENSERS	2900.	624.	19.	3543.
.2	CONDENSATE SYSTEM	480.	1465.	616.	2561.
.3	GAS REMOVAL SYSTEM	0.	147.	73.	220.
.4	TURBINE BYPASS SYSTEM	0.	0.	0.	0.
	SUBTOTAL	$ 3380.	$ 2236.	$ 707.	$ 6324.
234	FEED HEATING SYSTEM				
.1	REGENERATIVE HEAT EXCHANGERS	1500.	105.	30.	1635.
.2	PUMPS	1118.	103.	12.	1233.
.3	PIPING AND TANKS	0.	2528.	1486.	4014.
	SUBTOTAL	$ 2618.	$ 2735.	$ 1529.	$ 6882.
235	OTHER TURBINE PLANT EQUIPMENT				
.1	MAIN STEAM OR OTHER VAPOR PIPING	0.	2069.	1178.	3247.
.2	TURBINE AUXILIARIES	51.	330.	148.	529.
.3	AUXILIARIES COOLING SYSTEM	119.	282.	260.	660.
.4	MAKEUP TREATMENT SYSTEMS	0.	201.	753.	954.
.5	CHEMICAL TREATMENT AND CONDENSATE PURIFICATION SYSTEMS	0.	8.	15.	23.
.6	CENTRAL LUBRICATION SERVICE SYSTEM	0.	0.	0.	0.
.7	MISCELLANEOUS SUSPENSE ITEMS	0.	362.	38.	400.
	SUBTOTAL	$ 170.	$ 3252.	$ 2393.	$ 5812.
236	INSTRUMENTATION AND CONTROL				
.1	PROCESS I & C EQUIPMENT	785.	121.	11.	917.
.2	COMPUTER EQUIPMENT (IN 227.2)	0.	0.	0.	0.
.3	ISOLATED INDICATING AND RECORDING GAGES (IN 236.1)	0.	0.	0.	0.
.4	CONTROL AND INSTRUMENT PIPING	0.	402.	132.	534.
	SUBTOTAL	$ 785.	$ 523.	$ 143.	$ 1451.
	SUBTOTAL FOR ACCOUNT	$ 38191.	$ 12815.	$ 6199.	$ 57205.
	CONTINGENCY (5.0%MIL-10.0%LABOR)	1910.	1282.	310.	3501.
	SPARE PARTS (1.0%)	382.		62.	444.
	TOTAL FOR ACCOUNT 23	$ 40482.	$ 14097.	$ 6571.	$ 61149.

DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT PHILADELPHIA , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
24	ELECTRIC PLANT EQUIPMENT				
241	SWITCHGEAR				
.1	GENERATOR CIRCUITS	15.	8.	1.	24.
.2	STATION SERVICE	1000.	130.	43.	1173.
	SUBTOTAL	$ 1015.	$ 138.	$ 44.	$ 1197.
242	STATION SERVICE EQUIPMENT				
.1	STATION SERVICE AND STARTUP TRANSFORMERS	540.	46.	5.	591.
.2	LOW VOLTAGE UNIT SUBSTATIONS AND LIGHTING TRANSFORMERS	610.	87.	2.	699.
.3	BATTERY SYSTEMS	28.	10.	2.	40.
.4	DIESEL ENGINE GENERATORS	750.	157.	36.	943.
.5	GAS TURBINE GENERATORS	1620.	235.	107.	1961.
.6	MOTOR GENERATOR SETS	70.	11.	1.	82.
	SUBTOTAL	$ 3618.	$ 546.	$ 152.	$ 4316.
243	SWITCHBOARDS				
.1	MAIN CONTROL BOARD FOR ELECTRIC SYSTEMS	450.	54.	8.	512.
.2	AUXILIARY POWER AND SIGNAL BOARDS	9.	4.	1.	13.
	SUBTOTAL	$ 459.	$ 58.	$ 8.	$ 525.
244	PROTECTIVE EQUIPMENT				
.1	GENERAL STATION GROUNDING SYSTEM	0.	105.	71.	176.
.2	FIRE PROTECTION SYSTEM	0.	7.	5.	12.
	SUBTOTAL	$ 0.	$ 112.	$ 77.	$ 189.
245	ELECTRICAL STRUCTURES AND WIRING CONTAINERS				
.1	CONCRETE CABLE TUNNELS, TRENCHES, AND ENVELOPES	0.	47.	30.	77.
.2	CABLE TRAYS AND SUPPORTS	63.	199.	20.	282.
.3	CONDUIT	0.	599.	203.	802.
.4	OTHER STRUCTURES	0.	13.	5.	18.
	SUBTOTAL	$ 63.	$ 858.	$ 258.	$ 1179.
246	POWER AND CONTROL WIRING				
.1	GENERATOR CIRCUITS	495.	120.	5.	619.
.2	STATION SERVICE POWER WIRING	165.	1224.	497.	1886.
.3	CONTROL WIRING	0.	722.	339.	1061.
.4	INSTRUMENT WIRING	0.	435.	132.	565.
.5	CONTAINMENT PENETRATIONS	450.	253.	11.	714.
	SUBTOTAL	$ 1110.	$ 2751.	$ 984.	$ 4845.
	SUBTOTAL FOR ACCOUNT	$ 6265.	$ 4462.	$ 1523.	$ 12250.
	CONTINGENCY (5.0%MTL-10.0%LABOR)	313.	446.	76.	836.
	SPARE PARTS (1.0%)	63.		15.	78.
	TOTAL FOR ACCOUNT 24	$ 6641.	$ 4908.	$ 1615.	$ 13164.

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1000 MWE PWR POWER PLANT PHILADELPHIA , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
25	MISCELLANEOUS PLANT EQUIPMENT				
251	TRANSPORTATION AND LIFTING EQUIPMENT				
.1	CRANES, HOISTS, AND MONORAILS	495.	119.	38.	652.
.2	RAILWAY AND ROADWAY EQUIPMENT	0.	0.	0.	0.
	SUBTOTAL	$ 495.	$ 119.	$ 38.	$ 652.
252	AIR, WATER, AND STEAM SERVICE SYSTEMS				
.1	AIR SYSTEMS	62.	120.	31.	213.
.2	WATER SYSTEMS	242.	836.	418.	1496.
.3	AUXILIARY HEATING STEAM	400.	467.	0.	867.
	SUBTOTAL	$ 704.	$ 1423.	$ 449.	$ 2576.
253	COMMUNICATIONS EQUIPMENT				
.1	LOCAL COMMUNICATIONS SYSTEMS	25.	39.	8.	71.
.2	SIGNAL SYSTEMS	0.	19.	11.	31.
	SUBTOTAL	$ 25.	$ 58.	$ 19.	$ 102.
254	FURNISHINGS AND FIXTURES				
.1	SAFETY EQUIPMENT	10.	0.	0.	10.
.2	SHOP, LABORATORY, AND TEST EQUIPMENT	44.	4.	1.	49.
.3	OFFICE EQUIPMENT AND FURNISHINGS	50.	0.	0.	50.
.4	CHANGE ROOM EQUIPMENT	8.	1.	0.	9.
.5	ENVIRONMENTAL MONITORING EQUIPMENT	0.	0.	0.	0.
.6	DINING FACILITIES	125.	19.	0.	144.
	SUBTOTAL	$ 237.	$ 24.	$ 1.	$ 262.
	SUBTOTAL FOR ACCOUNT	$ 1461.	$ 1625.	$ 507.	$ 3592.
	CONTINGENCY (5.0%MTL-10.0%LABOR)	73.	162.	25.	261.
	SPARE PARTS (1.0%)	15.	0.	5.	20.
	TOTAL FOR ACCOUNT 25	$ 1549.	$ 1787.	$ 537.	$ 3873.

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1000 MWE PWR POWER PLANT PHILADELPHIA , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST($1000)
91	CONSTRUCTION FACILITIES, EQUIPMENT, AND SERVICES	
911	TEMPORARY FACILITIES	$ 3845.
912	CONSTRUCTION EQUIPMENT	$ 6408.
913	CONSTRUCTION SERVICES	$ 2563.
	TOTAL FOR ACCOUNT 91	$ 12816.

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1000 MWE PWR POWER PLANT PHILADELPHIA , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST($1000)
92	ENGINEERING AND CONSTRUCTION MANAGEMENT SERVICES	
921	ENGINEERING SERVICES	$ 11291.
922	CONSTRUCTION MANAGEMENT SERVICES.	$ 11291.
	TOTAL FOR ACCOUNT 92	$ 22581.

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ACCOUNT NUMBER	ACCOUNT TITLE	COST($1000)
93	OTHER COSTS	
931	TAXES AND INSURANCE	$ 5161.
932	STAFF TRAINING AND PLANT STARTUP	$ 469.
933	OWNERS G&A	$ 2459.
	TOTAL FOR ACCOUNT 93	$ 8089.

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1000 MWE PWR POWER PLANT PHILADELPHIA , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST($1000)
94	INTEREST DURING CONSTRUCTION	
941	PHYSICAL PLANT AND ASSOCIATED INDIRECT COSTS	$ 47206.
942	LAND AND LAND RIGHTS	$ 596.
	TOTAL FOR ACCOUNT 94	$ 47802.

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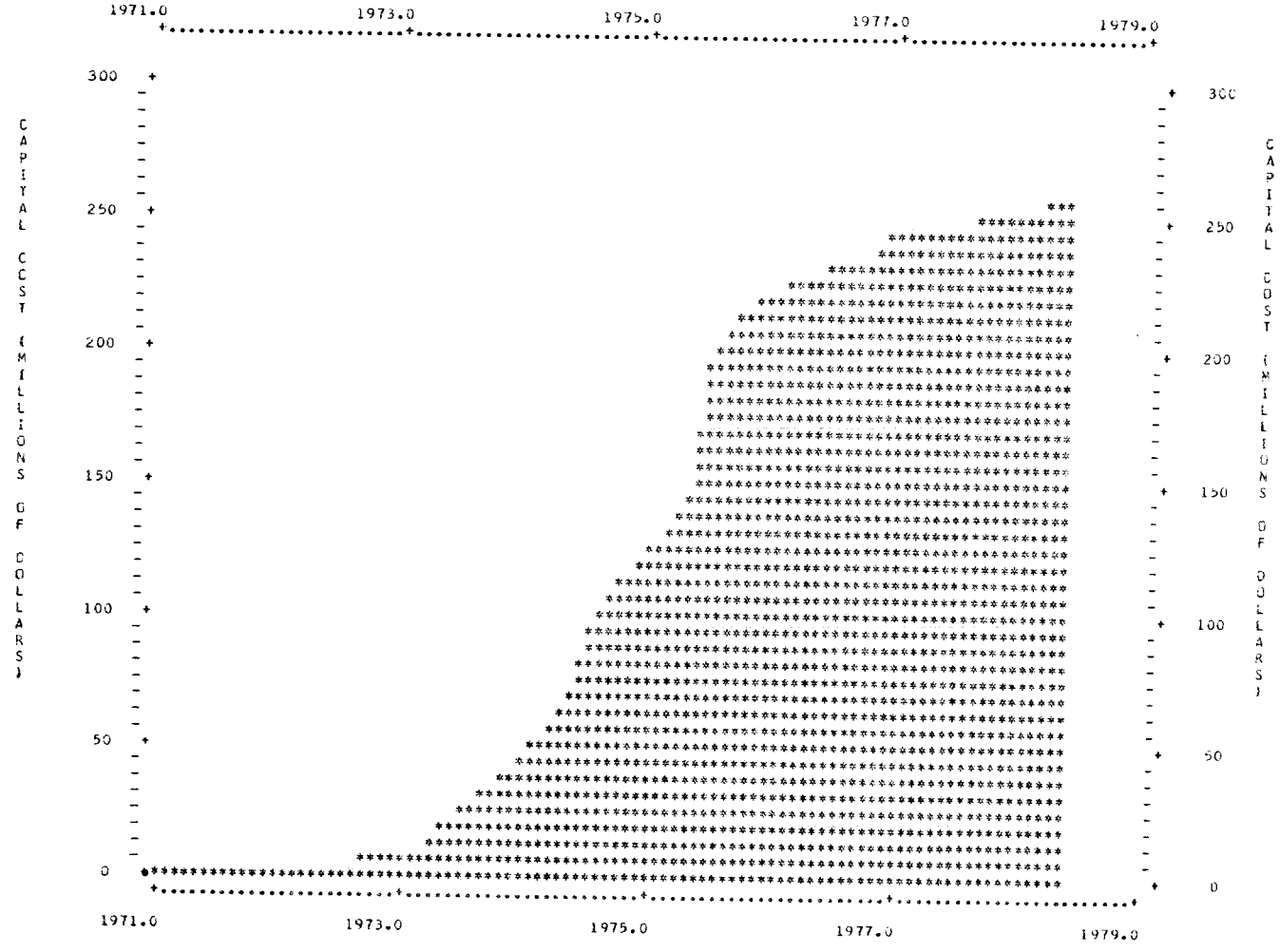
1000 MWE PWR POWER PLANT PHILADELPHIA , USA



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C     EXAMPLE PROBLEM 4
C     SAME PHILADELPHIA CASE AS EXAMPLE PROBLEM 2
C     BUT ESCALATED TO END OF PROJECT.
C     ONLY ONE PAGE OUTPUT SPECIFIED.
C
C     NOTE:  YEAR RANGE IS RESET WITH NAMELIST INPUT
C            BECAUSE OF CASE 3 TO PREVENT ERRORS.
C
1000 PWR      PHILADELPHIA      CASE 4            19710 19785  70  400 1 0 1 0 0
&CONOPT
YFIRST=1969.,YLAST=1999.,
&END

CONII CALLED - DATA FIT DONE ON PENNSYLVANIA    PHILADELPHIA
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DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT PHILADELPHIA , CASE 4

BASE RATE AND ESCALATION USED IN COST PROJECTIONS YFIRST = 1969.0

	ACC NO 20		ACC NO 21		ACC NO 22		ACC NO 23		ACC NO 24		ACC NO 25		ACC NO 26	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
BASE LABOR	5.84	1.10	6.44	1.10	6.80	1.10	6.79	1.10	7.29	1.10	6.30	1.10	5.82	1.10
BASE MATERIAL	1000.00	1.00	15.39	1.05	15.39	1.05	15.39	1.05	15.39	1.05	15.39	1.05	15.39	1.05

CRAFT BASE MIXING FACTORS

LABOR	ACC NO 20	ACC NO 21	ACC NO 22	ACC NO 23	ACC NO 24	ACC NO 25	ACC NO 26
BUILDING LABOR	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HEAVY LABOR	0.40	0.26	0.14	0.10	0.13	0.28	0.50
BRICKLAYERS	0.0	0.02	0.0	0.0	0.0	0.0	0.0
CARPENTERS	0.40	0.17	0.03	0.02	0.0	0.14	0.0
STRUCT. IRON	0.0	0.21	0.03	0.02	0.08	0.0	0.0
PLASTERERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ELECT. WORKERS	0.0	0.02	0.06	0.07	0.69	0.27	0.0
STEAM FITTERS	0.0	0.08	0.35	0.59	0.0	0.28	0.50
OPER. ENGRS.	0.10	0.08	0.11	0.07	0.08	0.0	0.0
SM. TRAC. OP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LG. TRAC. OP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CRANE OPERS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AIR COMP. OPERS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TRUCK DRIVERS	0.10	0.02	0.02	0.01	0.02	0.03	0.0
BOILER MAKERS	0.0	0.0	0.23	0.10	0.0	0.0	0.0
OTHER CRAFTS	0.0	0.13	0.03	0.02	0.0	0.0	1.00

MATERIAL	ACC NO 20	ACC NO 21	ACC NO 22	ACC NO 23	ACC NO 24	ACC NO 25	ACC NO 26
CHANNELS	0.0	0.08	0.08	0.08	0.08	0.08	0.08
I BEAMS	0.0	0.08	0.08	0.08	0.08	0.08	0.08
W FLANGES	0.0	0.08	0.08	0.08	0.08	0.08	0.08
RE-BARS	0.0	0.47	0.47	0.47	0.47	0.47	0.47
READIMIX CONCRETE	0.0	0.27	0.27	0.27	0.27	0.27	0.27
PLYFORM	0.0	0.01	0.01	0.01	0.01	0.01	0.01
LUMBER	0.0	0.01	0.01	0.01	0.01	0.01	0.01
LAND	1.00	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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SITE RATE AND ESCALATION USED IN COST PROJECTIONS YFIRST = 1969.0

	ACC NO 20		ACC NO 21		ACC NO 22		ACC NO 23		ACC NO 24		ACC NO 25		ACC NO 26	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
SITE LABOR	4.97	1.16	6.37	1.13	6.18	1.15	6.28	1.15	5.84	1.16	5.54	1.16	5.27	1.15
SITE MATERIAL	999.98	1.00	12.63	1.10	12.63	1.10	12.63	1.10	12.63	1.10	12.63	1.10	12.63	1.10

CRAFT SITE MIXING FACTORS

LABOR	ACC NO 20	ACC NO 21	ACC NO 22	ACC NO 23	ACC NO 24	ACC NO 25	ACC NO 26
BUILDING LABOR	0.0	0.13	0.03	0.02	0.0	0.0	0.0
HEAVY LABOR	0.40	0.26	0.14	0.10	0.13	0.28	0.50
BRICKLAYERS	0.0	0.02	0.0	0.0	0.0	0.0	0.0
CARPENTERS	0.40	0.17	0.03	0.02	0.0	0.14	0.0
STRUCT. IRON	0.0	0.21	0.03	0.02	0.08	0.0	0.0
PLASTERERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ELECT. WORKERS	0.0	0.02	0.06	0.07	0.69	0.27	0.0
STEAM FITTERS	0.0	0.08	0.35	0.59	0.0	0.28	0.50
OPER. ENGRS.	0.10	0.08	0.11	0.07	0.08	0.0	0.0
SM. TRAC. OP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LG. TRAC. OP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CRANE OPERS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AIR COMP. OPERS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TRUCK DRIVERS	0.10	0.02	0.02	0.01	0.02	0.03	0.0
BOILER MAKERS	0.0	0.0	0.23	0.10	0.0	0.0	0.0
OTHER CRAFTS	0.0	0.13	0.03	0.02	0.0	0.0	0.0

MATERIAL	ACC NO 20	ACC NO 21	ACC NO 22	ACC NO 23	ACC NO 24	ACC NO 25	ACC NO 26
CHANNELS	0.0	0.08	0.08	0.08	0.08	0.08	0.08
I BEAMS	0.0	0.08	0.08	0.08	0.08	0.08	0.08
W FLANGES	0.0	0.08	0.08	0.08	0.08	0.08	0.08
RE-BARS	0.0	0.47	0.47	0.47	0.47	0.47	0.47
READIMIX CONCRETE	0.0	0.27	0.27	0.27	0.27	0.27	0.27
PLYFORM	0.0	0.01	0.01	0.01	0.01	0.01	0.01
LUMBER	0.0	0.01	0.01	0.01	0.01	0.01	0.01
LAND	1.00	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DATE 01-10-73

CONCEPT PHASE II
PLANT CAPITAL INVESTMENT SUMMARY
(THOUSAND DOLLARS)

1000 MWE PWR — POWER PLANT PHILADELPHIA , CASE 4 — NAMELIST INPUT

COST BASIS: ESCALATION DURING CONSTRUCTION
DESIGN + CONSTRUCTION PERIOD 1971.0-1978.5
40-HOUR WORK WEEK
STRAIGHT INTEREST RATE = 7.0

ACCOUNT NUMBER	ACCOUNT TITLE	TOTAL COST
	DIRECT COSTS	
20	LAND AND LAND RIGHTS	$ 1000.
	PHYSICAL PLANT	
21	STRUCTURES AND SITE FACILITIES	53643.
22	REACTOR PLANT EQUIPMENT	73577.
23	TURBINE PLANT EQUIPMENT	89273.
24	ELECTRIC PLANT EQUIPMENT	20445.
25	MISCELLANEOUS PLANT EQUIPMENT	6294.
	SUBTOTAL	$ 243232.
	SPARE PARTS ALLOWANCE	1446.
	CONTINGENCY ALLOWANCE	17092.
	SUBTOTAL	$ 261770.
	INDIRECT COSTS	
91	CONSTRUCTION FACILITIES, EQUIPMENT, AND SERVICES	17179.
92	ENGINEERING AND CONSTRUCTION MANAGEMENT SERVICES	30282.
93	OTHER COSTS	10829.
94	INTEREST DURING CONSTRUCTION	72913.
	SUBTOTAL	$ 131203.
	TOTAL PLANT CAPITAL INVESTMENT - ($ 394/KW)	$ 393973.

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C     EXAMPLE PROBLEM 5
C     SAME AS CASE 4
C     BUT ESCALATION BROKEN
C     OUT INTO SEPARATE  ACC.
C
C     NOTE: NO NAMELIST INPUT REQUIRED.
C
1000 PWR      PHILADELPHIA      CASE 5            19710 19785  70  400 0 0 2 0 0

CONTI CALLED - DATA FIT DONE ON PENNSYLVANIA    PHILADELPHIA
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DATE 01-10-73 CONCEPT PHASE II
1000 MWE PWR POWER PLANT PHILADELPHIA , CASE 5

BASE RATE AND ESCALATION USED IN COST PROJECTIONS YFIRST = 1969.0

	ACC NO 20		ACC NO 21		ACC NO 22		ACC NO 23		ACC NO 24		ACC NO 25		ACC NO 26	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
BASE LABOR	5.84	1.10	6.44	1.10	6.80	1.10	6.79	1.10	7.29	1.10	6.30	1.10	5.82	1.10
BASE MATERIAL	1000.00	1.00	15.39	1.05	15.39	1.05	15.39	1.05	15.39	1.05	15.39	1.05	15.39	1.05

CRAFT BASE MIXING FACTORS

LABOR	ACC NO 20	ACC NO 21	ACC NO 22	ACC NO 23	ACC NO 24	ACC NO 25	ACC NO 26
BUILDING LABOR	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HEAVY LABOR	0.40	0.26	0.14	0.10	0.13	0.28	0.50
BRICKLAYERS	0.0	0.02	0.0	0.0	0.0	0.0	0.0
CARPENTERS	0.40	0.17	0.03	0.02	0.0	0.14	0.0
STRUCT. IRON	0.0	0.21	0.03	0.02	0.08	0.0	0.0
PLASTERERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ELECT. WORKERS	0.0	0.02	0.06	0.07	0.69	0.27	0.0
STEAM FITTERS	0.0	0.08	0.35	0.59	0.0	0.28	0.50
OPER. ENGRS.	0.10	0.08	0.11	0.07	0.08	0.0	0.0
SM. TRAC. OP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LG. TRAC. OP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CRANE OPERS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AIR COMP. OPERS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TRUCK DRIVERS	0.10	0.02	0.02	0.01	0.02	0.03	0.0
BOILER MAKERS	0.0	0.0	0.23	0.10	0.0	0.0	0.0
OTHER CRAFTS	0.0	0.13	0.03	0.02	0.0	0.0	1.00

MATERIAL	ACC NO 20	ACC NO 21	ACC NO 22	ACC NO 23	ACC NO 24	ACC NO 25	ACC NO 26
CHANNELS	0.0	0.08	0.08	0.08	0.08	0.08	0.08
I BEAMS	0.0	0.08	0.08	0.08	0.08	0.08	0.08
W FLANGES	0.0	0.08	0.08	0.08	0.08	0.08	0.08
RE-BARS	0.0	0.47	0.47	0.47	0.47	0.47	0.47
READYMIX CONCRETE	0.0	0.27	0.27	0.27	0.27	0.27	0.27
PLYFORM	0.0	0.01	0.01	0.01	0.01	0.01	0.01
LUMBER	0.0	0.01	0.01	0.01	0.01	0.01	0.01
LAND	1.00	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DATE 01-10-73 CONCEPT PHASE II

SITE RATE AND ESCALATION USED IN COST PROJECTIONS YFIRST = 1969.0

	ACC NO 20		ACC NO 21		ACC NO 22		ACC NO 23		ACC NO 24		ACC NO 25		ACC NO 26	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
SITE LABOR	4.97	1.16	6.37	1.13	6.18	1.15	6.28	1.15	5.84	1.16	5.54	1.16	5.27	1.15
SITE MATERIAL	999.98	1.00	12.63	1.10	12.63	1.10	12.63	1.10	12.63	1.10	12.63	1.10	12.63	1.10

CRAFT SITE MIXING FACTORS

LABOR	ACC NO 20	ACC NO 21	ACC NO 22	ACC NO 23	ACC NO 24	ACC NO 25	ACC NO 26
BUILDING LABOR	0.0	0.13	0.03	0.02	0.0	0.0	0.0
HEAVY LABOR	0.40	0.26	0.14	0.10	0.13	0.28	0.50
BRICKLAYERS	0.0	0.02	0.0	0.0	0.0	0.0	0.0
CARPENTERS	0.40	0.17	0.03	0.02	0.0	0.14	0.0
STRUCT. IRON	0.0	0.21	0.03	0.02	0.08	0.0	0.0
PLASTERERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ELECT. WORKERS	0.0	0.02	0.06	0.07	0.69	0.27	0.0
STEAM FITTERS	0.0	0.08	0.35	0.59	0.0	0.28	0.50
OPER. ENGRS.	0.10	0.08	0.11	0.07	0.08	0.0	0.0
SM. TRAC. OP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LG. TRAC. OP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CRANE OPERS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AIR COMP. OPERS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TRUCK DRIVERS	0.10	0.02	0.02	0.01	0.02	0.03	0.0
BOILER MAKERS	0.0	0.0	0.23	0.10	0.0	0.0	0.0
OTHER CRAFTS	0.0	0.13	0.03	0.02	0.0	0.0	0.0

MATERIAL	ACC NO 20	ACC NO 21	ACC NO 22	ACC NO 23	ACC NO 24	ACC NO 25	ACC NO 26
CHANNELS	0.0	0.08	0.08	0.08	0.08	0.08	0.08
I BEAMS	0.0	0.08	0.08	0.08	0.08	0.08	0.08
W FLANGES	0.0	0.08	0.08	0.08	0.08	0.08	0.08
RE-BARS	0.0	0.47	0.47	0.47	0.47	0.47	0.47
REDIMIX CONCRETE	0.0	0.27	0.27	0.27	0.27	0.27	0.27
PLYFORM	0.0	0.01	0.01	0.01	0.01	0.01	0.01
LUMBER	0.0	0.01	0.01	0.01	0.01	0.01	0.01
LAND	1.00	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DATE 01-10-73

CONCEPT PHASE II
PLANT CAPITAL INVESTMENT SUMMARY
(THOUSAND DOLLARS)

1000 MWE PWR POWER PLANT PHILADELPHIA , CASE 5
COST BASIS: AT START OF CONSTRUCTION
DESIGN + CONSTRUCTION PERIOD 1971.0-1978.5
40-HOUR WORK WEEK
STRAIGHT INTEREST RATE = 7.0

ACCOUNT NUMBER	ACCOUNT TITLE	TOTAL COST
	DIRECT COSTS	
20	LAND AND LAND RIGHTS	$ 1000.
	PHYSICAL PLANT	
21	STRUCTURES AND SITE FACILITIES	33548.
22	REACTOR PLANT EQUIPMENT	55480.
23	TURBINE PLANT EQUIPMENT	61819.
24	ELECTRIC PLANT EQUIPMENT	13594.
25	MISCELLANEOUS PLANT EQUIPMENT	4115.
	SUBTOTAL	$ 168555.
	SPARE PARTS ALLOWANCE	1126.
	CONTINGENCY ALLOWANCE	11226.
	SUBTOTAL	$ 180908.
	INDIRECT COSTS	
91	CONSTRUCTION FACILITIES, EQUIPMENT, AND SERVICES	13538.
92	ENGINEERING AND CONSTRUCTION MANAGEMENT SERVICES	23853.
93	OTHER COSTS	8541.
94	INTEREST DURING CONSTRUCTION	52054.
	SUBTOTAL	$ 97986.
	START OF CONSTRUCTION COST	$ 279894.
	ESCALATION DURING CONSTRUCTION (5.4%/YR)	$ 114080.
	TOTAL PLANT CAPITAL INVESTMENT - ($ 394/KW)	$ 393973.

```
C
C     EXAMPLE PROBLEM 6
C
C     THIS RUN ILLUSTRATES MULTIPLE OPTIONS:
C     CHANGES IN
C     1. ESCALATION RATES,
C     2. CASH FLOW CURVES,
C     3. SITE COSTS.
C
C     NOTE: TWO NAMELIST INPUTS REQUIRED FOR FLAG
C           OF 5 IN COLUMN 71
C
1100 PWRNET   MIDDLETOWN       USA                19745 19820  75  400 5 1 0 0 1
&CONOPT
BFC(1)=1.06,BFC(2)=1.06,BFC(3)=1.045,BFC(4)=1.06,BFC(5)=1.06,BFC(6)=1.06,
BLS=6*1.0683,BMS(2)=1.06,BMS(3)=1.045,BMS(4)=1.06,BMS(5)=1.06,BMS(6)=1.03,
ALS(2)=4.557,ALS(3)=6.19,ALS(4)=5.635,ALS(5)=4.245,ALS(6)=4.596,
CFCA(2,1)=0.0,CFCA(2,2)=0.05,CFCA(2,3)=0.05,CFCA(2,4)=0.2,CFCA(2,5)=0.2,
CFCA(2,6)=0.2,CFCA(2,7)=0.2,CFCA(2,8)=0.2,CFCA(2,9)=0.2,CFCA(2,10)=0.2,
CFCA(2,11)=.4,CFCA(2,12)=.4,CFCA(2,13)=.4,CFCA(2,14)=.4,CFCA(2,15)=.4,
CFCA(2,16)=.4,CFCA(2,17)=.4,CFCA(2,18)=.4,CFCA(2,19)=.4,CFCA(2,20)=.4,
CFCA(2,21)=.6,CFCA(2,22)=.6,CFCA(2,23)=.6,CFCA(2,24)=.6,CFCA(2,25)=.6,
CFCA(2,26)=.6,CFCA(2,27)=.6,CFCA(2,28)=.6,CFCA(2,29)=.6,CFCA(2,30)=.6,
&END
&CCNOPT
C3(2,1)=80.,C3(3,1)=500.,
&END
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DATE 01-10-73 CONCEPT PHASE II
1100 MWE PWRNET POWER PLANT MIDDLETOWN , USA

BASE RATE AND ESCALATION USED IN COST PROJECTIONS YFIRST = 1969.0

	ACC NO 20		ACC NO 21		ACC NO 22		ACC NO 23		ACC NO 24		ACC NO 25		ACC NO 26	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
BASE LABOR	5.84	1.10	6.44	1.10	6.80	1.10	6.79	1.10	7.29	1.10	6.30	1.10	5.82	1.10
BASE MATERIAL	1000.00	1.00	15.39	1.05	15.39	1.05	15.39	1.05	15.39	1.05	15.39	1.05	15.39	1.05

CRAFT BASE MIXING FACTORS

LABOR	ACC NO 20	ACC NO 21	ACC NO 22	ACC NO 23	ACC NO 24	ACC NO 25	ACC NO 26
BUILDING LABOR	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HEAVY LABOR	0.40	0.26	0.14	0.10	0.13	0.28	0.50
BRICKLAYERS	0.0	0.02	0.0	0.0	0.0	0.0	0.0
CARPENTERS	0.40	0.17	0.03	0.02	0.0	0.14	0.0
STRUCT. IRON	0.0	0.21	0.03	0.02	0.08	0.0	0.0
PLASTERERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ELECT. WORKERS	0.0	0.02	0.06	0.07	0.69	0.27	0.0
STEAM FITTERS	0.0	0.08	0.35	0.59	0.0	0.28	0.50
OPER. ENGRS.	0.10	0.08	0.11	0.07	0.08	0.0	0.0
SM. TRAC. OP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LG. TRAC. OP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CRANE OPERS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AIR COMP. OPERS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TRUCK DRIVERS	0.10	0.02	0.02	0.01	0.02	0.03	0.0
BOILER MAKERS	0.0	0.0	0.23	0.10	0.0	0.0	0.0
OTHER CRAFTS	0.0	0.13	0.03	0.02	0.0	0.0	0.0

MATERIAL	ACC NO 20	ACC NO 21	ACC NO 22	ACC NO 23	ACC NO 24	ACC NO 25	ACC NO 26
CHANNELS	0.0	0.08	0.08	0.08	0.08	0.08	0.08
I BEAMS	0.0	0.08	0.08	0.08	0.08	0.08	0.08
W FLANGES	0.0	0.08	0.08	0.08	0.08	0.08	0.08
RE-BARS	0.0	0.47	0.47	0.47	0.47	0.47	0.47
REDIMIX CONCRETE	0.0	0.27	0.27	0.27	0.27	0.27	0.27
PLYFORM	0.0	0.01	0.01	0.01	0.01	0.01	0.01
LUMBER	0.0	0.01	0.01	0.01	0.01	0.01	0.01
LAND	1.00	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DATE 01-10-73 CONCEPT PHASE II

SITE RATE AND ESCALATION USED IN COST PROJECTIONS YFIRST = 1969.0

	ACC NO 20		ACC NO 21		ACC NO 22		ACC NO 23		ACC NO 24		ACC NO 25		ACC NO 26	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
SITE LABOR	5.84	1.07	4.56	1.07	6.19	1.07	5.63	1.07	4.24	1.07	4.60	1.07	5.82	1.10
SITE MATERIAL	1000.00	1.00	15.39	1.06	15.39	1.04	15.39	1.06	15.39	1.06	15.39	1.03	15.39	1.05

CRAFT SITE MIXING FACTORS

LABOR	ACC NO 20	ACC NO 21	ACC NO 22	ACC NO 23	ACC NO 24	ACC NO 25	ACC NO 26
BUILDING LABOR	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HEAVY LABOR	0.40	0.26	0.14	0.10	0.13	0.28	0.50
BRICKLAYERS	0.0	0.02	0.0	0.0	0.0	0.0	0.0
CARPENTERS	0.40	0.17	0.03	0.02	0.0	0.14	0.0
STRUCT. IRON	0.0	0.21	0.03	0.02	0.08	0.0	0.0
PLASTERERS	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ELECT. WORKERS	0.0	0.02	0.06	0.07	0.69	0.27	0.0
STEAM FITTERS	0.0	0.08	0.35	0.59	0.0	0.28	0.50
OPER. ENGRS.	0.10	0.08	0.11	0.07	0.08	0.0	0.0
SM. TRAC. OP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LG. TRAC. OP.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CRANE OPERS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AIR COMP. OPERS.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TRUCK DRIVERS	0.10	0.02	0.02	0.01	0.02	0.03	0.0
BOILER MAKERS	0.0	0.0	0.23	0.10	0.0	0.0	0.0
OTHER CRAFTS	0.0	0.13	0.03	0.02	0.0	0.0	0.0

MATERIAL	ACC NO 20	ACC NO 21	ACC NO 22	ACC NO 23	ACC NO 24	ACC NO 25	ACC NO 26
CHANNELS	0.0	0.08	0.08	0.08	0.08	0.08	0.08
I BEAMS	0.0	0.08	0.08	0.08	0.08	0.08	0.08
W FLANGES	0.0	0.08	0.08	0.08	0.08	0.08	0.08
RE-BARS	0.0	0.47	0.47	0.47	0.47	0.47	0.47
READIMIX CONCRETE	0.0	0.27	0.27	0.27	0.27	0.27	0.27
PLYFORM	0.0	0.01	0.01	0.01	0.01	0.01	0.01
LUMBER	0.0	0.01	0.01	0.01	0.01	0.01	0.01
LAND	1.00	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UNASSIGNED	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DATE 01-10-73

CONCEPT PHASE II
PLANT CAPITAL INVESTMENT SUMMARY
(THOUSAND DOLLARS)

1100 MWE PWRNET POWER PLANT MIDDLETOWN , USA NAMELIST INPUT
COST BASIS: AT START OF CONSTRUCTION
DESIGN + CONSTRUCTION PERIOD 1974.5-1982.0
40-HOUR WORK WEEK
COMPOUND INTEREST RATE = 7.5

ACCOUNT NUMBER	ACCOUNT TITLE	TOTAL COST
	DIRECT COSTS	
20	LAND AND LAND RIGHTS	$ 580.
	PHYSICAL PLANT	
21	STRUCTURES AND SITE FACILITIES	34293.
22	REACTOR PLANT EQUIPMENT	70051.
23	TURBINE PLANT EQUIPMENT	89420.
24	ELECTRIC PLANT EQUIPMENT	15831.
25	MISCELLANEOUS PLANT EQUIPMENT	4471.
	SUBTOTAL	$ 214066.
	SPARE PARTS ALLOWANCE	1566.
	CONTINGENCY ALLOWANCE	13575.
	SUBTOTAL	$ 229207.
	INDIRECT COSTS	
91	CONSTRUCTION FACILITIES, EQUIPMENT, AND SERVICES	15695.
92	ENGINEERING AND CONSTRUCTION MANAGEMENT SERVICES	27561.
93	OTHER COSTS	9896.
94	INTEREST DURING CONSTRUCTION	76798.
	SUBTOTAL	$ 130051.
	TOTAL PLANT CAPITAL INVESTMENT - ($ 327/KW)	$ 359838.

DATE 01-10-73 CONCEPT PHASE II
1100 MWE PWRNET POWER PLANT MIDDLETOWN , USA
BREAKDOWN OF PHYSICAL PLANT COSTS (THOUSANDS OF DOLLARS)

PHYSICAL PLANT			FACTORY EQUIPMENT COST	SITE LABOR MAN-HR	SITE LABOR COST	SITE MATERIAL COST
21	STRUCTURES AND SITE FACILITIES	34293.	1973.	(2539)	18318.	14002.
22	REACTOR PLANT EQUIPMENT	70051.	49272.	(1200)	11766.	9013.
23	TURBINE PLANT EQUIPMENT	89420.	57401.	(2331)	20793.	11226.
24	ELECTRIC PLANT EQUIPMENT	15831.	8281.	(698)	4693.	2859.
25	MISCELLANEOUS PLANT EQUIPMENT	4471.	1855.	(256)	1873.	744.
	SUBTOTAL	214066.	118782.	(7024)	57439.	37844.

DATE 01-10-73 CONCEPT PHASE II
1100 MWE PWRNET POWER PLANT MIDDLETOWN , USA

ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
20	LAND AND LAND RIGHTS				
201	LAND AND PRIVILEGE ACQUISITION	$ 0.	$ 80.	$ 500.	580.
202	RELOCATION OF BUILDINGS, UTILITIES, ETC.	$ 0.	$ 0.	$ 0.	0.
	TOTAL FOR ACCOUNT 20	$ 0.	$ 80.	$ 500.	$ 580.

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ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
21	STRUCTURES AND FACILITIES				
211	SITE IMPROVEMENTS AND FACILITIES				
.1	GENERAL YARD IMPROVEMENTS	0.	672.	526.	2396.
.2	WATERFRONT IMPROVEMENTS	0.	0.	0.	0.
.3	HIGHWAY AND RAILWAY ACCESS	0.	492.	832.	1324.
	SUBTOTAL	$ 0.	$ 1164.	$ 1358.	$ 2522.
212	REACTOR BUILDING				
.1	BASIC BUILDING STRUCTURES (IN 212.3)	0.	0.	0.	0.
.2	BUILDING SERVICES	1392.	616.	474.	1090.
.3	CONTAINMENT STRUCTURES	0.	7305.	4910.	12215.
	SUBTOTAL	$ 1392.	$ 7921.	$ 5384.	$ 13305.
213	TURBINE BUILDING				
.1	BASIC BUILDING STRUCTURES	0.	1885.	2477.	6724.
.2	BUILDING SERVICES	113.	548.	216.	1755.
	SUBTOTAL	$ 113.	$ 2433.	$ 2693.	$ 5126.
214	INTAKE AND DISCHARGE STRUCTURES				
.1	INTAKE STRUCTURE	0.	790.	644.	2868.
.2	DISCHARGE STRUCTURE (IN 232.2)	0.	0.	0.	0.
.3	UNPRESSURIZED INTAKE AND DISCHARGE CONDUITS (IN 232.2)	0.	0.	0.	0.
	SUBTOTAL	$ 0.	$ 790.	$ 644.	$ 1434.
215	REACTOR AUXILIARIES BUILDING				
.1	BASIC BUILDING STRUCTURES	0.	2539.	1341.	7760.
.2	BUILDING SERVICES	51.	202.	145.	797.
	SUBTOTAL	$ 51.	$ 2741.	$ 1486.	$ 8557.
216	RADIOACTIVE WASTE BUILDING (IN 215)				
.1	BASIC BUILDING STRUCTURES	0.	0.	0.	0.
.2	BUILDING SERVICES	0.	0.	0.	0.
	SUBTOTAL	$ 0.	$ 0.	$ 0.	$ 0.
217	FUEL STORAGE BUILDING				
.1	BASIC BUILDING STRUCTURES	0.	767.	545.	2623.
.2	BUILDING SERVICES	29.	63.	35.	254.
	SUBTOTAL	$ 29.	$ 830.	$ 580.	$ 2877.
218	OTHER				
218A	CONTROL ROOM BUILDING	59.	834.	483.	2753.
218B	DIESEL GENERATOR BUILDING	13.	395.	212.	1240.
218C	ADMINISTRATION BUILDING	197.	397.	429.	2048.
218D	SERVICE BUILDING	118.	494.	546.	2317.
218E	FAN ROOM BUILDING	0.	228.	106.	669.
218F	AUXILIARY FEED PUMP ENCLOSURE	0.	99.	81.	342.
	SUBTOTAL	$ 388.	$ 2439.	$ 1857.	$ 9369.
219	STACKS	$ 0.	$ 0.	$ 0.	0.
	SUBTOTAL FOR ACCOUNT	$ 1973.	$ 18318.	$ 14002.	$ 34293.
	CONTINGENCY (5.0%MTL-10.0%LABOR)	99.	1832.	700.	2631.
	SPARE PARTS (1.0%)	20.	- - - -	140.	160.
	TOTAL FOR ACCOUNT 21	$ 2092.	$ 20149.	$ 14842.	$ 37064.

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ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
22	REACTOR PLANT EQUIPMENT				
221	REACTOR EQUIPMENT				
.1	REACTOR VESSELS AND ACCESSORIES	11949.	734.	190.	25746.
.2	REACTOR CONTROL DEVICES	5337.	105.	11.	10908.
.3	MODERATOR/REFLECTOR SYSTEMS	0.	0.	0.	0.
.4	REACTOR SHIELDING	15.	12.	0.	54.
	SUBTOTAL	$ 17301.	$ 851.	$ 202.	$ 36708.
222	MAIN HEAT TRANSFER AND TRANSPORT SYSTEMS				
.1	REACTOR CORE COOLANT SYSTEMS				
.11	PUMPS	$ 4565.	$ 205.	$ 193.	4963.
.12	PIPING SYSTEM	0.	1172.	3044.	4216.
.13	STEAM GENERATORS	16432.	1374.	613.	18419.
.14	PRESSURIZING SYSTEM	1461.	93.	54.	1607.
	SUBTOTAL	$ 22458.	$ 2844.	$ 3904.	$ 58410.
.2	REACTOR BLANKET COOLANT SYSTEMS				
.21	PUMPS	$ 0.	$ 0.	$ 0.	0.
.22	PIPING SYSTEM	0.	0.	0.	0.
.23	HEAT EXCHANGER EQUIPMENT	0.	0.	0.	0.
.24	PRESSURIZING SYSTEM	0.	0.	0.	0.
	SUBTOTAL	$ 0.	$ 0.	$ 0.	$ 0.
.3	INTERMEDIATE LOOP COOLANT SYSTEMS				
.31	PUMPS	$ 0.	$ 0.	$ 0.	0.
.32	PIPING SYSTEM	0.	0.	0.	0.
.33	HEAT EXCHANGER EQUIPMENT	0.	0.	0.	0.
.34	PRESSURIZING SYSTEM	0.	0.	0.	0.
	SUBTOTAL	$ 0.	$ 0.	$ 0.	$ 0.
	SUBTOTAL	$ 22458.	$ 2844.	$ 3904.	$ 58410.
223	SAFEGUARDS COOLING SYSTEMS				
.1	RESIDUAL HEAT REMOVAL SYSTEM	162.	333.	205.	1400.
.2	EMERGENCY SHUTDOWN OR CORE ISOLATION COOLING SYSTEM	0.	0.	0.	0.
.3	COOLANT INJECTION AND CORE SPRAY/FLOODING SYSTEMS	148.	994.	1131.	4545.
.4	CONTAINMENT HEAT ABSORPTION REJECTION SYSTEMS	83.	408.	456.	1894.
	SUBTOTAL	$ 393.	$ 1735.	$ 1792.	$ 7839.
224	RADIOACTIVE WASTE TREATMENT AND DISPOSAL				
.1	LIQUID WASTE PROCESSING EQUIPMENT	1106.	866.	298.	4540.
.2	GASEOUS WASTES AND OFF GAS PROCESSING EQUIPMENT	518.	325.	160.	2006.
.3	SOLID WASTES PROCESSING EQUIPMENT	77.	14.	3.	187.
	SUBTOTAL	$ 1701.	$ 1205.	$ 461.	$ 6734.
225	NUCLEAR FUEL HANDLING AND STORAGE SYSTEMS				
.1	FUEL HANDLING TOOLS, EQUIPMENT, AND SYSTEMS	216.	72.	28.	630.
.2	REMOTE VIEWING EQUIPMENT	0.	0.	0.	0.
.3	SERVICE PLATFORMS	140.	32.	3.	349.
.4	FUEL STORAGE, CLEANING, AND INSPECTION EQUIPMENT	388.	584.	421.	2785.
	SUBTOTAL	$ 744.	$ 687.	$ 451.	$ 3764.
226	OTHER REACTOR PLANT EQUIPMENT				
.1	INERT GAS SYSTEMS	57.	39.	13.	216.
.2	SPECIAL HEATING SYSTEMS	0.	0.	0.	0.
.3	COOLANT RECEIVING, STORAGE, AND MAKEUP SYSTEMS	0.	0.	0.	0.
.4	COOLANT CHARGE, VOLUME CONTROL, RELIEF, ETC.	227.	220.	297.	1489.
.5	COOLANT PURIFICATION & CHEMICAL TREATMENT SYSTEMS	1251.	1160.	783.	6388.
.6	FLUID LEAK DETECTION SYSTEMS	0.	0.	0.	0.
.7	AUXILIARIES COOLING SYSTEMS	355.	734.	452.	3082.
.8	MAINTENANCE EQUIPMENT	0.	0.	0.	0.
.9	MISCELLANEOUS SUSPENSE ITEMS	0.	1055.	106.	2323.
	SUBTOTAL	$ 1891.	$ 3208.	$ 1650.	$ 13498.

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ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
227	INSTRUMENTATION AND CONTROL				
.1	REACTOR PROCESS I&C EQUIPMENT	2780.	293.	38.	6222.
.2	COMPUTER EQUIPMENT	2003.	117.	0.	4241.
.3	RADIATION MONITORING SYSTEMS (IN 227.1)	0.	299.	192.	981.
.4	ISOLATED INDICATING AND RECORDING GAGES (IN 227.1)	0.	0.	0.	0.
.5	CONTROL AND INSTRUMENT PIPING	0.	827.	326.	1706.
	SUBTOTAL	$ 4783.	$ 1237.	$ 555.	$ 13149.
228	FOSSIL FUEL BOILERS AND SUPERHEATERS				
.1	BOILERS AND/OR SUPERHEATERS	0.	0.	0.	0.
.2	DRAFT SYSTEMS	0.	0.	0.	0.
.3	FUEL HANDLING SYSTEMS	0.	0.	0.	0.
.4	ASH HANDLING SYSTEMS	0.	0.	0.	0.
	SUBTOTAL	$ 0.	$ 0.	$ 0.	$ 0.
229	IRRADIATION FACILITIES				
.1	SPECIAL STRUCTURES	0.	0.	0.	0.
.2	MATERIALS HANDLING EQUIPMENT	0.	0.	0.	0.
.3	MATERIALS RECEIVING AND STORAGE SYSTEMS	0.	0.	0.	0.
	SUBTOTAL	$ 0.	$ 0.	$ 0.	$ 0.
	SUBTOTAL FOR ACCOUNT	$ 49272.	$ 11766.	$ 9013.	$ 70051.
	CONTINGENCY (5.0%MTL-10.0%LABOR)	2464.	1177.	451.	4091.
	SPARE PARTS (1.0%)	493.		90.	583.
	TOTAL FOR ACCOUNT 22	$ 52228.	$ 12942.	$ 9554.	$ 74724.

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ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
23	TURBINE PLANT EQUIPMENT				
231	TURBINE-GENERATORS				
.1	TURBINE-GENERATORS AND ACCESSORIES	40280.	2164.	274.	85436.
.2	FOUNDATIONS	0.	666.	425.	2183.
.3	STANDBY EXCITERS	0.	0.	0.	0.
.4	LUBRICATING SYSTEM	52.	125.	138.	633.
.5	GAS SYSTEMS	0.	49.	92.	281.
.6	REHEATERS (IN 231.1)	0.	0.	0.	0.
.7	SHIELDING	0.	0.	0.	0.
.8	WEATHER-PROOF HOUSING	0.	0.	0.	0.
	SUBTOTAL	$ 40333.	$ 3004.	$ 929.	$ 88533.
232	HEAT REMOVAL SYSTEMS				
.1	WATER INTAKE COMMON FACILITIES	116.	55.	14.	374.
.2	CIRCULATING WATER SYSTEMS				
.21	PUMPS	$ 1379.	$ 65.	$ 8.	1452.
.22	PIPING	0.	1022.	1049.	2071.
.23	DISCHARGE TUNNEL	0.	0.	0.	0.
.24	DISCHARGE PIPE AND STRUCTURES	0.	82.	99.	181.
.25	DEICING PUMP PIT STRUCTURES	0.	0.	0.	0.
	SUBTOTAL	$ 1379.	$ 1170.	$ 1156.	$ 7407.
.3	COOLING TOWERS	5413.	4591.	426.	20862.
.4	OTHER SYSTEMS REJECTING HEAT TO THE ATMOSPHERE	0.	0.	0.	0.
	SUBTOTAL	$ 6910.	$ 5816.	$ 1596.	$ 28644.
233	CONDENSING SYSTEMS				
.1	CONDENSERS	4707.	1055.	48.	11620.
.2	CONDENSATE SYSTEM	646.	1969.	1121.	7472.
.3	GAS REMOVAL SYSTEM	0.	198.	133.	662.
.4	TURBINE BYPASS SYSTEM	0.	0.	0.	0.
	SUBTOTAL	$ 5353.	$ 3222.	$ 1302.	$ 19754.
234	FEED HEATING SYSTEM				
.1	REGENERATIVE HEAT EXCHANGERS	2017.	141.	55.	4426.
.2	PUMPS	1504.	138.	22.	3328.
.3	PIPING AND TANKS	0.	3397.	2708.	12209.
	SUBTOTAL	$ 3521.	$ 3676.	$ 2784.	$ 19963.
235	OTHER TURBINE PLANT EQUIPMENT				
.1	MAIN STEAM OR OTHER VAPOR PIPING	0.	2780.	2145.	9852.
.2	TURBINE AUXILIARIES	69.	444.	269.	1562.
.3	AUXILIARIES COOLING SYSTEM	160.	379.	473.	2023.
.4	MAKEUP TREATMENT SYSTEMS	0.	270.	1371.	3283.
.5	CHEMICAL TREATMENT AND CONDENSATE PURIFICATION SYSTEMS	0.	11.	27.	76.
.6	CENTRAL LUBRICATION SERVICE SYSTEM	0.	0.	0.	0.
.7	MISCELLANEOUS SUSPENSE ITEMS	0.	487.	69.	1111.
	SUBTOTAL	$ 229.	$ 4371.	$ 4354.	$ 17907.
236	INSTRUMENTATION AND CONTROL				
.1	PROCESS I & C EQUIPMENT	1056.	162.	21.	2477.
.2	COMPUTER EQUIPMENT (IN 227.2)	0.	0.	0.	0.
.3	ISOLATED INDICATING AND RECORDING GAGES (IN 236.1)	0.	0.	0.	0.
.4	CONTROL AND INSTRUMENT PIPING	0.	541.	240.	1562.
	SUBTOTAL	$ 1056.	$ 703.	$ 260.	$ 4039.
	SUBTOTAL FOR ACCOUNT	$ 57401.	$ 20793.	$ 11226.	$ 89420.
	CONTINGENCY (5.0%MTL-10.0%LABOR)	2870.	2079.	561.	5511.
	SPARE PARTS (1.0%)	574.		112.	686.
	TOTAL FOR ACCOUNT 23	$ 60845.	$ 22872.	$ 11900.	$ 95617.

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ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
24	ELECTRIC PLANT EQUIPMENT				
241	SWITCHGEAR				
.1	GENERATOR CIRCUITS	20.	8.	1.	58.
.2	STATION SERVICE	1309.	131.	78.	3035.
	SUBTOTAL	$ 1329.	$ 139.	$ 79.	$ 3093.
242	STATION SERVICE EQUIPMENT				
.1	STATION SERVICE AND STARTUP TRANSFORMERS	762.	53.	8.	1646.
.2	LOW VOLTAGE UNIT SUBSTATIONS AND LIGHTING TRANSFORMERS	802.	89.	4.	1790.
.3	BATTERY SYSTEMS	37.	10.	3.	100.
.4	DIESEL ENGINE GENERATORS	986.	162.	64.	2424.
.5	GAS TURBINE GENERATORS	2129.	241.	193.	5121.
.6	MOTOR GENERATOR SETS	92.	11.	1.	209.
	SUBTOTAL	$ 4808.	$ 566.	$ 271.	$ 11289.
243	SWITCHBOARDS				
.1	MAIN CONTROL BOARD FOR ELECTRIC SYSTEMS	591.	56.	13.	1321.
.2	AUXILIARY POWER AND SIGNAL BOARDS	12.	4.	1.	34.
	SUBTOTAL	$ 603.	$ 59.	$ 15.	$ 1355.
244	PROTECTIVE EQUIPMENT				
.1	GENERAL STATION GROUNDING SYSTEM	0.	108.	127.	470.
.2	FIRE PROTECTION SYSTEM	0.	7.	9.	34.
	SUBTOTAL	$ 0.	$ 115.	$ 137.	$ 503.
245	ELECTRICAL STRUCTURES AND WIRING CONTAINERS				
.1	CONCRETE CABLE TUNNELS, TRENCHES, AND ENVELOPES	0.	46.	54.	204.
.2	CABLE TRAYS AND SUPPORTS	83.	241.	63.	774.
.3	CONDUIT	0.	616.	302.	1956.
.4	OTHER STRUCTURES	0.	13.	8.	43.
	SUBTOTAL	$ 83.	$ 919.	$ 486.	$ 2976.
246	POWER AND CONTROL WIRING				
.1	GENERATOR CIRCUITS	651.	123.	8.	1564.
.2	STATION SERVICE POWER WIRING	217.	1321.	1006.	5088.
.3	CONTROL WIRING	0.	742.	633.	2690.
.4	INSTRUMENT WIRING	0.	445.	234.	1350.
.5	CONTAINMENT PENETRATIONS	591.	260.	20.	1743.
	SUBTOTAL	$ 1459.	$ 2892.	$ 1872.	$ 12444.
	SUBTOTAL FOR ACCOUNT	$ 8281.	$ 4690.	$ 2859.	$ 15831.
	CONTINGENCY (5.0%MTL-10.0%LABOR)	414.	469.	143.	1026.
	SPARE PARTS (1.0%)	83.	- - - -	29.	111.
	TOTAL FOR ACCOUNT 24	$ 8778.	$ 5159.	$ 3031.	$ 16968.

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ACCOUNT NUMBER	ACCOUNT TITLE	COST (THOUSANDS OF DOLLARS) FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
25	MISCELLANEOUS PLANT EQUIPMENT				
251	TRANSPORTATION AND LIFTING EQUIPMENT				
.1	CRANES, HOISTS, AND MONORAILS	628.	137.	55.	1642.
.2	RAILWAY AND ROADWAY EQUIPMENT	0.	0.	0.	0.
	SUBTOTAL	$ 628.	$ 137.	$ 55.	$ 1642.
252	AIR, WATER, AND STEAM SERVICE SYSTEMS				
.1	AIR SYSTEMS	79.	138.	45.	525.
.2	WATER SYSTEMS	307.	963.	614.	3770.
.3	AUXILIARY HEATING STEAM	508.	539.	0.	2093.
	SUBTOTAL	$ 894.	$ 1640.	$ 660.	$ 6387.
253	COMMUNICATIONS EQUIPMENT				
.1	LOCAL COMMUNICATIONS SYSTEMS	32.	45.	11.	175.
.2	SIGNAL SYSTEMS	0.	22.	17.	78.
	SUBTOTAL	$ 32.	$ 67.	$ 28.	$ 253.
254	FURNISHINGS AND FIXTURES				
.1	SAFETY EQUIPMENT	13.	0.	0.	25.
.2	SHOP, LABORATORY, AND TEST EQUIPMENT	56.	4.	1.	123.
.3	OFFICE EQUIPMENT AND FURNISHINGS	63.	0.	0.	127.
.4	CHANGE ROOM EQUIPMENT	10.	1.	0.	22.
.5	ENVIRONMENTAL MONITORING EQUIPMENT	0.	0.	0.	0.
.6	DINING FACILITIES	159.	22.	0.	362.
	SUBTOTAL	$ 301.	$ 28.	$ 1.	$ 660.
	SUBTOTAL FOR ACCOUNT	$ 1855.	$ 1873.	$ 744.	$ 4471.
	CONTINGENCY (5.0%MTL-10.0%LABOR)	93.	187.	37.	317.
	SPARE PARTS (1.0%)	19.	--	7.	26.
	TOTAL FOR ACCOUNT 25	$ 1966.	$ 2060.	$ 788.	$ 4814.

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ACCOUNT NUMBER	ACCOUNT TITLE	COST($1000)
91	CONSTRUCTION FACILITIES, EQUIPMENT, AND SERVICES	
911	TEMPORARY FACILITIES	$ 4708.
912	CONSTRUCTION EQUIPMENT	$ 7847.
913	CONSTRUCTION SERVICES	$ 3139.
	TOTAL FOR ACCOUNT 91	$ 15695.

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ACCOUNT NUMBER	ACCOUNT TITLE	COST($1000)
92	ENGINEERING AND CONSTRUCTION MANAGEMENT SERVICES	
921	ENGINEERING SERVICES	$ 13831.
922	CONSTRUCTION MANAGEMENT SERVICES.	$ 13831.
	TOTAL FOR ACCOUNT 92	$ 27661.

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ACCOUNT NUMBER	ACCOUNT TITLE	COST($1000)
93	OTHER COSTS	
931	TAXES AND INSURANCE	$ 6313.
932	STAFF TRAINING AND PLANT STARTUP	$ 574.
933	OWNERS G&A	$ 3008.
	TOTAL FOR ACCOUNT 93	$ 9896.

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ACCOUNT NUMBER	ACCOUNT TITLE	COST($1000)
94	INTEREST DURING CONSTRUCTION	
941	PHYSICAL PLANT AND ASSOCIATED INDIRECT COSTS	$ 76532.
942	LAND AND LAND RIGHTS	$ 266.
	TOTAL FOR ACCOUNT 94	$ 76798.

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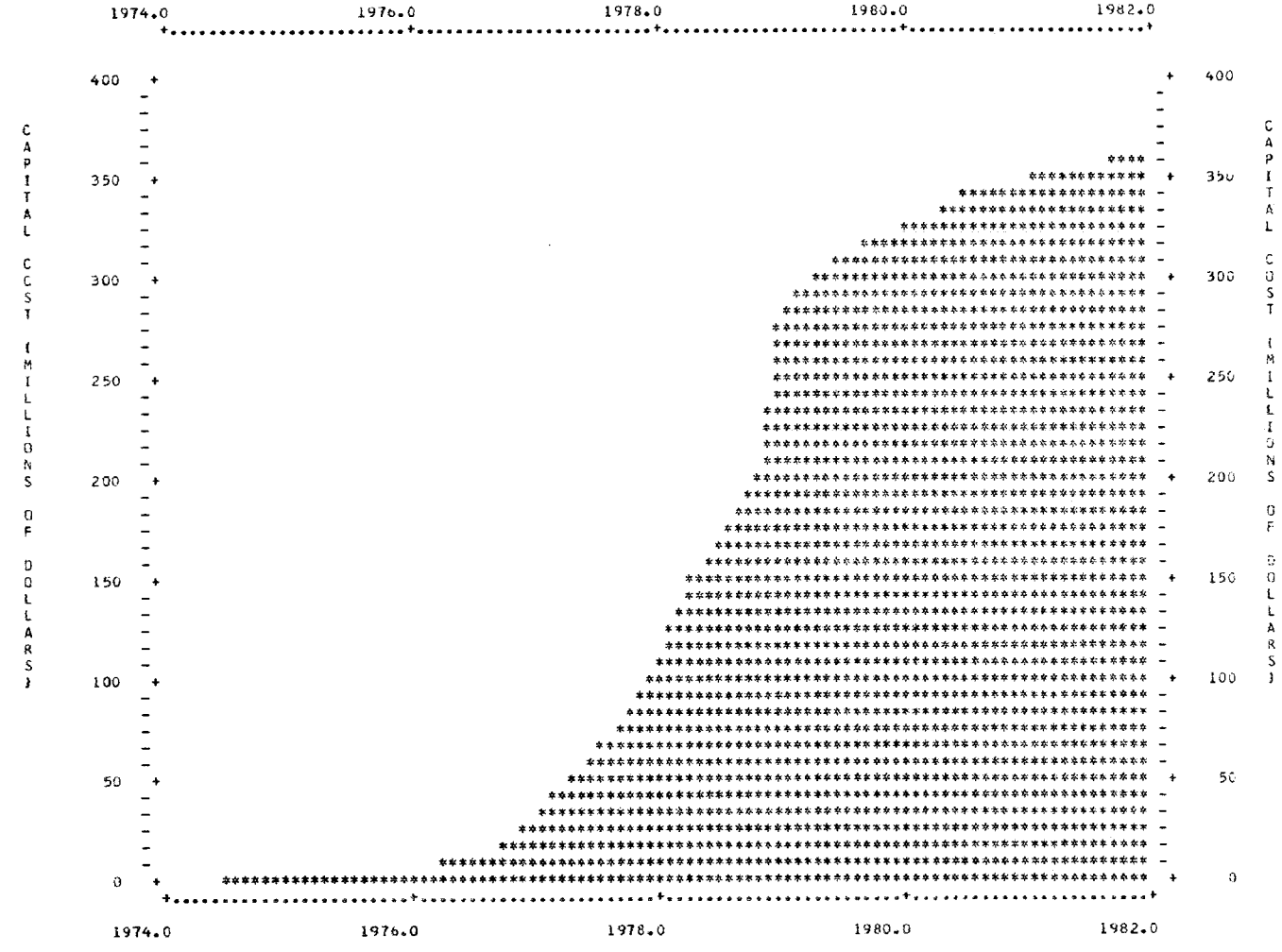

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APPENDICES

Appendix A

CONTAC AUXILIARY PROGRAM

Auxiliary program CONTAC is used to maintain the base cost model tape. This tape contains all data relating to the cost model for a power plant at some base location and base time. The program creates records, updates existing records, deletes unwanted records, and lists records that are on the tape. Written in FORTRAN IV, CONTAC has approximately the same machine requirements as the CONCEPT program. CONTAC consists of only a main program which exercises control over the option list. The data are entered on punched cards and listed on the system printer. Each set of data, a group of about 750 cards, creates one record on the tape consisting of the parameters listed in the input card description.

The cards are stacked in the order given, and the first two cards are used for tape and program logical flow control. The parameter ITAPE controls the cost model tape, and a value of '0' indicates the absence of an old cost model tape. A new cost model tape is created for each computer run even if an old cost model tape is listed with no updating.

On the second card, ITYPE is the alphabetic identification of the plant type, IREC is the numerical position of the record on the new cost model tape, and DOREC is the control of the record disposition where <u>A</u>DD is used to add a new record, <u>D</u>ELETE is used to delete an old record, <u>C</u>HANGE is used to change an existing record, and <u>L</u>IST is used to list an existing record. An ADD or CHANGE automatically produces an output listing of the record. Only the underlined letters are used by the program, but the entire word may be punched on the card for clarification. Records may be stacked on input starting with card 2, but must be kept in ascending IREC sequence.

After all records have been disposed of and listed according to input card instructions, an additional output table is given showing the new cost model tape record sequence with the appropriate plant type.

A description of the input cards is tabulated below, followed by a FORTRAN listing of the program and a listing of the cost model for PWR plants.

Input Card Description

Card	Column	Variable name	Description
1	1	ITAPE	Input tape control. Format I1. 0 – No input tape. 1 – Existing input tape.
2	1-8	ITYPE	Plant type. Format A8.
	9-13	IREC	Record number on output tape. Format I5.
	14	DOREC	Record control. Format A1. 'A' add record. 'C' change record. 'D' delete record. 'L' list record.
3	1-80	TITLE	Comment card. Format 20A4.
4	1-10	YBC	Year for start of construction for a base case. Format F10.0.
	11-20	YFIRST	Initial year for retrieval of historical labor and materials cost data. Format F10.0.
	21-30	RIB	Annual interest rate in percent. Format F10.0.
5	1-10	OTP	Overtime premium as function of base pay. Format F10.0.
	11-20	HW	Number of hours in workweek at site. Format F10.0.
	21-30	OVERS	Overtime efficiency. Format F10.0.
	31-40	DEOT	Efficiency loss. Format F10.0.
	41-50	COS	Input site burden factor. Format F10.0.
	51-60	COB	Base case burden factor. Format F10.0.
6	1-10 ⋮ 61-70	TIMLED(I)	Lead time array defined in Eq. (25) (I=1,7). Format 7F10.0.
7	1-10 ⋮ 41-50	FILB(J)	Factor for combining bases (J=1,5). Format 5F10.0.

Card	Column	Variable name	Description
8	1-10 ⋮ 41-50	FILS(J)	Factor for combining sites (J=1,5). Format 5F10.0.
9	1-10 ⋮ 51-60	CONTM(I)	Contingency as percent of material cost of account (I=1,11). Format 6F10.0.
10	1-10 ⋮ 41-50	CONTM(I)	(continued). Format 5F10.0.
11	1-10 ⋮ 51-60	CONTL(I)	Contingency as percent of labor cost of account (I=1,11). Format 6F10.0.
12	1-10 ⋮ 41-50	CONTL(I)	(continued). Format 5F10.0.
13	1-10 ⋮ 51-60	SPP(I)	Spare parts allowance as percent of account (I=1,11). Format 6F10.0
14	1-10 ⋮ 41-50	SPP(I)	(continued). Format 5F10.0.
15-22	1-10 ⋮ 51-60	RINT(J)	Annual interest rate in each time period of construction (J=1,50). Format 6F10.0.
23	1-10 11-20	RINT(I)	(continued). Format 2F10.0.
24	1-10 ⋮ 61-70	AMB(I)	Coefficient used for calculating base material rate (I=1,7). Format 7F10.0.
25	1-10 ⋮ 61-70	AMS(I)	Coefficient used for calculating site material rate (I=1,7). Format 7F10.0.

Card	Column	Variable name	Description
26	1-10 ⋮ 61-70	ALB(I)	Coefficient used for calculating base wage rate (I=1,7). Format 7F10.0.
27	1-10 ⋮ 61-70	ALS(I)	Coefficient used for calculating site wage rate (I=1,7). Format 7F10.0.
28	1-10 ⋮ 61-70	BMB(I)	Coefficient used for calculating base material escalation (I=1,7). Format 7F10.0.
29	1-10 ⋮ 61-70	BMS(I)	Coefficient used for calculating site material escalation (I=1,7). Format 7F10.0.
30	1-10 ⋮ 61-70	BLB(I)	Coefficient used for calculating base wage escalation (I=1,7). Format 7F10.0.
31	1-10 ⋮ 61-70	BLS(I)	Coefficient used for calculating site wage escalation (I=1,7). Format 7F10.0.
32	1-5 ⋮ 21-25	IBASE(J)	Array to indicate regions to be used for base labor rates (J=1,5). Format 5I5.
33	1-5 ⋮ 21-25	ISITE(J)	Array to indicate regions to be used for site labor rates (J=1,5). Format 5I5.
34-45	1-15 16-30 31-45	D2(I2)	Array containing direct costs for two-digit accounts (equipment, labor, material for one account) (I2=1,36). Format 3F15.0.
46-105	1-15 16-30 31-45	D3(I3)	Array containing direct costs for three-digit accounts (I3=1,180). Format 3F15.0.
106-255	1-15 16-30 31-45	D4(I4)	Array containing direct costs for four-digit accounts (I4=1,450). Format 3F15.0.

Card	Column	Variable name	Description
256-305	1-15 16-30 31-45	D5(I5)	Array containing direct costs for five-digit accounts (I5=1,150). Format 3F15.0.
306-315	1-15 16-30 31-45 46-60	AI(J)	Constants for equation describing indirect cost curves (J=1,40). Format 4F15.0.
316	1-10	BWE	Power level for base. Format F10.0.
317-326	1-15 16-30 31-45	AA(J)	Constants for equation describing direct costs, less contingency and spare parts for two-digit accounts (J=1,90). Format 3F15.0.
327	1-3	IAR1	Number of one-digit accounts. Format I3.
328	1-3 4-6 7-9 10-12 13-15	IAR2(I2)	Number of two-digit accounts (I2=1,5). Format 5I3.
329	1-3 ⋮ 43-45	IAR3(I3)	Number of three-digit accounts (I3=1,15). Format 15I3.
330-332	1-3 ⋮ 58-60	IAR4(I4)	Number of four-digit accounts (I4=1,60). Format 20I3.
333-340	1-3 ⋮ 58-60	IAR5(I5)	Number of five-digit accounts (I5=1,240). Format 20I3.
341-390	1-8 9-16 ⋮ 57-64	CFCA(J)	Array containing cash flow curves for each direct account (J=1,400). Format 8F8.5.
391-406	1-7 8-14 43-49	FACB1(K)	Mixing factors for base labor (K=1,112). Format 7F7.5.

Card	Column	Variable name	Description
407-422	1-7 ⋮ 43-49	FACS1(K)	Mixing factors for site labor (K=1,112). Format 7F7.5.
423-438	1-7 ⋮ 43-49	FACS1(K)	Mixing factors for base material (K=1,112). Format 7F7.5.
439-454	1-7 ⋮ 43-49	FACS2(K)	Mixing factors for site material (K=1,112). Format 7F7.5.
455-466	1-64	AC2(I2)	Alphabetic description of two-digit accounts (I2=1,96). Format 8A8.
467-526	1-64	AC3(I3)	Alphabetic description of three-digit accounts (I3=1,480). Format 8A8.
527-676	1-64	AC4(I4)	Alphabetic description of four-digit accounts (I4=1,1200). Format 8A8.
677-726	1-64	AC5(I5)	Alphabetic description of five-digit accounts (I5=1,400). Format 8A8.
727-738	1-64	ACC(I)	Alphabetic description of two-digit accounts for first page of output (I=1,96). Format 8A8.

```
//ASDRJBCT JOB (6503,253111),BARNARD,CLASS=A,REGION=96K                CTAC0010
/*MAIN LINES=(20,C)                                                    CTAC0020
/*SETUP DDNAME=FT09F001,UNIT=TAPE9,ID=(005052,RING,SAVE,NL)            CTAC0030
/*SETUP DDNAME=SYSUT1,UNIT=TAPE9,ID=(011054,NORING,SAVE,NL)            CTAC0040
//GCD   EXEC PGM=IERGENER                                              CTAC0050
//SYSPRINT DD SYSOUT=A                                                 CTAC0060
//*  THE CONTAC PROGRAM IS NOW USED IN 2 STEPS TO ELIMINATE EXCESSIVE  CTAC0070
//*  CARD HANDLING OF COST MODEL DATA.  JOB "GCD" READS COST MODEL DATA CTAC0080
//*  SETS AS INDIVIDUAL FILES ON THE MASTER CONCEPT SYSTEM TAPE AND    CTAC0090
//*  WRITES IN ONE FILE ON SYSDA DISC.  STEP 2 "WCT" IS THE PREVIOUS   CTAC0100
//*  STANDARD "CONTAC" PROGRAM WHICH HAS BEEN REVISED WITH SYMBOLIC I/O CTAC0110
//*  FILE ADDRESSING WHICH PERMITS FULL SCALE COST MODEL UPDATING FROM CTAC0120
//*  THE MASTER CONCEPT SYSTEM TAPE INSTEAD OF FROM THE COST MODEL DATA CTAC0130
//*  CARDS AS BEFORE.  ALL OTHER FEATURES ARE UNCHANGED.               CTAC0140
//*          FILE 06   =   MFL06   =   BWR                             CTAC0150
//*          FILE 07   =   MFL07   =   BWRMET                          CTAC0160
//*          FILE 08   =   MFL08   =   BWRNET                          CTAC0170
//*                                                                    CTAC0180
//*                                                                    CTAC0190
//*                                                                    CTAC0200
//*          FILE 12   =   MFL12   =   COAL                            CTAC0210
//*          FILE 13   =   MFL13   =   COALMET                         CTAC0220
//*          FILE 14   =   MFL14   =   COALNET                         CTAC0230
//*          FILE 15   =   MFL15   =   OIL                             CTAC0240
//*          FILE 16   =   MFL16   =   OILMET                          CTAC0250
//*          FILE 17   =   MFL17   =   OILNET                          CTAC0260
//*          FILE 18   =   MFL18   =   PWR                             CTAC0270
//*          FILE 19   =   MFL19   =   PWRMET                          CTAC0280
//*          FILE 20   =   MFL20   =   PWRNET                          CTAC0290
//*  THE MASTER FILE READING STARTS WITH FILE 6 TO BUILD A SINGLE FILE CTAC0300
//*  ON SYSUT2.                                                        CTAC0310
//SYSUT1 DD UNIT=TAPE9,LABEL=(06,NL),DISP=(SHR,PASS),DSN=MFL06,        CTAC0320
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200)                                CTAC0330
//        DD UNIT=TAPE9,LABEL=(07,NL),DISP=(SHR,PASS),DSN=MFL07,       CTAC0340
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200),VOL=REF=*.SYSUT1               CTAC0350
//        DD UNIT=TAPE9,LABEL=(08,NL),DISP=(SHR,PASS),DSN=MFL08,       CTAC0360
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200),VOL=REF=*.SYSUT1               CTAC0370
//        DD UNIT=TAPE9,LABEL=(09,NL),DISP=(SHR,PASS),DSN=MFL09,       CTAC0380
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200),VOL=REF=*.SYSUT1               CTAC0390
//        DD UNIT=TAPE9,LABEL=(10,NL),DISP=(SHR,PASS),DSN=MFL10,       CTAC0400
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200),VOL=REF=*.SYSUT1               CTAC0410
//        DD UNIT=TAPE9,LABEL=(11,NL),DISP=(SHR,PASS),DSN=MFL11,       CTAC0420
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200),VOL=REF=*.SYSUT1               CTAC0430
//        DD UNIT=TAPE9,LABEL=(12,NL),DISP=(SHR,PASS),DSN=MFL12,       CTAC0440
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200),VOL=REF=*.SYSUT1               CTAC0450
//        DD UNIT=TAPE9,LABEL=(13,NL),DISP=(SHR,PASS),DSN=MFL13,       CTAC0460
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200),VOL=REF=*.SYSUT1               CTAC0470
//        DD UNIT=TAPE9,LABEL=(14,NL),DISP=(SHR,PASS),DSN=MFL14,       CTAC0480
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200),VOL=REF=*.SYSUT1               CTAC0490
//        DD UNIT=TAPE9,LABEL=(15,NL),DISP=(SHR,PASS),DSN=MFL15,       CTAC0500
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200),VOL=REF=*.SYSUT1               CTAC0510
//        DD UNIT=TAPE9,LABEL=(16,NL),DISP=(SHR,PASS),DSN=MFL16,       CTAC0520
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200),VOL=REF=*.SYSUT1               CTAC0530
//        DD UNIT=TAPE9,LABEL=(17,NL),DISP=(SHR,PASS),DSN=MFL17,       CTAC0540
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200),VOL=REF=*.SYSUT1               CTAC0550
//        DD UNIT=TAPE9,LABEL=(18,NL),DISP=(SHR,PASS),DSN=MFL18,       CTAC0560
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200),VOL=REF=*.SYSUT1               CTAC0570
//        DD UNIT=TAPE9,LABEL=(19,NL),DISP=(SHR,PASS),DSN=MFL19,       CTAC0580
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200),VOL=REF=*.SYSUT1               CTAC0590
//        DD UNIT=TAPE9,LABEL=(20,NL),DISP=(SHR,PASS),DSN=MFL20,       CTAC0600
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200),VOL=REF=*.SYSUT1               CTAC0610
//SYSUT2 DD UNIT=SYSDA,DISP=(NEW,PASS),DSN=&&CFL,                      CTAC0620
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200),SPACE=(3200,(100,20),RLSE)     CTAC0630
//SYSIN DD DUMMY                                                       CTAC0640
//*  END OF FILE CARD '/*' SHOULD BE PLACED HERE                       CTAC0650
//WCT EXEC FORTGCLG,COND=(5,LT)                                        CTAC0660
//FORT.SYSIN DD *                                                      CTAC0670
C PROGRAM TO WRITE MASTER COST TAPE FOR CONCEPT PHASE IIB              CTAC0680
C         BARBARA SRITE 05/22/72                                       CTAC0690
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C |=================================================================|CTAC0700
C |                                                                 |CTAC0710
C |  CONTAC PROGRAM PHASE II                                        |CTAC0720
C |  REVISED DEC. 1972 BY R. J. BARNARD  WITH SYMBOLIC INPUT/OUTPUT |CTAC0730
C |  ADDRESSING TO FACILITATE USE OF SYSTEMS OUTSIDE CTC.           |CTAC0740
C |                  READ (5) CHANGED TO READ(INPT)                 |CTAC0750
C |                  WRITE(6) CHANGED TO WRITE (IOUT)               |CTAC0760
C |  NOTE THAT THERE IS STILL ONE STATEMENT TO READ (5) PER SE TO READ |CTAC0770
C |  A CONTROL CARD WHICH IS NOT INCLUDED AS PART OF THE COST MODEL |CTAC0780
C |  DATA SETS ON THE CONCEPT SYSTEM MASTER TAPE.  THEREFORE, THE CONT-|CTAC0790
C |  ROL CARD IS READ FROM WHATEVER SYSIN FILE IS NUMBERED AND THE COST|CTAC0800
C |  MODELS ARE FROM A DIRECT ACCESS DEVICE SYSDA PRESENTLY ASSIGNED |CTAC0810
C |  TO FT04F001 FOR UPDATING THE ENTIRE COST MODEL LIBRARY.  "INPT" |CTAC0820
C |  MAY BE ALTERED FOR READING SINGLE COST MODELS IN CARD FORM FROM |CTAC0830
C |  SYSIN AS DESIRED.  WHEN USING ALL COST MODELS FROM THE MASTER  |CTAC0840
C |  CONCEPT SYSTEM TAPE, THE CONTAC OLD MASTER IS NOT NEEDED SO A CARD|CTAC0850
C |  GO.FT08F001 DD DUMMY IS USED.                                  |CTAC0860
C |                                                                 |CTAC0870
C |=================================================================|CTAC0880
      REAL * 8                                                       CTAC0890
     * AC2(8,12)      , AC3(8,60)      , AC4(8,150)     , AC5(8,50)     ,  CTAC0900
     * ACC(8,12)      , DUM1           , DUM2           , DUM3          ,  CTAC0910
     * DATE           , RECTAB(50)     , TYPE           , TYPE1            CTAC0920
      REAL * 4                                                       CTAC0930
     * AMB(7)         , AMS(7)         , ALB(7)         , ALS(7)        ,  CTAC0940
     * BMB(7)         , BMS(7)         , BLB(7)         , BLS(7)        ,  CTAC0950
     * D2(3,12)       , D3(3,60)       , D4(3,150)      , D5(3,50)      ,  CTAC0960
     * AI(4,10)       , AA(3,10)       , CFCA(8,50)     , FACB1(7,16)   ,  CTAC0970
     * FACB2(7,16)    , FACS1(7,16)    , FACS2(7,16)    , CONTL(11)     ,  CTAC0980
     * CONTM(11)      , SPP(11)        , RINT(50)       , TIMLED(7)     ,  CTAC0990
     * FILB(5)        , FILS(5)        , TITLE(20)                        CTAC1000
      INTEGER                                                        CTAC1010
     * IAR1           , IAR2(5)        , IAR3(15)       , IAR4(60)      ,  CTAC1020
     * IAR5(160)      , IBASE(5)       , ISITE(5)                         CTAC1030
      DATA ADD/'A'/, DELETE/'D'/, CHANGE/'C'/, ALIST/'L'/            CTAC1040
       INPT = 4                                                      CTAC1050
       IOUT = 6                                                      CTAC1060
      CALL IDAY (DATE)                                               CTAC1070
      READ (5,5) ITAPE                                               CTAC1080
5     FORMAT(I1)                                                     CTAC1090
      IF (ITAPE.NE.0) REWIND 8                                       CTAC1100
      REWIND 9                                                       CTAC1110
      NOREC = 0                                                      CTAC1120
      IFLAG = 0                                                      CTAC1130
10    READ (INPT,20,END=1000) TYPE, IREC, DOREC, TITLE               CTAC1140
20    FORMAT(A8,2X,I5,A1/20A4)                                       CTAC1150
      IF (ITAPE.EQ.0) GO TO 50                                       CTAC1160
40    IF (IFLAG.EQ.1) GO TO 45                                       CTAC1170
      READ (8,END=49) TYPE1, YBC, YEIRST, TIMLED, RIB, RINT, OTP,    CTAC1180
     * HW, OVERS, DEOT, COS, COB, CONTM, CONTL, SPP, AMB, AMS, ALB,   CTAC1190
     * ALS, BMB, BMS, BLB, BLS, IBASE, ISITE, D2, D3, D4, D5, AI, BUF, CTAC1200
     * AA, IAR1, IAR2, IAR3, IAR4, IAR5, CFCA, FACB1, FACB2, FACS1,   CTAC1210
     * FACS2, FILB, FILS, AC2, AC3, AC4, AC5, ACC                     CTAC1220
      NOREC = NOREC + 1                                              CTAC1230
      IFLAG = 1                                                      CTAC1240
45    IF (IREC.NE.NOREC) GO TO 48                                    CTAC1250
      IF (DOREC.EQ.ALIST) GO TO 400                                  CTAC1260
      IF (DOREC.EQ.ADD) GO TO 50                                     CTAC1270
      NOREC = NOREC - 1                                              CTAC1280
      IFLAG = 0                                                      CTAC1290
      IF (DOREC.EQ.CHANGE) GO TO 50                                  CTAC1300
      GO TO 10                                                       CTAC1310
48    RECTAB(NOREC) = TYPE1                                          CTAC1320
      IFLAG = 0                                                      CTAC1330
      WRITE (9) TYPE1, YBC, YEIRST, TIMLED, RIB, RINT, OTP,          CTAC1340
     * HW, OVERS, DEOT, COS, COB, CONTM, CONTL, SPP, AMB, AMS, ALB,   CTAC1350
     * ALS, BMB, BMS, BLB, BLS, IBASE, ISITE, D2, D3, D4, D5, AI, BUF, CTAC1360
     * AA, IAR1, IAR2, IAR3, IAR4, IAR5, CFCA, FACB1, FACB2, FACS1,   CTAC1370
     * FACS2, FILB, FILS, AC2, AC3, AC4, AC5, ACC                     CTAC1380
      GO TO 40                                                       CTAC1390
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49    ITAPE = 0                                                         CTAC1400
      IFLAG = 0                                                         CTAC1410
50    WRITE (IOUT,51) TYPE, DATE, TITLE                                 CTAC1420
51    FORMAT('1',30X,A8,10X,'DATE ',A8/'0',20A4)                        CTAC1430
60    FORMAT(3F10.0/6F10.0/7F10.0/2(5F10.0/),(6F10.0/5F10.0))           CTAC1440
      READ (INPT,60) YBC, YFIRST, RIB, OTP, HW, OVERS, DEOT,            CTAC1450
     * COS, COB, TIMLED, FILB, FILS, CONTM, CONTL, SPP                  CTAC1460
      WRITE (IOUT,65) FILB, FILS                                        CTAC1470
65    FORMAT('0LOCATION FACTORS FOR BASE ', 5F15.5/                     CTAC1480
     * '0LOCATION FACTORS FOR SITE ', 5F15.5)                            CTAC1490
      WRITE (IOUT,70) YBC, YFIRST, TIMLED, RIB                          CTAC1500
70    FORMAT('0YEAR FOR START OF CONSTRUCTION - BASE CASE'/10X          CTAC1510
     * 'YBC = ',F10.5/                                                   CTAC1520
     * '0START OF YEAR RANGE FOR BASE AND ESCALATION'/10X               CTAC1530
     * 'YFIRST = ',F10.5/                                                CTAC1540
     * '0LEAD TIME FROM PURCHASE OF LAND TO START OF DESIGN AND CONSTRUCCTAC1550
     *TION'/ 10X, 'TIMLED = ',7F10.5/                                    CTAC1560
     * '0AVERAGE ANNUAL INTEREST RATE IN PERCENT'/10X,'RIB = ',F10.5)    CTAC1570
      WRITE (IOUT,71) OTP, HW, OVERS, DEOT, COS, COB                    CTAC1580
71    FORMAT('0OVERTIME PREMIUM AS FUNCTION OF BASE PAY'/ 10X           CTAC1590
     * 'OTP = ', F10.5/                                                  CTAC1600
     * '/NUMBER OF HOURS IN WORK WEEK AT SITE'/10X,'HW= ',F10.5/         CTAC1610
     * '/OVERTIME EFFICIENCY'/10X,'OVERS = ',F10.5/                      CTAC1620
     * 'OEFFICIENCY LOSS'/10X'DEOT = ', F10.5/                           CTAC1630
     * '0INPUT SITE LOAD FACTOR'/10X,'COS = ',F10.5/                     CTAC1640
     * '0INPUT BASE LOAD FACTOR'/10X,'COB = ',F10.5/' ')                 CTAC1650
      WRITE (IOUT,51) TYPE, DATE, TITLE                                 CTAC1660
      WRITE (IOUT,72) CONTM, CONTL, SPP                                 CTAC1670
72    FORMAT('0CONTM = CONTINGENCY AS % OF MATERIAL COST OF ACCOUNT'/   CTAC1680
     * ' CONTL = CONTINGENCY AS % OF LABOR COST OF ACCOUNT'/             CTAC1690
     * ' SPP = SPARE PARTS ALLOWANCE AS % OF ACCOUNT'/ '0% FOR ACC.',    CTAC1700
     * 6X,'1',6X,'2',6X,'3',6X,'4',6X,'5',6X,'6',6X,'7',/'+',87('_')/    CTAC1710
     * ' CONTM',6X,11F7.2/' CONTL',6X,11F7.2/' SPP',8X,11F7.2/'0')       CTAC1720
      READ (INPT,73) (RINT(I), I=1,50)                                  CTAC1730
73    FORMAT(6F10.0)                                                    CTAC1740
      WRITE (IOUT,74) (RINT(I), I=1,50)                                 CTAC1750
74    FORMAT('0ANNUAL INTEREST RATE IN EACH TIME PERIOD (BY YEAR) OF CONCTAC1760
     *STRUCTION PERIOD'/'+',100('_')/' ',(/' ',10F10.5))                CTAC1770
      WRITE (IOUT,51) TYPE, DATE, TITLE                                 CTAC1780
      READ (INPT,75) AMB, AMS, ALB, ALS, BMB, BMS, BLB, BLS             CTAC1790
75    FORMAT(7F10.0)                                                    CTAC1800
      WRITE (IOUT,76)                                                   CTAC1810
76    FORMAT('0  COEFFICIENTS USED FOR CALCULATING BASE RATE AND ESCALATCTAC1820
     *ION'/'+',80('_')/35X,'ACCOUNT'/' ',5X,'1',9X,'2',9X,'3',9X,'4',   CTAC1830
     * 9X,'5',9X,'6',9X,'7'/'+',80('_')/' ')                             CTAC1840
      WRITE (IOUT,77) AMB                                               CTAC1850
77    FORMAT('0',7F10.2,5X,'AMB')                                       CTAC1860
      WRITE (IOUT,78) AMS                                               CTAC1870
78    FORMAT('0',7F10.2,5X,'AMS')                                       CTAC1880
      WRITE (IOUT,79) ALB                                               CTAC1890
79    FORMAT('0',7F10.2,5X,'ALB')                                       CTAC1900
      WRITE (IOUT,80) ALS                                               CTAC1910
80    FORMAT('0',7F10.2,5X,'ALS')                                       CTAC1920
      WRITE (IOUT,81) BMB                                               CTAC1930
81    FORMAT('0',7F10.2,5X,'BMB')                                       CTAC1940
      WRITE (IOUT,82) BMS                                               CTAC1950
82    FORMAT('0',7F10.2,5X,'BMS')                                       CTAC1960
      WRITE (IOUT,83) BLB                                               CTAC1970
83    FORMAT('0',7F10.2,5X,'BLB')                                       CTAC1980
      WRITE (IOUT,84) BLS                                               CTAC1990
84    FORMAT('0',7F10.2,5X,'BLS')                                       CTAC2000
      READ (INPT,90) IBASE, ISITE                                       CTAC2010
90    FORMAT(5I5)                                                       CTAC2020
      WRITE (IOUT,95) IBASE, ISITE                                      CTAC2030
95    FORMAT('0FLAGS USED TO INDICATE LOCATION READ FROM LABOR TAPE'/   CTAC2040
     * ' IBASE = ', 5I5/' ISITE = ',5I5)                                 CTAC2050
      WRITE (IOUT,51) TYPE, DATE, TITLE                                 CTAC2060
99    WRITE (IOUT,100)                                                  CTAC2070
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100   FORMAT('0TABLE D2 SPLITS BASE COST INTO 2-DIGIT COST COMPONENTS   CTAC2080
     *(THOUSANDS OF DOLLARS)'/'0',5X,'$ FACTORY ',5X,'  $ SITE  ',5X,'  CTAC2090
     *$ SITE  ',20X,'CARD'/7X,'COST ',9X,'   LABOR ',7X,'MATERIAL',     CTAC2100
     * 9X,'ACCOUNT',5X 'NUMBER'/'+',86('_')/' ')                        CTAC2110
      DO 107 I = 1,12                                                   CTAC2120
      READ (INPT,105) (D2(J,I),J=1,3), DUM1, DUM2                       CTAC2130
105   FORMAT(3F15.0,19X,2A8)                                            CTAC2140
      DO 108 J = 1,3                                                    CTAC2150
      IF (D2(J,I).EQ.0.0) D2(J,I) = 1.0E-8                              CTAC2160
108   CONTINUE                                                          CTAC2170
      WRITE (IOUT,106) (D2(J,I),J=1,3), DUM1, DUM2                      CTAC2180
106   FORMAT(' ',3F15.2,10X,2A8)                                        CTAC2190
107   CONTINUE                                                          CTAC2200
      N = 51                                                            CTAC2210
      DO 112 I = 1,60                                                   CTAC2220
      READ (INPT,105) (D3(J,I),J=1,3), DUM1, DUM2                       CTAC2230
      DO 109 J = 1,3                                                    CTAC2240
      IF (D3(J,I).EQ.0.0) D3(J,I) = 1.0E-8                              CTAC2250
109   CONTINUE                                                          CTAC2260
      IF (N.LE.50) GO TO 111                                            CTAC2270
      WRITE (IOUT,51) TYPE, DATE, TITLE                                 CTAC2280
      WRITE (IOUT,110)                                                  CTAC2290
110   FORMAT('0TABLE D3 SPLITS BASE COST INTO 3-DIGIT COST COMPONENTS   CTAC2300
     *(THOUSANDS OF DOLLARS)'/'0',5X,'$ FACTORY ',5X,'  $ SITE  ',5X,'  CTAC2310
     *$ SITE  ',20X,'CARD'/7X,'COST ',9X,'   LABOR ',7X,'MATERIAL',     CTAC2320
     * 9X,'ACCOUNT',5X 'NUMBER'/'+',86('_')/' ')                        CTAC2330
      N = 1                                                             CTAC2340
111   WRITE (IOUT,106) (D3(J,I),J=1,3), DUM1, DUM2                      CTAC2350
      N = N + 1                                                         CTAC2360
112   CONTINUE                                                          CTAC2370
      N = 51                                                            CTAC2380
      DO 122 I = 1,150                                                  CTAC2390
      READ (INPT,105) (D4(J,I),J=1,3), DUM1, DUM2                       CTAC2400
      DO 119 J = 1,3                                                    CTAC2410
      IF (D4(J,I).EQ.0.0) D4(J,I) = 1.0E-8                              CTAC2420
119   CONTINUE                                                          CTAC2430
      IF (N.LE.50) GO TO 121                                            CTAC2440
      WRITE (IOUT,51) TYPE, DATE, TITLE                                 CTAC2450
      WRITE (IOUT,120)                                                  CTAC2460
120   FORMAT('0TABLE D4 SPLITS BASE COST INTO 4-DIGIT COST COMPONENTS   CTAC2470
     *(THOUSANDS OF DOLLARS)'/'0',5X,'$ FACTORY ',5X,'  $ SITE  ',5X,'  CTAC2480
     *$ SITE  ',20X,'CARD'/7X,'COST ',9X,'   LABOR ',7X,'MATERIAL',     CTAC2490
     * 9X,'ACCOUNT',5X 'NUMBER'/'+',86('_')/' ')                        CTAC2500
      N = 1                                                             CTAC2510
121   WRITE (IOUT,106) (D4(J,I),J=1,3), DUM1, DUM2                      CTAC2520
      N = N + 1                                                         CTAC2530
122   CONTINUE                                                          CTAC2540
      N = 51                                                            CTAC2550
      DO 132 I = 1,50                                                   CTAC2560
      READ (INPT,105) (D5(J,I),J=1,3), DUM1, DUM2                       CTAC2570
      IF (N.LE.50) GO TO 131                                            CTAC2580
      WRITE (IOUT,51) TYPE, DATE, TITLE                                 CTAC2590
      WRITE (IOUT,130)                                                  CTAC2600
130   FORMAT('0TABLE D5 SPLITS BASE COST INTO 5-DIGIT COST COMPONENTS   CTAC2610
     *(THOUSANDS OF DOLLARS)'/'0',5X,'$ FACTORY ',5X,'  $ SITE  ',5X,'  CTAC2620
     *$ SITE  ',20X,'CARD'/7X,'COST ',9X,'   LABOR ',7X,'MATERIAL',     CTAC2630
     * 9X,'ACCOUNT',5X 'NUMBER'/'+',86('_')/' ')                        CTAC2640
      N = 1                                                             CTAC2650
131   WRITE (IOUT,106) (D5(J,I),J=1,3), DUM1, DUM2                      CTAC2660
      N = N + 1                                                         CTAC2670
132   CONTINUE                                                          CTAC2680
135   WRITE (IOUT,51) TYPE, DATE, TITLE                                 CTAC2690
      WRITE (IOUT,140)                                                  CTAC2700
140   FORMAT('0TABLE A1 CONTAINS CONSTANTS FOR THE EQUATION'/'0',10X,'Y CTAC2710
     *= A + B / (C + X) **D'/'0 WHICH DESCRIBES THE INDIRECT COST CURVESCTAC2720
     * IN NUS-531'/' PAGES 3-37, 3-38, AND C-4 AS MODIFIED BY ORNL'/    CTAC2730
     * '0',10X,'A',14X,'B',14X,'C',14X,'D',15X,'ACCOUNT',6X,'CARD NUMBERCTAC2740
     *'/'+',95('_')/' ')                                                CTAC2750
      DO 142 I = 1,10                                                   CTAC2760
      READ (INPT,144) (A1(J,I),J=1,4), DUM1, DUM2                       CTAC2770
```

```
144   FORMAT(4F15.0,4X,2A8)                                          CTAC2780
      WRITE (IOUT,141) (AI(J,I),J=1,4), DUM1, DUM2                   CTAC2790
141   FORMAT(' ',4F15.5,11X,A8,6X,A8)                                CTAC2800
142   CONTINUE                                                       CTAC2810
      READ (INPT,143) BWE                                            CTAC2820
143   FORMAT(F10.0)                                                  CTAC2830
      WRITE (IOUT,150) BWE                                           CTAC2840
150   FORMAT('OTABLE AA CONTAINS CONSTANTS FOR THE EQUATION'/        CTAC2850
     * '0',10X,'Y = A + B * (X / BASE) **C'/                         CTAC2860
     * 'OWHICH DESCRIBES THE DIRECT COST (IN THOUSANDS OF DOLLARS)'/ CTAC2870
     * ' LESS CONTINGENCY AND SPARE PARTS OF EACH 2-DIGIT ACCOUNT'/  CTAC2880
     * ' AS A FUNCTION OF POWER LEVEL BASE SIZE = ', F7.2/           CTAC2890
     * '0',11X,'A',14X,'B',14X,'C',15X,'ACCOUNT',8X,'CARD NUMBER'/   CTAC2900
     * '+',84('_')/' ')                                              CTAC2910
      DO 153 I = 1,10                                                CTAC2920
      READ (INPT,151) (AA(J,I),J=1,3), DUM1, DUM2                    CTAC2930
151   FORMAT(3F15.0,19X,2A8)                                         CTAC2940
      WRITE (IOUT,152) (AA(J,I),J=1,3), DUM1, DUM2                   CTAC2950
152   FORMAT(' ',3F15.5,15X,A8,5X,A8)                                CTAC2960
153   CONTINUE                                                       CTAC2970
      READ (INPT,160) IAR1, DUM2                                     CTAC2980
160   FORMAT(I3,69X,A8)                                              CTAC2990
      WRITE (IOUT,51) TYPE, DATE, TITLE                              CTAC3000
      WRITE (IOUT,161) IAR1, DUM2                                    CTAC3010
161   FORMAT('OIAR1 DESCRIBES THE NUMBER OF 1 DIGIT ACCOUNTS', 15X,  CTAC3020
     * 'CARD NUMBER'/ '+',73('_')/'0',I3,59X,A8/'0')                 CTAC3030
      READ (INPT,170) (IAR2(I), I=1,5), DUM2                         CTAC3040
170   FORMAT(5I3,57X,A8)                                             CTAC3050
      WRITE (IOUT,171) (IAR2(I), I=1,5), DUM2                        CTAC3060
171   FORMAT('OIAR2 DESCRIBES THE NUMBER OF 2 DIGIT ACCOUNTS', 15X,  CTAC3070
     * 'CARD NUMBER'/ '+',73('_')/'0',5I3,47X,A8/'0')                CTAC3080
      READ (INPT,180) (IAR3(I), I=1,15), DUM2                        CTAC3090
180   FORMAT(15I3,27X,A8)                                            CTAC3100
      WRITE (IOUT,181) (IAR3(I), I=1,15), DUM2                       CTAC3110
181   FORMAT('OIAR3 DESCRIBES THE NUMBER OF 3 DIGIT ACCOUNTS', 15X,  CTAC3120
     * 'CARD NUMBER'/'+',73('_')/'0',15I3,17X,A8/'0')                CTAC3130
      WRITE (IOUT,190)                                               CTAC3140
190   FORMAT('OIAR4 DESCRIBES THE NUMBER OF 4 DIGIT ACCOUNTS', 15X,  CTAC3150
     * 'CARD NUMBER'/ '+',73('_'))                                   CTAC3160
      L = 0                                                          CTAC3170
      DO 193 I = 1,3                                                 CTAC3180
      K = L + 1                                                      CTAC3190
      L = K + 19                                                     CTAC3200
      READ (INPT,191) (IAR4(J),J=K,L), DUM2                          CTAC3210
191   FORMAT(20I3,12X,A8)                                            CTAC3220
      WRITE (IOUT,192) (IAR4(J), J=K,L), DUM2                        CTAC3230
192   FORMAT(' ',20I3,2X,A8)                                         CTAC3240
193   CONTINUE                                                       CTAC3250
      WRITE (IOUT,194)                                               CTAC3260
194   FORMAT('OIAR5 DESCRIBES THE NUMBER OF 5 DIGIT ACCOUNTS', 15X,  CTAC3270
     * 'CARD NUMBER'/ '+',73('_'))                                   CTAC3280
      L = 0                                                          CTAC3290
      DO 195 I = 1,8                                                 CTAC3300
      K = L + 1                                                      CTAC3310
      L = K + 19                                                     CTAC3320
      READ (INPT,191) (IAR5(J),J=K,L), DUM2                          CTAC3330
      WRITE (IOUT,192) (IAR5(J), J=K,L), DUM2                        CTAC3340
195   CONTINUE                                                       CTAC3350
      N22 = 0                                                        CTAC3360
      N32 = 0                                                        CTAC3370
      N42 = 0                                                        CTAC3380
      WRITE (IOUT,51) TYPE, DATE, TITLE                              CTAC3390
      WRITE (IOUT,196) IAR1                                          CTAC3400
196   FORMAT('0',30X,'ACCOUNT INDICES'/'+',120('_')/' |IAR1 |  IAR2  |  CTAC3410
     *IAR3  |  IAR4  |  IAR5',79X,'|'/'+',120('_')/' ',I3/'+',7('_'))  CTAC3420
      WRITE (IOUT,201)                                               CTAC3430
      DO 206 I1 = 1,IAR1                                             CTAC3440
      WRITE (IOUT,197) IAR2(I1)                                      CTAC3450
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197   FORMAT(10X,I3/'+',6X,10('_'))                                    CTAC3460
      WRITE (IOUT,201)                                                 CTAC3470
      N2 = IAR2(I1)                                                    CTAC3480
      IF (N2.EQ.0) GO TO 206                                           CTAC3490
      N21 = N22 + 1                                                    CTAC3500
      N22 = N21 + N2 - 1                                               CTAC3510
      DO 205 I2 = N21,N22                                              CTAC3520
      WRITE (IOUT,198) IAR3(I2)                                        CTAC3530
198   FORMAT(19X,I3/'+',15X,10('_'))                                   CTAC3540
      WRITE (IOUT,201)                                                 CTAC3550
      N3 = IAR3(I2)                                                    CTAC3560
      IF (N3.EQ.0) GO TO 205                                           CTAC3570
      N31 = N32 + 1                                                    CTAC3580
      N32 = N31 + N3 -1                                                CTAC3590
      DO 204 I3 = N31,N32                                              CTAC3600
      WRITE (IOUT,199) IAR4(I3)                                        CTAC3610
199   FORMAT(28X,I3/'+',24X,10('_'))                                   CTAC3620
      WRITE (IOUT,201)                                                 CTAC3630
      N4 = IAR4(I3)                                                    CTAC3640
      IF (N4.EQ.0) GO TO 204                                           CTAC3650
      N41 = N42 + 1                                                    CTAC3660
      N42 = N41 + N4 - 1                                               CTAC3670
      WRITE (IOUT,200) (IAR5(I4),I4=N41,N42)                           CTAC3680
200   FORMAT(37X,40I2)                                                 CTAC3690
      WRITE (IOUT,201)                                                 CTAC3700
201   FORMAT('+|',5X,'|',8X,'|',8X,'|',8X,'|',85X,'|')                 CTAC3710
      WRITE (IOUT,202)                                                 CTAC3720
202   FORMAT('+',33X,87('_'))                                          CTAC3730
204   CONTINUE                                                         CTAC3740
205   CONTINUE                                                         CTAC3750
206   CONTINUE                                                         CTAC3760
      WRITE (IOUT,207)                                                 CTAC3770
207   FORMAT('+',120('_'))                                             CTAC3780
      N = 51                                                           CTAC3790
      WRITE (IOUT,51) TYPE, DATE, TITLE                                CTAC3800
      WRITE (IOUT,210) TYPE                                            CTAC3810
210   FORMAT('0',36X,'1971'/' ',30X,'CASH FLOW ',A8/'0FRACTION OF ',15X,CTAC3820
     * 'ACCOUNT'/' CONSTRUCTION',4X,'1',9X,'2',9X,'3',9X,'4',9X,'5',9X, CTAC3830
     * '6',9X,'7',9X,'CARD'/' PERIOD 0-1.0',75X,'NUMBER'/'+',95('_')/   CTAC3840
     * ' ')                                                             CTAC3850
      DO 214 I = 1,50                                                  CTAC3860
211   READ (INPT,212) (CFCA(J,I), J=1,8), DUM2                         CTAC3870
212   FORMAT(8F8.5,8X,A8)                                              CTAC3880
      WRITE (IOUT,213) (CFCA(J,I), J=1,8), DUM2                        CTAC3890
213   FORMAT(' ',F10.5,2X,7F10.5,4X,A8)                                CTAC3900
214   CONTINUE                                                         CTAC3910
      WRITE (IOUT,51) TYPE, DATE, TITLE                                CTAC3920
      WRITE (IOUT,220)                                                 CTAC3930
220   FORMAT('0',5X,'MIXING FACTORS FOR BASE LABOR   '/30X,'ACCOUNT'/  CTAC3940
     * 5X,'1',10X,'2',10X,'3',10X,'4',10X,'5',10X,'6',10X,'7',6X,      CTAC3950
     * 'LABOR   ',10X,'CARD NUMBER'/'+',104('_')/' ')                  CTAC3960
      DO 223 I = 1,16                                                  CTAC3970
       READ (INPT,221) (FACR1(J,I),J=1,7), DUM1, DUM2, DUM3            CTAC3980
221   FORMAT(7(F7.5),4X,2A8,3X,A8)                                     CTAC3990
      WRITE (IOUT,222) (FACR1(J,I), J=1,7), DUM1, DUM2, DUM3           CTAC4000
222   FORMAT(1X,7(F7.5,4X),2A8,2X,A8)                                  CTAC4010
223   CONTINUE                                                         CTAC4020
      WRITE (IOUT,230)                                                 CTAC4030
230   FORMAT('0',5X,'MIXING FACTORS FOR SITE LABOR   '/30X,'ACCOUNT'/  CTAC4040
     * 5X,'1',10X,'2',10X,'3',10X,'4',10X,'5',10X,'6',10X,'7',6X,      CTAC4050
     * 'LABOR   ',10X,'CARD NUMBER'/'+',104('_')/' ')                  CTAC4060
      DO 231 I = 1,16                                                  CTAC4070
       READ (INPT,221) (FACS1(J,I),J=1,7), DUM1, DUM2, DUM3            CTAC4080
      WRITE (IOUT,222) (FACS1(J,I), J=1,7), DUM1, DUM2, DUM3           CTAC4090
231   CONTINUE                                                         CTAC4100
      WRITE (IOUT,51) TYPE, DATE, TITLE                                CTAC4110
      WRITE (IOUT,240)                                                 CTAC4120
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240   FORMAT('0',5X,'MIXING FACTORS FOR BASE MATERIAL'/30X,'ACCOUNT'/   CTAC4130
     * 5X,'1',10X,'2',10X,'3',10X,'4',10X,'5',10X,'6',10X,'7',6X,       CTAC4140
     * 'MATERIAL',10X,'CARD NUMBER'/'+',104('_')/' ')                   CTAC4150
      DO 241 I = 1,16                                                   CTAC4160
       READ (INPT,221) (FACB2(J,I),J=1,7), DUM1, DUM2, DUM3             CTAC4170
      WRITE (IOUT,242) (FACB2(J,I), J=1,7), DUM1, DUM2, DUM3            CTAC4180
242   FORMAT(1X,7(F8.3,3X),2A8,2X,A8)                                   CTAC4190
241   CONTINUE                                                          CTAC4200
      WRITE (IOUT,250)                                                  CTAC4210
250   FORMAT('0',5X,'MIXING FACTORS FOR SITE MATERIAL'/30X,'ACCOUNT'/   CTAC4220
     * 5X,'1',10X,'2',10X,'3',10X,'4',10X,'5',10X,'6',10X,'7',6X,       CTAC4230
     * 'MATERIAL',10X,'CARD NUMBER'/'+',104('_')/' ')                   CTAC4240
      DO 251 I = 1,16                                                   CTAC4250
       READ (INPT,221) (FACS2(J,I),J=1,7), DUM1, DUM2, DUM3             CTAC4260
      WRITE (IOUT,242) (FACS2(J,I), J=1,7), DUM1, DUM2, DUM3            CTAC4270
251   CONTINUE                                                          CTAC4280
      WRITE (IOUT,51) TYPE, DATE, TITLE                                 CTAC4290
      WRITE (IOUT,260)                                                  CTAC4300
260   FORMAT('OTABLE AC2 DESCRIBES THE 2-DIGIT ACCOUNT NUMBERS AND ALPHACTAC4310
     *BETIC INFORMATION PRINT ON OUTPUT'/'0ACC NO  ALPHABETIC INFORMATIOCTAC4320
     *N',39X,'CARD NUMBER'/'+',80('_')/' ')                             CTAC4330
      DO 263 I = 1,12                                                   CTAC4340
      READ (INPT,261) (AC2(J,I),J=1,8), DUM1, DUM2                      CTAC4350
261   FORMAT(10A8)                                                      CTAC4360
      WRITE (IOUT,262) (AC2(J,I),J=1,8), DUM1, DUM2                     CTAC4370
262   FORMAT(' ',10A8)                                                  CTAC4380
263   CONTINUE                                                          CTAC4390
      N = 51                                                            CTAC4400
      DO 272 I = 1,60                                                   CTAC4410
      IF (N.LE.50) GO TO 271                                            CTAC4420
      WRITE (IOUT,51) TYPE, DATE, TITLE                                 CTAC4430
      WRITE (IOUT,270)                                                  CTAC4440
270   FORMAT('OTABLE AC3 DESCRIBES THE 3-DIGIT ACCOUNT NUMBERS AND ALPHACTAC4450
     *BETIC INFORMATION PRINT ON OUTPUT'/'0ACC NO  ALPHABETIC INFORMATIOCTAC4460
     *N',39X,'CARD NUMBER'/'+',80('_')/' ')                             CTAC4470
      N = 1                                                             CTAC4480
271   READ (INPT,261) (AC3(J,I),J=1,8), DUM1, DUM2                      CTAC4490
      WRITE (IOUT,262) (AC3(J,I),J=1,8), DUM1, DUM2                     CTAC4500
      N = N + 1                                                         CTAC4510
272   CONTINUE                                                          CTAC4520
      N = 51                                                            CTAC4530
      DO 282 I = 1,150                                                  CTAC4540
      IF (N.LE.50) GO TO 281                                            CTAC4550
      WRITE (IOUT,51) TYPE, DATE, TITLE                                 CTAC4560
      WRITE (IOUT,280)                                                  CTAC4570
280   FORMAT('OTABLE AC4 DESCRIBES THE 4-DIGIT ACCOUNT NUMBERS AND ALPHACTAC4580
     *BETIC INFORMATION PRINT ON OUTPUT'/'0ACC NO  ALPHABETIC INFORMATIOCTAC4590
     *N',39X,'CARD NUMBER'/'+',80('_')/' ')                             CTAC4600
      N = 1                                                             CTAC4610
281   READ (INPT,261) (AC4(J,I),J=1,8), DUM1, DUM2                      CTAC4620
      WRITE (IOUT,262) (AC4(J,I),J=1,8), DUM1, DUM2                     CTAC4630
      N = N + 1                                                         CTAC4640
282   CONTINUE                                                          CTAC4650
      N = 51                                                            CTAC4660
      DO 292 I = 1,50                                                   CTAC4670
      IF (N.LE.50) GO TO 291                                            CTAC4680
      WRITE (IOUT,51) TYPE, DATE, TITLE                                 CTAC4690
      WRITE (IOUT,290)                                                  CTAC4700
290   FORMAT('OTABLE AC5 DESCRIBES THE 5-DIGIT ACCOUNT NUMBERS AND ALPHACTAC4710
     *BETIC INFORMATION PRINT ON OUTPUT'/'0ACC NO  ALPHABETIC INFORMATIOCTAC4720
     *N',39X,'CARD NUMBER'/'+',80('_')/' ')                             CTAC4730
      N = 1                                                             CTAC4740
291   READ (INPT,261) (AC5(J,I),J=1,8), DUM1, DUM2                      CTAC4750
      WRITE (IOUT,262) (AC5(J,I),J=1,8), DUM1, DUM2                     CTAC4760
      N = N + 1                                                         CTAC4770
292   CONTINUE                                                          CTAC4780
      N = 51                                                            CTAC4790
      WRITE (IOUT,51) TYPE, DATE, TITLE                                 CTAC4800
      DO 302 I = 1,12                                                   CTAC4810
      IF (N.LE.50) GO TO 301                                            CTAC4820
      WRITE (IOUT,300)                                                  CTAC4830
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300   FORMAT('0TABLE ACC DESCRIBES THE 2-DIGIT ACCOUNT NUMBERS AND ALPHACTAC4840
     *BETIC INFORMATION PRINT ON OUTPUT'/'0ACC NO  ALPHABETIC INFORMATIOCTAC4850
     *N',39X,'CARD NUMBER'/'+',80('_')/' ')                              CTAC4860
      N = 1                                                              CTAC4870
301   READ (INPT,261) (ACC(J,I),J=1,8), DUM1, DUM2                       CTAC4880
      WRITE (IOUT,262) (ACC(J,I),J=1,8), DUM1, DUM2                      CTAC4890
      N = N + 1                                                          CTAC4900
302   CONTINUE                                                           CTAC4910
      IF (IFLAG.EQ.1) RECTAB(NOREC) = TYPE                               CTAC4920
      NOREC = NOREC + 1                                                  CTAC4930
      IF (IFLAG.EQ.0) RECTAB(NOREC) = TYPE                               CTAC4940
      WRITE (9) TYPE, YBC, YFIRST, TIMLED, RIB, RINT, OTP,               CTAC4950
     * HW, OVERS, DEOT, COS, COB, CONTM, CONTL, SPP, AMB, AMS, ALB,      CTAC4960
     * ALS, BMB, BMS, BLB, BLS, IBASE, ISITE, D2, D3, D4, D5, AI, BWE,   CTAC4970
     * AA, IAR1, IAR2, IAR3, IAR4, IAR5, CECA, FACB1, FACB2, FACS1,      CTAC4980
     * FACS2, FILB, FILS, AC2, AC3, AC4, AC5, ACC                        CTAC4990
      GO TO 10                                                           CTAC5000
400   WRITE (IOUT,401) TYPE1, IREC, DATE                                 CTAC5010
401   FORMAT('1',10X,A8,' RECORD NO. ',I3,10X,'DATE ',A8)                CTAC5020
      WRITE (IOUT,70) YBC, YFIRST, TIMLED, RIB                           CTAC5030
      WRITE (IOUT,71) OTP, HW, OVERS, DEOT, COS, COB                     CTAC5040
      WRITE (IOUT,51) TYPE, DATE, TITLE                                  CTAC5050
      WRITE (IOUT,72) CONTM, CONTL, SPP                                  CTAC5060
      WRITE (IOUT,74) (RINT(I), I=1,50)                                  CTAC5070
      WRITE (IOUT,51) TYPE1, DATE, TITLE                                 CTAC5080
      WRITE (IOUT,76)                                                    CTAC5090
      WRITE (IOUT,77) AMB                                                CTAC5100
      WRITE (IOUT,78) AMS                                                CTAC5110
      WRITE (IOUT,79) ALB                                                CTAC5120
      WRITE (IOUT,80) ALS                                                CTAC5130
      WRITE (IOUT,81) BMB                                                CTAC5140
      WRITE (IOUT,82) BMS                                                CTAC5150
      WRITE (IOUT,83) BLB                                                CTAC5160
      WRITE (IOUT,84) BLS                                                CTAC5170
      WRITE (IOUT,95) IBASE, ISITE                                       CTAC5180
412   WRITE (IOUT,51) TYPE1, DATE, TITLE                                 CTAC5190
      WRITE (IOUT,100)                                                   CTAC5200
      DO 414 I = 1,12                                                    CTAC5210
      WRITE (IOUT,413) (D2(4,I),J=1,3), I                                CTAC5220
413   FORMAT('0',3F15.2,33X,'D2',4X,I2)                                  CTAC5230
414   CONTINUE                                                           CTAC5240
      N = 51                                                             CTAC5250
      DO 417 I = 1,60                                                    CTAC5260
      IF (N.LE.50) GO TO 415                                             CTAC5270
      WRITE (IOUT,51) TYPE1, DATE, TITLE                                 CTAC5280
      WRITE (IOUT,110)                                                   CTAC5290
      N = 1                                                              CTAC5300
415   WRITE (IOUT,416) (D3(J,I),J=1,3), I                                CTAC5310
416   FORMAT('0',3F15.2,33X,'D3',4X,I2)                                  CTAC5320
      N = N + 1                                                          CTAC5330
417   CONTINUE                                                           CTAC5340
      N = 51                                                             CTAC5350
      DO 420 I = 1,150                                                   CTAC5360
      IF (N.LE.50) GO TO 418                                             CTAC5370
      WRITE (IOUT,51) TYPE1, DATE, TITLE                                 CTAC5380
      WRITE (IOUT,120)                                                   CTAC5390
      N = 1                                                              CTAC5400
418   WRITE (IOUT,416) (D4(J,I),J=1,3), I                                CTAC5410
419   FORMAT('0',3F15.2,33X,'D4',4X,I2)                                  CTAC5420
      N = N + 1                                                          CTAC5430
420   CONTINUE                                                           CTAC5440
      WRITE (IOUT,51) TYPE1, DATE, TITLE                                 CTAC5450
      WRITE (IOUT,130)                                                   CTAC5460
      DO 422 I = 1,50                                                    CTAC5470
      WRITE (IOUT,421) (D5(J,I),J=1,3), I                                CTAC5480
421   FORMAT('0',3F15.2,33X,'D5',4X,I2)                                  CTAC5490
422   CONTINUE                                                           CTAC5500
423   WRITE (IOUT,51) TYPE1, DATE, TITLE                                 CTAC5510
      WRITE (IOUT,140)                                                   CTAC5520
      DO 426 I = 1,10                                                    CTAC5530
      WRITE (IOUT,425) (AI(J,I),J=1,4), I                                CTAC5540
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425   FORMAT(' ',4F15.5,25X,'AI',4X,I2)                                CTAC5550
426   CONTINUE                                                         CTAC5560
      WRITE (IOUT,150) BWF                                             CTAC5570
      DO 428 I= 1,10                                                   CTAC5580
      WRITE (IOUT,427) (AA(J,I),J=1,3), I                              CTAC5590
427   FORMAT(' ',3F15.5,28X,'AA',4X,I2)                                CTAC5600
428   CONTINUE                                                         CTAC5610
      WRITE (IOUT,51) TYPE1, DATE, TITLE                               CTAC5620
      WRITE (IOUT,161) IAR1                                            CTAC5630
      WRITE (IOUT,429) (IAR2(I), I=1,5)                                CTAC5640
429   FORMAT('0IAR2 DESCRIBES THE NUMBER OF 2 DIGIT ACCOUNTS',15X      CTAC5650
     * 'CARD NUMBER'/'+',73('_')/'0',5I3,47X,'IAR2   1'/'0')           CTAC5660
      WRITE (IOUT,430) (IAR3(I), I=1,15)                               CTAC5670
430   FORMAT('0IAR3 DESCRIBES THE NUMBER OF 3 DIGIT ACCOUNTS',15X,     CTAC5680
     * 'CARD NUMBER'/'+',73('_')/'0',15I3,17X,'IAR3   1'/'0')          CTAC5690
      WRITE (IOUT,190)                                                 CTAC5700
      L = 0                                                            CTAC5710
      DO 432 I = 1,3                                                   CTAC5720
      K = L + 1                                                        CTAC5730
      L = K + 19                                                       CTAC5740
      WRITE (IOUT,431) (IAR4(J),J=K,L), I                              CTAC5750
431   FORMAT(' ',20I3,2X,'IAR4',I4)                                    CTAC5760
432   CONTINUE                                                         CTAC5770
      WRITE (IOUT,194)                                                 CTAC5780
      L = 0                                                            CTAC5790
      DO 434 I = 1,8                                                   CTAC5800
      K = L + 1                                                        CTAC5810
      L = K + 19                                                       CTAC5820
      WRITE (IOUT,433) (IAR5(J),J=K,L)                                 CTAC5830
433   FORMAT(' ',20I3,2X,'IAR5',I4)                                    CTAC5840
434   CONTINUE                                                         CTAC5850
      N22 = 0                                                          CTAC5860
      N32 = 0                                                          CTAC5870
      N42 = 0                                                          CTAC5880
      WRITE (IOUT,51) TYPE1, DATE, TITLE                               CTAC5890
      WRITE (IOUT,196) IAR1                                            CTAC5900
      WRITE (IOUT,201)                                                 CTAC5910
      DO 437 I1 = 1,IAR1                                               CTAC5920
      WRITE (IOUT,197) IAR2(I1)                                        CTAC5930
      WRITE (IOUT,201)                                                 CTAC5940
      N2 = IAR2(I1)                                                    CTAC5950
      IF (N2.EQ.0) GO TO 437                                           CTAC5960
      N21 = N22 + 1                                                    CTAC5970
      N22 = N21 + N2 - 1                                               CTAC5980
      DO 436 I2 = N21,N22                                              CTAC5990
      WRITE (IOUT,198) IAR3(I2)                                        CTAC6000
      WRITE (IOUT,201)                                                 CTAC6010
      N3 = IAR3(I2)                                                    CTAC6020
      IF (N3.EQ.0) GO TO 436                                           CTAC6030
      N31 = N32 + 1                                                    CTAC6040
      N32 = N31 + N3 - 1                                               CTAC6050
      DO 435 I3 = N31, N32                                             CTAC6060
      WRITE (IOUT,199) IAR4(I3)                                        CTAC6070
      WRITE (IOUT,201)                                                 CTAC6080
      N4 = IAR4(I3)                                                    CTAC6090
      IF (N4.EQ.0) GO TO 435                                           CTAC6100
      N41 = N42 + 1                                                    CTAC6110
      N42 = N41 + N4 - 1                                               CTAC6120
      WRITE (6,200) (IAR5(I4), I4=N41,N42)                             CTAC6130
      WRITE (IOUT,201)                                                 CTAC6140
      WRITE (IOUT,202)                                                 CTAC6150
435   CONTINUE                                                         CTAC6160
436   CONTINUE                                                         CTAC6170
437   CONTINUE                                                         CTAC6180
      WRITE (IOUT,207)                                                 CTAC6190
      N = 51                                                           CTAC6200
      WRITE (IOUT,51) TYPE1, DATE, TITLE                               CTAC6210
      WRITE (IOUT,210) TYPE1                                           CTAC6220
      DO 440 I = 1,50                                                  CTAC6230
438   WRITE (IOUT,439) (CFCA(J,I),J=1,8), I                            CTAC6240
```

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439   FORMAT(' ',F10.5,2X,7F10.5,4X,'CFCA',I5)                          CTAC6250
440   CONTINUE                                                          CTAC6260
      WRITE (IOUT,51) TYPE1, DATE, TITLE                                CTAC6270
      WRITE (IOUT,220)                                                  CTAC6280
      DO 445 I = 1,16                                                   CTAC6290
      WRITE (IOUT,444) (FACB1(J,I), J=1,7), I                           CTAC6300
444   FORMAT(1X,7(F7.5,4X),18X,'FACB1',I3)                              CTAC6310
445   CONTINUE                                                          CTAC6320
      WRITE (IOUT,230)                                                  CTAC6330
      DO 450 I = 1,16                                                   CTAC6340
      WRITE (IOUT,449) (FACS1(J,I),J=1,7), I                            CTAC6350
449   FORMAT(1X,7(F7.5,4X),18X,'FACS1',I3)                              CTAC6360
450   CONTINUE                                                          CTAC6370
      WRITE (IOUT,51) TYPE1, DATE, TITLE                                CTAC6380
      WRITE (IOUT,240)                                                  CTAC6390
      DO 455 I = 1,16                                                   CTAC6400
      WRITE (IOUT,454) (FACB2(J,I),J=1,7), I                            CTAC6410
454   FORMAT(1X,7(F7.2,4X),18X,'FACB2',I3)                              CTAC6420
455   CONTINUE                                                          CTAC6430
      WRITE (IOUT,250)                                                  CTAC6440
      DO 460 I = 1,16                                                   CTAC6450
      WRITE (IOUT,459) (FACS2(J,I),J=1,7), I                            CTAC6460
459   FORMAT(1X,7(F7.2,4X),18X,'FACS2',I3)                              CTAC6470
460   CONTINUE                                                          CTAC6480
      WRITE (IOUT,51) TYPE1, DATE, TITLE                                CTAC6490
      WRITE (IOUT,260)                                                  CTAC6500
      DO 465 I = 1,12                                                   CTAC6510
      WRITE (IOUT,463) (AC2(J,I),J=1,8), I                              CTAC6520
463   FORMAT(' ',8A8,6X,'AC2',2X,I3)                                    CTAC6530
465   CONTINUE                                                          CTAC6540
      N = 51                                                            CTAC6550
      DO 470 I = 1,60                                                   CTAC6560
      IF (N.LE.50) GO TO 468                                            CTAC6570
      WRITE (IOUT,51) TYPE1, DATE, TITLE                                CTAC6580
      WRITE (IOUT,270)                                                  CTAC6590
      N = 1                                                             CTAC6600
468   WRITE (IOUT,469) (AC3(J,I), J=1,8), I                             CTAC6610
469   FORMAT(' ',8A8,6X,'AC3',2X,I3)                                    CTAC6620
      N = N + 1                                                         CTAC6630
470   CONTINUE                                                          CTAC6640
      N = 51                                                            CTAC6650
      DO 480 I = 1,150                                                  CTAC6660
      IF (N.LE.50) GO TO 478                                            CTAC6670
      WRITE (IOUT,51) TYPE1, DATE, TITLE                                CTAC6680
      WRITE (IOUT,280)                                                  CTAC6690
      N = 1                                                             CTAC6700
478   WRITE (IOUT,479) (AC4(J,I),J=1,8), I                              CTAC6710
479   FORMAT(' ',8A8,6X,'AC4',2X,I3)                                    CTAC6720
      N = N + 1                                                         CTAC6730
480   CONTINUE                                                          CTAC6740
      WRITE (IOUT,51) TYPE1, DATE, TITLE                                CTAC6750
      WRITE (IOUT,290)                                                  CTAC6760
      DO 490 I = 1,50                                                   CTAC6770
      WRITE (IOUT,485) (AC5(J,I), J=1,8), I                             CTAC6780
485   FORMAT(' ',8A8,6X,'AC5',2X,I3)                                    CTAC6790
490   CONTINUE                                                          CTAC6800
      WRITE (IOUT,51) TYPE1, DATE, TITLE                                CTAC6810
      WRITE (IOUT,300)                                                  CTAC6820
      DO 500 I = 1,12                                                   CTAC6830
      WRITE (IOUT,495) (ACC(J,I),J=1,8), I                              CTAC6840
495   FORMAT(' ',8A8,6X,'ACC',2X,I3)                                    CTAC6850
500   CONTINUE                                                          CTAC6860
      GO TO 10                                                          CTAC6870
1000  IF (ITAPE.EQ.0) GO TO 1002                                        CTAC6880
      IF (IFLAG.EQ.1) GO TO 1010                                        CTAC6890
1001  READ (8,END=1002) TYPE1, YBC, YFIRST, TIMLED, RIB, RINT, DTP,     CTAC6900
     * HW, OVERS, DEOT, CDS, CDB, CONTM, CONTL, SPP, AMR, AMS, ALR,     CTAC6910
     * ALS, BMB, BMS, BLR, BLS, IBASE, ISITE, D2, D3, D4, D5, AI, BWE,  CTAC6920
     * AA, IAR1, IAR2, IAR3, IAR4, IAR5, CFCA, FACB1, FACB2, FACS1,     CTAC6930
     * FACS2, FILR, FILS, AC2, AC3, AC4, AC5, ACC                       CTAC6940
      NOREC = NOREC + 1                                                 CTAC6950
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1010  RECTAB(NOREC) = TYPE1                                              CTAC6960
      WRITE (9) TYPE1, YBC, YFIRST, TIMLED, RIP, RINT, OTP,              CTAC6970
     * HW, OVERS, DEOT, COS, COB, CONTW, CONTL, SPP, AMB, AMS, ALB,      CTAC6980
     * ALS, BMB, BMS, BLB, BLS, IBASE, ISITE, D2, D3, D4, D5, AT, BWE,   CTAC6990
     * AA, IAR1, IAR2, IAR3, IAR4, IAR5, CFCA, FACB1, FACB2, FACS1,      CTAC7000
     * FACS2, FILB, FILS, AC2, AC3, AC4, AC5, ACC                        CTAC7010
      GO TO 1001                                                         CTAC7020
1002  END FILE 9                                                         CTAC7030
      WRITE (IOUT,1003)                                                  CTAC7040
1003  FORMAT('1NEW MASTER LIST')                                         CTAC7050
      DO 1005 I = 1,NOREC                                                CTAC7060
      WRITE (IOUT,1004) I, RECTAB(I)                                     CTAC7070
1004  FORMAT('0RECORD NO ',I2,' IS PLANT TYPE ',A8)                      CTAC7080
1005  CONTINUE                                                           CTAC7090
      STOP                                                               CTAC7100
      END                                                                CTAC7110
//GO.FT06F001 DD SYSOUT=A,DCB=(RECFM=FB,LRECL=133,BLKSIZE=1064)          CTAC7120
//GO.FT08F001 DD DUMMY                                                   CTAC7130
//GO.FT09F001 DD UNIT=TAPE9,LABEL=(1,BLP),DISP=(NEW,KEEP)                CTAC7140
//GO.FT04F001 DD DSN=&&CFL,DISP=(OLD,DELETE)                             CTAC7150
//GO.FT05F001 DD *                                                       CTAC7160
          BLANK CARD PRODUCES NEW MASTER FROM MASTER CARD SOURCE         CTAC7170
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PAGE DATE 01-01-73

FINAL DEC ESTIMATE (SINGLE UNIT) (WITH NEAR ZERO RAD WASTE)

LOCATION FACTORS FOR BASE 1.00000 0.0 0.0 0.0 0.0

LOCATION FACTORS FOR SITE 1.00000 0.0 0.0 0.0 0.0

YEAR FOR START OF CONSTRUCTION - BASE CASE
YRC = 1971.00000

START OF YEAR RANGE FOR BASE AND ESCALATION
YEIRST = 1969.00000

LEAD TIME FROM PURCHASE OF LAND TO START OF DESIGN AND CONSTRUCTION
TIMLED = 1.00000 0.0 0.0 0.0 0.0 -1.00000

AVERAGE ANNUAL INTEREST RATE IN PERCENT
RIR = 0.0

OVERTIME PREMIUM AS FUNCTION OF BASE PAY
OTP = 2.00000
NUMBER OF HOURS IN WORK WEEK AT SITE
HW= 40.00000
OVERTIME EFFICIENCY
OVERS = 0.0

EFFICIENCY LOSS
DEOT = 0.01000

INPUT SITE LOAD FACTOR
CDS = 0.17000

INPUT BASE LOAD FACTOR
CDB = 0.17000

PAGE DATE 01-01-73

FINAL DEC ESTIMATE (SINGLE UNIT) (WITH NEAR ZERO RAD WASTE)

CONTM = CONTINGENCY AS % OF MATERIAL COST OF ACCOUNT
CONTL = CONTINGENCY AS % OF LABOR COST OF ACCOUNT
SPP = SPARE PARTS ALLOWANCE AS % OF ACCOUNT

% FOR ACC.	1	2	3	4	5	6	7				
CONTM	0.0	5.00	5.00	5.00	5.00	5.00	5.00	0.0	0.0	0.0	0.0
CONTL	0.0	10.00	10.00	10.00	10.00	10.00	10.00	0.0	0.0	0.0	0.0
SPP	0.0	1.00	1.00	1.00	1.00	1.00	1.00	0.0	0.0	0.0	0.0

ANNUAL INTEREST RATE IN EACH TIME PERIOD (BY YEAR) OF CONSTRUCTION PERIOD

0.07000	0.07000	0.07000	0.07000	0.07000	0.07000	0.07000	0.07000	0.07000	0.07000
0.07000	0.07000	0.07000	0.07000	0.07000	0.07000	0.07000	0.07000	0.07000	0.07000
0.07000	0.07000	0.07000	0.07000	0.07000	0.07000	0.07000	0.07000	0.07000	0.07000
0.07000	0.07000	0.07000	0.07000	0.07000	0.07000	0.07000	0.07000	0.07000	0.07000
0.07000	0.07000	0.07000	0.07000	0.07000	0.07000	[illegible]	[illegible]	[illegible]	[illegible]

PWR DATE 01-31-73

FINAL UEC ESTIMATE (SINGLE UNIT) (WITH NEAR ZERO RAD WASTE)

COEFFICIENTS USED FOR CALCULATING BASE RATE AND ESCALATION

ACCOUNT 1	2	3	4	5	6	7	
1000.00	15.39	15.39	15.39	15.39	15.39	15.39	AMP
1000.00	15.39	15.39	15.39	15.39	15.39	15.39	AMS
5.84	6.44	6.80	6.79	7.29	6.30	5.82	ALP
5.84	6.44	6.80	6.79	7.29	6.30	5.82	ALS
1.00	1.05	1.05	1.05	1.05	1.05	1.05	BMP
1.00	1.05	1.05	1.05	1.05	1.05	1.05	BMS
1.10	1.10	1.10	1.10	1.10	1.10	1.10	BLP
1.10	1.10	1.10	1.10	1.10	1.10	1.10	BLS

FLAGS USED TO INDICATE LOCATION READ FROM LABOR TAPE

IBASE =	1	0	0	0	0
ISITE =	1	0	0	0	0

PWR DATE 01-31-73

FINAL UEC ESTIMATE (SINGLE UNIT) (WITH NEAR ZERO RAD WASTE)

TABLE 02 SPLITS BASE COST INTO 2-DIGIT COST COMPONENTS (THOUSANDS OF DOLLARS)

$ FACTORY COST	$ SITE LABOR	$ SITE MATERIAL	ACCOUNT	CARD NUMBER	
0.00	0.00	1000.00	20	02	1
1499.00	21215.00	10823.00	21	02	2
38987.00	10038.00	7198.00	22	02	3
38191.00	15919.00	8236.00	23	02	4
6265.00	6181.00	2024.00	24	02	5
1461.00	2086.00	673.00	25	02	6
0.00	0.00	0.00	26	02	7
13617.00	0.00	0.00	91	02	8
23991.00	0.00	0.00	92	02	9
8591.00	0.00	0.00	93	02	10
0.00	0.00	0.00		02	11
0.00	0.00	0.00		02	12

OWR DATE 01-31-73

FINAL UFC ESTIMATE (SINGLE UNIT) (WITH NEAR ZERO RAD WASTE)

TABLE 23 SPLITS BASE COST INTO 3-DIGIT COST COMPONENTS (THOUSANDS OF DOLLARS)

$ FACTORY COST	$ SITE LABOR	$ SITE MATERIAL	ACCOUNT	CARD NUMBER	
0.00	0.00	1030.00	201	03	1
0.00	0.00	0.00	202	03	2
0.00	1339.00	1037.00	211	03	3
1057.00	8772.00	4012.00	212	03	4
86.00	2694.00	2007.00	213	03	5
0.00	1754.00	844.00	214	03	6
39.00	3036.00	1107.00	215	03	7
0.00	0.00	0.00	216	03	8
22.00	919.00	432.00	217	03	9
295.00	2701.00	1384.00	218	03	1
0.00	0.00	0.00	219	03	11
13690.00	726.00	161.00	221	03	12
17770.00	2426.00	3118.00	222	03	13
311.00	1480.00	1431.00	223	03	14
1346.00	1028.00	268.00	224	03	15
589.00	586.00	360.00	225	03	16
1496.00	2737.00	1718.00	226	03	17
3785.00	1055.00	443.00	227	03	18
0.00	0.00	0.00	228	03	19
0.00	0.00	0.00	229	03	20
29989.00	2777.00	678.00	231	03	21
1248.00	2776.00	1221.00	232	03	22
3280.00	2773.00	940.00	233	03	23
2618.00	2398.00	2031.00	234	03	24
179.00	4040.00	3176.00	235	03	25
785.00	650.00	190.00	236	03	26
1015.00	191.00	59.00	241	03	27
3618.00	756.00	202.00	242	03	28
459.00	80.00	11.00	243	03	29
0.00	155.00	102.00	244	03	30
63.00	1188.00	343.00	245	03	31
1111.00	3811.00	1307.00	246	03	32
495.00	153.00	50.00	251	03	33
704.00	1827.00	597.00	252	03	34
25.00	75.00	25.00	253	03	35
237.00	31.00	1.00	254	03	36
4088.00	0.00	0.00	911	03	37
6808.00	0.00	0.00	912	03	38
2723.00	0.00	0.00	913	03	39
11896.00	0.00	0.00	921	03	40
11996.00	0.00	0.00	922	03	41
5481.00	0.00	0.00	931	03	42
498.00	0.00	0.00	932	03	43
2612.00	0.00	0.00	933	03	44
0.00	0.00	0.00		03	45
0.00	0.00	0.00		03	46
0.00	0.00	0.00		03	47
0.00	0.00	0.00		03	48
0.00	0.00	0.00		03	49
0.00	0.00	0.00		03	50

OWR DATE 01-31-73

FINAL UFC ESTIMATE (SINGLE UNIT) (WITH NEAR ZERO RAD WASTE)

TABLE 23 SPLITS BASE COST INTO 3-DIGIT COST COMPONENTS (THOUSANDS OF DOLLARS)

$ FACTORY COST	$ SITE LABOR	$ SITE MATERIAL	ACCOUNT	CARD NUMBER	
0.00	0.00	0.00		03	51
0.00	0.00	0.00		03	52
0.00	0.00	0.00		03	53
0.00	0.00	0.00		03	54
0.00	0.00	0.00		03	55
0.00	0.00	0.00		03	56
0.00	0.00	0.00		03	57
0.00	0.00	0.00		03	58
0.00	0.00	0.00		03	59
0.00	0.00	0.00		03	60

PWR DATE 01-31-73

FINAL UFC ESTIMATE (SINGLE UNIT) (WITH NEAR ZERO RAD WASTE)

TABLE D4 SPLITS BASE COST INTO 4-DIGIT COST COMPONENTS (THOUSANDS OF DOLLARS)

$ FACTORY COST	$ SITE LABOR	$ SITE MATERIAL	ACCOUNT	CARD NUMBER	
0.00	744.00	392.00	211.1	D4	1
0.00	0.00	0.00	211.2	D4	2
0.00	695.00	645.00	211.3	D4	3
0.00	0.00	0.00	212.1	D4	4
1057.00	682.00	353.00	212.2	D4	5
0.00	3090.00	3659.00	212.3	D4	6
0.00	2087.00	1846.00	213.1	D4	7
86.00	607.00	161.00	213.2	D4	8
0.00	1754.00	844.00	214.1	D4	9
0.00	0.00	0.00	214.2	D4	10
0.00	0.00	0.00	214.3	D4	11
0.00	2812.00	999.00	215.1	D4	12
39.00	224.00	108.00	215.2	D4	13
0.00	0.00	0.00	216.1	D4	14
0.00	0.00	0.00	216.2	D4	15
0.00	849.00	406.00	217.1	D4	16
22.00	70.00	26.00	217.2	D4	17
45.00	924.00	360.00	218A	D4	18
10.00	437.00	158.00	218B	D4	19
150.00	440.00	320.00	218C	D4	20
90.00	547.00	407.00	218D	D4	21
0.00	253.00	79.00	218E	D4	22
0.00	100.00	61.00	218F	D4	23
9455.00	626.00	152.00	221.1	D4	24
4223.00	90.00	9.00	221.2	D4	25
0.00	0.00	0.00	221.3	D4	26
12.00	10.00	0.00	221.4	D4	27
17770.00	2426.00	3118.00	222.1	D4	28
0.00	0.00	0.00	222.2	D4	29
0.00	0.00	0.00	222.3	D4	30
128.00	284.00	164.00	223.1	D4	31
0.00	0.00	0.00	223.2	D4	32
117.00	848.00	903.00	223.3	D4	33
66.00	348.00	364.00	223.4	D4	34
875.00	739.00	238.00	224.1	D4	35
410.00	277.00	128.00	224.2	D4	36
61.00	12.00	2.00	224.3	D4	37
171.00	61.00	22.00	225.1	D4	38
0.00	0.00	0.00	225.2	D4	39
111.00	27.00	2.00	225.3	D4	40
307.00	498.00	236.00	225.4	D4	41
45.00	33.00	10.00	226.1	D4	42
0.00	0.00	0.00	226.2	D4	43
0.00	0.00	0.00	226.3	D4	44
180.00	188.00	237.00	226.4	D4	45
990.00	990.00	625.00	226.5	D4	46
0.00	0.00	0.00	226.6	D4	47
281.00	626.00	361.00	226.7	D4	48
0.00	0.00	0.00	226.8	D4	49
0.00	900.00	85.00	226.9	D4	50

PXP DATE 01-31-73

FINAL UFC ESTIMATE (SINGLE UNIT) (WITH NEAR ZERO RAD WASTE)

TABLE D4 SPLITS BASE COST INTO 4-DIGIT COST COMPONENTS (THOUSANDS OF DOLLARS)

$ FACTORY COST	$ SITE LABOR	$ SITE MATERIAL	ACCOUNT	CA-3 NUMBER	
2200.00	250.00	30.00	227.1	D4	51
1585.00	100.00	0.00	227.2	D4	52
0.00	255.00	152.00	227.3	D4	53
0.00	0.00	0.00	227.4	D4	54
0.00	450.00	260.00	227.5	D4	55
0.00	0.00	0.00	228.1	D4	56
0.00	0.00	0.00	228.2	D4	57
0.00	0.00	0.00	228.3	D4	58
0.00	0.00	0.00	228.4	D4	59
0.00	0.00	0.00	229.1	D4	60
0.00	0.00	0.00	229.2	D4	61
0.00	0.00	0.00	229.3	D4	62
29950.00	2000.00	200.00	231.1	D4	63
0.00	616.00	310.00	231.2	D4	64
0.00	0.00	0.00	231.3	D4	65
39.00	116.00	101.00	231.4	D4	66
0.00	45.00	67.00	231.5	D4	67
0.00	0.00	0.00	231.6	D4	68
0.00	0.00	0.00	231.7	D4	69
0.00	0.00	0.00	231.8	D4	70
312.00	155.00	32.00	232.1	D4	71
936.00	2121.00	1188.00	232.2	D4	72
0.00	0.00	0.00	232.3	D4	73
0.00	0.00	0.00	232.4	D4	74
2900.00	775.00	25.00	233.1	D4	75
480.00	1820.00	810.00	233.2	D4	76
0.00	183.00	97.00	233.3	D4	77
0.00	0.00	0.00	233.4	D4	78
1500.00	130.00	40.00	234.1	D4	79
1118.00	138.00	16.00	234.2	D4	8
0.00	3140.00	1975.00	234.3	D4	81
0.00	2570.00	1569.00	235.1	D4	82
51.00	410.00	196.00	235.2	D4	83
119.00	350.00	345.00	235.3	D4	84
0.00	250.00	100.00	235.4	D4	85
0.00	10.00	20.00	235.5	D4	86
0.00	0.00	0.00	235.6	D4	87
0.00	450.00	50.00	235.7	D4	88
785.00	150.00	15.00	236.1	D4	89
0.00	0.00	0.00	236.2	D4	90
0.00	0.00	0.00	236.3	D4	91
0.00	500.00	175.00	236.4	D4	92
15.00	11.00	1.00	241.1	D4	93
1000.00	180.00	58.00	241.2	D4	94
540.00	64.00	6.00	242.1	D4	95
610.00	120.00	3.00	242.2	D4	96
28.00	14.00	2.00	242.3	D4	97
750.00	218.00	48.00	242.4	D4	98
1620.00	325.00	142.00	242.5	D4	99
70.00	15.00	1.00	242.6	D4	100

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FINAL DEC ESTIMATE (SINGLE UNIT) (WITH NEAR ZERO RAD WASTE)

TABLE D4 SPLITS BASE COST INTO 4-DIGIT COST COMPONENTS (THOUSANDS OF DOLLARS)

$ FACTORY COST	$ SITE LABOR	$ SITE MATERIAL	ACCOUNT	CARD NUMBER	
450.00	75.00	10.00	243.1	D4	101
9.00	5.00	1.00	243.2	D4	102
0.00	145.00	95.00	244.1	D4	103
0.00	10.00	7.00	244.2	D4	104
0.00	65.00	40.00	245.1	D4	105
63.00	275.00	27.00	245.2	D4	106
0.00	830.00	270.00	245.3	D4	107
0.00	18.00	6.00	245.4	D4	108
495.00	166.00	6.00	246.1	D4	109
165.00	1695.00	661.00	246.2	D4	110
0.00	1000.00	450.00	246.3	D4	111
0.00	630.00	175.00	246.4	D4	112
450.00	350.00	15.00	246.5	D4	113
495.00	153.00	50.00	251.1	D4	114
0.00	0.00	0.00	251.2	D4	115
62.00	154.00	41.00	252.1	D4	116
242.00	1073.00	556.00	252.2	D4	117
400.00	600.00	0.00	252.3	D4	118
25.00	50.00	10.00	253.1	D4	119
0.00	25.00	15.00	253.2	D4	120
10.00	0.00	0.00	254.1	D4	121
44.00	5.00	1.00	254.2	D4	122
50.00	0.00	0.00	254.3	D4	123
8.00	1.00	0.00	254.4	D4	124
0.00	0.00	0.00	254.5	D4	125
125.00	25.00	0.00	254.6	D4	126
0.00	0.00	0.00		D4	127
0.00	0.00	0.00		D4	128
0.00	0.00	0.00		D4	129
0.00	0.00	0.00		D4	130
0.00	0.00	0.00		D4	131
0.00	0.00	0.00		D4	132
0.00	0.00	0.00		D4	133
0.00	0.00	0.00		D4	134
0.00	0.00	0.00		D4	135
0.00	0.00	0.00		D4	136
0.00	0.00	0.00		D4	137
0.00	0.00	0.00		D4	138
0.00	0.00	0.00		D4	139
0.00	0.00	0.00		D4	140
0.00	0.00	0.00		D4	141
0.00	0.00	0.00		D4	142
0.00	0.00	0.00		D4	143
0.00	0.00	0.00		D4	144
0.00	0.00	0.00		D4	145
0.00	0.00	0.00		D4	146
0.00	0.00	0.00		D4	147
0.00	0.00	0.00		D4	148
0.00	0.00	0.00		D4	149
0.00	0.00	0.00		D4	150

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FINAL UFC ESTIMATE (SINGLE UNIT) (WITH NEAR ZERO RAD WASTE)

TABLE D5 SPLITS BASE COST INTO 5-DIGIT COST COMPONENTS (THOUSANDS OF DOLLARS)

% FACTORY COST	% SITE LABOR	% SITE MATERIAL	ACCOUNT	CARD NUMBER	
3612.00	175.00	154.00	222.11	D5	1
0.0	1000.00	2431.00	222.12	D5	2
13002.00	1172.00	490.00	222.13	D5	3
1156.00	79.00	43.00	222.14	D5	4
0.0	0.0	0.0	222.21	D5	5
0.0	0.0	0.0	222.22	D5	6
0.0	0.0	0.0	222.23	D5	7
0.0	0.0	0.0	222.24	D5	8
0.0	0.0	0.0	222.31	D5	9
0.0	0.0	0.0	222.32	D5	10
0.0	0.0	0.0	222.33	D5	11
0.0	0.0	0.0	222.34	D5	12
936.00	80.00	6.00	232.21	D5	13
0.0	567.00	399.00	232.22	D5	14
0.0	452.00	226.00	232.23	D5	15
0.0	940.00	520.00	232.24	D5	16
0.0	83.00	47.00	232.25	D5	17
0.0	0.0	0.0		D5	18
0.0	0.0	0.0		D5	19
0.0	0.0	0.0		D5	20
0.0	0.0	0.0		D5	21
0.0	0.0	0.0		D5	22
0.0	0.0	0.0		D5	23
0.0	0.0	0.0		D5	24
0.0	0.0	0.0		D5	25
0.0	0.0	0.0		D5	26
0.0	0.0	0.0		D5	27
0.0	0.0	0.0		D5	28
0.0	0.0	0.0		D5	29
0.0	0.0	0.0		D5	30
0.0	0.0	0.0		D5	31
0.0	0.0	0.0		D5	32
0.0	0.0	0.0		D5	33
0.0	0.0	0.0		D5	34
0.0	0.0	0.0		D5	35
0.0	0.0	0.0		D5	36
0.0	0.0	0.0		D5	37
0.0	0.0	0.0		D5	38
0.0	0.0	0.0		D5	39
0.0	0.0	0.0		D5	40
0.0	0.0	0.0		D5	41
0.0	0.0	0.0		D5	42
0.0	0.0	0.0		D5	43
0.0	0.0	0.0		D5	44
0.0	0.0	0.0		D5	45
0.0	0.0	0.0		D5	46
0.0	0.0	0.0		D5	47
0.0	0.0	0.0		D5	48
0.0	0.0	0.0		D5	49
0.0	0.0	0.0		D5	50

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FINAL DEC ESTIMATE (SINGLE UNIT) (WITH NEAR ZERO RAD WASTE)

TABLE AI CONTAINS CONSTANTS FOR THE EQUATION

Y = A + B / (C + X) **D

WHICH DESCRIBES THE INDIRECT COST CURVES IN NUS-531
PAGES 3-37, 3-38, AND C-4 AS MODIFIED BY ORNL

A	B	C	D	ACCOUNT	CARD NUMBER	
0.04927	13.76000	0.0	1.21000	91	AI	1
0.09700	24.17000	0.0	1.21000	92	AI	2
0.03100	8.73900	0.0	1.21000	93	AI	3
0.0	0.0	0.0	0.0		AI	4
0.0	0.0	0.0	0.0		AI	5
0.0	0.0	0.0	0.0		AI	6
0.0	0.0	0.0	0.0		AI	7
0.0	0.0	0.0	0.0		AI	8
0.0	0.0	0.0	0.0		AI	9
0.0	0.0	0.0	0.0		AI	10

TABLE AA CONTAINS CONSTANTS FOR THE EQUATION

Y = A + B * (X / BASE) **C

WHICH DESCRIBES THE DIRECT COST (IN THOUSANDS OF DOLLARS)
LESS CONTINGENCY AND SPARE PARTS OF EACH 2-DIGIT ACCOUNT
AS A FUNCTION OF POWER LEVEL BASE SIZE = 1000.00

A	B	C	ACCOUNT	CARD NUMBER	
1000.00000	0.0	0.0	20	AA	1
14229.00000	19309.00000	1.00321	21	AA	2
14562.00000	41662.00000	0.92265	22	AA	3
0.0	62347.00000	0.80000	23	AA	4
0.0	14470.00000	0.60000	24	AA	5
0.0	4220.00000	0.30000	25	AA	6
0.0	0.0	0.0	26	AA	7
0.0	0.0	0.0		AA	8
0.0	0.0	0.0		AA	9
0.0	0.0	0.0		AA	10

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FINAL DEC ESTIMATE (SINGLE UNIT) (WITH NEAR ZERO RAD WASTE)

IAR1 DESCRIBES THE NUMBER OF 1 DIGIT ACCOUNTS — CARD NUMBER

2 — IAR1 1

IAR2 DESCRIBES THE NUMBER OF 2 DIGIT ACCOUNTS — CARD NUMBER

7 4 0 0 0 — IAR2 1

IAR3 DESCRIBES THE NUMBER OF 3 DIGIT ACCOUNTS — CARD NUMBER

2 9 0 6 6 4 0 3 2 3 2 0 0 0 0 — IAR3 1

IAR4 DESCRIBES THE NUMBER OF 4 DIGIT ACCOUNTS — CARD NUMBER

0	0	3	3	2	3	2	2	2	6	0	4	3	4	3	4	0	5	4	3	IAR4	1
8	4	4	3	7	4	2	6	2	2	4	5	2	3	2	6	0	0	0	0	IAR4	2
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	IAR4	3

IAR5 DESCRIBES THE NUMBER OF 5 DIGIT ACCOUNTS — CARD NUMBER

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	IAR5	1
0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	IAR5	2
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	IAR5	3
0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	IAR5	4
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	IAR5	5
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	IAR5	6
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	IAR5	7
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	IAR5	8

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FINAL UEC ESTIMATE (SINGLE UNIT) (WITH NEAR ZERO RAD WASTE)

ACCOUNT INDICES

IAB1	IAB2	IAB3	IAB4	IAB5
2				
	7			
		2		
			0	
			0	
		9		
			3	
				0 0 0
			3	
				0 0 0
			2	
				0 0
			3	
				0 0 0
			2	
				0 0
			2	
				0 0
			2	
				0 0
			6	
				0 0 0 0 0 0
			0	
		9		
			4	
				0 0 0 0
			3	
				4 4 4
			4	
				0 0 0 0
			3	
				0 0 0
			4	
				0 0 0 0
			9	
				0 0 0 0 0 0 0 0 0
			5	
				0 0 0 0 0
			4	
				0 0 0 0
			3	
				0 0 0
		6		
			8	
				0 0 0 0 0 0 0 0
			4	
				0 5 0 0
			4	
				0 0 0 0
			3	
				0 0 0
			7	
				0 0 0 0 0 0 0
			4	
				0 0 0 0
		6		
			2	
				0 0
			6	
				0 0 0 0 0 0
			2	
				0 0
			2	
				0 0
			4	
				0 0 0 0
			5	
				0 0 0 0 0
		4		
			2	
				0 0
			3	
				0 0 0
			2	
				0 0
			6	
				0 0 0 0 0 0
		0		
	4			
		3		
			0	
			0	
			0	
		2		
			0	
			0	
		3		
			0	
			0	
			0	
		2		
			0	
			0	

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FINAL UFC ESTIMATE (SINGLE UNIT) (WITH NEAR ZERO RAD WASTE)

1971
CASH FLOW PWR

FRACTION OF CONSTRUCTION PERIOD 0-1.0	ACCOUNT 1	2	3	4	5	6	7	CARD NUMBER
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	CFCA 1
0.02000	1.00000	0.0	0.00100	0.0	0.0	0.0	0.0	CFCA 3
0.04000	1.00000	0.0	0.00333	0.0	0.0	0.0	0.0	CFCA 5
0.06000	1.00000	0.0	0.00700	0.0	0.0	0.0	0.0	CFCA 7
0.08000	1.00000	0.0	0.01200	0.0	0.0	0.0	0.0	CFCA 9
0.10000	1.00000	0.0	0.01684	0.0	0.0	0.0	0.0	CFCA 11
0.12000	1.00000	0.0	0.02063	0.0	0.0	0.0	0.0	CFCA 13
0.14000	1.00000	0.0	0.02456	0.0	0.0	0.0	0.0	CFCA 15
0.16000	1.00000	0.0	0.02863	0.0	0.0	0.0	0.0	CFCA 17
0.18000	1.00000	0.0	0.03284	0.0	0.0	0.0	0.0	CFCA 19
0.20000	1.00000	0.00055	0.03810	0.00077	0.00104	0.00715	0.0	CFCA 21
0.22000	1.00000	0.00195	0.04490	0.00273	0.00371	0.02535	0.0	CFCA 23
0.24000	1.00000	0.00375	0.05250	0.00525	0.00713	0.04875	0.0	CFCA 25
0.26000	1.00000	0.00595	0.06090	0.00833	0.01131	0.07735	0.0	CFCA 27
0.28000	1.00000	0.00855	0.07010	0.01197	0.01625	0.11115	0.0	CFCA 29
0.30000	1.00000	0.01200	0.08478	0.01661	0.02734	0.14410	0.0	CFCA 31
0.32000	1.00000	0.05200	0.10748	0.02249	0.04752	0.17290	0.0	CFCA 33
0.34000	1.00000	0.09000	0.13438	0.02925	0.07238	0.23250	0.0	CFCA 35
0.36000	1.00000	0.13600	0.16548	0.03689	0.10192	0.23290	0.0	CFCA 37
0.38000	1.00000	0.19000	0.20078	0.04541	0.13614	0.26410	0.0	CFCA 39
0.40000	1.00000	0.23440	0.23853	0.05829	0.15669	0.29427	0.0	CFCA 41
0.42000	1.00000	0.25960	0.27780	0.07744	0.18904	0.32240	0.0	CFCA 43
0.44000	1.00000	0.28000	0.32000	0.10000	0.21000	0.35000	0.0	CFCA 45
0.46000	1.00000	0.32640	0.39640	0.12784	0.27260	0.42280	0.0	CFCA 47
0.48000	1.00000	0.38560	0.49360	0.16016	0.35940	0.52120	0.0	CFCA 49
0.50000	1.00000	0.44320	0.57799	0.19528	0.43920	0.60320	0.0	CFCA 51
0.52000	1.00000	0.48481	0.61600	0.23152	0.48680	0.62002	0.0	CFCA 53
0.54000	1.00000	0.52001	0.62999	0.27000	0.52001	0.62681	0.0	CFCA 55
0.56000	1.00000	0.56560	0.68692	0.29644	0.56120	0.63320	0.0	CFCA 57
0.58000	1.00000	0.61440	0.75808	0.31696	0.60080	0.64480	0.0	CFCA 59
0.60000	1.00000	0.66000	0.81000	0.73999	0.65000	0.66500	0.0	CFCA 61
0.62000	1.00000	0.70000	0.84000	0.83502	0.69000	0.69500	0.0	CFCA 63
0.64000	1.00000	0.75000	0.86000	0.85200	0.75000	0.72000	0.0	CFCA 65
0.66000	1.00000	0.80000	0.87600	0.86260	0.79801	0.75700	0.0	CFCA 67
0.68000	1.00000	0.83666	0.88667	0.86867	0.83000	0.80334	0.0	CFCA 69
0.70000	1.00000	0.86520	0.89480	0.87504	0.85200	0.84360	0.0	CFCA 71
0.72000	1.00000	0.89080	0.90000	0.88656	0.87000	0.86240	0.0	CFCA 73
0.74000	1.00000	0.91000	0.90320	0.90000	0.88000	0.87000	0.0	CFCA 75
0.76000	1.00000	0.91922	0.90500	0.90656	0.89522	0.88522	0.0	CFCA 77
0.78000	1.00000	0.92000	0.91000	0.91000	0.91000	0.90000	0.0	CFCA 79
0.80000	1.00000	0.95001	0.95001	0.94533	0.94466	0.91934	1.00000	CFCA 81
0.82000	1.00000	0.95401	0.95134	0.95999	0.95000	0.93600	1.00000	CFCA 83
0.84000	1.00000	0.95680	0.95800	0.96199	0.95799	0.95000	1.00000	CFCA 85
0.86000	1.00000	0.96402	0.96600	0.96640	0.96640	0.96600	1.00000	CFCA 87
0.88000	1.00000	0.96520	0.96802	0.96960	0.98760	0.98200	1.00000	CFCA 89
0.90000	1.00000	0.97400	0.97400	0.97520	1.00000	0.99440	1.00000	CFCA 91
0.92000	1.00000	0.98200	0.98200	0.98080	1.00000	0.99960	1.00000	CFCA 93
0.94000	1.00000	0.99000	0.99000	0.99000	0.99999	1.00000	1.00000	CFCA 95
0.96000	1.00000	0.99520	0.99520	0.99520	1.00000	1.00000	1.00000	CFCA 97
0.98000	1.00000	0.99880	0.99880	0.99880	1.00000	1.00000	1.00000	CFCA 99

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FINAL UEC ESTIMATE (SINGLE UNIT) (WITH NEAR ZERO RAD WASTE)

MIXING FACTORS FOR BASE LABOR

ACCOUNT 1	2	3	4	5	6	7	LABOR	CARD NUMBER
0.0	0.0	0.0	0.0	0.0	0.0	0.0	BLDG. LABOR	FACR1 01
0.40000	0.26000	0.14000	0.10000	0.13000	0.28000	0.50000	HEAVY LABOR	FACR1 02
0.0	0.02500	0.0	0.0	0.0	0.0	0.0	BRICKLAYERS	FACR1 03
0.40000	0.17000	0.03000	0.02000	0.0	0.14000	0.0	CARPENTERS	FACR1 04
0.0	0.21000	0.03000	0.02000	0.08000	0.0	0.0	STRUCT. IRON	FACR1 05
0.0	0.0	0.0	0.0	0.0	0.0	0.0	PLASTERERS	FACR1 06
0.0	0.02500	0.06000	0.07000	0.69000	0.27000	0.0	ELEC.WORKERS	FACR1 07
0.0	0.08000	0.35000	0.59000	0.0	0.28000	0.50000	STEAM FITTERS	FACR1 08
0.10000	0.08000	0.11000	0.07000	0.08000	0.0	0.0	OPER. ENGRS.	FACR1 09
0.0	0.0	0.0	0.0	0.0	0.0	0.0	SM. TRAC. OP.	FACR1 10
0.0	0.0	0.0	0.0	0.0	0.0	0.0	LG. TRAC. OP.	FACR1 11
0.0	0.0	0.0	0.0	0.0	0.0	0.0	CRANE OPERS.	FACR1 12
0.0	0.0	0.0	0.0	0.0	0.0	0.0	AIR COMP. OPERS.	FACR1 13
0.10000	0.02000	0.02000	0.01000	0.02000	0.03000	0.0	TRUCK DRIVERS	FACR1 14
0.0	0.0	0.23000	0.10000	0.0	0.0	0.0	BOILER MKRS.	FACR1 15
0.0	0.13000	0.03000	0.02000	0.0	0.0	1.00000	ALL OTHERS	FACR1 16

MIXING FACTORS FOR SITE LABOR

ACCOUNT 1	2	3	4	5	6	7	LABOR	CARD NUMBER
0.0	0.13000	0.03000	0.02000	0.0	0.0	0.0	ALL OTHERS	FACS1 16
0.40000	0.26000	0.14000	0.10000	0.13000	0.28000	0.50000	HEAVY LABOR	FACS1 02
0.0	0.02500	0.0	0.0	0.0	0.0	0.0	BRICKLAYERS	FACS1 03
0.40000	0.17000	0.03000	0.02000	0.0	0.14000	0.0	CARPENTERS	FACS1 04
0.0	0.21000	0.03000	0.02000	0.08000	0.0	0.0	STRUCT. IRON	FACS1 05
0.0	0.0	0.0	0.0	0.0	0.0	0.0	PLASTERERS	FACS1 06
0.0	0.02500	0.06000	0.07000	0.69000	0.27000	0.0	ELEC.WORKERS	FACS1 07
0.0	0.08000	0.35000	0.59000	0.0	0.28000	0.50000	STEAM FITTERS	FACS1 08
0.10000	0.08000	0.11000	0.07000	0.08000	0.0	0.0	OPER. ENGRS.	FACS1 09
0.0	0.0	0.0	0.0	0.0	0.0	0.0	SM. TRAC. OP.	FACS1 10
0.0	0.0	0.0	0.0	0.0	0.0	0.0	LG. TRAC. OP.	FACS1 11
0.0	0.0	0.0	0.0	0.0	0.0	0.0	CRANE OPERS.	FACS1 12
0.0	0.0	0.0	0.0	0.0	0.0	0.0	AIR COMP. OPERS.	FACS1 13
0.10000	0.02000	0.02000	0.01000	0.02000	0.03000	0.0	TRUCK DRIVERS	FACS1 14
0.0	0.0	0.23000	0.10000	0.0	0.0	0.0	BOILER MKRS.	FACS1 15
0.0	0.13000	0.03000	0.02000	0.0	0.0	0.0	ALL OTHERS	FACS1 16

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FINAL UFC ESTIMATE (SINGLE UNIT) (WITH NEAR ZERO RAD WASTE)

MIXING FACTORS FOR BASE MATERIAL ACCOUNT

1	2	3	4	5	6	7	MATERIAL	CARD NUMBER
0.0	0.079	0.079	0.079	0.079	0.079	0.079	CHANNELS	FACB2 01
0.0	0.079	0.079	0.079	0.079	0.079	0.079	IBEAMS	FACB2 02
0.0	0.079	0.079	0.079	0.079	0.079	0.079	W FLANGES	FACB2 03
0.0	0.471	0.471	0.471	0.471	0.471	0.471	RE-BARS	FACB2 04
0.0	0.271	0.271	0.271	0.271	0.271	0.271	REDIMIX CONCRETE	FACB2 05
0.0	0.006	0.006	0.006	0.006	0.006	0.006	PLYFORM	FACB2 06
0.0	0.015	0.015	0.015	0.015	0.015	0.015	LUMBER	FACB2 07
1.000	0.0	0.0	0.0	0.0	0.0	0.0	LAND	FACB2 08
0.0	0.0	0.0	0.0	0.0	0.0	0.0	UNASSIGNED	FACB2 09
0.0	0.0	0.0	0.0	0.0	0.0	0.0	UNASSIGNED	FACB2 10
0.0	0.0	0.0	0.0	0.0	0.0	0.0	UNASSIGNED	FACB2 11
0.0	0.0	0.0	0.0	0.0	0.0	0.0	UNASSIGNED	FACB2 12
0.0	0.0	0.0	0.0	0.0	0.0	0.0	UNASSIGNED	FACB2 13
0.0	0.0	0.0	0.0	0.0	0.0	0.0	UNASSIGNED	FACB2 14
0.0	0.0	0.0	0.0	0.0	0.0	0.0	UNASSIGNED	FACB2 15
0.0	0.0	0.0	0.0	0.0	0.0	0.0	UNASSIGNED	FACB2 16

MIXING FACTORS FOR SITE MATERIAL ACCOUNT

1	2	3	4	5	6	7	MATERIAL	CARD NUMBER
0.0	0.079	0.079	0.079	0.079	0.079	0.079	CHANNELS	FACS2 01
0.0	0.079	0.079	0.079	0.079	0.079	0.079	IBEAMS	FACS2 02
0.0	0.079	0.079	0.079	0.079	0.079	0.079	W FLANGES	FACS2 03
0.0	0.471	0.471	0.471	0.471	0.471	0.471	RE-BARS	FACS2 04
0.0	0.271	0.271	0.271	0.271	0.271	0.271	REDIMIX CONCRETE	FACS2 05
0.0	0.006	0.006	0.006	0.006	0.006	0.006	PLYFORM	FACS2 06
0.0	0.015	0.015	0.015	0.015	0.015	0.015	LUMBER	FACS2 07
1.000	0.0	0.0	0.0	0.0	0.0	0.0	LAND	FACS2 08
0.0	0.0	0.0	0.0	0.0	0.0	0.0	UNASSIGNED	FACS2 09
0.0	0.0	0.0	0.0	0.0	0.0	0.0	UNASSIGNED	FACS2 10
0.0	0.0	0.0	0.0	0.0	0.0	0.0	UNASSIGNED	FACS2 11
0.0	0.0	0.0	0.0	0.0	0.0	0.0	UNASSIGNED	FACS2 12
0.0	0.0	0.0	0.0	0.0	0.0	0.0	UNASSIGNED	FACS2 13
0.0	0.0	0.0	0.0	0.0	0.0	0.0	UNASSIGNED	FACS2 14
0.0	0.0	0.0	0.0	0.0	0.0	0.0	UNASSIGNED	FACS2 15
0.0	0.0	0.0	0.0	0.0	0.0	0.0	UNASSIGNED	FACS2 16

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FINAL UEC ESTIMATE (SINGLE UNIT) (WITH NEAR ZERO RAD WASTE)

ABLE AC2 DESCRIBES THE 2-DIGIT ACCOUNT NUMBERS AND ALPHABETIC INFORMATION PRINT ON OUTPUT

CC NO	ALPHABETIC INFORMATION	CARD NUMBER	
0	LAND AND LAND RIGHTS	AC2	1
1	STRUCTURES AND FACILITIES	AC2	2
2	REACTOR PLANT EQUIPMENT	AC2	3
3	TURBINE PLANT EQUIPMENT	AC2	4
4	ELECTRIC PLANT EQUIPMENT	AC2	5
5	MISCELLANEOUS PLANT EQUIPMENT	AC2	6
6	SPECIAL MATERIALS	AC2	7
1	CONSTRUCTION FACILITIES, EQUIPMENT, AND SERVICES	AC2	8
2	ENGINEERING AND CONSTRUCTION MANAGEMENT SERVICES	AC2	9
3	OTHER COSTS	AC2	10
4	INTEREST DURING CONSTRUCTION	AC2	11
	* *	AC2	12

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FINAL UEC ESTIMATE (SINGLE UNIT) (WITH NEAR ZERO RAD WASTE)

ABLE AC3 DESCRIBES THE 3-DIGIT ACCOUNT NUMBERS AND ALPHABETIC INFORMATION PRINT ON OUTPUT

CC NO	ALPHABETIC INFORMATION	CARD NUMBER	
201	LAND AND PRIVILEGE ACQUISITION	AC3	1
202	RELOCATION OF BUILDINGS, UTILITIES, ETC.	AC3	2
211	SITE IMPROVEMENTS AND FACILITIES	AC3	3
212	REACTOR BUILDING	AC3	4
213	TURBINE BUILDING	AC3	5
214	INTAKE AND DISCHARGE STRUCTURES	AC3	6
215	REACTOR AUXILIARIES BUILDING	AC3	7
216	RADIOACTIVE WASTE BUILDING (IN 215)	AC3	8
217	FUEL STORAGE BUILDING	AC3	9
218	OTHER	AC3	10
219	STACKS	AC3	11
221	REACTOR EQUIPMENT	AC3	12
222	MAIN HEAT TRANSFER AND TRANSPORT SYSTEMS	AC3	13
223	SAFEGUARDS COOLING SYSTEMS	AC3	14
224	RADIOACTIVE WASTE TREATMENT AND DISPOSAL	AC3	15
225	NUCLEAR FUEL HANDLING AND STORAGE SYSTEMS	AC3	16
226	OTHER REACTOR PLANT EQUIPMENT	AC3	17
227	INSTRUMENTATION AND CONTROL	AC3	18
228	FOSSIL FUEL BOILERS AND SUPERHEATERS	AC3	19
229	IRRADIATION FACILITIES	AC3	20
231	TURBINE-GENERATORS	AC3	21
232	HEAT REMOVAL SYSTEMS	AC3	22
233	CONDENSING SYSTEMS	AC3	23
234	FEED HEATING SYSTEM	AC3	24
235	OTHER TURBINE PLANT EQUIPMENT	AC3	25
236	INSTRUMENTATION AND CONTROL	AC3	26
241	SWITCHGEAR	AC3	27
242	STATION SERVICE EQUIPMENT	AC3	28
243	SWITCHBOARDS	AC3	29
244	PROTECTIVE EQUIPMENT	AC3	30
245	ELECTRICAL STRUCTURES AND WIRING CONTAINERS	AC3	31
246	POWER AND CONTROL WIRING	AC3	32
251	TRANSPORTATION AND LIFTING EQUIPMENT	AC3	33
252	AIR, WATER, AND STEAM SERVICE SYSTEMS.	AC3	34
253	COMMUNICATIONS EQUIPMENT	AC3	35
254	FURNISHINGS AND FIXTURES	AC3	36
911	TEMPORARY FACILITIES	AC3	37
912	CONSTRUCTION EQUIPMENT	AC3	38
913	CONSTRUCTION SERVICES	AC3	39
921	ENGINEERING SERVICES	AC3	40
922	CONSTRUCTION MANAGEMENT SERVICES.	AC3	41
931	TAXES AND INSURANCE	AC3	42
932	STAFF TRAINING AND PLANT STARTUP	AC3	43
933	OWNERS G&A	AC3	44
941	PHYSICAL PLANT AND ASSOCIATED INDIRECT COSTS	AC3	45
942	LAND AND LAND RIGHTS	AC3	46
	* *	AC3	47
	* *	AC3	48
	* *	AC3	49
	* *	AC3	50

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FINAL UPC ESTIMATE (SINGLE UNIT) (WITH NEAR ZERO RAD WASTE)

TABLE AC3 DESCRIBES THE 3-DIGIT ACCOUNT NUMBERS AND ALPHABETIC INFORMATION PRINT ON OUTPUT

ACC NO	ALPHABETIC INFORMATION	CARD NUMBER	
	* *	AC3	51
	* *	AC3	52
	* *	AC3	53
	* *	AC3	54
	* *	AC3	55
	* *	AC3	56
	* *	AC3	57
	* *	AC3	58
	* *	AC3	59
	* *	AC3	60

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FINAL UPC ESTIMATE (SINGLE UNIT) (WITH NEAR ZERO RAD WASTE)

TABLE AC4 DESCRIBES THE 4-DIGIT ACCOUNT NUMBERS AND ALPHABETIC INFORMATION PRINT ON OUTPUT

ACC NO	ALPHABETIC INFORMATION	CARD NUMBER		
.1	GENERAL YARD IMPROVEMENTS	211	AC4	1
.2	WATERFRONT IMPROVEMENTS	211	AC4	2
.3	HIGHWAY AND RAILWAY ACCESS	211	AC4	3
.1	BASIC BUILDING STRUCTURES (IN 212.3)	212	AC4	4
.2	BUILDING SERVICES	212	AC4	5
.3	CONTAINMENT STRUCTURES	212	AC4	6
.1	BASIC BUILDING STRUCTURES	213	AC4	7
.2	BUILDING SERVICES	213	AC4	8
.1	INTAKE STRUCTURE	214	AC4	9
.2	DISCHARGE STRUCTURE (IN 232.2)	214	AC4	10
.3	UNPRESSURIZED INTAKE AND DISCHARGE CONDUITS (IN 232.2).	214	AC4	11
.1	BASIC BUILDING STRUCTURES	215	AC4	12
.2	BUILDING SERVICES	215	AC4	13
.1	BASIC BUILDING STRUCTURES	216	AC4	14
.2	BUILDING SERVICES	216	AC4	15
.1	BASIC BUILDING STRUCTURES	217	AC4	16
.2	BUILDING SERVICES	217	AC4	17
218A	CONTROL ROOM BUILDING		AC4	18
218B	DIESEL GENERATOR BUILDING		AC4	19
218C	ADMINISTRATION BUILDING		AC4	20
218D	SERVICE BUILDING		AC4	21
218E	FAN ROOM BUILDING		AC4	22
218F	AUXILIARY FEED PUMP ENCLOSURE		AC4	23
.1	REACTOR VESSELS AND ACCESSORIES	221	AC4	24
.2	REACTOR CONTROL DEVICES	221	AC4	25
.3	MODERATOR/REFLECTOR SYSTEMS	221	AC4	26
.4	REACTOR SHIELDING	221	AC4	27
.1	REACTOR CORE COOLANT SYSTEMS	222	AC4	28
.2	REACTOR BLANKET COOLANT SYSTEMS	222	AC4	29
.3	INTERMEDIATE LOOP COOLANT SYSTEMS	222	AC4	30
.1	RESIDUAL HEAT REMOVAL SYSTEM	223	AC4	31
.2	EMERGENCY SHUTDOWN OR CORE ISOLATION COOLING SYSTEM	223	AC4	32
.3	COOLANT INJECTION AND CORE SPRAY/FLOODING SYSTEMS	223	AC4	33
.4	CONTAINMENT HEAT ABSORPTION REJECTION SYSTEMS	223	AC4	34
.1	LIQUID WASTE PROCESSING EQUIPMENT	224	AC4	35
.2	GASEOUS WASTES AND OFF GAS PROCESSING EQUIPMENT	224	AC4	36
.3	SOLID WASTES PROCESSING EQUIPMENT	224	AC4	37
.1	FUEL HANDLING TOOLS, EQUIPMENT, AND SYSTEMS	225	AC4	38
.2	REMOTE VIEWING EQUIPMENT	225	AC4	39
.3	SERVICE PLATFORMS	225	AC4	40
.4	FUEL STORAGE, CLEANING, AND INSPECTION EQUIPMENT	225	AC4	41
.1	INERT GAS SYSTEMS	226	AC4	42
.2	SPECIAL HEATING SYSTEMS	226	AC4	43
.3	COOLANT RECEIVING, STORAGE, AND MAKEUP SYSTEMS	226	AC4	44
.4	COOLANT CHARGE, VOLUME CONTROL, RELIEF, ETC.	226	AC4	45
.5	COOLANT PURIFICATION & CHEMICAL TREATMENT SYSTEMS	226	AC4	46
.6	FLUID LEAK DETECTION SYSTEMS	226	AC4	47
.7	AUXILIARIES COOLING SYSTEMS	226	AC4	48
.8	MAINTENANCE EQUIPMENT	226	AC4	49
.9	MISCELLANEOUS SUSPENSE ITEMS	226	AC4	50

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FINAL UEC ESTIMATE (SINGLE UNIT) (WITH NEAR ZERO RAD WASTE)

ABLE AC4 DESCRIBES THE 4-DIGIT ACCOUNT NUMBERS AND ALPHABETIC INFORMATION PRINT ON OUTPUT

CC NO	ALPHABETIC INFORMATION	(ACCT NUMBER)		
.1	REACTOR PROCESS I&C EQUIPMENT	227	AC4	51
.2	COMPUTER EQUIPMENT	227	AC4	52
.3	RADIATION MONITORING SYSTEMS (IN 227.1)	227	AC4	53
.4	ISOLATED INDICATING AND RECORDING GAGES (IN 227.1)	227	AC4	54
.5	CONTROL AND INSTRUMENT PIPING	227	AC4	55
.1	BOILERS AND/OR SUPERHEATERS	223	AC4	56
.2	DRAFT SYSTEMS	223	AC4	57
.3	FUEL HANDLING SYSTEMS	223	AC4	58
.4	ASH HANDLING SYSTEMS	223	AC4	59
.1	SPECIAL STRUCTURES	229	AC4	60
.2	MATERIALS HANDLING EQUIPMENT	229	AC4	61
.3	MATERIALS RECEIVING AND STORAGE SYSTEMS	229	AC4	62
.1	TURBINE-GENERATORS AND ACCESSORIES	231	AC4	63
.2	FOUNDATIONS	231	AC4	64
.3	STANDBY EXCITERS	231	AC4	65
.4	LUBRICATING SYSTEM	231	AC4	66
.5	GAS SYSTEMS	231	AC4	67
.6	REHEATERS (IN 231.1)	231	AC4	68
.7	SHIELDING	231	AC4	69
.8	WEATHER-PROOF HOUSING	231	AC4	70
.1	WATER INTAKE COMMON FACILITIES	232	AC4	71
.2	CIRCULATING WATER SYSTEMS	232	AC4	72
.3	COOLING TOWERS	232	AC4	73
.4	OTHER SYSTEMS REJECTING HEAT TO THE ATMOSPHERE	232	AC4	74
.1	CONDENSERS	233	AC4	75
.2	CONDENSATE SYSTEM	233	AC4	76
.3	GAS REMOVAL SYSTEM	233	AC4	77
.4	TURBINE BYPASS SYSTEM	233	AC4	78
.1	REGENERATIVE HEAT EXCHANGERS	234	AC4	79
.2	PUMPS	234	AC4	80
.3	PIPING AND TANKS	234	AC4	81
.1	MAIN STEAM OR OTHER VAPOR PIPING	235	AC4	82
.2	TURBINE AUXILIARIES	235	AC4	83
.3	AUXILIARIES COOLING SYSTEM	235	AC4	84
.4	MAKEUP TREATMENT SYSTEMS	235	AC4	85
.5	CHEMICAL TREATMENT AND CONDENSATE PURIFICATION SYSTEMS	235	AC4	86
.6	CENTRAL LUBRICATION SERVICE SYSTEM	235	AC4	87
.7	MISCELLANEOUS SUSPENSE ITEMS	235	AC4	88
.1	PROCESS I & C EQUIPMENT	236	AC4	89
.2	COMPUTER EQUIPMENT (IN 227.2)	236	AC4	90
.3	ISOLATED INDICATING AND RECORDING GAGES (IN 236.1)	236	AC4	91
.4	CONTROL AND INSTRUMENT PIPING	236	AC4	92
.1	GENERATOR CIRCUITS	241	AC4	93
.2	STATION SERVICE	241	AC4	94
.1	STATION SERVICE AND STARTUP TRANSFORMERS	242	AC4	95
.2	LOW VOLTAGE UNIT SUBSTATIONS AND LIGHTING TRANSFORMERS	242	AC4	96
.3	BATTERY SYSTEMS	242	AC4	97
.4	DIESEL ENGINE GENERATORS	242	AC4	98
.5	GAS TURBINE GENERATORS	242	AC4	99
.6	MOTOR GENERATOR SETS	242	AC4	100

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FINAL USC ESTIMATE (SINGLE UNIT) (WITH NEAR ZERO RAD WASTE)

TABLE AC4 DESCRIBES THE 4-DIGIT ACCOUNT NUMBERS AND ALPHABETIC INFORMATION PRINT ON OUTPUT

ACC NO.	ALPHABETIC INFORMATION		CARD NUMBER
.1	MAIN CONTROL BOARD FOR ELECTRIC SYSTEMS	243	AC4 101
.2	AUXILIARY POWER AND SIGNAL BOARDS	243	AC4 102
.1	GENERAL STATION GROUNDING SYSTEM	244	AC4 103
.2	FIRE PROTECTION SYSTEM	244	AC4 104
.1	CONCRETE CABLE TUNNELS, TRENCHES, AND ENVELOPES	245	AC4 105
.2	CABLE TRAYS AND SUPPORTS	245	AC4 106
.3	CONDUIT	245	AC4 107
.4	OTHER STRUCTURES	245	AC4 108
.1	GENERATOR CIRCUITS	246	AC4 109
.2	STATION SERVICE POWER WIRING	246	AC4 110
.3	CONTROL WIRING	246	AC4 111
.4	INSTRUMENT WIRING	246	AC4 112
.5	CONTAINMENT PENETRATIONS	246	AC4 113
.1	CRANES, HOISTS, AND MONORAILS	251	AC4 114
.2	RAILWAY AND ROADWAY EQUIPMENT	251	AC4 115
.1	AIR SYSTEMS	252	AC4 116
.2	WATER SYSTEMS	252	AC4 117
.3	AUXILIARY HEATING STEAM	252	AC4 118
.1	LOCAL COMMUNICATIONS SYSTEMS	253	AC4 119
.2	SIGNAL SYSTEMS	253	AC4 120
.1	SAFETY EQUIPMENT	254	AC4 121
.2	SHOP, LABORATORY, AND TEST EQUIPMENT	254	AC4 122
.3	OFFICE EQUIPMENT AND FURNISHINGS	254	AC4 123
.4	CHANGE ROOM EQUIPMENT	254	AC4 124
.5	ENVIRONMENTAL MONITORING EQUIPMENT	254	AC4 125
.6	DINING FACILITIES	254	AC4 126
	* *		AC4 127
	* *		AC4 128
	* *		AC4 129
	* *		AC4 130
	* *		AC4 131
	* *		AC4 132
	* *		AC4 133
	* *		AC4 134
	* *		AC4 135
	* *		AC4 136
	* *		AC4 137
	* *		AC4 138
	* *		AC4 139
	* *		AC4 140
	* *		AC4 141
	* *		AC4 142
	* *		AC4 143
	* *		AC4 144
	* *		AC4 145
	* *		AC4 146
	* *		AC4 147
	* *		AC4 143
	* *		AC4 149
	* *		AC4 150

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FINAL DEC ESTIMATE (SINGLE UNIT) (WITH NEAR ZERO RAD WASTE)

ABLE AC5 DESCRIBES THE 5-DIGIT ACCOUNT NUMBERS AND ALPHABETIC INFORMATION PRINT ON OUTPUT

CC NO	ALPHABETIC INFORMATION	CARD NUMBER
.11	PUMPS	222.1 AC5 1
.12	PIPING SYSTEM	222.1 AC5 2
.13	STEAM GENERATORS	222.1 AC5 3
.14	PRESSURIZING SYSTEM	222.1 AC5 4
.21	PUMPS	222 AC5 5
.22	PIPING SYSTEM	222 AC5 6
.23	HEAT EXCHANGER EQUIPMENT	222 AC5 7
.24	PRESSURIZING SYSTEM	222 AC5 8
.31	PUMPS	222 AC5 9
.32	PIPING SYSTEM	222 AC5 10
.33	HEAT EXCHANGER EQUIPMENT	222 AC5 11
.34	PRESSURIZING SYSTEM	222 AC5 12
.21	PUMPS	232 AC5 13
.22	PIPING.	232 AC5 14
.23	DISCHARGE TUNNEL	232 AC5 15
.24	DISCHARGE CANAL AND STRUCTURES	232 AC5 16
.25	DEICING PUMP PIT STRUCTURES	232 AC5 17
	* *	AC5 18
	* *	AC5 19
	* *	AC5 20
	* *	AC5 21
	* *	AC5 22
	* *	AC5 23
	* *	AC5 24
	* *	AC5 25
	* *	AC5 26
	* *	AC5 27
	* *	AC5 28
	* *	AC5 29
	* *	AC5 30
	* *	AC5 31
	* *	AC5 32
	* *	AC5 33
	* *	AC5 34
	* *	AC5 35
	* *	AC5 36
	* *	AC5 37
	* *	AC5 38
	* *	AC5 39
	* *	AC5 40
	* *	AC5 41
	* *	AC5 42
	* *	AC5 43
	* *	AC5 44
	* *	AC5 45
	* *	AC5 46
	* *	AC5 47
	* *	AC5 48
	* *	AC5 49
	* *	AC5 50

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FINAL DEC ESTIMATE (SINGLE UNIT) (WITH NEAR ZERO RAD WASTE)

ABLE ACC DESCRIBES THE 2-DIGIT ACCOUNT NUMBERS AND ALPHABETIC INFORMATION PRINT ON OUTPUT

CC NO	ALPHABETIC INFORMATION	CARD NUMBER
0	LAND AND LAND RIGHTS	ACC 1
1	STRUCTURES AND SITE FACILITIES	ACC 2
2	REACTOR PLANT EQUIPMENT	ACC 3
3	TURBINE PLANT EQUIPMENT	ACC 4
4	ELECTRIC PLANT EQUIPMENT	ACC 5
5	MISCELLANEOUS PLANT EQUIPMENT	ACC 6
6	SPECIAL MATERIALS	ACC 7
1	CONSTRUCTION FACILITIES, EQUIPMENT, AND SERVICES . . .	ACC 8
2	ENGINEERING AND CONSTRUCTION MANAGEMENT SERVICES . . .	ACC 9
3	OTHER COSTS	ACC 10
4	INTEREST DURING CONSTRUCTION	ACC 11
	* *	ACC 12

Appendix B

CONLAM AUXILIARY PROGRAM

Auxiliary program CONLAM is used to generate a historical data tape containing information on labor and material costs for the 23 cities shown previously in Fig. 7. Data for other locations can also be entered through this program as they become available However, normal application of CONLAM will be limited to updating cost data for the existing 23 cities at regular time intervals. It is suggested that six-month intervals be used when updating existing data or creating new data sets. However, other time intervals are acceptable.

Data can be read for a maximum of 30 time periods, as specified by the user, for each of the 23 locations and are written in hexidecimal on a nine-track tape for use by subprogram CONII in the CONCEPT program. At the user's option, data can be read either (1) from cards alone when initially generating a tape or (2) from an existing tape and from cards when updating or modifying an existing tape. In either case, a new tape is produced. Options also exist for punching card decks of the data stored on tape and producing two types of listings: (1) card image output and (2) tabular output.

The following pages of Appendix B include (1) a description of the input data requirements, (2) blank keypunch forms for coding input data, (3) a FORTRAN listing of the program, containing examples of the two types of card input, followed by example input data for updating an existing tape, and (4) an example of tabular output. Note that card 2 is not used when updating an existing tape.

Input Card Description

Card	Column	Variable name	Description
1	1-5	NOPER	Number of actual data points stored on tape, less than or equal to MAXREC.
	6-10	MAXREC	Maximum number of time periods on tape for each location; not to exceed 30.
	11-15	NCITY	Number of locations on tape, presently 23.

Card	Column	Variable name	Description
	16-20	IRMOLD	Flag for type of input. =0 old tape and card input. =1 card input only.
	21-25	IPUNCH	Flag for card output. =0 omits card output. =1 produces card deck.
	26-30	NOLIST	Flag for listing card images. =0 produces list. =1 omits list.
	31-35	NOREF	Flag for table output. =0 produces table. =1 omits table.
2	1-2	IR	Region number (not used by CONCEPT). Format I2.
	3-4	IS	Site number (not used by CONCEPT). Format I2.
	5-8	IC	City number. Format I2.
	9-40	LOC	Location (alphabetic). Format 8A4.
	41-43	SP1	Unassigned. Format F13.6.
	44-56	SP2	Unassigned. Format F13.6.
	57-79	SP3	Unassigned. Format F13.6.
3	1-10	A(1)	Date. Format F10.2.
	11-80	A(2-8)	Unassigned. Format 7F10.2.
4	1-5	B(1)	Hourly rate for building labor. Format F5.2.
	11-15	B(3)	Hourly rate for heavy construction labor. Format F5.2.
	21-25	B(5)	Hourly rate for bricklayers. Format F5.2.
	31-35	B(7)	Hourly rate for carpenters. Format F5.2.
	41-45	B(9)	Hourly rate for structural iron workers. Format F5.2.

Card	Column	Variable name	Description
	51-55	B(11)	Hourly rate for plasterers. Format F5.2.
	61-65	B(13)	Hourly rate for electrical workers. Format F5.2.
	71-75	B(15)	Hourly rate for steamfitters. Format F5.2.
5	1-5	B(17)	Hourly rate for operating engineers. Format F5.2.
	11-15	B(19)	Hourly rate for small tractor operators. Format F5.2.
	21-25	B(21)	Hourly rate for large tractor operators. Format F5.2.
	31-35	B(23)	Hourly rate for crane operators. Format F5.2.
	41-45	B(25)	Hourly rate for air compressor operators. Format F5.2.
	51-55	B(27)	Hourly rate for truck drivers. Format F5.2.
	61-65	B(29)	Hourly rate for boilermakers. Format F5.2.
	71-75	B(30)	Hourly rate for all other crafts. Format F5.2.
6	1-10	C(1)	Material costs for channels, \$/10,000 lb. Format F10.2.
	11-20	C(2)	Material costs for I-beams, \$/10,000 lb. Format F10.2.
	21-30	C(3)	Material costs for W-flanges, \$/10,000 lb. Format F10.2.
	31-40	C(4)	Material costs for re-bars, \$/10,000 lb. Format F10.2.
	41-50	C(5)	Material costs for redimix concrete, \$/yd^3. Format F10.2.
	51-60	C(6)	Material costs for plyform, \$/1000 ft^2. Format F10.2.
	61-70	C(7)	Material costs for lumber, \$/1000 bd ft. Format F10.2.

Card	Column	Variable name	Description
	71-80	C(8)	Cost for land, $. Format F10.2.
7	1-80	C(9-16)	Unassigned. Format 8F10.2.

CONCEPT BASE COST KEYPUNCH FORM

PUNCH COL. 4 — 9 (YEAR)

CARD NO. 1 ALL SETS 22 EACH

CARD NO. 4 ALL SETS 22 EACH BLANK CARD

PAGE OF

DATE FOR REQUEST

CROSS OUT INAPPROPIATE LINE

CARD	1–10	11–20	21–30	31–40	41–50	51–60	61–70	71–80
2	BUILDING LABOR	HEAVY CONST. LABOR	BRICK LAYER	CARPENTER	STRUCTURAL IRON WORKER	PLASTERER	ELECTRICIAN	STEAMFITTER
	BASE / FRINGE	BASE / FRINGE	BASE / FRINGE	BASE / FRINGE	BASE / FRINGE	BASE / FRINGE	BASE / FRINGE	BASE / FRINGE
3	CHANNEL BEAMS $ CWT	I-BEAMS $ CWT	WIDE-FLANGE BEAMS $ CWT	REINFORCING BARS NEW STEEL $ CWT	READY MIX CONCRETE 1:2:4 MIX $ YD³	3/4" PLYFORM B-B $ MFT³	2" X 4" X 8' FIR PINE LEAST COST $ / MBF	LAND
2								
3								
2								
3								
2								
3								
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2								
3								

Atlanta, Los Angeles, Baltimore, Minneapolis, Ottawa, Boston, New York, Chicago, Philadelphia, Cincinnati, Pittsburgh, Cleveland, St. Louis, Dallas, Ft. Worth, Denver, Seattle, Detroit, Montreal, Kan. City, Toronto

LCN-9936
16 3-711

CONCEPT BASE COST KEYPUNCH FORM B

PUNCH COL. 4 — 9

CARD NO. 1 ALL SETS 22 EACH (YEAR)

CARD NO. 4 ALL SETS 22 EACH BLANK CARD

DATE ____ FOR ____ PAGE ____ OF ____ REQUEST ____

CROSS OUT INAPPROPIATE LINE

CARD	HOISTING ENGINEER		TRACTOR OPTR 49 HP		TRACTOR OPTR 100 HP		OPERATORS CRANES-SHOVELS		AIR COMPRESSOR OPTR		TRUCK DRIVER		BOILERMAKER		OTHER CRAFTS	
	BASE	FRINGE	BASE	FRINGE	BASE	FRINGE	BASE	FRINGE	BASE	FRINGE	BASE	FRINGE	BASE	FRINGE	BASE	FRINGE
2																
3																
2																
3																
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Atlanta, Los Angeles, Minneapolis, Baltimore, B'ham, N. Orleans, Boston, New York, Chicago, Philia., Cincinnati, Pitsbrg, Cleveland, St. Louis, Dallas, S. Fran., Denver, Seattle, Detroit, Montreal, Kan. City, Toronto

UCN-9906A (6 10-71)

```
//ASDRJBCL JOB (6503,253111),BARNARD,MSGLEVEL=1,CLASS=C,REGION=96K
/*FORMAT PR,DDNAME=FT06F001,COPIES=02
/*SETUP DDNAME=FT08F001,UNIT=TAPE9,ID=(013603,RING,SAVE,NL)
/*SETUP DDNAME=FT04F001,UNIT=TAPE9,ID=(003166,NORING,SAVE,NL)
/*SETUP DDNAME=FT09F001,UNIT=TAPE9,ID=(SCRTCH,RING,SAVE,NL)
//STEP1 EXEC FORTGCLG
//FORT.SYSIN DD *
CCLAM
C
C ==================================================================
C |                                                                |
C |                  C O N L A M   P R O G R A M                   |
C |                              PHASE 11                          |
C |                                                                |
C |          (CONSTRUCTION MODEL LABOR & MATERIAL COSTS)           |
C |  AUTHOR: R. J. BARNARD                                         |
C |  ENGINEERING ANALYSIS SECTION                                  |
C |  APPLIED SCIENCE DEPARTMENT                                    |
C |  COMPUTING TECHNOLOGY CENTER                                   |
C |  OAK RIDGE GASEOUS DIFFUSION PLANT                             |
C |  POST OFFICE BOX P                                             |
C |  OAK RIDGE, TENN. 37830                                        |
C |  JULY 1972                                                     |
                                                            CONTINUE
C ==================================================================
C |                                                                |
C |  COST DATA ARE TAKEN FROM THE MAGAZINE "ENGINEERING NEWS RECORD"  |
C |  (ENR)   EVERY JULY AND JANUARY FOR SELECTED LABOR AND MATERIALS  |
C |  USED WITH ANY MODEL PROGRAM FOR THE "ENR" LISTED CITIES.      |
C |  A STATISTICAL CITY CALLED "MIDDLETOWN" HAS BEEN GENERATED FROM |
C |  THESE COSTS FOR PERIODS 1960.0 THRU 1972.0.  SINCE 1972.0 COSTS |
C |  FOR MIDDLETOWN ARE INCREMENTED BY THE PROGRAM, SEMI-ANNUALLY, AT |
C |  + 5.0 % FOR LABOR RATES AND + 2.5 % FOR MATERIALS.            |
C |                                                                |
C ==================================================================
C
C ==================================================================
C |                                                                |
C |  * * *  DON'T FORGET TO ALTER THE DIMENSIONS OF D,E, AND F ARRAYS |
C |  IF MAXREC IS GREATER THAN 30. * * *                           |
C |                                                                |
C ==================================================================
C
      DIMENSION LOC(8), D(30,8), E(30,16), F(30,16)
      DATA I,J,K,L,M,N/0,0,0,0,0,0/
C
C ==================================================================
C |                                                                |
C |                        F I L E   N A M E S                     |
C |                                                                |
C |            MASCON = CONLAM UNFORMATTED MASTER COST FILE        |
C |            INP = SYSTEM INPUT FILE                             |
C |            IOPT = SYSTEM OUTPUT FILE                           |
C |            IPUN = SYSTEM PUNCH FILE                            |
C |            NEW = UPDATED FORMATTED LABOR AND MATERIALS MASTER  |
C |            MOLD = OLD FORMATTED LABOR AND MATERIALS MASTER     |
C |                                                                |
C ==================================================================
```

```
C
      MASCON = 9
      INP = 5
      IOPT = 6
      IPUN = 7
      NEW = 8
      MOLD = 4
C
C ==================================================================
C |                                                                |
C |   P R O G R A M   O P T I O N S  &  I N P U T   V A R I A B L E S |
C |                NOPER FORMAT I5 IN COL. 1-5                     |
C |                                                                |
C |  NOPER = NUMBER OF TIME-PERIODS FOR WHICH DATA IS AT HAND      |
C |  INCLUDING THE UPDATE TIME-PERIOD.                             |
C |                                                                |
C ==================================================================
C |                                                                |
      REWIND NEW
C
C ==================================================================
C |                                                                |
C |                MAXREC FORMAT I5 IN COL. 6-10                   |
C |  MAXREC = ARBITRARY NUMBER OF TIME-PERIODS IN THE COST DATA.   |
C |                                                                |
C ==================================================================
C
      REWIND MOLD
C
C ==================================================================
C |                                                                |
C |                NCITY FORMAT I5 IN COL. 11-15                   |
C |                                                                |
C | NCITY = NUMBER OF CITIES IN THE CITY SET WHICH IS CURRENTLY LIMITED|
C |  TO THOSE CITIES NAMED IN THE ENR DATA PLUS THE COMPUTED VALUES FOR|
C |  MIDDLETOWN, USA, MAKING A TOTAL OF 23 SETS.                   |
C |                                                                |
C ==================================================================
C
      REWIND MASCON
C
C |================================================================|
C |                                                                |
C |                IRMOLD FORMAT I5 IN COL 16-20                   |
C |                                                                |
C |  IRMOLD DETERMINES WHETHER AN OLD FORMATTED MASTER FILE IS USED |
C |  FOR INPUT OR A MASTER CARD FILE DECK IS USED. ALL MASTER FILES OR |
C |  THE FILE NEEDED TO WRITE MASCON FILE MUST BE CREATED FROM A MAST- |
C |  ER CARD DECK FILE.                                            |
C |                                                                |
C ==================================================================
C
      READ(INP,530)NOPER,MAXREC,NCITY,IRMOLD,IPUNCH,NOLIST,NOREF,
     * IBLMKR,IOCRFT
 530  FORMAT(9I5)
C
C ==================================================================
C |                                                                |
```

```
C |                IPUNCH FORMAT I5 IN COL. 21-25                        |
C |                                                                      |
C |  OPTION TO PUNCH AN ALTERED CARD DECK OF COST VALUES WHEN AN OLD     |
C |  DATA SET IS USED FOR INPUT AND A NEW DATA SET IS TO BE GENERATED    |
C |  WITH CORRECTIONS FOR A NEW VERSION OR REVISION OF THE MODEL.        |
C |                                                                      |
C |  IPUNCH = 0 SKIPS THE PUNCHING OF NEW CARDS .                        |
C |  IPUNCH = 1 PRODUCES A NEW DECK OF CITY COST DATA CARDS AS ALTERED   |
C |  BY THE PROGRAM LOGIC.                                               |
C |                                                                      |
C ========================================================================
C
C
C ========================================================================
C |                                                                      |
C |                NOLIST FORMAT I5 IN COL. 26-30                        |
C |  NOLIST = 0 PRODUCES NORMAL CARD LIST FOR EACH CITY                  |
C |  NOLIST = 1 NO CITY CARD LIST IS PRODUCED.                           |
C |                                                                      |
C |_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ |
C |                NOREF FORMAT I5 IN COL. 31-35                         |
C |  NOREF = 0 PRODUCES NORMAL COST REFERENCE TABLES FOR EACH CITY       |
C |  NOREF = 1 REFERENCE TABLES ARE OMITTED.                             |
C |                                                                      |
C ========================================================================
C
      WRITE(IOPT,515)NOPER,MAXREC,NCITY,IRMOLD,IPUNCH,NOLIST,NOREF,
     * IBLMKR, IOCRFT
  515 FORMAT('1',T20,'O P T I O N S   S E L E C T E D ',/
     *'0',T20,'DATA NOW AVAILABLE FOR (NOPER) PERIODS = ',I5,/
     *'0',T20,'MAXIMUM PERIODS POSSIBLE (MAXREC) = ',I5,/
     *'0',T20,'MAXIMUM CITY GROUPS (NCITY) = ',I5,/
     *'0',T20,'IRMOLD = 0 USES TAPE OLD MASTER;= 1 CARD DECK MASTER =',
     *I5,/
     *'0',T20,'IPUNCH = 0 NO CARDS PUNCHED; =1 CARD DECK PUNCHED =',I5,/
     *'0',T20,'NOLIST = 0 STANDARD LIST OF DATA BY CITY =',I5,/
     *'0',T20,'NOREF = 0 STANDARD COST TABLES BY CITY = ',I5,/
     *'0',T20,'IBLMKR=0 BOILERMAKER = STEAMFITTER WAGES=',I5,/
     *'0',T20,'IOCRFT = 0 OTHERCRAFTS = BRICKLAYER WAGES = ',I5,/T1,'1')
C
C ========================================================================
C |                                                                      |
C | OPTIONS TO INPUT WITH A CARD DECK OR WITH AN OLD MASTER IS           |
C | CONTROLLED WITH "IRMOLD".  IF IRMOLD > 0, CARD INPUT IS THE OPTION   |
C |  BUT THE DEFAULT OPTION IS TO INPUT FROM AN OLD MASTER TAPE.         |
C |                                                                      |
C ========================================================================
C
      IF(IRMOLD .GT. 0) GO TO 404
      WRITE(IOPT,510)
  510 FORMAT('1',T20,'LISTED CITY NAMES FROM "MOLD" TAPE AND CARDS FROM
     *THE UPDATE DECK',/)
C
C ========================================================================
C |                                                                      |
C | THE FOLLOWING ROUTINES UPDATE AN OLD MASTER TAPE WITH AN INPUT FILE|
C |  CARD DECK OF RECENT COST DATA PUNCHED FROM UCN-9906 AND UCN-9906A.|
C |                                                                      |
```

```
C ==================================================================
C
      DO 15 K  = 1,NCITY
C
C ==================================================================
C |                                                                |
C |  READ IN ONE CITY DATA SET FROM OLD MASTER FILE                |
C |                                                                |
C ==================================================================
C
      READ(MOLD,506)IR,IS,IC,LOC,SP1,SP2,SP3
      WRITE(NEW,506)IR,IS,IC,LOC,SP1,SP2,SP3
      WRITE(IOPT,102)IR,IS,IC,LOC,SP1,SP2,SP3
  506 FORMAT(2I2,I4,8A4,3F13.6)
      DO 10 I = 1,MAXREC
 500   FORMAT(8F10.2)
      READ(MOLD,500)(D(I,J),J=1,8)
      READ(MOLD,500)(E(I,J),J=1,16)
      READ(MOLD,500)(F(I,J),J=1,16)
      F(I,8)=1000.
      IF(I .GT. NOPER) F(I,8) = 0.0
 10   CONTINUE
C
C
C
C
C
C ==================================================================
C |                                                                |
C |  N O T I C E   N O T I C E   N O T I C E   N O T I C E   N O T I C E
C |                                                                |
C |  > > >   N O T I C E        N O T I C E          N O T I C E  < <  |
C |                                                                |
C |  > > > > > > >    N O T I C E        N O T I C E   < < < < < < <  |
C |                                                                |
C |  > > > > > > > > > > > >    N O T I C E    < < < < < < < < < < <  |
C |                                                                |
C |  >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>  <<<<<<<<<<<<<<<<<<<<<<<<<<<<<<  |
C |                                                                |
C |  THE UPDATE AFTER NOPER REACHES MAXREC THE D, E, AND F ARRAYS  |
C |  SHOULD BE KEPT THE SAME SIZE BY DROPPING THE EARLIEST COST PERIOD |
C |  UNLESS THERE ARE LESS THAN 30 PERIODS.  THIS CAN BE DONE BY THE |
C |  FOLLOWING ROUTINE EACH TIME THE UPDATE IS PROCESSED BY TAPE FILE |
C |  MASTERS.  IF A CARD MASTER IS USED, A MANUAL REMOVAL WILL BE  |
C |  BETTER THAN THE OTHERWISE NECESSARY REPUNCHING AN ALTERED DECK OF |
C |  UPDATED CARDS EACH TIME THE FILE IS UPDATED.                  |
C |                                                                |
                                                          CONTINUE
C     DO 900 I = 2,MAXREC
C     DO 950 J = 1,16
C     IF(J .LT. 9) D(I-1,J) = D(I,J)
C     E(I-1,J) = E(I,J)
C     F(I-1,J) = EFI,J)
C     IF(I .EQ. MAXREC .AND. J .LT. 9) D(I,J) = 0.0
C     IF(I .EQ. MAXREC ) E(I,J) = 0.0
C     IF(I .EQ. MAXREC ) F(I,J) = 0.0
C950  CONTINUE
C900  CONTINUE
```

```
C ==================================================================
C
C ==================================================================
C |                                                                |
C |  BEGIN THE UPDATE FOR A CITY IF IT IS NOT MIDDLETOWN           |
C |                                                                |
C ==================================================================
C
      IF(K .EQ. 23) GO TO 20
C
C ==================================================================
C |                                                                |
C |  SAMPLE UPDATE DECK INPUT FORMAT                               |
C |  (FIRST CITY IN UPDATE DECK)                                   |
C
C  1972.5
C4.60      4.60      8.16      7.82      7.12      7.65      9.24      8
C6.57      6.10      6.10      6.10      5.35      4.80      8.75      8
C    12.70     12.64     12.66     10.65     16.00    299.      148.
C
C ==================================================================
C |                                                                |
C |  (A BLANK CARD IS USED WHERE ONLY ZEROES ARE TO BE PUNCHED SINCE |
C |  MATERIAL COSTS ARE NOT YET BEING STORED IN F(I,J),J=9,16))    |
C |                                                                |
C ==================================================================
C ==================================================================
C
C |  (SECOND CITY IN UPDATE DECK)                                  |
C |                                                                |
C  1972.5
C5.42      5.42      9.07      8.20      8.57      8.25      8.83      8
C6.82      6.87      6.87      7.52      6.72      6.55      8.60      9
C    12.35     12.30     12.00     12.00     21.50    282.      177.
C
C |                                                                |
C ==================================================================
C
      READ(INP,500)(D(NOPER,J),J=1,8)
      WRITE(IOPT,501)(D(NOPER,J),J=1,8)
      READ(INP,500)(E(NOPER,J),J=1,16)
      WRITE(IOPT,501)(E(NOPER,J),J=1,8)
      WRITE(IOPT,501)(E(NOPER,J),J=9,16)
      READ(INP,500)(F(NOPER,J),J=1,16)
      IF(IOCRFT .LT. 1) E(NOPER,16) = E(NOPER,3)
      IF(IBLMKR .LT. 1) E(NOPER,15) = E(NOPER,8)
      F( NOPER,8) = 1000.
      WRITE(IOPT,501)(F(NOPER,J),J=1,8)
      WRITE(IOPT,501)(F(NOPER,J),J=9,16)
      IF(K .LT. 23) GO TO 13
C
C ==================================================================
C |                                                                |
C |  BEGIN UPDATE FOR MIDDLETOWN USING PREVIOUS PERIOD DATA AND COST |
C |  PROJECTION FACTORS.                                           |
C |                                                                |
C ==================================================================
C
```

```
 20   D(NOPER,1) = D(NOPER-1,1) + .5
      WRITE(IOPT,501)D(NOPER,1)
      DO 25 MT =1,16
      E(NOPER,MT) = E(NOPER-1,MT) * 1.05
      F(NOPER,MT) = F(NOPER-1,MT) * 1.025
      F(NOPER,8) = 1000.
 25   CONTINUE
      WRITE(IOPT,501)(E(NOPER,J),J=1,8)
      WRITE(IOPT,501)(E(NOPER,J),J=9,16)
      WRITE(IOPT,501)(F(NOPER,J),J=1,8)
      WRITE(IOPT,501)(F(NOPER,J),J=9,16)
C
C ==================================================================
C |                                                                |
C |  COMPLETED CITY UPDATE NOW STORED ON NEW FORMATTED MASTER FILE.|
C |                                                                |
C ==================================================================
C
 13   DO 17 I = 1,MAXREC
      WRITE(NEW,500)(D(I,J),J=1, 8)
      WRITE(NEW,500)(E(I,J),J=1,16)
      WRITE(NEW,500)(F(I,J),J=1,16)
 17   CONTINUE
 15   CONTINUE
C |                                                                |
C |================================================================|
C
C ==================================================================
C |                                                                |
C |  THE FOLLOWING STATEMENTS READ AN ORIGINAL CARD INPUT DECK PUNCHED |
C |  FROM UCN-9906 AND UCN-9906A, AND THEN UPDATES THAT ASSEMBLED DECK |
C |  WITH A NEW PERIOD OF COST DATA WITHOUT BEING IN THE CITY-PERIOD   |
C | SEQUENCE.  NOTE THAT THERE ARE NO CITY IDENTIFICATION CARDS IN THE |
C | UPDATE CARD DECK, ONLY THE D, E, AND F ARRAY MEMBERS ARE READ IN   |
C |  FOR THE NEW PERIOD.                                               |
C |                                                                    |
C |  PUNCHED CARD MASTER DECK INPUT SAMPLE FORMAT                      |
C |                                                                    |
C      (REGION STATE AND CITY CARD)
C 23   1   1    USA              MIDDLETOWN
C      (FIRST PERIOD DATA SET BEGINS WITH PERIOD CARD)
C  1960.0
C      (LABOR CARDS # 1 & 2)
C2.07      2.07      2.71      2.55      3.19      2.71      3.19      2
C3.98                                              2.31
C      (MATERIALS CARDS # 1 & 2)
C     6.26      6.26      6.26      5.85     12.27    171.00     87.50
C
                                                                CONTINUE
C      (NEXT PERIOD CARD IN SAME SEQUENCE OF YEAR, LABOR  AND MATERIALS)
C  1960.5
C2.17      2.17      2.84      2.67      3.35      2.84      3.35      3
C4.17                                              2.42
C     6.41      6.41      6.41      5.99     12.57    175.22     89.66
C
C_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
C .         .         .         .         .         .         .
C_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
```

```
C  1972.0
C6.50      6.50      8.51      8.00      10.00      8.51      10.00      9
C2.49                                                7.25
C    11.24     11.24     11.24     10.50     22.03    307.08    157.12
C
      GO TO 110
 404  DO 4 K = 1,NCITY
      READ(INP,702)IR,IS,IC,IDUM,LOC,SP1,SP2,SP3
 702  FORMAT(2XI2,2XI2,2I4,8A4,3F10.3)
C
C |                                                                    |
C ======================================================================
C |                                                                    |
C |  READ IN ONE CITY DATA SET FROM A MASTER CARD DECK INPUT FILE      |
C |                                                                    |
C ======================================================================
C
      WRITE(NEW,506)IR,IS,IC,LOC,SP1,SP2,SP3
 102  FORMAT(' ',3I5,2X8A4,2X3F13.6)
      WRITE(IOPT,102)IR,IS,IC,LOC,SP1,SP2,SP3
      DO 6 I = 1,NOPER
      READ(INP,500)(D(I,J),J=1,8)
      READ(INP,500)(E(I,J),J=1,16)
      IF(IBLMKR .LT. 1) E(NOPER,15) = E(NOPER,8)
      IF(IOCRFT .LT. 1) E(NOPER,16) = E(NOPER,3)
      READ(INP,500)(F(I,J),J=1,16)
      F(I,8)=1000.
 6    CONTINUE
      IF (MAXREC .EQ. NOPER) GO TO 14
      NZ = NOPER + 1
      DO 180 I = NZ,MAXREC
      DO 180 J = 1,16
      IF (J .LE. 8) D(I,J) = 0.0
      E(I,J) = 0.0
      F(I,J) = 0.0
 180  CONTINUE
 14   DO 18 I = 1,MAXREC
      WRITE(NEW,500)(D(I,J),J=1, 8)
      WRITE(NEW,500)(E(I,J),J=1,16)
      WRITE(NEW,500)(F(I,J),J=1,16)
 18   CONTINUE
 4    CONTINUE
C
C ======================================================================
C |                                                                    |
C |  WRITE NEW FORMATTED MASTER FILE HERE TO ORIGINATE A TAPE MASTER   |
C |                                                                    |
C ======================================================================
C
C
C ======================================================================
C |                                                                    |
C |  BOTH UPDATE METHODS, FROM TAPE OR FROM CARD, CONVERGE AT THIS     |
C |  POINT AND FOLLOW THE SAME PATH OF WRITING AN UNFORMATTED MASTER   |
C |  USED IN THE MODELING PROGRAM WITHOUT CONTINUALLY ENDANGERING THE  |
C |  TAPES USED FOR UPDATING THE COST DATA, SINCE THE COST DATA CARDS  |
C |  NOR THE TAPE RECORDS ARE IDENTIFIED UNIQUELY, BUT ARE IN UNIQUE   |
C |  POSITIONS IN THE DATA SET AND IN EACH CITY RECORD IN EACH PERIOD. |
```

```
C |                                                                    |
C ======================================================================
C
 110  ENDFILE NEW
      REWIND NEW
    1  FORMAT(8F10.2)
      WRITE (IOPT,111)
  111 FORMAT('1MASTER RECORDS')
C
C ======================================================================
C |                                                                    |
C |  READ NEW FORMATTED MASTER FILE AND WRITE NEW UNFORMATTED MASTER   |
C |  FILE                                                              |
C |                                                                    |
C ======================================================================
C
      DO 125 K = 1, NCITY
      READ (NEW,506,END=150) IR, IS, IC, LOC, SP1, SP2, SP3
      IF(IPUNCH .GT. 0) WRITE(IPUN,702)IR,IS,IC,IDUM,LOC,SP1,SP2,SP3
      WRITE(IOPT,202)
 202  FORMAT(T1,'1','SINCE CARDS ARE NOT IDENTIFIED AND MAY GET OUT OF O
     1RDER ***** S A V E   T H I S   L I S T *****',/T1,' ',131('_'),/)
      WRITE (IOPT,32) IR, IS, IC, LOC
   32 FORMAT('0',2I2,I4,8A4)
      DO 120 I = 1,MAXREC
 501  FORMAT(' ',8F10.2)
      READ (NEW,1) (D(I,J),J=1,8)
      READ (NEW,1) (E(I,J),J=1,8)
      READ(NEW,1) (E(I,J),J=9,16)
      READ (NEW,1) (F(I,J),J=1,8)
      READ(NEW,1) (F(I,J),J=9,16)
C
C ======================================================================
C |                                                                    |
C |  DO YOU WANT A NEW DECK PUNCHED WITH A CHANGED DATA SET???? IF SO  |
C |  MAKE CHANGES BEFORE BUT PUNCH THE CARDS HERE.                     |
C |                                                                    |
C ======================================================================
C
      IF (I .GT. NOPER) GO TO 130
      IF(IPUNCH .GT. 0) WRITE(IPUN,500)(D(I,J),J=1,8)
      IF(IPUNCH .GT. 0) WRITE(IPUN,500)(E(I,J),J=1,8)
      IF(IPUNCH .GT. 0) WRITE(IPUN,500)(E(I,J),J=9,16)
      IF(IPUNCH .GT. 0) WRITE(IPUN,500)(F(I,J),J=1,8)
      IF(IPUNCH .GT. 0) WRITE(IPUN,500)(F(I,J),J=9,16)
 130  IF(NOLIST .GT.0) GO TO 120
      WRITE(IOPT,501)  (D(I,J),J=1,8)
      WRITE(IOPT,501)  (E(I,J),J=1,8)
      WRITE(IOPT,501)  (E(I,J),J=9,16)
      WRITE(IOPT,501)  (F(I,J),J=1,8)
      WRITE(IOPT,501)  (F(I,J),J=9,16)
  120 CONTINUE
 125  WRITE (MASCON) IR, IS, IC, LOC, SP1, SP2, SP3, D, E, F
  150 REWIND NEW
      END FILE MASCON
•      REWIND MASCON
C
C ======================================================================
```

```
C |                                                                    |
C |  READ NEW UNFORMATTED MASTER FILE TO PRODUCE COST REFERENCE TABLES |
C |  FOR EACH CITY.                                                    |
C |                                                                    |
C ======================================================================
C
      IF(NOREF .GT. 0) GO TO 300
      DO 300 K=1,NCITY
      READ(MASCON)IR,IS,IC,LOC,SP1,SP2,SP3,D,E,F
      DO 200 I=1,NOPER
      IF(I.GT. 1) GO TO 551
      WRITE(6,550)IR,IS,IC,LOC
 550  FORMAT(T1,'1  REGION-',I2,T15,'STATE-',I2,T24,'CITY-',I4,T34,'CODE
     1',T60,8A4,/T1,' ',T60,'C R A F T   L A B O R   R A T E S',/T1,'+',
     2T60,32('_'),/T1,' BLDG    HEAVY   BRICK   CARPEN- STRUCT. PLAST-
     3ELECT.  STEAM  OPERATING TRACTOR OPRTERS  CRANE   AIR CMP TRUCK
     4BOILER  OTHER YEAR',/T1,' LABOR   LABOR   LAYER    TER   IRON WKR
     5ERER    WORKER  FITTER ENGINEER  SMALL   LARGE   OPERATOR OPRATOR
     6DRIVER  MAKER   CRAFTS',/T1,'+',T2,131('_'))
 551  YR = D(I,1) - 1900.
      WRITE(6,552)(E(I,J),J=1,16),YR
 552  FORMAT(T1,' ',T2,16(F5.2,3X),F4.1)
 200  CONTINUE
      DO 250 I=1,NOPER
      IF(I.GT. 1) GO TO 555
      WRITE(6,554) IR,IS,IC,LOC
 554  FORMAT(T1,'1  REGION-',I2,T15,'STATE-',I2,T24,'CITY-',I4,T34,'CODE
     *',T60,8A4,/T1,' ',T60,'M A T E R I A L   C O S T S',/T1,'+',
     *T60,27('_'
     1),/T1,'    CHANNEL BEAMS     I-BEAMS     WIDE-FLANGE BEAMS  REINFO
     2RCING BARS  READY-MIX CONCRETE  PLYFORM    LLUMBER   LAND   YEAR',
     */T1,'+',T2,131('_'))
 555  WRITE(6,556)(F(I,J),J=1,8),D(I,1)
 556  FORMAT(T1,' ',T7,F6.2,T23,F6.2,T40,F6.2,T58,F6.2,T78,F6.2,T92,F6.2
     1,T104,F6.2,T112,F6.1,T120,F6.1)
 250  CONTINUE
 300  CONTINUE
      RETURN
      END
/*
//GO.FT06F001 DD SYSOUT=A,DCB=(RECFM=FB,LRECL=133,BLKSIZE=1064)
//GO.FT04F001 DD UNIT=TAPE9,LABEL=(,NL),DISP=(OLD,KEEP),
//          DCB=(RECFM=FB,LRECL=80,BLKSIZE=800)
//GO.FT08F001 DD UNIT=TAPE9,LABEL=(,NL),DISP=NEW,
//          DCB=(RECFM=FB,LRECL=80,BLKSIZE=800)
//GO.FT09F001 DD UNIT=TAPE9,LABEL=(I,NL),DISP=NEW
//GO.FT05F001 DD *
```

```
   26   30   23    0    1    0    0
   1972.5
 4.60      4.60      8.16      7.82      7.12      7.65      9.24      8.75
 6.57      6.10      6.10      6.10      5.35      4.80      8.75      8.16
     12.70     12.64     12.66     10.65     16.00    299.      148.

   1972.5
 5.42      5.42      9.07      8.20      8.57      8.25      8.83      8.60
 6.82      6.87      6.87      7.52      6.72      6.55      8.60      9.07
```

```
    12.35      12.30      12.00      12.00      21.50     282.       177.

  1972.5
 4.38       4.43       7.23       6.47       7.84       6.35       7.24       7.61
 6.83       6.83       6.83       6.83       6.42       4.53       7.61       7.23
    12.48      12.41      12.61       8.50      18.00     229.       156.

  1972.5
 6.35       6.00       9.54       8.81       9.21       8.00       9.90      10.00
 8.98       8.76       8.76       9.88       7.55       5.66      10.00       9.54
    10.90      10.70      10.60      11.50      22.50     330.       175.

  1972.5
 7.12       7.12       9.43       8.65      10.59       9.73       9.60       9.99
10.17       9.02       9.02      10.17       8.12       5.72       9.99       9.43
    11.50      11.45      10.90       8.15      16.75     335.       177.

  1972.5
 7.12       7.40       9.65       9.45       9.53       8.42       9.48       9.92
 9.40       9.25       9.25       9.24       9.39       5.94       9.92       9.65
    12.88      12.83      12.28       9.60      20.70     309.       180.

  1972.5
 6.88       9.00      10.46      10.41      10.43      10.41      10.31      10.46
 9.46       9.31       9.31       9.93       9.46       5.85      10.46      10.46
    13.05      13.00      12.45       8.10      19.45     324.       187.

  1972.5
 4.98       4.98       8.06       7.19       7.07       7.52       7.38       8.12
 6.71       7.11       7.11       7.11       6.71       3.00       8.12       8.06
    12.35      13.05      12.20       8.25      17.50     319.       168.

  1972.5
 4.68       4.68       9.25       7.51       7.68       7.29       7.44       8.40
 6.05       5.35       6.05       6.20       5.70       5.15       8.40       9.25
    12.81      12.76      12.26       9.30      19.15     367.       167.

  1972.5
 8.05       8.05      10.59      10.19      11.09      10.15      10.65      10.64
 9.81       9.81       9.81      10.35       8.91       7.78      10.64      10.59
    12.24      13.17      12.62      10.23      18.72     302.       176.

  1972.5
 8.26       6.19       8.63       7.97       9.30       8.45       8.13       9.26
 8.82       9.55       9.55       9.55       9.05       8.64       9.26       8.63
    13.01      12.96      12.41      10.50      19.50     330.       180.

  1972.5
 7.45       7.45       8.80       8.89      10.29       9.83       9.70      11.54
 9.55       9.65       9.65       9.65       8.78       9.41      11.54       8.80
    11.80      12.70      13.15       9.65      15.75     291.       169.

  1972.5
 6.95       7.00       8.68       8.28       8.55       8.37       9.34       9.10
 8.25       6.43       7.98       8.20       7.20       6.70       9.10       8.68
    12.97      12.92      12.37       9.50      16.27     305.       185.
```

```
  1972.5
 4.40      4.86      7.39      7.01      7.37      6.65      7.74      8.73
 7.22      7.22      7.22      7.22      5.96      5.40      8.73      7.39
     10.56     10.50     10.00      7.40     18.20    228.       148.

  1972.5
 8.81      8.81     11.74     11.09     12.25      9.06     11.00     10.47
11.42     11.18     11.18     12.39     11.42      6.91     10.47     11.74
     12.98     13.25     12.70     10.25     23.00    331.       176.

  1972.5
 6.55      6.55      9.96     10.17      9.33      7.82     10.07     10.57
10.38      9.42      9.42     10.67      8.66      6.19     10.57      9.96
     12.75     12.70     12.35     10.05     21.67    345.       188.

  1972.5
 5.43      7.13     10.01      9.50      9.42      8.28      8.67      9.54
 8.87      7.69      7.69      9.59      5.78      5.98      9.54     10.01
     12.82     12.77     12.22      8.50     21.45    350.       190.

  1972.5
 7.35      7.35      8.69      8.29      8.91      8.18      9.43     10.80
 7.76      8.27      8.27      8.27      7.72      7.72     10.80      8.69
     12.58     12.53     11.98      7.85     17.10    255.       166.

  1972.5
 7.35      7.35     10.81      9.73     10.32      8.47     10.81     10.49
 9.47     10.34     10.34     10.66      9.07      7.29     10.49     10.81
     12.50     13.40     13.85      8.50     19.50    365.       175.

  1972.5
 6.10      6.10      8.35      7.51      8.24      7.58      8.25      9.33
 7.59      8.08      8.08      8.48      7.78      7.68      9.33      8.35
     13.30     13.15     14.20     10.00     18.90    280.       130.

  1972.5
 4.94      4.94      6.18      5.93      6.05      6.20      6.71      6.29
 6.05      5.69      5.69      6.05      5.37      5.00      6.29      6.18
      9.50      9.50      9.50      8.90     16.00    245.       140.

  1972.5
 5.67      5.38      7.50      7.26      8.38      8.03      8.67      9.01
 8.23      7.58      7.58      8.23      7.58      5.82      9.01      7.50
      9.60     10.35      9.75      9.70     18.30    410.       175.

/*
```

REGION-16 STATE- 1 CITY- 1 CODE PENNSYLVANIA PHILADELPHIA

C O S T L A B O R R A T E S

BLDG LABOR	HEAVY LABOR	BRICK LAYER	CARPEN-TER	STRUCT. IRON WKR	PLAST-ERER	ELECT. WORKER	STEAM FITTER	OPERATING ENGINEER	TRACTOR OPRTERS SMALL	TRACTOR OPRTERS LARGE	CRANE OPERATOR	AIR CMP OPRATOR	TRUCK DRIVER	BOILER MAKER	OTHER CRAFTS	YEAR
2.50	2.50	4.27	3.78	4.53	4.30	4.53	4.41	4.31	3.62	3.76	4.31	3.51	2.60	4.41	4.27	60.0
2.60	2.75	4.42	3.88	4.53	4.30	4.53	4.41	4.31	3.62	3.77	4.31	3.51	2.60	4.41	4.42	60.5
2.65	2.75	4.42	3.98	4.68	4.35	4.53	4.51	4.31	3.73	3.87	4.44	3.61	2.60	4.51	4.42	61.0
2.85	2.75	4.57	4.20	4.68	4.35	4.70	4.57	4.62	4.05	4.20	4.77	3.93	2.82	4.67	4.57	61.5
2.85	2.85	4.57	4.20	4.83	4.50	4.85	4.67	4.77	4.05	4.30	4.77	3.90	3.00	4.67	4.57	62.0
2.95	2.90	4.57	4.38	4.83	4.50	4.85	4.87	4.95	4.23	4.48	4.98	4.08	3.05	4.87	4.57	62.5
2.95	2.90	4.77	4.38	4.88	4.63	4.98	4.89	4.95	4.23	4.48	4.98	4.08	3.05	4.89	4.77	63.0
3.10	3.05	4.97	4.58	4.89	4.63	5.10	4.96	5.15	4.43	4.68	5.18	4.28	3.05	4.96	4.97	63.5
3.10	3.11	4.97	4.58	5.23	4.63	5.25	4.96	5.15	4.43	4.68	5.18	4.28	3.05	4.96	4.97	64.0
3.20	3.20	5.22	4.73	5.20	4.76	5.25	5.21	5.30	4.58	4.83	5.33	4.43	4.47	5.21	5.22	64.5
3.25	3.20	5.22	4.73	5.35	4.76	5.43	5.21	5.30	4.58	4.83	5.33	4.45	3.47	5.21	5.22	65.0
3.40	3.35	5.52	4.93	5.35	4.96	5.53	5.46	5.56	4.84	5.09	5.59	4.69	3.62	5.46	5.52	65.5
3.40	3.35	5.52	4.93	5.55	5.06	5.44	5.46	5.56	4.84	5.09	5.59	4.69	3.62	5.46	5.52	66.0
3.60	3.55	5.52	4.90	6.00	5.06	5.44	5.76	5.56	4.84	5.09	5.59	4.69	3.74	5.76	5.52	66.5
3.60	3.55	5.82	5.13	6.00	5.26	5.66	5.76	5.88	5.16	5.41	5.91	5.01	3.74	5.76	5.82	67.0
3.85	3.80	6.07	5.38	6.00	5.81	5.66	6.11	6.26	5.54	5.79	6.29	5.39	3.86	6.11	6.07	67.5
3.85	3.80	6.07	5.38	6.25	5.81	6.02	6.11	5.86	5.54	5.79	6.29	5.39	3.86	6.11	6.07	68.0
4.15	4.05	6.37	5.63	6.25	5.81	6.23	6.11	5.86	5.54	5.79	6.29	5.39	3.86	6.11	6.37	68.5
4.10	4.10	6.37	5.63	7.15	6.16	6.23	6.11	6.44	5.80	6.06	6.96	6.00	4.15	6.11	6.37	69.0
4.30	4.25	7.29	6.40	7.01	6.37	6.33	7.41	6.54	6.23	6.54	7.14	6.06	4.40	7.41	7.29	69.5
4.30	4.30	8.44	6.90	7.86	6.16	6.73	7.41	6.81	6.45	6.81	7.61	6.31	4.61	7.41	8.44	70.0
5.35	5.30	8.44	8.34	8.62	6.16	7.89	8.61	6.81	6.70	7.08	7.91	6.56	4.61	8.61	8.44	70.5
5.35	5.30	8.44	8.34	8.61	6.16	8.95	8.61	7.35	6.70	7.08	8.21	6.81	4.60	8.61	8.44	71.0
5.35	5.30	8.44	8.34	9.61	6.16	8.95	9.86	7.35	6.70	7.08	8.21	6.81	5.53	9.86	8.44	71.5
6.25	6.25	9.44	9.59	9.33	7.82	10.07	9.86	9.38	8.76	8.76	9.90	8.05	6.19	9.86	9.44	72.0
6.55	6.55	9.96	10.17	9.33	7.82	10.07	10.57	10.38	9.42	9.42	10.67	8.66	6.19	10.57	9.96	72.5

REGION-16 STATE- 1 CITY- 1 CODE PENNSYLVANIA PHILADELPHIA

MATERIAL COSTS

CHANNEL BEAMS	I-BEAMS	WIDE-FLANGE BEAMS	REINFORCING BARS	READY-MIX CONCRETE	PLYFORM	LUMBER	LAND	YEAR
9.10	9.10	9.10	8.23	13.90	270.00	110.00	1000.0	1960.0
7.85	7.85	7.85	8.23	13.90	280.00	112.00	1000.0	1960.5
7.10	7.10	7.10	8.43	13.90	212.00	95.00	1000.0	1961.0
7.35	7.35	7.35	8.43	13.90	214.50	97.00	1000.0	1961.5
7.35	7.35	7.35	8.23	14.65	197.30	91.75	1000.0	1962.0
7.60	7.60	7.60	8.23	14.65	193.85	106.25	1000.0	1962.5
8.05	8.05	8.05	8.23	14.65	189.10	90.75	1000.0	1963.0
6.75	6.75	6.75	8.23	14.65	193.00	91.00	1000.0	1963.5
8.45	8.45	8.45	8.23	14.65	193.00	90.00	1000.0	1964.0
8.45	8.45	8.45	8.23	14.95	193.00	90.00	1000.0	1964.5
8.40	8.35	7.95	8.23	14.95	193.00	98.00	1000.0	1965.0
8.40	8.35	7.95	8.23	14.95	193.00	98.00	1000.0	1965.5
8.40	8.35	7.95	8.23	14.95	193.00	98.00	1000.0	1966.0
8.80	8.75	8.25	8.23	15.30	193.00	98.00	1000.0	1966.5
8.80	8.75	8.25	8.23	15.30	183.00	98.00	1000.0	1967.0
8.80	8.75	8.35	8.23	15.30	183.00	98.00	1000.0	1967.5
8.85	8.80	8.45	8.23	15.30	183.00	98.00	1000.0	1968.0
8.85	8.80	8.45	8.25	15.30	183.00	98.00	1000.0	1968.5
9.35	9.20	8.95	9.23	14.00	188.00	140.00	1000.0	1969.0
9.35	9.20	8.95	9.23	15.85	244.00	145.00	1000.0	1969.5
10.05	10.00	9.65	9.00	15.85	170.00	125.00	1000.0	1970.0
10.75	10.70	10.35	9.00	15.95	170.00	110.00	1000.0	1970.5
10.75	10.70	10.35	8.50	14.60	217.95	127.50	1000.0	1971.0
11.55	11.50	11.20	8.50	19.70	270.00	175.00	1000.0	1971.5
12.75	12.70	12.35	10.05	19.70	275.00	189.00	1000.0	1972.0
12.75	12.70	12.35	10.05	21.67	345.00	188.00	1000.0	1972.5

Appendix C

DETAILED MATHEMATICAL TREATMENT OF PROJECTION TECHNIQUE

Historical cost data are projected by fitting data for a location (or city) using the following method. Equation (4) can be rewritten as follows:

$$\ell n\ I = \ell n\ \overline{C}_f + (Y - Y_f)\ \ell n(1 + \overline{\epsilon})\ . \qquad \text{(C-1)}$$

For simplification, Eq. (C-1) becomes

$$y_j = A + BX_j\ , \qquad \text{(C-2)}$$

where j indicates discrete data points associated with time variation at some location. If A and B can be evaluated, then $\overline{C}_f$ and $1 + \overline{\epsilon}$ are defined by the following:

$$\overline{C}_f = e^A \qquad \text{(C-3)}$$

and

$$1 + \overline{\epsilon} = e^B\ . \qquad \text{(C-4)}$$

The above fitting problem is compounded by weighting factors for multiple locations, labor types, and material types. Since the material and labor weighting factors are similar, one expression will suffice to illustrate the procedure:

$$I_j = \sum_{k=1}^{k_{max}} f_k C_{kj}\ , \qquad \text{(C-5)}$$

where C_{kj} is related to various types k of labor or material at time j, and f_k is the weighting factor for that component. The evaluation of A_ℓ and B_ℓ for some location ℓ is accomplished by solving the following equations:

$$\sum_{j=1}^{j_{max}} y_j = A_\ell \, j_{max} + B_\ell \sum_{j=1}^{j_{max}} X_j \tag{C-6}$$

and

$$\sum_{j=1}^{j_{max}} y_j \, X_j = A_\ell \sum_{j=1}^{j_{max}} X_j + B_\ell \sum_{j=1}^{j_{max}} X_j^2 \, . \tag{C-7}$$

When locations (or cities) are combined for regional calculations, the following equations give weighted-average values for A and B:

$$A = \sum_{\ell=1}^{\ell_{max}} f_\ell \, A_\ell \tag{C-8}$$

and

$$B = \sum_{\ell=1}^{\ell_{max}} f_\ell \, A_\ell \, B_\ell \Big/ \sum_{\ell=1}^{\ell_{max}} f_\ell \, A_\ell \, , \tag{C-9}$$

where f_ℓ is the weighting factor for location ℓ.

Appendix D

CONCEPT PROGRAM LISTING

```
//ASDRJBII JOB (6503,253111),BARNARD,CLASS=B,REGION=130K
/*SETUP DDNAME=FT09F001,UNIT=TAPE9,ID=(05052,NORING,SAVE,NL)
/*SETUP DDNAME=FT08F001,UNIT=TAPE9,ID=(20421,NORING,SAVE,NL)
//STEP EXEC FORTGCLG
//FORT.SYSIN DD *
C                                                                       CONC0010
C |=================================================================|CONC0020
C |                                                                 |CONC0030
C |                          - CONCEPT -                            |CONC0040
C |                 COMPUTERIZED CONCEPTUAL COST ESTIMATES          |CONC0050
C |                     FOR STEAM-ELECTRIC POWER PLANTS             |CONC0060
C |                            PHASE II                             |CONC0070
C |                                                                 |CONC0080
C |- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - |CONC0090
C |                                                                 |CONC0100
C |                 BY : R.C.DELOZIER     |  APPLIED SCIENCE DEPARTMENT  |CONC0110
C |                      L.D.REYNOLDS     |  COMPUTING TECHNOLOGY CENTER |CONC0120
C |                      B.E.SRITE        |  UNION CARBIDE NUCLEAR DIVSN |CONC0130
C |  REVISED BY R. J. BARNARD DEC. 1972 FOR SYMBOLIC ADDRESSING OF     |CONC0140
C |  INPUT/OUTPUT AND COMMENT EDITING.                                 |CONC0150
                                                              CONTINUE CONC0160
C |      THE CONCEPT COMPUTER CODE PACKAGE PROVIDES CONCEPTUAL CAPITAL |CONC0170
C |  COST ESTIMATES FOR NUCLEAR AND FOSSIL-FUELED POWER PLANTS.  COST  |CONC0180
C |  ESTIMATES ARE MADE AS A FUNCTION OF PLANT TYPE, SIZE, LOCATION, & |CONC0190
C |  DATE OF OPERATION.                                                |CONC0200
C |      OUTPUT INCLUDES A DETAILED BREAKDOWN OF THE ESTIMATE INTO     |CONC0210
C |  DIRECT AND INDIRECT COSTS ACCORDING TO THE USAEC ACCOUNTING       |CONC0220
C |  SYSTEM DESCRIBED IN DOCUMENT NUS-531.  COST MODELS CURRENTLY      |CONC0230
C |  AVAILABLE ARE:                                                    |CONC0240
C |  SINGLE-UNIT PWR, BWR, AND COAL- AND OIL-FIRED PLANTS.             |CONC0250
C |                                                                    |CONC0260
C |      THIS WORK WAS PERFORMED BY MEMBERS OF THE CAPITAL COST GROUP  |CONC0270
C |  OF THE ORNL STUDIES AND EVALUATIONS PROGRAM AND THE APPLIED       |CONC0280
C |  SCIENCE DEPARTMENT OF THE COMPUTING TECHNOLOGY CENTER UNDER THE   |CONC0290
C |  SPONSORSHIP OF THE OFFICE OF PROGRAM ANALYSIS, DIVISION OF        |CONC0300
C |  REACTOR DEVELOPMENT AND TECHNOLOGY, USAEC.                        |CONC0310
C |                                                                    |CONC0320
C |  PROGRAM DOCUMENTATION:                                            |CONC0330
C |                 USAEC REPORT WASH-1180, ORNL-TM-3276, ORNL-4809.   |CONC0340
C |=================================================================|CONC0350
C                                                                       CONC0360
      DIMENSION APLOT(101), YTIME(50)                                   CONC0370
      DIMENSION ICARD(80), CM(50)                                       CONC0380
      DIMENSION FILB(5), FILS(5)                                        CONC0390
       REAL SC2(12)                                                     CONC0400
      DATA ICOM /'C'/, IAMEND /'&END'/                                  CONC0410
      REAL * 8 AC2, AC3, AC4, AC5, ACC, B, DATE, LOC, FACLAB, FACMAT    CONC0420
      REAL * 8 TYPE, TYPE1                                              CONC0430
      COMMON / FORM /                                                   CONC0440
     * AC2(8,12)     , AC3(8,60)     , AC4(8,150)    , AC5(8,50)     ,  CONC0450
     * ACC(8,12)     , DATE          , FACLAB(2,16)  , FACMAT(2,16)  ,  CONC0460
     * IAR1          , IAR2(5)       , IAR3(15)      , IAR4(60)      ,  CONC0470
     * IAR5(160)                                                       CONC0480
      COMMON /PROG/                                                     CONC0490
     * LOC(4)        , B(25)         , CFCA(8,50)    , CSAVE(11)     ,  CONC0500
     * FACIN         , YRST          , YREND         , ICOY          ,  CONC0510
     * IMM           , MWE           , NTP                              CONC0520
```

```
      COMMON /OUT/                                                      CONC0530
     * BWE          , C(10)        , C2(4,12)     , C3(4,60)     ,      CONC0540
     * C4(4,150)    , C5(4,50)     , C2C(4,12)    , C2SP(4,12)   ,      CONC0550
     * C2T(4,12)    , ESCL         , SFMC         , SSMC         ,      CONC0560
     * SSLC         , SSPP         , SCONT        , STDC         ,      CONC0570
     * STDCS        , TIC          , TDA          , TPCI         ,      CONC0580
     * MHS(7)       , MMHS         , IAC                               CONC0590
      COMMON / NAML/                                                    CONC0600
     * ALB(7)       , AMB(7)       , ALS(7)       , AMS(7)       ,      CONC0610
     * AFC(7)       , BLB(7)       , BMB(7)       , BLS(7)       ,      CONC0620
     * BMS(7)       , BFC(7)       , APC(7)       , BPC(7)       ,      CONC0630
     * AA(3,10)     , AF           , AI(4,10)     , COB          ,      CONC0640
     * CONTL(11)    , CONTM(11)    , COS          , DUMMY        ,      CONC0650
     * D2(3,12)     , D3(3,60)     , D4(3,150)    , D5(3,50)     ,      CONC0660
     * DEOT         , DY           , FACB1(7,16)  , FACB2(7,16)  ,      CONC0670
     * FACS1(7,16)  , FACS2(7,16)  , HW           , IACC         ,      CONC0680
     * IBASE(5)     , ISITE(5)     , MIDDLE       , NUMSL        ,      CONC0690
     * OTP          , OVERS        , RIB          , RIBA         ,      CONC0700
     * RINT(50)     , SPP(11)      , TIMLED(7)    , TSMAT        ,      CONC0710
     * YBC          , YFIRST      , YLAST                              CONC0720
      NAMELIST /CONOPT/                                                 CONC0730
     * A      , AA     , AC2    , AC3    , AC4    , AC5    , ACC    ,  CONC0740
     * AI     , AMB    , AMS    , ALB    , ALS    , AFC    , APC    ,  CONC0750
     * BB     , BFC    , BPC    , BMB    , BMS    , BLB    , BLS    ,  CONC0760
     * CFCA   , COB    , CONTL  , CONTM  , COS    , C2     , C3     ,  CONC0770
     * C4     , C5     , D2     , D3     , D4     , D5     , DEOT   ,  CONC0780
     * DY     , FACB1  , FACB2  , FACS1  , FACS2  , FILB   , FILS   ,  CONC0790
     * IAR1   , IAR2   , IAR3   , IAR4   , IAR5   , IAC    , ICOB   ,  CONC0800
     * IBASE  , ISITE  , MIDDLE , OTP    , OVERS  , RINT   , SPP    ,  CONC0810
     * TIMLED , TYBC   , YFIRST , YLAST                                CONC0820
C                                                                       CONC0830
C |=================================================================|CONC0840
C |                                                                 |CONC0850
C |            COMPUTING TECHNOLOGY CENTER FILE ASSIGNMENTS         |CONC0860
C |            ____________________________________________         |CONC0870
C |       INPT IS THE SYSTEM INPUT STREAM ON FT05F001               |CONC0880
C |       IOUT IS THE SYSTEM OUTPUT FILE ON FT06F001                |CONC0890
C |       MED IS THE INTERMEDIATE FILE ON SYSDA ASSIGNED TO FT03F001|CONC0900
C |       LAM IS THE LABOR AND MATERIALS COSTS FILE ON FT08F001     |CONC0910
C |       MOD IS THE PLANT COST MODEL FILE OF FT09F001              |CONC0920
C |                                                                 |CONC0930
C |=================================================================|CONC0940
C                                                                       CONC0950
      INPT = 5                                                          CONC0960
      IOUT = 6                                                          CONC0970
      MED = 3                                                           CONC0980
      LAM = 8                                                           CONC0990
      MOD = 9                                                           CONC1000
      IM       =      10000                                             CONC1010
      CALL IDAY (DATE)                                                  CONC1020
      CALL ERRSET (209,IM,-1,0,0)                                       CONC1030
      CALL ERRSET (207,IM,-1,0,0)                                       CONC1040
      CALL ERRSET (253,IM,-1,0,0)                                       CONC1050
20    ICOY     =      1                                                 CONC1060
      NUMSL    =      25                                                CONC1070
      MM       =      0                                                 CONC1080
      WRITE (IOUT,25)                                                   CONC1090
```

```
25    FORMAT('1')                                                        CONC1100
C                                                                        CONC1110
C |=================================================================|CONC1120
C |                                                                 |CONC1130
C |   INPUT DATA OR COMMENT CARD                                    |CONC1140
C |                                                                 |CONC1150
C |=================================================================|CONC1160
30     CONTINUE                                                        CONC1170
C                                                                        CONC1180
C |=================================================================|CONC1190
C |                                                                 |CONC1200
C |                 DESCRIPTION OF STANDARD INPUT CARD              |CONC1210
C |                 ------------------------------------            |CONC1220
C |                                                                 |CONC1230
C |  COLUMN   VARIABLE        FUNCTION AND FORMAT                   |CONC1240
C |  -------  ---------       -------------------                   |CONC1250
C |   1-4     MWE             MEGAWATTS NOMINAL POWER (RIGHT ADJUSTED) |CONC1260
C |   6-13    TYPE            POWER PLANT TYPE (BEGIN IN COL. 6)    |CONC1270
C |   15-30   LOC(I),I=1,2    CITY, BEGIN IN COLUMN 15.             |CONC1280
C |   32-47   LOC(I),I=3,4    OTHER IDENTIFICATION                  |CONC1290
C |   50-54   YRST            DATE FOR START OF CONSTRUCTION; F5.1. |CONC1300
C |   56-60   YREND           DATE FOR END OF CONSTRUCTION; F5.1    |CONC1310
C |   62-65   RIB             INTEREST DURING CONSTRUCTION IN %,(F4.2) |CONC1320
C |   67-69   HW              NUMBER OF HOURS WORKED PER WEEK; F3.1 |CONC1330
                                                            CONTINUE CONC1340
C |   71      IFLAG           FLAG FOR OPTIONAL NAMELIST INPUT;     |CONC1350
C |                           0 - BYPASS CONOPT READ AND CALL TO CONII |CONC1360
C |                           1 - READ NAMELIST                     |CONC1370
C |                           2 - READ NAMELIST IN COST SUBROUTINE  |CONC1380
C |                           3 - CALL CONII WITHOUT NAMELIST       |CONC1390
C |                           4 - CALL CONII AND READ NAMELIST      |CONC1400
C |                           5 - READ NAMELIST AFTER CALL TO CONII |CONC1410
C |                               AND IN COST.                      |CONC1420
C |   73      IOF             OUTPUT FLAG; 0 OR BLANK = 2-DIGIT SUMMARY |CONC1430
C |                       1 = 3- AND 4-DIGIT BREAKDOWN AS IN NUS-531. |CONC1440
C |   75      IWANT           FLAG FOR ESCALATION DURING CONSTRUCTION; |CONC1450
C |                           0 = START OF CONSTRUCTION COSTS,      |CONC1460
C |                           1 = ESCALATION DURNING CONSTRUCTION.  |CONC1470
C |                           2 = ESCALATION BROKEN OUT             |CONC1480
C |   77      IBS             FLAG USED TO CHANGE BASE AND/OR SITE  |CONC1490
C |                           IBS IS USED FOR IFLAG = 3 OR 4        |CONC1500
C |                           0 - CHANGE SITE                       |CONC1510
C |                           1 - CHANGE BASE                       |CONC1520
C |                           2 - CHANGE BASE AND SITE              |CONC1530
C |   79      IAC             FLAG USED TO COMPUTE TYPE OF INTEREST |CONC1540
C |                             0 - STRAIGHT INTEREST               |CONC1550
C |                             1 - COMPOUND INTEREST               |CONC1560
C |                                                                 |CONC1570
C |=================================================================|CONC1580
C                                                                        CONC1590
       IAC      =    1                                                   CONC1600
      READ (INPT,31,END=120) ICARD                                       CONC1610
31    FORMAT(80A1)                                                       CONC1620
      IF (ICARD(1).NE.ICOM) GO TO 40                                     CONC1630
      MM        =      MM + 1                                            CONC1640
      WRITE (IOUT,35) ICARD                                              CONC1650
35    FORMAT(' ',80A1)                                                   CONC1660
```

```
      GO TO 30                                                          CONC1670
40    REWIND MED                                                        CONC1680
      WRITE (MED,31) ICARD                                              CONC1690
      WRITE (IOUT,35) ICARD                                             CONC1700
      REWIND MED                                                        CONC1710
C                                                                       CONC1720
C |=================================================================|CONC1730
C |                                                                 |CONC1740
C |   READ DATA FROM DISK                                           |CONC1750
C |                                                                 |CONC1760
C |=================================================================|CONC1770
C                                                                       CONC1780
      READ (MED,45) MWE, TYPE, (LOC(I), I=1,4), YRST, YREND, RIB, HW,   CONC1790
     * IFLAG, IOF, IWANT, IBS, IAC                                      CONC1800
45    FORMAT(I4,1XA8,2(1X,2A8),2XF5.1,1XF5.1,1XF4.2,1XF3.1,5(1X,I1))    CONC1810
      REWIND MED                                                        CONC1820
      RIB       =      RIB / 100.0                                      CONC1830
      IF (HW.LE.0.0) HW = 40.0                                          CONC1840
48    IF (IFLAG.EQ.0) GO TO 50                                          CONC1850
49    READ (INPT,47) (ICARD(KK),KK=1,20)                                CONC1860
      WRITE (IOUT,47) (ICARD(KK),KK=1,20)                               CONC1870
      WRITE (MED,47) (ICARD(KK),KK=1,20)                                CONC1880
47    FORMAT(1X,19A4,A3)                                                CONC1890
      IF (ICARD(1).NE.IAMEND) GO TO 49                                  CONC1900
      IF (IFLAG.NE.5) GO TO 50                                          CONC1910
56    READ (INPT,47) (ICARD(KK),KK=1,20)                                CONC1920
      WRITE (IOUT,47) (ICARD(KK),KK=1,20)                               CONC1930
      WRITE (MED,47) (ICARD(KK),KK=1,20)                                CONC1940
      IF (ICARD(1).NE.IAMEND) GO TO 56                                  CONC1950
50    REWIND MED                                                        CONC1960
C                                                                       CONC1970
C |=================================================================|CONC1980
C |                                                                 |CONC1990
C |  ** READ MASTER TAPE FOR BASIC COSTS *******                    |CONC2000
C |                                                                 |CONC2010
C |=================================================================|CONC2020
C                                                                       CONC2030
      REWIND MOD                                                        CONC2040
51    READ (MOD,END=55) TYPE1, YBC, YFIRST, TIMLED, DUMRIB, RINT, OTP,  CONC2050
     * DUMHW, OVERS, DEOT, COS, COB, CONTM, CONTL, SPP, AMB, AMS, ALB,  CONC2060
     * ALS, BMB, BMS, BLB, BLS, IBASE, ISITE, D2, D3, D4, D5, AI, BWE,  CONC2070
     * AA, IAR1, IAR2, IAR3, IAR4, IAR5, CFCA, FACB1, FACB2, FACS1,    CONC2080
     * FACS2, FILB, FILS, AC2, AC3, AC4, AC5, ACC                       CONC2090
      IF (TYPE1.EQ.TYPE) GO TO 65                                       CONC2100
      GO TO 51                                                          CONC2110
55    WRITE (IOUT,60) TYPE1                                             CONC2120
60    FORMAT('1TYPE OF PLANT NOT FOUND ON BASIC COST MASTER TAPE'/      CONC2130
     * ' ', A8, ' USED FOR RUN')                                         CONC2140
      TYPE      =      TYPE1                                            CONC2150
65    MM        =      0                                                CONC2160
C                                                                       CONC2170
C |=================================================================|CONC2180
C |                                                                 |CONC2190
C |   CHECK FOR LOCATION IN GEOGRAPHIC TABLE                        |CONC2200
C |                                                                 |CONC2210
C |=================================================================|CONC2220
C                                                                       CONC2230
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      DO 80  J =   1,NUMSL                                              CONC2240
      IF (LOC(1).NE.B(J)) GO TO 80                                      CONC2250
      KCITY    =   J                                                    CONC2260
      GO TO 90                                                          CONC2270
80    CONTINUE                                                          CONC2280
      WRITE (IOUT,85) (LOC(I), I=1,4)                                   CONC2290
85    FORMAT('1',4A8,' WAS NOT FOUND IN TABLE OF CITIES: MIDDLETOWN, USACONC2300
     * WILL BE USED AS THE GEOGRAPHIC LOCATION')                        CONC2310
      KCITY    =   MIDDLE                                               CONC2320
90    ISITE(1) =   KCITY                                                CONC2330
      IBASE(1) =   MIDDLE                                               CONC2340
C                                                                       CONC2350
C |=================================================================|CONC2360
C |                                                                 |CONC2370
C |   TESTS FOR FLAG OPTIONS                                        |CONC2380
C |                                                                 |CONC2390
C |=================================================================|CONC2400
C                                                                       CONC2410
      IF (IFLAG.EQ.1) READ(3,CONOPT)                                    CONC2420
      IF (KCITY.NE.MIDDLE) GO TO 93                                     CONC2430
      IF (IFLAG.EQ.0) GO TO 105                                         CONC2440
      IF (IFLAG.NE.3.AND.IFLAG.NE.4) GO TO 95                           CONC2450
93    IF (IBS.EQ.1.OR.IBS.EQ.2) CALL CONII (ALB, BLB, AMB, BMB, IBASE,  CONC2460
     * FACB1, FACB2, FILB, YFIRST, YLAST, IAR2(1))                      CONC2470
      IF (IBS.EQ.0.OR.IBS.EQ.2) CALL CONII (ALS, BLS, AMS, BMS, ISITE,  CONC2480
     * FACS1, FACS2, FILS, YFIRST, YLAST, IAR2(1))                      CONC2490
      IF (IFLAG.EQ.4) READ (3,CONOPT)                                   CONC2500
95    IF (IFLAG.NE.5) GO TO 105                                         CONC2510
      READ (MED,CONOPT)                                                 CONC2520
105   CONTINUE                                                          CONC2530
       ESCL    =   0.                                                   CONC2540
       IWANTS  =   IWANT                                                CONC2550
       IF(IWANT.EQ.2) IWANTS = -1                                       CONC2560
C                                                                       CONC2570
C |=================================================================|CONC2580
C |                                                                 |CONC2590
C |    BREAK OUT ESCALATION                                         |CONC2600
C |                                                                 |CONC2610
C |=================================================================|CONC2620
C                                                                       CONC2630
      CALL COST (IOF, IWANTS, IFLAG)                                    CONC2640
      IF (IWANT.LT.2) GO TO 107                                         CONC2650
       IWANTS  =   0                                                    CONC2660
       N2      =   IAR2(1)                                              CONC2670
      SVIC = TPCI                                                       CONC2680
       DO 106 I=   1,N2                                                 CONC2690
       SC2(I)  =   C2(4,I)                                              CONC2700
106   CONTINUE                                                          CONC2710
      CALL COST (IOF, IWANTS, IFLAG)                                    CONC2720
      DO 111 I =   1,N2                                                 CONC2730
      SC2(I)   =   SC2(I) - C2(4,I)                                     CONC2740
      ESCL     =   ESCL + SC2(I)                                        CONC2750
111   CONTINUE                                                          CONC2760
      ESCL = SVIC - TPCI                                                CONC2770
107   CONTINUE                                                          CONC2780
108   CONTINUE                                                          CONC2790
      N2       =   IAR2(1)                                              CONC2800
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      DO 115 J =    1,IMM                                                CONC2810
      CM(J)         =    CFCA(2,J) * C2(4,1)                             CONC2820
      DO 110 I   =    2,N2                                               CONC2830
C                                                                        CONC2840
C |=================================================================|CONC2850
C |                                                                 |CONC2860
C |   GENERATE PROJECT CASH FLOW                                    |CONC2870
C |                                                                 |CONC2880
C |=================================================================|CONC2890
C                                                                        CONC2900
      CM(J)         =    CM(J) + C2(4,1) * CFCA(I+1,J) * (TPCI - C2(4,1)) CONC2910
     *                   / STDCS                                       CONC2920
110   CONTINUE                                                           CONC2930
115   CONTINUE                                                           CONC2940
      CALL OUTPUT (IOF, IWANT, IFLAG, TYPE)                              CONC2950
      IF (IOF.EQ.0) GO TO 20                                             CONC2960
      WRITE (IOUT,117) DATE, MWE, TYPE, (LOC(II), II=1,4)                CONC2970
117   FORMAT('1DATE ',A8,13X,'CONCEPT PHASE II'/' ',I4,' MWE ',          CONC2980
     * A8,' POWER PLANT  ',2A8,', ',2A8)                                 CONC2990
      CALL PLOT (YRST, YREND, CM, IMM)                                   CONC3000
      GO TO 20                                                           CONC3010
120   CONTINUE                                                           CONC3020
      RETURN                                                             CONC3030
      END                                                                CONC3040
```

```
      SUBROUTINE CONII (AL, BL, AM, BM, IL, FL, FM, FIL, YFIRST, YLAST, CNII0010
     * N2)                                                              CNII0020
C                                                                       CNII0030
C |=================================================================|CNII0040
C |                                                                 |CNII0050
C |   SUBPROGRAM FOR EVALUATION OF ESCALATION COMPONENTS            |CNII0060
C |                                                                 |CNII0070
C |   BY R. C. DELOZIER AND B. E. SRITE 01/01/72                    |CNII0080
C |                                                                 |CNII0090
C |_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ |CNII0100
C |                                                                 |CNII0110
C |  VARIABLE  DESCRIPTION                                          |CNII0120
C |  ________  ___________                                          |CNII0130
C |                                                                 |CNII0140
C |    AL      LABOR RATE IN YFIRST                                 |CNII0150
C |    BL      ESCALATION RATE FOR LABOR                            |CNII0160
C |    AM      MATERIAL COST IN YFIRST                              |CNII0170
C |    BM      ESCALATION RATE FOR MATERIAL                         |CNII0180
C |    IL      LOCATIONS TO BE STUDIED                              |CNII0190
C |    FL      FACTOR FOR LABOR TYPE                                |CNII0200
C |    FM      FACTOR FOR MATERIAL TYPE                             |CNII0210
C |    FIL     FACTOR FOR LOCATION                                  |CNII0220
C |    YFIRST  FIRST YEAR PERTRAINING TO CONLAM DATA                |CNII0230
C |    YLAST   LAST YEAR PERTAINING TO CONLAM DATA                  |CNII0240
C |    N2      NUMBER OF 2-DIGIT ACCOUNTS                           |CNII0250
C |                                                                 |CNII0260
C |=================================================================|CNII0270
C                                                                       CNII0280
      DIMENSION AL(7),BL(7),AM(7),BM(7),FL(7,16),FM(7,16),FIL(5),       CNII0290
     *          A(30,8),B(30,16),C(30,16),YR(30),RM(30),RL(30)          CNII0300
      DIMENSION IL(5), SAM(7), SBM(7), SAL(7), SBL(7)                   CNII0310
      DIMENSION LOCIN(8)                                                CNII0320
      IOUT = 6                                                          CNII0330
      LAM = 8                                                           CNII0340
       REWIND LAM                                                       CNII0350
       DO  10  I    =    1,5                                            CNII0360
       IF(IL(I).EQ.0)  GO TO 20                                         CNII0370
10    CONTINUE                                                          CNII0380
      I            =    6                                               CNII0390
20    CONTINUE                                                          CNII0400
      IMX          =    IL(I-1)                                         CNII0410
      DO 40 I      =    1,N2                                            CNII0420
      SBM(I)       =    0.0                                             CNII0430
      SAM(I)       =    0.0                                             CNII0440
      SAL(I)       =    0.0                                             CNII0450
      SBL(I)       =    0.0                                             CNII0460
40    CONTINUE                                                          CNII0470
C                                                                       CNII0480
C |                                                                 |CNII0490
C |=================================================================|CNII0500
C |   LOOK FOR UP TO 5 LOCATIONS                                    |CNII0510
C |   CAN BE COMBINED FOR REGION PROJECTIONS                        |CNII0520
C |.                                                                |CNII0530
C |=================================================================|CNII0540
C                                                                       CNII0550
      IC           =    1                                               CNII0560
      DO 90 I      =    1,IMX                                           CNII0570
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      READ (LAM,END=101) IR, IS, IT, LOCIN, SP1, SP2, SP3, A, B, C      CNII0580
      IF (IL(IC).NE.I) GO TO 90                                         CNII0590
      WRITE (IOUT,41) LOCIN                                             CNII0600
41    FORMAT('OCONII CALLED - DATA FIT DONE ON ',8A4)                   CNII0610
      IC          =   IC + 1                                            CNII0620
C                                                                       CNII0630
C |=================================================================|CNII0640
C |                                                                 |CNII0650
C |    DO N2 ACCOUNTS                                                |CNII0660
C |                                                                 |CNII0670
C |=================================================================|CNII0680
C                                                                       CNII0690
      DO 60 J     =   1,N2                                              CNII0700
      DO 35 K     =   1,30                                              CNII0710
      RM(K)       =   0.0                                               CNII0720
      RL(K)       =   0.0                                               CNII0730
35    CONTINUE                                                          CNII0740
      KK          =   0                                                 CNII0750
C                                                                       CNII0760
C |=================================================================|CNII0770
C |                                                                 |CNII0780
C |    DO TIME PERIODS                                               |CNII0790
C |                                                                 |CNII0800
C |=================================================================|CNII0810
C                                                                       CNII0820
      DO 50 K     =   1,30                                              CNII0830
      IF (A(K,1).EQ.0.0) GO TO 55                                       CNII0840
      IF (A(K,1).GT.YLAST) GO TO 55                                     CNII0850
      IF (YFIRST.GT.A(K,1)) GO TO 50                                    CNII0860
      KK          =   KK + 1                                            CNII0870
      DO 45 L     =   1,16                                              CNII0880
      RL(KK)      =   RL(KK) + B(K,L) * FL(J,L)                         CNII0890
      RM(KK)      =   RM(KK) + C(K,L) * FM(J,L)                         CNII0900
45    CONTINUE                                                          CNII0910
      RL(KK)      =   ALOG(RL(KK))                                      CNII0920
      RM(KK)      =   ALOG(RM(KK))                                      CNII0930
      YR(KK)      =   A(K,1) - YFIRST + 1.0E-6                          CNII0940
50    CONTINUE                                                          CNII0950
55    CONTINUE                                                          CNII0960
      CALL FITS (YR, RL, KK, AL1, BL1)                                  CNII0970
      CALL FITS (YR, RM, KK, AM1, BM1)                                  CNII0980
      SAL(J)      = SAL(J) + FIL(IC-1) * AL1                            CNII0990
      SAM(J)      =   SAM(J) + FIL(IC-1) * AM1                          CNII1000
      SBL(J)      =   SBL(J) + FIL(IC-1) * AL1 * BL1                    CNII1010
      SBM(J)      =   SBM(J) + FIL(IC-1) * AM1 * BM1                    CNII1020
60    CONTINUE                                                          CNII1030
90    CONTINUE                                                          CNII1040
      DO 100 J    =   1,N2                                              CNII1050
      AL(J)       =   SAL(J)                                            CNII1060
      BL(J)       =   SBL(J) / SAL(J)                                   CNII1070
      AM(J)       =   SAM(J)                                            CNII1080
      BM(J)       =   SBM(J) / SAM(J)                                   CNII1090
100   CONTINUE                                                          CNII1100
101   RETURN                                                            CNII1110
      END                                                               CNII1120
```

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      SUBROUTINE FITS(X,Y,N,A,B)                                        FITS0010
C                                                                       FITS0020
C |=================================================================|FITS0030
C |                                                                 |FITS0040
C |   EVALUATE COEFFICIENTS A AND B OF LN(Y) = LN(A) + B LN(X)      |FITS0050
C |                                                                 |FITS0060
C |      LINEAR FIT ....   R.C. DELOZIER  .....  5/17/72            |FITS0070
C |                                                                 |FITS0080
C |=================================================================|FITS0090
C                                                                       FITS0100
      REAL X(N),Y(N)                                                    FITS0110
      R          =   N                                                  FITS0120
      SX         =   0.                                                 FITS0130
      SX2        =   0.                                                 FITS0140
      SY         =   0.                                                 FITS0150
      SXY        =   0.                                                 FITS0160
      DO 5 I     =   1,N                                                FITS0170
      SX         =   SX + X(I)                                          FITS0180
      SX2        =   SX2+ X(I)     **2                                  FITS0190
      SY         =   SY +Y(I)                                           FITS0200
      SXY        =   SXY+Y(I)          *X(I)                            FITS0210
    5 CONTINUE                                                          FITS0220
      B          =   (SY*SX-SXY*R)/(SX*SX-SX2*R)                        FITS0230
      A          =   (SY-B*SX)/R                                        FITS0240
      A          =   EXP(A)                                             FITS0250
      B          =   EXP(B)                                             FITS0260
      RETURN                                                            FITS0270
      END                                                               FITS0280
```

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      SUBROUTINE COST (IOF, IWANT, IFLAG)                                COST0010
      FIND(A1,B1,C1,D1,E1) = A1 + B1 / (C1 + E1) **D1                    COST0020
C                                                                        COST0030
C |=================================================================|COST0040
C |                                                                 |COST0050
C |    THIS ROUTINE  DOES ALL COST MODIFICATIONS                    |COST0060
C |                                                                 |COST0070
C |    BY :  L.D.REYNOLDS                                           |COST0080
C |          R.C.DELOZIER                                           |COST0090
C |          B.E.SRITE                                              |COST0100
C |          DATE 02/05/72                                          |COST0110
                                                            CONTINUE  COST0120
C |_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ |COST0130
C |                                                                 |COST0140
C |                       LIST OF NOMENCLATURE                      |COST0150
C |  VARIABLE                                                       |COST0160
C |    NAME        DESCRIPTION                                      |COST0170
C |  ___________   ________________________________________________ |COST0180
C |   C2             DIRECT COSTS OF 2-DIGIT ACCOUNTS               |COST0190
C |   C3             DIRECT COSTS OF 3-DIGIT ACCOUNTS               |COST0200
C |   C4             DIRECT COSTS OF 4-DIGIT ACCOUNTS               |COST0210
C |   C5             DIRECT COSTS OF 5-DIGIT ACCOUNTS               |COST0220
C |   C2C            CONTINGENCY FOR 2-DIGIT ACCOUNTS               |COST0230
C |   C2SP           SPARE PARTS COSTS OF 2-DIGIT ACCOUNT           |COST0240
C |   C2T            TOTAL COSTS FOR 2-DIGIT ACCOUNTS               |COST0250
C |   SUBSCRIPTS FOR C ARRAYS                                       |COST0260
C |                  1 - FACTORY                                    |COST0270
C |                  2 - LABOR                                      |COST0280
C |                  3 - MATERIAL                                   |COST0290
C |                  4 - TOTAL OF FACTORY, LABOR AND MATERIAL       |COST0300
C |   CONTM(I)     MTL CONTINGENCY AS PERCENTAGE OF 2-DIGIT SUBTOTALS |COST0310
C |   CONTL(I)   LABOR CONTINGENCY AS PERCENTAGE OF 2-DIGIT SUBTOTALS |COST0320
C |   SPP(I)       SPARE PARTS AS PERCENTAGE OF 2-DIGIT SUBTOTALS   |COST0330
C |                                                                 |COST0340
C |=================================================================|COST0350
C                                                                        COST0360
       DIMENSION CAP(11),FAC(11),TIM(11)                                 COST0370
      REAL * 8 AC2, AC3, AC4, AC5, ACC, B, DATE, LOC, FACLAB, FACMAT     COST0380
      COMMON / FORM /                                                    COST0390
     * AC2(8,12)     , AC3(8,60)     , AC4(8,150)    , AC5(8,50)     ,   COST0400
     * ACC(8,12)     , DATE          , FACLAB(2,16)  , FACMAT(2,16)  ,   COST0410
     * IAR1          , IAR2(5)       , IAR3(15)      , IAR4(60)      ,   COST0420
     * IAR5(160)                                                         COST0430
      COMMON /PROG/                                                      COST0440
     * LOC(4)        , B(25)         , CFCA(8,50)    , CSAVE(11)     ,   COST0450
     * FACIN         , YRST          , YREND         , ICOY          ,   COST0460
     * IMM           , MWE           , NTP                               COST0470
      COMMON /OUT/                                                       COST0480
     * BWE           , C(10)         , C2(4,12)      , C3(4,60)      ,   COST0490
     * C4(4,150)     , C5(4,50)      , C2C(4,12)     , C2SP(4,12)    ,   COST0500
     * C2T(4,12)     , ESCL          , SFMC          , SSMC          ,   COST0510
     * SSLC          , SSPP          , SCONT         , STOC          ,   COST0520
     * STOCS         , TIC           , TDA           , TPCI          ,   COST0530
     * MHS(7)        , MMHS          , IAC                               COST0540
      COMMON /NAML/                                                      COST0550
     * ALB(7)        , AMB(7)        , ALS(7)        , AMS(7)        ,   COST0560
     * AFC(7)        , BLB(7)        , BMB(7)        , BLS(7)        ,   COST0570
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     * BMS(7)        , BFC(7)        , APC(7)        , BPC(7)        ,      COST0580
     * AA(3,10)      , AF            , AI(4,10)      , COB           ,      COST0590
     * CONTL(11)     , CONTM(11)     , COS           , DUMMY         ,      COST0600
     * D2(3,12)      , D3(3,60)      , D4(3,150)     , D5(3,50)      ,      COST0610
     * DEOT          , DY            , FACB1(7,16)   , FACB2(7,16)   ,      COST0620
     * FACS1(7,16)   , FACS2(7,16)   , HW            , IACC          ,      COST0630
     * IBASE(5)      , ISITE(5)      , MIDDLE        , NUMSL         ,      COST0640
     * OTP           , OVERS         , RIB           , RIBA          ,      COST0650
     * RINT(50)      , SPP(11)       , TIMLED(7)     , TSMAT         ,      COST0660
     * YBC           , YFIRST       , YLAST                                 COST0670
      NAMELIST /CONOPT/                                                     COST0680
     * A       , AA      , AC2     , AC3     , AC4     , AC5     , ACC     ,  COST0690
     * AI      , AMB     , AMS     , ALB     , ALS     , AFC     , APC     ,  COST0700
     * BB      , BFC     , BPC     , BMB     , BMS     , BLB     , BLS     ,  COST0710
     * CFCA    , COB     , CONTL   , CONTM   , COS     , C2      , C3      ,  COST0720
     * C4      , C5      , D2      , D3      , D4      , D5      , DEOT    ,  COST0730
     * DY      , FACB1   , FACB2   , FACS1   , FACS2   , FILB    , FILS    ,  COST0740
     * IAR1    , IAR2    , IAR3    , IAR4    , IAR5    , ICOB    , MIDDLE  ,  COST0750
     * OTP     , OVERS   , RINT    , SPP     , TIMLED  , TSMAT   , YBC     ,  COST0760
     * YFIRST , YLAST                                                        COST0770
C                                                                           COST0780
C                                                                           COST0790
C |=================================================================|COST0800
C |                                                                 |COST0810
C |   STEP 1.  INITIALIZE VARIABLES.                                |COST0820
C |                                                                 |COST0830
C |_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ |COST0840
C |                                                                 |COST0850
C |    IYY AND AC ARE FLAGS FOR INTEREST MODIFCATIONS               |COST0860
C |                                                                 |COST0870
C |=================================================================|COST0880
C                                                                           COST0890
      MFD = 3                                                               COST0900
      IWKEPN = IWANT                                                        COST0910
      IWANT = IABS(IWANT)                                                   COST0920
      IYY          =   1                                                    COST0930
      STDC         =   0.0                                                  COST0940
      SFMC         =   0.0                                                  COST0950
      SSMC         =   0.0                                                  COST0960
      SSLC         =   0.0                                                  COST0970
      STDCS        =   0.0                                                  COST0980
      SCONT        =   0.0                                                  COST0990
      SSPP         =   0.0                                                  COST1000
      MMHS         =   0                                                    COST1010
      OVER         =   1.0 - DEOT * (HW - 40.0)                             COST1020
      IF (OVERS.GT.0.001) OVER = OVERS                                      COST1030
      OTPP         =   (40.0 + OTP * (HW - 40.0 )) / HW                     COST1040
      N2           =   IAR2(1)                                              COST1050
      DO 70 I      =   1,3                                                  COST1060
      N32          =   0                                                    COST1070
      N42          =   0                                                    COST1080
      N52          =   0                                                    COST1090
      DO 65 I2     =   1,N2                                                 COST1100
      IF (I.NE.1) GO TO 10                                                  COST1110
      C2C(4,I2)    =   0.                                                   COST1120
      C2SP(4,I2)   =   0.                                                   COST1130
      C2T(4,I2)    =   0.                                                   COST1140
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      C2(4,I2)     =    0.                                                COST1150
10    CONTINUE                                                            COST1160
C                                                                         COST1170
C |=================================================================|COST1180
C |                                                                 |COST1190
C |  STEP 2.  CALCULATE DIRECT COST (LESS CONTINGENCY AND SPARE PARTS) |COST1200
C |           OF EACH 2-DIGIT ACCOUNT FOR BASE CASE TIME AND LOCATION, |COST1210
C |           BUT AT INPUT POWER LEVEL, MWE.                          |COST1220
C |=================================================================|COST1240
C |                                                                 |COST1230
C                                                                         COST1250
      C(I2)        =    AA(1,I2) + AA(2,I2) * (MWE / BWE) **AA(3,I2)      COST1260
C                                                                         COST1270
C |=================================================================|COST1280
C |                                                                 |COST1290
C |   STEP 3.  DIVIDE EACH 2-DIGIT ACCOUNT INTO COMPONENTS OF         |COST1300
C |            FACTORY MTL, SITE LABOR, & SITE MTL.                   |COST1310
C |                                                                 |COST1320
C |=================================================================|COST1330
C                                                                         COST1340
      C2(I,I2)     =    C(I2) * (D2(I,I2) / (D2(1,I2)+D2(2,I2)+D2(3,I2))) COST1350
C                                                                         COST1360
C |=================================================================|COST1370
C |                                                                 |COST1380
C |   STEP 4.  CALCULATE 2-DIGIT COST COMPONENTS AT INPUT TIME AND    |COST1390
C |            LOCATION.                                              |COST1400
C |                                                                 |COST1410
C |=================================================================|COST1420
C                                                                         COST1430
      IF(I.EQ.1)C2(I,I2) = C2(I,I2)*CLAB(I2,3,1,YRST)/CLAB(I2,3,1,YBC)  COST1440
      IF(I.EQ.3)C2(I,I2) = C2(I,I2)*CLAB(I2,2,2,YRST)/CLAB(I2,1,2,YBC)  COST1450
      IF(I.EQ.2)C2(I,I2) = C2(I,I2)*CLAB(I2,2,1,YRST)/CLAB(I2,1,1,YBC)  COST1460
     >      * (1.0+COS) / (1.0+COB)                                     COST1470
      IF(I.EQ.2)    C2(I,I2)=C2(I,I2)/(APC(I2) + BPC(I2)                COST1480
     >   *(YRST-YBC))                                                   COST1490
C                                                                         COST1500
C |=================================================================|COST1510
C |                                                                 |COST1520
C |   STEP 5.  ADJUST MAN-HOURS FOR EACH 2-DIGIT ACCOUNT FOR DIFFER-  |COST1530
C |            ENCES IN WAGE RATES AND CONTRACTOR'S OVERHEAD BETWEEN  |COST1540
C |            BASE AND INPUT CASES.                                  |COST1550
C |                                                                 |COST1560
C |=================================================================|COST1570
C                                                                         COST1580
15    IF (I.EQ.2) MHS(I2) = C2(I,I2)/(CLAB(I2,2,1,YRST)*(1.0+COS))      COST1590
      IF (IWANT.EQ.0) GO TO 25                                            COST1600
C                                                                         COST1610
C |=================================================================|COST1620
C |                                                                 |COST1630
C |   STEP 6.  IF REQUESTED (IWANT>0) ESCALATE 2-DIGIT ACCOUNTS THRU  |COST1640
C |            CONSTRUCTION PERIOD.  SKIP THIS SECTION FOR START OF   |COST1650
C |            CONSTRUCTION BASIS.                                    |COST1660
C |                                                                 |COST1670
C |=================================================================|COST1680
C                                                                         COST1690
      ILOC         =    3                                                COST1700
      ITYP         =    1                                                COST1710
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      IF(I.GT.1) ILOC=2                                                 COST1720
      IF(I.EQ.3) ITYP=2                                                 COST1730
      Y          =   YRST - TIMLED(I2)                                  COST1740
      IF (TIMLED(I2).LT.0.0) Y = YREND + TIMLED(I2)                     COST1750
      YR11       =   Y                                                  COST1760
      IT         =   1                                                  COST1770
      SUM        =   0.                                                 COST1780
      PROD1      =   1.0                                                COST1790
      IF (I.EQ.2) PROD1=APC(I2) + BPC(I2) * (YRST - YBC)                COST1800
      PROD       =   1.0                                                COST1810
20    CONTINUE                                                          COST1820
      IF (I.EQ.2) PROD = APC(I2) + BPC(I2) * (Y - YBC)                  COST1830
      SUM        =   SUM+(CFCA(I2+1,IT+1)-CFCA(I2+1,IT))*CLAB(I2,ILOC, COST1840
     >                ITYP,Y) / PROD                                    COST1850
      Y          =   Y + (CFCA(1,IT+1)-CFCA(1,IT))*(YREND-YR11)         COST1860
      IF(IT.LT.IMM-1) IT = IT + 1                                       COST1870
      IF(Y.LE.YREND) GO TO 20                                           COST1880
      C2(I,I2)   =   C2(I,I2) * SUM * PROD1 / CLAB(I2,ILOC,ITYP,YR11)   COST1890
25    CONTINUE                                                          COST1900
      IF(I.EQ.2) C2(I,I2) = C2(I,I2) * OTPP / OVER                      COST1910
      IF(I.EQ.2) C2OLD = C2(I,I2)                                       COST1920
C                                                                       COST1930
C |=================================================================|COST1940
C |                                                                 |COST1950
C |  STEP 7.  BREAK INPUT CASE 2-DIGIT ACCOUNTS DOWN TO 5-DIGIT LEVEL |COST1960
C |            USING BASE CASE RATIOS, PLUS ANY INPUT PERTURBATIONS.  |COST1970
C |                                                                 |COST1980
C |=================================================================|COST1990
C                                                                       COST2000
      C2S        =   C2(I,I2)                                           COST2010
      IF (IAR3(I2).EQ.0) GO TO 55                                       COST2020
      C2S        =   0.                                                 COST2030
      N31        =   N32 + 1                                            COST2040
      N32        =   N31 + IAR3(I2) - 1                                 COST2050
      DO 50 I3   =   N31,N32                                            COST2060
      IF(I.EQ.1) C3(4,I3) = 0.                                          COST2070
      C3(I,I3)   =   C2(I,I2) * (D3(I,I3) / D2(I,I2))                   COST2080
      C3S        =   C3(I,I3)                                           COST2090
      IF (IAR4(I3).EQ.0) GO TO 45                                       COST2100
      C3S        =   0.                                                 COST2110
      N41        =   N42 + 1                                            COST2120
      N42        =   N41 + IAR4(I3) - 1                                 COST2130
      DO 40 I4   =   N41,N42                                            COST2140
      IF(I.EQ.1) C4(4,I4) = 0.                                          COST2150
      C4(I,I4)   =   C3(I,I3) * (D4(I,I4) / D3(I,I3))                   COST2160
      C4S        =   C4(I,I4)                                           COST2170
      IF (IAR5(I4).EQ.0) GO TO 35                                       COST2180
      C4S        =   0.                                                 COST2190
      N51        =   N52 + 1                                            COST2200
      N52        =   N51 + IAR5(I4) - 1                                 COST2210
      DO 30 I5   =   N51,N52                                            COST2220
      IF(I.EQ.1) C5(4,I5) = 0.                                          COST2230
      C5(I,I5)   =   C4(I,I4) * (D5(I,I5) / D4(I,I4))                   COST2240
      C5(4,I5)   =   C5(4,I5) + C5(I,I5)                                COST2250
      C4S        =   C4S + C5(I,I5)                                     COST2260
C                                                                       COST2270
C |=================================================================|COST2280
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C |                                                                    |COST2290
C |   STEP 8.  SUM REVISED INPUT CASE TO 2-DIGIT LEVEL.                |COST2300
C |                                                                    |COST2310
C |====================================================================|COST2320
C                                                                       COST2330
30    CONTINUE                                                          COST2340
35    C3S          =   C3S + C4S                                        COST2350
      C4(I,I4)     =   C4S                                              COST2360
      C4(4,I4)     =   C4(4,I4) + C4(I,I4)                              COST2370
40    CONTINUE                                                          COST2380
45    C2S          =   C2S + C3S                                        COST2390
      C3(I,I3)     =   C3S                                              COST2400
      C3(4,I3)     =   C3(4,I3) + C3(I,I3)                              COST2410
50    CONTINUE                                                          COST2420
55    CONTINUE                                                          COST2430
      C2(I,I2)     =   C2S                                              COST2440
      C2(4,I2)     =   C2(4,I2) + C2(I,I2)                              COST2450
      IF (I.NE.2) GO TO 60                                              COST2460
      MHS(I2)      =   MHS(I2) * C2(2,I2) / C20LD                       COST2470
      IF (HW.GT.40.0) MHS(I2) = MHS(I2) / OVER                          COST2480
      MMHS         =   MMHS + MHS(I2)                                   COST2490
60    CONTINUE                                                          COST2500
C                                                                       COST2510
C |====================================================================|COST2520
C |                                                                    |COST2530
C |   STEP 9.  CALCULATE CONTINGENCIES AND SPARE PARTS COSTS FOR EACH  |COST2540
C |            DIRECT 2-DIGIT ACCOUNT                                  |COST2550
C |                                                                    |COST2560
C |====================================================================|COST2570
C                                                                       COST2580
      C2C(I,I2)    =   CONTM(I2) * C2(I,I2) / 100.                      COST2590
      IF(I.EQ.2) C2C(I,I2) = CONTL(I2) * C2(I,I2) / 100.                COST2600
      C2C(4,I2)    =   C2C(4,I2) + C2C(I,I2)                            COST2610
      C2SP(I,I2)   =   SPP(I2) * C2(I,I2) / 100.                        COST2620
      IF(I.EQ.2) C2SP(I,I2) = 0.                                        COST2630
      C2SP(4,I2)   =   C2SP(4,I2) + C2SP(I,I2)                          COST2640
      C2T(I,I2)    =   C2(I,I2) + C2C(I,I2) + C2SP(I,I2)                COST2650
      C2T(4,I2)    =   C2T(4,I2) + C2T(I,I2)                            COST2660
      IF(I.LT.3.OR.I2.EQ.1) GO TO 65                                    COST2670
      SFMC         =   SFMC + C2(1,I2)                                  COST2680
      SSLC         =   SSLC + C2(2,I2)                                  COST2690
      SSMC         =   SSMC + C2(3,I2)                                  COST2700
      STDCS        =   STDCS + C2(4,I2)                                 COST2710
      SCONT        =   SCONT + C2C(4,I2)                                COST2720
      SSPP         =   SSPP + C2SP(4,I2)                                COST2730
      STDC         =   STDC + C2T(4,I2)                                 COST2740
65    CONTINUE                                                          COST2750
70    CONTINUE                                                          COST2760
      IF (IFLAG.NE.2.AND.IFLAG.NE.5) GO TO 96                           COST2770
C                                                                       COST2780
C |====================================================================|COST2790
C |                                                                    |COST2800
C |   READ NEW DIRECT COSTS INTO C ARRAY AND RESUM TOTALS              |COST2810
C |                                                                    |COST2820
C |====================================================================|COST2830
C                                                                       COST2840
      IF(IWKEPN .LT. 0) GO TO 71                                        COST2850
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      READ (MED,CONOPT)                                                 COST2860
 71   CONTINUE                                                          COST2870
      MMHS          =    0                                            COST2880
      STDC          =    0.0                                          COST2890
      SFMC          =    0.0                                          COST2900
      SSMC          =    0.0                                          COST2910
      SSLC          =    0.0                                          COST2920
      STDCS         =    0.0                                          COST2930
      SCONT         =    0.0                                          COST2940
      SSPP          =    0.0                                          COST2950
      DO 95 I       =    1,3                                          COST2960
      N32           =    0                                            COST2970
      N42           =    0                                            COST2980
      N52           =    0                                            COST2990
      DO 90 I2      =    1,N2                                         COST3000
      IF (I.EQ.2) C2OLD = C2(I,I2)                                      COST3010
      IF (I.NE.1) GO TO 72                                              COST3020
      C2C(4,I2)     =    0.0                                          COST3030
      C2SP(4,I2)    =    0.0                                          COST3040
      C2T(4,I2)     =    0.0                                          COST3050
      C2(4,I2)      =    0.0                                          COST3060
 72   CONTINUE                                                          COST3070
      C2S           =    C2(I,I2)                                     COST3080
      IF (IAR3(I2).EQ.0) GO TO 86                                       COST3090
      N31           =    N32 + 1                                      COST3100
      N32           =    IAR3(I2) + N31 - 1                           COST3110
      C2S           =    0.0                                          COST3120
      DO 85 I3      =    N31,N32                                      COST3130
      IF (I.EQ.1) C3(4,I2) = 0.0                                        COST3140
      C3S           =    C3(I,I3)                                     COST3150
      IF (IAR4(I3).EQ.0) GO TO 81                                       COST3160
      N41           =    N42 + 1                                      COST3170
      N42           =    IAR4(I3) + N41 - 1                           COST3180
      C3S           =    0.0                                          COST3190
      DO 80 I4      =    N41,N42                                      COST3200
      IF (I.EQ.1) C4(4,I2) = 0.0                                        COST3210
      C4S           =    C4(I,I4)                                     COST3220
      IF (IAR5(I4).EQ.0) GO TO 76                                       COST3230
      N51           =    N52 + 1                                      COST3240
      N52           =    IAR5(I4) + N51 - 1                           COST3250
      C4S           =    0.0                                          COST3260
      DO 75 I5      =    N51,N52                                      COST3270
      IF (I.EQ.1) C5(4,I5) = 0.0                                        COST3280
      C4S           =    C4S + C5(I,I5)                               COST3290
      C5(4,I5)      =    C5(4,I5) + C5(I,I5)                          COST3300
 75   CONTINUE                                                          COST3310
 76   CONTINUE                                                          COST3320
      C4(I,I4)      =    C4S                                          COST3330
      C4(4,I4)      =    C4(4,I4) + C4S                               COST3340
      C3S           =    C3S + C4S                                    COST3350
 80   CONTINUE                                                          COST3360
 81   CONTINUE                                                          COST3370
      C3(I,I3)      =    C3S                                          COST3380
      C3(4,I3)      =    C3(4,I3) + C3S                               COST3390
      C2S           =    C2S + C3S                                    COST3400
 85   CONTINUE                                                          COST3410
 86   CONTINUE                                                          COST3420
```

```
      C2(I,I2)      =    C2S                                                COST3430
      C2(4,I2)      =    C2(4,I2) + C2S                                     COST3440
      IF (I.NE.2) GO TO 87                                                  COST3450
      MHS(I2)       =    MHS(I2) * (1.0 + (C2(2,I2) - C2OLD) / (C2OLD *    COST3460
     * OVER))                                                               COST3470
      MMHS          =    MMHS + MHS(I2)                                     COST3480
87    CONTINUE                                                              COST3490
      C2C(I,I2)     =    CONTM(I2) * C2(I,I2) / 100.0                       COST3500
      IF(I.EQ.2) C2C(I,I2) = CONTL(I2) * C2(I,I2) / 100.                    COST3510
      C2C(4,I2)     =    C2C(4,I2) + C2C(I,I2)                              COST3520
      C2SP(I,I2)    =    SPP(I2) * C2(I,I2) / 100.                          COST3530
      IF(I.EQ.2) C2SP(I,I2) = 0.                                            COST3540
      C2SP(4,I2)    =    C2SP(4,I2) + C2SP(I,I2)                            COST3550
      C2T(I,I2)     =    C2(I,I2) + C2C(I,I2) + C2SP(I,I2)                  COST3560
      C2T(4,I2)     =    C2T(4,I2) + C2T(I,I2)                              COST3570
      IF(I.LT.3.OR.I2.EQ.1) GO TO 90                                        COST3580
      SFMC          =    SFMC + C2(1,I2)                                    COST3590
      SSLC          =    SSLC + C2(2,I2)                                    COST3600
      SSMC          =    SSMC + C2(3,I2)                                    COST3610
      STDCS         =    STDCS + C2(4,I2)                                   COST3620
      SCONT         =    SCONT + C2C(4,I2)                                  COST3630
      SSPP          =    SSPP + C2SP(4,I2)                                  COST3640
      STDC          =    STDC + C2T(4,I2)                                   COST3650
90    CONTINUE                                                              COST3660
95    CONTINUE                                                              COST3670
96    CONTINUE                                                              COST3680
C                                                                           COST3690
C |=================================================================|COST3700
C |                                                                 |COST3710
C |   STEP 10. CALCULATE INDIRECT COST ACCOUNTS EXCEPT FOR INTEREST.|COST3720
C |                                                                 |COST3730
C |=================================================================|COST3740
C                                                                           COST3750
      I             =    0                                                  COST3760
      N22           =    N2                                                 COST3770
      SUMCI         =    0.0                                                COST3780
      DO 110 I1     =    2,IAR1                                             COST3790
      N21           =    N22 + 1                                            COST3800
      N22           =    N21 + IAR2(I1) - 1                                 COST3810
      DO 105 I2     =    N21,N22                                            COST3820
      IF (I2.EQ.N22.AND.I1.EQ.IAR1) GO TO 115                               COST3830
      I             =    I + 1                                              COST3840
      C2T(4,I2)     =    FIND(AI(1,I), AI(2,I), AI(3,I), AI(4,I), STDC      COST3850
     *                   * 1.0E-3) * STDC                                   COST3860
      SUMCI         =    SUMCI + C2T(4,I2)                                  COST3870
      N31           =    N32 + 1                                            COST3880
      N32           =    N31 + IAR3(I2) - 1                                 COST3890
      DO 100 I3     =    N31,N32                                            COST3900
      C3(4,I3)      =    C2T(4,I2) * (D3(1,I3) / D2(1,I2))                  COST3910
100   CONTINUE                                                              COST3920
105   CONTINUE                                                              COST3930
110   CONTINUE                                                              COST3940
115   CONTINUE                                                              COST3950
C                                                                           COST3960
C |=================================================================|COST3970
C |                                                                 |COST3980
C |   STEP 11.  CALCULATE INTEREST DURING CONSTRUCTION ACCOUNT.     |COST3990
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C |                                                                    |COST4000
C |_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ |COST4010
C |                                                                    |COST4020
C |   CORFAC      CORRECTION FACTOR FOR NUMERICAL INTEGRATION,         |COST4030
C |               PROCEDURE IS APPROXIMATELY 2% LOW                    |COST4040
C |                                                                    |COST4050
C |====================================================================|COST4060
C                                                                      COST4070
      CORFAC       =   0.973                                           COST4080
      IF (IAC.EQ.1) CORFAC=0.922                                       COST4090
      RS           =   0.0                                             COST4100
      DO 120 J     =   1,IMM                                           COST4110
      IF (RIB.GT.0.)  RINT(J) = RIB                                    COST4120
      RS           =   RS + RINT(J)                                    COST4130
120   CONTINUE                                                         COST4140
      RIBA         =   RS / IMM                                        COST4150
      DO 125 I2    =   1,N2                                            COST4160
      TIM(I2)      =   YREND - YRST + TIMLED(I2)                       COST4170
      IF (TIMLED(I2).LT.0.0) TIM(I2) = ABS(TIMLED(I2))                 COST4180
      CAP(I2)      =   0.0                                             COST4190
125   CONTINUE                                                         COST4200
      TUM1         =   0.0                                             COST4210
      CUM1         =   0.0                                             COST4220
      DO 180 JJ    =   2,IMM,IYY                                       COST4230
      TUM2         =   0.0                                             COST4240
      CUM2         =   0.0                                             COST4250
      DO 170 I2    =   1,N2                                            COST4260
      J            =   IMM + TIM(I2) * (JJ - IMM) / (YREND - YRST)     COST4270
      JN1          =   IMM + TIM(I2) * (JJ - 1 - IMM) / (YREND - YRST) COST4280
      IF (J.GT.2) GO TO 165                                            COST4290
      JN1          =   1                                               COST4300
      J            =   2                                               COST4310
165   CONTINUE                                                         COST4320
      I2P1         =   I2 + 1                                          COST4330
      IF (I2P1.GT.8) I2P1 = 8                                          COST4340
      CTER         =   (CFCA(I2P1,JN1) + CFCA(I2P1,J)) / 2.0           COST4350
      ETER         =   (CFCA(1,J) - CFCA(1,JN1)) * TIM(I2)             COST4360
      DTITER       =   (CFCA(1,J) - CFCA(1,JN1)) * C2T(4,I2)           COST4370
      VTEV         =   CTER * C2T(4,I2) * CORFAC                       COST4380
       IF(IAC.EQ.1) VTEV =VTEV+CAP(I2)                                 COST4390
      CAP(I2)      =   CAP(I2) + ETER * VTEV * RINT(J)                 COST4400
      CUM2         =   CUM2 + CTER * DTITER                            COST4410
      TUM2         =   TUM2 + DTITER                                   COST4420
170   CONTINUE                                                         COST4430
      CUM1         =   CUM1 + CUM2                                     COST4440
      TUM1         =   TUM1 + TUM2                                     COST4450
180   CONTINUE                                                         COST4460
      FACIN        =   CUM1 / TUM1                                     COST4470
      SVE          =   CAP(1)                                          COST4480
      N2N1         =   N2 - 1                                          COST4490
      SCAP         =   0.0                                             COST4500
      DO 185 I2    =   2,N2N1                                          COST4510
      SCAP         =   SCAP + CAP(I2)                                  COST4520
185   CONTINUE                                                         COST4530
      TERMI        =   FACIN * SUMCI * RIBA * (YREND - YRST)           COST4540
       IF(IAC.EQ.1) TERMI = FACIN*SUMCI*((1.+RIBA)**(YREND-YRST)-1.)   COST4550
      CAP(1)       =   SCAP + TERMI                                    COST4560
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```
      CAP(2)        =    SVE                                          COST4570
      CAP(3)        =    CAP(N2)                                      COST4580
      N22           =    N2 + IAR2(2)                                 COST4590
      I31           =    N32 + 1                                      COST4600
      I32           =    I31 + 2                                      COST4610
C     REALLY I32 = I31 + IAR3(N22) - 1                                COST4620
      C2T(4,N22)    =    0.                                           COST4630
      DO 190 I3     =    I31,I32                                      COST4640
      IJ            =    I3 - I31 + 1                                 COST4650
      C3(4,I3)      =    CAP(IJ)                                      COST4660
      C2T(4,N22)    =    C2T(4,N22) + C3(4,I3)                        COST4670
190   CONTINUE                                                        COST4680
      RIBA          =    RIBA * 100.0                                 COST4690
C                                                                     COST4700
C |=================================================================|COST4710
C |                                                                 |COST4720
C |   STEP 12.  CALCULATE TOTAL CAPITAL COST ESTIMATE FOR INPUT PLANT. |COST4730
C |                                                                 |COST4740
C |=================================================================|COST4750
C                                                                     COST4760
      TIC           =    SUMCI + C2T(4,N22)                           COST4770
      TDA           =    STDC + TIC                                   COST4780
      TPCI          =    C2(4,1) + TDA                                COST4790
      RETURN                                                          COST4800
      END                                                             COST4810
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      FUNCTION CLAB(K,ILOC,ITYP,Y)                                      CLAB0010
C                                                                       CLAB0020
C |=================================================================|CLAB0030
C |                                                                 |CLAB0040
C |   EVALUATE PROJECTED INDEXES FOR LABOR OR MATERIAL              |CLAB0050
C |                                                                 |CLAB0060
C |    BY :  L.D.REYNOLDS                                           |CLAB0070
C |          R.C.DELOZIER                                           |CLAB0080
C |                                                                 |CLAB0090
C |- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - |CLAB0100
C |                                                                 |CLAB0110
C |     ILOC      1 - BASE,     2 - SITE,                           |CLAB0120
C |     ITYP      1 - LABOR,     2 - MATERIAL                       |CLAB0130
C |     ILOC = 3 AND ITYP = 1    - FACTORY EQUIPMENT                |CLAB0140
C |                                                                 |CLAB0150
C |                                                                 |CLAB0160
C |=================================================================|CLAB0170
C                                                                       CLAB0180
      REAL * 8 DATE                                                     CLAB0190
      COMMON /NAML/                                                     CLAB0200
     * ALB(7)        , AMB(7)        , ALS(7)        , AMS(7)        ,  CLAB0210
     * AFC(7)        , BLB(7)        , BMB(7)        , BLS(7)        ,  CLAB0220
     * BMS(7)        , BFC(7)        , APC(7)        , BPC(7)        ,  CLAB0230
     * AA(3,10)      , AF            , AI(4,10)      , COB           ,  CLAB0240
     * CONTL(11)     , CONTM(11)     , COS           , DUMMY         ,  CLAB0250
     * D2(3,12)      , D3(3,60)      , D4(3,150)     , D5(3,50)      ,  CLAB0260
     * DEOT          , DY            , FACB1(7,16)   , FACB2(7,16)   ,  CLAB0270
     * FACS1(7,16)   , FACS2(7,16)   , HW            , IACC          ,  CLAB0280
     * IBASE(5)      , ISITE(5)      , MIDDLE        , NUMSL         ,  CLAB0290
     * OTP           , OVERS         , RIB           , RIBA          ,  CLAB0300
     * RINT(50)      , SPP(11)       , TIMLED(7)     , TSMAT         ,  CLAB0310
     * YBC           , YFIRST       , YLAST                            CLAB0320
      DIMENSION A(7,5),B(7,5)                                           CLAB0330
      EQUIVALENCE (A(1,1),ALB(1)), (B(1,1),BLB(1))                      CLAB0340
      J            =   2*(ILOC-1) + ITYP                                CLAB0350
      CLAB         =   A(K,J) * B(K,J) ** (Y - YFIRST)                  CLAB0360
      RETURN                                                            CLAB0370
      END                                                               CLAB0380
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      SUBROUTINE OUTPUT (IOF, IWANT, IFLAG, TYPE)                       OPUT0010
C                                                                       OPUT0020
C |=================================================================|OPUT0030
C |                                                                 |OPUT0040
C |    ROUTINE TO GENERATE OUTPUT REPORTS                           |OPUT0050
C |    BY :                                                         |OPUT0060
C |          R.C.DELOZIER                                           |OPUT0070
C |          L.D.REYNOLDS                                           |OPUT0080
C |          R. J. BARNARD                                          |OPUT0090
C |          B.E.SRITE                                              |OPUT0100
C |          DATE  8/25/71                                          |OPUT0110
C |                                                                 |OPUT0120
C |=================================================================|OPUT0130
C                                                                       OPUT0140
      REAL * 8 EDC(4)/' ESCALAT','ION DURI','NG CONST','RUCTION '/,     OPUT0150
     * SCE(4)/' AT STAR','T OF CON','STRUCTIO','N       '/,            OPUT0160
     * BLANK  /'        '/ , NI(2)   ,NAMIP(2)/'  NAMELI','ST INPUT'/  OPUT0170
      REAL * 8 AC2, AC3, AC4, AC5, ACC, B, DATE, LOC, FACLAB, FACMAT    OPUT0180
      REAL * 8 TYPE, TYPE1                                              OPUT0190
      REAL * 8 ACN(7)                                                   OPUT0200
      INTEGER NIUSED /0/                                                OPUT0210
      COMMON / FORM /                                                   OPUT0220
     * AC2(8,12)     , AC3(8,60)     , AC4(8,150)    , AC5(8,50)     ,  OPUT0230
     * ACC(8,12)     , DATE          , FACLAB(2,16)  , FACMAT(2,16)  ,  OPUT0240
     * IAR1          , IAR2(5)       , IAR3(15)      , IAR4(60)      ,  OPUT0250
     * IAR5(160)                                                       OPUT0260
      COMMON /PROG/                                                     OPUT0270
     * LOC(4)        , B(25)         , CFCA(8,50)    , CSAVE(11)     ,  OPUT0280
     * FACIN         , YRST          , YREND         , ICOY          ,  OPUT0290
     * IMM           , MWE           , NTP                             OPUT0300
      COMMON /OUT/                                                      OPUT0310
     * BWF           , C(10)         , C2(4,12)      , C3(4,60)      ,  OPUT0320
     * C4(4,150)     , C5(4,50)      , C2C(4,12)     , C2SP(4,12)    ,  OPUT0330
     * C2T(4,12)     , ESCL          , SFMC          , SSMC          ,  OPUT0340
     * SSLC          , SSPP          , SCONT         , STDC          ,  OPUT0350
     * STDCS         , TIC           , TDA           , TPCI          ,  OPUT0360
     * MHS(7)        , MMHS          , IAC                             OPUT0370
      COMMON /NAML/                                                     OPUT0380
     * ALB(7)        , AMB(7)        , ALS(7)        , AMS(7)        ,  OPUT0390
     * AFC(7)        , BLB(7)        , BMB(7)        , BLS(7)        ,  OPUT0400
     * BMS(7)        , BFC(7)        , APC(7)        , BPC(7)        ,  OPUT0410
     * AA(3,10)      , AF            , AI(4,10)      , COB           ,  OPUT0420
     * CONTL(11)     , CONTM(11)     , COS           , DUMMY         ,  OPUT0430
     * D2(3,12)      , D3(3,60)      , D4(3,150)     , D5(3,50)      ,  OPUT0440
     * DEOT          , DY            , FACB1(7,16)   , FACB2(7,16)   ,  OPUT0450
     * FACS1(7,16)   , FACS2(7,16)   , HW            , IACC          ,  OPUT0460
     * IBASE(5)      , ISITE(5)      , MIDDLE        , NUMSL         ,  OPUT0470
     * OTP           , OVERS         , RIB           , RIBA          ,  OPUT0480
     * RINT(50)      , SPP(11)       , TIMLED(7)     , TSMAT         ,  OPUT0490
     * YBC           , YFIRST       , YLAST                            OPUT0500
      IOUT = 6                                                          OPUT0510
      N2            =   IAR2(1)                                         OPUT0520
      DO 2 I        =   1,7                                             OPUT0530
      ACN(I)        =   BLANK                                           OPUT0540
2     CONTINUE                                                          OPUT0550
      DO 3 I        =  1,N2                                             OPUT0560
      ACN(I)        =   AC2(1,I)                                        OPUT0570
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3     CONTINUE                                                          OPUT0580
      WRITE (IOUT,235) DATE, MWE, TYPE, (LOC(I), I=1,4)                 OPUT0590
      WRITE (IOUT,4) YFIRST, (ACN(I), I=1,7), (ALB(I), BLB(I), I=1,7),  OPUT0600
     * (AMB(I), BMB(I), I=1,7), (ACN(I), I=1,7), (FACLAB(1,I),          OPUT0610
     * FACLAB(2,I), (FACB1(J,I), J=1,7), I=1,16), (ACN(I), I=1,7),      OPUT0620
     * (FACMAT(1,I), FACMAT(2,I), (FACB2(J,I), J=1,7), I=1,16)          OPUT0630
4     FORMAT('0BASE RATE AND ESCALATION USED IN COST PROJECTIONS',10X   OPUT0640
     * 'YFIRST = ', F6.1/,                                              OPUT0650
     * '0',14X,7(4X,'ACC NO ',A5)/,' ',14X,7(3X,'A',7X,'B',4X)/,        OPUT0660
     * ' BASE LABOR   ',14(1X,F7.2)/,' BASE MATERIAL', 14(1X,F7.2)/,    OPUT0670
     * '0CRAFT',40X,'BASE MIXING FACTORS'/'0LABOR',14X,7(1X,'ACC NO ',  OPUT0680
     * A5)/16(' ',2A8,7(6X,F7.2)/),'0MATERIAL',11X,7(1X,'ACC NO ',A5)/, OPUT0690
     * 16(' ',2A8,7(6X,F7.2)/))                                         OPUT0700
      WRITE (IOUT,5) DATE                                               OPUT0710
      WRITE (IOUT,6) YFIRST, (ACN(I), I=1,7), (ALS(I), BLS(I), I=1,7),  OPUT0720
     * (AMS(I), BMS(I), I=1,7), (ACN(I), I=1,7), (FACLAB(I,I),          OPUT0730
     * FACLAB(2,I), (FACS1(J,I), J=1,7), I=1,16), (ACN(I), I=1,7),      OPUT0740
     * (FACMAT(1,I), FACMAT(2,I), (FACS2(J,I), J=1,7), I=1,16)          OPUT0750
6     FORMAT('0SITE RATE AND ESCALATION USED IN COST PROJECTIONS',10X   OPUT0760
     * 'YFIRST = ', F6.1/,                                              OPUT0770
     * '0',14X,7(4X,'ACC NO ',A5)/,' ',14X,7(3X,'A',7X,'B',4X)/,        OPUT0780
     * ' SITE LABOR   ',14(1X,F7.2)/,' SITE MATERIAL',14(1X,F7.2)/,     OPUT0790
     * '0CRAFT',40X,'SITE MIXING FACTORS'/'0LABOR',14X,7(1X,'ACC NO ',  OPUT0800
     * A5)/16(' ',2A8,7(6X,F7.2)/),'0MATERIAL',11X,7(1X,'ACC NO ',A5)/, OPUT0810
     * 16(' ',2A8,7(6X,F7.2)/))                                         OPUT0820
      WRITE (IOUT,5) DATE                                               OPUT0830
5     FORMAT('1','DATE ',A8,18X,'CONCEPT PHASE II')                     OPUT0840
      IF (ICOY.EQ.2) GO TO 530                                          OPUT0850
      IHW = HW                                                          OPUT0860
      IF (IFLAG.GT.0) GO TO 10                                          OPUT0870
      NI(1) = BLANK                                                     OPUT0880
      NI(2) = BLANK                                                     OPUT0890
      GO TO 20                                                          OPUT0900
10    NI(1) = NAMIP(1)                                                  OPUT0910
      NI(2) = NAMIP(2)                                                  OPUT0920
      NIUSED = 1                                                        OPUT0930
20    IF (IWANT.EQ.1) GO TO 50                                          OPUT0940
30    WRITE (IOUT,40) MWE, TYPE, (LOC(I),I=1,4), NI, SCE, YRST, YREND   OPUT0950
40    FORMAT(24X,'PLANT CAPITAL INVESTMENT SUMMARY'/30X,'(THOUSAND DOLLAOPUT0960
     *RS)'/' ',I4,' MWE ',A8,' POWER PLANT  ',2A8,', ',4A8/22X,         OPUT0970
     * 'COST BASIS:',4A8/20X,'DESIGN + CONSTRUCTION PERIOD ',F6.1,'-',  OPUT0980
     * F6.1)                                                            OPUT0990
      GO TO 60                                                          OPUT1000
50    WRITE (IOUT,40) MWE, TYPE, (LOC(I),I=1,4), NI, EDC, YRST, YREND   OPUT1010
60    CONTINUE                                                          OPUT1020
      IF (IHW.GT.40) GO TO 90                                           OPUT1030
      WRITE (IOUT,80) IHW                                               OPUT1040
80    FORMAT(' ',T28,I3,'-HOUR WORK WEEK ')                             OPUT1050
      GO TO 110                                                         OPUT1060
90    WRITE (IOUT,100) IHW, OTP                                         OPUT1070
100   FORMAT(' ',T13,I3,'-HOUR WORK WEEK - ',                           OPUT1080
     *F4.1,' TIMES BASE PAY FOR OVERTIME')                              OPUT1090
110   WRITE (IOUT,120) RIRA                                             OPUT1100
120   FORMAT(' ',T44,'INTEREST RATE =',F4.1)                            OPUT1110
      IF (IAC.EQ.0) WRITE (6,122)                                       OPUT1120
122   FORMAT('+',T35,'STRAIGHT')                                        OPUT1130
      IF (IAC.EQ.1) WRITE (6,123)                                       OPUT1140
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123   FORMAT('+',T35,'COMPOUND')                                        OPUT1150
      WRITE (IOUT,150)                                                  OPUT1160
150   FORMAT('0ACCOUNT',T68,'TOTAL'/' NUMBER    ACCOUNT TITLE',T68,     OPUT1170
     * 'COST'/'+',62('_'),2X,10('_')/'0',5X,'DIRECT COSTS'/'+',5X,      OPUT1180
     * 12('_')/)                                                        OPUT1190
      N21          =    IAR2(1)                                        OPUT1200
      N22          =    IAR2(2)                                        OPUT1210
      DO 165 I2    =    1,N21                                          OPUT1220
      IF (IAR3(I2).EQ.0) GO TO 165                                      OPUT1230
      WRITE (IOUT,160) (ACC(J,I2), J=1,8), C2(4,I2)                     OPUT1240
160   FORMAT('0',8A8,1X,F7.0)                                           OPUT1250
      IF (I2.EQ.1) WRITE (6,162)                                        OPUT1260
162   FORMAT('+',T65,'$'/T66,7('=')/'0',8X,'PHYSICAL PLANT'/'+',8X,     OPUT1270
     * 14('_')/)                                                        OPUT1280
165   CONTINUE                                                          OPUT1290
      WRITE (IOUT,168)                                                  OPUT1300
168   FORMAT('+',T66,7('_'))                                            OPUT1310
      WRITE (IOUT,170) STDCS                                            OPUT1320
170   FORMAT('0',T15,'SUBTOTAL',21(' .'),'$ ',F7.0)                     OPUT1330
      WRITE (IOUT,175) SSPP, SCONT                                      OPUT1340
175   FORMAT('0',T10,'SPARE PARTS ALLOWANCE ',17('. '),2X,F6.0/'0',T10, OPUT1350
     * 'CONTINGENCY ALLOWANCE ',17('. '),2X,F6.0)                       OPUT1360
      WRITE (IOUT,168)                                                  OPUT1370
      WRITE (IOUT,170) STDC                                             OPUT1380
       WRITE(IOUT,180)                                                  OPUT1390
180   FORMAT(T66,7('='))                                                OPUT1400
      WRITE (IOUT,190)                                                  OPUT1410
190   FORMAT('0',T7,'INDIRECT COSTS'/'+',T7,14('_')/' ')                OPUT1420
      I2           =    N21                                            OPUT1430
      DO 200 I     =    1,N22                                          OPUT1440
      I2           =    I2 + 1                                         OPUT1450
      IF (IAR3(I2).EQ.0) GO TO 200                                      OPUT1460
      WRITE (IOUT,195) (ACC(J,I2),J=1,8), C2T(4,I2)                     OPUT1470
195   FORMAT('0',8A8,1X,F7.0)                                           OPUT1480
200   CONTINUE                                                          OPUT1490
      WRITE (IOUT,168)                                                  OPUT1500
      WRITE (IOUT,170) TIC                                              OPUT1510
      WRITE (IOUT,180)                                                  OPUT1520
      IF (IWANT.NE.2) GO TO 202                                         OPUT1530
      PES          =    ESCL / (TPCI * (YREND - YRST)) * 100.0         OPUT1540
      WRITE (IOUT,201) TPCI                                             OPUT1550
201   FORMAT('0',9X,'START OF CONSTRUCTION COST',T65,'$',F8.0)          OPUT1560
      TPCI         =    TPCI + ESCL                                    OPUT1570
      WRITE (IOUT,203) PES, ESCL                                        OPUT1580
202   CONTINUE                                                          OPUT1590
203   FORMAT('0',9X,'ESCALATION DURING CONSTRUCTION ','(',F4.1,         OPUT1600
     * '%/YR )', T65,'$',F8.0)                                          OPUT1610
      WRITE (IOUT,168)                                                  OPUT1620
      ICKW         =    TPCI / MWE + 0.5                               OPUT1630
      WRITE (IOUT,231) ICKW                                             OPUT1640
231   FORMAT('0',9X,'TOTAL PLANT CAPITAL INVESTMENT - ($',I4,'/KW)')    OPUT1650
      WRITE (IOUT,232) TPCI                                             OPUT1660
232   FORMAT('+',T65,'$',F8.0)                                          OPUT1670
      WRITE (IOUT,180)                                                  OPUT1680
      IF(IOF.EQ.0) RETURN                                               OPUT1690
      WRITE (IOUT,235) DATE, MWE, TYPE, (LOC(I1), I1=1,4)               OPUT1700
235   FORMAT('1DATE ',A8,13X,'CONCEPT PHASE II'/' ',I4,' MWE ',         OPUT1710
```

```
     * A8,' POWER PLANT  ',2A8,', ',2A8)                                  OPUT1720
      WRITE (IOUT,240)                                                    OPUT1730
240   FORMAT(' ',T10,'BREAKDOWN OF PHYSICAL PLANT COSTS (THOUSANDS OF DOOPUT1740
     *LLARS)')                                                            OPUT1750
      WRITE (IOUT,250)                                                    OPUT1760
250   FORMAT('0',T63,'FACTORY  __________SITE___________'/,T62,           OPUT1770
     * 'EQUIPMENT      LABOR     MATERIAL'/,T64,'COST    MAN-HR   COST   OPUT1780
     *   COST',T2,'PHYSICAL PLANT',/,'+',14('_'),T62,33('_'))             OPUT1790
      N2            =   IAR2(1)                                           OPUT1800
      DO 270 I2  =   2,N2                                                 OPUT1810
      IF (IAR3(I2).EQ.0) GO TO 270                                        OPUT1820
      WRITE (IOUT,260) (ACC(J,I2), J=1,6), C2(4,I2), C2(1,I2), MHS(I2),   OPUT1830
     * C2(2,I2), C2(3,I2)                                                 OPUT1840
260   FORMAT('0',6A8,F7.0,2X,F9.0,2X,'(',I5,')',F8.0,F9.0)                OPUT1850
270   CONTINUE                                                            OPUT1860
      WRITE (IOUT,280) STDCS, SFMC, MMHS, SSLC, SSMC                      OPUT1870
280   FORMAT('+',T50,7('_'),4X,32('_'),/'0',T15,'SUBTOTAL ',              OPUT1880
     * 13('. '),F7.0,2X,F9.0,2X,'(',I5,')',F8.0,F9.0)                     OPUT1890
      I2            =   0                                                 OPUT1900
      I3            =   0                                                 OPUT1910
      I4            =   0                                                 OPUT1920
      I5            =   0                                                 OPUT1930
      N1            =   IAR1                                              OPUT1940
      DO 520 I      =   1,N1                                              OPUT1950
      N2            =   IAR2(I)                                           OPUT1960
      DO 520 J      =   1,N2                                              OPUT1970
      I2            =   I2 + 1                                            OPUT1980
      N3            =   IAR3(I2)                                          OPUT1990
      IF (N3.EQ.0) GO TO 520                                              OPUT2000
      IF (I.GT.1) GO TO 291                                               OPUT2010
      WRITE (IOUT,235) DATE, MWE, TYPE, (LOC(I1), I1=1,4)                 OPUT2020
      WRITE (IOUT,290)                                                    OPUT2030
290   FORMAT('0',T85,'COST  (THOUSANDS OF DOLLARS)'/'+',T70,56('_'),/     OPUT2040
     * ' ACCOUNT',T70,'FACTORY',T87,'SITE',T101,'SITE'/' NUMBER',T13,     OPUT2050
     * 'ACCOUNT TITLE',T70,'EQUIPMENT',T87,'LABOR',T101,'MATERIALS',      OPUT2060
     * T120,'TOTAL'/'+',8('_'),2X,55('_'),3X,9('_'),8X,5('_'),9X,          OPUT2070
     * 9('_'),10X,5('_'))                                                 OPUT2080
      GO TO 292                                                           OPUT2090
291   WRITE (IOUT,235) DATE, MWE, TYPE, (LOC(I1), I1=1,4)                 OPUT2100
      WRITE (IOUT,300)                                                    OPUT2110
300   FORMAT(' ACCOUNT',/,' NUMBER      ACCOUNT TITLE',T70,'  COST($1000OPUT2120
     *)',/'+',8('_'),2X,56('_'),2X,14('_'))                               OPUT2130
292   LIN           =   0                                                 OPUT2140
305   WRITE (IOUT,310) (AC2(LL,I2),LL=1,8)                                OPUT2150
310   FORMAT('0',A8,2X,7A8,/)                                             OPUT2160
      DO 420 K      =   1,N3                                              OPUT2170
      I3            =   I3 + 1                                            OPUT2180
      N4            =   IAR4(I3)                                          OPUT2190
      IF (N4.EQ.0) GO TO 390                                              OPUT2200
      WRITE (IOUT,320) (AC3(LL,I3), LL=1,8)                               OPUT2210
320   FORMAT(' ',A8,2X,7A8,2X,4(F8.0,8X))                                 OPUT2220
      LIN           =   LIN + 1                                           OPUT2230
      DO 380 L = 1,N4                                                     OPUT2240
      I4            =   I4 + 1                                            OPUT2250
      N5            =   IAR5(I4)                                          OPUT2260
      IF (N5.EQ.0) GO TO 370                                              OPUT2270
      WRITE (IOUT,330) (AC4(LL,I4), LL = 1,8)                             OPUT2280
```

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330   FORMAT(' ',A8,2X,7A8,2X,4(F8.0,8X))                                OPUT2290
      LIN          =    LIN + 1                                         OPUT2300
      DO 350 M = 1,N5                                                   OPUT2310
      I5           =    I5 + 1                                          OPUT2320
      WRITE (IOUT,330) (AC5(LL,I5),LL=1,8), C5(1,I5), C5(2,I5), C5(3,I5)OPUT2330
     *,C5(4,I5)                                                         OPUT2340
      LIN          =    LIN + 1                                         OPUT2350
      IF (M.EQ.1) WRITE (6,340)                                         OPUT2360
340   FORMAT('+',T70,3('$',15X))                                        OPUT2370
350   CONTINUE                                                          OPUT2380
      WRITE (IOUT,360) C4(1,I4), C4(2,I4), C4(3,I4), C4(4,I4)           OPUT2390
360   FORMAT('+',T70,4(8('_'),8X)/T20,'SUBTOTAL',20('. '),2X,4('$',F7.0,OPUT2400
     * 8X))                                                             OPUT2410
      LIN          =    LIN + 1                                         OPUT2420
      GO TO 380                                                         OPUT2430
370   CONTINUE                                                          OPUT2440
      WRITE (IOUT,330) (AC4(LL,I4),LL=1,8), C4(1,I4), C4(2,I4), C4(3,I4)OPUT2450
     *,C4(4,I4)                                                         OPUT2460
      LIN          =    LIN + 1                                         OPUT2470
      IF (IDOL2.EQ.0) WRITE (6,340)                                     OPUT2480
      IF(IDOL2.EQ.0) IDOL2 = 1                                          OPUT2490
380   CONTINUE                                                          OPUT2500
      WRITE (IOUT,360) C3(1,I3), C3(2,I3), C3(3,I3), C3(4,I3)           OPUT2510
      LIN          =    LIN + 1                                         OPUT2520
      GO TO 415                                                         OPUT2530
390   CONTINUE                                                          OPUT2540
      IF (I.GT.1) GO TO 400                                             OPUT2550
      WRITE (IOUT,320) (AC3(LL,I3), LL=1,8), C3(1,I3), C3(2,I3), C3(3,I3OPUT2560
     *),C3(4,I3)                                                        OPUT2570
      LIN          =    LIN + 1                                         OPUT2580
      WRITE (IOUT,340)                                                  OPUT2590
      GO TO 415                                                         OPUT2600
400   CONTINUE                                                          OPUT2610
      WRITE (IOUT,410) (AC3(LL,I3), LL=1,8), C3(4,I3)                   OPUT2620
410   FORMAT(' ',A8,2X,7A8,2X,'$',F7.0)                                 OPUT2630
      LIN          =    LIN + 1                                         OPUT2640
415   IF (LIN.LT.50) GO TO 420                                          OPUT2650
      IF (I.GT.1) GO TO 412                                             OPUT2660
      WRITE (IOUT,235) DATE, MWE, TYPE, (LOC(I1), I1=1,4)               OPUT2670
      WRITE (IOUT,290)                                                  OPUT2680
      GO TO 413                                                         OPUT2690
412   WRITE (IOUT,235) DATE, MWE, TYPE, (LOC(I1), I1=1,4)               OPUT2700
      WRITE (IOUT,300)                                                  OPUT2710
413   LIN          =    0                                               OPUT2720
420   CONTINUE                                                          OPUT2730
425   IF (I2.EQ.1.OR.I2.GT.IAR2(1)) GO TO 480                           OPUT2740
      WRITE (IOUT,430) C2(1,I2), C2(2,I2), C2(3,I2), C2(4,I2)           OPUT2750
430   FORMAT(' ',124('_'),/T20,'SUBTOTAL FOR ACCOUNT',14('. '),  2X,    OPUT2760
     *       4('$',F7.0,8X))                                            OPUT2770
      WRITE (IOUT,440) CONTM(I2), CONTL(I2), C2C(1,I2), C2C(2,I2),      OPUT2780
     * C2C(3,I2), C2C(4,I2)                                             OPUT2790
440   FORMAT(T20,'CONTINGENCY (',F4.1,'%MTL-',F4.1,'%LABOR)', 7(' .'),  OPUT2800
     * 3X,4(F8.0,8X))                                                   OPUT2810
450   FORMAT('+',T70,4(8('_'),8X))                                      OPUT2820
      IF (I2.LT.2.OR.I2.GT.6) GO TO 480                                 OPUT2830
      WRITE (IOUT,460) SPP(I2), C2SP(1,I2), C2SP(3,I2), C2SP(4,I2)      OPUT2840
460   FORMAT(T20,'SPARE PARTS (',F5.1,'%)',14('. '),2X,F8.0,8X,         OPUT2850
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     * '  - - - ',2(8X,F8.0))                                          OPUT2860
      WRITE (IOUT,450)                                                 OPUT2870
480   CONTINUE                                                         OPUT2880
      IF (I2.EQ.IAR2(1)) WRITE (6,490) SPP(I2), C2SP(1,I2),            OPUT2890
     * C2SP(3,I2), C2SP(4,I2)                                          OPUT2900
490   FORMAT(T20,'RESERVE IN STORAGE(' ,F5.1,'%)',11('. '),2X,F8.0, 8X, OPUT2910
     * '  - - - ',2(8X,F8.0))                                          OPUT2920
      IF (I2.GE.8) WRITE (6,500) AC2(1,I2), C2T(4,I2)                  OPUT2930
500   FORMAT('+',T70,   8('_')     ,/T20,'TOTAL FOR ACCOUNT ',A8,11('. ')OPUT2940
     *,2X,  '$',F7.0,     /'+',T70,  8('_'),     /T70,  8('-')     )   OPUT2950
      IF (I2.GE.8) GO TO 520                                           OPUT2960
      WRITE (IOUT,510) AC2(1,I2), C2T(1,I2), C2T(2,I2), C2T(3,I2),     OPUT2970
     * C2T(4,I2)                                                       OPUT2980
510   FORMAT('+',T70,4( 8('_'),8X),/T20,'TOTAL FOR ACCOUNT ',A8,11('. ')OPUT2990
     *,2X,4('$',F7.0,8X),/'+',T70,4(8('_'),8X),/T70,4(8('-'),8X))      OPUT3000
520   CONTINUE                                                         OPUT3010
      RETURN                                                           OPUT3020
530   CONTINUE                                                         OPUT3030
       IF(IOF.EQ.0) RETURN                                             OPUT3040
      WRITE (IOUT,540) MWE, TYPE, (LOC(I),I=1,4), YRST, YREND          OPUT3050
540   FORMAT('1',T23,'PLANT CAPITAL INVESTMENT SUMMARY'/,T29,'(THOUSAND OPUT3060
     * DOLLARS)'/,T24,I4,' MWE ',A8,' POWER PLANT'/,                   OPUT3070
     *T19,2A8,',',2A8,/                          ,T21,'CONSTRUCTION PEOPUT3080
     *RIOD ',F6.1,'-',F6.1//)                                          OPUT3090
      WRITE (IOUT,550)                                                 OPUT3100
550    FORMAT( '1 ACCOUNT TITLE',T60,'ESCALATED',T80,'UNESCALATED',T100,OPUT3110
     * 'ESCALATION')                                                   OPUT3120
      N2          =   IAR2(1) + IAR2(2)                                OPUT3130
       DO 570 I = 1,N2                                                 OPUT3140
      DC          =   CSAVE(I) - C2T(4,I)                              OPUT3150
      WRITE (IOUT,560) (AC2(J,I),J=2,8), CSAVE(I), C2T(4,I), DC        OPUT3160
560    FORMAT(1X,7A8,3F20.0)                                           OPUT3170
570   CONTINUE                                                         OPUT3180
       RETURN                                                          OPUT3190
      END                                                              OPUT3200
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      SUBROUTINE PLOT (XFYR, XLYR, SOST, IMM)                           PLOT0010
C                                                                       PLOT0020
C |=================================================================|PLOT0030
C |                                                                 |PLOT0040
C |   GENERATE PRINTER PLOT OF PROJECT CASH FLOW                    |PLOT0050
C |  *******     DAVID BERNSTEIN ********** 05/20/72 **********     |PLOT0060
C |                                                                 |PLOT0070
C |=================================================================|PLOT0080
C                                                                       PLOT0090
      LOGICAL*1 IVERT(51)/' ',' ','C','A','P','I','T','A','L',' ','C',  PLOT0100
     2 'O','S','T',' ','(','M','I','L','L','I','O','N','S',' ','O','F', PLOT0110
     3 ' ','D','O','L','L','A','R','S',')',15*' '/                      PLOT0120
      DIMENSION COST(100), JOUT(101), YR(5), SOST(IMM)                  PLOT0130
      IOUT =6                                                           PLOT0140
      ISTAR          =   92 * 16777216                                  PLOT0150
C                                                                       PLOT0160
C |=================================================================|PLOT0170
C |                                                                 |PLOT0180
C |  IND X (YEAR) AXIS DIVISIONS.                                   |PLOT0190
C |                                                                 |PLOT0200
C |=================================================================|PLOT0210
C                                                                       PLOT0220
      TST            =   2.0                                           PLOT0230
      DIF            =   XLYR - XFYR                                   PLOT0240
      FF1            =   100.0                                         PLOT0250
      FF2            =   IMM                                           PLOT0260
      DFF            =   FF2 / FF1                                     PLOT0270
      DII            =   1.0                                           PLOT0280
      II             =   1                                             PLOT0290
      III            =   2                                             PLOT0300
      DO 5 I         =   1,100                                         PLOT0310
      COST(I)        =   (SOST(II) + (DII - II) * (SOST(III) - SOST(II))) PLOT0320
     *                   / 1000.0                                     PLOT0330
      DII            =   DII + DFF                                     PLOT0340
      II             =   DII                                           PLOT0350
      IF (II.GT.IMM) II = IMM                                          PLOT0360
      IF (III+1.LE.IMM) III = II + 1                                   PLOT0370
5     CONTINUE                                                         PLOT0380
10    IF (TST.GE.DIF) GO TO 30                                         PLOT0390
      TST            =   2.0 + TST                                     PLOT0400
      GO TO 10                                                         PLOT0410
C                                                                       PLOT0420
C |=================================================================|PLOT0430
C |                                                                 |PLOT0440
C |  IND Y (COST) AXIS DIVISIONS.                                   |PLOT0450
C |                                                                 |PLOT0460
C |=================================================================|PLOT0470
C                                                                       PLOT0480
   30 ICST=(COST(100)+100.0)/100                                       PLOT0490
      IMULT = ICST/5 + 1                                               PLOT0500
      IMULT = 1                                                        PLOT0510
      ISPACE=(IMULT*50)/(ICST*2)                                       PLOT0520
      IDIVS=(IMULT*50)/ISPACE                                          PLOT0530
      IXTRA = 50-ISPACE*IDIVS                                          PLOT0540
      CST=ICST*100.0                                                   PLOT0550
      DIV=ISPACE*IDIVS                                                 PLOT0560
60    IYEAR          =   XFYR                                          PLOT0570
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      YRDIF = XFYR - IYEAR                                              PLOT0580
      YR(1) = IYEAR                                                     PLOT0590
      DO 90 I=2,5                                                       PLOT0600
90    YR(I)         =   YR(I-1) + TST / 4.0                             PLOT0610
C                                                                       PLOT0620
C |=================================================================|PLOT0630
C |                                                                 |PLOT0640
C |  WRITE TOP LEGEND.                                              |PLOT0650
C |                                                                 |PLOT0660
C |=================================================================|PLOT0670
C                                                                       PLOT0680
      WRITE(IOUT,100) (YR(N),N=1,5)                                     PLOT0690
100   FORMAT('0',11X,4(F6.1,19X),F6.1)                                  PLOT0700
      WRITE(IOUT,110)                                                   PLOT0710
110   FORMAT (' ',16X,4('+.......................'),'+')               PLOT0720
C                                                                       PLOT0730
C |=================================================================|PLOT0740
C |                                                                 |PLOT0750
C |  CALCULATIONS TO FIND START OF SHADED AREA.                     |PLOT0760
C |                                                                 |PLOT0770
C |=================================================================|PLOT0780
C                                                                       PLOT0790
      LSTCOL        =   (DIF / TST) * 100.0 + (YRDIF/TST) * 100.0       PLOT0800
      IF(LSTCOL .GT. 101) LSTCOL = 101                                  PLOT0810
C                                                                       PLOT0820
C |=================================================================|PLOT0830
C |                                                                 |PLOT0840
C |  BLANK OUTPUT ARRAY.                                            |PLOT0850
C |                                                                 |PLOT0860
C |=================================================================|PLOT0870
C                                                                       PLOT0880
      DO 115 I      =   1,101                                           PLOT0890
115   JOUT(I)       =   0                                               PLOT0900
      NUM           =   CST                                             PLOT0910
      IF(IXTRA .EQ. 0) GO TO 118                                        PLOT0920
      DO 116 M=1,IXTRA                                                  PLOT0930
  116 WRITE(IOUT,139)                                                   PLOT0940
  118 WRITE (IOUT,117) NUM, NUM                                         PLOT0950
117   FORMAT (' ',6X,I6,3X,'+',102X,'+',I6)                             PLOT0960
C                                                                       PLOT0970
C |=================================================================|PLOT0980
C |                                                                 |PLOT0990
C |  PRINT GRAPH WITH VERTICAL MARGINS.                             |PLOT1000
C |                                                                 |PLOT1010
C |=================================================================|PLOT1020
C                                                                       PLOT1030
      DO 150 I      =   1,IDIVS                                         PLOT1040
      DO 140 J      =   1,ISPACE                                        PLOT1050
      KK            =   ((I-1) * ISPACE) + J                            PLOT1060
      PRCOST        =   CST - KK * (CST / DIV )                         PLOT1070
      IF (COST(100) .LT. PRCOST) GO TO 138                              PLOT1080
      DO 120 K      =   1,100                                           PLOT1090
      IM            =   100 + 1 - K                                     PLOT1100
      IF (COST(IM) .LE. PRCOST .AND. COST(IM) .GE. (PRCOST - CST/DIV )) PLOT1110
     2 GO TO 130                                                        PLOT1120
120   CONTINUE                                                          PLOT1130
      GO TO 132                                                         PLOT1140
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130   X              =    IM                                                PLOT1150
      IFRCOL = ((((X /100.0) * DIF) + YRDIF) / TST) * 100.0                 PLOT1160
      IF(IFRCOL .GT. 101) IFRCOL = 101                                     PLOT1170
132   DO 135 LL = IFRCOL, LSTCOL                                           PLOT1180
135   JOUT(LL)       =    ISTAR                                            PLOT1190
      IF (J .EQ. ISPACE) GO TO 140                                         PLOT1200
      WRITE(IOUT,137) IVERT(KK ),(JOUT(JP),JP=1,101), IVERT(KK )           PLOT1210
137   FORMAT (' ',2X,A1,11X,'- ',101A1,'-',10X,A1)                         PLOT1220
      GO TO 140                                                            PLOT1230
138   WRITE(IOUT,139) IVERT(KK), IVERT(KK)                                 PLOT1240
139   FORMAT (' ',2X,A1,11X,'- ',101X,'-',10X,A1)                          PLOT1250
140   CONTINUE                                                             PLOT1260
      NUM            =    CST - I * (50*IMULT)                             PLOT1270
      WRITE (IOUT,145) IVERT(I*ISPACE), NUM, (JOUT(JP),JP=1,101), NUM,     PLOT1280
     2 IVERT(I*ISPACE)                                                     PLOT1290
145   FORMAT (' ',2X,A1,3X,I6,3X,'+',101A1,' +',I6,3X,A1)                  PLOT1300
       IF(NUM.LE.0) GOTO151                                                PLOT1310
150   CONTINUE                                                             PLOT1320
 151   CONTINUE                                                            PLOT1330
C                                                                          PLOT1340
C |=================================================================|PLOT1350
C |                                                                 |PLOT1360
C |  PRINT BOTTOM SCALES.                                           |PLOT1370
C |                                                                 |PLOT1380
C |=================================================================|PLOT1390
C                                                                          PLOT1400
      YR(1) = IYEAR                                                        PLOT1410
      DO 186 I = 2,5                                                       PLOT1420
 186  YR(I) = YR(I-1) + TST/4.                                             PLOT1430
      WRITE(IOUT,110)                                                      PLOT1440
      WRITE(IOUT,100) (YR(N),N=1,5)                                        PLOT1450
      RETURN                                                               PLOT1460
      END                                                                  PLOT1470
```

```
      BLOCK DATA                                                        BDTA0010
C                                                                       BDTA0020
C |=================================================================|BDTA0030
C |                                                                 |BDTA0040
C |   THIS BLOCK DATA SUBPROGRAM CONTAINS THE SPECIAL INFORMATION   |BDTA0050
C |   NECESSARY TO CALCULATE CAPITAL COST                           |BDTA0060
C |   BY R.C. DELOZIER AND L. D. REYNOLDS        5/28/69            |BDTA0070
C |                                                                 |BDTA0080
C |=================================================================|BDTA0090
C                                                                       BDTA0100
      REAL * 8 AC2, AC3, AC4, AC5, ACC, B, DATE, LOC, FACLAB, FACMAT    BDTA0110
      COMMON / FORM /                                                   BDTA0120
     * AC2(8,12)     , AC3(8,60)     , AC4(8,150)    , AC5(8,50)     ,  BDTA0130
     * ACC(8,12)     , DATE          , FACLAB(2,16)  , FACMAT(2,16)  ,  BDTA0140
     * IAR1          , IAR2(5)       , IAR3(15)      , IAR4(60)      ,  BDTA0150
     * IAR5(160)                                                       BDTA0160
      COMMON /PROG/                                                     BDTA0170
     * LOC(4)        , B(25)         , CFCA(8,50)    , CSAVE(11)     ,  BDTA0180
     * FACIN         , YRST          , YREND         , ICOY          ,  BDTA0190
     * IMM           , MWE           , NTP                             BDTA0200
      COMMON /NAML/                                                     BDTA0210
     * ALB(7)        , AMB(7)        , ALS(7)        , AMS(7)        ,  BDTA0220
     * AFC(7)        , BLB(7)        , BMB(7)        , BLS(7)        ,  BDTA0230
     * BMS(7)        , BFC(7)        , APC(7)        , BPC(7)        ,  BDTA0240
     * AA(3,10)      , AF            , AI(4,10)      , COB           ,  BDTA0250
     * CONTL(11)     , CONTM(11)     , COS           , DUMMY         ,  BDTA0260
     * D2(3,12)      , D3(3,60)      , D4(3,150)     , D5(3,50)      ,  BDTA0270
     * DEOT          , DY            , FACB1(7,16)   , FACB2(7,16)   ,  BDTA0280
     * FACS1(7,16)   , FACS2(7,16)   , HW            , IACC          ,  BDTA0290
     * IBASE(5)      , ISITE(5)      , MIDDLE        , NUMSL         ,  BDTA0300
     * OTP           , OVERS         , RIB           , RIBA          ,  BDTA0310
     * RINT(50)      , SPP(11)       , TIMLED(7)     , TSMAT         ,  BDTA0320
     * YBC           , YFIRST       , YLAST                            BDTA0330
C                                                                       BDTA0340
C |=================================================================|BDTA0350
C |                                                                 |BDTA0360
C |    YEAR RESTRICTIONS FOR SCANNING TAPE                          |BDTA0370
C |                                                                 |BDTA0380
C |=================================================================|BDTA0390
C                                                                       BDTA0400
      DATA YFIRST, YLAST / 0.0, 2000.0/                                 BDTA0410
C                                                                       BDTA0420
C |=================================================================|BDTA0430
C |                                                                 |BDTA0440
C |  ** FACTORS USED IN FACTORY ESCALATION *****                    |BDTA0450
C |                                                                 |BDTA0460
C |=================================================================|BDTA0470
C                                                                       BDTA0480
      DATA AFC/                                                         BDTA0490
     * 1.0,  1.0,  1.0,  1.0,  1.0,  1.0,  1.0/                         BDTA0500
      DATA BFC/                                                         BDTA0510
     * 1.05,  1.05,  1.05,  1.05,  1.05,  1.05,  1.05/                  BDTA0520
C                                                                       BDTA0530
C |=================================================================|BDTA0540
C |                                                                 |BDTA0550
C |  ** FACTORS USED IN SITE PRODUCTIVITY *****                     |BDTA0560
C |                                                                 |BDTA0570
```

```
C |=================================================================|BDTA0580
C                                                                   BDTA0590
      DATA APC/                                                     BDTA0600
     * 1.0,  1.0,  1.0,  1.0,  1.0,  1.0,  1.0 /                    BDTA0610
      DATA BPC/                                                     BDTA0620
     * 0.0,  0.0,  0.0,  0.0,  0.0,  0.0,  0.0 /                    BDTA0630
      DATA IMM /50/                                                 BDTA0640
C                                                                   BDTA0650
C |=================================================================|BDTA0660
C |                                                                |BDTA0670
C |    "MIDDLE"  SETS TAPE SCAN TO MIDDLETOWN, USA                 |BDTA0680
C |                                                                |BDTA0690
C |=================================================================|BDTA0700
C                                                                   BDTA0710
      DATA MIDDLE /23/                                              BDTA0720
      DATA B /                                                      BDTA0730
     * 'ATLANTA ' , 'BALTIMOR' , 'BIRMINGH' , 'BOSTON  ' ,          BDTA0740
     * 'CHICAGO ' , 'CINCINNA' , 'CLEVELAN' , 'DALLAS  ' ,          BDTA0750
     * 'DENVER  ' , 'DETROIT ' , 'KANSAS C' , 'LOS ANGE' ,          BDTA0760
     * 'MINNEAPO' , 'NEW ORLE' , 'NEW YORK' , 'PHILADEL' ,          BDTA0770
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     * 'MONTREAL' , 'TORONTO ' , 'MIDDLETO' /                       BDTA0790
      DATA FACLAB/                                                  BDTA0800
     * 'BUILDING', ' LABOR  ',                                      BDTA0810
     * 'HEAVY LA', 'BOR     ',                                      BDTA0820
     * 'BRICKLAY', 'ERS     ',                                      BDTA0830
     * 'CARPENTE', 'RS      ',                                      BDTA0840
     * 'STRUCT. ', 'IRON    ',                                      BDTA0850
     * 'PLASTERE', 'RS      ',                                      BDTA0860
     * 'ELECT. W', 'ORKERS  ',                                      BDTA0870
     * 'STEAM FI', 'TTERS   ',                                      BDTA0880
     * 'OPER. EN', 'GRS.    ',                                      BDTA0890
     * 'SM. TRAC', '. OP.   ',                                      BDTA0900
     * 'LG. TRAC', '. OP.   ',                                      BDTA0910
     * 'CRANE OP', 'ERS.    ',                                      BDTA0920
     * 'AIR COMP', '. OPERS.',                                      BDTA0930
     * 'TRUCK DR', 'IVERS   ',                                      BDTA0940
     * 'BOILER M', 'AKERS   ',                                      BDTA0950
     * 'OTHER CR', 'AFTS    '/                                      BDTA0960
      DATA FACMAT/                                                  BDTA0970
     * 'CHANNELS', '        ',                                      BDTA0980
     * 'I BEAMS ', '        ',                                      BDTA0990
     * 'W FLANGE', 'S       ',                                      BDTA1000
     * 'RE-BARS ', '        ',                                      BDTA1010
     * 'REDIMIX ', 'CONCRETE',                                      BDTA1020
     * 'PLYFORM ', '        ',                                      BDTA1030
     * 'LUMBER  ', '        ',                                      BDTA1040
     * 'LAND    ', '        ',                                      BDTA1050
     * 'UNASSIGN', 'ED      ',                                      BDTA1060
     * 'UNASSIGN', 'ED      ',                                      BDTA1070
     * 'UNASSIGN', 'ED      ',                                      BDTA1080
     * 'UNASSIGN', 'ED      ',                                      BDTA1090
     * 'UNASSIGN', 'ED      ',                                      BDTA1100
     * 'UNASSIGN', 'ED      ',                                      BDTA1110
     * 'UNASSIGN', 'ED      ',                                      BDTA1120
     * 'UNASSIGN', 'ED      '/                                      BDTA1130
      END                                                           BDTA1140
```

```
//GO.FT06F001 DD SYSOUT=A,DCB=(RECFM=FB,LRECL=133,BLKSIZE=1064)
//GO.FT03F001 DD UNIT=SYSDA,SPACE=(CYL,(5,1)),
//  DCB=(RECFM=F,LRECL=80,BLKSIZE=80)
//GO.FT08F001 DD UNIT=TAPE9,DISP=(OLD,KEEP),LABEL=(1,BLP)
//GO.FT09F001 DD UNIT=TAPE9,DISP=(OLD,KEEP),LABEL=(1,BLP)
//GO.FT05F001 DD *
C     EXAMPLE PROBLEM 1
C
C     PWR BASE CASE, MIDDLETOWN USA,
C     1000 MW(E), 7% SIMPLE INTEREST,
C     40 HR. WORK WEEK, START 1971 AND END 1978.5
C     ESCALATED TO START OF CONSTRUCTION.
C
1000 PWR       MIDDLETOWN        USA                19710 19785  70  400 0 1 0 0 0
C
C     EXAMPLE PROBLEM 2
C     PWR BASE CASE AT PHILADELPHIA
C     1000 MW(E), 7% SIMPLE INTEREST,
C     40 HR. WORK WEEK, START 1971 AND END 1978.5
C     ESCALATED TO START OF CONSTRUCTION.
C
1000 PWR       PHILADELPHIA      USA                19710 19785  70  400 0 1 0 0 0
C
C     EXAMPLE PROBLEM 3
C     PWR BASE CASE AT PHILADELPHIA
C     1000 MW(E), 7% SIMPLE INTEREST,
C     40 HR. WORK WEEK, START 1971 AND END 1978.5
C     ESCALATED TO START OF CONSTRUCTION.
C     CHANGE YEAR RANGE FOR HISTORICAL COST ANALYSIS TO 1960-1969, NAMELIST INPUT
C
1000 PWR       PHILADELPHIA      USA                19710 19785  70  400 1 1 0 2 0
 &CONOPT
 YFIRST=1960.,YLAST=1969.,
 &END
C     EXAMPLE PROBLEM 4
C     SAME PHILADELPHIA CASE AS EXAMPLE PROBLEM 2
C     BUT ESCALATED TO END OF PROJECT.
C     ONLY ONE PAGE OUTPUT SPECIFIED.
C
C     NOTE:  YEAR RANGE IS RESET WITH NAMELIST INPUT
C            BECAUSE OF CASE 3 TO PREVENT ERRORS.
C
1000 PWR       PHILADELPHIA       CASE 4            19710 19785  70  400 1 0 1 0 0
 &CONOPT
 YFIRST=1969.,YLAST=1999.,
 &END
C     EXAMPLE PROBLEM 5
C     SAME AS CASE 4
C     BUT ESCALATION BROKEN
C     OUT INTO SEPARATE  ACC.
C
C     NOTE: NO NAMELIST INPUT REQUIRED.
C
1000 PWR       PHILADELPHIA       CASE 5            19710 19785  70  400 0 0 2 0 0
C
C     EXAMPLE PROBLEM 6
C
```

```
C     THIS RUN ILLUSTRATES MULTIPLE OPTIONS:
C     CHANGES IN
C     1. ESCALATION RATES,
C     2. CASH FLOW CURVES,
C     3. SITE COSTS.
C
C     NOTE: TWO NAMELIST INPUTS REQUIRED FOR FLAG
C           OF 5 IN COLUMN 71
C
1100 PWRNET   MIDDLETOWN        USA                 19745 19820  75  400 5 1 0 0 1
 &CONOPT
 BFC(1)=1.06,BFC(2)=1.06,BFC(3)=1.045,BFC(4)=1.06,BFC(5)=1.06,BFC(6)=1.06,
 BLS=6*1.0683,BMS(2)=1.06,BMS(3)=1.045,BMS(4)=1.06,BMS(5)=1.06,BMS(6)=1.03,
 ALS(2)=4.557,ALS(3)=6.19,ALS(4)=5.635,ALS(5)=4.245,ALS(6)=4.596,
 CFCA(2,1)=0.0,CFCA(2,2)=0.05,CFCA(2,3)=0.05,CFCA(2,4)=0.2,CFCA(2,5)=0.2,
 CFCA(2,6)=0.2,CFCA(2,7)=0.2,CFCA(2,8)=0.2,CFCA(2,9)=0.2,CFCA(2,10)=0.2,
 CFCA(2,11)=.4,CFCA(2,12)=.4,CFCA(2,13)=.4,CFCA(2,14)=.4,CFCA(2,15)=.4,
 CFCA(2,16)=.4,CFCA(2,17)=.4,CFCA(2,18)=.4,CFCA(2,19)=.4,CFCA(2,20)=.4,
 CFCA(2,21)=.6,CFCA(2,22)=.6,CFCA(2,23)=.6,CFCA(2,24)=.6,CFCA(2,25)=.6,
 CFCA(2,26)=.6,CFCA(2,27)=.6,CFCA(2,28)=.6,CFCA(2,29)=.6,CFCA(2,30)=.6,
 &END
 &CONOPT
 C3(2,1)=80.,C3(3,1)=500.,
 &END
```

Appendix E

NOMENCLATURE FOR SUBPROGRAM COST

The subprogram COST is the most important routine in the CONCEPT code for the user who wishes to make internal modifications. Therefore, most of the important variable names and arrays used in COST are defined here. Other variables and arrays have been defined previously in the section on data input.

Variable name	Description
C(J)	Initial estimate of Jth two-digit-account direct cost (J=1,10).
C2(I,J)	Subtotal of Ith components of Jth two-digit-account direct cost less contingency and spare parts allowance (I=1,4 represents equipment, labor, material, and total respectively; J=1,12).
C2C(I,J)	Contingency allowance for corresponding two-digit-account component in C2 array.
C2SP(I,J)	Spare parts allowance for corresponding two-digit-account component in C2 array.
C2T(I,J)	Total cost including contingency and spare parts allowance for corresponding two-digit-account component in C2 array.
C3(I,K)	The Ith component of the Kth three-digit-account cost (I=1,4 as in C2 array; K=1,60). Array IAR3(J) has stored the number of three-digit accounts in two-digit account J.
C4(I,L)	The Ith component of the Lth four-digit-account cost (I=1,4 as in array C2; L=1,150). Array IAR4(K) has stored the number of four-digit accounts in three-digit account K.
C5(I,M)	The Ith component of the Mth five-digit-account cost (I=1,4 as in array C2; M=1,50). Array IAR5(L) has stored the number of five-digit accounts in four-digit account L.
MHS(K)	Total labor man-hours required for each two-digit account for input case (K=1,7).
MMHS	Total labor man-hours required for the input plant.
OTPP	Average hourly wage rate ratio of overtime week to 40-hr week [Φ in Eq. (10)].

Variable name	Description
OVER	Ratio of total workweek efficiency to 40-hr week efficiency [E in Eq. (9)].
PROD	Productivity of labor for 40-hr week at discrete time intervals during design and construction period [P(y) in Eq. (14)].
PROD1	Productivity of labor for 40-hr week at start of design and construction [P* in Eqs. (7) and (13)].
RIBA	Average annual interest rate for the design and construction period [$\bar{R}$ in Eq. (28)].
SCONT	Total contingency allowance for the input plant.
SFMC	Total equipment cost for the input plant.
SSLC	Total labor cost for the input plant.
SSMC	Total material cost for the input plant.
SSPP	Total spare parts allowance for the input plant.
STDC	Total direct cost estimate for the input plant.
STDCS	Direct cost of the input plant, excluding contingency and spare parts.
TDA	Total capital cost of the input plant, excluding land.
TIC	Total indirect cost of the input plant.
TPCI	Total capital cost of the input plant.

Appendix F

DATA INPUT SHEET FOR CONCEPT

UCN-9849
(3 8-72)

DATA SHEET

CONCEPT (PHASE II)

* NOTE: ANY NON-ZERO PUNCH IN COL. 71 OR 77 REQUIRES ADDITIONAL NAMELIST INPUT ON REVERSE SIDE BE SUBMITTED TO AVOID ERRORS FROM INPUT DATA

REQUEST NO. | NAME | DATE

MWE (F4)	PLANT (A8)	CITY (2A8)	EXTRA IDENTIFICATION (2A8)	YEAR START (F5.1)	YEAR END (F5.1)	% INTEREST RATE (F4.2)	HRS. PER WEEK (F3.1)	FLAG OPTIONS* INPUT	OUTPUT	ESCALAT	COSTS	INTEREST
1 2 3 4	5 6 7 8 9 10 11 12 13	14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47	48 49 50 51 52 53 54	55 56 57 58 59 60	61 62 63 64 65	66 67 68 69	70 71	72 73	74 75	76 77	78 79 80

CONCEPT (PHASE II)

NAMELIST INPUT

First Card
DATA

&CONOPT

Must Be
Last Card

&END

(LAST CARD IS NON-STANDARD IN FORTRAN NAMELIST INPUT)

ORNL-4809
UC-80 – Reactor Technology

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