MASTER

**User's Instructions for Preliminary Version of
the Concept-5 Computer Code**

C. R. Hudson II

OAK RIDGE NATIONAL LABORATORY
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USER'S INSTRUCTIONS FOR PRELIMINARY VERSION OF THE
CONCEPT-5 COMPUTER CODE

C. R. Hudson II

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NOTICE: This document contains information of a preliminary nature. It is subject to revision or correction and therefore does not represent a final report.

Prepared by the
OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37830
operated by
UNION CARBIDE CORPORATION
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DEPARTMENT OF ENERGY

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USER'S INSTRUCTIONS FOR PRELIMINARY VERSION OF THE CONCEPT-5 COMPUTER CODE

C. R. Hudson II

ABSTRACT

In an effort to increase user flexibility and produce more accurate conceptual cost estimates of electric power generating plants, the CONCEPT-5 computer program package has been prepared. Delays in acquiring certain cost data necessitate the release of a preliminary version of the CONCEPT-5 code. By doing so, new cost data already available may be utilized until a final version is issued. This report contains instructions on loading the programs into the computer, a description of the cost models presently available, input requirements and operating features, and example cases. This report assumes the reader has familiarity with the prior version of the code described in ERDA-108.

1. INTRODUCTION

The CONCEPT computer code has been used for making conceptual capital cost estimates of electric power generating plants since 1971. Since that time, program improvements and cost data updates have resulted in various versions of the code. Presently, work is nearing completion on Phase 5 of the CONCEPT code. This version, CONCEPT 5, will contain detailed cost data for pressurized water reactor (PWR) plants, boiling water reactor (BWR) plants, and coal-fired plants with and without flue gas desulfurization (FGD) systems. The CONCEPT-5 package also contains significant improvements and increased flexibility over earlier versions. These features are summarized in Table 1.1. Users not already familiar with the CONCEPT code should refer to the Phase IV user's manual, ERDA-108, for more details on the CONCEPT methodology.¹

Although all changes to the code itself have been completed, delays in acquiring cost data on alternate cooling systems and multi-unit plants have limited the number of cost models created thus far. However, in the interest of making available up-to-date cost information, a preliminary CONCEPT-5 package has been prepared. Four plant types (PWR, BWR, coal with FGD, and coal without FGD) are available in this package. Temporary second-unit models are also included. The only cooling system available

Table 1.1. Summary of modifications included
in CONCEPT-5 package

Cost models updated at full five-digit level
Indirect costs treated in the same manner as direct costs
Time-dependent escalation input saved for subsequent cases
Time-dependent escalation data can be input for time prior to NSSS order date
Additional information on cash flows now available
Owner's cost category established
Historical file on factory equipment costs established
Weighted average escalation rates for equipment, labor, and material now printed on two-digit summary
Auxiliary programs CONTAC and CONLAM modified consistent with CONCEPT modifications

at this time utilizes wet mechanical draft cooling towers. The various cost model types are described in greater detail in Section 3.

It should be remembered that all of these cost models, particularly the second-unit models, are tentative and are subject to some change. As with any conceptual estimate, each individual or detailed cost item should not be considered exact. However, on a total cost basis, these temporary models should be sufficient to produce consistent conceptual capital cost estimates for present-day electric power plants.

2. LOADING THE PROGRAMS INTO THE COMPUTER

The CONCEPT package is generally transmitted to a user on a nine-track magnetic tape in extended binary coded decimal interchange code (ERCDIC) at a density of 800 bpi. The tape contains the following files:

- File 1 The CONCEPT-5 source program
- File 2 The CONTAC-5 source program
- File 3 The CONLAM-5 source program
- File 4 The sample cases for testing CONCEPT 5

File 5 The cost models to be processed by CONTAC 5

File 6 The equipment, labor, and material cost history data used
by CONLAM 5

The source programs are compiled at ORNL using an IBM Level H FORTRAN compiler and are executed on an IBM 360-95 machine with HASP-MVT. The core requirements for execution of any of the three programs on the IBM 360 is less than 270 K. Example IBM job control language (JCL) instructions are given in Table 2.1 to assist users in preparing JCL cards. Those using other than IBM equipment may find some help in converting IBM JCL to other systems by consulting the IBM System/360 Job Control Language Reference.²

The CONTAC and CONLAM programs must be compiled and executed prior to execution of the CONCEPT program. Steps 1 through 4 do this and establish two files named COSTMOD.LIBR and CONLAM.LIBR on a permanent system direct access device identified as SYSTM1. A temporary direct access device is also needed and is identified in this JCL as SYSDA. Steps 2 and 3 employ the IBM OS utility program IEBGENER. It is described in the IBM OS Utility Reference.³

In Step 4 FT08F001 defines a formatted master file which should be saved on some device, not necessarily direct access, for periodic updating of the equipment, labor, and material file.

Step 5 compiles and link edits the CONCEPT-5 program to create a stored load module for use in Step 7. Step 6 again uses the IBM OS utility program IEBGENER to read input data for the CONCEPT program.

Input to the CONCEPT program must be read in Step 6, and the statement PARM='CK=-5' must be in Step 7 when using HASP spooling systems. This is due to a HASP limitation on rewinding the input file during execution of the CONCEPT program. Users with ASP systems should not have this problem and may omit Step 6 and replace the FT05F001 card in Step 7 with

```
//FT05F001 DD DSN=EXAMPLE,UNIT=TAPE9,VOL=SER=X1234,LABEL=(4,NL),
// DISP=(OLD,KEEP),DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200)
```

PARM='CK=-5' may also be omitted for those with ASP control.

Table 2.1. Example IBM job control language instructions

```

//STEP1 EXEC FORTHCLG,REGION=270K
//FORT.SYSIN DD DSN=CONAC5,UNIT=TAPE9,VOL=SER=X1234,
// LABEL=(2,NL),DISP=(OLD,PASS),DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200)
//GO.FT06F001 DD SYSOUT=A
//FT04F001 DD DSN=COSTMOD5,UNIT=TAPE9,VOL=SER=X1234,
// LABEL=(5,NL),DISP=(OLD,PASS),DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200)
//FT08F001 DD DUMMY
//FT09F001 DD DSN=COSTMOD.LIBR,VOL=SER=SYSTEM1,UNIT=3330,
// DISP=(NEW,CATLG),SPACE=(CYL,(2,1),RLSE),
// DCB=(RECFM=VBS,LRECL=X,BLKSIZE=13030)
//FT05F001 DD *
J
/*
//STEP2 EXEC PGM=IEBGENER
//SYSPRINT DD SYSOUT=A
//SYSIN DD DUMMY
//SYSUT2 DD DSN=6&TEMP1,UNIT=SYSDA,DISP=(NEW,PASS),
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=6400),SPACE=(TRK,(1,1),RLSE)
//SYSUT1 DD *
30 30 23 1 0 0 0 0 0
/*
//STEP3 EXEC PGM=IEBGENER
//SYSPRINT DD SYSOUT=A
//SYSIN DD DUMMY
//SYSUT2 DD DSN=6&TEMP2,UNIT=SYSDA,DISP=(NEW,PASS),
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=6400),SPACE=(CYL,(2,1),RLSE)
//SYSUT1 DD DSN=ELMDATA,UNIT=TAPE9,VOL=SER=X1234,LABEL=(6,NL),
// DISP=(OLD,PASS),DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200)
//STEP4 EXEC FORTHCLG,REGION=270K
//FORT.SYSIN DD DSN=CONLAM5,UNIT=TAPE9,VOL=SER=X1234,LABEL=(3,NL),
// DISP=(OLD,PASS),DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200)
//GO.FT06F001 DD SYSOUT=A
//FT05F001 DD DSN=6&TEMP1,DISP=(OLD,DELETE)
// DD DSN=6&TEMP2,DISP=(OLD,DELETE)
//FT09F001 DD DSN=CONLAM.LIBR,VOL=SER=SYSTEM1,UNIT=3330,
// DISP=(NEW,CATLG),SPACE=(TRK,(9,1),RLSE),
// DCB=(RECFM=VBS,LRECL=4860,BLKSIZE=13030)
//FT08F001 DD DSN=NEWMASTR,VOL=SER=-----,UNIT=-----,
// DISP=(NEW,KEEP),SPACE=----- 278,000 BYTES,
// DCB=(RECFM=FB,LRECL=80,BLKSIZE=6400)
//FT04F001 DD DUMMY
//STEP5 EXEC FORTHCLG,REGION=270K
//FORT.SYSIN DD DSN=CONCEPT5,UNIT=TAPE9,VOL=SER=X1234,LABEL=(1,NL),
// DISP=(OLD,PASS),DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200)
//LKED.SYSLMOD DD DSN=CONCEPT5.LOAD(CONCEPT5),VOL=SER=SYSTEM1,
// UNIT=3330,DISP=(NEW,CATLG),SPACE=(TRK,(13,1,1),RLSE),
// DCB=(RECFM=U,BLKSIZE=13030)
//STEP6 EXEC PGM=IEBGENER
//SYSPRINT DD SYSOUT=A
//SYSIN DD DUMMY
//SYSUT2 DD DSN=6&TEMP,UNIT=SYSDA,DISP=(NEW,PASS),
// SPACE=(800,(8,1),RLSE),DCB=(RECFM=FB,LRECL=80,BLKSIZE=800)
//SYSUT1 DD DSN=EXAMPLE,UNIT=TAPE9,VOL=SER=X1234,LABEL=(4,NL),
// DISP=(OLD,KEEP),DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200)
//STEP7 EXEC PGM=CONCEPT5,REGION=270K,PARM='CK=-5'
//STEPLIB DD DSN=CONCEPT5.LOAD,DISP=SHR
//FT06F001 DD SYSOUT=A
//FT04F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1),RLSE),
// DCB=(RECFM=F,LRECL=80,BLKSIZE=80),DISP=(NEW,DELETE)
//FT02F001 DD UNIT=SYSDA,SPACE=(CYL,(1,1),RLSE),
// DCB=(RECFM=F,LRECL=80,BLKSIZE=80),DISP=(NEW,DELETE)
//FT03F001 DD UNIT=(SYSDA,SEP=FT02F001),SPACE=(CYL,(1,1),RLSE),
// DCB=(RECFM=F,LRECL=80,BLKSIZE=80)
//FT11F001 DD UNIT=(SYSDA,SEP=(FT02F001,FT03F001)),
// SPACE=(CYL,(1,1),RLSE),DCB=(RECFM=VS,LRECL=10500,BLKSIZE=7294)
//FT08F001 DD DSN=CONLAM.LIBR,DISP=SHR
//FT09F001 DD DSN=COSTMOD.LIBR,DISP=SHR
//FT05F001 DD DSN=*.STEP6.SYSUT2,DISP=(OLD,DELETE)
//

```

As given in Table 2.1, the example input data will be used. Subsequent runs of CONCEPT may now be made by using only the cards in Steps 6 and 7. The SYSUT1 card in Step 6 should be changed to

```
//SYSUT1 DD *
```

followed by the input data and a /* card. Again this applies for machines with HASP spooling. Those having ASP control should replace the FT05F001 card in Step 7 with

```
//FT05F001 DD *
```

followed by the input data and a /* card.

3. COST MODELS AVAILABLE

The following cost models are available at this time:

PWRMET	First- and second-unit PWR plants with mechanical
PWR2MET	draft cooling towers
BWRMET	First- and second-unit BWR plants with mechanical
BWR2MET	draft cooling towers
CBIGMET	First- and second-unit low-sulfur coal plants with
CBIG2MET	mechanical draft cooling towers and cross-compound turbines
CBIGSMET	First- and second-unit high-sulfur coal plants
CBIGS2MT	with mechanical draft cooling towers, FGD (scrubbers), and cross-compound turbines
COALMET	First- and second-unit low-sulfur coal plants with
COAL2MET	mechanical draft cooling towers and tandem-compound turbines
COALSMET	First- and second-unit high-sulfur coal plants with
COAL2SMT	mechanical draft cooling towers, FGD (scrubbers), and tandem-compound turbines

Note the introduction of a new cost model type with the prefix CBIG. Those models starting with CBIG are designed to represent large-size coal plants utilizing cross-compound turbine generators. Smaller plants described by COAL models use tandem-compound turbine generators. The break between tandem- and cross-compound turbine generators is in the range of 900 to 1000 MW(e).

Cost data for these models were obtained from an ERDA and NRC sponsored study by United Engineers & Constructors, Inc. Detailed plant descriptions and other information may be found in a series of reports prepared during that study.⁴⁻⁹

4. INPUT AND OPERATING FEATURES

This section will point out only the changes to the input/output options made from CONCEPT IV to CONCEPT 5. For a description of those items not changed, the user should refer to the CONCEPT-IV user's manual.¹

4.1 Standard Input Data

Variable IOF in column 72 determines the output option and can be as follows:

- 0 — Two-digit summary output only
- 1 — Two-digit summary and cash flow information
- 2 — Complete cost breakdown with cash flow

Examples of the cash flow information and complete cost breakdown are given in Section 4.4.

Variable IBS in column 76 determines whether time-dependent escalation data will be used. IBS can take on the following values:

- 0 — No input data expected
- 1 — Escalation data expected as input (which is now saved internally)
- 2 — Retrieve data used when IBS was 1

Thus for subsequent cases the same time-dependent escalation data can be used without punching additional cards. The card format for entering time-dependent escalation data has also been changed and is discussed in Section 4.3.

4.2 Nonstandard Input Data

As described in ERDA-108, additional data can be entered through the NAMELIST feature. Many variables are now dimensioned that were not

previously. A listing and brief description of all the variables adjustable through NAMELIST are given below.

Variable name	Description
AA(I,J)	Scaling coefficients for adjusting the direct and indirect costs as a function of size according to the relation $\alpha_1 + \alpha_2 \left(\frac{MW_1}{MW_0} \right)^{\alpha_3}$ for each two-digit account. The first dimension, I, determines the α such that I=1,3. The second dimension, J, defines the two-digit account such that J=1,11 for accounts 20 through 94.
APC(I)	Productivity indices for each two-digit direct and indirect cost account such that I=1,11.
BPC(I)	
COB(I)	Contractor's overhead burden factor for each two-digit direct and indirect cost account in the base model (COB) and the specific case (COS). I=1,11 for accounts 20 through 94.
COS(I)	
CONTL(I)	Contingency percentage for labor, material, and factory equipment, respectively, for each two-digit direct and indirect cost account. I=1,11 for accounts 20 through 94.
CONTM(I)	
CONTE(I)	
DEOT(I)	Labor efficiency coefficient, overtime payment premium, and labor efficiency factor, respectively, for each two-digit direct and indirect cost account (I=1,11).
OTP(I)	
OVERS(I)	
FACS1(I,J)	Weighting factors for labor, material, and equipment, respectively, for each two-digit direct and indirect cost account (J=1,11). The first dimension, I, correlates a weighting factor to a specific labor, material, or equipment index in the CONLAM file.
FACS2(I,J)	
FACS3(I,J)	
FILS(J)	Weighting factor and site location number for up to twenty locations to be combined in a composite site (J=1,20).
ISITE(J)	
RINT(J)	Interest rate expressed as a decimal number for each of the fifty time periods between the steam supply date and commercial operation date (J=1,50).
YFIRST	The first and last dates to be considered in performing a linear regression on the historical equipment, labor, and material file.
YLAST	

Variable name (continued)	Description (continued)
HWI(J) HW	The number of hours worked per week for each two-digit direct and indirect cost account (J=1,11) or, alternatively, the number of hours worked per week in all the accounts.
FACE(I,J)	An escalation factor for equipment, labor, and material (I=1,3) in each of the two-digit direct and indirect cost accounts (J=1,11).
AMAN	The direct labor manhours per kilowatt for the specific case being run.
CFCA(I,J)	Cash flow data for each two-digit direct and indirect cost account (I=2,12) in each of the fifty time periods between the steam supply date and commercial operation date (J=1,50).
D(I,J)	Lowest-digit account direct and indirect costs divided into equipment, labor, and material (I=1,3) for a given account (J=1,350).

4.3 Time-Dependent Escalation Data Input

Time-dependent escalation input can be used to alter the escalation rates and cost indices for equipment, labor, and material. To do so requires a set of six input cards which follows after the standard input and NAMELIST cards (when used). Figure 4.1 shows the form of the six cards. The first two are for factory equipment direct and indirect cost accounts, respectively. Labor and material are treated in the same fashion. The "A" field in each of the two-digit accounts represents a cost index at a given point in time. The "B" field represents the escalation rate in the $(1 + \epsilon)$ form at a given point in time. If fields are left blank on the data cards, the escalation coefficients in these fields will not be altered. The last field on the sixth card is for a date written in decimal notation. This is the "effective" date for the data being input. This date may be during or before the design and construction period.

Additional sets of six cards may be used in a sequential fashion with different dates in chronological order to change escalation parameters with time. However, following the last set a card with -1. in the last

5

Fig. 4.1. Time-dependent escalation input format.

field must be input. This is true even if there is only one set of six cards being input.

As described in Section 4.1, the time-dependent escalation data input may be saved for subsequent cases.

4.4 Example Problems

Two example runs have been provided on the following pages. The first example is a simple problem with no NAMELIST or time-dependent escalation input. The output option variable, IOF, has been set such that the complete detailed output will be printed.

The second example displays the use of the NAMELIST and time-dependent escalation features. The effect of the time-dependent escalation input is to set the escalation rate to 8% per year for all accounts. Note that this data as well as the NAMELIST data is saved and used again for the second unit. The output option variable has been set such that a two-digit summary and cash flow information will be printed.

1100 PWRMET MIDDLETOWN EXAMPLE1 197800 198200 198800 9000 0 1 2 0 0 1 1

800 COALSMET MIDDLETOWN EXAMPLE2 197800 198200 198600 9000 1 1 1 0 1 1 2

&CONOPT YFIRST=1967.,

&END

1.08 1.03 1.08 1.08 1.08 1.08 1.08

1.08 1.03 1.08 1.08

1.08 1.03 1.08 1.08 1.08 1.08 1.08

1.08 1.03 1.08 1.08

1.08 1.08 1.08 1.08 1.08 1.08 1.08

1.08 1.08 1.08 1.08 1977.00

-1.

800 COAL2SMT MIDDLETOWN 197800 198400 198800 9000 2 1 1 0 2 1

CONCEPT PHASE 2 DATA SETS

POWER PLANT TYPE CODES

1	PWRMET	06-17-77
2	PWR2MET	06-17-77
3	BWRMET	06-30-77
4	BWR2MET	06-30-77
5	CBIGSMET	08-19-77
6	CBIG2SMT	08-19-77
7	COALMET	10-26-77
8	COAL2MET	10-26-77
9	COALSMET	01-11-78
10	COAL2SMT	01-11-78

CITY NAME CODES

1	ATLANTA	GEORGIA
2	BALTIMORE	MARYLAND
3	BIRMINGHAM	ALABAMA
4	BOSTON	MASSACHUSETTS
5	CHICAGO	ILLINOIS
6	CINCINNATI	OHIO
7	CLEVELAND	OHIO
8	DALLAS	TEXAS
9	DENVER	COLORADO
10	DETROIT	MICHIGAN
11	KANSAS CITY	KANSAS
12	LOS ANGELES	CALIFORNIA
13	MINNEAPOLIS	MINNESOTA
14	NEW ORLEANS	LOUISIANA
15	NEW YORK	NEW YORK
16	PHILADELPHIA	PENNSYLVANIA
17	PITTSBURGH	PENNSYLVANIA
18	ST. LOUIS	MISSOURI
19	SAN FRANCISCO	CALIFORNIA
20	SEATTLE	WASHINGTON
21	MONTREAL	CANADA
22	TORONTO	CANADA
23	MIDDLETOWN	USA

IF THE PLANT TYPE OR CITY SELECTED WAS NOT USED
IN COMPUTATIONS, CHECK SPELLING AND FIELD JUSTIFICATION
WITH THE AVAILABLE PLANT TYPE AND CITY NAME CODES

D A I A _ _ _ C A R D _ _ _ C O L U M N S _ _ _ U S E D

1--4	6-----13	15-----30	32----39	41----47	48----54	55----61	62--66	68	70	72	74	76	78	80	
MWE	MODEL	CITY	EXTRA	ID YR	SSS	YR PER	YR CUP	% INT	ILAZ	IFLAG	IOF	IESC	IBS	IAC	ISTACK

1100	PWRMET	MIDDLETOWN	EXAMPLE1	1978.000	1982.000	1988.000	9.000	0	0	2	0	0	1	1
------	--------	------------	----------	----------	----------	----------	-------	---	---	---	---	---	---	---

DATE 01-17-78 C O N C E P T C O S T E S T I M A T E S (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT SUMMARY (MILLIONS OF DOLLARS)
 1100 MWE PWRMET () POWER PLANT AT MIDDLETOWN EXAMPLE1
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE
 DESIGN & CONSTRUCTION PERIOD: STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1988.000

CUNIV CALLED - DATA FIT DONE ON USA

MIDDLETOWN

SITE RATE AND ESCALATION USED IN COST PROJECTIONS

YFIRST = 1963.00 YLAST = 1977.50

ACCT	20	ACCT	21	ACCT	22	ACCT	23	ACCT	24	ACCT	25	ACCT	26	ACCT	27	ACCT	28	ACCT	29	ACCT	30		
A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B		
*****				1978.000				*****															
E195.9	1.060	195.9	1.060	195.9	1.060	195.9	1.060	195.9	1.060	195.9	1.060	195.9	1.060	195.9	1.060	195.9	1.060	195.9	1.060	195.9	1.060		
L14.29	1.083	14.29	1.083	14.93	1.081	14.85	1.081	15.02	1.081	14.91	1.081	14.48	1.082	14.29	1.083	14.78	1.078	14.78	1.076	14.78	1.076		
M1000.	1.000	22.66	1.066	22.66	1.066	22.66	1.066	22.66	1.066	22.66	1.066	22.66	1.066	22.66	1.066	22.66	1.066	22.66	1.066	22.66	1.066		

DATE 01-17-78 CONCEPT COST ESTIMATES (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT SUMMARY (MILLIONS OF DOLLARS)
 1190 MWE PWRMET (06-17-77) POWER PLANT AT MIDDLETOWN EXAMPLE1
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE
 DESIGN & CONSTRUCTION PERIOD: STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1988.000

ACCOUNT NUMBER	ACCOUNT TITLE	TOTAL COSTS	EQUIPMENT COSTS	LABOR MANHOURS	MATERIAL COSTS
20 .	LAND AND LAND RIGHTS	2	0.0	(0.0)	0.0
21 .	STRUCTURES + IMPROVEMENTS	116	6.316	(4.635)	66.249
22 .	REACTOR PLANT EQUIPMENT	144	102.947	(2.101)	31.373
23 .	TURBINE PLANT EQUIPMENT	120	87.471	(1.776)	26.377
24 .	ELECTRIC PLANT EQUIPMENT	45	14.056	(1.429)	21.476
25 .	MISCELLANEOUS PLANT EQUIPT	13	7.756	(0.304)	4.543
26 .	MAIN COND HEAT REJECT SYS	23	16.823	(0.362)	2.244
	SUBTOTAL	463	235.169	(10.007)	155.263
				9.643	MANHOURS/KW
91 .	CONSTRUCTION SERVICES	80			
92 .	HQME OFFICE ENGRG.&SERVICE	53			
93 .	FIELD OFFICE ENGRG&SERVICE	31			
94 .	OWNER'S COSTS	42			
	SUBTOTAL	208			
	DIRECT & INDIRECT COSTS	(\$ 610/KW)	671		
	CONTINGENCY ALLOWANCE		67		
			=====		
	TOTAL DIRECT & INDIRECT COSTS	(\$ 671/KW)	738		
	ESCALATION DURING CONSTRUCTION	(6.720%/YR)	221		
	TOTAL ESCALATED DIRECT & INDIRECT COSTS	(\$ 990/KW)	1089		
			=====		
	INTEREST DURING CONSTRUCTION COMPOUND	(9.000%/YR)			
	ON DIRECT & INDIRECT COSTS		324		
	ON ESCALATION DURING CONSTRUCTION		123		
	TOTAL INTEREST DURING CONSTRUCTION	(\$ 415/KW)	457		
			=====		
	TOTAL PLANT CAPITAL INVESTMENT	(\$ 1405/KW)	1546		

WEIGHTED AVERAGE ESCALATION (%/YR)
 EQUIPMENT 5.909
 LABOR 8.220
 MATERIAL 6.624

DATE 01-17-78 CONCEPT COST ESTIMATES (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 1100 MWE PERMIT (06-17-77) POWER PLANT AT: MIDDLETOWN EXAMPLE1
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1988.000

ACCOUNT NUMBER	ACCOUNT TITLE	FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
20.	LAND AND LAND RIGHTS				
201.	LAND AND PRIVILEGE ACQUISITION	\$ 0.	\$ 0.	\$ 2000.	2000.
202.	RELOCATION OF BUILDINGS, UTILITIES, ETC.	\$ 0.	\$ 0.	\$ 0.	0.
	SUBTOTAL FOR ACCOUNT	\$ 0.	\$ 0.	\$ 2000.	\$ 2000.
	CONTINGENCY (0.0%EQP- 0.0%LABOR- 0.0%MTL) . . .	0.	0.	0.	0.
	TOTAL FOR ACCOUNT 20	\$ 0.	\$ 0.	\$ 2000.	\$ 2000.

DATE 01-17-78 CONCEPT COST ESTIMATES (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 1100 MWE PERMIT (06-17-77) POWER PLANT AT: MIDDLETOWN EXAMPLE 1
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1988.000

ACCOUNT NUMBER	ACCOUNT TITLE	FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
21.	STRUCTURES + IMPROVEMENTS				
211.	YARDWORK				
211.1	GENERAL YARDWORK				
211.11	GENERAL CUT + FILL	\$ 0.	\$ 184.	\$ 228.	412.
211.12	ROADS, WALKS + PARKING ARE	0.	202.	550.	752.
211.14	FENCING + GATES	0.	64.	64.	128.
211.15	SANITARY SEWER FACILITY	181.	112.	72.	365.
211.16	YARD DRAINAGE STORM SEWERS	0.	212.	526.	738.
211.17	ROADWAY + YARD LIGHTING	0.	307.	227.	534.
211.19	SETTLING BASINS	0.	75.	112.	187.
	SUBTOTAL	\$ 181.	\$ 1156.	\$ 1780.	\$ 3117.
211.4	RAILROADS				
211.41	CUT + FILL	\$ 0.	\$ 12.	\$ 14.	26.
211.42	GRADING	0.	6.	13.	19.
211.43	TRACK (BALLAST, TIES, RAIL	0.	922.	883.	1805.
211.45	SWITCHES+BUMPERS	0.	17.	24.	40.
211.46	RIP RAP (24 IN. THICK)	0.	5.	3.	8.
	SUBTOTAL	\$ 0.	\$ 961.	\$ 937.	\$ 1898.
211.7	STRUCTURE ASSOCIATED YDWK				
211.71	CUT + FILL	\$ 0.	\$ 3247.	\$ 2253.	5500.
	SUBTOTAL	\$ 0.	\$ 3247.	\$ 2253.	5500.
	SUBTOTAL	\$ 181.	\$ 5364.	\$ 4970.	\$ 10515.
212.	REACTOR CONTAINMENT BLDG				
212.1	BUILDING STRUCTURE				
212.13	SUBSTRUCTURE CONCRETE	\$ 0.	\$ 1487.	\$ 1112.	2599.
212.14	SUPERSTRUCTURE	1391.	20583.	13304.	35277.
	SUBTOTAL	\$ 1391.	\$ 22069.	\$ 14416.	\$ 37876.
212.2	BUILDING SERVICES				
212.22	HEATING, VENT + AIR COND	\$ 1553.	\$ 771.	\$ 163.	2487.
212.24	LIGHTING+SERVICE POWER	0.	86.	80.	166.
212.25	ELEVATOR	23.	34.	8.	96.
	SUBTOTAL	\$ 1607.	\$ 891.	\$ 251.	2748.
	SUBTOTAL	\$ 2997.	\$ 22960.	\$ 14667.	\$ 40624.
213.	TURBINE ROOM + HEATER BAY				
213.1	BUILDING STRUCTURE				
213.13	SUBSTRUCTURE CONCRETE	\$ 0.	\$ 1390.	\$ 779.	2170.
213.14	SUPERSTRUCTURE	0.	3259.	6034.	9322.
	SUBTOTAL	\$ 0.	\$ 4749.	\$ 6813.	\$ 11562.
213.2	BUILDING SERVICES				
213.21	PLUMBING + DRAINS	\$ 131.	\$ 257.	\$ 55.	443.
213.22	HEATING, VENT, + AIR COND.	271.	218.	29.	517.
213.23	FIRE PROTECTION	79.	174.	22.	274.
213.24	LIGHTING+SERVICE POWER	0.	307.	136.	443.
213.25	ELEVATOR	23.	27.	2.	93.
	SUBTOTAL	\$ 534.	\$ 982.	\$ 244.	1761.
	SUBTOTAL	\$ 534.	\$ 5732.	\$ 7057.	\$ 13323.

DATE 01-17-78 C O N C E P T C O S T E S T I M A T E S (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 1100 MWE PWRMET (06-17-77) POWER PLANT AT: MIDDLETOWN EXAMPLE1
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1988.000

ACCOUNT NUMBER	ACCOUNT TITLE	FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	INITIAL
215.	PRIM AUX BLDG + TUNNELS				
215.1	BUILDING STRUCTURE				
215.13	SUBSTRUCTURE CONCRETE	\$ 0.	\$ 402.	\$ 213.	615.
215.14	SUPERSTRUCTURE	-----0	-----4529	-----2407	-----7016
	SUBTOTAL	\$ 0.	\$ 4531.	\$ 2700.	\$ 7631.
215.2	BUILDING SERVICES				
215.21	PLUMBING + DRAINS	\$ 26.	\$ 73.	\$ 12.	110.
215.22	HEATING, VENT, + AIR COND	593.	818.	222.	1633.
215.23	FIRE PROTECTION	3.	23.	5.	31.
215.24	LIGHTING & SERVICE POWER	-----0	-----197	-----88	-----282
	SUBTOTAL	\$ 622.	\$ 1111.	\$ 326.	\$ 2059.
	SUBTOTAL	\$ 622.	\$ 6042.	\$ 3026.	\$ 9690.
216.	WASTE PROCESS BUILDING				
216.1	BUILDING STRUCTURE				
216.13	SUBSTRUCTURE CONCRETE	\$ 0.	\$ 245.	\$ 193.	438.
216.14	SUPERSTRUCTURE	-----0	-----5223	-----2528	-----7781
	SUBTOTAL	\$ 0.	\$ 5468.	\$ 2752.	\$ 8220.
216.2	BUILDING SERVICES				
216.21	PLUMBING + DRAINS	\$ 25.	\$ 54.	\$ 9.	87.
216.22	HEATING, VENT + AIR COND	101.	301.	106.	507.
216.24	LIGHTING & SERVICE POWER	0.	219.	108.	327.
216.25	ELEVATOR	-----21	-----27	-----2	-----82
	SUBTOTAL	\$ 179.	\$ 601.	\$ 225.	\$ 1004.
	SUBTOTAL	\$ 179.	\$ 6068.	\$ 2977.	\$ 9224.
217.	FUEL STORAGE BLDG				
217.1	BLDG STRUCTURE				
217.13	SUBSTRUCTURE CONCRETE	\$ 0.	\$ 1138.	\$ 720.	1858.
217.14	SUPERSTRUCTURE	-----0	-----1531	-----899	-----2612
	SUBTOTAL	\$ 0.	\$ 2669.	\$ 1619.	\$ 4488.
217.2	BUILDING SERVICES				
217.21	PLUMBING + DRAINS	\$ 24.	\$ 51.	\$ 9.	83.
217.22	HEATING, VENT, + AIR COND	327.	114.	32.	474.
217.24	LIGHTING & SERVICE POWER	-----0	-----62	-----27	-----82
	SUBTOTAL	\$ 351.	\$ 227.	\$ 63.	\$ 640.
	SUBTOTAL	\$ 351.	\$ 3096.	\$ 1687.	\$ 5134.
218.	OTHER STRUCTURES				
218A.	CONTROL RM/D-G BUILDING				
218A.1	BUILDING STRUCTURE	\$ 0.	\$ 5298.	\$ 2775.	8072.
218A.2	BUILDING SERVICES	-----808	-----1323	-----216	-----2466
	SUBTOTAL	\$ 808.	\$ 6620.	\$ 3111.	\$ 10539.
218B.	ADMINISTRATION+SERVICE BLDG				
218B.1	BUILDING STRUC.	\$ 0.	\$ 1392.	\$ 1615.	3006.
218B.2	BLDG. SERVICES	-----523	-----1370	-----309	-----2292
	SUBTOTAL	\$ 523.	\$ 2762.	\$ 1983.	\$ 5298.
218D.	FIRE PUMP HOUSE, INC FNDTNS				
218D.1	BLDG. STRUC.	\$ 0.	\$ 120.	\$ 78.	198.
218D.2	BUILDING SERVICES	-----18	-----22	-----6	-----22
	SUBTOTAL	\$ 18.	\$ 149.	\$ 84.	\$ 251.

DATE 01-17-78 CONCEPT COST ESTIMATES (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 1100 MWE PWRMET (06-17-77) POWER PLANT AT: MIDDLETOWN EXAMPLE1
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1988.000

ACCOUNT NUMBER	ACCOUNT TITLE	FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
218E.	EMERGENCY FEED PUMP BLDG				
218E.1	BLDG. STRUCTURE	\$ 0.	\$ 1707.	\$ 575.	2282.
218E.2	BUILDING SERVICES	\$ 24.	\$ 52.	\$ 15.	91.
	SUBTOTAL	\$ 24.	\$ 1759.	\$ 590.	\$ 2373.
218F.	MANWAY TUNNELS (RCA TUNLS)				
218F.1	BUILDING STRUCTURE	\$ 0.	\$ 403.	\$ 153.	557.
218F.2	BUILDING SERVICES	\$ 2.	\$ 20.	\$ 10.	32.
	SUBTOTAL	\$ 2.	\$ 423.	\$ 163.	\$ 589.
218G.	ELEC. TUNNELS				
218G.2	BUILDING SERVICES	\$ 3.	\$ 6.	\$ 3.	12.
	SUBTOTAL	\$ 3.	\$ 6.	\$ 3.	\$ 12.
218H.	NON-ESSEN. SWGR BLDG.				
218H.1	BLDG. STRUCT.	\$ 0.	\$ 172.	\$ 121.	294.
218H.2	BUILDING SERVICES	\$ 11.	\$ 21.	\$ 11.	49.
	SUBTOTAL	\$ 11.	\$ 200.	\$ 132.	\$ 342.
218J.	MN STEAM + FW PIPE ENC.				
218J.1	BLDG. STRUCT.	\$ 0.	\$ 1751.	\$ 1092.	2842.
218J.2	BLDG. SERV.	\$ 7.	\$ 34.	\$ 14.	58.
	SUBTOTAL	\$ 7.	\$ 1785.	\$ 1106.	\$ 2899.
218K.	PIPE TUNNELS				
218K.1	BLDG. STRUCT.	\$ 0.	\$ 211.	\$ 82.	293.
218K.2	BLDG. SERV.	\$ 0.	\$ 24.	\$ 12.	36.
	SUBTOTAL	\$ 0.	\$ 234.	\$ 94.	\$ 328.
218M.	HYDROGEN RECOMBINER STRUCT				
218M.1	BLDG. STRUCTURES	\$ 0.	\$ 68.	\$ 48.	115.
218M.2	BUILDING SERVICES	\$ 0.	\$ 4.	\$ 3.	7.
	SUBTOTAL	\$ 0.	\$ 71.	\$ 51.	\$ 122.
218P.	CONTAIN EQ HATCH MSLE SHLD				
218P.1	SHIELD STRUCTURE	\$ 0.	\$ 121.	\$ 35.	156.
	SUBTOTAL	\$ 0.	\$ 121.	\$ 35.	\$ 156.
218S.	HOLDING POND				
218S.1	POND STRUCTURE	\$ 0.	\$ 23.	\$ 36.	128.
	SUBTOTAL	\$ 0.	\$ 93.	\$ 36.	\$ 128.
218T.	ULTIMATE HEAT SINK STRUCT				
218T.1	BLDG. STRUCT	\$ 0.	\$ 2632.	\$ 1179.	3811.
218T.2	BUILDING SERVICES	\$ 27.	\$ 10.	\$ 1.	37.
	SUBTOTAL	\$ 27.	\$ 2642.	\$ 1180.	\$ 3849.
218V.	CONTR RM EMG AIR INTK STR				
218V.1	BLDG. STRUCTURE	\$ 0.	\$ 121.	\$ 46.	169.
	SUBTOTAL	\$ 0.	\$ 121.	\$ 46.	\$ 169.
	SUBTOTAL	\$ 1433.	\$ 16987.	\$ 8615.	\$ 27054.
	SUBTOTAL FOR ACCOUNT	\$ 6316.	\$ 66249.	\$ 42999.	\$ 115561.
	CONTINGENCY (10.04EQP-10.0%LABOR-10.0%MTL)	\$ 632.	\$ 6622.	\$ 4100.	\$ 11558.
	TOTAL FOR ACCOUNT 21	\$ 6947.	\$ 72871.	\$ 47099.	\$ 127120.

DATE 01-17-78 CONCEPT COST ESTIMATES (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 1100 MWE PWRMET (06-17-77) POWER PLANT AT: MIDDLETOWN EXAMPLE1
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1988.000

ACCOUNT NUMBER	ACCOUNT TITLE	FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
22.	REACTOR PLANT EQUIPMENT				
220.	NUCLEAR STEAM SUPPLY SYSTEM				
220A.	NUCLEAR STEAM SUPPLY(NSSS)				
220A.1	QUOTED NSSS PRICE	\$ 69290.	\$ 0.	\$ 0.	\$ 69290.
	SUBTOTAL	\$ 69290.	\$ 0.	\$ 0.	\$ 69290.
220B.	NSSS OPTIONS	\$ 0.	\$ 0.	\$ 0.	\$ 0.
	SUBTOTAL	\$ 69290.	\$ 0.	\$ 0.	\$ 69290.
221.	REACTOR EQUIPMENT				
221.1	REACTOR VESSEL + ACCESSORY				
221.11	REACTOR SUPPORT	\$ 506.	\$ 37.	\$ 3.	\$ 547.
221.12	VESSEL STRUCTURE	0.	862.	93.	\$ 955.
221.13	VESSEL INTERNALS	0.	207.	20.	\$ 227.
221.14	TRANSPORT TO SITE	0.	0.	1939.	\$ 1939.
	SUBTOTAL	\$ 506.	\$ 1106.	\$ 2055.	\$ 3667.
221.2	REACTOR CONTROL DEVICES				
221.21	CONTROL ROD SYSTEM	\$ 0.	\$ 190.	\$ 41.	\$ 231.
	SUBTOTAL	\$ 0.	\$ 190.	\$ 41.	\$ 231.
	SUBTOTAL	\$ 506.	\$ 1296.	\$ 2096.	\$ 3898.
222.	MAIN HEAT XFER XPORT SYS.				
222.1	REACTOR CORE COOLANT SYS.				
222.11	FLUID CIRCULATION DR. SYS.	\$ 826.	\$ 428.	\$ 37.	\$ 1291.
222.12	REACT.COOLANT PIPING SYS.	704.	4105.	428.	\$ 5316.
222.13	STEAM GENERATOR EQUIPMENT	1972.	878.	68.	\$ 2938.
222.14	PRESSURIZING SYSTEM	107.	91.	9.	\$ 207.
222.15	PRI COOL PIPE WHIP RESTRICT	522.	50.	4.	\$ 576.
	SUBTOTAL	\$ 4211.	\$ 2552.	\$ 295.	\$ 10328.
	SUBTOTAL	\$ 4211.	\$ 5552.	\$ 565.	\$ 10328.
223.	SAFEGUARDS SYSTEM				
223.1	RESIDUAL HEAT REMOVAL SYS				
223.11	ROTATING MACHINERY	\$ 0.	\$ 29.	\$ 2.	\$ 32.
223.12	HEAT TRANSFER EQUIPMENT	0.	15.	1.	\$ 16.
223.15	PIPING	666.	1928.	204.	\$ 2798.
223.16	RHR VALVES	9.	0.	0.	\$ 9.
223.17	PIPING - MISC. ITEMS	21.	0.	0.	\$ 21.
223.18	INSTRUMENTATION + CONTROL	28.	2.	0.	\$ 30.
	SUBTOTAL	\$ 724.	\$ 1975.	\$ 207.	\$ 2905.
223.3	SAFETY INJECTION SYSTEM				
223.31	ROTATING MACHINERY	\$ 16.	\$ 34.	\$ 3.	\$ 53.
223.33	TANKS AND PRESSURE VESSELS	0.	182.	249.	\$ 431.
223.35	PIPING	607.	2037.	267.	\$ 2910.
223.36	VALVES	190.	0.	0.	\$ 190.
223.37	PIPING - MISC. ITEMS	23.	0.	0.	\$ 23.
223.38	INSTRUMENTATION + CONTROL	28.	0.	0.	\$ 28.
	SUBTOTAL	\$ 893.	\$ 2258.	\$ 519.	\$ 3671.
223.4	CONTAINMENT SPRAY SYSTEM				
223.41	ROTATING MACHINERY	\$ 160.	\$ 37.	\$ 3.	\$ 200.
223.42	HEAT TRANSFER EQUIPMENT	161.	15.	1.	\$ 177.
223.43	TANKS AND PRESSURE VESSELS	92.	3.	0.	\$ 95.
223.45	PIPING	852.	2363.	233.	\$ 3448.
223.46	VALVES + FITTINGS	600.	3.	0.	\$ 604.
223.47	PIPING - MISC. ITEMS	29.	0.	0.	\$ 29.
223.48	INSTRUMENTATION + CONTROL	36.	2.	0.	\$ 38.
	SUBTOTAL	\$ 1932.	\$ 2426.	\$ 237.	\$ 4595.

DATE 01-17-78 C O N C E P T C O S T E S T I M A T E S (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 1100 MWE PWRMET (06-17-77) POWER PLANT AT: MIDDLETOWN EXAMPLE1
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1988.000

ACCOUNT NUMBER	ACCOUNT TITLE	FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
223.5	COMBUSTIBLE GAS CONTROL SY				
223.55	PIPING	\$ 21.	\$ 44.	\$ 4.	70.
223.56	VALVES	7.	0.	0.	7.
223.57	PIPING - MISC ITEMS	2.	0.	0.	2.
223.58	INSTRUMENTATION + CONTROL	11.	1.	0.	12.
223.59	FOUNDATIONS / SKIDS	722.	52.	5.	864.
	SUBTOTAL	\$ 841.	\$ 124.	\$ 10.	\$ 975.
	SUBTOTAL	\$ 4370.	\$ 6763.	\$ 973.	\$ 12125.
224.	RADWASTE PROCESSING				
224.1	LIQUID WASTE SYSTEM				
224.11	EQUIPMENT DRAIN TRAIN	\$ 750.	\$ 613.	\$ 127.	1491.
224.12	MISC WASTE TRAIN	752.	45.	4.	801.
224.13	DETERGENT WASTE TRAIN	365.	23.	2.	389.
224.14	CHEMICAL WASTE TRAIN	0.	1.	0.	8.
224.15	STM GEN BLOWDOWN	217.	352.	190.	670.
224.16	REGEN CHEM WASTE TRAIN	1147.	350.	116.	1616.
224.17	MISC RADWASTE EQUIP	48.	14.	1.	63.
224.18	INSTRUMENTATION + CONTROL	98.	7.	1.	106.
	SUBTOTAL	\$ 3354.	\$ 1405.	\$ 354.	\$ 5113.
224.2	RAD GAS WASTE PROCESSING				
224.21	RAD GAS WASTE PROCESS SYS	\$ 858.	\$ 572.	\$ 139.	1572.
	SUBTOTAL	\$ 858.	\$ 575.	\$ 139.	\$ 1572.
224.3	SOLID WASTE SYSTEM				
224.31	SOLID WASTE PROCESSING SYS	\$ 845.	\$ 1258.	\$ 307.	2411.
224.32	VOLUME REDUCTION	229.	302.	36.	567.
	SUBTOTAL	\$ 1074.	\$ 1560.	\$ 343.	\$ 2977.
	SUBTOTAL	\$ 6016.	\$ 3608.	\$ 836.	\$ 10460.
225.	FUEL HANDLING + STORAGE				
225.1	FUEL HANDLG TOOLS + EQUIP				
225.11	CRANES + HOISTS	\$ 514.	\$ 71.	\$ 6.	591.
225.12	FUEL HANDLING TOOLS	959.	6.	0.	965.
225.13	TRANSFER SYSTEMS	128.	113.	11.	252.
	SUBTOTAL	\$ 1601.	\$ 190.	\$ 17.	\$ 1808.
225.3	SERVICE PLATFORMS				
225.32	FUEL STOR POOL SERV PLATFM	\$ 49.	\$ 15.	\$ 1.	65.
	SUBTOTAL	\$ 49.	\$ 15.	\$ 1.	\$ 65.
225.4	FUEL STOR, CLNG, + INSPEC EQ.				
225.41	NEW FUEL STORAGE RACKS	\$ 195.	\$ 76.	\$ 8.	278.
225.42	SPENT FUEL STORAGE RACKS	195.	76.	8.	278.
225.43	SPENT FUEL POOL CLG+PURIF	528.	467.	73.	1067.
225.44	INSTRUMENTATION + CONTROL	18.	2.	0.	20.
	SUBTOTAL	\$ 936.	\$ 621.	\$ 89.	\$ 1646.
	SUBTOTAL	\$ 2604.	\$ 825.	\$ 107.	\$ 3535.
226.	OTHER REACTOR PLANT EQUIP				
226.1	INERT GAS SYS				
226.11	H2/N2 GAS SUPPLY SYS	\$ 61.	\$ 89.	\$ 9.	159.
	SUBTOTAL	\$ 61.	\$ 89.	\$ 9.	\$ 159.

DATE 01-17-78 CONCEPT COST ESTIMATES (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 1100 MWE PWRMET (06-17-77 POWER PLANT AT: MIDDLETOWN EXAMPLE1
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1988.000

ACCOUNT NUMBER	ACCOUNT TITLE	FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
226.3	REACTOR MAKEUP WATER SYS				
226.31	ROTATING MACHINERY	\$ 6.	\$ 3.	\$ 0.	10.
226.33	TANKS AND PRESSURE VESSELS	0.	80.	170.	250.
226.35	PIPING	81.	226.	28.	335.
226.36	VALVES	43.	0.	0.	43.
226.37	PIPING-MISC ITEMS	4.	0.	0.	4.
226.38	INSTRUMENTATION + CONTROL	2.	1.	0.	3.
	SUBTOTAL	\$ 140.	\$ 311.	\$ 198.	\$ 648.
226.4	COOLANT TREATMENT/RECYCLE				
226.41	CHEM & VOLUME CONTROL	\$ 1122.	\$ 1613.	\$ 268.	3023.
226.42	BORON RECYCLE SYSTEM	1448.	2717.	921.	5155.
	SUBTOTAL	\$ 2570.	\$ 4330.	\$ 1279.	\$ 8178.
226.6	FLUID LEAK DETECTION SYS				
226.68	INSTRUMENTATION+CONTROL	\$ 101.	\$ 2.	\$ 0.	104.
	SUBTOTAL	\$ 101.	\$ 2.	\$ 0.	\$ 104.
226.7	AUX COOL SYS				
226.71	NUC SERV WTR SYS	\$ 1455.	\$ 2254.	\$ 1022.	4731.
226.72	PRI CMPNT COOLING WTR	2828.	3174.	423.	6395.
	SUBTOTAL	\$ 4283.	\$ 5428.	\$ 1325.	\$ 11036.
226.8	MAINTENANCE EQUIPMENT				
226.86	DECONTAMINATION EQUIPMENT	\$ 0.	\$ 0.	\$ 215.	215.
226.87	LAUNDRY EQUIPMENT	0.	0.	65.	65.
226.88	HOT CHANGE AREA	0.	0.	5.	5.
	SUBTOTAL	\$ 0.	\$ 0.	\$ 285.	\$ 285.
226.9	SAMPLING EQUIP				
226.95	PIPING	\$ 0.	\$ 53.	\$ 16.	69.
226.96	SAMPLE SYSTEM VALVES	18.	0.	0.	18.
226.97	PIPING-MISC ITEMS	1.	0.	0.	1.
226.98	INSTRUMENTATION+CONTROL	213.	20.	1.	235.
	SUBTOTAL	\$ 232.	\$ 73.	\$ 17.	\$ 323.
	SUBTOTAL	\$ 7387.	\$ 10233.	\$ 3113.	\$ 20733.
227.	RX INSTRUMENTATION+CONTROL				
227.1	BENCHBOARD, PANELS + RACKS				
227.11	NSS CONTROL BOARD	\$ 656.	\$ 59.	\$ 3.	718.
227.14	REMOTE SHUTDOWN PANELS	107.	11.	1.	119.
227.15	HVAC PANELS	53.	0.	0.	59.
227.16	RADWASTE PANELS + RACKS	243.	24.	1.	248.
227.17	LOCAL PANELS + CABINETS	213.	23.	1.	237.
227.18	INSTRUMENT RACKS	281.	41.	2.	324.
	SUBTOTAL	\$ 1533.	\$ 163.	\$ 9.	\$ 1704.
227.2	PROCESS COMPUTER	1836.	574.	55.	2464.
227.3	MONITORING SYSTEMS				
227.31	RADIOLOGICAL MON+DATA MNG	\$ 586.	\$ 63.	\$ 3.	653.
227.32	NEUTRON MONITORING SYSTEM	706.	38.	2.	746.
227.33	POST ACCIDENT MONITOR	35.	0.	0.	85.
227.34	REACTOR DIAGNOSTIC SYSTEM	280.	30.	1.	312.
227.35	CONTAINMENT ATMOSPHERE MON	128.	14.	1.	143.
227.36	CONTAINMENT LEAK MONITOR	64.	7.	1.	72.
227.37	FAILED FUEL DETECTION	28.	7.	1.	62.
	SUBTOTAL	\$ 1957.	\$ 159.	\$ 10.	\$ 2076.

DATE 01-17-78 CONCEPT COST ESTIMATES (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 1100 MWE PWRMET (06-17-77) POWER PLANT AT: MIDDLETOWN EXAMPLE1
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1988.000

ACCOUNT NUMBER	ACCOUNT TITLE	FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
227.4	PLANT CONTROL SYSTEMS				
227.41	REACTOR POWER CONTROL	\$ 513.	\$ 28.	\$ 3.	564.
227.42	REACTOR PROTECTION SYSTEM	640.	15.	3.	678.
227.43	ENGR SAFETY FEATURE ACTUAT	373.	23.	2.	398.
	SUBTOTAL	\$ 1546.	\$ 86.	\$ 9.	\$ 1640.
227.5	RX PLANT I+C TUBING+FITTING	125.	43.	4.	172.
	SUBTOTAL	\$ 6946.	\$ 1025.	\$ 36.	\$ 8057.
228.	REACTOR PLANT MISC ITEMS				
228.1	MISC SUSPENSE ITEMS				
228.11	FINAL ALIGNMENT+CHECKING	\$ 0.	\$ 976.	\$ 59.	1035.
228.12	FIELD PAINTING	0.	270.	113.	383.
228.13	QUALIFICATION OF WELDERS	0.	111.	48.	159.
	SUBTOTAL	\$ 0.	\$ 1357.	\$ 221.	\$ 1577.
228.2	STANDARD NSSS VALVE PKG	1599.	0.	0.	1599.
228.3	REACTOR PLANT INSULATION				
228.31	PIPE INSULATION	\$ 0.	\$ 404.	\$ 800.	1205.
228.32	EQUIPMENT INSULATION	0.	75.	248.	322.
228.33	NSSS INSULATION	0.	236.	804.	1040.
	SUBTOTAL	\$ 0.	\$ 715.	\$ 1852.	\$ 2567.
	SUBTOTAL	\$ 1599.	\$ 2072.	\$ 2072.	\$ 5743.
	SUBTOTAL FOR ACCOUNT	\$ 102947.	\$ 31373.	\$ 9848.	\$ 144163.
	CONTINGENCY (10.0%EQP-10.0%LABOR-10.0%MTL) . . .	10295.	3137.	985.	14417.
	TOTAL FOR ACCOUNT 22	\$ 113242.	\$ 4510.	\$ 10833.	\$ 158585.

DATE 01-17-78 CONCEPT COST ESTIMATES (PHASE D)
 UNIT 1 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 1100 MWE PWRMET (06-17-77) POWER PLANT AT: MIDDELTOWN EXAMPLE1
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1986.000

ACCOUNT NUMBER	ACCOUNT TITLE	FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
23.	TURBINE PLANT EQUIPMENT				
231.	TURBINE GENERATOR				
231.1	TURBINE GENERATOR +ACCESSRY				
231.11	TURBINE FACTORY COST	\$ 56335.	\$ 0.	\$ 0.	56335.
231.12	OTHER TURBINE COSTS	0.	2921.	262.	3183.
	SUBTOTAL	\$ 56335.	\$ 2921.	\$ 262.	\$ 59498.
231.2	FOUNDATIONS				
231.21	T-G PEDESTAL	0.	151.	822.	2403.
	SUBTOTAL	\$ 0.	\$ 151.	\$ 822.	\$ 2403.
231.4	LUBRICATING OIL SYSTEM				
231.43	TANKS + PRESSURE VESSELS	0.	5.	25.	29.
231.45	PIPING	3.	24.	4.	31.
231.46	VALVES	25.	0.	0.	25.
231.47	PIPING-MISC. ITEMS	1.	0.	0.	1.
231.48	INSTRUMENTATION + CONTROL	11.	1.	0.	12.
231.49	SKIDS / FOUNDATIONS	112.	41.	84.	241.
	SUBTOTAL	\$ 156.	\$ 90.	\$ 93.	\$ 339.
231.5	GAS SYSTEMS				
231.51	HYDROGEN STORAGE SYSTEM	103.	92.	9.	203.
231.52	CARBON DIOXIDE STORAGE SYS	67.	62.	5.	134.
	SUBTOTAL	\$ 169.	\$ 154.	\$ 14.	\$ 337.
231.6	MSTR SEPRTR/KEHTR DRAIN SYS				
231.63	TANKS + PRESS. VESSELS	96.	18.	2.	117.
231.65	PIPING	537.	1196.	113.	1846.
231.66	VALVES	661.	0.	0.	661.
231.67	PIPING-MISC. ITEMS	108.	0.	0.	108.
231.68	INSTRUMENTATION + CONTROL	29.	2.	0.	31.
	SUBTOTAL	\$ 1510.	\$ 1216.	\$ 116.	\$ 2762.
	SUBTOTAL	\$ 58090.	\$ 5872.	\$ 1377.	\$ 65339.
233.	CONDENSING SYSTEMS				
233.1	CONDENSER EQUIPMENT				
233.12	HEAT TRANSFER EQUIPMENT	6287.	1492.	142.	7927.
	SUBTOTAL	\$ 6287.	\$ 1498.	\$ 142.	\$ 7927.
233.2	CONDENSATE SYSTEM				
233.21	ROTATING MACHINERY	878.	99.	10.	987.
233.23	TANKS & PRESSURE VESSELS	248.	136.	13.	396.
233.25	PIPING	767.	1701.	162.	2630.
233.26	VALVES	536.	0.	0.	536.
233.27	PIPING-MISC. ITEMS	153.	0.	0.	153.
233.28	INSTRUMENTATION + CONTROL	52.	6.	0.	58.
233.29	FOUNDATIONS	0.	324.	252.	576.
	SUBTOTAL	\$ 2634.	\$ 2266.	\$ 434.	\$ 5334.
233.3	GAS REMOVAL SYSTEM				
233.31	CONDENSER GAS REMOVAL SYS.	343.	129.	13.	485.
	SUBTOTAL	\$ 343.	\$ 129.	\$ 13.	\$ 485.
233.4	TURBINE BYPASS SYSTEM				
233.41	TURBINE BYPASS SYS. EQPT.	159.	0.	0.	159.
	SUBTOTAL	\$ 159.	\$ 0.	\$ 0.	\$ 159.

DATE 01-17-78 CONCEPT COST ESTIMATES (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 1100 MWE PWRMET (06-17-77) POWER PLANT AT: MIDDLETOWN EXAMPLE1
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1988.000

ACCOUNT NUMBER	ACCOUNT TITLE	FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
233.5	CONDENSATE POLISHING	1522	615	29	2265
	SUBTOTAL	\$ 11015.	\$ 4538.	\$ 647.	\$ 16170.
234.	FEED HEATING SYSTEM				
234.1	FEEDWATER HEATERS	2142.	710.	67.	2919.
234.2	FEEDWATER SYSTEM				
234.21	ROTATING MACHINERY	\$ 1841.	\$ 250.	\$ 24.	2114.
234.25	PIPING	1695.	4003.	360.	6077.
234.26	VALVES	1639.	0.	0.	1639.
234.27	PIPING-MISC. ITEMS	328.	0.	0.	328.
234.28	INSTRUMENTATION + CONTROL	62	7	0	69
	SUBTOTAL	\$ 5565.	\$ 4259.	\$ 403.	\$ 10228.
234.3	EXTRACTION STEAM SYSTEM				
234.35	PIPING	\$ 311.	\$ 691.	\$ 65.	1067.
234.36	VALVES	421.	0.	0.	421.
234.37	PIPING-MISCELLANEOUS	62.	0.	0.	62.
234.38	INSTRUMENTATION + CONTROL	28	3	0	32
	SUBTOTAL	\$ 831.	\$ 694.	\$ 65.	\$ 1590.
234.4	FWH VENT + DRAIN SYSTEM				
234.41	ROTATING MACHINERY	\$ 211.	\$ 27.	\$ 2.	240.
234.43	TANKS + PRESSURE VESSELS	0.	18.	85.	103.
234.45	PIPING	253.	560.	33.	866.
234.46	VALVES	223.	0.	0.	223.
234.47	PIPING-MISC. ITEMS	51.	0.	0.	51.
234.48	INSTRUMENTATION + CONTROL	20	5	0	25
	SUBTOTAL	\$ 748	\$ 622	\$ 140	\$ 1537
	SUBTOTAL	\$ 9325.	\$ 6272.	\$ 676.	\$ 16274.
235.	OTHER TURBINE PLANT EQUIP.				
235.1	MAIN VAPOR PIPING SYSTEM				
235.11	MAIN STEAM SYSTEM	\$ 4534.	\$ 7058.	\$ 667.	12260.
235.14	MAIN VAPOR PIPE WHIP RES.	1059	92	2	1152
	SUBTOTAL	\$ 5593.	\$ 7150.	\$ 676.	\$ 13418.
235.2	TURBINE AUXILIARIES				
235.21	MN STM/REHEAT VENTS + DRNS	\$ 4	\$ 23	\$ 4	31
	SUBTOTAL	\$ 4.	\$ 23.	\$ 4.	\$ 31.
235.3	TB CLOSED CLG WATER SYS				
235.31	ROTATING MACHINERY	\$ 34.	\$ 18.	\$ 2.	54.
235.32	HEAT TRANSFER EQUIPMENT	313.	11.	1.	326.
235.33	TANKS + PRESSURE VESSELS	1.	1.	0.	2.
235.35	PIPING	222.	500.	46.	770.
235.36	VALVES	398.	0.	0.	398.
235.37	PIPING-MISC. ITEMS	44.	0.	0.	44.
235.38	INSTRUMENTATION + CONTROL	12	2	0	14
	SUBTOTAL	\$ 1032.	\$ 532.	\$ 51.	\$ 1616.
235.4	DEMIN.WATER MAKE-UP SYSTEM	1115.	177.	24.	1316.
235.5	CHEMICAL TREATMENT SYSTEM	37.	9.	2.	48.

DATE 01-17-78 CONCEPT COST ESTIMATES (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 1100 MWE PWRMET (06-17-77) POWER PLANT AT: MIDDLETOWN EXAMPLE
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1988.000

ACCOUNT NUMBER	ACCOUNT TITLE	FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
235.6	NEUTRALIZATION SYSTEM				
235.61	ROTATING MACHINERY	\$ 16.	\$ 6.	\$ 1.	23.
235.63	TANKS AND PRESSURE VESSELS	42.	3.	0.	46.
235.65	PIPING	2.	5.	0.	7.
235.66	VALVES	0.	0.	0.	0.
235.67	PIPING - MISC ITEMS	0.	0.	0.	0.
	SUBTOTAL	\$ 62.	\$ 14.	\$ 1.	\$ 77.
	SUBTOTAL	\$ 7841.	\$ 7905.	\$ 758.	\$ 16504.
236.	INSTRUMENTATION + CONTROL				
236.1	PROCESS I/C EQUIPMENT				
236.11	BENCHBOARD, PANELS + RACKS	\$ 1054.	\$ 154.	\$ 13.	1221.
	SUBTOTAL	\$ 1054.	\$ 154.	\$ 13.	\$ 1221.
236.2	PROCESS COMPUTER	0.	0.	0.	0.
236.3	TURB PLT I/C TUBING	147.	40.	3.	190.
	SUBTOTAL	\$ 1252.	\$ 193.	\$ 16.	\$ 1461.
237.	TURBINE PLANT MISC ITEMS				
237.1	MISC SUSPENSE ITEMS				
237.11	PIPE	\$ 0.	\$ 112.	\$ 94.	206.
237.12	FIELD PAINTING	0.	451.	193.	644.
237.13	QUALIFICATION OF WELDERS	0.	111.	32.	143.
	SUBTOTAL	\$ 0.	\$ 674.	\$ 319.	\$ 992.
237.3	TURBINE PLANT INSULATION				
237.31	PIPE INSULATION	\$ 0.	\$ 717.	\$ 1422.	2138.
237.32	EQUIPMENT INSULATION	0.	236.	471.	707.
	SUBTOTAL	\$ 0.	\$ 953.	\$ 1892.	\$ 2845.
	SUBTOTAL	\$ 0.	\$ 1627.	\$ 2211.	\$ 3838.
SUBTOTAL FOR ACCOUNT		\$ 67471.	\$ 26377.	\$ 5685.	\$ 119532.
CONTINGENCY (10.0%EQP-10.0%LABOR-10.0%MTL) . . .		8747.	2638.	562.	11953.
TOTAL FOR ACCOUNT 23		\$ 76219.	\$ 29015.	\$ 6247.	\$ 131487.

DATE 01-17-78 C O N C E P T C O S T E S T I M A T E S (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 1100 MWE PWRMET (06-17-77) POWER PLANT AT: MIDDLETOWN EXAMPLE1
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1988.000

ACCOUNT NUMBER	ACCOUNT TITLE	FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
24.	ELECTRIC PLANT EQUIPMENT				
241.	SWITCHGEAR				
241.1	GEN EQPT SWITCHGEAR				
241.11	GEN LOAD BREAK SWITCH	\$ 769.	\$ 68.	\$ 7.	843.
241.12	GEN NEUTRAL GROUNDING EQPT	0.	51.	4.	55.
241.13	GEN CURRENT+POTENTIAL XFMR	0.	8.	1.	10.
	SUBTOTAL.	\$ 769.	\$ 127.	\$ 12.	\$ 928.
241.2	STATION SERVICE SWITCHGEAR				
241.21	MEDIUM VOLTAGE METAL CLAD	\$ 3081.	\$ 527.	\$ 48.	3656.
241.22	STATION MOTOR CONTROL CNTR	919.	309.	28.	1256.
	SUBTOTAL.	\$ 4000.	\$ 836.	\$ 76.	\$ 4912.
	SUBTOTAL.	\$ 4769.	\$ 963.	\$ 88.	\$ 5820.
242.	STATION SERVICE EQUIPMENT				
242.1	STATION SERVICE STARTUP XFMR				
242.11	UNIT AUXILIARY TRANSFORMER	\$ 541.	\$ 64.	\$ 8.	633.
242.12	RESERVE AUXILIARY XFMR	1039.	100.	9.	1148.
242.13	FOUNDATIONS FOR XFMR	0.	186.	91.	277.
	SUBTOTAL.	\$ 1580.	\$ 371.	\$ 107.	\$ 2058.
242.2	UNIT SUBSTATIONS				
242.21	LOAD CENTER SWITCHGEAR	\$ 1378.	\$ 327.	\$ 29.	1735.
242.22	LOAD CENTER TRANSFORMERS	474.	238.	22.	734.
242.23	MISCELLANEOUS XFMR	16.	13.	1.	30.
	SUBTOTAL.	\$ 1869.	\$ 578.	\$ 52.	\$ 2499.
242.3	AUXILIARY POWER SOURCES				
242.31	BATTERY SYSTEMS	\$ 210.	\$ 70.	\$ 7.	287.
242.32	EMERGENCY DIESEL GEN SYS	3964.	532.	76.	4572.
242.34	INVERTERS	190.	27.	2.	168.
	SUBTOTAL.	\$ 4364.	\$ 629.	\$ 82.	\$ 5075.
	SUBTOTAL.	\$ 7763.	\$ 1578.	\$ 244.	\$ 9585.
243.	SWITCHBOARDS				
243.1	CONTROL PANELS				
243.11	GEN+AXU POWER SYS CTRL PNL	\$ 215.	\$ 56.	\$ 5.	276.
243.14	GEN PROTECTIVE RELAY PANEL	161.	42.	3.	207.
	SUBTOTAL.	\$ 376.	\$ 98.	\$ 9.	\$ 492.
243.2	AUX. POWER & SIGNAL BOARDS				
243.21	POWER DISTRIBUTION PANEL	\$ 24.	\$ 8.	\$ 1.	33.
243.22	BATTERY CNTRL & DC DIST PNL	94.	48.	26.	199.
	SUBTOTAL.	\$ 118.	\$ 57.	\$ 27.	\$ 202.
	SUBTOTAL.	\$ 494.	\$ 154.	\$ 66.	\$ 714.
244.	PROTECTIVE EQUIPMENT				
244.1	GENRL STATION GROUND SYS				
244.11	EQUIPMENT GROUNDING SYSTEM	\$ 0.	\$ 348.	\$ 137.	484.
244.12	YARD + STRUCTURE GROUNDING	0.	320.	71.	400.
	SUBTOTAL.	\$ 0.	\$ 677.	\$ 207.	\$ 884.
244.2	FIRE DETECTION+SUPPRESSION	0.	123.	56.	180.
244.3	LIGHTNING PROTECTION	0.	30.	43.	74.

DATE 01-17-78 C O N C E P T C O S T E S T I M A T E S (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 1100 MWE PWRMET (06-17-77) POWER PLANT AT: MIDDLTOWN EXAMPLE1
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1988.000

ACCOUNT NUMBER	ACCOUNT TITLE	FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
244.4	CATHODIC PROTECTION	0.	155.	163.	318.
244.5	HEAT TRACING + FREEZE PROT	0.	267.	108.	375.
	SUBTOTAL	\$ 0.	\$ 1253.	\$ 578.	\$ 1831.
245.	ELECT.STRUC +WIRING CONTR				
245.1	UNDERGROUND DUCT RUNS				
245.11	NON-CLASS 1E DUCT BANKS	\$ 0.	\$ 502.	\$ 212.	714.
245.12	CLASS 1E DUCT BANKS	0.	223.	94.	318.
	SUBTOTAL	\$ 0.	\$ 725.	\$ 306.	\$ 1031.
245.2	CABLE TRAY	0.	3339.	1206.	4545.
245.3	CONDUIT	0.	4155.	855.	5010.
	SUBTOTAL	\$ 0.	\$ 8220.	\$ 2367.	\$ 10586.
246.	POWER & CONTROL WIRING				
246.1	GENERATOR CIRCUITS WIRING				
246.11	MAIN GENERATOR BUS DUCT	\$ 467.	228.	21.	716.
	SUBTOTAL	\$ 467.	\$ 228.	\$ 21.	\$ 716.
246.2	STATION SERVICE PWR WIRING				
246.21	HIGH VOLTAGE BUS+CABLE	\$ 0.	\$ 255.	\$ 823.	1078.
246.22	LOW VOLTAGE BUS+CABLE	0.	921.	362.	1283.
	SUBTOTAL	\$ 0.	\$ 1175.	\$ 1186.	\$ 2361.
246.3	CONTROL CABLE	0.	3989.	3036.	7025.
246.4	INSTRUMENT WIRE	0.	3553.	1649.	5202.
246.5	CONTAINMENT PENETRATIONS	543.	362.	33.	938.
	SUBTOTAL	\$ 1010.	\$ 9308.	\$ 5923.	\$ 16242.
	SUBTOTAL FOR ACCOUNT	\$ 14056.	\$ 21475.	\$ 9266.	\$ 44798.
	CONTINGENCY (10.0%EQP-10.0%LABOR-10.0%MTL) . . .	1406.	2148.	927.	4480.
	TOTAL FOR ACCOUNT 24	\$ 15461.	\$ 23623.	\$ 10193.	\$ 49278.

DATE 01-17-78 C O N C E P T C O S T E S T I M A T E S (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 1100 MWE PHRMET (06-17-77) POWER PLANT AT: MIDDLETOWN EXAMPLE1
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1988.000

ACCOUNT NUMBER	ACCOUNT TITLE	FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
25.	MISCELLANEOUS PLANT EQUIPT				
251.	TRANSPORTATION & LIFT EQPT				
251.1	CRANES & HOISTS				
251.11	TURBINE BUILDING CRANE	\$ 758.	\$ 115.	\$ 11.	894.
251.12	REACTOR CONTNMT BLDG CRANE	1274.	252.	24.	1551.
251.16	MISC. CRANES, HOISTS + MONORLS	0.	45.	91.	136.
251.17	DIESEL BUILDING CRANES	48.	2.	1.	51.
	SUBTOTAL	\$ 2089.	\$ 421.	\$ 127.	\$ 2637.
252.	AIR, WATER + STEAM SERVICE SY				
252.1	AIR SYSTEMS				
252.11	COMPRESSED AIR SYSTEM	\$ 157.	\$ 290.	\$ 51.	499.
252.12	CONTAIN BLDG INST AIR SYS	622.	62.	8.	692.
	SUBTOTAL	\$ 779.	\$ 352.	\$ 59.	\$ 1190.
252.2	WATER SYSTEMS				
252.21	SERVICE WATER SYSTEM	\$ 848.	\$ 1028.	\$ 98.	2074.
252.22	YARD FIRE PROTECTION	1127.	1936.	186.	3249.
252.24	POTABLE WATER SYSTEM	14.	87.	11.	112.
	SUBTOTAL	\$ 2089.	\$ 3051.	\$ 295.	\$ 5445.
252.3	AUXILIARY STEAM SYSTEM				
252.31	AUXILIARY BOILER SYSTEM	\$ 583.	\$ 109.	\$ 11.	703.
252.32	AUX BOILER FEEDWATER SYS	31.	15.	1.	47.
252.33	AUX FUEL OIL SYSTEM	0.	10.	2.	19.
252.34	AUX DEAR + MAKEUP SYSTEM	30.	17.	1.	48.
252.35	AUX CHEM FEED SYSTEM	12.	8.	2.	22.
252.36	AUX. STEAM + CONDENSATE RETRN	15.	22.	2.	39.
252.38	AUX BOILER BLOWDOWN	10.	3.	0.	13.
252.39	AUX STEAM SYS COMPLETE I+C	92.	9.	0.	101.
	SUBTOTAL	\$ 779.	\$ 194.	\$ 20.	\$ 992.
252.4	PLANT FUEL OIL SYSTEM				
252.43	TANKS AND PRESSURE VESSELS	\$ 43.	\$ 54.	\$ 5.	102.
252.49	FOUNDATIONS/SKIDS	0.	38.	12.	50.
	SUBTOTAL	\$ 43.	\$ 92.	\$ 17.	\$ 152.
	SUBTOTAL	\$ 3790.	\$ 3689.	\$ 391.	\$ 7780.
253.	COMMUNICATIONS EQUIPMENT				
253.1	LOCAL COMMUNICATIONS SYS				
253.11	GEN. PURPOSE TELEPHONE SYS	\$ 0.	\$ 42.	\$ 39.	81.
253.15	PA + INTERCOM SYS.	0.	177.	118.	294.
	SUBTOTAL	\$ 0.	\$ 219.	\$ 156.	\$ 375.
253.2	SIGNAL SYSTEMS				
253.21	FIRE DETECTION SYSTEM	\$ 261.	\$ 28.	\$ 2.	290.
253.22	SECURITY SYSTEM	782.	84.	8.	874.
	SUBTOTAL	\$ 1043.	\$ 111.	\$ 10.	\$ 1164.
254.	FURNISHINGS + FIXTURES				
254.1	SAFETY EQUIPMENT				
254.11	PORTABLE FIRE EXTINGUISHERS	\$ 0.	\$ 2.	\$ 10.	12.
	SUBTOTAL	\$ 0.	\$ 2.	\$ 10.	\$ 12.

DATE 01-17-78 CONCEPT COST ESTIMATES (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 1100 MWE PWRMET (06-17-77) POWER PLANT AT: MIDDLETOWN EXAMPLE1
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1988.000

ACCOUNT NUMBER	ACCOUNT TITLE	FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
254.2	CHEMICAL LAB + INSTR SHOP				
254.22	INSTRUMENT SHOP APPARATUS	\$ 54.	\$ 2.	\$ 0.	56.
254.23	SPEC LAB FURNITURE+FIXTURE	108.	10.	1.	119.
	SUBTOTAL	\$ 162.	\$ 13.	\$ 1.	\$ 175.
254.3	OFFICE EQUIP+FURNISHINGS				
254.31	OFFICE FURNITURE	\$ 120.	\$ 0.	\$ 0.	120.
	SUBTOTAL	\$ 120.	\$ 0.	\$ 0.	\$ 120.
254.4	CHANGE ROOM EQUIPMENT				
254.41	LOCKERS+BENCHES	\$ 19.	\$ 1.	\$ 0.	21.
	SUBTOTAL	\$ 19.	\$ 1.	\$ 0.	\$ 21.
254.5	ENVIRONMENT MONIT EQUIP				
254.51	OFF SITE RADIOLOGICAL MONIT	\$ 192.	\$ 10.	\$ 1.	203.
254.52	METEOROLOGICAL MONIT.EQUIP	104.	11.	1.	117.
254.53	WATER QUALITY MONITORING	54.	6.	1.	61.
254.54	THERMAL EFFLUENT MONITOR	32.	3.	0.	36.
254.55	SEISMIC MONITORING	43.	5.	0.	48.
	SUBTOTAL	\$ 425.	\$ 36.	\$ 3.	\$ 464.
254.6	DINING FACILITIES				
254.61	CAFETERIA EQUIPMENT	\$ 128.	\$ 52.	\$ 5.	225.
	SUBTOTAL	\$ 128.	\$ 52.	\$ 5.	\$ 225.
	SUBTOTAL	\$ 924.	\$ 103.	\$ 20.	\$ 1047.
	SUBTOTAL FOR ACCOUNT	\$ 7756.	\$ 4543.	\$ 703.	\$ 13002.
	CONTINGENCY (10.0%EQP-10.0%LABOR-10.0%MTL). . .	776.	454.	70.	1300.
	TOTAL FOR ACCOUNT 25	\$ 8531.	\$ 4997.	\$ 773.	\$ 14302.

DATE 01-17-78 CONCEPT COST ESTIMATES (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 1100 MWE PWRMT (06-17-77) POWER PLANT AT: MIDDLETOWN EXAMPLE1
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1962.000
 COMMERCIAL OPERATION: 1968.000

ACCOUNT NUMBER	ACCOUNT TITLE	FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
25.	MAIN COND HEAT REJECT SYS				
251.	STRUCTURES				
251.1	MAKEUP WTR INT + DISCH STR				
251.11	INTAKE STRUCTURE	\$ 5.	\$ 297.	\$ 179.	471.
251.12	DISCHARGE STRUCTURE	\$ 0.	\$ 2.	\$ 2.	18.
	SUBTOTAL	\$ 5.	\$ 296.	\$ 187.	\$ 489.
251.2	CIRC WATER PUMP HOUSE				
251.21	BUILDING STRUCTURE	\$ 0.	\$ 676.	\$ 295.	971.
251.22	BUILDING SERVICE	\$ 29.	\$ 61.	\$ 17.	137.
	SUBTOTAL	\$ 29.	\$ 736.	\$ 312.	\$ 1108.
251.3	MAKEUP WTR PRETREATMNT BLDG				
251.31	BUILDING STRUCTURE	\$ 0.	\$ 272.	\$ 317.	589.
251.32	BUILDING SERVICES	\$ 18.	\$ 73.	\$ 18.	122.
	SUBTOTAL	\$ 18.	\$ 345.	\$ 335.	\$ 718.
251.4	CHLORINATION BUILDING				
251.41	BUILDING STRUCTURE	\$ 0.	\$ 6.	\$ 4.	10.
	SUBTOTAL	\$ 0.	\$ 6.	\$ 4.	\$ 10.
	SUBTOTAL	\$ 153.	\$ 1384.	\$ 839.	\$ 2325.
262.	MECHANICAL EQUIPMENT				
262.1	HEAT REJECTION SYSTEM				
262.11	WATER INTAKE EQUIPMENT	\$ 175.	\$ 78.	\$ 9.	261.
262.12	CIRCULATING WATER SYSTEM	4476.	1275.	245.	5996.
262.13	COOLING TOWERS	10299.	1856.	173.	12328.
262.15	MAIN CT. MAKEUP+BLOWDN SYS.	1571.	652.	126.	2349.
	SUBTOTAL	\$ 16520.	\$ 3861.	\$ 553.	\$ 20934.
	SUBTOTAL	\$ 16520.	\$ 3861.	\$ 553.	\$ 20934.
	SUBTOTAL FOR ACCOUNT	\$ 16623.	\$ 5244.	\$ 1392.	\$ 23259.
	CONTINGENCY (10.0%EQP-10.0%LABOR-10.0%MTL)	1662.	524.	139.	2326.
	TOTAL FOR ACCOUNT 26	\$ 18285.	\$ 5769.	\$ 1531.	\$ 25585.

DATE 01-17-78 C O N C E P T C O S T E S T I M A T E S (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 1100 MWE PWRMET (06-17-77) POWER PLANT AT: MIDDLETOWN EXAMPLE:
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1988.000

ACCOUNT NUMBER	ACCOUNT TITLE	FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	INITIAL
91 .	CONSTRUCTION SERVICES				
911.	TEMPORARY CONSTRUCTION FAC	\$ 0.	\$ 19218.	\$ 8560.	27779.
912.	CONSTRUCTION TOOLS & EQUIP	\$ 0.	\$ 3608.	\$ 19071.	22680.
913.	PAYROLL INSURANCE & TAXES	\$ 0.	\$ 24735.	\$ 0.	24735.
914.	PERMITS, INS. & LOCAL TAXES	\$ 0.	\$ 0.	\$ 4334.	4334.
	SUBTOTAL FOR ACCOUNT	\$ 0.	\$ 47562.	\$ 31906.	\$ 79528.
	CONTINGENCY (10.0%EQP-10.0%LABOR-10.0%MTL) . . .	0.	4756.	3197.	7953.
	TOTAL FOR ACCOUNT 91	0.	\$ 52318.	\$ 35103.	\$ 87421.

DATE 01-17-78 CONCEPT COST ESTIMATES (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 1100 MWE PWRMET (06-17-77) POWER PLANT AT: MIDDLETOWN EXAMPLE
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1988.000

ACCOUNT NUMBER	ACCOUNT TITLE	FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
92 . .	HOME OFFICE ENGRG.&SERVICE				
921.	HOME OFFICE SERVICES	\$ 49420.	\$ 0.	\$ 0.	49420.
922.	HOME OFFICE Q/A	\$ 2353.	\$ 0.	\$ 0.	2353.
923.	HOME OFFICE CONSTRCTN MGMT	\$ 1349.	\$ 0.	\$ 0.	1349.
SUBTOTAL FOR ACCOUNT.		\$ 53122.	\$ 0.	\$ 0.	\$ 53122.
CONTINGENCY (10.0%ECP-10.0%LABOR-10.0%MTL). . .		5312.	0.	0.	5312.
TOTAL FOR ACCOUNT 92		\$ 58434.	\$ 0.	\$ 0.	\$ 58434.

DATE 01-17-78 C O N C E P T C O S T E S T I M A T E S (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 1100 MWE PWRMET (06-17-77) POWER PLANT AT: MIDDLETOWN EXAMPLE1
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1976.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1988.000

ACCOUNT NUMBER	ACCOUNT TITLE	FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
93 .	FIELD OFFICE ENGR&SERVICE				
931.	FIELD OFFICE EXPENSES	\$ 3216.	\$ 0.	\$ 0.	3216.
932.	FIELD JOB SUPERVISION	\$ 19718.	\$ 0.	\$ 0.	19718.
933.	FIELD QA/QC	\$ 4813.	\$ 0.	\$ 0.	4813.
934.	PLANT STARTUP & TEST	\$ 2932.	\$ 0.	\$ 0.	2932.
	SUBTOTAL FOR ACCOUNT	\$ 30678.	\$ 0.	\$ 0.	\$ 30678.
	CONTINGENCY (10.0%EJP-10.0%LABOR-10.0%MTL) . . .	3068.	0.	0.	3068.
	TOTAL FOR ACCOUNT 93	\$ 33745.	\$ 0.	\$ 0.	\$ 33745.

DATE 01-17-78 CONCEPT COST ESTIMATES (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 1100 MWE PWRMET (06-17-77) POWER PLANT AT: MIDDLETOWN EXAMPLE1
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1988.000

ACCOUNT NUMBER	ACCOUNT TITLE	FACTORY EQUIPMENT	SITE LABOR	SITE MATERIALS	TOTAL
94.	OWNER'S COSTS				
941.	ENGINEERING & QA	\$ 6432.	\$ 0.	\$ 0.	6432.
942.	TAXES & INSURANCE	\$ 15009.	\$ 0.	\$ 0.	15009.
943.	SPARE PARTS	\$ 6432.	\$ 0.	\$ 0.	6432.
944.	STAFF TRAINING	\$ 4288.	\$ 0.	\$ 0.	4288.
945.	OWNER'S G&A	\$ 12865.	\$ 0.	\$ 0.	12865.
SUBTOTAL FOR ACCOUNT		\$ 45027.	\$ 0.	\$ 0.	\$ 45027.
CONTINGENCY (10.0%EQP-10.0%LABOR-10.0%MTL)		4503.	0.	0.	4503.
TOTAL FOR ACCOUNT 94.		\$ 49530.	\$ 0.	\$ 0.	\$ 49530.

DATE 01-17-78 CONCEPT COST ESTIMATES (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 1100 MWE PWRMET (06-17-77) POWER PLANT AT: MIDDLETOWN EXAMPLE1
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1988.000

DATE 01-17-78 CONCEPT COST ESTIMATES (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 1100 MWE PWRMET (06-17-77) POWER PLANT AT: MIDDLETOWN EXAMPLE:
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1988.000

CUMULATIVE CASH FLOW

BOTH THE CASH FLOW CURVE SHOWN ABOVE AND THE FOLLOWING CASH FLOW TABLE
 HAVE COSTS EXPRESSED AS TOTAL COST INCURRED TO DATE (INCLUDING INTEREST CHARGES TO DATE).

DATE	COST TO DATE (MILLIONS OF DOLLARS)
1978.000	0.0
1978.200	2.903
1978.400	2.953
1978.600	4.003
1978.800	4.073
1979.000	5.550
1979.200	7.427
1979.400	7.556
1979.600	10.837
1979.800	11.026
1980.000	14.806
1980.200	20.442
1980.400	20.798
1980.600	27.370
1980.800	27.846
1981.000	35.622
1981.200	44.882
1981.400	45.663
1981.600	57.051
1981.800	69.462
1982.000	83.553
1982.200	98.841
1982.400	118.893
1982.600	172.193
1982.800	205.965
1983.000	243.441
1983.200	281.493
1983.400	348.579
1983.600	404.803
1983.800	473.692
1984.000	539.944
1984.200	620.180
1984.400	672.684
1984.600	728.833
1984.800	685.180
1985.000	952.605
1985.200	1030.707
1985.400	1070.705
1985.600	1107.603
1985.800	1144.282
1986.000	1199.434
1986.200	1218.631
1986.400	1276.552
1986.600	1309.192
1986.800	1350.343
1987.000	1361.622
1987.200	1415.284
1987.400	1448.986
1987.600	1482.988
1988.000	1545.114

D A I A _ _ C A R D _ _ C O L U M N S _ _ L S E _ D

1--4	6-----13	15-----30	32----39	41-----47	48-----54	55-----61	62--66	68	70	72	74	76	78	80
MWE	MODEL	CITY	EXTRA	ID YR SSS	YR PER	YR CUP	8 INT	ILAZ	IFLAG	IUF	DESC	IOS	IAC	ISTACK

800 COALSMET MIDDLETOWN
 &CONOPT YFIRST=1957.,
 &END

EXAMPLE2 1978.000 1982.000 1986.000 9.000 1 1 1 0 1 1 2

LIST OF REPEATED CONOPT DATA FROM ICON FILE

&CONOPT YFIRST=1967.,
 &END

DATE 01-17-78 C O N C E P T C O S T E S T I M A T E S (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT SUMMARY (MILLIONS OF DOLLARS)
 800 MWE COALSMET (01-11-78) POWER PLANT AT MIDDLETOWN EXAMPLE2
 CUST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE
 DESIGN & CONSTRUCTION PERIOD: STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1986.000

ACCOUNT NUMBER	A C C O U N T I T L E	TOTAL COSTS	EQUIPMENT COSTS	LABOR MANHOURS	MATERIAL COSTS
20 .	LAND AND LAND RIGHTS	2	0.0 (0.0)	0.0	2.160
21 .	STRUCTURES + IMPROVEMENTS	46	2.476 (1.200)	17.651	26.151
22 .	BOILER PLANT EQUIPMENT	144	90.058 (2.598)	39.394	14.330
23 .	TURBINE PLANT EQUIPMENT	78	58.420 (1.013)	15.448	3.917
24 .	ELECTRIC PLANT EQUIPMENT	36	8.452 (1.083)	16.879	9.713
25 .	MISCELLANEOUS PLANT EQUIPMENT	10	5.151 (0.222)	3.410	0.845
26 .	MAIN COND HEAT REJECT SYS	14	10.408 (0.208)	3.128	1.026
	SUBTOTAL	330	176.265 (6.324)	95.891	58.172
			7.905 MANHOURS/KW		
91 .	CONSTRUCTION SERVICES	45			
92 .	HOME OFFICE ENGRG.&SERVICE	14			
93 .	FIELD OFFICE ENGRG.&SERVICE	12			
94 .	OWNER'S COSTS	34			
	SUBTOTAL	105			
	DIRECT & INDIRECT COSTS (\$ 544/KW)	435			
	CONTINGENCY ALLOWANCE	43			
		=====			
	TOTAL DIRECT & INDIRECT COSTS (\$ 598/KW)	478			
	ESCALATION DURING CONSTRUCTION (8.001%/YR)	242			
	TOTAL ESCALATED DIRECT & INDIRECT COSTS (\$ 900/KW)	720			
		=====			
	INTEREST DURING CONSTRUCTION COMPOUND (9.000%/YR)				
	ON DIRECT & INDIRECT COSTS	130			
	ON ESCALATION DURING CONSTRUCTION	52			
	TOTAL INTEREST DURING CONSTRUCTION (\$ 236/KW)	189			
		=====			
	TOTAL PLANT CAPITAL INVESTMENT (\$ 1136/KW)	909			

WEIGHTED AVERAGE ESCALATION (%/YR)
 EQUIPMENT 8.000
 LABOR 8.000
 MATERIAL 8.000

DATE 01-17-78 CONCEPT COST ESTIMATES (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 300 MWE COALSMET(01-11-78) POWER PLANT AT: MIDDLETOWN EXAMPLE2
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1986.000

DATE 01-17-78 CONCEPT COST ESTIMATES (PHASE 5)
 UNIT 1 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 800 MWE COALSMET(01-11-78) POWER PLANT AT: MIDDLETOWN EXAMPLE2
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1982.000
 COMMERCIAL OPERATION: 1986.000

CUMULATIVE CASH FLOW

BOTH THE CASH FLOW CURVE SHOWN ABOVE AND THE FOLLOWING CASH FLOW TABLE
 HAVE COSTS EXPRESSED AS TOTAL COST INCURRED TO DATE (INCLUDING INTEREST CHARGES TO DATE).

DATE	COST TO DATE (MILLIONS OF DOLLARS)
1978.000	0.0
1978.160	0.0
1978.320	2.868
1978.480	2.908
1978.640	2.948
1978.800	2.989
1978.960	3.031
1979.120	3.073
1979.280	4.373
1979.440	4.433
1979.600	4.495
1979.760	4.557
1979.920	4.621
1980.080	4.685
1980.240	8.611
1980.400	8.731
1980.560	8.852
1980.720	8.975
1980.880	9.099
1981.040	9.226
1981.200	25.965
1981.360	26.326
1981.520	26.691
1981.680	27.062
1981.840	27.438
1982.000	31.522
1982.160	56.915
1982.320	91.187
1982.480	118.605
1982.640	148.843
1982.800	182.898
1982.960	210.031
1983.120	266.351
1983.280	335.991
1983.440	392.932
1983.600	443.441
1983.760	496.405
1983.920	525.569
1984.080	610.197
1984.240	653.721
1984.400	695.501
1984.560	729.555
1984.720	753.703
1984.880	773.477
1985.040	807.288
1985.200	827.618
1985.360	846.753
1985.520	864.020
1985.680	880.390
1986.000	909.295

D_A_I_A---C_A_R_D---C_O_L_U_M_N_S---U_S_E_D

1--4	6-----13	15-----30	32-----39	41-----47	48-----54	55-----61	62-----68	69	70	72	74	76	78	80
MWE	MODEL	CITY	EXTRA ID	YR SSS	YR PER	YR COP	% INT	ILAZ	IFLAG	IOF	IESC	IDS	IAC	ISTACK

800	COAL2SMT	MIDDLETOWN		1978.000	1984.000	1988.00	9.000	2	1	1	0	2	1	0
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LIST OF REPEATED CONOPT DATA FROM ICON FILE

&CONOPT YFIRST=1967.,
&END

DATE 01-17-78 CONCEPT COST ESTIMATES (PHASE 5)
 UNIT 2 CAPITAL INVESTMENT SUMMARY (MILLIONS OF DOLLARS)
 800 MWE COAL2SMT () POWER PLANT AT MIDDLETOWN
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE
 DESIGN & CONSTRUCTION PERIOD: STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1984.000
 COMMERCIAL OPERATION: 1988.000

CUNIV CALLED - DATA FIT DONE ON USA

MIDDLETOWN

INPUT CARDS TO PRODUCE TIME DEPENDENT ESCALATION RATES

1.08	1.08	1.08	1.08	1.08	1.08	1.08
1.08	1.08	1.08	1.08	1.08	1.08	1.08
1.08	1.08	1.08	1.08	1.08	1.08	1.08
1.08	1.08	1.08	1.08	1.08	1.08	1.08
1.08	1.08	1.08	1.08	1.08	1.08	1.08
1.08	1.08	1.08	1.08	1.08	1.08	1.08

1977.00

-1.

SITE RATE AND ESCALATION USED IN COST PROJECTIONS

YFIRST = 1967.00 YLAST = 1977.50

ACCT	20	ACCT	21	ACCT	22	ACCT	23	ACCT	24	ACCT	25	ACCT	26	ACCT	27	ACCT	28	ACCT	29	ACCT	30
A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
*****		*****		*****		*****		*****		*****		*****		*****		*****		*****		*****	
				1978.000																	
E212.4	1.080	212.4	1.080	212.4	1.080	212.4	1.080	212.4	1.080	212.4	1.080	212.4	1.080	212.4	1.080	198.9	1.080	198.9	1.080	198.9	1.080
L14.70	1.080	14.70	1.080	15.16	1.080	15.24	1.080	15.58	1.080	15.31	1.080	14.87	1.080	14.63	1.080	15.05	1.080	15.05	1.080	15.05	1.080
M1080.	1.080	24.53	1.080	24.53	1.080	24.53	1.080	24.53	1.080	24.53	1.080	24.53	1.080	24.53	1.080	24.53	1.080	24.53	1.080	24.53	1.080

DATE 01-17-78 CONCEPT COST ESTIMATES (PHASE 5)
 UNIT 2 CAPITAL INVESTMENT SUMMARY (MILLIONS OF DOLLARS)
 800 MWE COAL2SMT (01-11-78) POWER PLANT AT MIDDLETOWN
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE
 DESIGN & CONSTRUCTION PERIOD: STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1984.000
 COMMERCIAL OPERATION: 1988.000

ACCOUNT NUMBER	ACCOUNT TITLE	TOTAL COSTS	EQUIPMENT COSTS	LABOR MANHOURS	MATERIAL COSTS
20 .	LAND AND LAND RIGHTS	0	0.0	(0.0)	0.0
21 .	STRUCTURES + IMPROVEMENTS	40	2.131	(1.032)	15.180
22 .	BOILER PLANT EQUIPMENT	141	88.257	(2.546)	38.610
23 .	TURBINE PLANT EQUIPMENT	76	57.248	(0.993)	15.142
24 .	ELECTRIC PLANT EQUIPMENT	30	7.520	(0.909)	14.178
25 .	MISCELLANEOUS PLANT EQUIPT	6	3.635	(0.131)	2.014
26 .	MAIN COND HEAT REJECT SYS	14	10.016	(0.204)	3.046
	SUBTOTAL	307	168.796	(5.815)	88.169
				7.269	MANHOURS/KW
91 .	CONSTRUCTION SERVICES	30			
92 .	HQME OFFICE ENGRG.&SERVICE	7			
93 .	FIELD OFFICE ENRG&SERVICE	9			
94 .	OWNER'S COSTS	23			
	SUBTOTAL	68			
	DIRECT & INDIRECT COSTS	(\$ 465/KW)	375		
	CONTINGENCY ALLOWANCE		38		
			=====		
	TOTAL DIRECT & INDIRECT COSTS	(\$ 516/KW)	413		
	ESCALATION DURING CONSTRUCTION	(8.002%/YR)	303		
	TOTAL ESCALATED DIRECT & INDIRECT COSTS	(\$ 895/KW)	716		
			=====		
	INTEREST DURING CONSTRUCTION COMPOUND	(9.000%/YR)			
	ON DIRECT & INDIRECT COSTS		119		
	ON ESCALATION DURING CONSTRUCTION		81		
	TOTAL INTEREST DURING CONSTRUCTION	(\$ 250/KW)	200		
			=====		
	TOTAL PLANT CAPITAL INVESTMENT	(\$ 1145/KW)	916		

WEIGHTED AVERAGE ESCALATION (%/YR)
 EQUIPMENT 8.000
 LABOR 8.000
 MATERIAL 8.000

DATE 01-17-78 C O N C E P T C O S T E S T I M A T E S (PHASE 2)
 UNIT 2 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 800 MWE COAL2SMT(01-11-78) POWER PLANT AT: MIDDLETOWN
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1984.000
 COMMERCIAL OPERATION: 1988.000

DATE 01-17-78 CONCEPT COST ESTIMATES (PHASE 5)
 UNIT 2 CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 800 MWE COAL2SMT(01-11-78) POWER PLANT AT: MIDDLETOWN
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1984.000
 COMMERCIAL OPERATION: 1988.000

CUMULATIVE CASH FLOW

BOTH THE CASH FLOW CURVE SHOWN ABOVE AND THE FOLLOWING CASH FLOW TABLE
 HAVE COSTS EXPRESSED AS TOTAL COST INCURRED TO DATE (INCLUDING INTEREST CHARGES TO DATE).

DATE	COST TO DATE (MILLIONS OF DOLLARS)
1978.000	0.0
1978.200	0.0
1978.400	0.494
1978.600	0.503
1978.800	0.512
1979.000	0.521
1979.200	0.530
1979.400	0.539
1979.600	0.548
1979.800	1.542
1980.000	1.568
1980.200	1.596
1980.400	1.623
1980.600	1.652
1980.800	1.680
1981.000	1.709
1981.200	4.638
1981.400	4.719
1981.600	4.801
1981.800	4.884
1982.000	4.969
1982.200	5.055
1982.400	5.143
1982.600	17.175
1982.800	17.473
1983.000	17.777
1983.200	18.086
1983.400	18.401
1983.600	18.721
1983.800	33.486
1984.000	61.383
1984.200	95.663
1984.400	119.923
1984.600	165.281
1984.800	216.762
1985.000	286.918
1985.200	351.484
1985.400	405.913
1985.600	485.419
1985.800	572.340
1986.000	625.490
1986.200	673.812
1986.400	713.753
1986.600	751.655
1986.800	783.045
1987.000	817.590
1987.200	837.411
1987.400	858.184
1987.600	880.201
1988.000	915.531

DATE 01-17-78 CONCEPT CLS - ESTIMATES (PHASE 5)
TOTAL CAPITAL INVESTMENT SUMMARY (MILLIONS OF DOLLARS)
1600 MWE COAL2SMT (01-11-78) POWER PLANT AT MIDDLETOWN
COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE
DESIGN & CONSTRUCTION PERIOD: STEAM SUPPLY SYSTEM PURCHASE: 1978.000
CONSTRUCTION PERMIT: 1984.000
COMMERCIAL OPERATION: 1988.000

ACCOUNT NUMBER	A.C.C.O.U.N.T	TOTAL COSTS	EQUIPMENT COSTS	MANHOURS	LABOR COSTS	MATERIAL COSTS
20 .	LAND AND LAND RIGHTS	2	0.0	(0.0)	0.0	2.160
21 .	STRUCTURES + IMPROVEMENTS	86	4.606	(2.232)	32.831	48.640
22 .	BOILER PLANT EQUIPMENT	285	178.315	(5.144)	78.004	28.378
23 .	TURBINE PLANT EQUIPMENT	154	115.667	(2.006)	30.590	7.754
24 .	ELECTRIC PLANT EQUIPMENT	65	16.471	(1.992)	31.057	17.869
25 .	MISCELLANEOUS PLANT EQUIPT	17	9.736	(0.353)	5.423	1.345
26 .	MAIN COND HEAT REJECT SYS	28	22.214	(2.412)	6.154	2.091
	SUBTOTAL	637	345.050	(12.139)	184.059	106.236
				7.587	MANHOURS/KW	
91 .	CONSTRUCTION SERVICES	75				
92 .	HQME OFFICE ENGRG.&SERVICE	21				
93 .	FIELD OFFICE ENGRG&SERVICE	21				
94 .	OWNER'S COSTS	57				
	SUBTOTAL	174				
	DIRECT & INDIRECT COSTS	(\$ 507/KW)	811			
	CONTINGENCY ALLOWANCE	81				
		=====				
	TOTAL DIRECT & INDIRECT COSTS	(\$ 558/KW)	892			
	ESCALATION DURING CONSTRUCTION	(8.001%/YR)	544			

	TOTAL ESCALATED DIRECT & INDIRECT COSTS	(\$ 898/KW)	1436			
		=====				
	INTEREST DURING CONSTRUCTION COMPOUND	(9.000%/YR)				
	ON DIRECT & INDIRECT COSTS	249				
	ON ESCALATION DURING CONSTRUCTION	140				

	TOTAL INTEREST DURING CONSTRUCTION	(\$ 243/KW)	349			
		=====				
	TOTAL PLANT CAPITAL INVESTMENT	(\$ 1141/KW)	1825			

WEIGHTED AVERAGE ESCALATION (4/YR)

EQUIPMENT	LABOR	MATERIAL
8.00%	8.00%	8.00%

8.00%

DATE 01-17-78 C O N C E P T C O S T E S T I M A T E S (PHASE 5)
 TOTAL CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 1600 MWE COAL2SMT(01-11-78) POWER PLANT AT: MIDDLETOWN
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1984.000
 COMMERCIAL OPERATION: 1988.000

	1978.0	1981.0	1984.0	1987.0	1990.0	
	+	+	+	+	+	
	1900	+				+ 1900
	1800	+		***		+ 1800
C	-			*****		-
A	1700	+		*****		+ 1700
P	-			*****		-
I	1600	+		*****		+ 1600
T	-			*****		-
A	1500	+		*****		+ 1500
L	-			*****		-
	1400	+		*****		+ 1400
C	-			*****		-
O	1300	+		*****		+ 1300
S	-			*****		-
T	1200	+		*****		+ 1200
	-			*****		-
I	1100	+		*****		+ 1100
M	-			*****		-
I	1000	+		*****		+ 1000
L	-			*****		-
L	900	+		*****		+ 900
I	-			*****		-
U	800	+		*****		+ 800
N	-			*****		-
S	700	+		*****		+ 700
	-			*****		-
O	600	+		*****		+ 600
F	-			*****		-
	500	+		*****		+ 500
O	-			*****		-
U	400	+		*****		+ 400
L	-			*****		-
L	300	+		*****		+ 300
A	-			*****		-
R	200	+		*****		+ 200
S	-			*****		-
I	100	+		*****		+ 100
	-			*****		-
	0	+		*****		+ 0
	+	+	+	+	+	
	1978.0	1981.0	1984.0	1987.0	1990.0	

DATE 01-17-78 CONCEPT COST ESTIMATES (PHASE 5)
 TOTAL CAPITAL INVESTMENT DETAIL COSTS (THOUSANDS OF DOLLARS)
 1600 MWE COAL2SMT(01-11-78) POWER PLANT AT: MIDDLETOWN
 COST BASIS: YEAR OF STEAM SUPPLY SYSTEM PURCHASE

STEAM SUPPLY SYSTEM PURCHASE: 1978.000
 CONSTRUCTION PERMIT: 1984.000
 COMMERCIAL OPERATION: 1988.000

CUMULATIVE CASH FLOW

BOTH THE CASH FLOW CURVE SHOWN ABOVE AND THE FOLLOWING CASH FLOW TABLE
 HAVE COSTS EXPRESSED AS TOTAL COST INCURRED TO DATE (INCLUDING INTEREST CHARGES TO DATE).

DATE	COST TO DATE (MILLIONS OF DOLLARS)
1978.000	0.0
1978.200	0.718
1978.400	3.382
1978.600	3.441
1978.800	3.501
1979.000	3.562
1979.200	4.253
1979.400	4.957
1979.600	5.043
1979.800	6.115
1980.000	6.221
1980.200	9.225
1980.400	10.354
1980.600	10.534
1980.800	10.717
1981.000	10.903
1981.200	30.603
1981.400	31.136
1981.600	31.677
1981.800	32.228
1982.000	36.485
1982.200	70.552
1982.400	110.039
1982.600	158.446
1982.800	200.371
1983.000	241.909
1983.200	319.310
1983.400	397.097
1983.600	462.162
1983.800	537.184
1984.000	629.201
1984.200	738.504
1984.400	815.423
1984.600	900.498
1984.800	980.337
1985.000	1085.740
1985.200	1179.102
1985.400	1256.989
1985.600	1357.623
1985.800	1463.555
1986.000	1534.763
1986.200	1583.106
1986.400	1623.048
1986.600	1660.949
1986.800	1692.340
1987.000	1726.885
1987.200	1746.705
1987.400	1767.478
1987.600	1789.496
1988.000	1824.826

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