

4 IN A SERIES OF 8

4

**Commercial Electric Power
Cost Studies**

Prepared for the U.S. Nuclear
Regulatory Commission and the
U.S. Department of Energy by
United Engineers &
Constructors Inc.

**Capital Cost:
Low and High
Sulfur Coal
Plants—
800 MWe**

79 0 9040535

703207

NOTICE

This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Nuclear Regulatory Commission, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, nor assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, nor represents that its use would not infringe privately owned rights.

Available from
National Technical Information Service
Springfield, Virginia 22161
Price: Printed Copy \$11.00; Microfiche \$3.00

The price of this document for requesters outside of the North American Continent can be obtained from the National Technical Information Service.

703228

NUREG-0244 COO-2477-8

Capital Cost: Low and High Sulfur Coal Plants- 800 MWe

Commercial Electric Power Cost Studies

Prepared for the U.S. Nuclear Regulatory Commission under contract No. AT (49-24)-0351 and the U.S. Department of Energy under contract No. EY-76-C-02-2477 by United Engineers & Constructors Inc., 30 South 17th Street, P.O. Box 8223, Philadelphia, Pa. 19101

4 VOL. 3 of 3

703229

- 1 Capital Cost: Pressurized Water Reactor Plant
NUREG-0241, COO-2477-5

- 2 Capital Cost: Boiling Water Reactor Plant
NUREG-0242, COO-2477-6

- 3 Capital Cost: High and Low Sulfur Coal
Plants—1200 MWe
NUREG-0243, COO-2477-7

- 4 **Capital Cost: Low and High Sulfur Coal
Plants—800 MWe** Volume 3 of 3
NUREG-0244, COO-2477-8

- 5 Capital Cost Addendum: Multi-Unit Coal and
Nuclear Stations
NUREG-0245, COO-2477-9

- 6 Fuel Supply Investment Cost: Coal and Nuclear
NUREG-0246, COO-2477-10

- 7 Cooling Systems Addendum: Capital and Total
Generating Cost Studies
NUREG-0247, COO-2477-11

- 8 Total Generating Costs: Coal and Nuclear Plants
NUREG-0248, COO-2477-12

INDEX

703231

POOR
ORIGINAL

COMMERCIAL ELECTRIC POWER COST STUDY
LOW AND HIGH SULFUR COAL PLANTS - 800 MWe

INDEX

VOLUME III 794 MWe High Sulfur Coal Plant

Legal Notice	i
Preface	ii
Acknowledgements	iii
Table List	iv
Drawing List	v

Section

7. Summary of High Sulfur Coal Plant	7
7.1 Introduction	
7.2 Major Study Ground Rules	
7.3 Cost Summary	
7.4 Comparison with Low Sulfur Coal Plant	

Section

8. Plant Description	8
8.1 Introduction	
8.2 Plant Design Criteria	
8.3 Plant Design Description	
8.4 Construction Support Activities	
9. Cost Estimate	9
9.1 Introduction	
9.2 Cost Estimate Exclusions	
Total Base Construction Cost	
10. Drawings	10
11. Equipment List	11
12. Site Description	12

LEGAL NOTICE

This report was prepared under the joint funding of ERDA (Contract No. EY-76-C-02-2477) and NRC (Contract No. AT(49-24)-0351). Volumes I and II were prepared under the ERDA contract and Volume III under the NRC contract. Neither the United States Government or any agency thereof, nor any person acting on behalf of the United States Government

- a. Makes any warranty or representation, expressed or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this report, or that the use of any information, apparatus, method or process disclosed in this report may not infringe privately owned rights, or,
- b. Assumes any liabilities with respect to the use of or for damage resulting from the use of, any information, apparatus, method, or process disclosed in this report.

As used in the above "person acting on behalf of the United States Government" includes any employee or contractor thereof or any employee of such contractor to the extent that such employee prepares, disseminates, or provides access to, any information pursuant to his employment or contract with the United States Government, or his employment with such contractor.

703233

PREFACE

This Commercial Electric Power Cost Study for 800 MWe (Nominal) low and high sulfur coal plants consists of three volumes. The low sulfur coal plant is described in Volumes I and II, while Volume III describes the high sulfur coal plant.

The design basis and cost estimate for the 801 MWe low sulfur coal plant is presented in Volume I and the drawings, equipment list and site description are contained in Volume II.

The design basis, drawings and summary cost estimate for a 794 MWe high sulfur coal plant are presented in Volume III. This information was developed by redesigning the low sulfur sub-bituminous coal plant for burning high sulfur bituminous coal. The reference design includes a lime flue gas desulfurization system.

These coal plants utilize a mechanical draft (wet) cooling tower system for condenser heat removal. Costs of alternate cooling systems are provided in Report No. 7 in this series of studies of costs of commercial electrical power plants.

703234

ACKNOWLEDGEMENTS

The information used in the preparation of this report was obtained from various sources, including United Engineers' records and files. Special recognition is given to the following organizations who contributed specific design, performance and/or cost information.

<u>Company</u>	<u>Plant System</u>
o The Babcock & Wilcox Co.	Balanced Draft Furnace Steam Generator
o The Babcock & Wilcox Co. Wheelabrator-Frye Inc.	Electrostatic Precipitators
o General Electric Co.	Tandem Compound Steam Turbine Generators
o Marley Company	Cooling Towers
o John L. Klug Corp.	Lime Handling System
o American Standard	SO ₂ Booster Fans
o FMC	Sludge Handling Equipment

703235

TABLE LIST

794 MWe HIGH SULFUR COAL PLANT

<u>Table No.</u>	<u>Title</u>	<u>Vol. No.</u>	<u>Page No.</u>
7-1	Cost Estimate Summary - Two Digit Account Level	III	7-5
7-2	Direct Craft Labor Summary	III	7-6
8-1	Key Plant Parameters - Steam Supply System	III	8-4
8-2	Key Plant Parameters - Steam and Power Conversion System	III	8-5
8-3	Location and Extent Of Design Basis Coal Seam	III	8-6
8-4	Design Basis Coal Analysis	III	8-7
8-5	Availability Related Design Bases for the Electric Power System	III	8-76
8-6	Design Ambient Conditions for Electric Equipment	III	8-77
9-1	Cost Estimate Exclusions	III	9-3
9-2	Cost Estimate Summary - Two Digit Account Level	III	9-4
9-3	Cost Estimate Summary - Three Digit Account Level	III	9-5
9-4	Glossary of Significant Abbreviations	III	9-9

703236

DRAWING LIST

794 MWe HIGH SULFUR COAL PLANT

<u>Drawing Number</u>	<u>Title</u>
6509.002-HSC-1	Symbol Legend for Flow and Block Diagrams
6509.002-HSC-2	Plot Plan
6509.002-HSC-3	General Arrangement Plan "A-A" at 63'0" & 180'0" EL.
6509.002-HSC-4	General Arrangement Plans 18'-0" & 40'-0" EL.
6509.002-HSC-5	Flow Diagram-Balanced Draft System
6509.002-HSC-6	Steam Heat Balance Diagram (Max. Guaranteed)
6509.002-HSC-7	Flow Diagram-Main Steam, Hot Reheat and Cold Reheat System
6509.002-HSC-8	Flow Diagram-Extraction Steam System
6509.002-HSC-9	Flow Diagram-Condensate and Feedwater System
6509.002-HSC-10	Flow Diagram-Heater Drains and Vents System
6509.002-HSC-11	One Line Diagram-Unit Electrical Distribution
6509.002-HSC-12	One Line Diagram d-c Distribution System
6509.002-HSC-13	Flow Diagram-Auxiliary Steam System
6509.002-HSC-14	Flow Diagram-Coal Handling System
6509.002-HSC-15	Flow Diagram-Bottom Ash Handling System
6509.002-HSC-16	Block Diagram-Plant Fire Protection System
6509.002-HSC-17	Block Diagram-Waste Water Treatment System
6509.002-HSC-18	Block Diagram-Lime SO ₂ Scrubber System
6509.002-HSC-19	General Arrangement-Lime SO ₂ Scrubber Plan
6509.002-HSC-20	General Arrangement-Lime SO ₂ Scrubber Section

703237



7

SECTION 7
SUMMARY OF HIGH SULFUR COAL PLANT

703258

POOR
ORIGINAL

SECTION 7

SUMMARY FOR HIGH SULFUR COAL PLANT

7.1 INTRODUCTION

This Commercial Electric Power Cost Study for the 794 MWe High Sulfur Coal Plant is presented in Volume III of the three volume series. This volume contains the Legal Notice, Preface, Summary for High Sulfur Coal Plant, Plant Description, Cost Estimate, Drawings, Equipment List and Site Description.

7.2 MAJOR STUDY GROUND RULES

In addition to the "Site Description" presented in Section 12, the major criteria used in the high sulfur coal plant study are as follows:

- o The plant design incorporates a once-through supercritical pressure single reheat type steam generator to supply steam to a tandem compound four flow turbine. The heat balance shown on drawing 6509.002-HSC-6 (Volume III, Section 10) reflects steam conditions for a 800 MWe nominally rated plant.
- o Key plant parameters for the steam supply system, and the steam and power conversion system are shown in Tables 8-1 and 8-2 respectively.
- o The steam generator is designed for a high sulfur eastern coal. The coal selection criteria are discussed in Section 8.2.2. The characteristics of the design basis coal seam and the design basis coal specification are presented in Tables 8-3 and 8-4 respectively.
- o The plant coal handling system is designed to unload a 100 car coal unit train in five hours. The design provides indoor coal storage silos with a capacity sufficient for eight hours consumption at full load and an outdoor storage area with a capacity sufficient for 60 days consumption at full load.
- o The reference plant design includes a lime scrubber system for removal of sulfur dioxide (SO_2) from the flue gas.

2)

703239

- o A full complement of environmental and siting criteria circa January 1, 1976 are utilized. Structural design criteria for the major structures are addressed in Section 8.2.3.
- o The main heat rejection system incorporates mechanical draft wet cooling towers.
- o The design provides a connection to the utility grid at two different voltage levels; 500 kV for the generator connection and 230 kV for the reserve auxiliary transformer connection.
- o The cost estimate is developed for a single unit, with sufficient land area to accommodate an identical second unit.
- o The cost estimate is developed in accordance with a Code of Accounts as expanded from that presented in the USAEC Report NUS-531.
- o Cost data is based on prices effective as of July 1, 1976.
- o Escalation and interest during construction are not included in the cost estimate.
- o The plant design life is 40 years during the first part of which it will be baseloaded.

7.3 COST SUMMARY

The estimated total base construction cost for the 800 MWe (Nominal) High Sulfur Coal Plant reference design is \$335,248,353 or \$422/kW based on July 1, 1976 prices. A summary of the Cost Estimate at the two digit account level is shown in Table 7-1. The cost estimate does not include normal contingency costs for the equipment, material and labor components of the total base construction cost; nor does it include escalation and interest during construction. Other items not included in the detailed cost estimate are listed in the beginning of Section 9, Cost Estimate. As noted in the Foreword in Volume I; for a specific site, this baseline cost estimate must be adjusted for regional variations in material and labor rates, different construction schedule lengths, and escalation and interest rates incurred during construction.

703249

Table 7-2 is a summary breakdown of the direct craft labor costs and hours for this 794 MWe reference design. The total direct craft labor cost of approximately \$77,979,270 corresponds to a weighted average hourly rate of \$12.39. Approximately 6,295,000 craft labor manhours average 7.9 manhours/kW.

7.4 COMPARISON WITH LOW SULFUR COAL PLANT

The coal summary for the high sulfur coal (HSC) plant is presented in Section 7.3, Cost Summary, while the low sulfur coal (LSC) plant cost summary is shown in Section 1.3, Volume I. Significant features of each reference plant are summarized as follows:

	<u>High Sulfur</u>	<u>Low Sulfur</u>
Design Basis Coal	Eastern Bituminous	Western Sub-Bituminous
Coal Sulfur Content	3.61 percent	0.5 percent
Net Output	794 MWe	801 MWe
Base Construction Cost	\$335.2 x 10 ⁶	\$287.4 x 10 ⁶
Unit Capital Cost	\$422/kW	\$359/kW

The gross output from the turbine generator is identical (855 MWe) for both plants. The difference in net plant output between the HSC plant and the LSC plant is due to the variation in auxiliary power requirements. For the design basis coals selected, the net output of the LSC plant is 7 MWe (0.9 percent) less than the HSC plant.

Comparing total base construction costs, the differential unit capital cost between the HSC plant and the LSC plant is \$63/kW. This differential

is due primarily to the Flue Gas Desulfurization (FGD) system as determined by the coal selected for the reference designs. Higher cost differentials for other plant designs are possible depending upon the coals selected, equipment redundancy and the items included in the plant capital cost. In the FGD system for this study, one spare module is provided to backup four operating modules. This is the only major redundancy in the system. The capital cost of an off-site sludge stabilization system is included in this study. However, the cost of disposal site land and its development are not included.

The cost of the FGD system is higher than the unit capital cost differential would indicate. This is due to higher steam generator, draft system and fuel handling costs for the LSC plant, which partially compensates for the FGD system cost and reduces the differential cost between plants. Coal composition has an important effect on the cost of a coal fired plant. In any examination of capital cost for HSC and LSC plants, the coal analyses must be identified for an understanding of the basis for comparison.

Following are examples of the differences in quantities of construction materials between plants:

	<u>HSC Plant</u>	<u>LSC Plant</u>
Concrete, cu. yds.	90,700	65,900
Reinforcing Steel, lbs.	11.9 x 10 ⁶	9.0 x 10 ⁶
Structural Steel, lbs.	43.8 x 10 ⁶	35.3 x 10 ⁶

703242

TABLE 7-1
 COST ESTIMATE SUMMARY
 TWO DIGIT ACCOUNT LEVEL
 794 MWe COAL FIRED PLANT
 MIDDLETOWN, USA

09/16/77

CCST BASIS
 07/76

ACCT NO	ACCOUNT DESCRIPTION	FACTORY EQUIP. COSTS	SITE LABOR HOURS	SITE LABOR COST	SITE MATERIAL COST	TOTAL COSTS
*****	*****	*****	*****	*****	*****	*****
20 .	LAND AND LAND RIGHTS				2,000,000	2,000,000
21 .	STRUCTURES + IMPROVEMENTS	2,084,775	1196623 MH	14,065,057	21,865,139	38,014,971
22 .	BOILER PLANT EQUIPMENT	75,728,992	2581618 MH	32,449,814	11,967,198	120,146,004
23 .	TURBINE PLANT EQUIPMENT	49,109,337	1007161 MH	12,805,021	3,268,137	65,182,495
24 .	ELECTRIC PLANT EQUIPMENT	7,546,575	1080187 MH	13,252,709	8,132,414	28,931,698
25 .	MISCELLANEOUS PLANT EQUIPT	5,188,759	221988 MH	2,842,632	704,962	8,736,353
26 .	MAIN COND HEAT REJECT SYS	8,596,199	207976 MH	2,564,037	881,496	12,041,732
2 .	TOTAL DIRECT COSTS	148,254,637	6295553 MH	77,979,270	48,819,346	275,053,253
91 .	CONSTRUCTION SERVICES	11,892,000	972000 MH	10,112,500	13,213,000	35,217,500
92 .	HOME OFFICE ENGRG. & SERVICE	14,350,000				14,350,000
93 .	FIELD OFFICE ENGRG. & SERVICE	9,727,600			900,000	10,627,600
9 .	TOTAL INDIRECT COSTS	35,969,600	972000 MH	10,112,500	14,113,000	60,195,100
	TOTAL BASE COST	184,224,237	7267553 MH	\$88,091,770	\$62,932,346	335,248,353

203243

TABLE 7-2

DIRECT CRAFT LABOR SUMMARY FOR 794 MWe
HIGH SULFUR COAL PLANT - MIDDLETOWN, USA
COST BASIS - 7/76

<u>Craft Description</u>	<u>Site Labor Hours</u>	<u>% Hours</u>	<u>Site Labor Cost</u>	<u>% Cost</u>
Asbestos Worker	108,960	1.7	1,418,660	1.8
Boiler Maker	174,429	2.8	2,410,607	3.1
Bricklayer	117,843	1.9	1,344,589	1.7
Carpenter	288,614	4.6	3,347,930	4.3
Dock Builder	833	0.0	11,429	0.0
Electrician	1,285,481	20.4	15,939,959	20.4
Iron Worker	631,819	10.0	8,371,655	10.7
Laborers	443,732	7.0	4,135,585	5.3
Millwrights	126,454	2.0	1,603,28	2.1
Operating Engineers	417,788	6.6	5,213,959	6.7
Painters	203,418	3.2	1,946,710	2.5
Pipefitters	1,500,769	23.8	20,110,311	25.8
Roofers	8,126	.1	109,536	.1
Teamsters	96,018	1.5	821,919	1.1
Undefined Crafts	891,269	14.2	11,192,993	14.4
TOTAL FOR PLANT	6,295,553	100.0	\$ 77,979,270	100.0

7-6

703214

SECTION 8
PLANT DESCRIPTION

POOR
ORIGINAL

703245

1999
10/10/99

703246

SECTION 8

PLANT DESIGN DESCRIPTION

8.1 INTRODUCTION

Section 8 describes the High Sulfur Coal Plant design and the construction support activities covered by the cost estimate.

The material presented in this section is organized to correspond to the uniform system of accounts (USAEC Report NUS-531) used in the cost estimate. This format correlates the plant design description with the detailed cost estimate in Section 9 and the equipment list is in Section 11 of this Volume III. The two digit accounts used in this regard are as follows:

<u>Code of Accounts</u>		Page
21	STRUCTURES AND IMPROVEMENTS	8-10
22	BOILER PLANT EQUIPMENT	8-30
23	TURBINE PLANT EQUIPMENT	8-53
24	ELECTRIC PLANT EQUIPMENT	8-68
25	MISCELLANEOUS PLANT EQUIPMENT	8-78
26	MAIN CONDENSER HEAT REJECTION SYSTEM	8-85
91	CONSTRUCTION SERVICES	8-91
92	HOME OFFICE ENGINEERING AND SERVICES	8-92
93	FIELD OFFICE ENGINEERING AND SERVICES	8-93

A summary description is provided in this section for each major account for the high sulfur (794 MWe) coal plant. This is followed by detailed descriptions of each system and structure at the three digit account level.

The descriptions associated with Accounts 21 through 26 address the power plant design. This corresponds to the "direct cost" portion of the cost estimate. The descriptions associated with the Accounts 91 through 93 define the construction support activities. This corresponds to the "indirect cost" portion of the cost estimate. The sum of the "direct cost" and the "indirect cost" is the "total base construction cost".

The scope of the indirect cost accounts varies with utility and project. Therefore, an understanding of the definition of these accounts, provided later in this section, will avoid confusion when utilizing the cost estimates provided in this report.

8.2 PLANT DESIGN CRITERIA

8.2.1 General Study Criteria

The major criteria for the High Sulfur Coal Plant study were discussed in Section 7. The key parameters are tabulated in Tables 8-1 and 8-2 in this section. The coal selection criteria is described in Section 8.2.2. Design codes for the major structures and equipment are addressed in Section 8.2.3 and in the Equipment List (Vol. III, Section 11). The design of the heat rejection system is based upon mechanical draft wet cooling towers.

8.2.2 Coal Selection Criteria

The design of a coal fired plant is influenced by the chemical characteristics and calorific value of the coal. Therefore, a coal was selected which is the basis for the plant design.

The following criteria were used in selecting the design basis coal:

- o The coal is representative of a major eastern coal field.
- o The coal field size is large enough to reasonably expect that it will be mined for steam electric power plant fuel in the future as long as the fuel is legally burnable.
- o The sulfur content is sufficiently high to require the use of sulfur dioxide removal equipment.
- o The coal field is currently providing fuel for steam electric power plants.

The description of the location and extent of the design basis coal seam selected for this study is presented in Table 8-3. The coal analysis for the coal from this location and seam is presented in Table 8-4.

TABLE 8-1

KEY PLANT PARAMETERS - STEAM SUPPLY SYSTEM

794 MWe HIGH SULFUR COAL PLANT

Steam Generator	Supercritical pressure, single reheat with a Balanced Draft Furnace
Steam Flow	
Maximum Continuous Rating 10 ⁶ lb/hr	6.530
Normal Superheater Outlet, 10 ⁶ lb/hr	5.810
Normal Reheater Outlet 10 ⁶ lb/hr	5.188
Steam Pressure	
Superheater Outlet, psig	3,845
Reheater Outlet, psig	730
Steam Temperature	
Superheater Outlet, F	1,010
Reheater Outlet, F	1,000
Final Feedwater Temperature, F	516
Fuel Type	Eastern Bituminous Coal
Fuel Firing Rate, Ton/Hr	365
Fuel Analysis	See Table 8-4
Number of Pulverizers	6 Plus 1 Spare
Pulverizer Fuel Flow, Tons/Hr	61
Number of Forced Draft Fans	2
Total Forced Draft Fan, Capacity, scf	1,360,000
Number of Primary Air Fans	2
Total Primary Air Fan Capacity, scfm	340,000
Number of Induced Draft Fans	2
Total Induced Draft Fan Capacity, scfm	1,800,000
Number of Precipitators	2
Precipitator Efficiency, in percent	99.3

TABLE 8-2

KEY PLANT PARAMETERS - STEAM AND POWER CONVERSION SYSTEM

GUARANTEED CONDITION-794 MWe HIGH SULFUR COAL PLANT

Turbine Configuration	Tandem-Compound, 4 Flow
Steam Flow at HP Turbine Inlet, 10^6 lb/hr	5.810
Steam Pressure at HP Turbine Inlet, psia	3,512
Steam Temperature at HP Turbine Inlet, F	1,000
Turbine Back Pressure, in HgA (multi-pressure condenser)	1.7/2.5
Turbine Output, MWe	854
Auxiliary Power, MWe	60
Net Station Output, MWe	794
Number of Feedwater Heating Stages	7
Generator Rating, MVA	1,050
Net Station Steam Rate, lbs/kWhr	7.31
Net Station Heat Rate, Btu/kWhr	9,482
Thermal Efficiency, in percent	35.27

TABLE 8-3

LOCATION AND EXTENT OF DESIGN BASIS COAL SEAM
794 MWe HIGH SULFUR COAL PLANT

Coal Type: Eastern High Sulfur Bituminous Coal

Location:

State: Illinois

County: St. Clair

Seam: Illinois No. 6

Extent:

Reserves (Est.): 3,000,000,000 Tons

Current Production: 8,000,000 Tons/Year (1976)

Projected Production: 10,000,000 Tons/Year (1978)

Major Coal Users: Steam Electric Power Plants:

TABLE 8-4

DESIGN BASIS COAL ANALYSIS

794 MWe HIGH SULFUR COAL PLANT

Coal Type: Bituminous Coal	Eastern High Sulfur
Moisture (% by Wt.)	11.31
<u>Proximate Analysis (% by Wt. dry):</u>	
Volatile Matter	39.72
Fixed Carbon	48.68
Ash	11.60
<u>Ultimate Analysis (% by Wt. dry):</u>	
Carbon	69.33
Hydrogen	4.30
Nitrogen	.86
Chlorine	.04
Sulfur	3.61
Oxygen	9.64
<u>Ash Analysis (% by Wt. dry):</u>	
P ₂ O ₅	.05
SiO	45.73
Fe ₂ O ₃	18.38
Al ₂ O ₃	19.40
TiO ₂	1.30
CaO	5.50
MgO	.95
SO ₃	6.63
K ₂ O	1.53
Na ₂ O	.51
Undetermined	.02
<u>Calorific Value (Btu/lb.)</u>	
As Received	11,026
Dry	12,432
<u>Ash Fusion Temperature (°F Red./°F Ox.)</u>	
Initial	1950/2270
H = W	2140/2380
H = ½W	2160/2400
Fluid	2250/2500

8.2.3 Structural Design Criteria

The structural design criteria used for the reference plant design are summarized as follows:

Structures are designed to withstand the effects of various combinations of all normal loadings to which they are subjected in accordance with ACI 318, Building Code Requirements for Reinforced Concrete, AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings and applicable local building codes. The structures are designed for seismic effects in accordance with criteria established by the Uniform Building Code. The chimney is designed in accordance with ACI 307, Specification for the Design and Construction of Reinforced Concrete Chimneys. Coal silos are designed using 55 lbs/cu ft as the coal density for load calculations.

The loads listed below are considered in the buildings designs where applicable.

- o Dead Loads - Permanent gravity loads including concrete, structural steel, equipment, piping, cable trays and hydrostatic pressure. The ground water level is assumed at El + 10 ft - 0 in. Buoyancy from ground water is considered in building stability and base mat design.
- o Live Loads - Loads which vary with intensity and/or occurrence. During normal operation the live loads considered are a snow load of 20 psf and the lateral soil pressures. During construction live load from cranes, wet concrete and major equipment transport loads are also considered.
- o Wind Load - Wind loading is in accordance with ANSI A58.1 with a basic wind loading of 26 psf.

703254

- o Flood Loads - The plant site lies ten ft above the 100 year maximum water level of the North River. Consequently no flooding of the site is considered.
- o Seismic - Structures are designed for seismic conditions in accordance with the requirements of the Uniform Building Code.

ACCOUNT 21

8.3 PLANT DESIGN DESCRIPTION

Following are the HSC plant design descriptions for Accounts 21 through 26.

ACCOUNT 21 STRUCTURES AND IMPROVEMENTS

The steam generator, the turbine-generator and all other related equipment are housed in fully enclosed buildings. The superstructures have braced steel frames bearing on concrete footings supported on the bedrock underlying the site. Grating floors are used whenever possible to allow maximum air circulation within the building. The siding for the buildings is generally insulated metal panels with interior liner panels. Layouts of the plants are shown on the drawings in Section 10 of this Volume III. Design concepts are discussed in greater detail in the following design descriptions for the major accounts.

ACCOUNT 211 Yardwork

The plant location is the hypothetical site of Middletown U.S.A. This is defined in Section 12, Site Description of this Volume III.

The datum plane for site and yard elevations is mean river level. Main plant finish grade is 18 ft above mean river level. Soil overburden is estimated to be eight feet thick. Limestone rock with no underground cavities are located below the overburden and is satisfactory for supporting plant structures.

Site preparation consists of clearing, grubbing and stripping of top soil for structures, roads, railroads, parking areas, the materials handling area and the construction facilities. Rough grading quantities include

703256

ACCOUNT 21

the general cut and fill for the main plant structures and fine grading with landscaping.

Earth excavation, rock excavation, backfill, concrete fill and dewatering for the main plant structures are included with the structure associated yardwork. This includes all excavation work for the steam generator building and turbine heater and control building areas. Excavation work for structures not included with the main excavation are included with the structural work for each of the individual buildings. The cut and fill work also includes hauling, dumping, stockpiling, placing and compacting. For those portions of the structure below rock, concrete fill is used under and adjacent to the structure. In cases where rock elevations vary, concrete fill is used to assure that building loads are carried to competent rock.

Excavated material is used on site for general fill as much as possible. Spoil areas and storage areas are utilized for excavated material not used for fill or for top soil. Erosion and sedimentation control of those areas is practiced in accordance with EPA requirements. Temporary settling basins are provided to collect all runoff during construction prior to discharge into the North River.

Transformer area, above ground oil storage tanks and other oil or chemical storage and handling areas are designed to contain spills and collect and route surface runoff to the holding pond prior to discharge to the North River. In addition, steam generator and turbine building floor drains and other plant dirty drains are routed by underground piping to the waste

ACCOUNT 21

process building, as required, or to the holding pond for treatment before discharge into the North River.

The yard drainage system consists of a system of interceptor ditches (paved and unpaved) and storm drains with catch basins to carry storm water from developed areas. Sedimentation basins are provided during construction as required. Water courses that are intercepted near the power plant, coal storage pile, are diverted by ditches into existing stream beds or storm drains. Culverts carry stream flow under the railroad, railroad car storage yard and roads. The yard surface water drainage is directed to the North River via the existing water courses as much as possible. Building roof drainage is directed to the yard drainage system.

Surface water runoff from portions of the coal handling, flue gas desulfurization, precipitator, ash handling, and oil storage areas, together with the plant dirty drains is routed by underground piping to a holding pond and to the waste treatment system for treatment in the contaminated yard and building drainage system.

A temporary sanitary sewage system is provided during construction. Piping and toilet facilities for permanent plant requirements are provided based on permanent plant personnel requirements. All sewage receives tertiary treatment prior to discharge into the North River.

Highway access is provided to the site by five miles of secondary roads connecting to a state highway. This road is in good condition and needs no additional improvements. An onsite asphalt road is provided around

ACCOUNT 21

the main plant structures. The highway road is paved in accordance with the standard thickness required for public highways. In addition, parking areas, concrete curbs and walks are provided.

Temporary construction roads with minimum thickness paving (AASHO HS20 Loading) and unpaved roads for material handling equipment are provided. Service roads are arranged to provide access to all truck sized doors in the power plant units, to all buildings and to auxiliary structures requiring servicing or maintenance by vehicles. Paved roads for washing and refueling locomotives and mobile equipment are provided.

Railroad access to the site is provided by constructing a double track railroad spur which intersects the B&M Railroad. The spur which is five miles long from the main line to the plant site, approaches the site from the east. Anticipated railroad traffic is up to 700 cars per week in 100 car unit coal trains plus the required number of lime trains. During construction 400 to 500 cars of construction materials are delivered including the boiler components, transformers, and generator stator. These items are the heaviest loads anticipated and require special cars. A yard locomotive is provided to handle all onsite car movements.

In addition to the coal delivery loop track there are spur tracks into the turbine hall, the transformer yard, the warehouse, the fuel tank area, and the locomotive repair shop.

A temporary spur is installed to the construction yard storage area and to the boiler area for delivery and installation of the boiler headers, boiler panels and subassemblies.

ACCOUNT 21

A ladder track area, for storage of cars with bypass tracks and switches allows engine access to either end of trains being divided. This track accommodates odd lot trains of coal, lime or equipment arriving and the making up of departing trains with waste material and empty cars.

All road bed and trackage are designed in accordance with the latest railroad standards. Railroad structures are designed for Cooper E80 wheel load. g.

In addition to the above items; fencing, a gate house, and roadway and yard lighting are provided with the yardwork.

ACCOUNT 212 Steam Generator Building

The steam generator building consists of the boiler house, auxiliary boiler room, air compressor room, machine shop, diesel generator room, and forced draft fan room. The building is 141 ft wide, 280 ft long and 264 ft high at the top of the boiler, and has an overall volume of approximately 8,800,000 cu ft. A description of each of the above areas of the building is given e below.

Boiler House

The boiler house is a steel framed structure 141 ft wide and 230 ft long with two main roof heights of 162 ft for the coal silos and conveyors and 264 ft at the top of the boiler. The building volume, less the forced draft fan room, is approximately 8,300,000 cu ft. It has three main floors at elevations 18 ft, 40 ft, and 63 ft. The building is supported on reinforced concrete spread footings on rock. The reinforced concrete

ACCOUNT 21

ground floor is located at grade. The roof is cast in place concrete over metal deck, covered with a roofing membrane and supported on steel framing. The exterior walls are insulated metal siding and the interior walls are either concrete or metal partitions.

The building houses the steam generator, coal silos and pulverizers, coal conveyors, the forced draft fan room and an elevator.

Ventilation for the boiler house is provided by 16-66,600 cfm each power roof ventilators and heating is provided by 55 steam unit heaters located throughout the building.

Auxiliary Boiler Room

The auxiliary boiler room, located north west of the boiler house, is a one story steel frame structure 50 ft wide, 70 ft long and 40 ft high. The building volume is approximately 140,000 cu ft. The building substructure and superstructure are identical to that described for the boiler house. The auxiliary boiler room houses the two auxiliary boilers and their accessory equipment.

Ventilation is provided by wall exhaust fans and heating is provided by steam unit heaters.

Air Compressor Room

The air compressor room, located north of the boiler house, is a one story steel frame structure 50 ft wide, 46 ft long and 40 ft high. The building volume is approximately 92,000 cu ft. The building substructure and superstructure are identical to that described for the boiler house. The

703261

ACCOUNT 21

air compressor room houses the soot blowing air compressors, receiver and accessories; and the station air compressors, receivers, air dryers and accessories.

Ventilation is provided by wall exhaust fans and heating is provided by steam unit heaters.

Machine Shop

The machine shop, located north of the boiler house, is a one story steel framed structure 50 ft wide, 55 ft long and 40 ft high. The building volume is approximately 110,000 cu ft. The building substructure and superstructure are identical to that described for the boiler house.

The machine shop houses the machines and tools necessary to perform the required in-plant maintenance and repair of plant equipment. A monorail is installed for handling equipment.

Ventilation is provided by wall exhaust fans and heating is provided by steam unit heaters.

Diesel Generator Room

The diesel generator room, located north east of the boiler house, is a one story steel framed structure 50 ft wide, 25 ft long and 40 ft high. The building volume is approximately 50,000 cu ft. The building substructure and superstructure are identical to that described for the boiler house.

703262

ACCOUNT 21

The diesel generator room houses the two auxiliary diesel generators, air intakes for the diesel generators, and auxiliary equipment. The exhaust silencers are mounted on the roof. A monorail is installed for equipment maintenance and removal.

Ventilation is provided by wall exhaust fans and heating is provided by steam unit heaters.

Forced Draft Fan Room

The forced draft fan room, located on west side of the boiler house, is a one story steel framed structure 30 ft wide, 120 ft long and 40 ft high. The building volume is approximately 144,000 cu ft. The fan room is part of the boiler house and has a common substructure. The roof slab is cast in place concrete over acoustically treated metal deck and supported on steel framing. The exterior walls are acoustical masonry block. The walls and roof are designed to resist the differential pressure caused by the fans. Sound attenuators are installed at the air inlets in the walls, and personnel doors are pressure tight and arranged to provide an air lock. A lintel is installed in a wall to allow for equipment removal.

The fan room houses the forced draft and primary air fans, inlet silencers, combustion air steam coils and accessories. A monorail is installed for equipment maintenance and removal.

ACCOUNT 213 Turbine, Heater and Control Building

The building consists of the turbine hall, auxiliary (heater) bay, and control and switchgear building as described below.

ACCOUNT 21

Turbine Hall and Auxiliary Bay

The turbine hall and auxiliary bay are located east of the boiler house. The turbine hall is a three story (elevations 18 ft, 40 ft and 63 ft) steel framed structure 100 ft wide, 290 ft long and 115 ft high. The auxiliary bay is a five story (elevations 18 ft, 40 ft, 63 ft, 83 ft and 103 ft) steel framed structure 30 ft wide, 290 ft long and 115 ft high. The building volume is approximately 4,335,500 cu ft. The building is supported on reinforced concrete spread footings on rock. The reinforced concrete ground floor is located at grade. The mezzanine, operating and deaerator floors are reinforced slabs supported on metal deck on steel framing. The roof is concrete plank covered with a roofing membrane. The exterior walls are insulated metal siding, and the interior walls are either concrete block or metal partitions. The massive "high tuned" turbine pedestal is reinforced concrete and is supported on a thick concrete foundation mat bearing on rock. The turbine pedestal is isolated from the remaining building support loads. Structural quantities for the pedestal are shown in Account 231 of the cost estimate.

The building houses the turbine-generator, its condensers and associated equipment, feedwater heaters, boiler feed pumps and condenser, boiler feed booster pumps, condensate pumps, condensate booster pumps, condensate polishing and demineralizing equipment, turbine lube oil equipment, deaerator, other auxiliary equipment and switchgear rooms.

ACCOUNT 21

The turbine hall and auxiliary bay are cooled by eight - 75,000 cfm each power roof ventilators and heated by 24 steam unit heaters located throughout the building.

At the south end of the turbine hall is located a rail car bay for transport of generator and turbine parts. An overhead traveling crane located at the top of the building serves this bay as well as the full operating floor area. All floors are connected by several stairways.

Control and Switchgear Building

The control and switchgear building, located north of the turbine hall, is a four story (elevations 18 ft, 33 ft, 48 ft, and 63 ft) steel framed structure 120 ft wide, 50 ft long and 65 ft high. The building volume is approximately 390,000 cu ft. The building substructure and superstructure are identical to that described for the turbine hall and auxiliary bay.

The control and switchgear building houses the 13.8 kV and 4.16 kV switchgear, battery rooms, d-c auxiliary rooms, relay and instrumentation and control cabinet room, coal sampling and water analysis laboratories, cable spreading room, communication room, and control room.

The control and switchgear building HVAC system provides filtered and conditioned air to the control room, water analysis room, communications room, cable spreading room and switchgear area. Supply air to these rooms is provided by a multizone air handling unit and a heating and ventilating unit. A centrifugal water chiller supplies chilled water for air

ACCOUNT 21

conditioning and cooling requirements. Local exhaust fans exhaust air as required from the toilet and battery rooms.

ACCOUNT 218B Administration and Service Building

The administration and service building, located south of the turbine hall, is a four story (elevations 18 ft, 33 ft, 48 ft, and 63 ft) steel framed structure 80 ft wide, 100 ft long and 60 ft high. The building volume is approximately 480,000 cu ft. The building is supported on reinforced concrete spread footings on rock. The reinforced concrete ground floor is located at grade. The other floors are reinforced concrete supported on metal deck on steel framing. The roof is concrete plank covered with a roofing membrane. The exterior walls are insulated metal siding and the interior walls are either concrete block or metal partitions. Most areas are provided with suspended acoustical ceilings.

The building houses the service shops, storage areas, locker rooms, showers, lunch room, equipment rooms, laboratories, general offices and conference rooms.

Filtered and conditioned air is provided to the offices, conference room, laboratories, shops, storage area, lunch rooms, equipment rooms and toilet and locker rooms. Supply air to the rooms is provided by a multizone air handling unit and a heating and ventilating unit. Return air fans exhaust air to the units or to atmosphere as required. Chilled water is supplied from a centrifugal water chiller. Local fans exhaust air as required from toilets, locker rooms and fume hoods.

703266

ACCOUNT 21

ACCOUNT 218D Fire Pump House

The fire pump house, located along the riverbank west of the main plant structures, is an integral part of the makeup water intake structure.

The two fire pumps and one jockey pump are located on the north side of the makeup water intake structure and are supported from the reinforced concrete basin roof slab. The structural description, quantities and costs are shown in Account 261.

ACCOUNT 218I Electrical Switchgear Buildings

The electrical switchgear buildings consist of three separate one story steel framed structures. The coal handling system and cooling tower buildings, located south of the main plant structures, are 30 ft wide, 50 ft long, and 16 ft high and 30 ft wide, 35 ft long and 16 ft high respectively. The building volumes are approximately 24,000 and 16,800 cu ft each. The material handling switchgear building, located southwest of the main plant structures, is 25 ft wide, 30 ft long and 16 ft high. The building volume is approximately 12,000 cu ft. The switchgear buildings are supported on reinforced concrete spread footings on rock. The superstructure is prefabricated and has insulated metal walls and roof.

The buildings are heated by electric unit heaters. Supply air is provided by ventilating units consisting of roughing filters and supply air fans. The buildings are pressurized to protect equipment from coal dust.

ACCOUNT 21

ACCOUNT 218M Coal Car Thaw Shed

The coal car thaw shed, located southwest of the main plant structures, is a one story steel framed structure 20 ft wide, 159 ft long and 24 ft high. The building volume is approximately 76,000 cu ft. The shed is located on the track approaching the rotary car dumper. The shed is supported on reinforced concrete spread footings on rock. The reinforced concrete ground floor is located at grade. The superstructure is metal siding and roof deck, and is furnished with the coal car thawing equipment shown in Account 224.13. The shed has two heating bays and one soaking bay.

ACCOUNT 218N Rotary Car Dumper Building and Tunnel

The rotary car dumper building, located southwest of the main plant structures, is a one story steel framed structure 52 ft wide, 66 ft long and 26 ft high. The building volume is approximately 89,200 cu ft. The foundation is reinforced concrete founded on rock. The roof is either insulated or uninsulated metal roof deck supported on steel framing. The exterior walls are either insulated or uninsulated metal siding and the interior walls are masonry block. The underground conveyor tunnels are reinforced concrete founded on rock.

The building houses the rotary car dumper, traveling hammermill lump breaker, receiving hoppers, vibrating feeders, transfer chutes, dust suppression system, control house, toilet facilities, and equipment rooms.

703268

ACCOUNT 21

Heating is provided by electric unit heaters. Supply air to the electrical equipment rooms is provided by a ventilating unit consisting of a roughing filter and supply air fan. Excess air is exhausted through wall louvers. The rooms are pressurized to protect equipment from coal dust. A packaged air cooled air conditioning unit maintains the control room at ambient conditions. The substructure and tunnels are supplied with air through a ventilating fan.

ACCOUNT 2180 Coal Breaker House

The coal breaker house, located southwest of the main plant structures, is a steel framed structure 58 ft wide, 62 ft long and 144 ft high. The building volume is approximately 518,000 cu ft. The building is supported on reinforced concrete spread footings on rock. The reinforced concrete ground floor is located at grade. The three floors are reinforced concrete slabs supported on metal deck on steel framing. The roof is metal deck supported on metal framing. The exterior walls are either insulated or uninsulated metal siding and the interior walls are masonry block.

The building houses the head pulleys and drives for the car dumper-to-breaker house conveyor, two breakers, separators, distribution hopper, slide gates and belt feeders, tail pulleys of the breaker house-to-lowering well conveyors, sampler, and an elevator. The ground floor contains a power and motor control center.

Heating is provided for the coal breaker house by electric unit heaters. Supply air to electrical rooms is provided by a ventilating unit consisting of a roughing filter and supply air fan. Excess air is exhausted through

ACCOUNT 21

wall louvers. The rooms are pressurized to protect equipment from coal dust.

ACCOUNT 218P Coal Crusher House

The coal crusher house, located south of the rotary car dumper building, is a steel framed structure 43 ft wide, 43 ft long and 106 ft high. The building volume is approximately 196,000 cu ft. The building is supported on reinforced concrete spread footings on rock.

The reinforced concrete ground floor is located at grade. The three floors are reinforced concrete slabs supported on metal deck on steel framing. The roof is metal deck supported on metal framing. The exterior walls are metal siding, and the interior walls are masonry block.

The building houses the head pulleys for the reclaim conveyors, magnetic separators, surge bin, vibrating feeders, and two crushers.

Heating is provided for the coal crusher house by electric unit heaters. Supply air to electrical rooms is provided by a ventilating unit consisting of roughing filter and supply air fan. Excess air is exhausted through wall louvers. The rooms are pressurized to protect equipment from coal dust.

ACCOUNT 218Q Boiler House Transfer Tower

The boiler house transfer tower, located at the southwest corner of the boiler house, is a steel framed structure 25 ft wide, 32 ft long and 212 ft high. The tower volume is approximately 170,000 cu ft. The tower is supported on reinforced concrete spread footings on rock. The reinforced

ACCOUNT 21

concrete ground floor, which is integral with the boiler house ground floor, is located at grade. The two floors are reinforced concrete slabs supported on metal deck on steel framing. The roof is free standing metal deck. The exterior walls, from elevations 18 ft to 160 ft, are common with the boiler house on two sides and insulated metal siding on the other two sides. From elevations 160 ft to 230 ft, the exterior walls are either insulated or uninsulated siding.

The tower houses the head pulleys of the crusher house-to-boiler house conveyors, transfer chutes-to-tripper conveyors, and as-fired sampling system.

Heating is provided to the electrical equipment room by electric unit heaters. Supply air is provided by a ventilating unit consisting of a roughing filter and supply air fan. Excess air is exhausted through wall louvers. The room is pressurized to protect equipment from coal dust.

ACCOUNT 218R Rotary Plow Maintenance Shed

The rotary plow maintenance shed, located south of the rotary car dumper, is a one story steel framed structure 32 ft wide, 88 ft long and 28 ft high. The shed volume is approximately 78,800 cu ft. The two reclaim tunnels are 430 ft long each. The shed houses the maintenance facilities for the rotary plows. The rotary plow maintenance shed and reclaim tunnels are founded on rock. The tunnels are reinforced concrete. The shed has a reinforced concrete floor. The roof is metal deck. Exterior walls are metal siding except for the south wall which has a concrete retaining wall for the coal pile.

703271

ACCOUNT 21

Heating is provided by electric unit heaters. Ventilation is provided by drawing outside air through wall louvers and exhausting through power roof ventilators.

ACCOUNT 218T Locomotive Repair Shop and Garage Facilities

The locomotive repair shop and garage, located north of the rotary car dumper, is a one story steel framed structure 65 ft wide, 65 ft long and 30 ft high. The building volume is approximately 126,800 cu ft. The reinforced concrete ground floor is located at grade. The roof is metal deck on steel framing. The exterior walls are insulated metal siding.

The building houses a locomotive repair area and four-bay garage facility for the onsite diesel operated heavy equipment and service vehicles.

Heating is provided by electric unit heaters. The area is ventilated by drawing outside air through wall louvers and exhausting through power roof ventilators.

ACCOUNT 218U Materials Handling and Service Building

The materials handling and service building, located north of the rotary car dumper, is a one story steel framed structure 50 ft wide, 60 ft long and 20 ft high. The building volume is approximately 60,000 cu ft. The building is supported on reinforced concrete spread footings on rock.

The reinforced concrete ground floor is located at grade. The roof is insulated metal deck supported on steel framing. The exterior walls are insulated metal siding and the interior walls are masonry block.

703272

ACCOUNT 21

The building houses the service shops, offices, storage areas, lunch room, toilet and shower rooms.

The HVAC system provides filtered and conditioned air to the offices, lunch rooms, electrical and mechanical rooms, toilet and shower rooms. Supply air to the rooms is provided by a multizone air handling unit and a heating and ventilating unit. The multizone air handling unit consists of a roughing filter, heating and cooling coils, and supply air fan.

ACCOUNT 218V Waste-Water Treatment Building

The waste-water treatment building, located west of the main plant structures, is a one story prefabricated steel structure 25 ft wide, 80 ft long and 20 ft high. The building volume is approximately 40,000 cu ft. The building is supported on reinforced concrete spread footings on rock. The reinforced concrete ground floor is located at grade. The exterior walls and roof are insulated metal and interior walls are masonry block.

The building houses a control area, storage area, pumps, tanks and other waste-water treatment equipment. Large items of the treatment equipment, such as the batch holding tank, are located adjacent to the building.

Heating is provided by electric unit heaters. The building is ventilated by drawing outside air through wall louvers and exhausting through power roof ventilators.

ACCOUNT 218W Miscellaneous Coal Handling Structures

The coal conveyor galleries include all overhead supporting structures and their associated foundations. The galleries are approximately 2,300 ft long and are

long and are supported on reinforced concrete spread footings on rock. The conveyor galleries consist of removable dust tight sheet metal enclosures supported from structural steel members. Grating walkways provided for access are illuminated.

The rotary plow access tunnel and ventilating shed are approximately 350 ft long and is parallel to the rotary plow tunnels. The access tunnel provides ventilation and is available for emergency exit. The tunnel structure consists of six ft concrete pipe sections. At the end of the tunnel, a well structure encloses a stairway to grade, and is enclosed in a concrete block shed. The shed houses the ventilating fans.

The coal pile membrane barrier area is 525,000 ft². The impermeable membrane layer blankets all areas where coal is stored outdoors, and prevents contamination of ground water by coal pile rain water runoff. The top of the membrane is covered with suitable fill material to prevent damage by coal handling equipment. A drainage system, installed below the membrane layer throughout the active and dead storage areas, routes intercepted surface drainage to drainage channels and prevents hydrostatic pressure on the underside of the membrane layer.

The two lowering wells, located in the center of the coal pile, are reinforced concrete structures 12 ft in diameter and 100 ft high. The cylinders are supported on reinforced concrete foundations bearing on rock. The foundations are integral with the rotary plow tunnels which pass on each side at the base of the cylinders.

703274

ACCOUNT 21

ACCOUNT 219 Stack Structure

The stack structure measures 600 ft high (618 ft elevation) with a 25 ft inside diameter and 35 ft outside diameter at the top, and 45 ft inside diameter and 55 ft outside diameter at the bottom.

The stack is a reinforced concrete structure with a separate free standing brick liner. An elevator and ladder in the stack structure provides for access to platforms for sampling ports, smoke density temperature probes, and for maintenance of aircraft warning lights. The foundation is a 93 ft octagonal reinforced concrete mat bearing on rock.

ACCOUNT 22

ACCOUNT 22 BOILER PLANT EQUIPMENT

The steam generating system supplies steam to the turbine generator which converts heat energy to electrical energy. The steam generator includes the steam generator, soot blowers, pulverizers, coal feeders and piping, fuel firing equipment, primary air, forced draft and induced draft fans, primary and secondary regenerative air preheaters and associated ductwork, complete structural steel, and associated instrumentation and controls.

ACCOUNT 221 Steam Generating System

The steam generator is a supercritical pressure unit with a single reheat designed for a maximum continuous rating of 6,530,000 lb/hr of steam at 3,845 psig and 1,010 F at the superheater outlet and 1,000 F at the reheater outlet using 516 F feedwater delivered to the economizer. The furnace is designed for firing high sulfur eastern bituminous coal. Ignitors fired with No. 2 fuel oil are utilized during startup and low load operation.

The overall dimension of the steam generator are approximately 127 ft wide by 90 ft long by 264 ft above floor elevation. The single dry ash furnace is designed for balanced draft operation and is sized for possible future sub-bituminous coal firing. The furnace cross section is approximately 51 ft wide by 90 ft long. Multiple rows of burners are located in the front and rear walls. Steam temperature is maintained at reduced load by varying firing rate of burner rows. The burners are supplied with pulverized coal from a total of six pulverizers each rated at 75 tons/hr. A seventh pulverizer is provided as a spare.

ACCOUNT 22

The steam generator is equipped with an automatic sequential soot blowing system. The system is designed to remove soot and ash from the boiler surfaces to maintain effective heat transfer. The soot blowers use compressed air with electric motors for rotating and traversing the lances. Two 7,000 scfm centrifugal air compressors supply the required soot blowing air at a pressure of 300 psig.

A superheater bypass system is provided to control flow and pressure during the transition period of attaining critical pressure operation. This is accomplished by maintaining the pressure within the waterwalls and primary superheater sections above saturation pressure until supercritical operation is attained. The bypass provides the flexibility to control the rate of pressure and temperature increase and to coordinate the starting sequence of both the turbine and steam generator.

The steam generator is equipped with a vent and drain system which provides a means of venting air, steam and accumulated water from the boiler and piping systems during startup and shutdown. The system also is used for filling and draining the steam generator during chemical cleaning and hydrostatic testing. The system drains to the wastewater treatment system and is designed to drain the steam generator during normal operation in two hours and during chemical cleaning in one hour.

Valves necessary for startup and shutdown or control of the unit are arranged for remote operation.

703277

ACCOUNT 22

ACCOUNT 22: Draft System

A balanced draft arrangement is used for the steam generator system. Forced draft and primary air fans provide air for combustion, and induced draft fans remove the combustion gases from the system to the stack. The draft system flow diagram for the unit is shown in Drawing 6509.002-HSC-5.

Two 50 percent capacity forced draft fans and two 50 percent capacity primary air fans are provided.

The forced draft fans operate the steam generator at its maximum continuous rating. One forced draft fan and one primary air fan is capable of sustaining operation at reduced load. The forced draft fans discharge through three secondary regenerative element type air heaters to the burner windboxes. The primary air fans discharge through one primary regenerative air heater to the pulverizers inlets.

Steam coils are provided with sufficient surface to maintain a forced draft and primary air fan inlet temperature of 80 F. A control system is provided to maintain the average cold-end temperature of the regenerative air heater at 185 F (above the acid dewpoint) using the steam coils; or to maintain flue gas temperature to the precipitator at a minimum of 275 F. The inlet steam coils are protected against freezing.

Electrostatic precipitators, located at the outlets of the regenerative air heaters, are provided to reduce the particulate emissions of the flue gas to conform to applicable State and Federal Regulations (presently 0.1 lb per million Btu fired). Provisions are made to isolate each regenerative

ACCOUNT 22

air heater, precipitator, and draft fan train. Each precipitator is sufficiently sectionalized to assure continued operation at guaranteed efficiency during rapping operations while isolated sections are operative.

Two 50 percent capacity induced draft fans are provided; one at the outlet of each electrostatic precipitator. The fans discharge directly into the stack. One induced draft fan is capable of sustaining plant operation at reduced load.

Instrumentation for the boiler air and gas system monitors significant air and gas pressures, differential pressures flows and temperatures from the air inlet to the furnace, i.e., at the windbox, to the gas outlet.

The duct work in this account does not include the duct work required for the SO₂ scrubbing systems, or that furnished with the steam generator. The added duct work and supports required for the SO₂ scrubbing systems is included in ACCOUNT 226.

ACCOUNT 223 Ash and Dust Handling System

The ash and dust handling system removes and transports flyash from the precipitators, economizer and gas duct hoppers to the storage silos. The system consists of two 100 percent capacity dry positive displacement pressurized systems designed to handle 30 tons of ash per hour each. The dry type system uses a mixture of flue gas and air as the transporting medium. An air lock valve is located on each economizer hopper,

703279

ACCOUNT 22

precipitator hopper and gas duct hopper. A pressure system conveys the flyash to the silos. The silos provide for 90 hours accumulation of flyash while operating at maximum continuous rating assuring 85 percent of the ash is flyash.

Each flyash hopper is furnished with a hopper heater to prevent flyash caking. System capacity allows for intermittent operation with automatic actuation of the cycle on a timed basis. Control equipment is provided for the air preheater hopper, the precipitator hoppers and the flyash silos. All primary devices are located at or near the source, transmitting to receiver type indicators and controllers located in the control panel.

A prepackaged control panel is enclosed and located near the precipitator. It contains all alarms, controllers, indicators, lights and switches, required for automatic or manual operation. A local annunciator alarms various system malfunctions and transmits a common trouble alarm to the main control room. A hopper load level control automatically activates the removal and transport system, transferring the material to the disposal storage silos.

Bottom Ash and Pyrites Handling System

The bottom ash and pyrites handling system removes the bottom ash from the boiler and pyrites from the pulverizers and transports them to the dewatering bins for removal by truck. This system is designed to handle 13 tons per hour. The system flow diagram for the bottom ash handling system is shown in Drawing 6509.002-HSC-15.

703280

ACCOUNT 22

The bottom ash is transported by a hydraulic system using water as a transport medium. The bottom ash hopper provides ten hours of bottom ash accumulation while operating at maximum continuous rating, assuming 25 percent of the ash content is bottom ash. A continuous water trough around the periphery of the ash hopper seals against the full furnace pressure. Bottom ash dewatering bins provide 90 hours of storage, 45 hours for each bin, at maximum continuous rating. Bottom ash is removed from the site by truck and hauled to the disposal site.

The pyrites are also transported by a hydraulic system using water as a transport medium. Pyrites rejected from the pulverizers are sequentially sluiced from the pyrites box to a holding bin located near the pulverizer area. The holding bin provides storage of 12 hours accumulation of pyrites resulting from the boiler operation at maximum continuous rating. The pyrites are sluiced from the holding bin to one of two pyrites dewatering bins. Each bin provides 45 hours of storage while operating at maximum continuous rating. Control equipment is provided for the furnace bottom ash hoppers, the economizer ash hoppers, the pulverizer reject hoppers and the dewatering bins.

ACCOUNT 224 Fuel Handling Systems

The function of the coal handling system is to receive, stack out, reclaim, crush and transport coal to the coal silos in the boiler house. The buildings and structures comprising this system are located in the yard of the power plant southwest of the boiler house and turbine hall. The flow diagram for the coal handling system is shown in Drawing 6509.002-HSC-14.

703281

ACCOUNT 22

The coal handling system is sized for a coal rate of 365 tons per hour. This is based on using the design basis coal for the operating condition with the turbine valves wide open, five percent overpressure (VWO, five percent OP).

A total of 526,000 tons of coal is stored at the plant site, in the form of active or dead storage. The active (short term) storage pile provides 26,000 tons, or three days coal supply. This coal pile is continuously cycled and completely turned over, in three days. The dead storage (long term) coal pile capacity is 500,000 tons, 57 days supply. This pile provides coal to the plant boiler only if normal rail delivery of coal is interrupted for extended periods of time. Since the Illinois No. 6 (seam) coal used by the plant has a relatively low moisture content (11 to 12 percent) long term storage poses no spontaneous ignition or coal property degradation problems.

The coal handling system consists of four major structures; a rotary car dumper, a breaker house, two lowering wells and an underground rotary plow gallery, and a crusher house. Coal enters the boiler house at a transfer tower at the southwest corner of the boiler house. Equipment for the coal handling system is sized to unload and transfer coal to storage at a rate of 2000 tons/hr. This allows turnaround of a 100-car a unit train (100 tons per car) in five hours. Seven unit train loads of coal are required to provide the tonnage of coal (61,300 tons) burned weekly (7-days) by the plant. Thus, two unit trains per day, unloaded

703282

ACCOUNT 22

during the first and second shifts, can be easily accommodated. The five hour unloading cycle does not incur increased transportation costs due to railroad demurrage penalties since it is assumed that the utility leases dedicated unit trains supplying coal to the site. The railroad crew uncouples a loaded unit train at the coal unloading loop, and picks up an empty unit train at the storage ladder siding. The unit train is moved through the coal yard and switchyard by an in-plant locomotive.

Coal is reclaimed from either active or dead storage at a rate of 550 tons/hr. Full 100 percent redundancy (i.e. crushers, conveyors and rotary plows) is provided. Coal is reclaimed on a nearly continuous basis.

Coal is weighed and totalized at two locations in the coal handling system; 1) at the rotary dumper-to-breaker house conveyor, and 2) for analysis at the lowering well-to-crusher house conveyors. As-fired coal is sampled in the boiler house transfer tower, prior to delivery to the coal silos; as received coal is sampled in the breaker house prior to discharge to the lowering well. Magnetic separators remove miscellaneous iron from the coal at the top of both the breaker house and crusher house.

All of the coal conveyors are equipped with wire-reinforced fabric/rubber belt material and have self aligning troughing (angled side) idlers. The conveyors, and the adjacent walkway, are enclosed above ground. A solvent/water spray dust suppression system prevents excessive dusting at the discharge of each conveyor.

703283

ACCOUNT 22

Coal is delivered to the plant by a 100 car unit train, equipped with rotary car couplers. A hydraulic car positioner centers an individual car in the rotary dumper that rotates a car 180 degrees. The contents of a car discharge onto a traveling hammermill lump breaker, and subsequently into two hoppers. A vibrating feeder at the bottom of each hopper feeds coal onto the dumper-to-breaker house conveyor belt.

Coal enters the breaker house at a splitter chute that diverts coal to one of two breakers which reduce to three inch size and under.

A belt conveyor transfers coal from the breakers, to the top of either of two lowering wells. The lowering well is a hollow, cylindrical silo, with a hopper bottom. Openings in the side wall of each well allow coal to form a conical-shaped pile, as the lowering well fills with coal. The conical shaped piles account for the 26,000 ton active storage. Vibrating feeders at the center of the lowering well, allow gravity reclaim of the active storage pile.

Dead storage coal is moved by bulldozer to the vicinity of the lowering wells, when required. An underground (below grade) gallery beneath the lowering wells houses the, two lowering well-to-crusher house conveyors and two rotary plows. The conveyors run in a direction parallel to a line connecting the lowering wells. The rotary plow is a small motor driven car, that travels on rails beneath the coal pile supported above each conveyor. A horizontal plow slowly rotates atop the car, sweeping coal from a concrete trough below the active coal piles to the conveyor. A rotary plow maintenance shed is located where, the conveyors exit to the underground galleries and angle upwards.

703284

ACCOUNT 22

Coal discharges from the lowering well-to-crusher house conveyors into a storage bin that has two outlets each of which feeds a crusher. The crushers reduce the coal to a one inch to one and one half inch size. The crushed coal is fed to one of two conveyors.

Crusher house-to-boiler house conveyor belts transport the coal to the boiler house transfer tower. Here, the coal is divided between the two rows (near and far) of coal silos. Each row is serviced by a traveling tripper that can be stopped to discharge the conveyor belt flow to a specific silo. The seven silos are sized for eight hours (approximately 420 tons each) of coal storage.

Ignition and Plant Fuel Oil System

The fuel oil system supplies No. 2 fuel oil to the main boiler ignitors for startup and low-load operation. This fuel oil is also used for the auxiliary boiler and miscellaneous diesel driven equipment, the emergency diesel-driven generator, the locomotive, the diesel-driven fire pump and the coal moving equipment. The plant fuel oil systems are located in the plant yard, boiler room, auxiliary boiler room and at the circulating water intake.

An aboveground fuel oil storage tank which stores 125,000 gallons of No. 2 fuel oil provides for a 30 day supply of oil for the auxiliary boiler. A dike surrounding the tank will contain the oil in the event of a spill or tank failure. Separate pumps, which take suction directly from the

703285

ACCOUNT 22

fuel oil storage tank, supply the fuel oil to the main and auxiliary boilers.

Oil delivery for the aboveground tank is made by either rail or truck. An unloading pump is provided for vehicles not having unloading equipment.

All diesel engine driven equipment is capable of burning No. 2 fuel oil. The aboveground storage tank also supplies fuel to the diesel engine driven equipment located in the proximity of the tank.

Instrumentation for the fuel oil system monitors and controls unloading, storage and transfer of fuel oil to points of use. It also provides information both locally and to the main control room as required for controls, displays, alarms and logs.

ACCOUNT 225 Flue Gas Desulfurization Structures

Lime Slaking Building and Service Building

The lime slaking building, located southwest of the main plant structures, is a steel framed structure 42 ft wide and 80 ft, with an enclosed portion 51 ft high and an overall height of 160 ft. The enclosed building volume is approximately 171,000 cu ft. The adjacent service building is a steel framed structure 28 ft wide, 80 ft long and 16 ft high. The building volume is approximately 36,000 cu ft. The buildings are supported on reinforced concrete spread footings on rock. The reinforced concrete ground floors are located at grade. The lime slaking building has three enclosed floors and three platform floor elevations above the roof. The second and third floors are reinforced concrete slabs supported on metal

703286

ACCOUNT 22

deck on steel framing. The service building has one floor. The roofs of both structures are concrete channel plank covered with roofing membrane. The exterior walls are insulated metal siding.

The lime slaking building houses pumps, tanks, silos, conveyors, elevators and other associated equipment. The service building houses an electrical room, mechanical service room, control room, laboratory, toilets and office.

The lime slaking building is heated by electric unit heaters, and ventilated by drawing outside air through wall louvers and exhausting through power roof ventilators. The service building has a HVAC system which provides filtered and conditioned air to the offices, laboratory control room and service rooms.

Desulfurization Control and Switchgear Building

The desulfurization control and switchgear building, located north of the desulfurization area, is a two story steel framed structure 35 ft wide, 40 ft long and 42 ft high. The building volume is approximately 59,000 cu ft. The building is supported on reinforced concrete spread footings on rock. The reinforced concrete ground floor is located at grade. The second floor is a reinforced concrete slab supported on metal deck on steel framing. The roof is concrete channel plank covered with a roofing membrane. The exterior walls are insulated metal siding, and the interior walls are masonry block.

703287

ACCOUNT 22

The building houses the control room, office, toilets and switchgear area.

The control room is heated by electric baseboard radiators and cooled by a window type air conditioner. The switchgear room is heated by electric unit heaters. Ventilation is provided by a ventilating unit consisting of roughing filter and supply air fan. Air is exhausted through a wall louver.

Process and Seal Water Pump House

The process and seal water pump house, located west of the main plant structures, is a one story prefabricated steel structure 20 ft wide, 40 ft long and 16 ft high. The building volume is approximately 12,800 cu ft. The building is supported on reinforced concrete spread footings on rock. The reinforced concrete ground floor is located at grade. The exterior walls are insulated metal siding, and the roof is insulated metal standing rib.

The building houses the process and seal water pumps, tanks, filters and associated equipment.

Heating is provided by electric unit heaters. The building is ventilated by drawing outside air through wall louvers and exhausting through wall exhaust fans.

Thickener Equipment Building

The thickener equipment building, located northwest of the main plant structures, is a one story prefabricated steel structure 40 ft wide, 60 ft long and 16 ft high. The building volume is approximately 33,400 cu ft.

703288

The building substructure, superstructure and heating and ventilation is identical to that described for the process and seal water pump house.

Sludge Stabilization Building

The sludge stabilization building, located approximately six miles from the main plant structures, consists of a main building and a service building. The main building is a two story steel framed structure 50 ft wide, 60 ft long and 30 ft high. The building volume is approximately 90,000 cu ft. The adjacent service building is a one story steel framed structure 40 ft wide, 50 ft long and 18 ft high. The building volume is approximately 36,000 cu ft. The buildings are supported on reinforced concrete spread footings on rock. The reinforced concrete ground floors are at grade. The second floor of the main building is a reinforced concrete slab supported on metal deck on steel framing. The roofs are cast in place concrete over metal deck, covered with a roofing membrane and supported on steel framing. The exterior walls are insulated metal siding, and the interior walls are either masonry or metal partitions. Vinyl tile and ceramic tile floors and acoustical ceilings are provided, as appropriate, in the service building.

The main building houses the vacuum filters, pumps, sludge mixers, feeders, conveyors and associated equipment. The service building houses the offices, lunch room, control room and toilets.

The main building is heated by electric unit heaters and is ventilated by drawing outside air through wall louvers and exhausting through power roof ventilators. The service building has a HVAC system which provides filtered and conditioned air.

Sludge Pump House

The sludge pump house, located north west of the main plant structures, is a one story steel framed structure 20 ft wide, 30 ft long and 12 ft high. The building volume is approximately 7,200 cu ft. The building is supported on reinforced concrete spread footings on rock. The reinforced concrete ground floor is at grade. The roof is concrete channel plank covered with a roofing membrane. The exterior walls are insulated metal siding.

The building houses an electrical equipment room and mechanical equipment room.

Heating is provided by electric unit heaters. The building is ventilated by drawing outside air through wall louvers and exhausting through wall exhaust fans.

Lime Unloading Building

The lime unloading building, located west of the main plant structures, is a one story steel framed structure 36 ft wide, 50 ft long and 20 ft high. The building volume is approximately 36,000 cu ft. The building support is reinforced concrete founded on rock. The reinforced concrete ground floor is located at grade. The roof is steel supported on steel framing. The exterior walls are metal siding.

703230

ACCOUNT 22

The building houses the grizzly hopper and conveyor, and has rail and truck access. The building is large enough to accommodate one railroad car. A tunnel accommodates a conveyor to the bucket elevator at the lime silos.

Tunnel ventilation is provided by a supply air fan.

ACCOUNT 226 Lime Flue Gas Desulfurization System

This system is designed to remove SO_2 from flue gas exiting from the electrostatic precipitators. Lime handling and slaking facilities, stack gas scrubbing equipment and spent slurry handling facilities are provided.

Lime Handling and Feed Preparation

Lime is unloaded from railroad hopper cars in an unloading shed. The lime is dropped into a hopper and conveyed to adjacent concrete storage silos by a conveyor belt and bucket elevator. Two silos provide a 30 day supply of lime for full load operation.

Lime is conveyed by a reclaim belt conveying system to four process storage silos located above the lime slaking building. Lime is fed by volumetric belt feeders to lime slakers located below each storage silo. A combination of fresh process makeup water and thickener overflow is used for lime slaking. A 15 percent slurry of slaker lime is fed by gravity to slurry surge tanks located below the slakers and subsequently pumped to lime slurry feed tanks adjacent to the SO_2 scrubbing equipment.

703291

Sulfur Dioxide Scrubbing Equipment

This system brings flue gas into intimate contact with the SO₂ scrubbing medium. Booster fans direct flue gas from a bypass duct to SO₂ scrubbing modules. These fans are designed for a maximum pressure drop across the scrubbing system.

A bypass duct is sized to handle 100 percent of the flue gas at maximum load in case of operating problems with the scrubbers.

Five 15 percent capacity booster fans and SO₂ modules are provided. Each module is designed to remove 90 percent of the SO₂ contained in the entering flue gas. The system is sized for a maximum gas velocity of 10.5 ft/sec through each scrubber. At full load, six modules scrubbing 88.15 percent of the flue gas are required to operate in order to comply with the SO₂ emission standard of 1.2 lb SO₂ per million Btu's. The seventh module is provided as a spare. The balance of flue gas is bypassed to provide reheat for the saturated flue gas leaving the SO₂ scrubbers.

In each SO₂ scrubber, the flue gas is initially directed to a down-flow quencher. A slurry of CaO, reaction products and water is sprayed into the hot flue gas at the quencher throat; saturating the gas and providing the first stage of SO₂ removal. The slurry is pumped from a reaction tank and introduced to the quencher throat through a series of spray nozzles. Some of the recirculation slurry is also employed as wall wash on the convergent section to present a wetted wall to the incoming of hot flue gas.

ACCOUNT 22

The saturated gas exits downward from the diverging section and turns through a horizontal, low velocity sump. The slurry droplets exit the quencher at a relatively high velocity and are separated by inertia in the sump turn.

The flue gas leaving the sump flows up through the counter-current tray absorber where a slurry of recirculated lime, reaction products, and water is intimately contacted with the flue gas to remove the sulfur dioxide. The scrubber gas continues on through a moisture separator and ducts to the stack.

Sludge Handling System

A portion of the recirculating slurry in the SO₂ scrubbing system containing lime and reaction products is directed to thickeners. Clear supernatant from the thickeners is fed by gravity to an overflow surge tank. Thickened underflow is mixed with flyash and pumped to a sludge stabilization building located six miles from the station.

At the stabilization building the slurry is dewatered by vacuum filtration and conveyed to solid-solid mixers where lime is added. After mixing, the resulting material is conveyed to a point outside of the building for landfilling. The flyash and lime undergo pozzolanic reactions to produce a stabilized landfill material. Filtrate from the dewatering operation is returned to the thickener overflow storage tank at the plant site.

ACCOUNT 227 Steam Generator Plant Instrumentation and Control

The steam generator plant instrumentation and control provides the necessary instruments for the monitoring of the plant status and equipment condition.

They include the required controls and indications for the startup, shutdown and normal operation of the plant. Monitors are provided for SO₂, NO_x, particulates and oxygen to insure compliance with the federal emission standards and other applicable state and local regulations.

Boiler-Turbine-Generator Control Board

The boiler-turbine-generator (BTG) board contains the necessary controllers, indicators and recorders for the plant coordinated control system, the turbine supervisory control system and the primary cycle systems. The board may be arranged in either an "L" or straight line configuration. Pneumatic instruments are not allowed on the board. The board is a walk-in type tunnel board.

Instrument items on the board are grouped according to their functions. Normally, controllers and control switches are placed on the bench portion of the board, indicators and recorders are placed on the vertical position. Control and instrumentation that require continuous operators attention are mounted in the front side and those requiring periodic attention are placed in the rear. Space is provided for inserts of the following items: mechanical-hydraulic control insert, load frequency control equipment insert, burner control insert, computer CRT with keyboard.

Computer console, printers, and trend recorders are mounted separately from the BTG board. The coal handling and related systems are controlled from the vertical board.

Auxiliary Panels and Cabinets

These panels and cabinets provide monitoring and controls of miscellaneous operations such as soot blowing, coal handling, compressed air supply and service water supply.

Instrument Racks

The instrument racks take the form of an open rack. They are used to mount local instruments such as pressure transmitters, manifolds, pressure switches, and other pneumatic instruments that connect directly with the process pipes. The rack has a rigid structure, suitably braced, to withstand all stress incidental to shipping, installation and operation, without warping or twisting. Arrangement of instruments, conduits on racks, and electrical devices are placed out of the paths of condensation or water drains when testing or calibrating instruments. In addition, the instruments are so mounted that replacement could be accomplished without interruption of service to adjacent devices. There is provision to collect the drains when the instrument is removed. Suitable engraved, plastic nameplates are provided for each instrument.

Plant Computer System

The primary function of the plant computer system is to assist the control room operator in conducting safe and efficient operation of the power plant and to provide information on plant performance history. Normal safe operation of the plant does not require the use of the computer.

ACCOUNT 22

The major functions of the computer are:

- a. Monitoring of all analog, digital and calculated input points
- b. Analog input processing which includes conversion of analog inputs to engineering units, reasonability tests, limit comparisons, error checking
- c. Digital input processing which includes status checkup
- d. Sequence of event input processing
- e. Pulse input signal processing
- f. Operation of audible and visual alarm displays
- g. Performance calculations - These include plant thermal efficiency calculations, unit heat rate calculations, condenser performance calculations, heat exchangers performance calculations, turbine performance calculations, boiler efficiency calculation and related electrical calculations
- h. Analog and digital trend recording
- i. Generation of periodic logs, on demand logs, alarm summary and post-mortem review reports.

The hardware of the computer system includes the following major equipment:

- a. All required analog and digital signal conditioning equipment
- b. All required signal scanning and signal multiplexing equipment
- c. All required analog to digital and digital to analog converters
- d. Termination cabinets for all incoming and outgoing cables and wires
- e. Data acquisition computer with sufficient operating speed, core storage and input/output handling capability to meet system requirements and insure complete satisfactory performance
- f. Watchdog timer for the computer
- g. Two CRT's and three printers
- h. Six point trend recorder

703236

ACCOUNT 22

- i. Paper tape reader/punch
- j. Card reader
- k. Uninterruptible a-c power supply.

Coordinated Control System

The coordinated control system operates the turbine-generator and the boiler as an integrated unit. This system coordinates the regulation of feedwater flow, fuel feed, air flow, main steam temperature control, reheat steam temperature control and the turbine servo or load reference motor. The system is designed to minimize interactions between the values to be controlled; namely, unit generation, steam pressure and steam temperature, by proper adjustment of fuel, feedwater, air, turbine control valve and the steam temperature regulating equipment. The system has the flexibility of operating in one of the three modes: coordinated mode, boiler follow mode and turbine follow mode.

Burner Control System

The burner control system is designed to prevent continued operation of the steam generator where a hazardous furnace condition could exist, and to assist the operator in starting and stopping of burners and fuel equipment.

The control system consists of four major subsystems: furnace purge system, burner mill control system, boiler fuel safety system and alarm system. The furnace purge system insures that the boiler is adequately

ACCOUNT 22

purged under the conditions and in the proper sequence prior to igniting the first fire in the boiler. The burner mill control system allows remote operation of the ignitors and burners. The subsystem is designed to follow a predetermined set program in safely placing ignitors and burners in and out of service. The boiler fuel safety system is designed to shut off all fuel to the furnace in the event that predetermined potentially hazardous conditions should develop during operation. Examples of these conditions are loss of flame, loss of seal air, or loss of primary air. The alarm system alerts the operator the existence of certain equipment malfunctions such as mill trip, main flame and detector failure.

703258

ACCOUNT 23

ACCOUNT 23 TURBINE PLANT EQUIPMENT

The turbine plant equipment includes the turbine-generator and all auxiliary equipment necessary to assure continuous operation of the main turbine - generator. All turbine plant equipment is designed to operate at the valve wide open, five percent overpressure point (VWO, five percent OP).

The turbine generator is a tandem-compound four flow machine. Normally approximately 60 percent of the inlet steam passes through the entire turbine machinery frame and exhausts into the condenser at a vacuum condition, where waste heat is rejected. The remaining 40 percent of the inlet flow is extracted at various stages from the turbine for heating the feedwater being pumped to the boiler. A portion of the extraction steam also powers two auxiliary steam turbines that drive the main boiler feedwater pumps.

Cold reheat pipes carry approximately 89 percent of main steam inlet flow from the high pressure turbine exhaust to the reheater section of the boiler. Hot reheat piping supplies reheated steam to interceptor valves that control steam flow to the intermediate pressure turbine.

Condensate is pumped from the condenser hot-wells by three 50 percent capacity condensate pumps through 100 percent flow deep bed polishing demineralizers, and a steam packing exhaustor. Three 33-1/3 percent capacity condensate booster pumps provide the necessary head from that point for the condensate to flow through the four stages of low pressure heaters to the deaerator. The two 50 percent capacity heater drain pumps take the first stage heater drains from the heater drain tank and return

703299

ACCOUNT 23

it to the cycle at the suction to the condensate polishing system. Then two 50 percent capacity steam turbine driven main feedwater pumps supply water to the high pressure feedwater heaters (6th, 7th, 8th stages) to raise the feedwater temperature to 516 F before entering the boiler economizer.

ACCOUNT 231 Turbine Generator

The turbine-generator is designed to deliver 794 MWe net output with throttle steam conditions of 3512 psia, 1000 F superheated steam, 637 psia and 1000 F reheat, zero percent make-up, 1.7/2.5 in-HgA back pressure, eight stages of feedwater heating, and turbine driven feedwater pumps. The maximum guaranteed steam heat balance diagram is shown in Drawing 6509.002-HSC-6.

The turbine is a tandem-compound machine with four flow exhaust using 33.5 inch last stage blades designed for 3600 rpm. The maximum guarantee throttle flow is 5,809,582 lb of steam per hour.

The cold reheat steam exhausts from the high pressure machine at 707 psia, 585 F and passes through the reheater section of the boiler. Hot reheat steam returns and passes through four interceptor valves to the intermediate pressure turbine. Exhaust from the intermediate pressure turbine passes to each of the two low pressure turbines.

Generator

The turbine-driven electrical generator has a rating of 1050 MVA with 0.90 PF, 26,000 V, 3 phase, 60 Hz output, and has a totally enclosed

703300

ACCOUNT 23

hydrogen cooled (at 75 psig) rotor. The stator is a liquid conductor-cooled type with deionized water (at 105 F) as the liquid coolant.

The generator rotor is furnished with an internal cooling system including: hydrogen coolers, terminal bushings, instruments, grounding pads, seal housing insulation, foundation plates, shims, and special tools.

The generator stator is furnished with the following external equipment: deionized water circulating and cooling unit assembled on a skid and including storage tank, pumps, coolers, deionizer, flow meter, conductivity cells, gauges, piping, valves, filters, instruments, and regulating equipment, stator winding control cabinet assembled and combined with the hydrogen control cabinet including annunciator, generator automatic runback logic and all necessary control devices.

The generator hydrogen system includes: hydrogen coolers, one skid mounted seal oil unit, hydrogen manifold with one bottle pressure regulator with high and low pressure gauges, pressure switch for hydrogen supply pressure "low" alarm, shutoff valves and bottle connectors, generator hydrogen pressure regulator, hydrogen storage bottles, control cabinet, temperature detectors, and special tools.

The alternator bearings, the silicon diode rectifier assemblies, the main generator collector and the brush rigging are all totally enclosed within the alternator exciter housing with suitable heat exchangers and means for circulating air. The closed ventilation circuit is equipped with water to air coolers located in the exciter frame. The excitation

703301

ACCOUNT 23

switchgear is an integrated unit of standard low voltage, located indoors, and metal enclosed. The function of the excitation switchgear is to connect, rectify and control excitation to the a-c alternator exciter from the alternator stator, and to provide voltage regulation by adjustment of the generator field voltage (d-c regulator) or the generator terminal voltage (a-c regulator). The excitation switchgear houses the exciter field breaker, the thyristor regulator bridge and the a-c and d-c regulator logic.

Exciter

The exciter is a direct driven alternator and stationary silicon diode rectifier type, and it has a 0.5 response ratio.

Turbine Gland Steam Sealing System

The gland steam sealing system provides sealing of the turbine shaft at the turbine shell penetration, under all conditions of turbine loading. The shaft packings seal against leakage of air into the condenser (vacuum packings) and prevent steam from blowing out into the turbine room (pressure packings).

The steam sealing system provides the above functions automatically at all loads and consists of the following equipment: oil operated dual feed steam regulator, steam packing exhauster with two blowers, auxiliary steam feed regulator, regulator bypass unloading valve, blowdown valve, three-way diverting valves and ventilator valve. The HP turbine inner glands are relieved to heater number five. The HP, IP and LP turbine outer glands are relieved to the steam packing exhauster. The steam

703302

packing exhauster is designed with stainless steel tubes for 400 psig pressure and 125 F cooling water.

Lubricating Oil System

A main shaft driven oil volute type centrifugal pump supplies the oil required by the high pressure hydraulic control system and the low pressure lubrication system during normal operation, and provides high pressure and low pressure oil for the hydrogen seal oil system of the generators.

A motor suction oil pump supplies low pressure lubrication oil to the main shaft pump suction during startup and shutdown. A booster pump driven by an oil turbine powered by oil from the main shaft pump is overtaken at about 90 percent speed by the main shaft pump and removed from operation. A control station at the turbine bench board starts the motor suction pump automatically, provided the switch is not in "lock-off" position, when the main shaft pump reaction pressure drops below nine psig. The pump continues to run until stopped by the operator.

A small motor driven centrifugal pump provides an additional source of back-up to the bearing oil system. This pump protects the turbine in case of loss of a-c power.

The oil pumping system with oil reservoir contains a screen for removing foreign materials from the oil drained into the reservoir and the following additional equipment: ejector, orifices and check valves, two oil coolers, float-type oil level indicator with high and low alarms, pressure switches with test valves for automatic starting of the turning gear and emergency bearing oil pumps, and one vapor extractor.

Turbine Oil Conditioning System

The lubricating continuous bypass oil conditioning system has a capacity of 1,350 gallons per hour of 150 SSU viscosity lubricating oil at 100 F. The clean oil storage capacity in the conditioner is 1,000 gallons at turbine shutdown. The system consists of the following equipment: centrifugal type lubrication oil purifier with inlet and discharge pump, necessary instruments, breakover switch, feed/stop valve, electric controller and safety interlocks, 14.2 kW heater, centrifuge driven by an open drip-proof motor including piping and wiring.

Gas Systems

The carbon dioxide system consists of a liquid carbon dioxide storage unit with refrigeration system, vaporizer, relief valves and two pressure reducing valves. Carbon dioxide is used for purging hydrogen from the generator housing during shutdown, and for purging air from the housing before being filled with hydrogen during startup.

Hydrogen gas is used to cool the rotor of the generator and is circulated within the generator housing under pressure. Shell and tube type coolers at the ends of the generator are supplied with cooling water to dissipate the rotor heat and wind losses.

The hydrogen is supplied from a series of bottled containers which are individually connected to a manifold. The manifold is equipped with a relief valve and two pressure regulators with isolation valves.

703304

ACCOUNT 233 Condensing System

Condensing Equipment

The condenser is a multi-pressure, single pass design with divided fabricated steel water boxes and shell. The condenser is designed to handle the total heat rejection from the main turbine. The condenser has a condensing surface of 635,749 sq ft; 46,243-3/4 inch diameter 18 BWG 90-10 CuNi tubes, 70 ft long. Cooling water flow is 312,904 gpm resulting in a tube velocity of 6.5 ft/sec and a total temperature rise at full load of 26 F.

The condenser shell is floor mounted and connected to the turbine exhaust flange by means of a stainless steel expansion joint to accommodate thermal expansion.

The carbon steel shell is equipped with fabricated steel water boxes that are bolted to the condenser shell and designed for removal without disturbing the tube sheets.

Two motor driven two stage vacuum pumps are supplied for removing non-condensable gases from the condenser shell. During startup, both pumps are operating, hogging the condensers to minimize the time to reach the intermediate pressure at which operation begins. To provide system reliability, two 100 percent capacity pumps are selected, with one normally operating to maintain condenser vacuum. When condenser pressure falls to 26 in-Hg vacuum, the spare vacuum pump starts automatically.

ACCOUNT 23

The total hotwell capacity of the shells is 43,000 gallons at normal water level. The hotwell is designed to deaerate the condensate to maintain a maximum of five ppm of dissolved O₂ during normal steady state operation.

The condensate pumps are vertical type, suitable for the NPSH requirements of the condenser hotwell service. The pumps develop sufficient head to ensure adequate suction pressure at the condensate booster pumps after overcoming the pressure drop in the condensate piping, steam packing exhauster, and the condensate polishing demineralizers. Three half-size motor driven pumps are supplied. The third pump is redundant and is on standby or isolated for maintenance.

The steam packing exhauster consists of a shell and tube type condenser and air removal equipment in the form of two full size motor driven blowers.

One complete condensate polishing system is provided that is capable of treating 100 percent of the condensate flow. The system consists of five individual high flow rate, deep bed type demineralizers operating in parallel.

The condensate passes through four demineralizers with the fifth demineralizer serving as a standby. Each demineralizer is rated for a flow rate of 2,650 gpm (53 gpm per sq ft of flow area). The bed depth is three ft with two ft free board. The shells are designed for 200 psig, 130 F, and are lined with rubber with stainless steel internals. The total resin volume consists of 100 cu ft of cation resin and 50 cu ft of

703306

ACCOUNT 23

anion resin per shell. When the resin is expended, it is regenerated externally. A resin separation tank, cation regeneration tank, anion regeneration tank and resin storage tank are principal parts of the regeneration system. A hot water caustic dilution tank and a control panel complete with instrumentation for automatic regeneration is also provided with this system.

ACCOUNT 234 Feedheating System

Feedwater Heaters

Seven stages of feedwater heaters are utilized to heat the feedwater returning to the boiler. The heaters are placed in series and operate under increased pressure of various stages of extraction steam from the high pressure, intermediate pressure, and the low pressure turbines. All heaters have a horizontal U-tube arrangement, using stainless steel tubes. Each heater has an integral drain-cooler section with the exception of the first and fifth stage heaters.

There are four low pressure (LP) stages of feedwater heating, one deaerating stage, and two high pressure (HP) stages of feedwater heating. The LP heating system consists of eight feedwater heaters arranged in two parallel trains of four each. A single bypass is provided to allow removing a complete train of heaters from service while still maintaining full load on the unit. The bypass is sized to pass 40 percent of the guarantee turbine throttle flow while the remaining heaters pass 60 percent. The LP heaters employ a cascade drain arrangement to heater number one, where they collect in a drain tank and are pumped forward to the inlet of the condensate polishing system.

ACCOUNT 23

The fifth stage heater is a horizontal tray type deaerator with storage tank. The storage tank is sized for five minutes storage at VWO, five percent OP.

The high pressure (HP) feedwater heating system consists of four feedwater heaters arranged in two parallel trains of two each. Each train is designed to pass 60 percent of the guarantee turbine throttle flow. The HP heater drains cascade to the fifth stage deaerator drain tank.

Boiler Feedwater Pumps

Two 50 percent capacity motor driven boiler feedwater booster pumps are provided to supply the minimum net positive suction head (NPSH) at the suction of the boiler feedwater pumps. Each pump is designed for a flow rate of 8,750 gpm at 150 ft total dynamic head (TDH).

The two 50 percent capacity turbine driven boiler feedwater pumps are designed for a flow rate of 8,750 gpm each and develop a TDH of 11,200 ft when operating at a speed of 5,800 rpm. Calculated brake horsepower is 27,160. Each feed pump is driven by a dual admission, multi-stage, condensing steam turbine exhausting to the main steam condenser. The dual admission inlet consists of a high and a low pressure valve, one supplied with main steam, the other supplied with steam from the high pressure turbine exhaust to the low pressure valve. For startup purposes, auxiliary boiler steam is also supplied to the low pressure valve admission inlet.

703308

ACCOUNT 23

ACCOUNT 235 Other Turbine Plant Equipment

Main Vapor Piping Systems

The main vapor piping systems consist of the main steam and hot and cold reheat systems. The main steam system conveys high pressure superheated steam from the steam generator to the high pressure turbine, related auxiliary equipment, and the station auxiliary steam system.

The hot and cold reheat system conveys exhaust steam from the HP turbine to the steam generator reheater and returns it to the intermediate pressure turbine.

The main steam and hot and cold reheat system flow diagram is shown in Drawing No. 6509.002-HSC-7.

Turbine Building Closed Cooling Water System

A closed cooling water system is provided with three 50 percent capacity (4,000 gpm each) motor driven water pumps, air tank and heat exchangers, which dissipates heat to the main cooling towers. The heat exchangers are two 50 percent capacity shell and tube type, designed for a flow rate of 4,000 gpm on the shell side and 5,400 on the tube side. The tubes are 90-10 CuNi material, and supply 95 F water to the system based on a supply water temperature of 85 F from the plant service water system. The system supplies cooling water to the turbine plant and miscellaneous plant equipment.

703309

ACCOUNT 23

Demineralized Water Makeup System

The demineralized water makeup system consists of two independent trains, each having the following equipment: an activated charcoal prefilter, cation demineralizer, an anion demineralizer, and a mixed bed demineralizer. A common vacuum degasifier serves both trains with water from the cation demineralizers directed to the vacuum degasifier before being admitted to the anion demineralizer. Each demineralizer regenerates in place without sluicing the resins. The makeup demineralizing system supplies the plant makeup requirements, and the effluent is discharged into the 500,000 gallon condensate storage tank.

Chemical Treatment System

The chemical treatment system is used to maintain the water chemistry of the feedwater and consists of two hydrazine feed pumps, two ammonia feed pumps, one hydrazine storage tank and one ammonia storage tank. The hydrazine chemically removes the dissolved oxygen from the feedwater and the ammonia controls the pH.

Neutralization System

The neutralization system consists of two pumps, one blower and one tank. The neutralization tank is used to chemically neutralize the spent regenerant from the demineralization system and condensate polishing system to acceptable levels prior to discharge.

ACCOUNT 236 Turbine Plant Instrumentation and Control

Main Control Board

The main control board for the turbine plant is an integral part of the boiler-turbine-generator control (BTG) board described in the Account 227.

The requirements of the BTG board also apply to the turbine plant main control board.

Turbine Supervisory Panel

The turbine supervisory panel contains recorders to be mounted on the BTG board or the turbine and unit miscellaneous panel. These are the shaft vibration recorder, the eccentricity, speed and position recorder, and the multipoint expansion and temperature recorder. An indicator is provided for turbine shaft vibration phase angle.

EHC Control Cabinet

The electric hydraulic control (EHC) cabinet contains the control and indicating equipment required for the startup, normal operation and testing of the turbine. This cabinet is normally mounted as a subpanel on the boiler-turbine-generator board. Typical control functions available are:

- a. Selection of starting rates: slow, medium or fast
- b. Setting of turbine speed at startup
- c. Setting of load limit, and loading rate limit
- d. Chest/shell warming
- e. Turbine trip
- f. Selection of operating mode: standby, manual or remote
- g. Selection of load: increase or decrease

Typical indicating functions available are:

- a. Turbine speed
- b. Percentage of warming rate

703311

ACCOUNT 23

- c. Throttle steam pressure, first stage pressure, intermediate pressure
- d. Generator output, ^{MW}
- e. Acceleration, rpm/minute
- f. Valve positions for main stop valves, control valves and intermediate valves.

Typical testing functions available are:

- a. Thrust bearing wear detector test
- b. Backup overspeed trip test
- c. Electrical trip test
- d. Mechanical overspeed and piston trip test
- e. Testing of main stop valves, control valves and intermediate valves

Turbine Accessory Panels

Turbine accessory panels contain the instrumentation and control devices for various turbine auxiliary systems. These panels may be field mounted or control room mounted. Typical auxiliary systems are hydrogen and cooling water, turning gear motor control, and excitation control. Control panels for these systems are located in the field. There are turbine panels located in the control room, such as the turbine control panels and turbine supervisory instrument cabinet. These control room panels contain the circuitry for the turbine control devices, turbine supervisory instruments, and turbine stress measurement, and are mounted on the main control board or other vertical panels.

703312

ACCOUNT 23

Turbine Plant Heating, Ventilation and Air Conditioning Panels

These panels provide monitoring and control of the HVAC systems for buildings which house the turbine plant systems. Typical HVAC systems controlled from these panels are turbine building air handling system, intake structure ventilation system, and administration building ventilation system.

Turbine and Unit Miscellaneous Panel

The turbine plant miscellaneous panel is a vertical, walk-through control board with access doors at both ends. The panel provides the monitors and controls for auxiliary turbine systems such as turbine lube oil system and miscellaneous turbine monitoring recorders. The panel also provides the controls of the valving for the extraction steam lines, drain lines, and feedwater heater isolation. Instrumentation and controls that require constant operator attention are located in the BTG board.

Computer

The computer system described in the steam generator plant instrumentation and control section also monitors the turbine plant systems. One computer system is used for both the boiler and the turbine systems.

Turbine Plant Instrument Tubing and Fittings

The scope of supply of instrument tubing begins at the root valve and extends to the instrument shutoff valve. Materials and certification of instrument lines which are part of the pressure boundary are in accordance with the Instrument Society of America Standards.

703313

ACCOUNT 24

ACCOUNT 24 ELECTRIC PLANT EQUIPMENT

The electric plant equipment conveys the electric power generated in the plant to the low voltage bushings of the generator step-up (GSU) transformers, controls and meters the electric energy, and protects the components through which the power flows. It is the source of power for the plant auxiliaries and the plant control, protection and surveillance systems during normal operation and emergency conditions.

Continuous ratings of equipment and interrupting ratings of protective and disconnecting devices are based on equipment load tabulations, fault studies and voltage regulation studies. Equipment continuous current ratings are based on the maximum continuous load plus the largest spare auxiliary, and the effects of diversity. Short time intermittent loads are not included.

The electric plant design features are as follows:

- a. The plant auxiliary distribution system design is based on a source voltage variation of ± 5 percent.
- b. The main generator, the three single phase generator step-up (GSU) transformers and the four three phase unit auxiliary transformers (UAT) are interconnected with isolated phase bus. (Note: The GSU transformers, the connections to the switchyard and the switchyard equipment and materials are not included in the equipment list or base cost estimate for this study. However, provisions have been made in the plant design for location of the GSU transformers and routing of the connection to the switchyard. The GSU transformers and switchyard are shown on the drawings for clarity and completeness).
- c. Four unit auxiliary transformers (UAT), are connected to the generator main leads. Two are two winding transformers rated at 25.5 kV to 13.8 kV and two are three winding transformers rated at 25.5 kV to 4.16 - 4.16 kV.

ACCOUNT 24

- d. Two reserve auxiliary transformers (RAT), are connected to an offsite transmission system. One is a two winding transformer rated at 230 kV to 13.8 kV and the other is a three winding transformer rated at 230 kV to 4.16 - 4.16 kV.
- e. The medium voltage a-c distribution system is nominally 13.8 kV and 4.16 kV. Two separate and independent buses are provided for each voltage level. In addition, one 4.16 kV separate and independent bus is provided for the coal handling system and one for the SO₂ removal system.
- f. The low voltage a-c distribution systems are a nominal 480 volts. Twenty buses are provided for the plant process systems, six buses for the precipitators and ten buses for the coal handling and SO₂ removal systems.
- g. Two separate and independent 120 volt nominal, uninterruptible power supplies fed from the 480 volt buses are provided. One supplies power to instrumentation and control and the other to the plant computer.
- h. The auxiliary d-c distribution and supply system is nominally 125/250 volts, with a center-tapped battery system. One center-tapped station battery and distribution system is provided.
- i. One 125 volt battery charger is provided for each of the two 125 volt sections of the 125/250 volt center-tapped battery.
- j. Two redundant, 100 percent, 400 kW diesel generator units are provided as the power supply for the emergency buses, and are automatically connected to their respective buses when the unit and reserve auxiliary power supplies are not available.

Motor starting voltage and frequency and allowable operational variations, at which the required starting and operating torques are developed, are as follows:

- a. Continuous Operation of a-c Motors
 - 1) Voltage: ± 10 percent of rated
 - 2) Frequency: ± 5 percent of rated
- b. Starting and Short Time (Approx. 30 seconds) Operation of a-c Motors: Voltage: 80 percent of rated
- c. d-c Motors (Voltage): 210 to 280 volts

ACCOUNT 24

All emergency loads are furnished with a-c or d-c power from one of the following: the a-c emergency buses, the uninterruptible instrumentation and control a-c power supplies or the d-c buses.

The unit power supply for the plant electric auxiliaries is from the main generator through the unit auxiliary transformers. The reserve power supply is from the 230 kV offsite power supply via the reserve auxiliary transformers. The emergency power supply is from one of the two diesel generator units to the corresponding emergency a-c bus.

The availability design bases for the electric power system are tabulated in Table 8-5 of this section.

Table 8-6 in this section presents allowable ranges of temperature for electric equipment. Design ambient conditions for spaces housing electric equipment are based on these ranges and limits plus a minimum of five percent for margin.

ACCOUNT 241 Switchgear

The medium voltage metal-clad switchgear comprises two 13.8 kV buses and four 4.16 kV buses. Each bus is supplied by an independent winding of a UAT or by a shared winding of an RAT. Motors rated 2,500 hp and above are rated 13.2 kV and motors rated 250 hp to 2,250 hp are rated 4.0 kV. Transfer schemes are provided for automatically and manually transferring each bus between the reserve power supply and the unit power supply. Overcurrent protection is provided for all circuits. Differential

703316

ACCOUNT 24

protection, overload protection and zero sequence overcurrent ground protection is provided for all medium voltage motor circuits.

480 volt motor control centers are provided for power distribution to motors 100 hp and below, lighting loads and miscellaneous loads such as motor-operated valves, resistance heaters, heat tracing and motor space heaters.

ACCOUNT 242 Station Service Equipment

Four unit auxiliary transformers (UAT) and two reserve auxiliary transformers (RAT) are provided to furnish power to the plant auxiliary power system. Each UAT winding is sized with sufficient margin to carry the plant auxiliary load of its connected bus under the heaviest load conditions. Each RAT winding is sized to cover either the startup load of its two connected buses or the plant auxiliary load of either one of its connected buses at the heaviest load conditions. Transformer impedances are based on limiting fault current availability to switchgear capability considering voltage regulation. Each transformer is protected with differential protection schemes and sudden internal overpressure devices.

Unit substations are provided to transform the medium distribution voltages to the low distribution voltage for low voltage loads. Motors rated 125 hp through 200 hp are connected to the unit substations. Unit substation transformer impedances are based on matching switchgear capability to fault current availability considering voltage regulation. Overcurrent protection is provided for all circuits. Overload protection is provided for motor circuits. The unit substations for the cooling towers are fed

ACCOUNT 24

from a loop feeder. The distribution buses for the precipitators are also fed from a loop feeder.

The battery systems comprise the plant batteries and battery chargers. The plant 125/250 volt d-c bus is supplied from a 125/250 volt center tapped battery and two 125 volt battery chargers, one for each 125 volt section of the 125/250 volt battery. During normal operation, d-c power is supplied from the battery chargers. During emergency operation, d-c power is supplied from the batteries. During startup and shutdown, d-c power is supplied from whichever source is available.

Two redundant diesel generator units are provided to furnish emergency a-c power to the emergency buses.

Each diesel generator unit is provided with automatic starting systems that are initiated when loss of offsite power occurs. Minimum voltage that can be experienced at the diesel generator terminals during motor starting is 85 percent.

Two dual input solid state inverters are provided to serve as uninterruptible power sources for miscellaneous a-c and plant instrumentation loads. The inverters are supplied with power from the a-c buses through regulating transformers or directly from the station battery.

ACCOUNT 243 Switchboards

Two a-c power distribution panels are provided to distribute a-c power from the inverters to the 120/240 volt uninterruptible loads. They are configured as one panel per inverter.

703318

ACCOUNT 24

One d-c power distribution switchgear lineup is provided to distribute d-c power from the battery and its associated chargers.

Sixteen feet of control benchboard is provided in the main control board lineup for control and data acquisition of the main generator and the auxiliary electric power system.

One electric system relay panel lineup is provided for protection and metering of the main generators, the generator step-up transformers and the unit and reserve auxiliary transformers. The main generator is protected by high speed differential, ground current, loss-of-field, negative sequence overcurrent, and voltage restrained overcurrent relays. The main generator, the generator step-up transformers and the unit auxiliary transformers are protected by power directional and overall differential relays. The reserve auxiliary transformers are protected by power directional and differential relays.

ACCOUNT 244 Protective Equipment

The station grounding system provides the means for maintaining an effective ground at equipment and metal structures, protecting equipment and structures from galvanic corrosion and protecting personnel from dangerous potentials. Lightning protection schemes are provided for the stack and for the boiler structure.

ACCOUNT 245 Electrical Structures and Wiring Containers

This equipment provides mechanical protection for wire and cable routed between various equipment and buildings. The bulk of the raceways consist

ACCOUNT 24

of cable trays of various types. Raceways are routed in accordance with the same criteria as for cable routing. Fire stops are placed in cable trays wherever they penetrate floors or firewalls, and in other areas where their installation reduces the hazard of fire propagation.

ACCOUNT 246 Power and Control Wiring

Isolated phase bus is provided to interconnect generator terminals, GSU transformer low voltage terminals and UAT high voltage terminals. This is force-cooled with redundant active components in the cooling unit.

The plant wire and cable consists of three conductor and triplexed, single conductor power cable, multi-conductor control cable, coaxial, triaxial, shielded twisted pair and multi-shielded twisted pair and shielded quad instrument wire. Materials for insulation systems (ethylene-propylene rubber insulation with chloro-sulfonated polyethylene based jacket) are selected to provide optimum system performance in the areas of physical stability, tensile strength, flexibility, aging characteristics, resistance to abrasion, ozone (where required), water absorption, heat distortion, solvent extraction, self-extinguishing and non-propagating fire characteristics and resistance to corona effects where required. Wire and cable is separated by voltage and energy level to reduce heating and fault problems.

Wire and cable routing is governed by the following:

- a. Requirements for the power supply, control network and/or instrumentation signals

703320

ACCOUNT 24

- b. Requirements for loading
- c. Requirements for physical separation of different voltage and energy level circuits
- d. Avoidance of high hazard areas (e.g., areas subject to high ambient temperatures and fires)
- e. Simplicity of layout
- f. Ease of installation
- g. Ease of access.

703321

TABLE 8-5

AVAILABILITY RELATED DESIGN BASES FOR THE ELECTRIC POWER SYSTEM

1. Availability Oriented Design:
 - a. Considers interactive effects of plant operating requirements and natural phenomena to the extent that power required by the plant auxiliaries is available to fulfill the plant operating requirements.
 - b. Includes provisions to minimize fire or fire damage and to detect, confine and promptly extinguish any fire which might occur.
 - c. Includes provisions to allow periodic maintenance of systems and equipment.
2. Power sources, and power supplies, have sufficient backup and distribution systems have sufficient independence so that reduction of plant output will be prevented or minimized for loss of any source or bus.

703322

TABLE 8-6

DESIGN AMBIENT CONDITIONS FOR ELECTRIC EQUIPMENT

Type of Equipment	Limit	Equipment	Ambient Temperature Limit (Degrees F)	Equipment Space
Battery	Max	90		N/A
Battery	Min	77		80
Cable	Max	104		100
Cable	Min	N/A		N/A
All Other**	Max	104		100
All Other**	Min	40*		50*

* Or above dewpoint temperature, whichever is higher

** Sensitive relays and other electrical devices are placed in controlled environment spaces such as the control room, computer room, or battery room, as applicable.

703323

ACCOUNT 25

ACCOUNT 25 MISCELLANEOUS PLANT EQUIPMENT

Miscellaneous plant equipment includes systems for maintenance or provisions for plant equipment support requirements. Included are cranes and hoists, air, water and steam services, auxiliary boiler and associated equipment, and the plant fuel oil system.

ACCOUNT 251 Transportation and Lifting Equipment

Cranes and Hoists

A turbine-generator overhead traveling bridge crane located in the turbine hall has a main hoist capacity of 100 ton, and an auxiliary hoist of 30 ton capacity with a bridge span of 92 ft.

There are ten hoists provided, one of 10 ton capacity and nine of five ton capacity, which are capable of hoisting 30 ft in height.

ACCOUNT 252 Air, Water and Steam Service System

Compressed Air System

The plant compressed air system supplies service and instrument air for the entire plant. The compressed air system consists of three 50 percent (350 cfm each) reciprocating compressors, complete with intake filters, aftercoolers, air receivers and two 100 percent air dryers. Each compressor has an inlet silencer and filter.

Compressed air is supplied to the air receivers at a maximum of 150 psig and a minimum of 100 psig.

703324

ACCOUNT 25

Each compressor maintains air receiver tank pressure within desired operating range. A local control switch is provided to manually start and stop each compressor. To provide for an additional source of service air, an interconnection is made with the scot blower air compressor system.

Service Water System

The service water system supplies cooling water from the main condenser heat rejection (MCHR) system to the turbine building closed cooling water system. The system has three 50 percent capacity (5,500 gpm each), vertical wet pit service water pumps which are located in the circulating water pumphouse. Makeup water to the MCHR system is discharged near the suction of these pumps to lower the average temperature of the service water.

Fire Protection System

The fire protection system is designed to minimize the probability and effect of the occurrence of a fire. The system has three vertical wet pit fire pumps (1500 gpm each), two motor driven and one diesel driven; and one 50 gpm vertical wet pit jockey pump. The pumps are located in the fire pump house adjacent to and common with the makeup water pump house.

The jockey pump normally operates to maintain system pressure. One of the motor driven pumps is used in the event that the jockey pump cannot maintain system pressure. The second motor driven pump is started if the system pressure continues to drop. If system pressure is still falling the diesel driven pump is started. A booster pump is provided in the boiler house to supply water to the top elevations.

ACCOUNT 25

Potable Water System

Potable water is required for drinking, sanitary, and washing purposes at the plant. This water is supplied by the local municipal water supply system.

Auxiliary Boiler System

This system consists of two auxiliary oil fired boilers located in the auxiliary boiler room. The function of the auxiliary boiler system is to provide auxiliary steam during shutdown periods and during startup. The system flow diagram for the auxiliary steam is shown on Dwg. 6509.002-HSC-13.

Two 100 percent capacity auxiliary boilers are provided. These boilers are shop assembled, pressurized type, complete with forced draft fans, including ducting between fans, windboxes and breaching to the stack. These "packaged" boilers are equipped with automatic control of feedwater and combustion, including all protective devices.

Each auxiliary boiler is sized to provide the quantity of steam required for a cold start of the main unit, under the worst expected conditions. The estimated flow is 125,000 lb/hr each. The auxiliary boilers are designed to produce steam at 225 psig and 600 F.

The auxiliary boilers are manually started. They are capable of being normally started either locally or from the control room. Each phase of the startup procedure is separately initiated. The auxiliary boiler is

703326

ACCOUNT 25

controlled to shut down when the steam-flow falls below the minimum flow capability of the boiler during plant startup.

Fuel oil atomization utilizes steam from the auxiliary steam system. Compressed air and/or mechanical atomizing burners are provided for startup when steam is not available. Each boiler discharges exhaust gases through separate flues. Forced draft flow control is provided by inlet dampers. Boiler blowdown is accomplished manually without heat recovery equipment.

ACCOUNT 253 Communications System

Local Communications System

The communication system consists of an intercommunication and paging system, a telephone system, and a sound-powered telephone system. These systems are designed to provide communications between various parts of the plant for all conditions of operation.

ACCOUNT 254 Furnishings and Fixtures

Instrument Shop Apparatus

Instrument shop apparatus are provided for testing, calibration, repairing, and routine maintenance of the plant instrumentation and control devices.

A typical list of instrument shop apparatus is provided below:

- a. Dead weight tester
- b. Pneumatic calibrator equipment
- c. Decade resistance box
- d. Digital volt meter
- e. Variable voltage and current sources

703377

ACCOUNT 25

- f. Potentiometer
- g. Oscilloscope
- h. Electronic counter
- i. Stop watch
- j. Resistance and impedance bridges
- k. Megge.
- l. Pressure g-uges
- m. Meters: d-c (MA, Amp, Volts), a-c (Amp, Volts)

Meteorological Monitoring System

The meteorological monitoring system provides all equipment essential for the monitoring and recording of the atmospheric parameters of the plant prior to, during construction, and over the life of the plant. The equipment for the system consists of a meteorological tower and various meteorological monitoring instruments.

Water Quality Monitoring System

The water quality monitoring system monitors the rates and concentrations of contaminants in the plant effluent discharge. Typical variables measured are chlorine, suspended solids, pH, oil and grease. Sampling techniques are established to yield representative batches or flows of the effluent discharge. Analytical data are recorded in proper form for immediate, as well as future interpretation and use.

703328

Thermal Effluent Monitoring System

This system monitors the temperature of the effluent discharged from the plant. The system provides basic data to evaluate the thermal effect of the plant effluent.

Air Quality Monitoring

Air quality monitoring is performed by the stack gas monitoring system which provides for the measurement and recording of pollutants related with the stack gas. Measurements are made of particulate load, and of sulfur dioxide and nitrogen oxide concentrations. Concentration measurements are corrected for diluting air by measuring oxygen concentration in the stack gas.

Emission standards for particulates, sulfur dioxide and nitrogen oxide are in accordance with CFR 40, Protection of Environment, Part 60, Subpart D, and other applicable local and state regulations.

The detecting instruments are of the in-situ type, i.e., with sensing devices located in the stack. Withdrawal and conditioning of stack gas samples are not required. Sulfur dioxide and nitrogen oxide is reported in terms of concentration, i.e., μ g/m³ or ppm.

Particulate emission is reported in mass flow units, i.e., lbs/hr by combining measurements of particulate concentration and the mass flow rate of stack gas. Emission rate is integrated and logged daily. Sampling ports are provided for conformance testing.

703329

ACCOUNT 25

ACCOUNT 255 Waste Water Treatment Equipment

The wastewater treatment equipment is designed to treat all plant wastewater. This includes water runoff from coal piles, regenerant effluents from demineralizers, metal cleaning wastes and floor drain discharges.

Two 1,350,000 gallon holding tanks are provided for retention and treatment of metal cleaning wastes and coal pile runoff. Lime is fed to the tanks to raise the wastewater pH. Iron is effectively precipitated at pHs greater than 8.0. After allowing for the sludge to settle, sludge is withdrawn from the tanks and dewatered by two vacuum filters. Supernatant from the holding tanks is pumped to a 5,000 gallon pH adjustment tank. The wastewater subsequently passes through one of two 1,350,000 gallon earthen settling basins before discharge.

Regenerants from the demineralizers are treated in a 40,000 gallon neutralization tank. Acid and caustic feed systems are provided for neutralization. The treated wastewater is passed through the earthen settling basins prior to discharge.

Floor drains are collected in several sumps located in the plant, and pumped to a central API separator for oil and grease and suspended solids removal. Effluent from the separator is passed through the earthen settling basins prior to discharge.

703330

ACCOUNT 26

ACCOUNT 26 MAIN CONDENSER HEAT REJECTION SYSTEM

The main heat rejection system is a circulating water system consisting of structures and mechanical equipment which serve the main condensers and service water system to reject the plant heat through two mechanical draft wet cooling towers. Makeup water extracted from the North River initially passes through traveling screens. The raw water is then clarified, and chemicals are injected for pH and fouling control. Fouling within the towers is controlled by continuous blowdown to the river in order to maintain the concentration at less than ten times that of the makeup water.

ACCOUNT 261 Structures

Makeup Water Intake and Discharge Structures

The makeup water intake and discharge structures are located along the riverbank west of the main plant structures. The intake basin is 15 ft-6 in wide by 26 ft long by 30 ft deep and is below plant grade. The volume of the basin is approximately 12,100 cu ft. The north wall of the structure has a 5 ft wide by 9 ft long and 30 ft high extension which houses the fire pumps. The structure is reinforced concrete with foundation mat bearing on rock. There are two intake chambers and two makeup water pumps supported from the reinforced concrete basin roof slab. The intakes are protected by bar racks, trash rakes, stop logs, traveling screens and a trash pit. Fish escapes are also provided. A channel is excavated in the river bottom from the ship channel to the intake structure to ensure an adequate supply of water during low tide conditions. Interior walls are reinforced and masonry concrete. A battery and switchgear room are

1703331

located at grade adjacent to the basin and supported on spread footings. The floor, roof, exterior walls and interior walls are reinforced concrete. The blowdown discharge is provided by concrete pipes running between the circulating water pumps discharge and the river.

Circulating Water Pump House

The circulating water pump house is a reinforced concrete structure located between the turbine building and the cooling towers and supported on a three ft thick reinforced concrete foundation. The superstructure has common walls with the turbine building and administration building. The circulating water pump basin foundation is supported on rock 28 ft below grade sloping upwards to the cooling tower water basins four ft below grade. The circulating water basin is approximately 60 ft wide, 53 ft long and 27 ft high to the operating floor. Attached to the west end of the three-bay circulating water pump basin is a service water pump basin founded 12 ft below grade. The basin is 12 ft wide, 17 ft long and 16 ft high to the operating floor. The foundation also slopes upwards to the cooling tower water basins. The approximate volume of the two basins is 90,000 cu ft.

The exterior walls, base mat, operating floor slab and interior columns supporting the operating floor are reinforced concrete. Portions of the operating floor are grating. The intake areas are protected by panel screens and stop logs. A 40 ft wide, 53 ft long and 13 ft high equipment room is located on the reinforced concrete portion of the operating slab. The room houses the circulating water pumps and electrical equipment.

ACCOUNT 26

The equipment room is masonry construction with a built-up roof on metal deck.

Makeup Water Pretreatment Building

The makeup water pretreatment building, located west of the main plant structures, is a two story steel framed structure 60 ft wide, 100 ft long and 30 ft high. The building volume is approximately 180,000 cu ft. It is supported on reinforced concrete spread footings on rock. The reinforced concrete ground floor is located six ft below grade. The intermediate floor is reinforced concrete supported on metal deck on steel framing. The roof is concrete channel plank covered with a roofing membrane. The exterior walls are insulated metal siding and the interior walls are concrete block.

The building houses the sand filters, carbon filters, chemical feeds, sludge dewatering equipment and all other equipment and accessories required for a complete water pretreatment system.

The building has a heating and ventilation system which consists of four 25,000 cfm roof ventilators for cooling and four electric unit heaters for heating.

ACCOUNT 262 Mechanical Equipment

Circulating Water Pumps

There are three 33-1/3 percent capacity circulating water pumps, of the mixed flow vertical type. Each pump is designed for a flow rate of 104,300 gpm with a total dynamic head of 92 ft. Circulating water pump motors

ACCOUNT 26

are 3,000 hp each, operating at a synchronous speed of 400 rpm. The pumps are located within a pump house well where the water flows from the individual cooling tower basins by gravity. The pumps discharge the water to the main condensers, where heat is absorbed. The water is then returned to the distribution system of the towers. Water flow from each individual cooling tower is controlled simply by an overflow from the tower basin.

Cooling Towers

There are two main mechanical draft wet cooling towers, each sized for one half of the requirements. Each tower is designed to cool 162,000 gpm of water from 118 F to 92 F when operating at a wet bulb temperature of 74 F. Each tower employs a reinforced concrete-filled structure combined with components for water distribution, fill splash service, support system, drift eliminators, louvers and fan deck. The fan deck provides a stable base for the eight fan cylinders and mechanical equipment. Each fan is 33 ft in diameter and operates in an 18 ft high, glass reinforced polyester, velocity recovery fan stack. The hot water distribution system includes a circular flume distribution basin and metering orifice which uniformly distributes the hot water over the fill. The distribution basin is divided into thirds by means of concrete dividers. This design allows one third of the tower to be removed from service with the full flow distributed over the remainder of the tower.

Main Cooling Tower Make-up and Blowdown Systems

Two 100 percent mixed flow vertical type pumps are provided for the makeup system. Each pump is rated at 10,100 gpm developing a total dynamic head

703334

ACCOUNT 26

of 35 ft and is driven by a 100 hp motor. The pumps are located at the intake structure adjacent to the river. Two five ft wide by 29 ft high traveling screens are provided, each suitable for 50 percent of the flow requirements with an approach velocity of 1/2 ft per second. Serving the traveling screens are two 100 percent capacity screen wash pumps with a flow rate of 90 gpm and a total dynamic head of 100 ft to wash the screens when they require cleaning. Two screen speeds are provided, a high and low speed, for removal of materials. Vertical trash racks with automatic rake are provided ahead of the traveling screens to remove debris.

Makeup Water Pretreatment Plant

The source of makeup water is from the North River. The purpose of this system is to precondition the raw river water which is used principally as makeup to the circulating water system. However, a small portion of the clarified water is used as makeup to the demineralizer.

The primary objective is to remove debris and suspended solids characteristically present in river water. The amount of solids and debris contained in the raw influent is subject to wide fluctuations due to seasonal changes and natural river environment.

Initially, the influent water is clarified within a rectangular vessel. Various chemicals are used to achieve optimum settling and removal of solid particulates. The clarified effluent is then used directly as makeup to the circulating water system.

703335

ACCOUNT 26

Chlorination at approximately 5,000 lb a day is included in the clarification step to oxidize naturally occurring organic matter. Chlorination is also applied directly to the recirculating cooling water on an intermittent basis to minimize biological fouling within the condenser and throughout the piping system. Sulfuric acid is also used for pH control to minimize formation of scale on the heat exchanger surfaces.

Accordingly, any serious operation and/or maintenance problems resulting from plugging, clogging, or development of bacteriological growths throughout the plant piping and cooling systems are practically eliminated. The water used as makeup to the demineralizer is first filtered and dechlorinated. In addition, the clarified water is used for the initial filling of the fire protection system and for general use throughout the power plant.

703336

2.4 CONSTRUCTION SUPPORT ACTIVITIES

The description associated with accounts 91 through 93 addresses the construction support activities. This portion of the cost estimate (Volume III, Section 9) is called the "indirect cost".

ACCOUNT 91 CONSTRUCTION SERVICES

The services, functions, expenses, taxes and other indirect costs are contained in the listed code of accounts.

ACCOUNT 911 Temporary Construction Facilities

The costs for temporary construction and facilities are costs of all temporary structures, janitorial services and maintenance of temporary facilities, guards and security, roads, parking lots, laydown areas, and temporary electrical and piping, temporary heat, air, steam and water systems, general cleanup, etc.

ACCOUNT 912 Construction Tools and Equipment

The costs for construction tools and equipment are the cost of rental and/or purchase of construction equipment, small tools, consumables (fuel and lubricants) and maintenance of construction equipment.

ACCOUNT 913 Payroll Insurance and Taxes

These include insurance and taxes related to craft labor such as Social Security taxes and state unemployment taxes at 9.3 percent of the cost of total craft labor. Workmen's Compensation Insurance and Public Liability and Property Damage Insurance are included at 4.9 percent of the cost of total craft labor.

ACCOUNT 91-92

ACCOUNT 914 Permits Insurance and Local taxes

This account includes builders all-risk insurance, local fees and permits, state and local taxes and liability insurance.

Builders all-risk insurance is an allowance based upon in-house experience for the cost of their item during the project construction phase.

ACCOUNT 92 HOME OFFICE ENGINEERING AND SERVICES

ACCOUNT 921 Home Office Services

These services are associated with home office engineering and design, procurement and expediting activities, estimating and cost control, engineering planning and scheduling, home office reproduction services as well as expenses associated with performance of the above functions (i.e., telephone, postage, computer use, travel, etc.). These costs include salaries of personnel, direct payroll-related costs (DPC), overhead loading, expenses and fee for these services consistent with contractual terms.

ACCOUNT 922 Home Office Quality Assurance

This includes the services of home office quality assurance engineers and staff personnel engaged in work on the project. Services include reviews, audits, and vendor surveillance as required for design and construction of the facility. Costs included are salaries, DPC, overhead loading and expenses (i.e., travel) of these individuals. Manhours required for these services and their costs are based upon UE&C experience in this area.

703338

ACCOUNT 92-3

ACCOUNT 923 Home Office - Construction Management

These services include those of the construction manager and his assistants. Services of construction planning and scheduling, construction methods, labor relations, safety and security personnel are utilized as required. Costs include salaries, DPC, overhead loading, and expenses.

ACCOUNT 93 FIELD OFFICE ENGINEERING AND SERVICE

ACCOUNT 931 Field Office Expenses

These expenses include costs associated with purchase and/or rental of furniture and equipment (including reproduction), communication charges, postage, stationery, other office supplies, first aid and medical expenses.

ACCOUNT 932 Field Job Supervision

This management function includes the resident construction superintendent and his assistants, craft labor supervisors, field accounting, payroll and administrative personnel, field construction schedulers, field purchasing personnel, warehousemen, survey parties, stenographers and clerical personnel. Costs include salaries, DPC, overhead loading, relocation costs of key personnel, and fee. The estimates assume that size of supervisory forces is a function of total direct employed craft labor. The supervision requirement was calculated to be the number of manhours equal to about 10 percent of 85 percent of total craft labor.

ACCOUNT 933 Field - Quality Assurance

These services include those of personnel located at the job site engaged in inspection, required documentation of equipment and inspection of construction activities. Costs included are salaries, DPC, and overhead loading.

ACCOUNT 93

ACCOUNT 934 Test and Startup Engineering

These services are associated with preparation of startup and plant operation manuals and test procedures, direction and supervision of all testing of equipment and systems as the plant nears completion and direction of startup of the facility. Costs include salaries, DPC, overhead loading, and miscellaneous related expenses. Costs of any craft labor required for startup and testing activities are included in the appropriate Direct Cost line items.

Indirect accounts 913, 921, 922, 923, 932, 933 and 934 are included under factory costs in the cost estimate to differentiate them from site related craft labor and material costs.

703340

SECTION 9
COST ESTIMATE

703341

POOR
ORIGINAL

SECTION 9

COST ESTIMATE

9.1 INTRODUCTION

This section contains the details of the total base construction cost estimate for the high sulfur coal (HSC) plant described in Section 8. The criteria and plant description used to govern the development of the cost estimate are specified in Sections 7 and 8. The cost estimate reflects the reference plant design at the "Middletown" hypothetical site described in Section 12 entitled, "Site Description".

The total base construction cost for the 794 MWe HSC is \$335,248,353 or \$422/kW based on July 1, 1976 prices.

The cost estimate presented in this section is summarized at the two and three digit level of accounting detail in Tables 9-2 and 9-3 respectively. The cost estimate presented here is a total base construction cost that does not include contingency, interest during construction or escalation.

The total base construction cost is organized in accordance with the expanded AEC Code of Accounts (USAEC Report NUS-531). Therefore, it corresponds in structure to the Plant Description in (Section 9) and the equipment list in (Section 11). This is done for the reader's convenience in relating the material presented in the different sections of the report.

The total base construction cost consists of "direct" and "indirect" costs. The "direct cost" (Accounts 20 through 26) encompasses the cost of the power plant structures and systems. The "indirect cost" (Accounts 91 through 93) consists of the costs of the construction support activities.

A breakdown of the steam generation (boiler) equipment scope is shown in Account number 220A, and a lump sum cost is shown in Account 220A.1. The installation costs for the steam generator boiler equipment are distributed throughout the three digit level accounts.

It should be noted that certain factory and site material quantities in the cost estimate are listed in two successive accounts rather than in one account. This situation occurs because the computer program is designed to handle material quantities that exceed six digits in this manner.

9.2 COST ESTIMATE EXCLUSIONS

The list of items excluded from the cost estimate is shown in Table 9-1. Generally, these items are sensitive to the particular policies and preferences of the individual utility and to the specific plant and site being considered.

A list of abbreviations is provided in Table 9-4 entitled, "Glossary of Significant Abbreviations".

703343

TABLE 9-1

794 MWe HSC COST ESTIMATE EXCLUSIONS

1. Main Transformer, Switchyard and Transmission Facility Costs
2. Owner's Costs, Including Consultants, Site Selection, etc.
3. Waste Disposal Costs
4. Fees and Permits - Federal, State, Local
5. State and Local Taxes
6. Spare Parts
7. Interest During Construction
8. Initial Coal Supply
9. FGD disposal land and site development
10. Escalation
11. Contingency

702248

COST BASIS
07/76

TABLE 9-2
COST ESTIMATE SUMMARY
TWO DIGIT ACCOUNT LEVEL
794 MWe COAL FIRED PLANT
MIDDLETOWN, USA

Page 1 of 5

09/16/77

ACCT NO *****	ACCOUNT DESCRIPTION *****	FACTORY EQUIP. COSTS *****	SITE LABOR HOURS *****	SITE LABOR COST *****	SITE MATERIAL COST *****	TOTAL COSTS *****
20 .	LAND AND LAND RIGHTS				2,000,000	2,000,000
21 .	STRUCTURES + IMPROVEMENTS	2,084,775	1196623 MH	14,065,057	21,865,139	38,014,971
22 .	BOILER PLANT EQUIPMENT	75,728,992	2581618 MH	32,449,814	11,967,198	120,146,004
23 .	TURBINE PLANT EQUIPMENT	49,109,337	1007161 MH	12,805,021	3,268,137	65,182,495
24 .	ELECTRIC PLANT EQUIPMENT	7,546,575	1080187 MH	13,252,709	8,132,414	28,931,698
25 .	MISCELLANEOUS PLANT EQUIPT	5,188,759	22' 88 MH	2,842,632	704,962	8,736,353
26 .	MAIN COND HEAT REJECT SYS	8,596,199	207976 MH	2,564,037	881,496	12,041,732
2 .	TOTAL DIRECT COSTS	148,254,637	6295553 MH	77,979,270	48,819,346	275,053,253
91 .	CONSTRUCTION SERVICES	11,892,000	972000 MH	10,112,500	13,213,000	35,217,500
92 .	HOME OFFICE ENGRG.&SERVICE	14,350,000				14,350,000
93 .	FIELD OFFICE ENGRG&SERVICE	9,727,600			900,000	10,627,600
9 .	TOTAL INDIRECT COSTS	35,969,600	972000 MH	10,112,500	14,113,000	60,195,100
	TOTAL BASE COST	184,224,237	7267553 MH	\$88,091,770	\$62,932,346	335,248,353

203315

TABLE 9-3
 COST ESTIMATE SUMMARY
 THREE DIGIT ACCOUNT LEVEL
 794 MWe COAL FIRED PLANT
 MIDDLETOWN, USA

COST BASIS
 07/76

ACCT NO	ACCOUNT DESCRIPTION	FACTORY EQUIP. COSTS	SITE LABOR HOURS	SITE LABOR COST	SITE MATERIAL COST	TOTAL COSTS
.....
20 .	LAND AND LAND RIGHTS				2,000,000	2,000,000
211.	YARDWORK	115,500	185757 MH	1,916,048	2,279,924	4,311,472
212.	STEAM GENERATOR BUILDING	427,075	406914 MH	4,979,323	10,868,612	16,275,010
213.	TURBINE, HEATER, CONTROL BLD	278,378	234496 MH	2,834,517	4,731,801	7,844,696
218B.	ADMINISTRATION+SERVICE BLD	197,098	53761 MH	656,967	724,294	1,578,359
218I.	ELECTRICAL SWITCHGR BLDGS	20,055	6306 MH	77,184	40,878	138,117
218M.	COAL CAR THAW SHED		2023 MH	23,330	12,435	35,765
218N.	ROTARY CAR DUMP BLDG+TUNNL	3,485	37186 MH	431,915	374,245	809,645
218O.	COAL BREAKER HOUSE	54,150	18997 MH	236,034	335,728	625,912
218P.	COAL CRUSHER HOUSE	79,945	14545 MH	181,010	179,834	440,789
218Q.	BOILER HOUSE TRANSFR TOWER	1,780	2909 MH	36,917	68,164	106,861
218R.	ROTARY PLOW MAINTNCE SHED	6,040	90639 MH	1,034,587	793,553	1,834,180
218T.	LOCOMOTIVE REPAIR GARAGE	11,570	4715 MH	58,298	64,460	134,328
218U.	MATERIAL HANDL+SERVICE BLD	17,735	10570 MH	129,195	135,343	282,273
218V.	WASTE WATER TREATMENT BLDG	4,964	8468 MH	99,631	74,531	179,126
218W.	MISC COAL HANDLING STRUCT		61427 MH	705,337	1,028,397	1,733,734
219.	STACK STRUCTURE	867,000	57910 MH	664,764	152,940	1,684,704
21 .	STRUCTURES + IMPROVEMENTS	2,084,775	1196623 MH	14,065,057	21,865,139	38,014,971

346

COST BASIS
07/76

TABLE 9-3
COST ESTIMATE SUMMARY
THREE DIGIT ACCOUNT LEVEL
794 MWe COAL FIRED PLANT
MIDDLETOWN, USA

Page 3 of 5
09/16/77

ACCT NO	ACCOUNT DESCRIPTION	FACTORY EQUIP. COSTS	SITE LABOR HOURS	SITE LABOR COST	SITE MATERIAL COST	TOTAL COSTS
*****	*****	*****	*****	*****	*****	*****
220A.	FOSSIL STEAM SUPPLY SYSTEM	39,360,000	736455 MH	9,124,677	912,468	49,397,145
221.	STEAM GENERATING SYSTEM	979,713	28831 MH	374,450	47,277	1,401,440
222.	DRAFT SYSTEM	7,590,628	268042 MH	3,500,053	1,092,385	12,183,066
223.	ASH + DUST HANDLING SYSTEM	3,548,225	103957 MH	1,340,724	165,109	5,054,058
224.	FUEL HANDLING SYSTEMS	6,501,165	125983 MH	1,643,065	398,969	8,543,199
225.	FLUE GAS DESULFUR STRUCT	63,571	53905 MH	654,166	775,952	1,493,689
226.	DESULFURIZATION EQUIPMENT	15,590,690	1057773 MH	13,365,188	7,414,408	36,370,286
227.	INSTRUMENTATION + CONTROL	1,925,000	76681 MH	937,320	68,374	2,930,694
228.	BOILER PLANT MISC ITEMS	170,000	129991 MH	1,510,171	1,092,256	2,772,427
22 .	BOILER PLANT EQUIPMENT	75,728,992	2581618 MH	32,449,814	11,967,198	120,146,004
231.	TURBINE GENERATOR	27,729,086	230575 MH	2,846,760	998,776	31,574,622
233.	CONDENSING SYSTEMS	6,953,103	135825 MH	1,792,069	182,936	8,928,108
234.	FEED HEATING SYSTEM	8,261,530	176356 MH	2,288,392	229,313	10,779,235
235.	OTHER TURBINE PLANT EQUIP.	5,609,618	373461 MH	4,839,535	508,048	10,957,201
236.	INSTRUMENTATION + CONTROL	556,000	5383 MH	65,798	3,290	625,088
237.	TURBINE PLANT MISC ITEMS		85561 MH	972,467	1,345,774	2,318,241
23 .	TURBINE PLANT EQUIPMENT	49,109,337	1007161 MH	12,805,021	3,268,137	65,182,495

203317

TABLE 9-3
 COST ESTIMATE SUMMARY
 THREE DIGIT ACCOUNT LEVEL
 794 MWe COAL FIRED PLANT
 MIDDLETOWN, USA

Page 4 of 5
 09/16/77

COST BASIS
 07/76

ACCT NO	ACCOUNT DESCRIPTION	FACTORY EQUIP. COSTS	SITE LABOR HOURS	SITE LABOR COST	SITE MATERIAL COST	TOTAL COSTS
*****	*****	*****	*****	*****	*****	*****
241.	SWITCHGEAR	3,793,000	58640 MH	725,412	72,980	4,591,392
242.	STATION SERVICE EQUIPMENT	2,896,500	49487 MH	606,235	117,832	3,620,367
243.	SWITCHBOARDS	428,000	9030 MH	111,609	57,563	599,172
244.	PROTECTIVE EQUIPMENT		76400 MH	942,760	622,000	1,564,760
245.	ELECT. STRUC + WIRING CONTR		500709 MH	6,121,638	2,358,000	8,479,638
246.	POWER & CONTROL WIRING	429,275	385921 MH	4,745,055	4,902,039	10,076,369
24 .	ELECTRIC PLANT EQUIPMENT	7,546,575	1080187 MH	13,252,709	8,132,4	28,931,698
251.	TRANSPORTATION & LIFT EQPT	1,160,000	7200 MH	92,531	89,223	1,341,754
252.	AIR, WATER + STEAM SERVICE SY	2,714,359	154730 MH	2,002,613	254,167	4,971,139
253.	COMMUNICATIONS EQUIPMENT	100,000	25000 MH	307,386	154,656	562,042
254.	FURNISHINGS + FIXTURES	653,700	6720 MH	78,761	16,094	748,555
255.	WASTE WATER TREATMENT EQPT	560,700	28338 MH	361,341	190,822	1,112,863
25 .	MISCELLANEOUS PLANT EQUIPT	1,88,759	221988 MH	2,842,632	704,962	8,736,353
261.	STRUCTURES	78,213	31157 MH	596,665	556,810	1,231,688
262.	MECHANICAL EQUIPMENT	8,517,986	156819 MH	1,967,372	324,686	10,810,044
26 .	MAIN COND HEAT REJECT SYS	8,596,199	207976 MH	2,564,037	881,496	12,041,732
2 .	TOTAL DIRECT COSTS	148,254,637	6295553 MH	77,979,270	48,819,346	275,053,253

09/16/77

TABLE 9-3
COST ESTIMATE SUMMARY
THREE DIGIT ACCOUNT LEVEL
794 MWe COAL FIRED PLANT
MIDDLETOWN, USA

Page 5 of 5

COST BASIS
07/76

09/16/77

ACCT NO *****	ACCOUNT DESCRIPTION *****	FACTORY QUIP. COSTS *****	SITE LABOR HOURS *****	SITE LABOR COST *****	SITE MATERIAL COST *****	TOTAL COSTS *****
911.	TEMPORARY CONSTRUCTION FAC		847000 MH	8,575,000	4,143,000	12,718,000
912.	CONSTRUCTION TOOLS & EQUIP		125000 MH	1,537,500	8,590,000	10,127,500
913.	PAYROLL INSUR NCE & TAXES	11,892,000				11,892,000
914.	PERMITS, INS. & LOCAL TAXES				480,000	480,000
915.	TRANSPORTATION					
91 .	CONSTRUCTION SERVICES	11,892,000	972000 MH	10,112,500	13,213,000	35,217,500
921.	HOME OFFICE SERVICES	13,425,000				13,425,000
922.	HOME OFFICE O/A					
923.	HOME OFFICE CONSTRUCTN MGMT	925,000				925,000
92 .	HOME OFFICE ENGRG. & SERVICE	14,350,000				14,350,000
931.	FIELD OFFICE EXPENSES				900,000	900,000
932.	FIELD JOB SUPERVISION	9,216,000				9,216,000
933.	FIELD O. IC	174,600				174,600
934.	PLANT ST. UP & TEST	337,000				337,000
93 .	FIELD OFFICE ENGRG & SERVICE	9,727,600			900,000	10,627,600
9 .	TOTAL INDIRECT COSTS	35,969,600	972000 MH	10,112,500	14,113,000	60,195,100
	TOTAL BASE COST	184,224,237	7267553 MH	\$88,091,770	\$62,932,346	335,248,353

TABLE 9-4

GLOSSARY OF SIGNIFICANT ABBREVIATIONS

AC	Acre	Hg	Mercury
A/C	Air Conditioning	HI	High
a-c	Alternating Current	HOP	Hopper
AUX	Auxiliary	HP	High Pressure
		HP	Horse Power
BD	Board	HSC	High Sulfur Coal
BFP	Boiler Feed Pump	HVAC	Heating Ventilation and Air Conditioning
Btu	British Thermal Unit		
BU	Built Up	HW	Hot Water
		HX	Heat Exchanger
CI	Cast Iron	Hz	Hertz
CLG	Cooling		
CLNG	Cleaning	IC	Instrument Control
CPMNT	Component	I&C	Instrumentation & Control
CS	Carbon Steel	IN	Inches
CU	Copper	INJ	Injection
CY	Cubic Yards	INS	Insurance
		INSUL	Insulation
d-c	Direct Current		
DETER	Detergent	Kg	Kilo Gram
DISPL	Displacement	kV	Kilo Volt
DV	Division	kW	Kilo Watt
DRNS	Drains		
		LB	Pounds
EA	Each	LD	Load
EL	Elevation	LF	Linear Feet
EMG	Emergency	LO	Low
EQ	Equipment	LP	Low Pressure
E/P	Electro-Pneumatic	LSB	Last Stage Blades
EPA	Environ. Protection Agency	LS/LT	Lump Sum/Lot
EVAC	Evacuating		
EVAP	Evaporative	MCC	Master Control Center
EXH	Exhaust	MCR	Main Control Room
		MCR	Maximum Continuous Rating
FDTN	Foundation	ME	Mechanical Equipment
FGD	Flue Gas Desulfurization	MER	Mechanical Equipment Room
FL	Fuel	MISC	Miscellaneous
FT	Feet	MN	Main
FWH	Feed Water Heater	MON	Monitor
FX	Fixtures	MTR	Motor
		MU	Makeup
GALV	Galvanized	MWe	Megawatt Electric
GEN	Generator	MWt	Megawatt Thermal
gph	Gallons Per Hour		
gpm	Gallons Per Minute	OA	Outside Air
GR	Gear	OP	Operating
GSKT	Gasket		
GSU	Generator Step Up		

TABLE 9-4 (Continued)

PCT	Percent	TB	Turbine Building
P&M	Pump and Motor	T/C	Thermocouple
PMP	Pump	T-G	Turbine-Generator
POS	Positive	TK	Tank
P	Pounds per Square Inch Absolute	TPH	Tons Per Hour
Psig	Pounds per Square Inch Gravity	TN	Tons
PURIF	Purification	UAT	Unit Auxiliary Transformers
PVC	Poly Vinyl Chloride	VAC	Vacuum
QA	Quality Assurance	V	Volt
Q./QC	Quality Assurance/Quality Control	VWO	Valves Wide Open
RC	Recycle	WST	Waste
RECIRC	Recirculation	WTR	Water
REGEN	Regenerating	XCHGR	Exchanger
RES	Restraint	XFER	Transfer
RM	Room	XFMR	Transformer
rpm	Revolutions Per Minute	XPORT	Transport
SCFM	Standard Cubic Feet Per Minute		
SEQ	Sequence		
SF	Square Feet		
SS	Stainless Steel		
STA	Storage		
STL	Steel		
SYS	System(s)		
SW	Switch		

703351

SECTION 10
DRAWINGS

10

703352

POOR
ORIGINAL

SECTION 10

DRAWING LIST

794 MWe HIGH SULFUR COAL-FIRED PLANT

This section contains the drawings for the 794 MWe High Sulfur Coal Plant described in Section 8. The drawings include Plot Plan, General Arrangement Drawings, Flow Diagrams, Block Diagrams and One Line Diagrams.

<u>Drawing Number</u>	<u>Title</u>
6509.002-HSC-1	Symbol Legend for Flow and Block Diagrams
6509.002-HSC-2	Plot Plan
6509.002-HSC-3	General Arrangement Plan "A-A" (63'-0" & 180'-0") Elevations
6509.002-HSC-4	General Arrangement Plans (18'-0" & 40'-0") Elevations
6509.002-HSC-5	Flow Diagram - Balanced Draft System
6509.002-HSC-6	Steam Heat Balance Diagram (Maximum Guaranteed)
6509.002-HSC-7	Flow Diagram - Main Steam, Hot Reheat & Cold Reheat System
6509.002-HSC-8	Flow Diagram - Extraction Steam System
6509.002-HSC-9	Flow Diagram - Condensate and Feedwater System
6509.002-HSC-10	Flow Diagram - Heater Drains and Vents System
6509.002-HSC-11	One Line Diagram - Unit Electrical Distribution
6509.002-HSC-12	One Line Diagram - d-c Distribution System
6509.002-HSC-13	Flow Diagram - Auxiliary Steam System
6509.002-HSC-14	Flow Diagram - Coal Handling System
6509.002-HSC-15	Flow Diagram - Bottom Ash Handling System
6509.002-HSC-16	Block Diagram - Plant Fire Protection System
6509.002-HSC-17	Block Diagram - Waste Water Treatment System
6509.002-HSC-18	Block Diagram - Lime SO ₂ Scrubber System
6509.002-HSC-19	General Arrangement - Lime SO ₂ Scrubber Plan
6509.002-HSC-20	General Arrangement-Lime SO ₂ Scrubber Section

VALVE BODIES

<u>OPEN</u>	<u>CLOSED</u>	
		SLIDING GATE
		GATE
		GLOBE
		BUTTERFLY
		THREE WAY
		ANGLE
		SAFETY OR RELIEF
		SWING CHECK
		STOP CHECK
		SAUNDERS (WEIR)
		POWER ASSISTED NON RETURN
		POWER ACTUATED PRESSURE RELIEF

VALVE ACTU

T	HAND
	GEAR
	ELEC
	SOLE (SPR)
	PIST
	ELEC
	DIAP (SPR)

PIPING SYMBOLS

	EXPANSION JOINT
	ORIFICE
	REDUCER

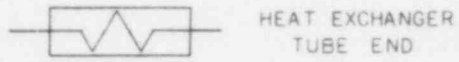
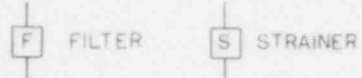
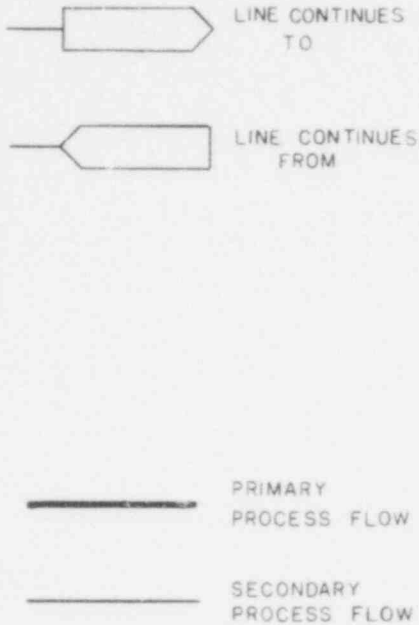
INSTRUME

FLOW

703354

EQUIPMENT SYMBOLS

LINE DESIGNATIONS



ATOR

WHEEL - MANUAL

- MANUAL

TRIC MOTOR

NOID
(ING OPPOSED)

ON OR CYLINDER


TRO - HYDRAULIC

HRAGM
(ING OPPOSED)

NT SYMBOL

NOZZLE

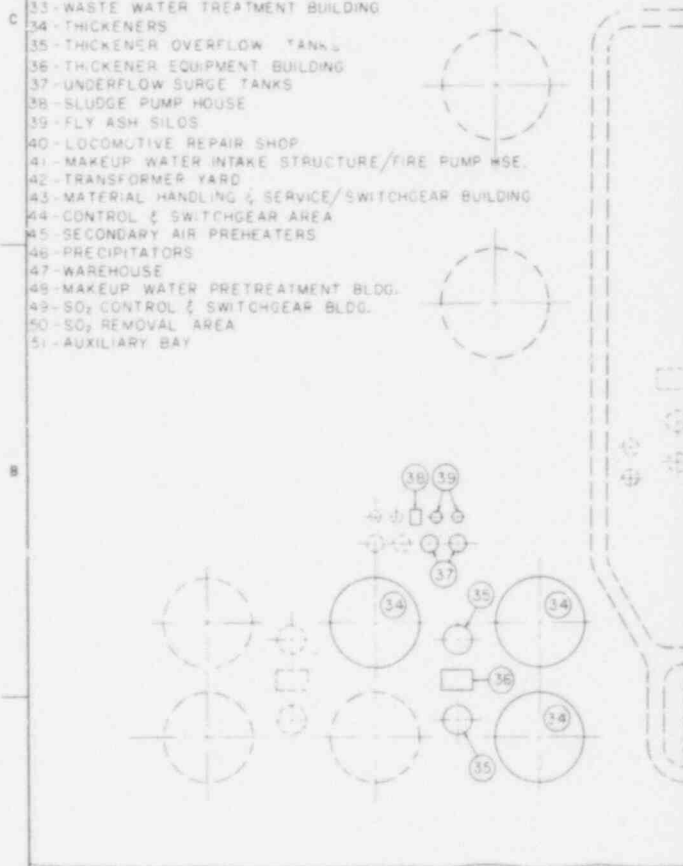
703855

SYMBOL LEGEND
FOR
FLOW & BLOCK DIAGRAMS
794 MWe FOSSIL PLANT
MIDDLETOWN, HYPOTHETICAL SITE
 **United Engineers**
6509.002-HSC-1

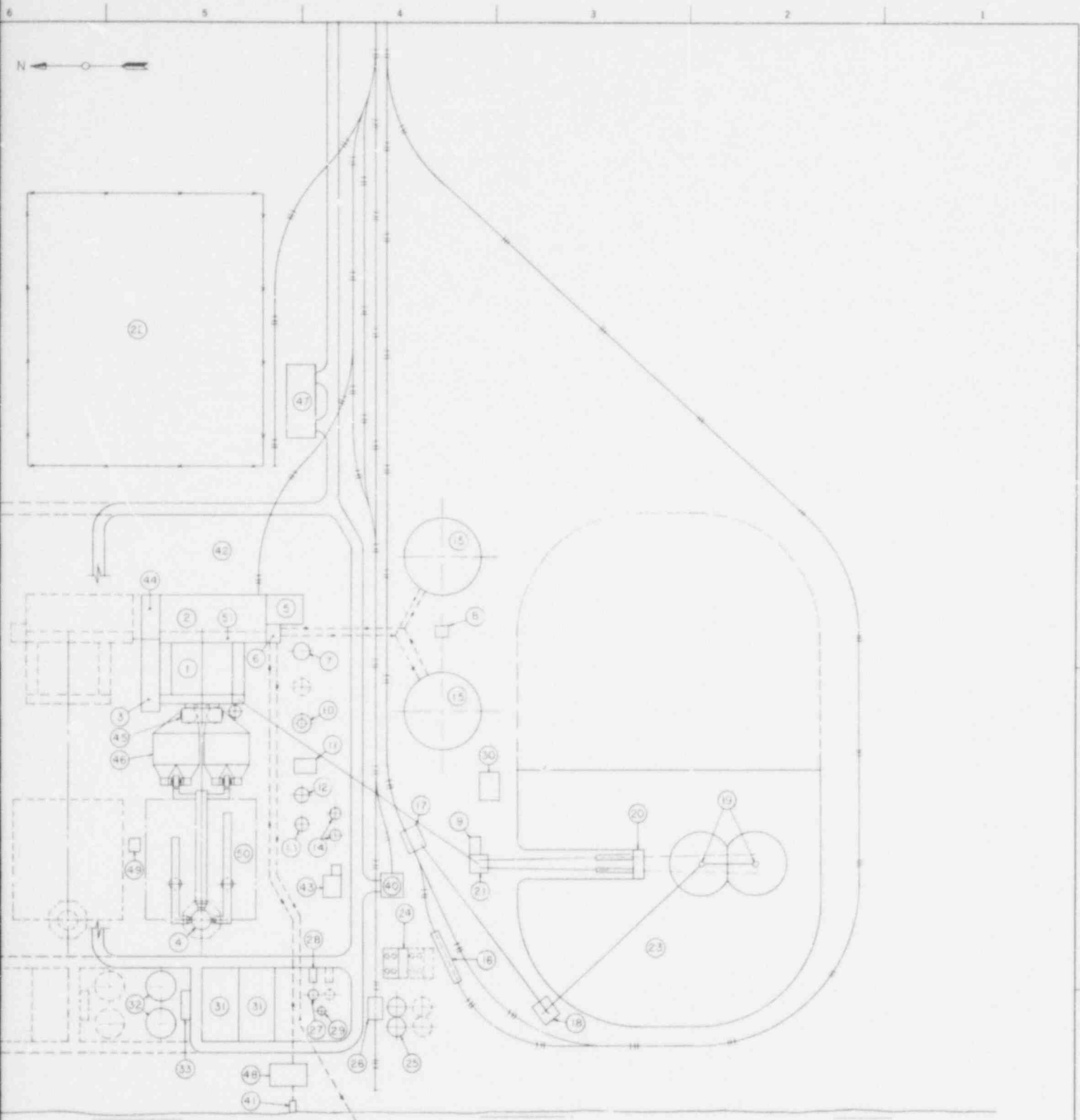
8 7

PLANT NOMENCLATURE

- 1-BOILER HOUSE
- 2-TURBINE HALL
- 3-SERVICE AREA
- 4-STACK
- 5-ADMINISTRATION BUILDING
- 6-CIRCULATING WATER PUMP HOUSE
- 7-CONDENSATE STORAGE TANK
- 8-COOLING TOWER SWITCHGEAR BUILDING
- 9-COAL HANDLING SYSTEM SWITCHGEAR BUILDING
- 10-FUEL OIL TANK
- 11-BATCH WASTE SUMP
- 12-RECIRCULATING TANK
- 13-SETTLING TANK
- 14-DEWATERING BIN
- 15-MAIN COOLING TOWERS
- 16-CAR THAW SHED
- 17-ROTARY CAR DUMPER
- 18-BREAKER HOUSE
- 19-LOWERING WELLS
- 20-FLOW MAINTENANCE SHED
- 21-CRUSHER HOUSE
- 22-SWITCHYARD
- 23-COAL PILE (60 DAY STORAGE)
- 24-LIME SLAKING & SERVICE BUILDING
- 25-LIME STORAGE SILOS
- 26-LIME UNLOADING BUILDING & TUNNEL
- 27-PROCESS WATER SURGE TANK
- 28-PROCESS & SEAL WATER PUMP HOUSE
- 29-SEAL WATER TANK
- 30-COAL PILE SETTling BASIN
- 31-WASTE WATER SETTLING BASINS
- 32-BATCH HOLDING TANKS
- 33-WASTE WATER TREATMENT BUILDING
- 34-THICKENERS
- 35-THICKENER OVERFLOW TANKS
- 36-THICKENER EQUIPMENT BUILDING
- 37-UNDERFLOW SURGE TANKS
- 38-SLUDGE PUMP HOUSE
- 39-FLY ASH SILOS
- 40-LOCOMOTIVE REPAIR SHOP
- 41-MAKEUP WATER INTAKE STRUCTURE/FIRE PUMP HSE.
- 42-TRANSFORMER YARD
- 43-MATERIAL HANDLING & SERVICE/SWITCHGEAR BUILDING
- 44-CONTROL & SWITCHGEAR AREA
- 45-SECONDARY AIR PREHEATERS
- 46-PRECIPIATORS
- 47-WAREHOUSE
- 48-MAKEUP WATER PRETREATMENT BLDG.
- 49-SO₂ CONTROL & SWITCHGEAR BLDG.
- 50-SO₂ REMOVAL AREA
- 51-AUXILIARY BAY



703356

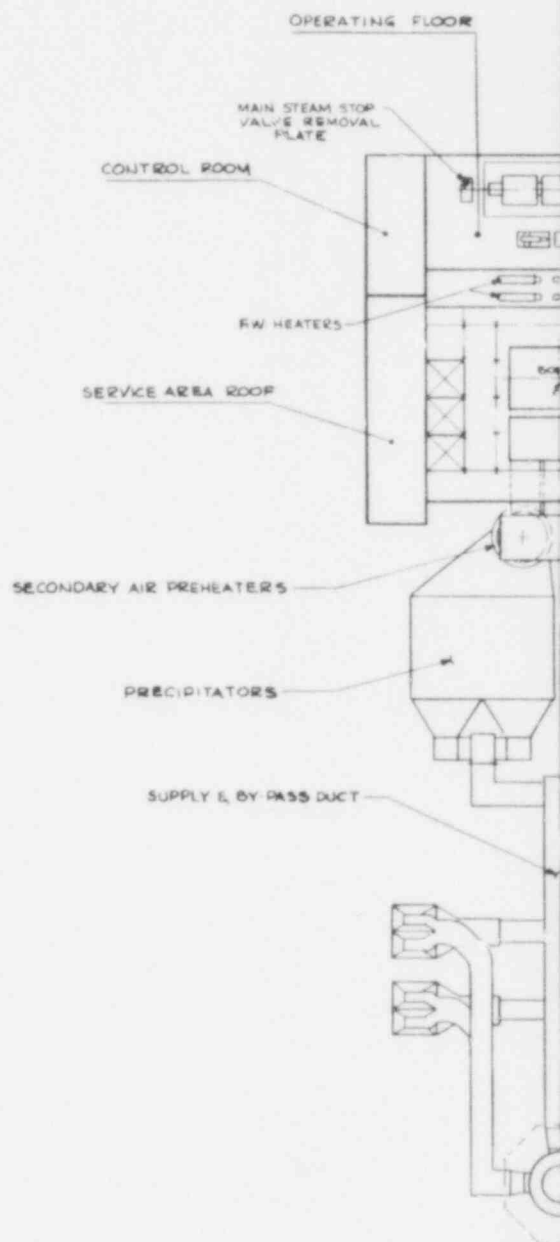


NORTH RIVER
FLOW →

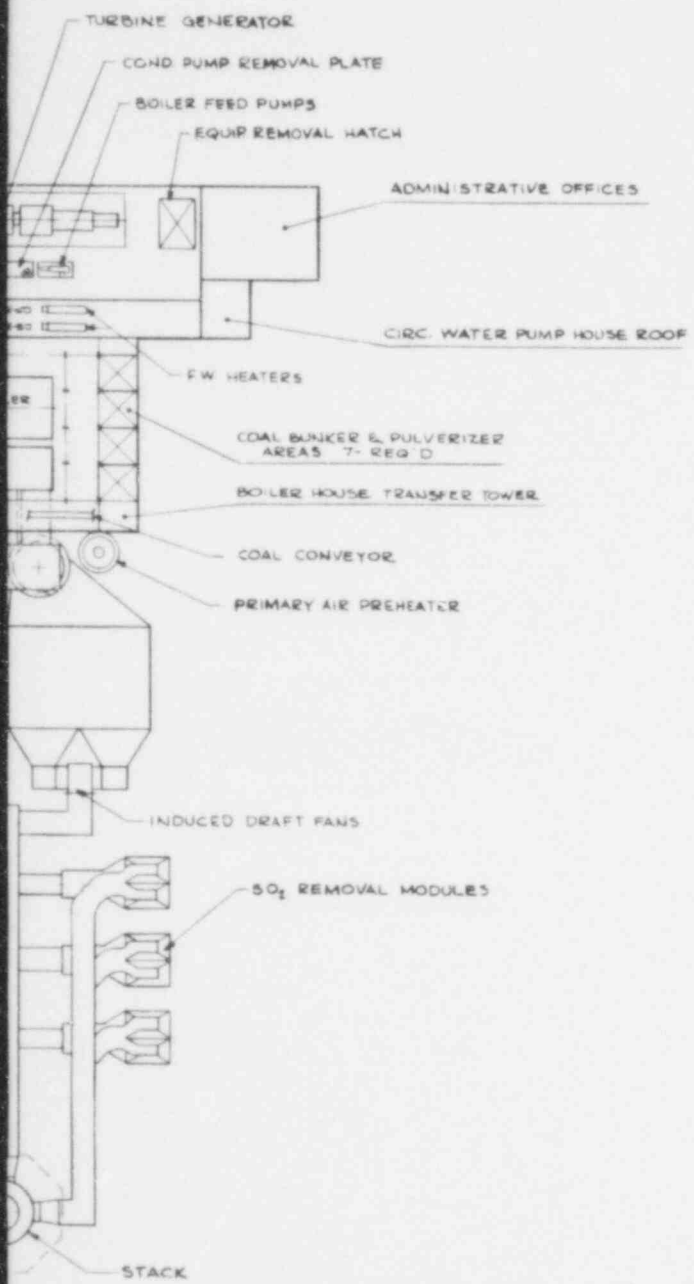


703057

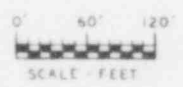
<p>PLOT PLAN 794 MW Fossil Plant MIDDLETOWN HYPOTHETICAL SITE United engineers 8509002 HSC-2</p>
--



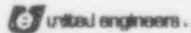
703358

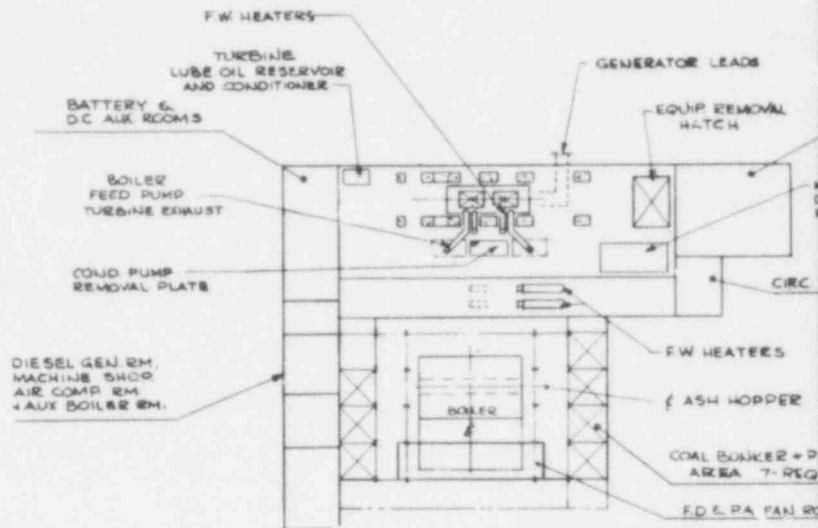


NOTE
 FOR PLANE OF SECTION A-A'
 SEE 6509.002-HSC-4

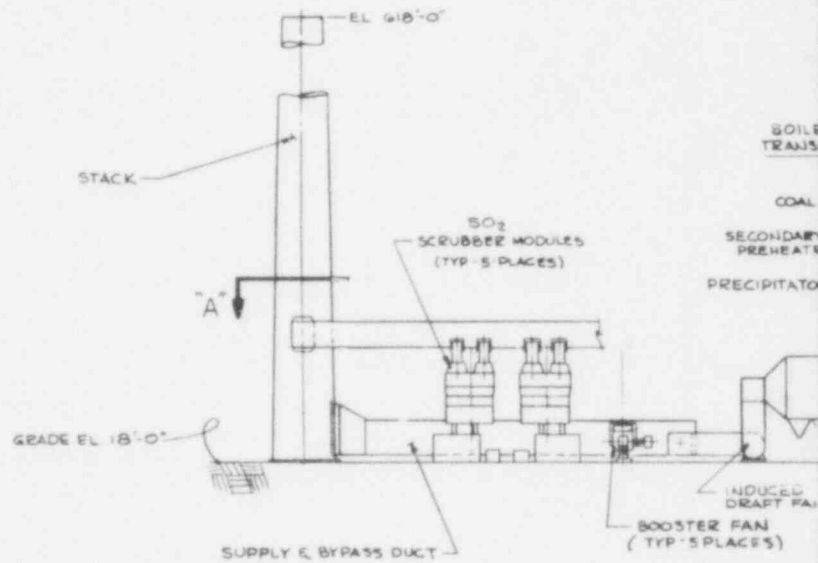


703359

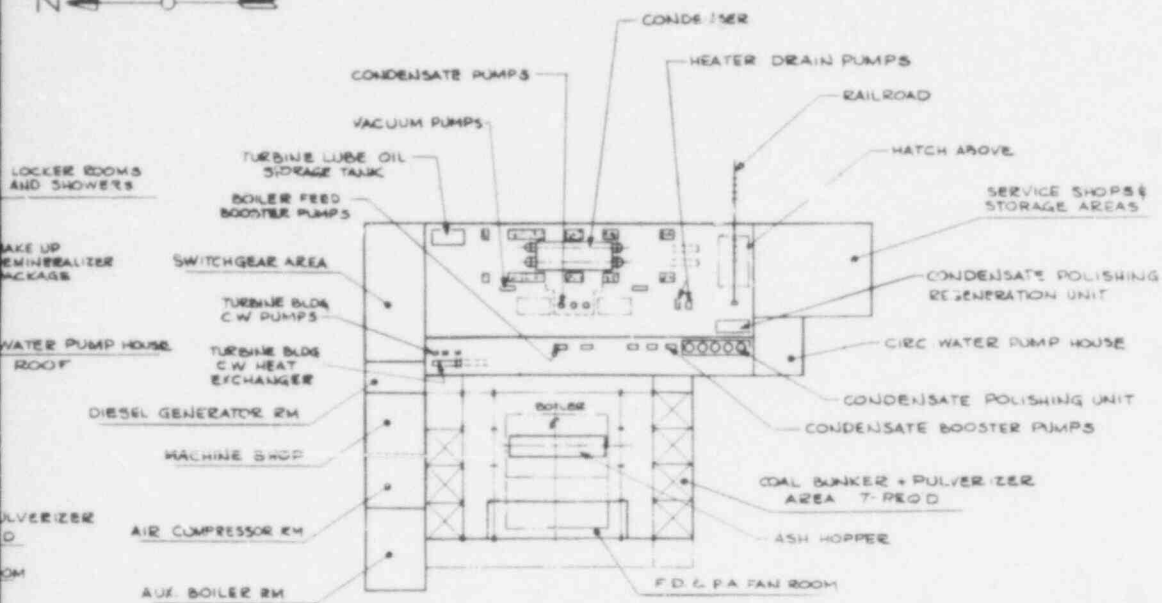
GENERAL ARRANGEMENT PLAN 'A-A' (EL 63'-0" & 180'-0") 794 MWe FOSSIL PLANT MIDDLETOWN HYPOTHETICAL SITE  6509.002-HSC-3
--



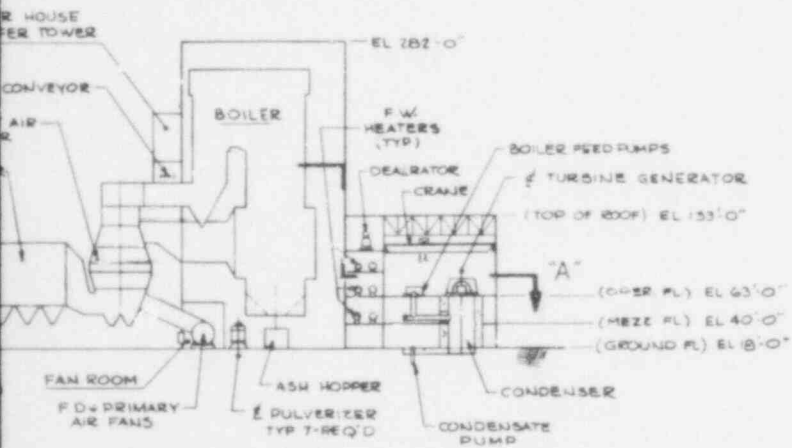
PLAN - MEZZANINE FLOOR - EL. 40'-0"



703360



PLAN GROUND FLOOR -EL -18'-0"



NOTE
FOR PLAN "A-A" SEE 6509-002-HSC-3

ELEVATION



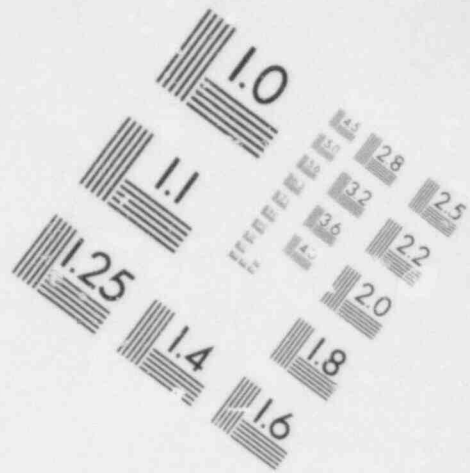
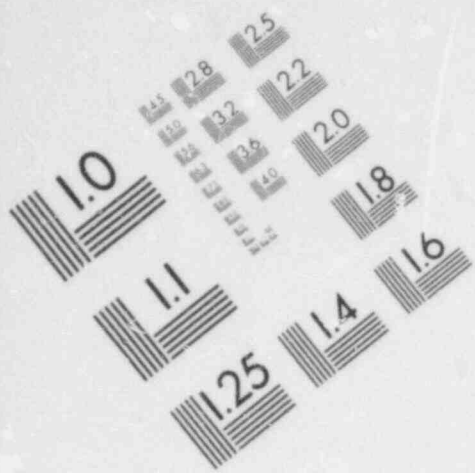
SCALE - FEET

703361

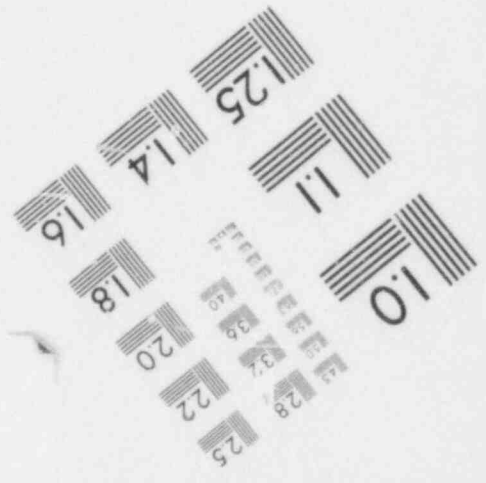
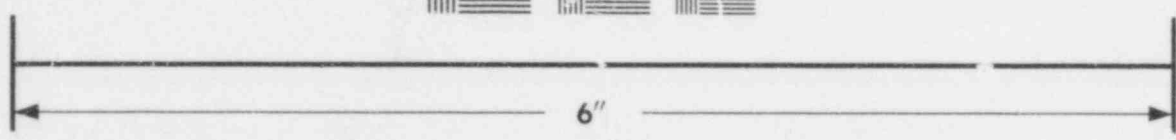
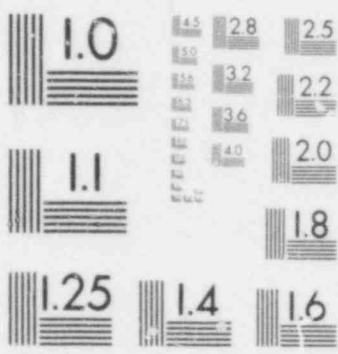
GENERAL ARRANGEMENT
PLANS (EL -18'-0" & 40' J)
AND ELEVATION
794 MWe FOSSIL PLANT
MIDDLETOWN HYPOTHETICAL SITE

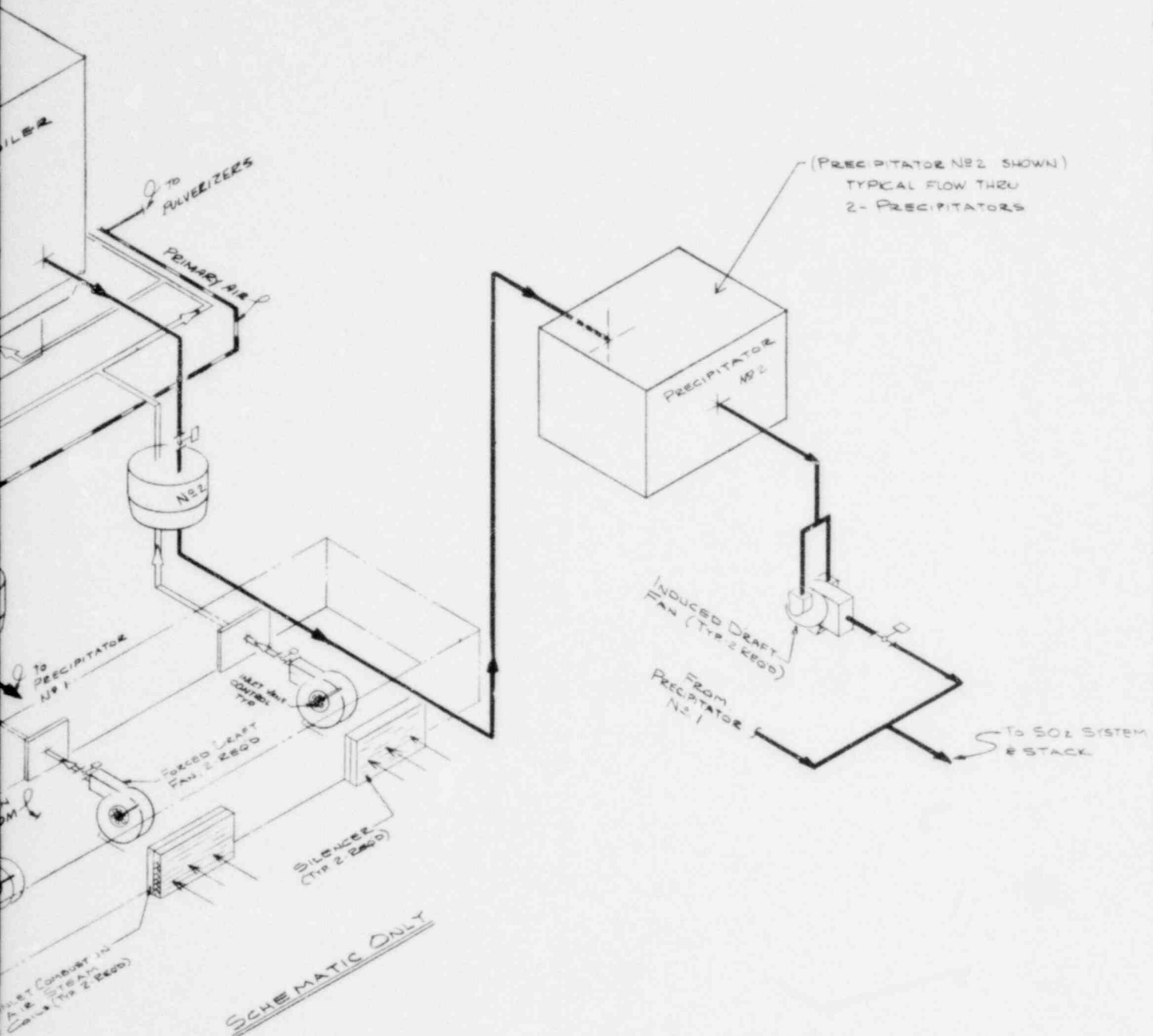
united engineers

6509.002-HSC-4



**IMAGE EVALUATION
TEST TARGET (MT-3)**

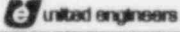


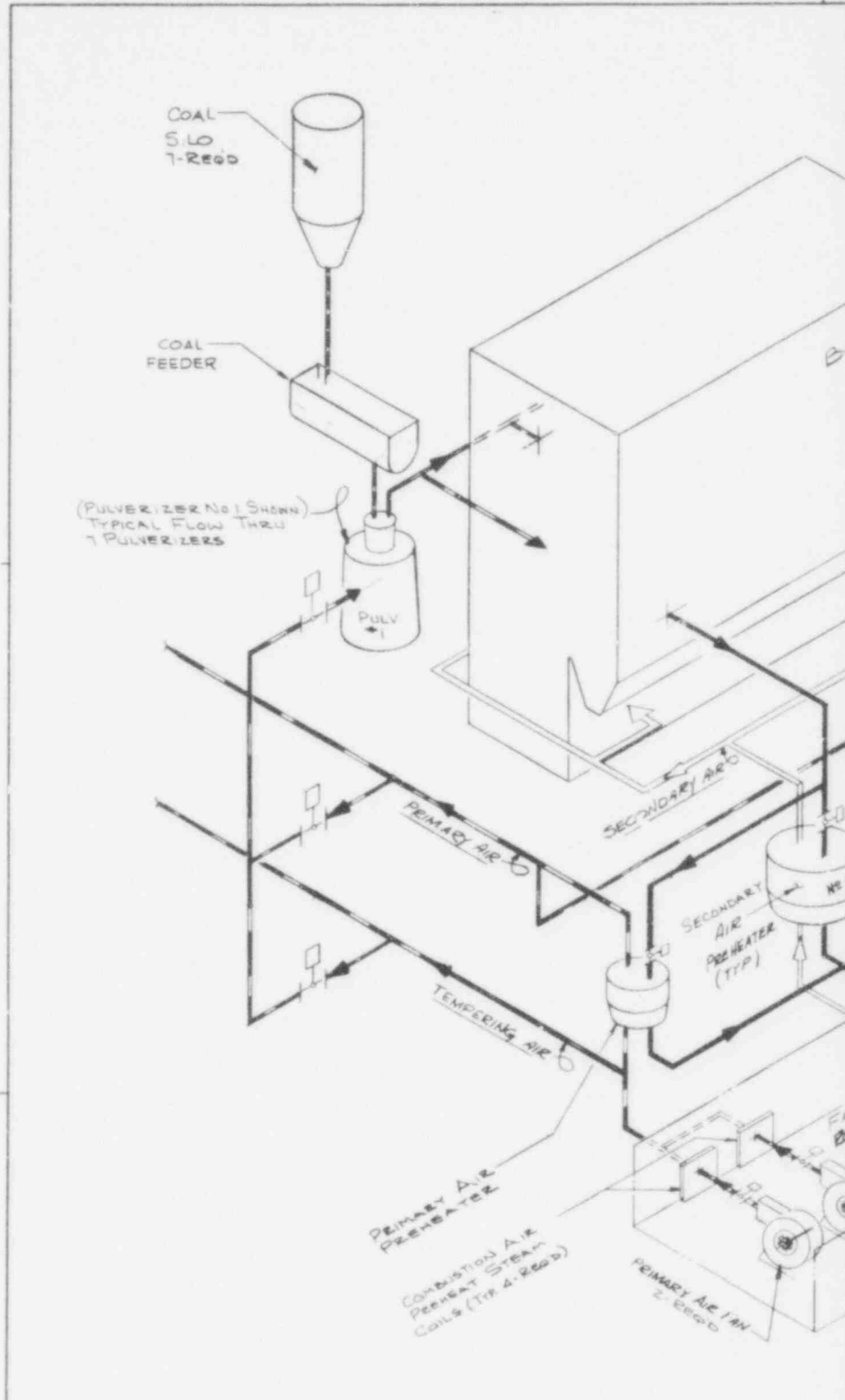


704001



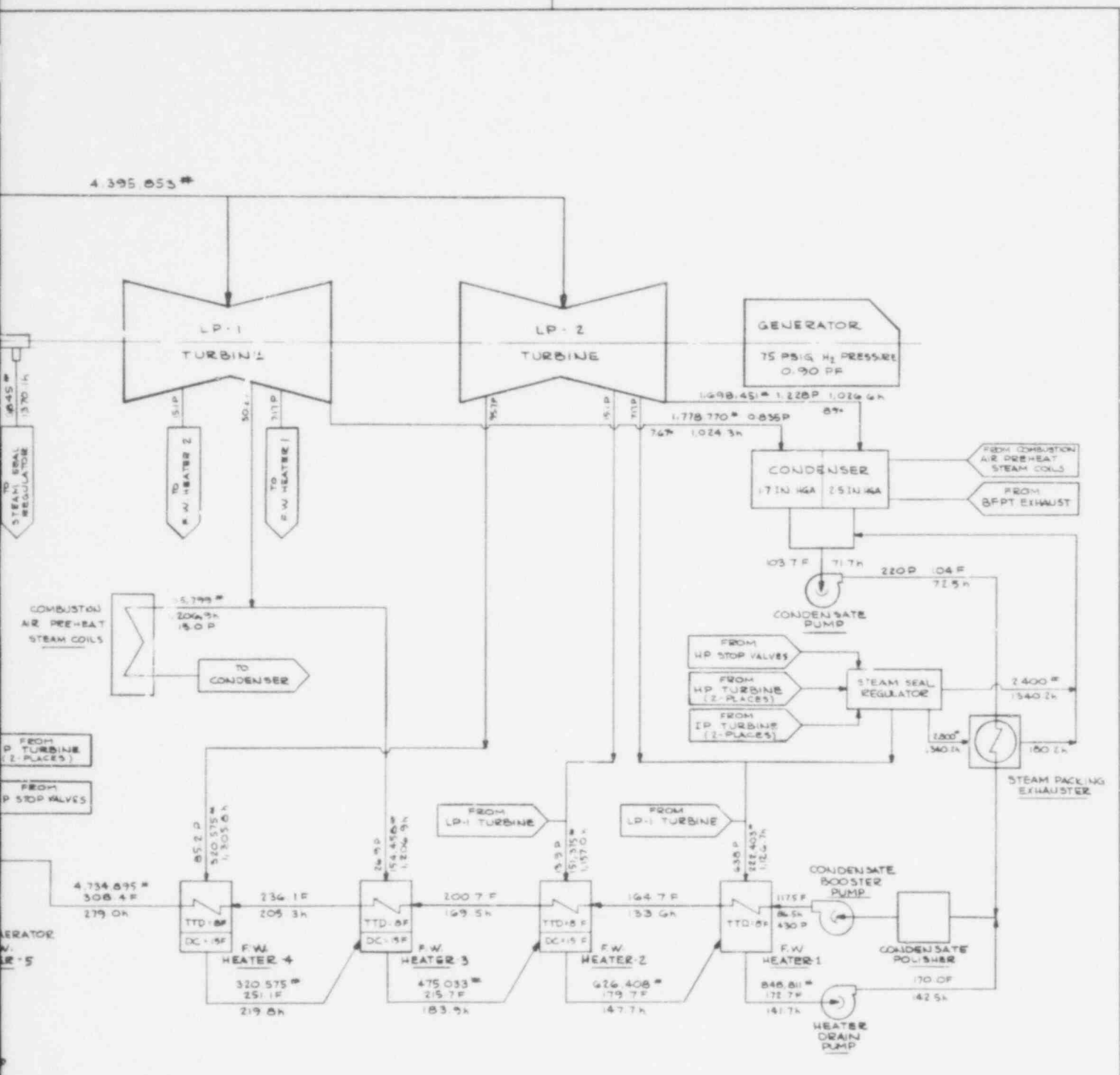
NOTE
 FOR SYMBOL LEGEND SEE
 DWG. 6509.002-HSC-1

FLOW DIAGRAM BALANCED DRAFT SYSTEM 794 MWe FOSSIL PLANT MIDDLETOWN HYPOTHETICAL SITE  6509.002-HSC-5
--

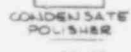
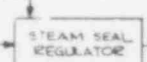
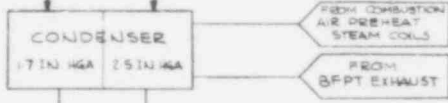
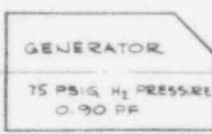
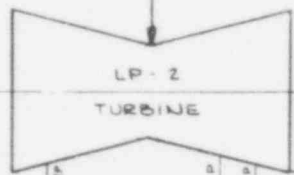


704062





4 395 853 #

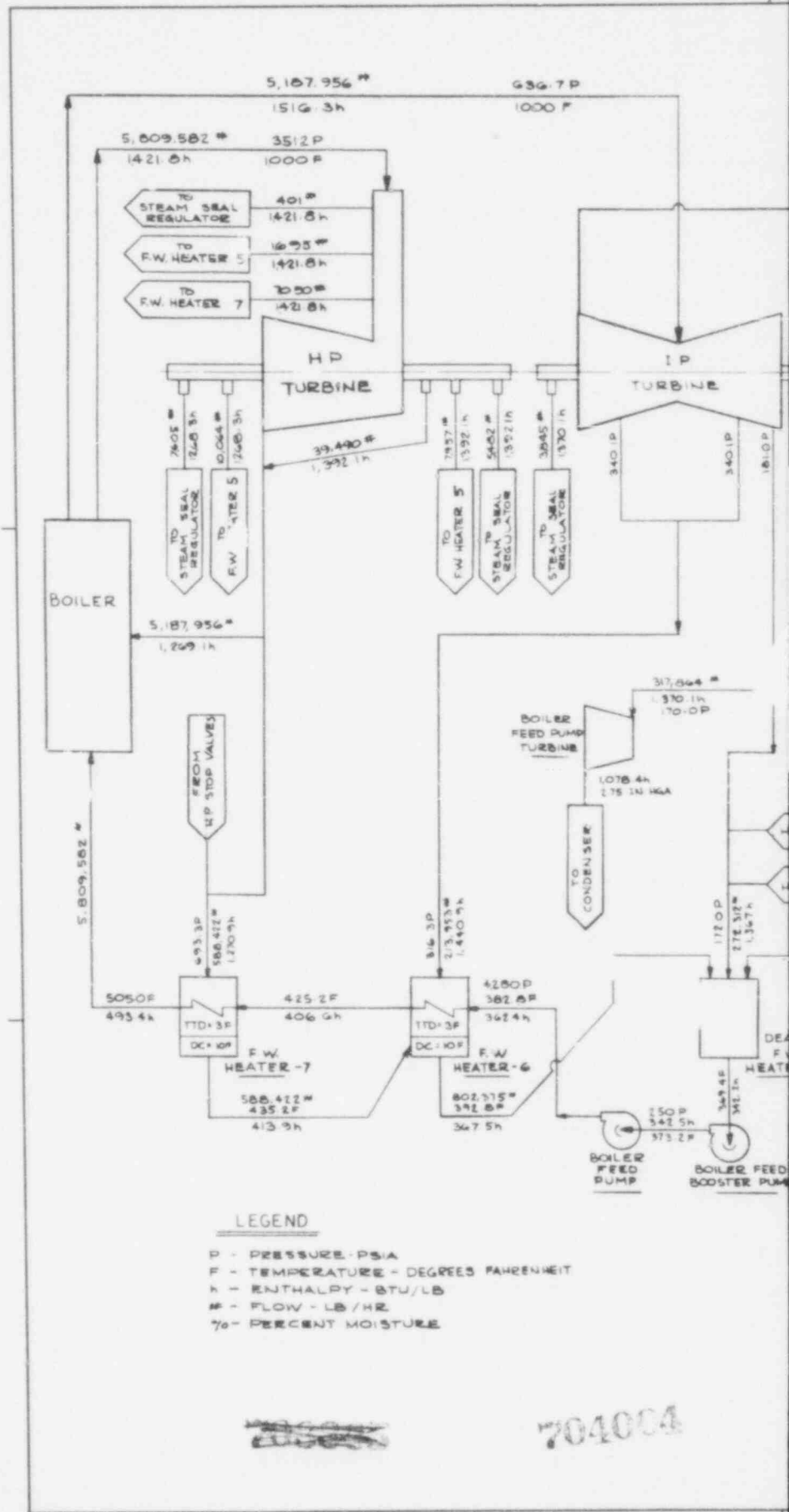


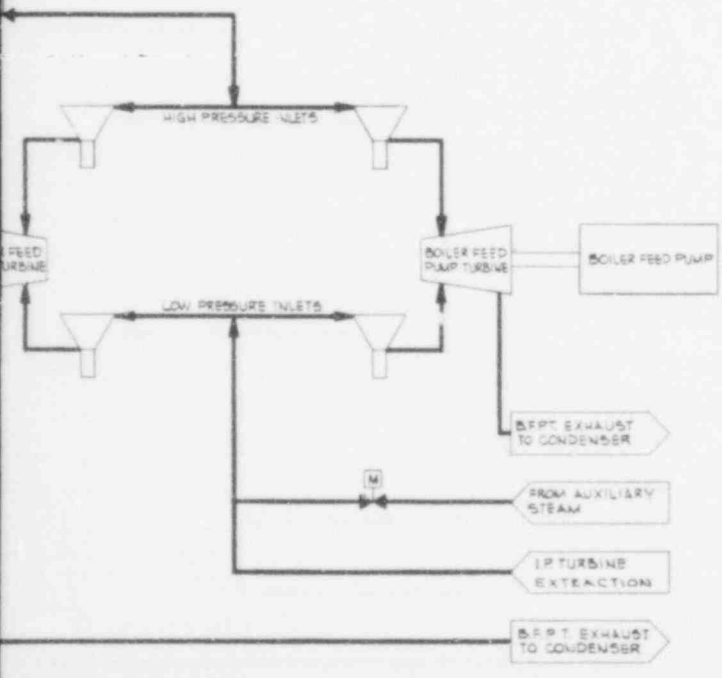
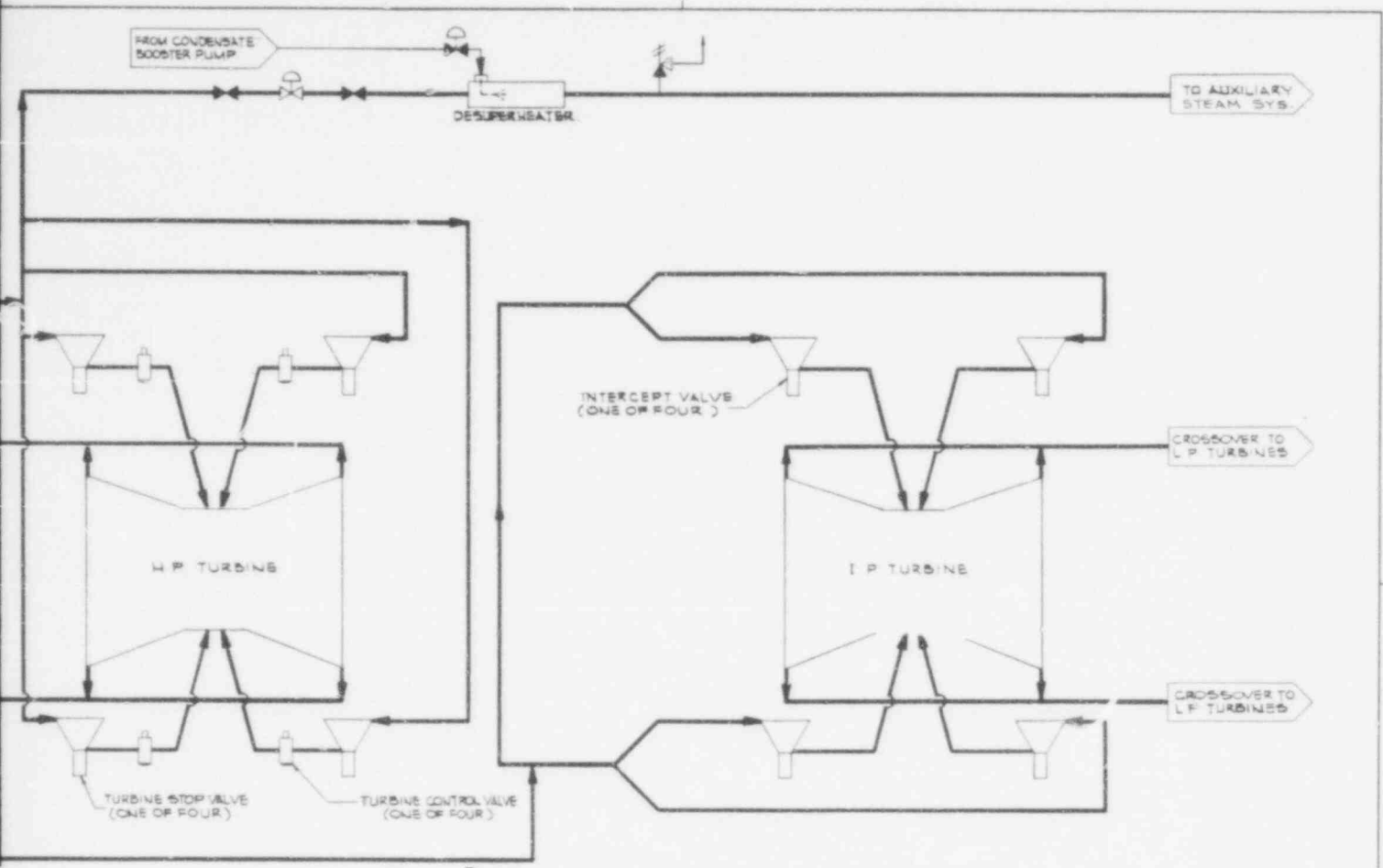
PERFORMANCE DATA:

• TOTAL TURBINE OUTPUT	868,867 KW
• FIXED LOSSES	2,779 KW
• GENERATOR LOSSES	11,313 KW
• GENERATOR OUTPUT	854,715 KW
• AUXILIARY POWER	60,300 KW
• NET POWER TO TRANSFORMER	794,415 KW
• NET STATION STEAM RATE	7.31 #/KW
• NET STATION HEAT RATE	9,482 BTU/KW-HR
• THERMAL EFFICIENCY	35.57 %

70400

STEAM HEAT BALANCE
 DIAGRAM (MAX GUARANTEE)
 794 MWe FOSSIL PLANT
 MIDDLETOWN HYPOTHETICAL SITE
 UNITED ENGINEERS
 6509.002-HSC-8





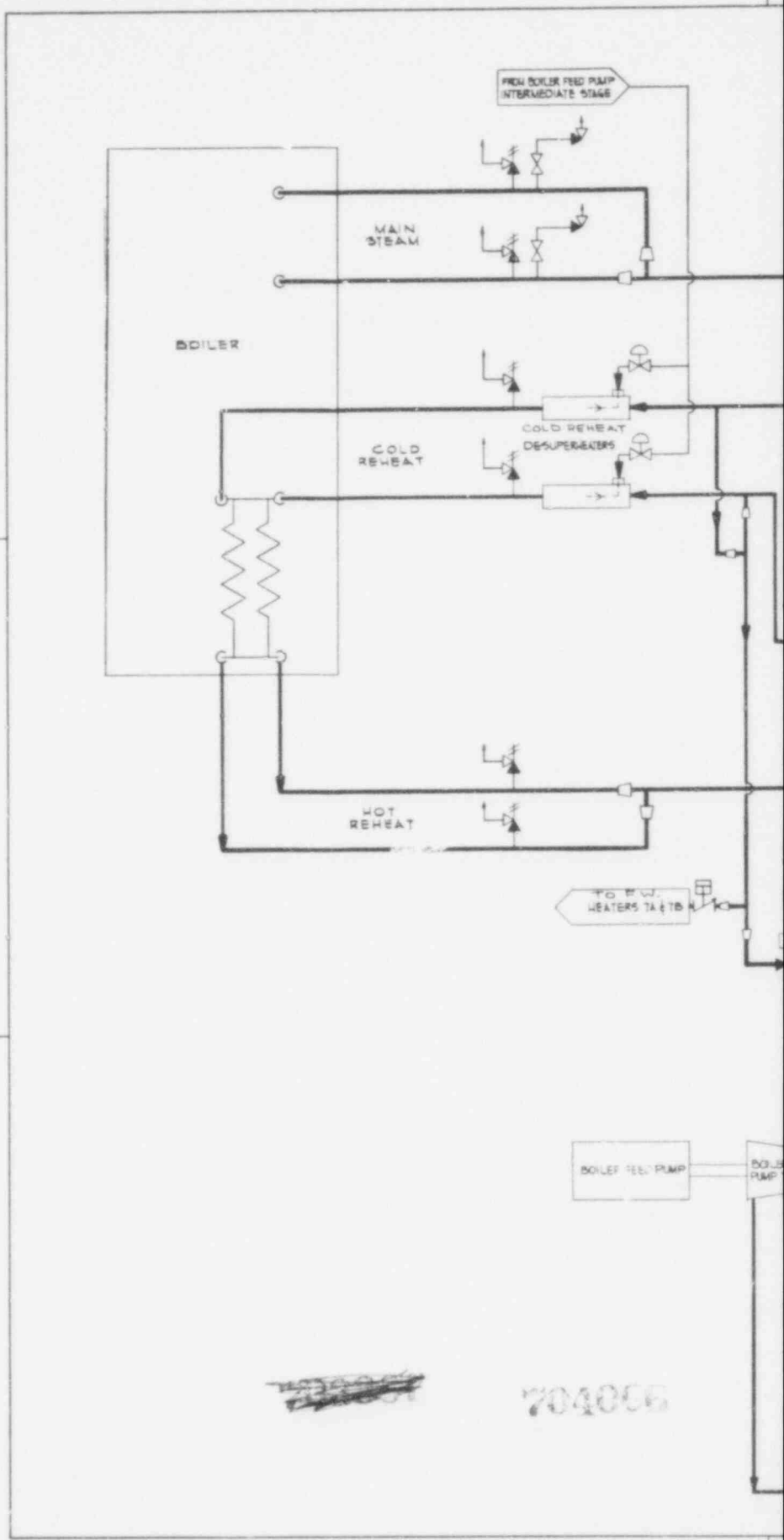
704005

NOTE:
FOR SYMBOL LEGEND SEE
DWG. 6509.002-HSC-1

FLOW DIAGRAM
MAIN STEAM HOT REHEAT
& COLD REHEAT SYSTEM
794 MW FOSIL PLANT
MIDDLETOWN HYPOTHETICAL SITE

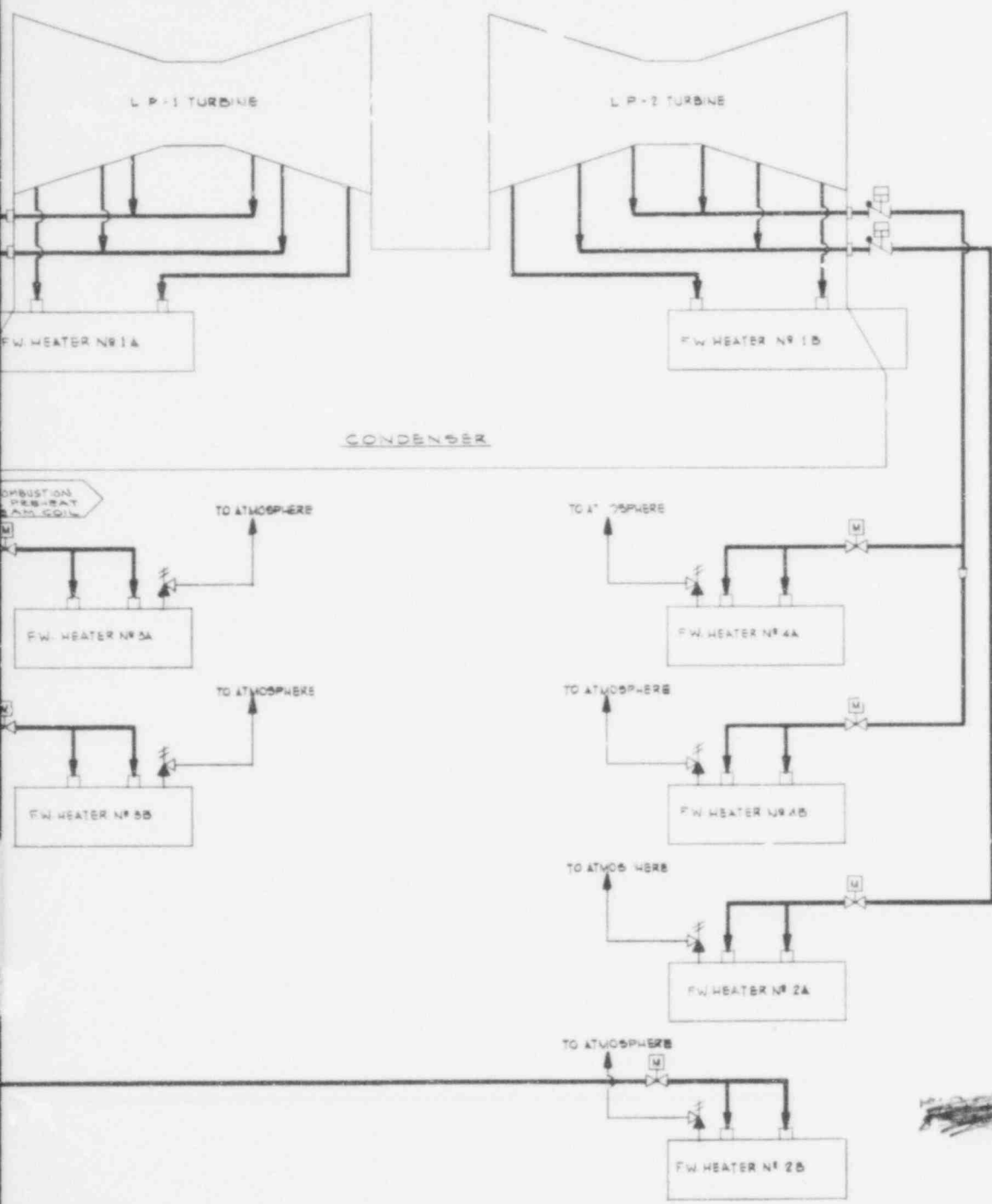
united engineers

6509.002-HSC-7



~~704005~~


704005



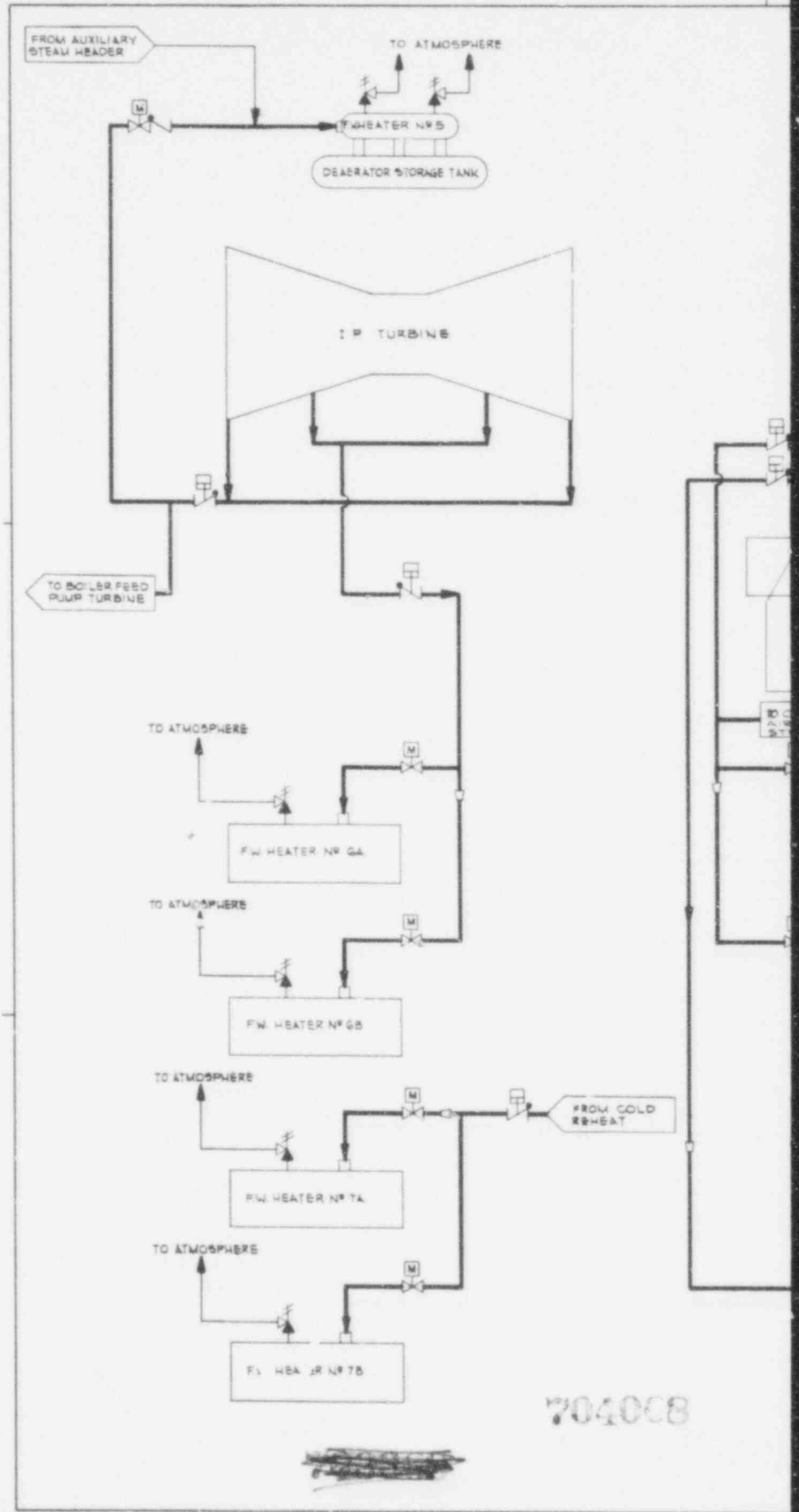
704007

NOTE
FOR SYMBOL LEGEND SEE
DWG 6509002-HSC-1

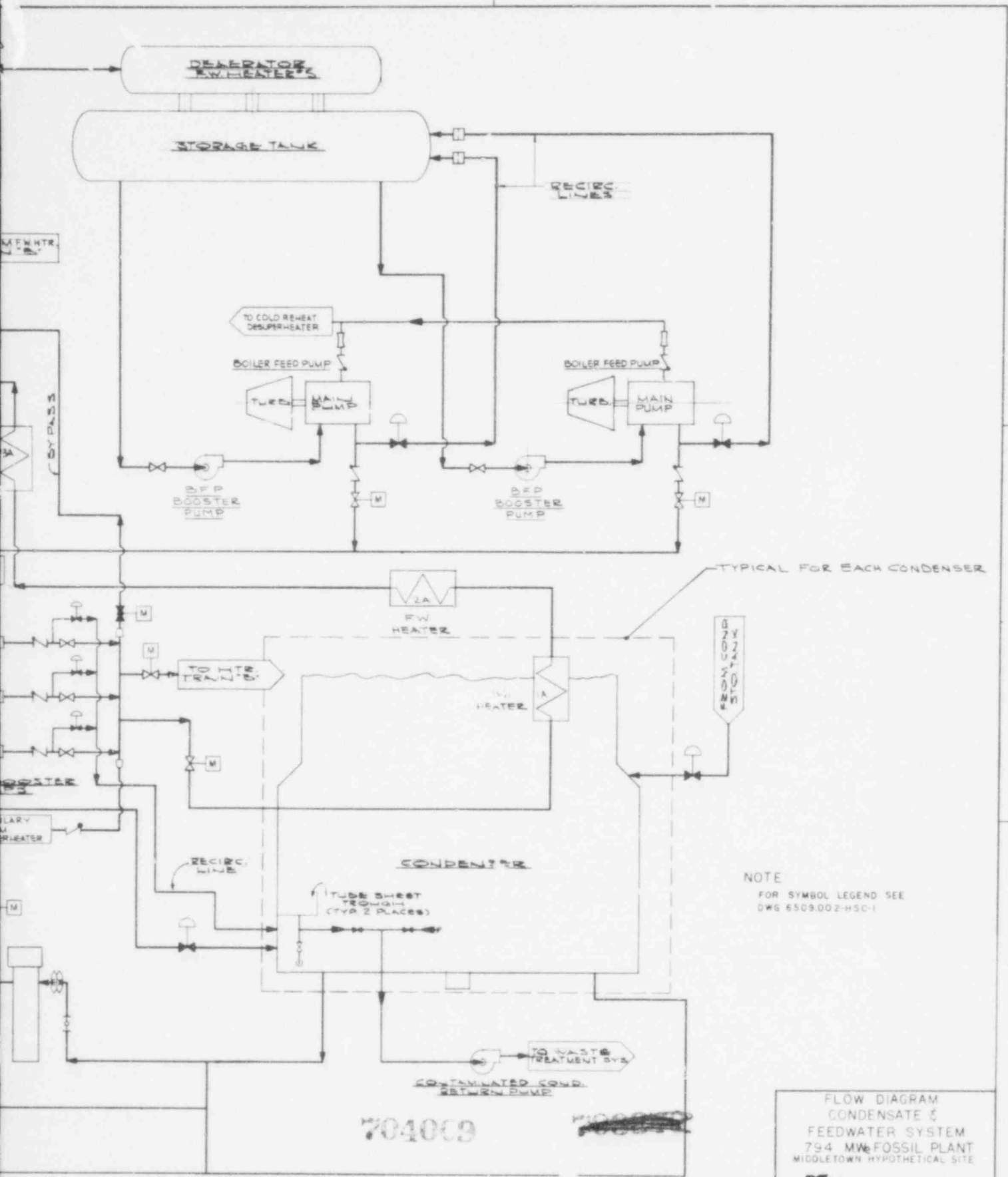
FLOW DIAGRAM
EXTRACTION STEAM SYSTEM
794 MW FOSSIL PLANT
MIDDLETOWN HYPOTHETICAL SITE

 united engineers

6 509002:HSC-B

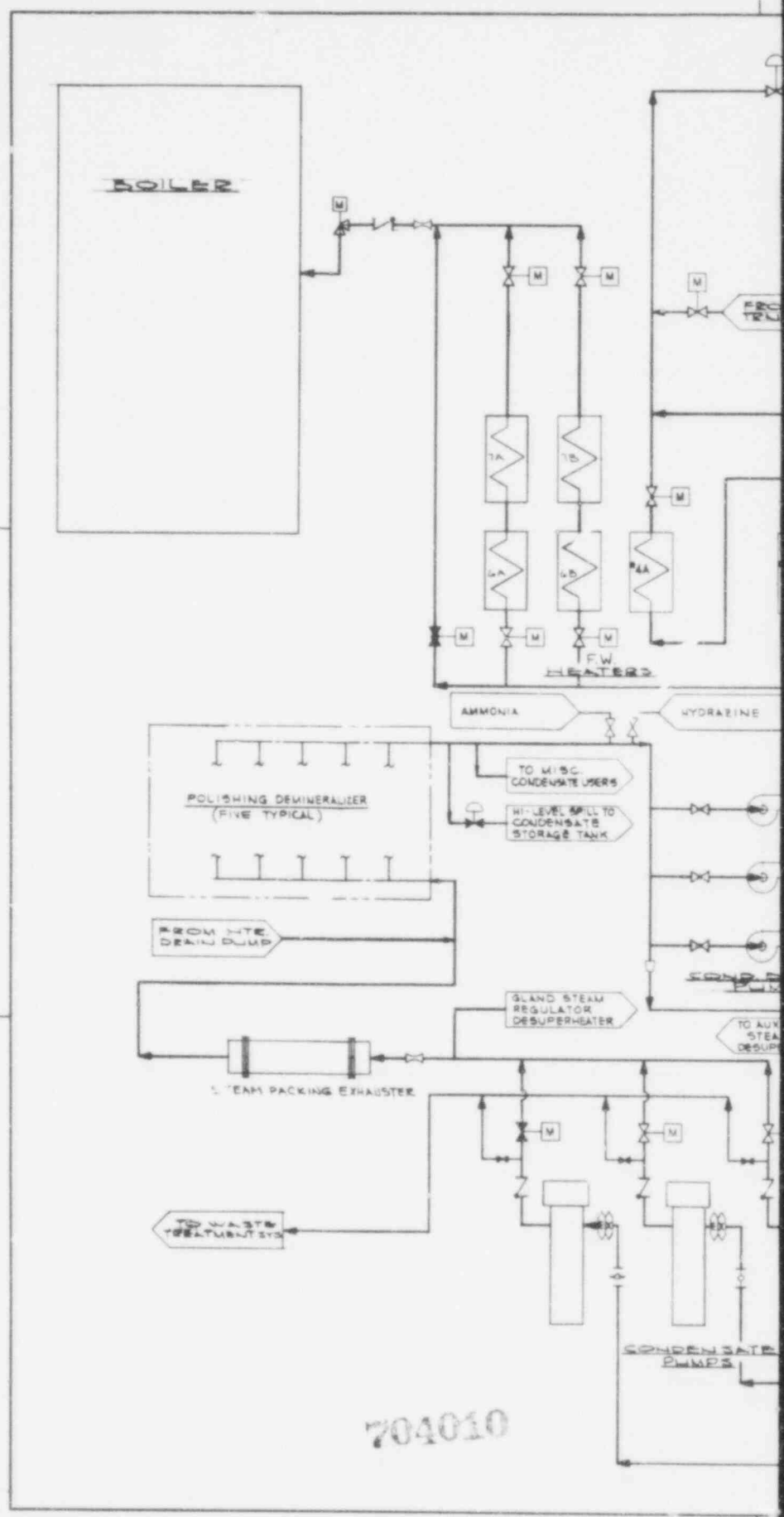


704008



704009

FLOW DIAGRAM
CONDENSATE &
FEEDWATER SYSTEM
794 MWe FOSSIL PLANT
MIDDLETOWN HYPOTHETICAL SITE
e united engineers & architects
6509.002-HSC-9



ATMOSPHERE

GENERATOR
(HTR #S)

STORAGE TANK

TYP FOR EACH
OF TWO TRAINS

F.W.
HEATER # 4A

F.W.
HEATER # 3A

F.W.
HEATER # 2A

F.W.
HEATER # 1A

CONDENSER

HEATER DRAIN
PUMP

HEATER
DRAIN
TANK

FROM COMBUSTION
AIR PREHEAT
STEAM COILS


TO COND. &
FEEDWTR. SYS

FROM HEATING
DRAIN TANK
PUMPS

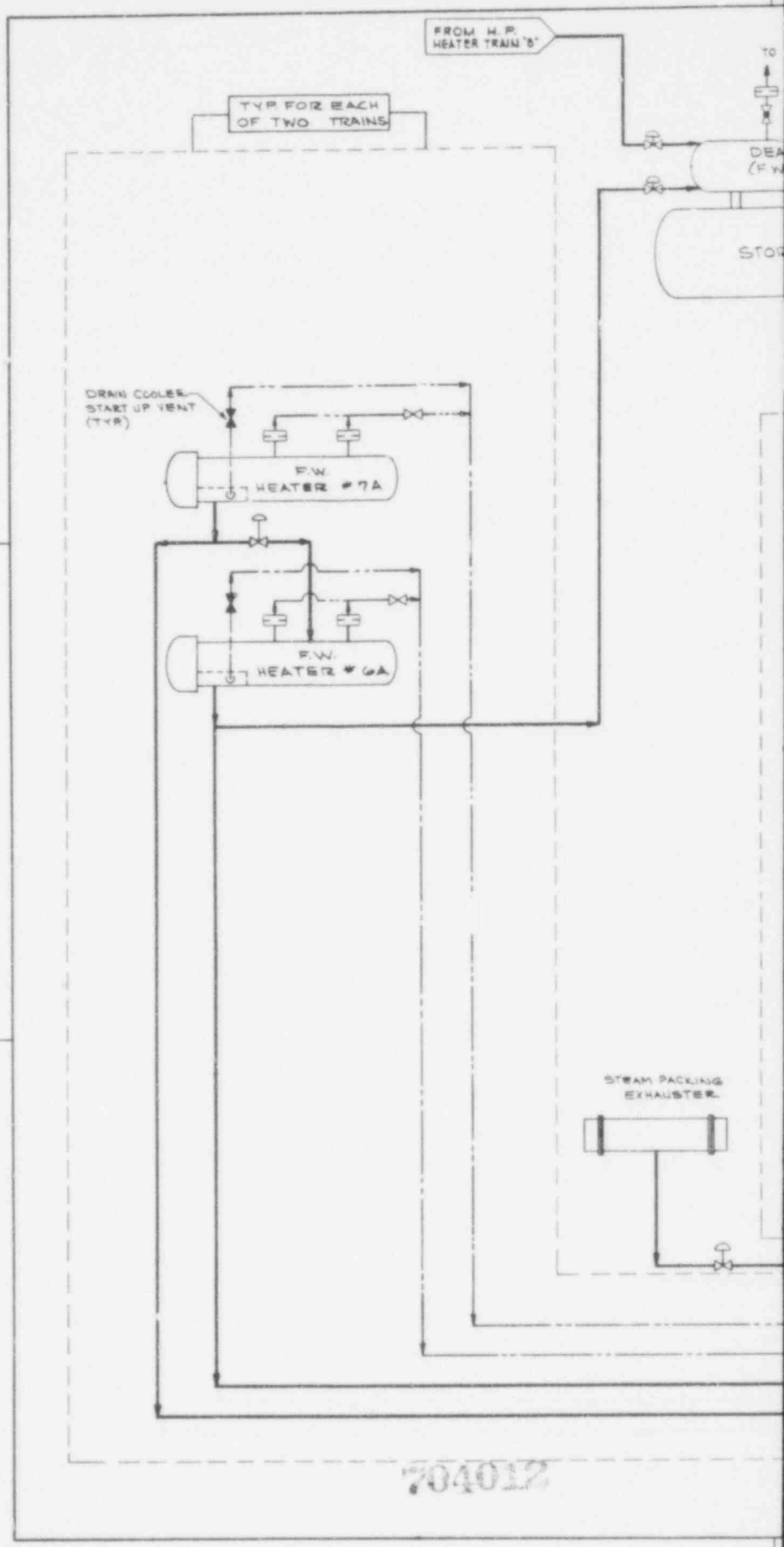
LEGEND

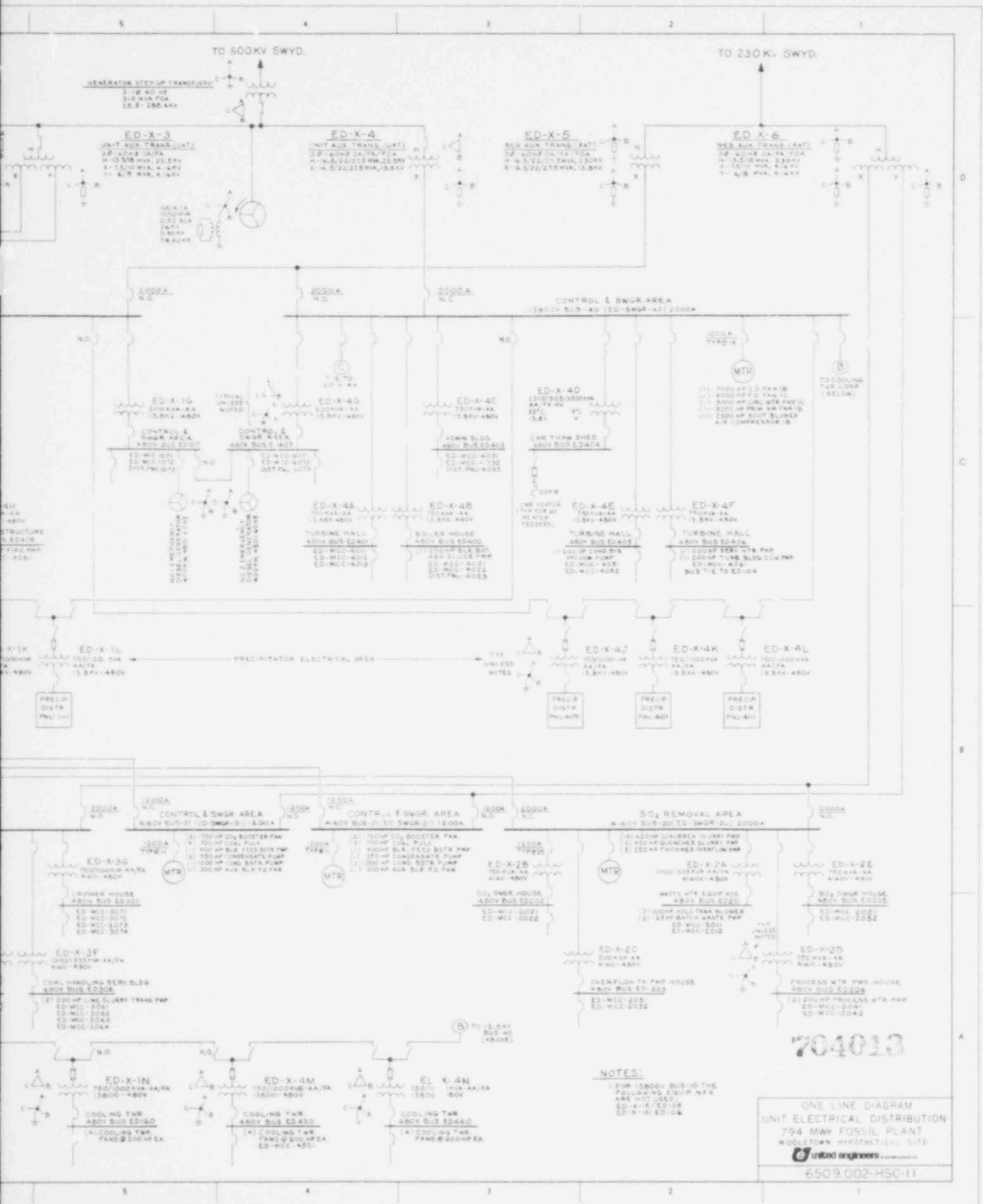
- HEATER DRAINS
- - - HEATER VENTS

NOTE
FOR SYMBOL LEGEND SEE DWG. 6509.002-HSC-1

FLOW DIAGRAM
HEATER DRAINS & VENTS SYS
794 MW_e FOSSIL PLANT
MIDDLETOWN, HYPOTHETICAL SITE
 **United Engineers** INCORPORATED
6 509,002-HSC-10

704011





GENERATOR STEP-UP TRANSFORMER
3-12 40 Hz
510 MVA PDA
15.5-280 KV

TO 500KV SWID.

TO 230KV SWID.

ED-X-3
UNIT AUX. TRANS. (UAT)
3P-60Hz DA/FA
H-13.5KV WVA, 25.5KV
X-12.0KV WVA, 4-4KV
Y-6.9KV WVA, 4.1KV

ED-X-4
UNIT AUX. TRANS. (UAT)
3P-60Hz DA/FA/FOA
H-16.5KV WVA, 27.5KV, 25.5KV
X-14.0KV WVA, 22.75KV, 13.5KV

ED-X-5
RES. AUX. TRANS. (RAT)
3P-60Hz DA/FA/FOA
H-16.5KV WVA, 27.5KV, 23.0KV
X-14.0KV WVA, 22.75KV, 13.5KV

ED-X-6
RES. AUX. TRANS. (RAT)
3P-60Hz DA/FA/FOA
H-13.5KV WVA, 23.0KV
X-12.0KV WVA, 4.1KV
Y-6.9KV WVA, 4.1KV

CONTROL & SWGR AREA
13800V BUS-40 (ED-SWGR-40) 2000A

2000A
N.C.

2000A
N.C.

2000A
N.C.

2000A
TYRAG

ED-X-1G
200KV-AA
13.8KV-480V

ED-X-4G
200KV-AA
13.8KV-480V

ED-X-4C
200KV-AA
13.8KV-480V

ED-X-4D
1500/315/3500KVA
AA/FA/FOA
27% 7%
13.8V
V

MTR
(1) 700HP 2.2 FAN 1B
(2) 400HP 2.2 FAN 1C
(3) 300HP 2.2 FAN 1D
(4) 300HP 2.2 FAN 1E
(5) 200HP 2.2 FAN 1F
(6) 200HP 2.2 FAN 1G
(7) 200HP 2.2 FAN 1H
(8) 200HP 2.2 FAN 1I
(9) 200HP 2.2 FAN 1J
(10) 200HP 2.2 FAN 1K
(11) 200HP 2.2 FAN 1L
(12) 200HP 2.2 FAN 1M
(13) 200HP 2.2 FAN 1N
(14) 200HP 2.2 FAN 1O
(15) 200HP 2.2 FAN 1P
(16) 200HP 2.2 FAN 1Q
(17) 200HP 2.2 FAN 1R
(18) 200HP 2.2 FAN 1S
(19) 200HP 2.2 FAN 1T
(20) 200HP 2.2 FAN 1U
(21) 200HP 2.2 FAN 1V
(22) 200HP 2.2 FAN 1W
(23) 200HP 2.2 FAN 1X
(24) 200HP 2.2 FAN 1Y
(25) 200HP 2.2 FAN 1Z

TO COOLING TWR LOOP (BELOW)

ED-MCC-101
ED-MCC-102
DIST. PNL-101/2

ED-MCC-401
ED-MCC-402
DIST. PNL-401/2

ED-MCC-403
ED-MCC-404
DIST. PNL-403/4

ED-MCC-405
ED-MCC-406
DIST. PNL-405/6

ED-MCC-407
ED-MCC-408
DIST. PNL-407/8

ED-MCC-409
ED-MCC-410
DIST. PNL-409/10

ED-X-1A
200KV-AA
13.8KV-480V

ED-X-1B
200KV-AA
13.8KV-480V

ED-X-1C
200KV-AA
13.8KV-480V

ED-X-1D
200KV-AA
13.8KV-480V

ED-X-1E
200KV-AA
13.8KV-480V

ED-X-1F
200KV-AA
13.8KV-480V

ED-X-1K
200KV-AA
13.8KV-480V

ED-X-1L
200KV-AA
13.8KV-480V

ED-X-1M
200KV-AA
13.8KV-480V

ED-X-1N
200KV-AA
13.8KV-480V

ED-X-1O
200KV-AA
13.8KV-480V

ED-X-1P
200KV-AA
13.8KV-480V

ED-X-3G
200KV-AA/FA
13.8KV-480V

ED-X-3H
200KV-AA/FA
13.8KV-480V

ED-X-3I
200KV-AA/FA
13.8KV-480V

ED-X-3J
200KV-AA/FA
13.8KV-480V

ED-X-3K
200KV-AA/FA
13.8KV-480V

ED-X-3L
200KV-AA/FA
13.8KV-480V

ED-X-3F
200KV-AA/FA
13.8KV-480V

ED-X-3G
200KV-AA/FA
13.8KV-480V

ED-X-3H
200KV-AA/FA
13.8KV-480V

ED-X-3I
200KV-AA/FA
13.8KV-480V

ED-X-3J
200KV-AA/FA
13.8KV-480V

ED-X-3K
200KV-AA/FA
13.8KV-480V

ED-X-1N
200KV-AA/FA
13.8KV-480V

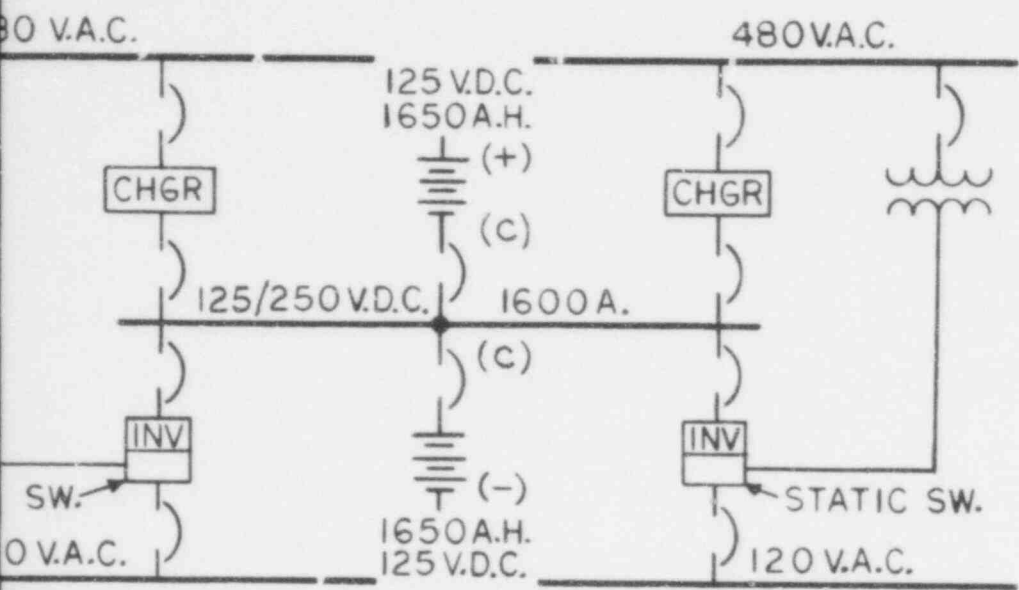
ED-X-1O
200KV-AA/FA
13.8KV-480V

ED-X-1P
200KV-AA/FA
13.8KV-480V

NOTES:
1. FOR 13800V BUS-40 THE FOLLOWING EQUIP. NPS ARE NOT USED:
ED-X-1E/ED-1F
ED-X-1G/ED-1H

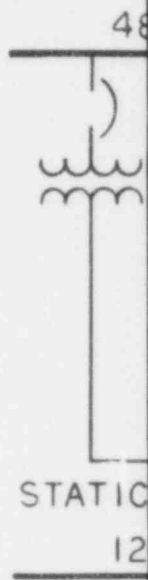
704013

ONE LINE DIAGRAM
UNIT ELECTRICAL DISTRIBUTION
794 MW FOSSIL PLANT
MIDDLETOWN HYPOTHETICAL SITE
United engineers
6509.002-H5C-11

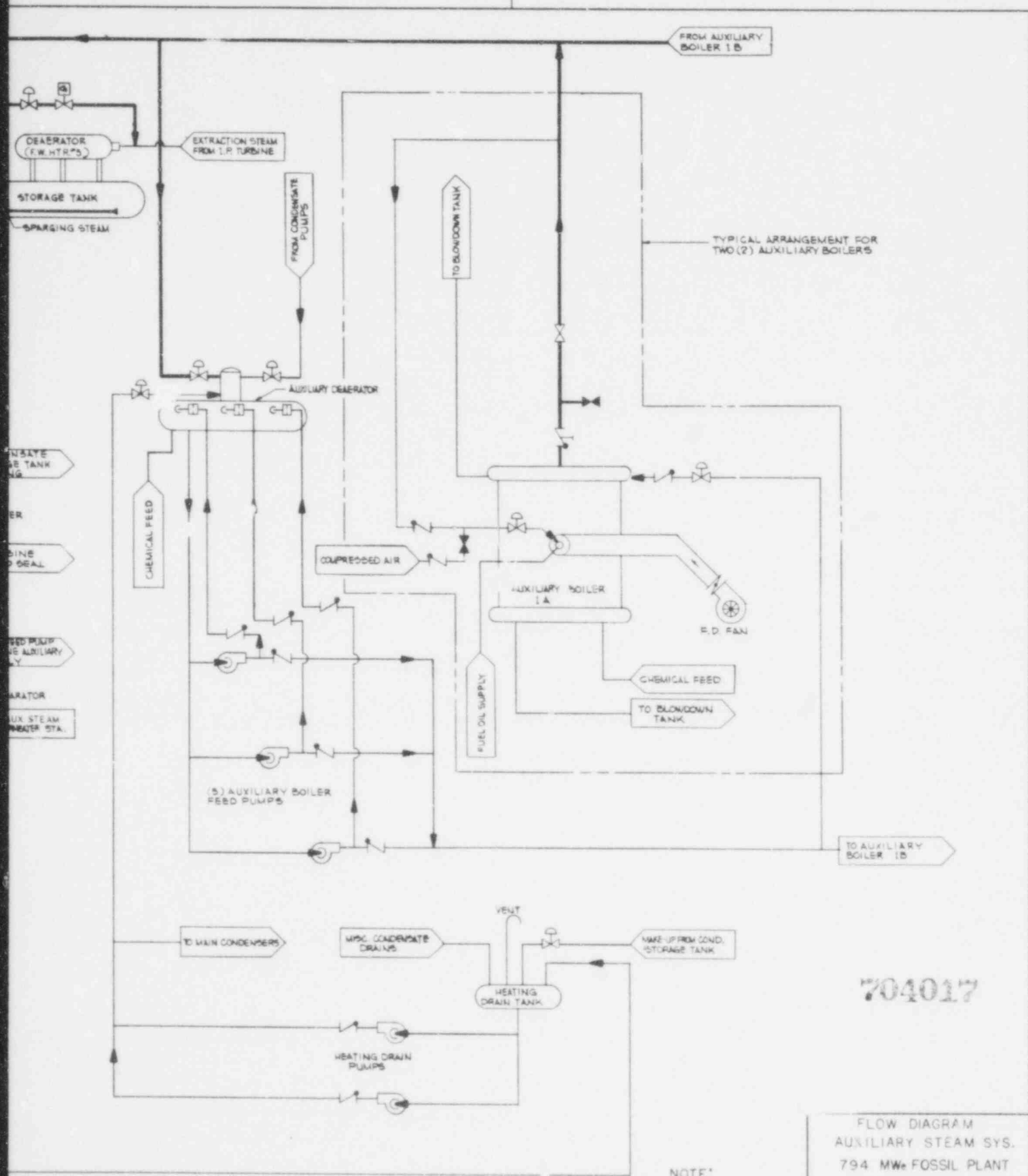


ENGINEER	DATE
STATE REG.	No.
ONE LINE DIAGRAM D.C. DISTRIBUTION SYS. 794 MWe FOSSIL PLANT MIDDLETOWN HYPOTHETICAL SITE	
6509.002-HSC-12	

704015



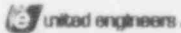
704016

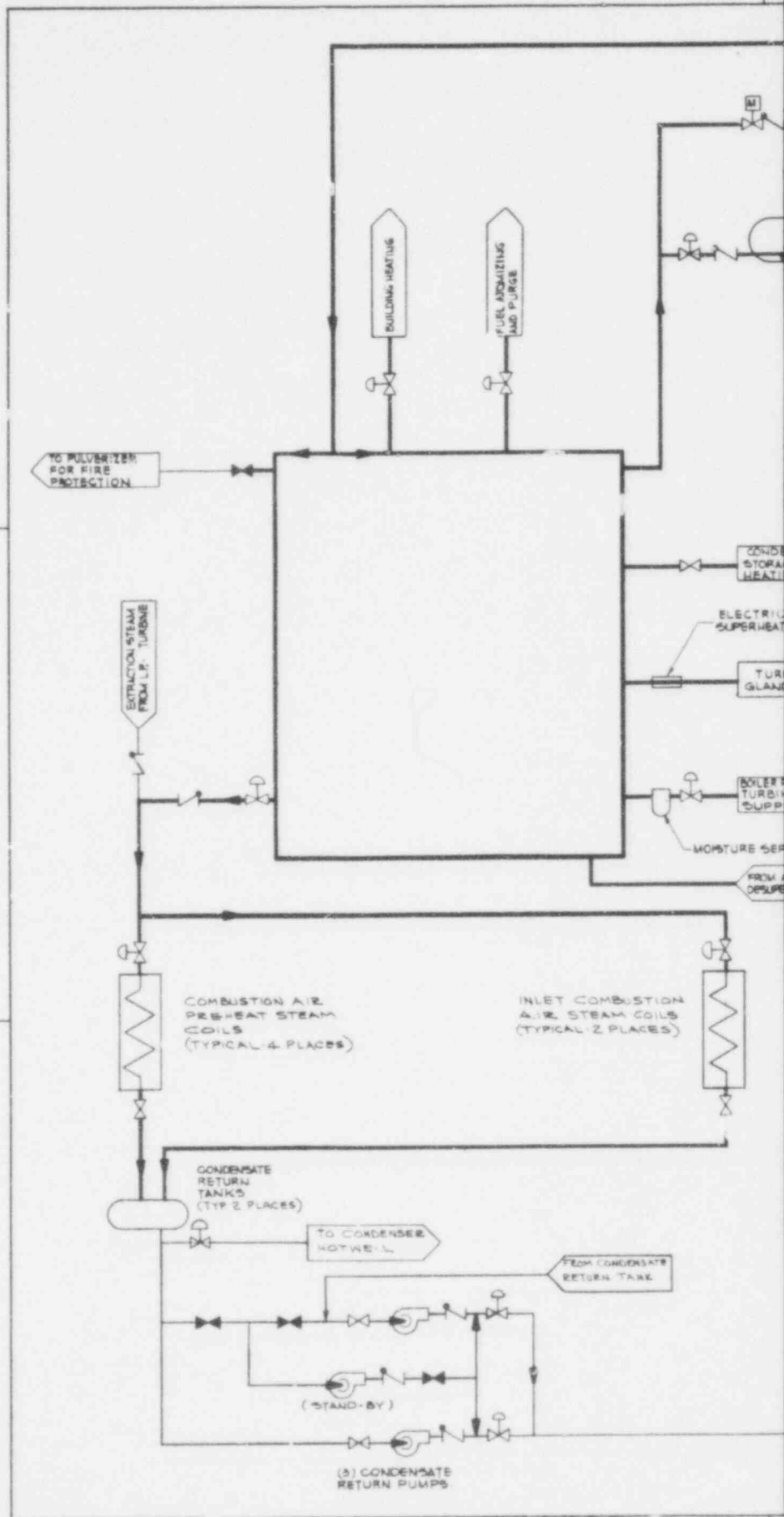


INSIDE
 TANK
 NG
 ER
 DINE
 DEAL
 PUMP
 VE
 ALIARY
 Y
 ARATOR
 UX STEAM
 WATER STA.

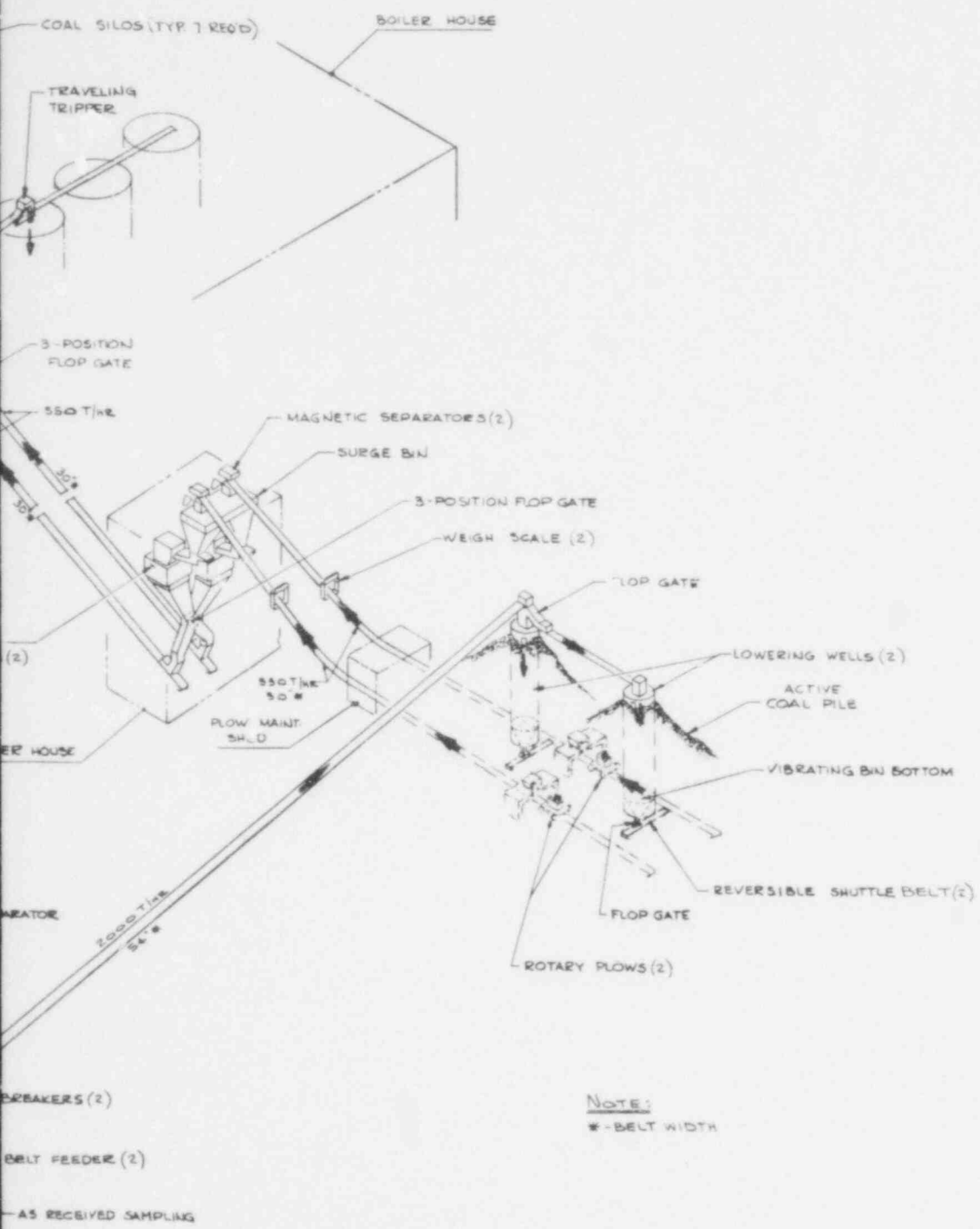
704017

NOTE:
 FOR SYMBOL LEGEND SEE
 DWG. 6509002-HSC-1

FLOW DIAGRAM
 AUXILIARY STEAM SYS.
 794 MW_e FOSSIL PLANT
 MIDDLETOWN HYPOTHETICAL SITE
 **united engineers**
 6509002-HSC-13

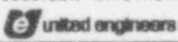


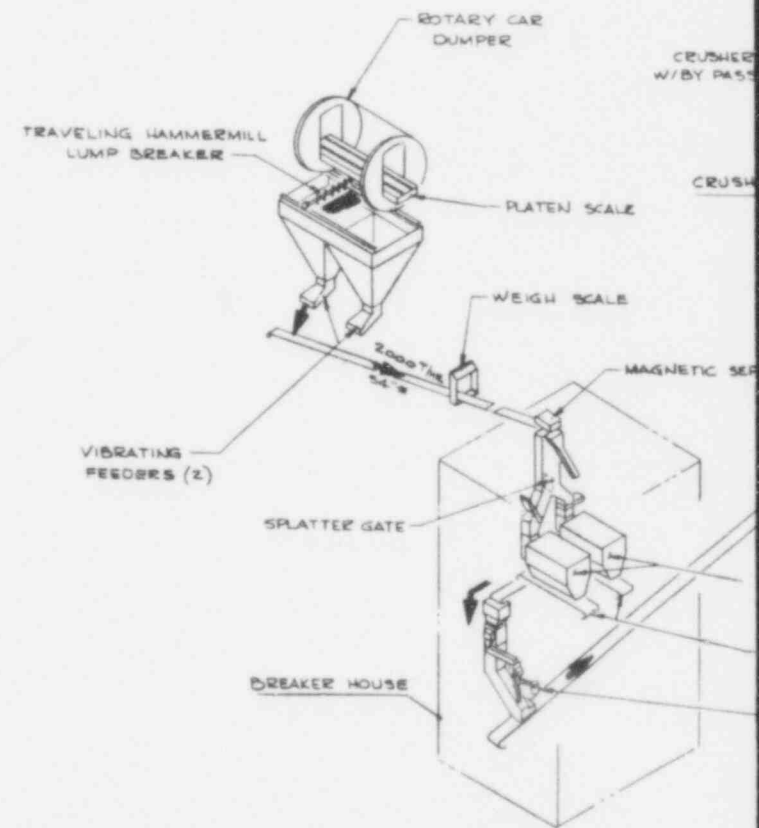
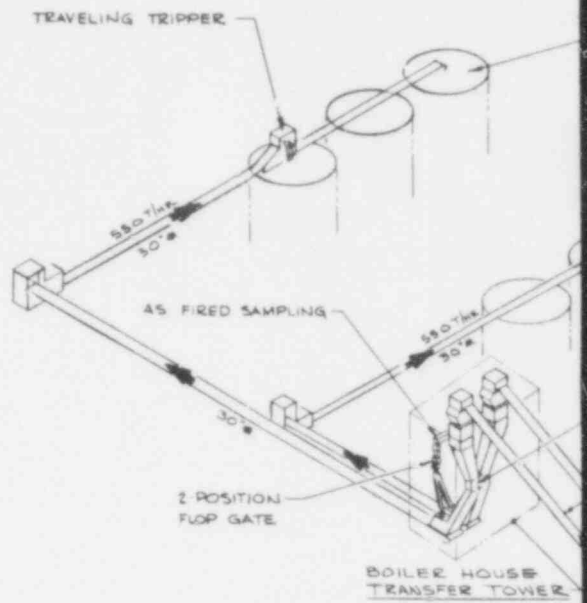
704018



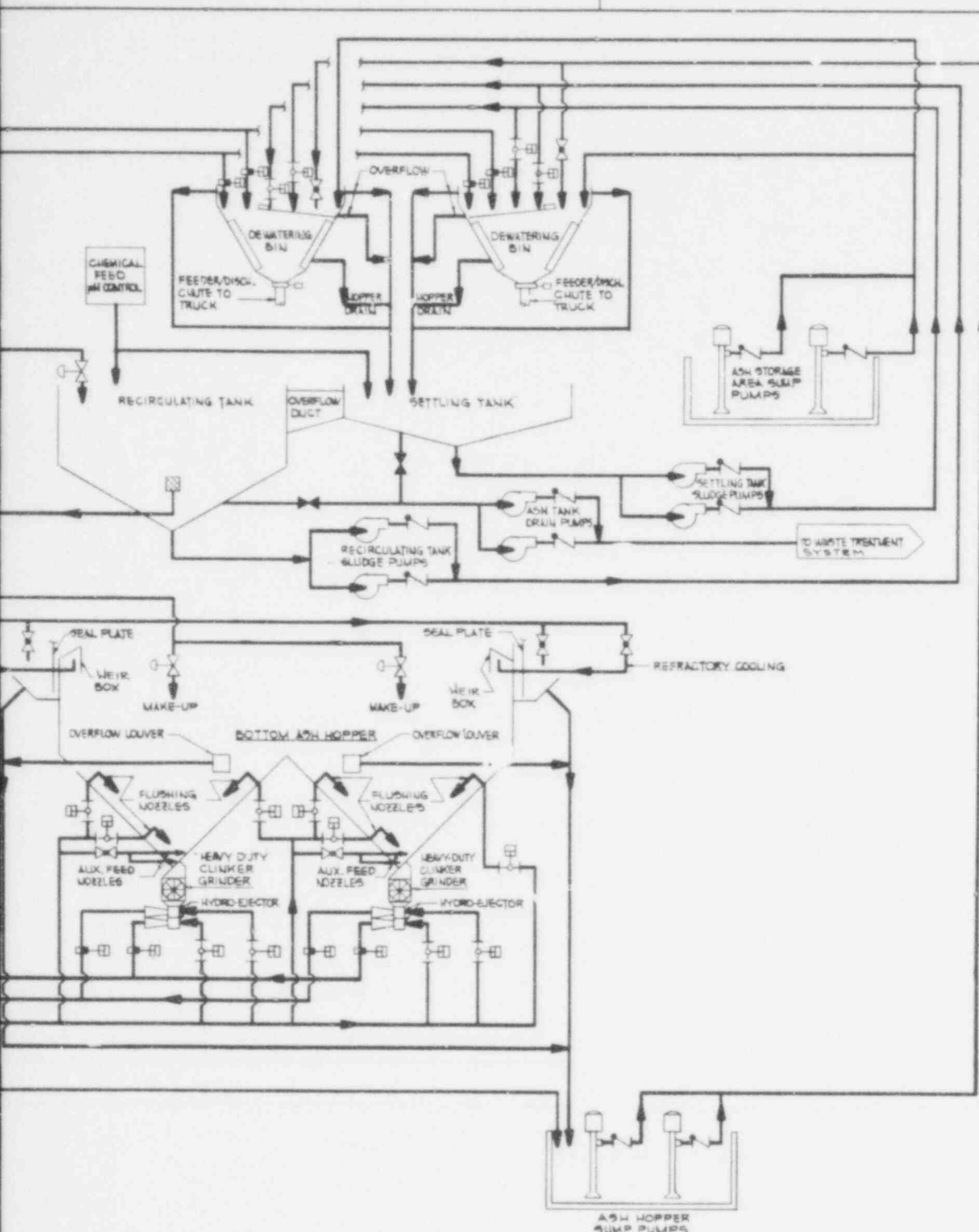
NOTE:
* - BELT WIDTH

704019

FLOW DIAGRAM COAL HANDLING SYSTEM 794 MWe FOSSIL PLANT MIDDLETOWN HYPOTHETICAL SITE  6509.002-H5C-I-4

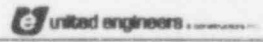


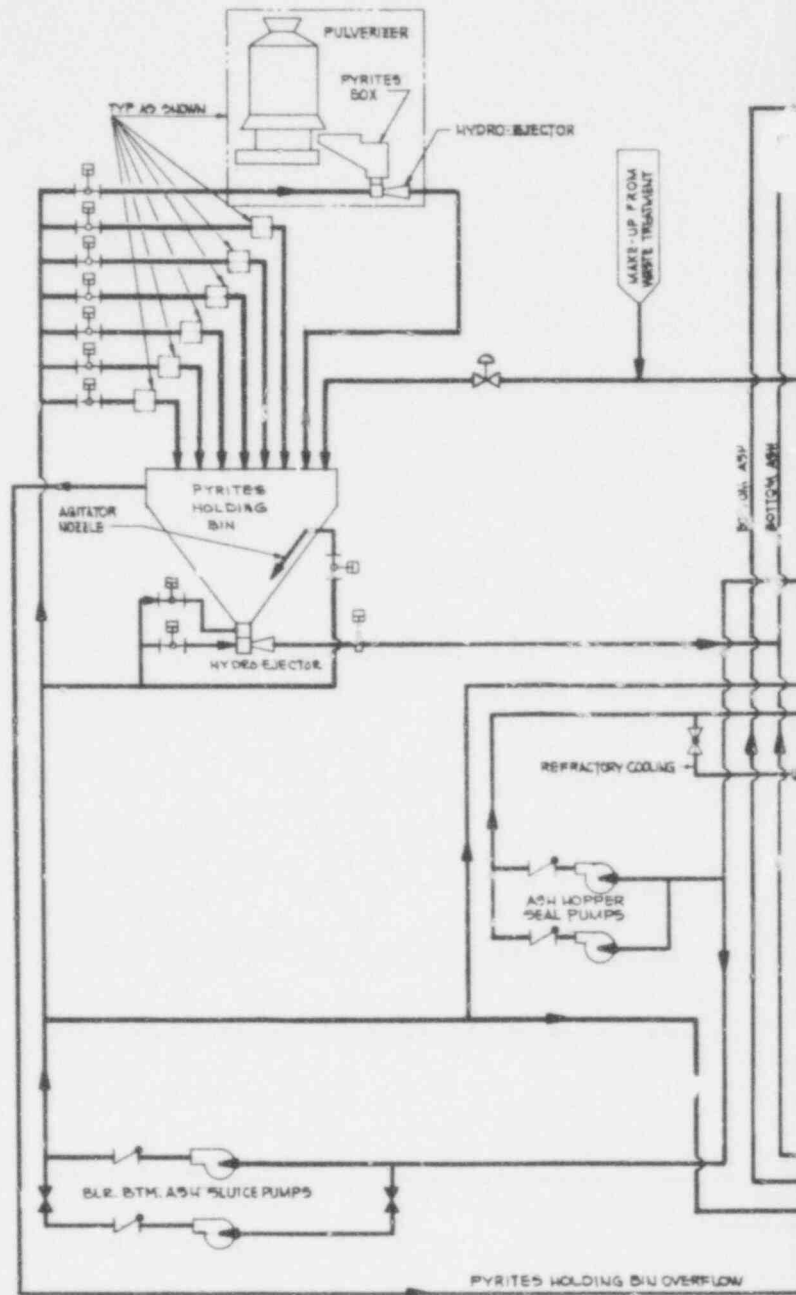
704020



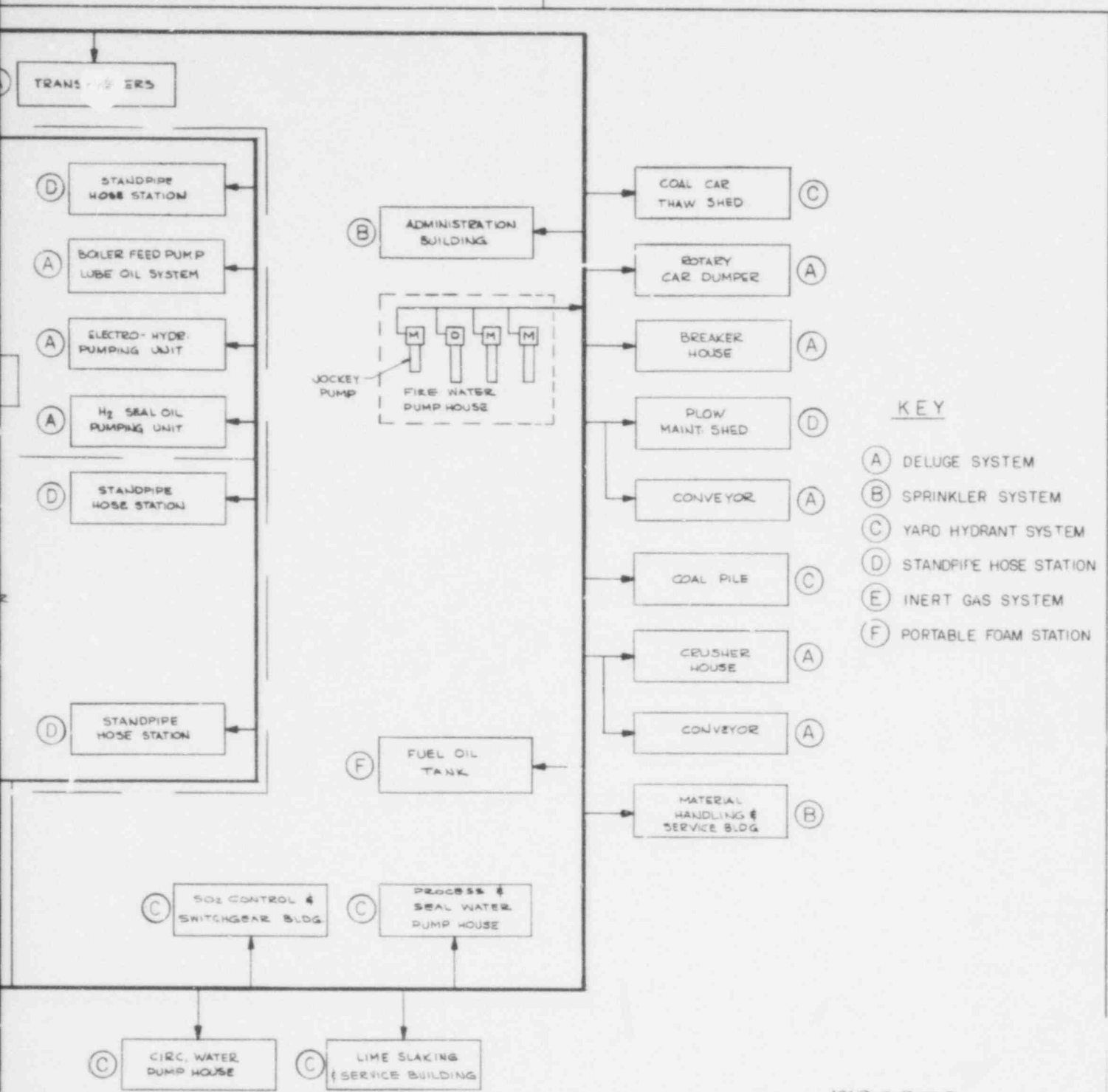
704021

NOTE:
FOR SYMBOL LEGEND SEE
DWG. 6509.002-HSC-1

FLOW DIAGRAM
BOTTOM ASH HANDLING SYS.
794 MWe FOSSIL PLANT
MIDDLETOWN HYPOTHETICAL SITE

 6509.002-HSC-15



704022



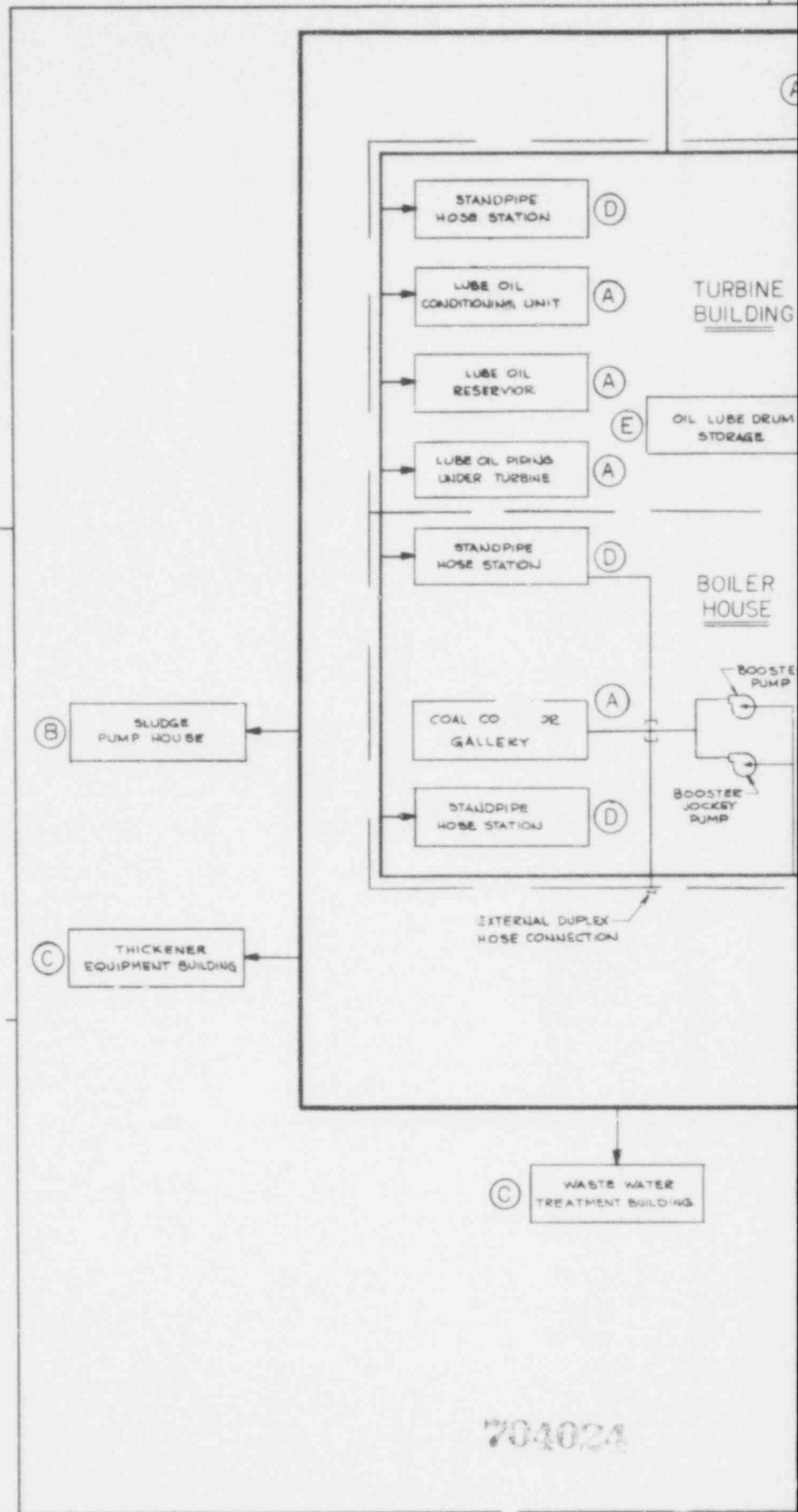
KEY

- (A) DELUGE SYSTEM
- (B) SPRINKLER SYSTEM
- (C) YARD HYDRANT SYSTEM
- (D) STANDPIPE HOSE STATION
- (E) INERT GAS SYSTEM
- (F) PORTABLE FOAM STATION

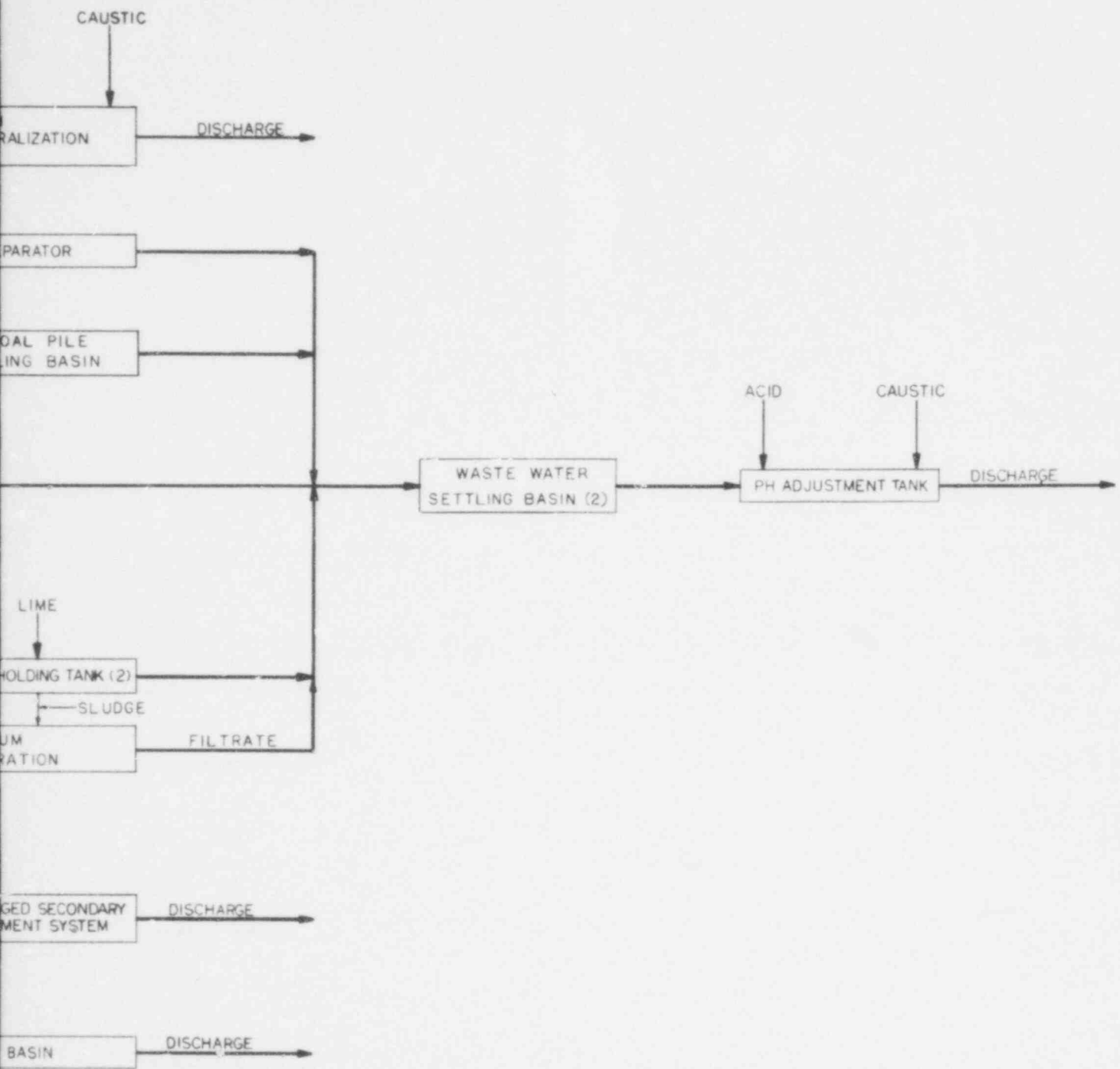
704023

NOTE
FOR SYMBOL LEGEND SEE
DWG 6509.002-HSC-1

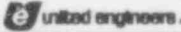
BLOCK DIAGRAM
PLANT FIRE
PROTECTION SYSTEM
794 MW_g FOSSIL PLANT
MIDDLETOWN HYPOTHETICAL SITE
 United Engineers
6509.002-HSC-16

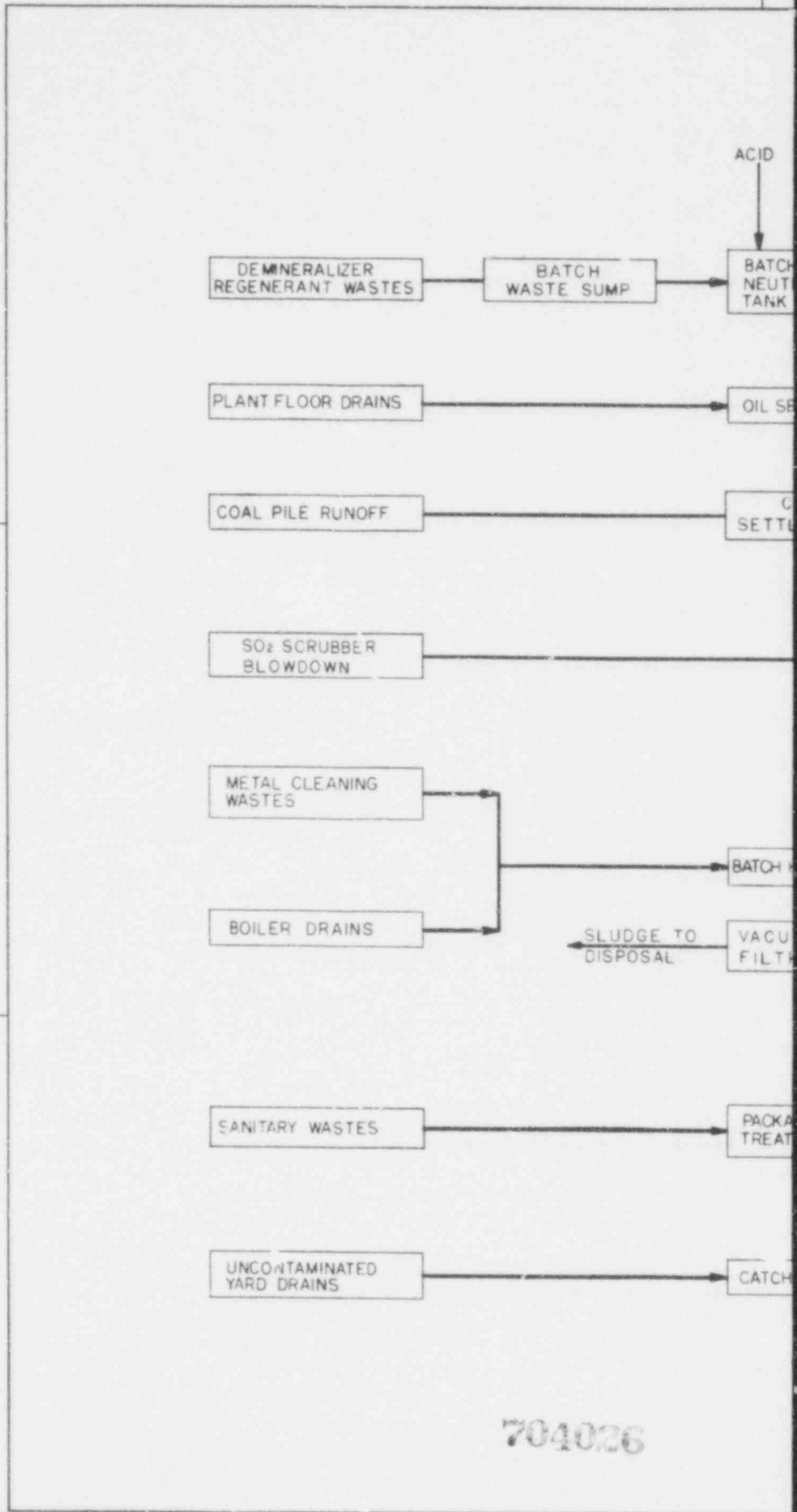


704024

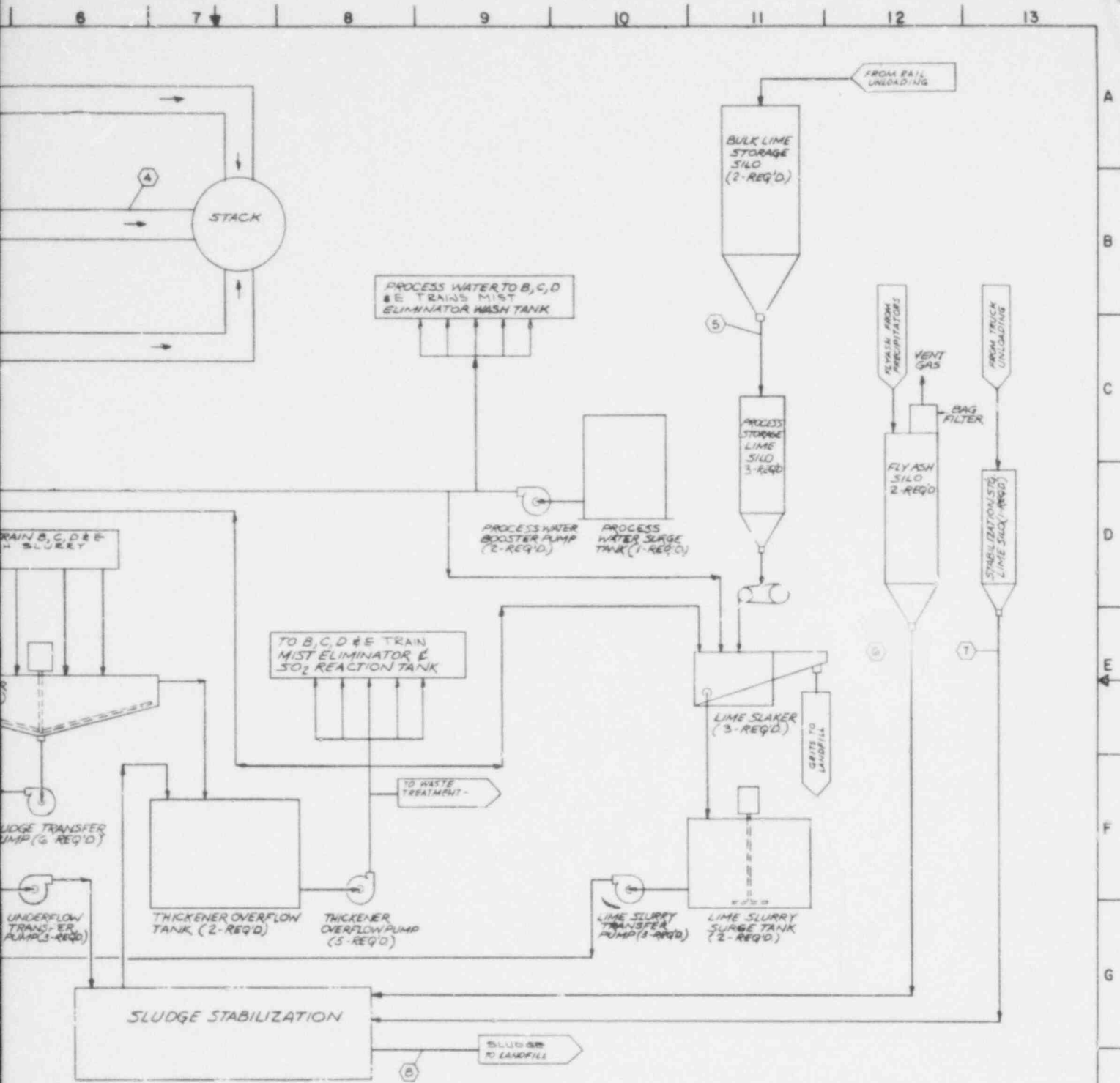


704025

BLOCK DIAGRAM
 WASTEWATER
 TREATMENT SYSTEM
 794 MWe FOSSIL PLANT
 MIDDLE TOWN HYPOTHETICAL SITE
 **United engineers**
 6509.002-HSC-17



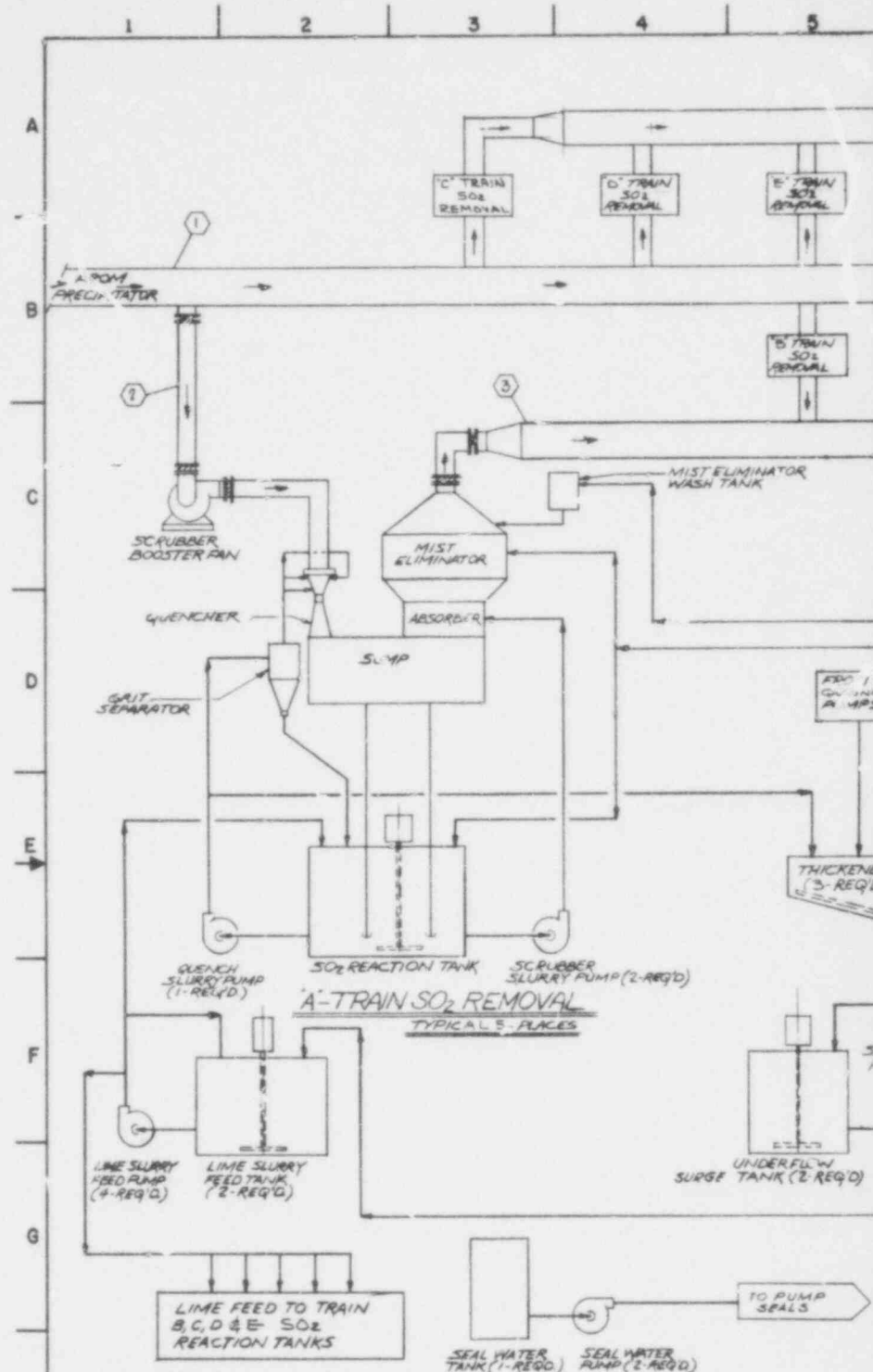
704026



- NOTES:
- 1-FUEL BURN RATE - 750,000 LB/HR
 - 2-COAL ANALYSIS:
 - ASH - 10.51%
 - H₂O - 11.51%
 - SULFUR - 5.2%
 - 11,026 BTU/LB
 - 3-LIME AS RECEIVED CONTAINS 5% INERTS
 - 4-110% STOICHIOMETRIC LIME
 - 5-FIVE SO₂ TRAINS ARE OPERATED AT MAXIMUM FUEL BURN RATE
 - 6-SO₂ REMOVAL TRAINS ACHIEVE 90% SO₂ REMOVAL. THIS ONLY 88.15% OF FLUE GAS MUST BE SCRUBBED TO MEET EFFLUENT LIMITATION (12 LB SO₂/MM BTUS)
 - 7-FOR SYMBOL LEGEND SEE DWG 6509.002-HSC-1

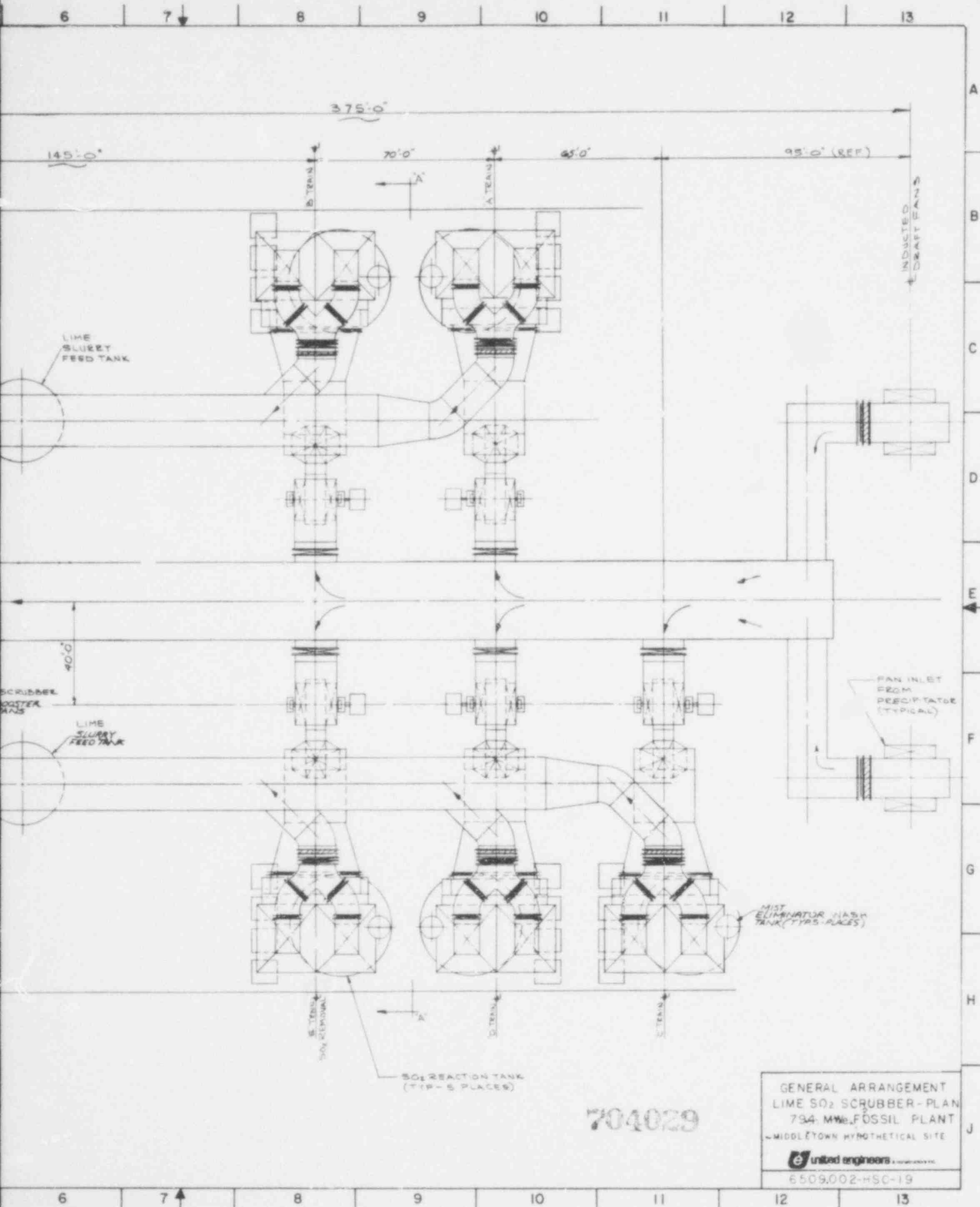
704027

BLOCK DIAGRAM
 LIME SO₂ SCRUBBER SYSTEM
 794 MWe FOSSIL PLANT
 MIDDLETOWN HYPOTHETICAL SITE
 UNITED ENGINEERS
 6509.002-HSC-1B



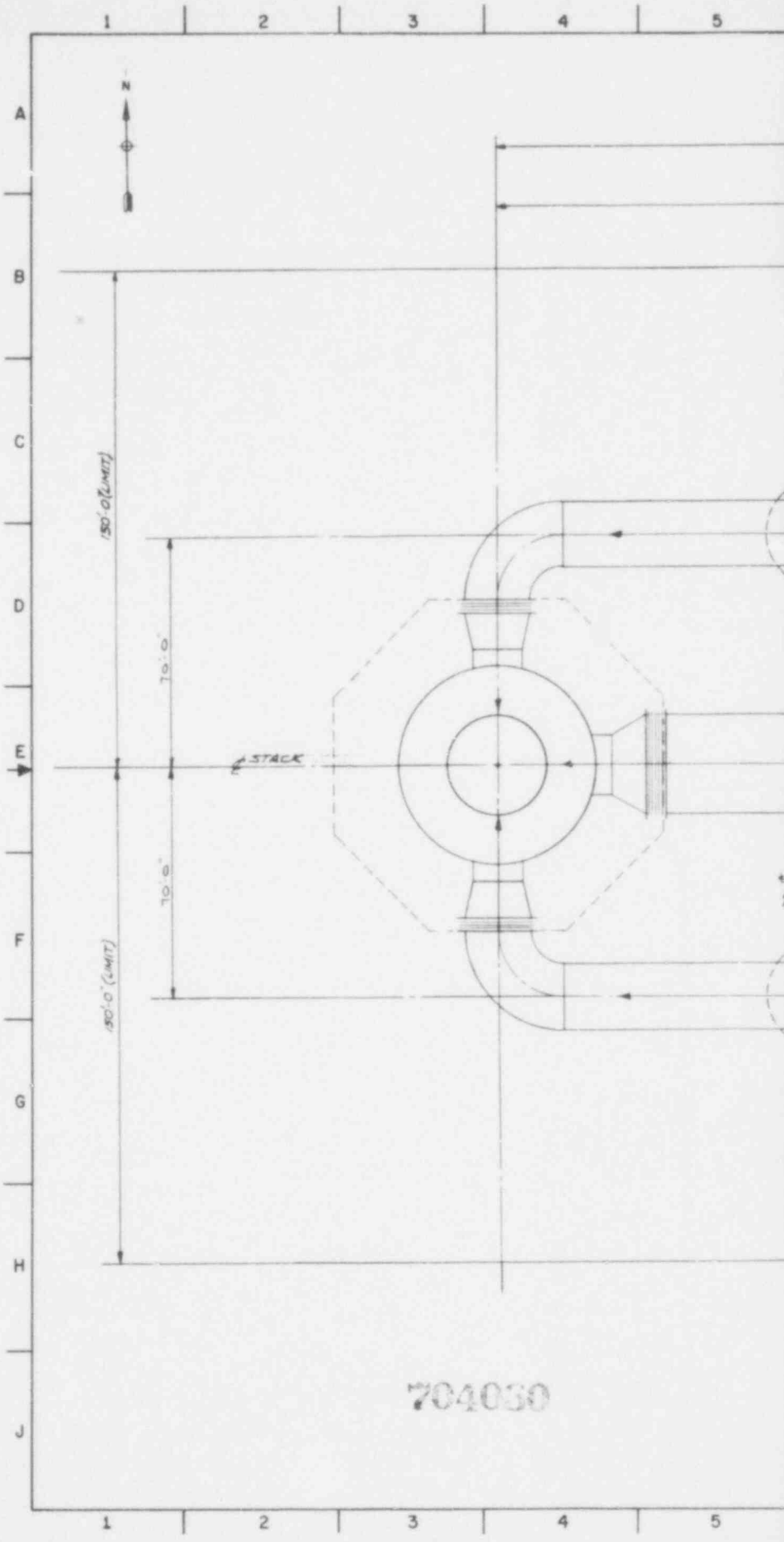
STREAM IN	1	2	3	4	5	6	7	8
DRY GAS	7851380	1750458	1720144	950500				
H ₂ O (VAPOR)	4464490	102574	180615	55954				
SO ₂	4379	10511	1031	5545				
WATER (LIQ'D)							65595	
SOLIDS							142270	
WATER (HYDRATION)							6364	
LIME					37547	54436	4371	
FLYASH	805	178	89	95				
TOTAL LB/HR	2318575	1833217	1900848	985751	37597	59436	4371	207647
TEMP (F)	304	304	128	304				
PRESSURE (PSIA)								
ACFM								
GPM								
SPECIFIC GRAVITY								

704028



704029

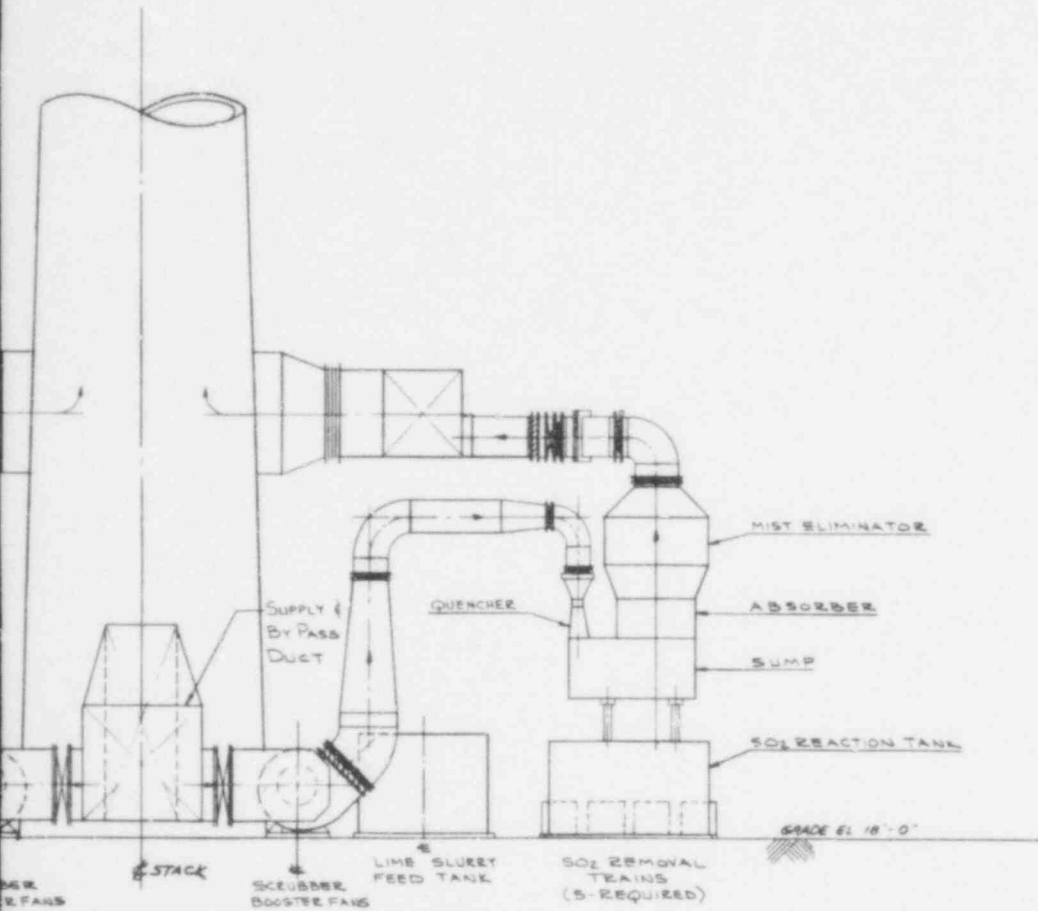
GENERAL ARRANGEMENT
 LIME SO₂ SCRUBBER - PLAN
 734 MW_e FOSSIL PLANT
 - MIDDLETOWN HYPOTHETICAL SITE
 united engineers & architects
 6509,002-HSC-19



704030

6 7 8 9 10 11 12 13

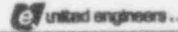
A
B
C
D
E
F
G
H
J



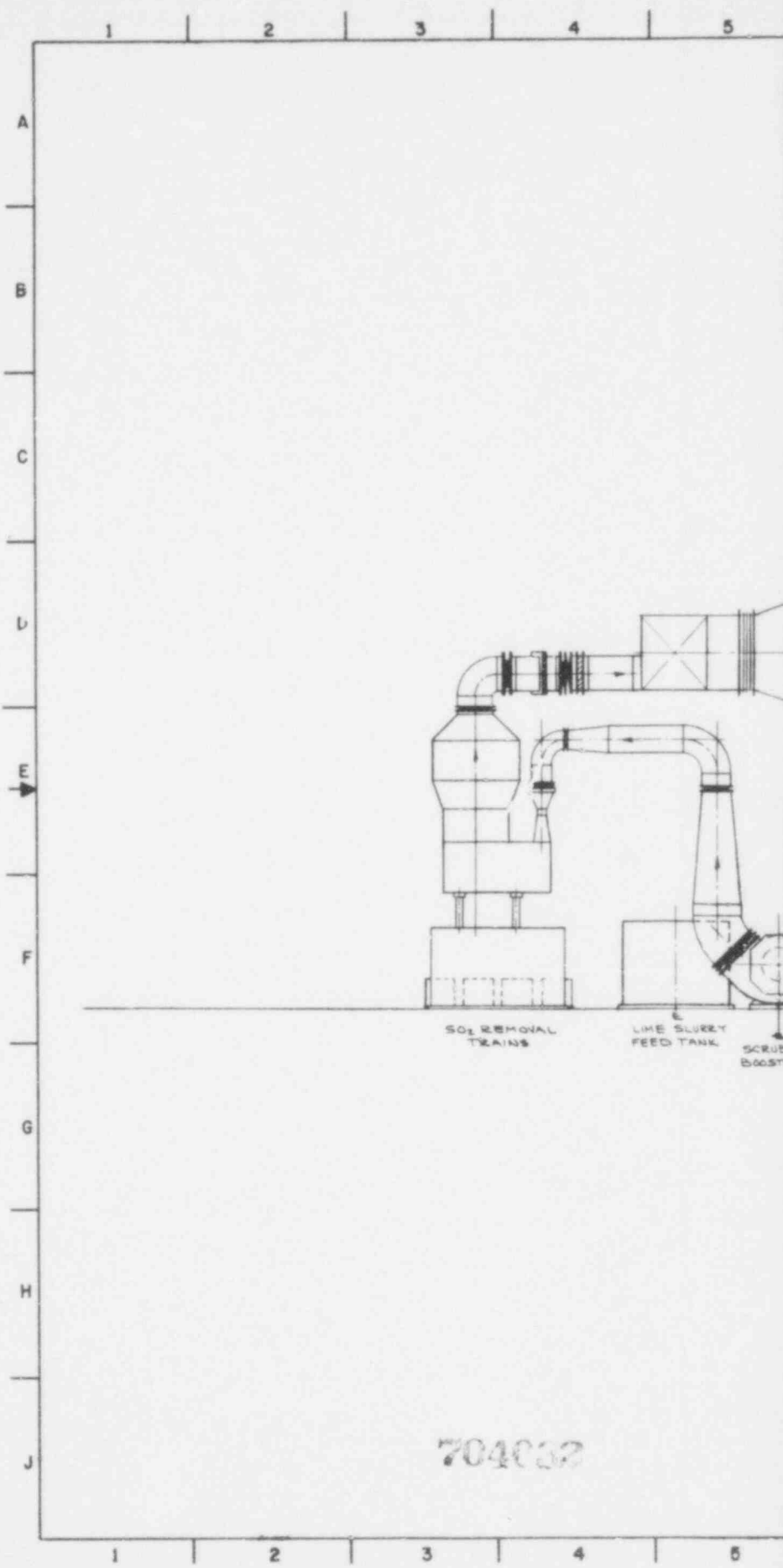
SECTION A-A



704031

GENERAL ARRANGEMENT
 LIME SO₂ SCRUBBER-SECTION
 794 MWe FOSSIL PLANT
 MIDDLETOWN HYPOTHETICAL SITE

 6509.002-HSC-20

6 7 8 9 10 11 12 13



704032

SECTION 11
EQUIPMENT LIST

704033

POOR
ORIGINAL

SECTION 11

EQUIPMENT LIST

11.1 INTRODUCTION

This section describes in detail, the major components of the 794 MWe HSC Coal-Fired plant design developed for this study. Each of these are described in terms of quantity, type, orientation, capacity or flow, design pressure, design temperature, etc., in sufficient detail to permit preparation of the cost estimate in Section 9, Volume III of this report.

As a convenience, the components are listed in accordance with an expanded AEC code-of-accounts (USAEC Report NUS-531), which permits correlation and cross-referencing with the detailed cost estimate.

In order to maintain consistency for the various systems in the equipment list, nine standard sub-account headings are used to group similar items, as follows:

1. Rotating Machinery
2. Heat Transfer Equipment
3. Tanks and Pressure Vessels
4. Purification and Filtration Equipment
5. Piping or Piping and Ductwork
6. Valves or Valves and Dampers
7. Piping - Miscellaneous Items
8. Instrumentation and Control
9. Foundation/Skids

704034

As a guide for the use of this equipment list, it is important to note that the unit quantities for piping, valves and structural items are excluded and only the code-of-accounts listings are shown. However, the quantities for these items and their associated costs appear in the detailed cost estimate in Section 9 of this report.

704035

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
20 .	LAND AND LAND RIGHTS	
21 .	STRUCTURES + IMPROVEMENTS	
211 .	YARDWORK	
211.1	GENERAL YARDWORK	
211.11	GENERAL CUT + FILL	
211.111	CUT + FILL BEYOND OPEN CUT	
211.112	CLEARING + GRUBBING	
211.113	FINE GRADING	
211.114	LANDSCAPING	
211.12	ROADS, WALKS+PARKING AREA	
211.121	SUBGRADE PREPARATION	
211.122	ON-SITE ROADS+PARKING AREA	
211.1221	ROADS - ASPHALT	
211.1222	PARKING AREAS - ASPHALT	
211.1223	CURBS - CONCRETE	
211.123	WALKS - CONCRETE	
211.14	FENCING + GATES	
211.141	PERMANENT FENCE	
211.142	GATE HOUSE	
211.15	SANITARY SEWER FACILITY	
211.151	SEWAGE TREATMENT FACILITY	
211.152	SANITARY PIPING	
211.1521	2 IN + SMALLER	

704036

~~SECRET~~

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
211.1522	2.5 IN + LARGER	
211.15221	CI BELL + SPIGOT/NNS	
211.153	OIL SEPERATORS	
211.16	YARD DRAINAGE STORM SEWERS	
211.161	DRAINS	
211.162	PIPING	
211.1621	2 IN + SMALLER	
211.1622	2.5 IN + LARGER	
211.16221	GALVANIZED/NNS	
211.17	ROADWAY + YARD LIGHTING	
211.19	SETTLING BASINS	
211.191	EARTH EXCAVATION	
211.192	ROCK EXCAVATION	
211.193	BACKFILL	
211.194	PUMPING	
211.195	FORMWORK	
211.196	REINFORCING STEEL	
211.197	CONCRETE	
211.198	SHEET PILING	
211.199	RIP-RAP(12 IN. THICK)	
211.4	RAILROADS	
211.41	CUT + FILL	
211.42	GRADING	

2040319

2040319

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
211.43	TRACK(BALLAST,TIES,RAIL)	
211.45	SWITCHES + BUMPERS	
211.451	TURNOUTS(NO. 8)	
211.452	BUMPERS	
211.46	RIP RAP(24 IN. THICK)	
211.7	STRUCTURE ASSOCIATED YDWK.	
211.71	CUT + FILL	
211.711	OPEN CUT	
211.7111	DEWATERING	
211.7112	EARTH EXCAVATION	
211.7113	ROCK EXCAVATION	
211.712	FILL + BKFILL(PLACE/COMP)	
211.7122	EARTH FILL	
211.7123	SAND FILL	
211.7124	CONCRETE FILL	
212.	STEAM GENERATOR BUILDING	
212.1	BUILDING STRUCTURE	
212.11	EXCAVATION WORK	
212.111	EARTH EXCAVATION	
212.112	ROCK EXCAVATION	
212.113	CONCRETE FILL	
212.114	FILL + BACKFILL	
212.115	DEWATERING	

04038

04038

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
212.13	SUBSTRUCTURE CONCRETE	
212.131	FORMWORK	
212.132	REINFORCING STEEL	
212.133	CONCRETE	
212.134	EMBEDDED STEEL	
212.135	FLOOR FINISH	
212.139	WELDED WIRE FABRIC	
212.14	SUPERSTRUCTURE	
212.141	CONCRETE WORK	
212.1411	FORMWORK	
212.1412	REINFORCING STEEL	
212.1413	CONCRETE	
212.1415	FLOOR FINISH	
212.1418	CONSTRUCTION JOINTS	
212.142	STRUCTURAL + MISC. STEEL	
212.1421	STRUCTURAL STEEL	
212.1422	MISC. FRAMES, ETC.	
212.1423	FLOOR GRATING (GALVANIZED)	
212.1424	STAIR TREADS	
212.1425	HANDRAIL	
212.143	EXTERIOR WALLS	
212.1432	MASONRY WALLS	
212.1433	METAL INSULATED SIDING	

704009-78188

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
212.144	ROOFING + FLASHING	
212.1441	METAL ROOF DECK	
212.1443	CONCRETE FILL	
212.1444	WELDED WIRE FABRIC	
212.1445	B.U. ROOFING, NO INSULATION	
212.146	INTERIOR WALLS + PARTITION	
212.1462	MASONRY WALLS	
212.1463	METAL PARTITIONS	
212.147	DOORS + WINDOWS	
212.1471	ROLLING STEEL DOORS	
212.1472	PERSONNEL DOORS	
212.1473	SASH + GLAZING	
212.148	SPECIAL FINISHES	
212.1481	VINYL TILE FLOORS	
212.1482	COMPUTER FLOORS (RAISED)	
212.1483	CERAMIC TILE FLOOR + WALLS	
212.1484	ACOUSTICAL CEILING	
212.149	PAINTING	
212.1492	STEELWORK	
212.1493	HANDRAILS	
212.1494	DOORS + WALLS	
212.2	ERECTING SERVICES	
212.21	PLUMBING + DRAINS	

070702

070702

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
212.211	ROOF DRAINS + PIPING	
212.2111	DRAINS	
212.2115	PIPING	
212.212	FLOOR DRAINS + PIPING	
212.2121	DRAINS	
212.2125	PIPING	
212.213	OIL SEPERATOR	
212.22	HEATING, VENT + AIR COND	
212.221	BOILER ROOM	
212.2211	ROTATING MACHINERY	
212.22111	BOILER RM ROOF VENT+MOTOR	
212.221111	BOILER RM ROOF VENTILATOR	
212.221112	BOILER RM ROOF VENT MOTOR	
212.2212	HEAT TRANSFER EQUIPMENT	
212.22121	BOILER ROOM UNIT HEATERS	
212.2214	PURIFICATION + FILT EQUIP	
212.22141	BOILER RM VA CLEAN SYS+MT	
212.221411	BOILER RM CLEAN SYS EQ	
212.221412	BOILER RM VAL CL SYS MOTOR	
212.22142	BUNKER VENTILATION	
212.221421	CYCLONE DUST COLLECTOR	
212.2215	EXHAUST DUCTWORK-BUNKER	
212.2216	VALVES + DAMPERS	

704013

EQUIPMENT LIST - REPORT 1

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
212.22169	SPECIAL VALVES + DAMPERS	
212.221691	BOILER ROOM WALL LOUVERS	
212.222	LUBE OIL DRUM STORAGE	
212.2221	ROTATING MACHINERY	
212.22211	LUBE OIL DM ST EXHST FN+MT	
212.222111	LUBE OIL DM ST EXHAUST FAN	
212.222112	LUBE OIL DM ST EXHST MOTOR	
212.2222	HEAT TRANSFER EQUIPMENT	
212.22221	LUBE OIL DM ST HEATER+MTR	
212.222211	LUBE OIL DM ST UNIT HEATER	
212.222212	LUBE OIL DM ST HEATR MOTOR	
212.2226	VALVES + DAMPERS	
2 22269	SPECIAL VALVES + DAMPERS	
212.222691	LUBE OIL DM ST WALL LOUVER	
212.223	ELEVATOR MACHINE ROOM	
212.2232	HEAT TRANSFER EQUIPMENT	
212.22321	ELEV MACH RM BASEBOARD HTR	
212.2236	VALVES + DAMPERS	
212.22369	SPECIAL VALVES + DAMPERS	
212.223691	ELEV MACH RM WALL LOUVERS	
212.2239	FOUNDATIONS/SKIDS	
212.22391	ELEV MACH RM AIR UNIT+MTR	
212.223911	ELEV MACH RM AIR UNIT	

204012

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
212.223912	ELEV MACH RM AIR UNIT MOTOR	
212.224	AUXILIARY BOILER ROOM	
212.2241	ROTATING MACHINERY	
212.22411	AUX BOILER RM EXHST FN+MTR	
212.224111	AUX BOILER RM EXHAUST FAN	
212.224112	AUX BOILER RM EXHST MOTOR	
212.2242	HEAT TRANSFER EQUIPMENT	
212.22421	AUX BOILER RM HEATER+MOTOR	
212.224211	AUX BOILER RM UNIT HEATERS	
212.224212	AUX BOILER RM HEATER MOTOR	
212.2246	VALVES + DAMPERS	
212.22469	SPECIAL VALVES + DAMPERS	
212.224691	AUX BOILER RM WALL LOUVER	
212.225	MACHINE SHOP	
212.2251	ROTATING MACHINERY	
212.22511	MACHINE SHOP EXHST FAN+MTR	
212.225111	MACHINE SHOP EXHAUST FAN	
212.225112	MACHINE SHOP EXHAUST MOTOR	
212.2252	HEAT TRANSFER EQUIPMENT	
212.22521	MACH SHOP UNIT HEATERS+MTR	
212.225211	MACHINE SHOP UNIT HEATERS	
212.225212	MACH SHOP UNIT HEATER MTR	
212.2256	VALVES + DAMPERS	

704013

EQUIPMENT LIST - REPORT 1

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
212.22569	SPECIAL VALVES + DAMPERS	
212.225691	MACHINE SHOP WALL LOUVERS	
212.226	AIR COMPRESSOR ROOM	
212.2261	ROTATING MACHINERY	
212.22611	AIR COMP RM EXHST FAN+MTR	
212.226111	AIR COMP RM EXHAUST FAN	
212.226112	AIR COMP RM EXHAUST MOTOR	
212.2262	HEAT TRANSFER EQUIPMENT	
212.22621	AIR COMP RM UNIT HEATR+MTR	
212.226211	AIR COMP RM UNIT HEATERS	
212.226212	AIR COMP RM UNIT HEATR MTR	
212.2266	VALVES + DAMPERS	
212.22669	SPECIAL VALVES + DAMPERS	
212.226691	AIR COMP RM WALL LOUVERS	
212.227	COAL TRIPPER GALLERY	
212.2271	ROTATING MACHINERY	
212.22711	COAL TRIP GAL ROOF VENT+MT	
212.227111	COAL TRIP GAL ROOF VENT	
212.227112	COAL TRIP GAL ROOF VENT MT	
212.228	INSTRUMENTATION + CONTROL	
212.24	LIGHTING + SERVICE POWER	
212.25	ELEVATOR	
212.251	ELEVATOR EQUIPMENT	

204014

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
212.26	FIRE PROTECTION SYSTEM	
212.261	ROTATING MACHINERY	
212.2611	FIRE PROTECTION PUMP+MOTOR	
212.26111	FIRE PROTECTION PUMP	
212.26112	FIRE PROTECTION PUMP MOTOR	
212.262	HOSE + SPRAY EQUIPMENT	
212.2621	HOSE REELS	
212.2622	SPRAY HEADS	
212.265	PIPING	
212.2652	2.5 IN + LARGER	
212.26521	CS/NNS	
213.	TURBINE, HEATER, CONTROL BLD	
213.1	BUILDING STRUCTURE	
213.11	EXCAVATION WORK	
213.111	EARTH EXCAVATION	
213.112	ROCK EXCAVATION	
213.113	CONCRETE FILL	
213.114	FILL + BACKFILL	
213.115	DEWATERING	
213.13	SUBSTRUCTURE CONCRETE	
213.131	FORMWORK	
213.132	REINFORCING STEEL	
213.133	CONCRETE	

704015

09/16/77

EQUIPMENT LIST - REPORT 1

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
213.134	EMBEDDED STEEL	
213.135	FLOOR FINISH	
213.136	WATERPROOFING	
213.137	CONSTRUCTION JOINTS	
213.138	RUBBING CONCRETE SURFACE	
213.139	WIRE FABRIC	
213.14	SUPERSTRUCTURE	
213.141	CONCRETE WORK	
213.1411	FORMWORK	
213.14111	FORMWORK - WOOD	
213.14112	FORMWORK - METAL	
213.1412	REINFORCING STEEL	
213.1413	CONCRETE	
213.1414	EMBEDDED STEEL	
213.1415	FLOOR FINISH	
213.1416	WATERPROOFING	
213.1417	RUBBING CONCRETE SURFACES	
213.1418	CONSTRUCTION JOINTS	
213.142	STRUCTURAL + MISC STEEL	
213.1421	STRUCTURAL STEEL	
213.1422	FLOOR + PLATFORM SUPPORTS	
213.1423	MISC FRAMES, ETC	
213.1424	CHECKERED PLATE	

201008

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
213.1425	FLOOR GRATING(GALV)	
213.1426	STAIR TREADS	
213.1427	HANDRAIL	
213.143	EXTERIOR WALLS	
213.1431	CONCRETE WALLS	
213.1432	MASONRY WALLS	
213.1433	METAL INSULATED SIDING	
213.144	ROOF DECK	
213.1441	METAL ROOF DECK	
213.1442	CONCRETE PLANK	
213.1443	CONCRETE FILL	
213.1444	REINFORCING STEEL	
213.145	ROOFING + FLASHING	
213.1451	B.U. ROOF INSULATION+FLASH	
213.1452	ELASTOMERIC ROOFING	
213.146	INTERIOR WALLS+PARTITIONS	
213.1461	MASONRY WALLS	
213.1462	CONCRETE BLOCK WALLS	
213.1463	METAL PARTITIONS	
213.147	DOORS + WINDOWS	
213.1471	ROLLING STEEL DOORS	
213.1472	PERSONNEL DOORS	
213.1473	SASH + GLAZING	

2101017

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
213.148	SPECIAL FINISHES	
213.1481	VINYL TILE FLOORS	
213.1484	ACOUSTICAL CEILING	
213.149	PAINTING	
213.1491	CONCRETE	
213.1492	STEELWORK	
213.1493	DOORS + WALLS	
213.1494	HANDRAIL	
213.2	BUILDING SERVICES	
213.21	PLUMBING + DRAINS	
213.211	ROOF DRAINS + PIPING	
213.2111	DRAINS	
213.2115	PIPING	
213.21151	2 IN + SMALLER	
213.21152	2.5 IN + LARGER	
213.211521	GALV STEEL/NNS	
213.212	FLOOR DRAINS + PIPING	
213.2121	DRAINS	
213.2125	PIPING	
213.21251	2 IN + SMALLER	
213.21252	2.5 IN + LARGER	
213.212521	CI/NNS	
213.212522	CS/NNS	

704048

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
213.212523	PVC/NNS	
213.213	PUMPS	
213.2131	DRAIN PUMP + MOTOR	
213.21311	DRAIN PUMP	
213.21312	DRAIN PUMP MOTOR	
213.214	SANITARY DRAINS + PIPING	
213.2141	SANITARY FIXTURES	
213.2145	PIPING	
213.21451	2 IN + SMALLER	
213.214511	CI/NNS	
213.214512	COPPER/NNS	
213.21452	2.5 IN + LARGER	
213.214521	CI/NNS	
213.22	HEATING, VENT + AIR COND	
213.221	GENERAL BUILDING	
213.2211	ROTATING MACHINERY	
213.22111	ROOF VENTILATOR + MOTOR	
213.221111	ROOF VENTILATOR	
213.221112	ROOF VENTILATOR MOTOR	
213.2212	HEAT TRANSFER EQUIPMENT	
213.22121	STEAM HEATER UNIT + MOTOR	
213.221211	STEAM UNIT HEATER	
213.221212	STEAM UNIT MOTOR	

704049

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
213.2215	PIPING	
213.22151	2 IN + SMALLER	
213.221511	CS/NNS	
213.22152	2.5 IN + LARGER	
213.221521	CS/NNS	
213.2216	VALVES + DAMPERS	
213.22161	GATE	
213.22162	CHECK	
213.22169	SPECIAL VALVES + DAMPERS	
213.221691	INTAKE LOUVERS	
213.2217	PIPING - MISC ITEMS	
213.22171	HANGERS + SUPPORTS	
213.22172	INSULATION	
213.222	HEATER BAY	
213.2221	ROTATING MACHINERY	
213.22211	ROOF VENTILATOR + MOTOR	
213.222111	ROOF VENTILATOR	
213.222112	ROOF VENTILATOR MOTOR	
213.223	LUBE OIL ROOM	
213.2231	ROTATING MACHINERY	
213.22311	LUBE OIL RM EXHST FAN+MTR	
213.223111	LUBE OIL RM EXHST FAN	
213.223112	LUBE OIL RM EXHST FAN MTR	

004050

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
213.2236	VALVES	
213.22369	SPECIAL VALVES + DAMPERS	
213.223691	DAMPERS	
213.225	CONTROL ROOM	
213.2251	ROTATING MACHINERY	
213.22511	CHILLER WATER PUMP + MOTOR	
213.225111	CHILLER WATER PUMP	
213.225112	CHILLER WATER PUMP MOTOR	
213.22512	CONTROL RM EXHST FAN+MOTOR	
213.225121	CONTROL RM EXHST FAN	
213.225122	CONTROL RM EXHST FAN MOTOR	
213.2252	HEAT TRANSFER EQUIPMENT	
213.22521	CHILLER + MOTOR	
213.225211	CHILLER	
213.225212	CHILLER MOTOR	
213.22522	MULTIZONE AIR UNIT+MOTOR	
213.225221	MULTIZONE AIR HANDLING UNT	
213.225222	MULTIZONE AIR UNIT MOTOR	
213.22523	HEATING+VENT AIR UNIT+MTR	
213.225231	HEATING+VENT AIR UNIT	
213.225252	HEATING+VENT AIR UNIT MTR	
213.2255	PIPING + DUCTWORK	
213.22551	GENERAL DUCTWORK	

701051

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
213.226	WATER SAMPLING ROOM	
213.2261	ROTATING MACHINERY	
213.22611	WATR SAMP RM EXHST FAN+MTR	
213.226111	WATER SAMP RM EXHST FAN	
213.226112	WATR SAMP RM EXHST FAN MTR	
213.227	COAL SAMPLING ROOM	
213.2271	ROTATING MACHINERY	
213.22711	COAL SAMP RM EXHST FAN+MTR	
213.227111	COAL SAMP RM EXHST FAN	
213.227112	COAL SAMP RM EXHST FAN MTR	
213.228	BATTERY ROOM	
213.2281	ROTATING MACHINERY	
213.22811	BATTERY ROOM EXHST FAN+MTR	
213.228111	BATTERY ROOM EXHST FAN	
213.228112	BATTERY ROOM EXHST FAN MTR	
213.229	INSTRUMENTATION + CONTROL	
213.23	FIRE PROTECTION SYSTEM	
213.232	HOSE + SPRAY EQUIPMENT	
213.2321	HOSE REELS	
213.2322	SPRAY HEADS	
213.235	PIPING	
213.2352	2.5 IN + LARGER	
213.23521	CS/NNS	

204057

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
213.236	VALVES	
213.2369	SPECIAL VALVES	
213.23691	DELUGE VALVES	
213.24	LIGHTING + SERVICE POWER	
218B.	ADMINISTRATION+SERVICE BLD	
218B.1	BUILDING STRUCTURE	
218B.11	EXCAVATION WORK	
218B.111	EARTH EXCAVATION	
218B.112	ROCK EXCAVATION	
218B.113	CONCRETE FILL	
218B.114	FILL + BACKFILL	
218B.115	DEWATERING	
218B.13	SUBSTRUCTURE CONCRETE	
218B.131	FORMWORK	
218B.132	REINFORCING STEEL	
218B.133	CONCRETE	
218B.134	EMBEDDED STEEL	
218B.135	FLOOR FINISH	
218B.136	WATERPROOFING	
218B.137	CONSTRUCTION JOINTS	
218B.138	RUBBING CONCRETE SURFACES	
218B.139	WELDED WIRE FABRIC	
218B.14	SUPERSTRUCTURE	

704053

MODEL 640 - 0794 MME/2200 MAT COAL - 2.5/1.7 IN HG AU - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
218B.141	CONCRETE WORK	
218B.1411	FORMWORK	
218B.14111	FORMWORK-WOOD	
218B.14112	FORMWORK-METAL	
218B.1412	REINFORCING STEEL	
218B.1413	CONCRETE	
218B.1414	EMBEDDED STEEL	
218B.1415	FLOOR FINISH	
218B.1416	WATERPROOFING	
218B.1417	RUBBING CONCRETE SURFACES	
218B.1418	CONSTRUCTION JOINTS	
218B.142	STRUCTURAL + MISC. STEEL	
218B.1421	STRUCTURAL STEEL	
218B.1423	MISC. FRAMES, ETC.	
218B.1425	FLOOR GRATING (GALV.)	
218B.1426	STAIR TREADS	
218B.1427	HANDRAIL	
218B.143	EXTERIOR WALLS	
218B.1431	CONCRETE WALLS	
218B.1432	MASONRY WALLS	
218B.1433	METAL INSULATED SIDING	
218B.1434	WINDOW WALL	
218B.144	ROOF DECK	

704054

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
218B.1442	PRECAST CONCRETE PANELS	
218B.145	ROOFING + FLASHING	
218B.1451	B.U. ROOF INSUL + FLASHING	
218B.146	INTERIOR WALLS+PARTITIONS	
218B.1462	MASONRY WALLS	
218B.1463	METAL PARTITIONS	
218B.147	DOORS + WINDOWS	
218B.1471	ROLLING STEEL DOORS	
218B.1472	PERSONNEL DOORS	
218B.1473	SASH + GLAZING	
218B.148	WALLS, FLOOR+CEILING FINISH	
218B.1481	VINYL FLOOR TILE	
218B.1482	CERAMIC TILE FLOOR	
218B.1483	CARPET	
218B.1484	CERAMIC TILE WALL FINISH	
218B.1485	SUSPENDED CEILING	
218B.149	PAINTING	
218B.1491	CONCRETE	
218B.1492	STEELWORK	
218B.1495	HANDRAIL	
218B.1497	DOORS + WALLS	
218B.2	BUILDING SERVICES	
218B.21	PLUMBING + DRAINS	

704055

EQUIPMENT LIST - REPORT 1

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
218B.211	ROOF DRAINS + PIPING	
218B.2111	DRAINS	
218B.2115	PIPING	
218B.21152	2.5 IN+LARGER(GALV/NNS)	
218B.212	FLOOR DRAINS + PIPING	
218B.2121	DRAINS	
218B.2125	PIPING	
218B.21251	2.5 IN+LARGER(CS/NNS)	
218B.21252	2.5 IN+LARGER(CI/NNS)	
218B.213	PLUMBING FIXTURES+PIPING	
218B.2131	FIXTURES	
218B.2132	DOMESTIC WATER HEATERS	
218B.2135	PIPING	
218B.21351	2 IN + SMALLER(CS/NNS)	
218B.21352	2 IN + SMALLER(COPPER/NN)	
218B.21353	2.5 IN+LARGER(CS/NNS)	
218B.22	HEATING, VENT + AIR COND	
218B.221	TR CONDITIONING SYSTEMS	
218B.2219	FOUNDATIONS/SKIDS	
218B.22191	MULTI-TONE AIR UNIT + MOTOR	
218B.222	EXH. AIR SYSTEMS	
218B.2223	ROTATING MACHINERY	
218B.22231	TOILET RM EXHAUST FAN+MTR	

704056

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
218B.22232	FUME HOOD EXHAUST FAN+MTR	
218B.22233	RETURN AIR FANS + MOTORS	
218B.223	REFRIG CHILLED WATER SYS	
218B.2231	ROTATING MACHINERY	
218B.22311	CHILLER + MOTOR	
218B.22322	CHILLED WATER PUMP + MOTOR	
218B.224	BUILDING HEATING SYSTEMS	
218B.2241	HEAT TRANSFER EQUIPMENT	
218B.22411	HEAT+VENT AIR UNIT + MOTOR	
218B.22412	ELECTRIC BASEBOARD HEATERS	
218B.225	PIPING	
218B.227	2 IN+SMALLER	
218E 511	CS/NNS	
218B.2252	2.5 IN+LARGER	
218B.22521	CS/NNS	
218B.226	VALVES	
218B.2261	GATE	
218B.2262	CHECK	
218B.2263	GLOBE	
218B.2265	SAFETY/RELIEF	
218B.2268	PLUG	
218B.2269	SPECIAL VALVES	
218B.227	PIPING-MISC. ITEMS	

204057

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
218B.2271	HANGERS	
218B.228	DUCTWORK	
218B.229	INSTRUMENTATION+CONTROL	
218B.23	FIRE PROTECTION	
218B.231	FIRE HOSE CABINETS	
218B.232	SPRINKLERS	
218B.24	LIGHTING+SERVICE POWER	
218B.25	ELEVATOR	
218B.251	ELEVATOR EQUIPMENT	
218I.	ELECTRICAL SWITCHGR BLDGS	
218I.1	BUILDING STRUCTURE	
218I.11	EXCAVATION WORK	
218I.111	EXCAVATION-EARTH	
218I.114	BACKFILL-EARTH	
218I.13	SUBSTRUCTURE CONCRETE	
218I.131	FORMWORK	
218I.132	REINFORCING STEEL	
218I.133	CONCRETE	
218I.134	EMBEDDED STEEL	
218I.135	FLOOR FINISH	
218I.139	WIRE FABRIC	
218I.14	SUPERSTRUCTURE	
218I.142	STRUCTURAL + MISC. STEEL	

704058

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 079/ MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
218I.1421	PREFAB BUILDING	
218I.147	DOORS + WINDOWS	
218I.1472	PERSONNEL DOORS	
218I.1473	SASH + GLAZING	
218I.2	BUILDING SERVICES	
218I.21	PLUMBING + DRAINS	
218I.22	HEATING,VENT + AIR COND	
218I.24	LIGHTING + SERVICE POWER	
218M.	COAL CAR THAW SHED	
218M.1	BUILDING STRUCTURE	
218M.11	EXCAVATION WORK	
218M.111	EXCAVATION-EARTH	
218M.114	BACKFILL-EARTH	
218M.13	SUBSTRUCTURE CONCRETE	
218M.131	FORMWORK	
218M.132	REINFORCING STEEL	
218M.133	CONCRETE	
218M.134	EMBEDDED STEEL	
218M.14	SUPERSTRUCTURE	
218M.24	LIGHTING + SERVICE POWER	
218N.	ROTARY CAR DUMP BLDG+TUNNL	
218N.1	BUILDING STRUCTURE	
218N.11	EXCAVATION WORK	

70A059

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
218N.111	EXCAVATION-EARTH	
218N.112	EXCAVATION-ROCK	
218N.114	BACKFILL-EARTH	
218N.115	DEWATERING	
218N.13	SUBSTRUCTURE CONCRETE	
218N.131	FORMWORK	
218N.132	REINFORCING STEEL	
218N.133	CONCRETE	
218N.134	EMBEDDED STEEL	
218N.135	FLOOR FINISH	
218N.139	WIRE FABRIC	
218N.14	SUPERSTRUCTURE	
218N.141	CONCRETE WORK	
218N.142	STRUCTURAL + MISC STEEL	
218N.1421	STRUCTURAL STEEL	
218N.1423	MISC STEEL	
218N.1425	FLOOR GRATING	
218N.1426	STAIR TREADS	
218N.143	EXTERIOR WALLS	
218N.1433	METAL INSULATED SIDING	
218N.1434	METAL UNINSULATED SIDING	
218N.144	ROOF DECK	
218N.1441	METAL ROOF DECK -INSULATED	

704060

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
218N.1442	METAL ROOF DECK-UNINSUL	
218N.146	INTERIOR WALLS	
218N.1462	MASONRY	
218N.147	DOORS + WINDOWS	
218N.1472	PERSONNEL DOORS	
218N.1474	WINDOWS -INSULATED GLASS	
218N.2	BUILDING SERVICES	
218N.21	DRAINS + PIPING	
218N.211	ROOF DRAINS + PIPING	
218N.212	FLOOR DRAINS + PIPING	
218N.213	PLUMBING FIXTURES+PIPING	
218N.2131	FIXTURES	
218N.2132	DOMESTIC WATER HEATERS	
218N.215	PIPING	
218N.22	HEAT,VENT+AIR CONDITIONING	
218N.23	FIRE PROTECTION	
218N.24	LIGHTING + SERVICE POWER	
2180.	COAL BREAKER HOUSE	
2180.1	BUILDING STRUCTURE	
2180.11	EXCAVATION WORK	
2180.111	EXCAVATION-EARTH	
2180.114	BACKFILL-EARTH	
2180.13	SUBSTRUCTURE CONCRETE	

70A001

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
2180.131	FORMWORK	
2180.132	REINFORCING STEEL	
2180.133	CONCRETE	
2180.134	EMBEDDED STEEL	
2180.135	FLOOR FINISH	
2180.139	WIRE FABRIC	
2180.14	SUPERSTRUCTURE	
2180.141	CONCRETE WORK	
2180.1411	FORMWORK	
2180.14111	METAL FORMWORK	
2180.1413	CONCRETE	
2180.142	STRUCTURAL + MISC STEEL	
2180.1421	STRUCTURAL STEEL	
2180.143	EXTERIOR WALLS	
2180.1433	METAL INSULATED SIDING	
2180.1434	METAL UNINSULATED SIDING	
2180.144	ROOF DECK	
2180.1441	METAL ROOF DECK	
2180.146	INTERIOR WALLS	
2180.1462	MASONRY WALLS	
2180.147	DOORS + WINDOWS	
2180.1472	PERSONNEL DOORS	
2180.2	BUILDING SERVICES	

201062

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MMT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
2180.21	DRAINS + PIPING	
2180.211	ROOF DRAINS + PIPING	
2180.212	FLOOR DRAINS + PIPING	
2180.22	HEATING VENT + AIR COND	
2180.24	LIGHTING + SERVICE POWER	
2180.25	ELEVATOR	
2180.251	ELEVATOR EQUIPMENT	
218P.	COAL CRUSHER HOUSE	
218P.1	BUILDING STRUCTURE	
218P.11	EXCAVATION WORK	
218P.111	EXCAVATION-EARTH	
218P.114	BACKFILL-EARTH	
218P.13	SUBSTRUCTURE CONCRETE	
218P.131	FORMWORK	
218P.132	REINFORCING STEEL	
218P.133	CONCRETE	
218P.134	EMBEDDED STEEL	
218P.135	FLOOR FINISH	
218P.139	WIRE FABRIC	
218P.14	SUPERSTRUCTURE	
218P.141	CONCRETE WORK	
218P.1411	FORMWORK	
218P.14111	METAL FORMWORK	

704063

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
218P.1413	CONCRETE	
218P.142	STRUCTURAL + MISC STEEL	
218P.1421	STRUCTURAL STEEL	
218P.143	EXTERIOR WALLS	
218P.1434	METAL UNINSULATED SIDING	
218P.144	ROOF DECK	
218P.1442	METAL ROOF DECK-UNINSUL	
218P.146	INTERIOR WALLS	
218P.1462	MASONRY	
218P.147	DOORS + WINDOWS	
218P.1472	PERSONNEL DOORS	
218P.2	BUILDING SERVICES	
218P.21	DRAINS + PIPING	
218P.211	ROOF DRAINS + PIPING	
218P.212	FLOOR DRAINS + PIPING	
218P.22	HEATING, VENT + AIR COND	
218P.24	LIGHTING + WIRING	
218P.25	ELEVATOR	
218P.251	ELEVATOR EQUIPMENT	
218Q.	BOILER HOUSE TRANSFR TOWER	
218Q.1	BUILDING STRUCTURE	
218Q.11	EXCAVATION WORK	
218Q.111	EXCAVATION-EARTH	

704004

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
2180.114	BACKFILL-EARTH	
2180.13	SUBSTRUCTURE CONCRETE	
2180.131	FORMWORK	
2180.132	REINFORCING STEEL	
2180.133	CONCRETE	
2180.134	EMBEDDED STEEL	
2180.14	SUPERSTRUCTURE	
2180.141	CONCRETE WORK	
2180.1411	FORMWORK	
2180.14111	METAL FORMWORK	
2180.1413	CONCRETE	
2180.142	STRUCTURAL + MISC STEEL	
2180.1421	STRUCTURAL STEEL	
2180.143	EXTERIOR WALLS	
2180.1433	METAL INSULATED SIDING	
2180.1434	METAL UNINSULATED SIDING	
2180.144	ROOF DECK	
2180.1441	METAL ROOF DECK	
2180.147	DOORS + WINDOWS	
2180.1472	PERSONNEL DOORS	
2180.2	BUILDING SERVICES	
2180.22	HEATING, VENT + AIR COND	
2180.24	LIGHTING + SERVICE POWER	

704065

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
218R.	ROTARY PLOW MAINTNCE SHED	
218R.1	BUILDING STRUCTURE	
218R.11	EXCAVATION WORK	
218R.111	EXCAVATION-EARTH	
218R.112	EXCAVATION-ROCK	
218R.114	BACKFILL-EARTH	
218R.115	DEWATERING	
218R.13	SUBSTRUCTURE CONCRETE	
218R.131	FORMWORK	
218R.132	REINFORCING STEEL	
218R.133	CONCRETE	
218R.134	EMBEDDED STEEL	
218R.14	SUPERSTRUCTURE	
218R.141	CONCRETE WORK	
218R.142	STRUCTURAL + MISC STEEL	
218R.1421	STRUCTURAL STEEL	
218R.143	EXTERIOR WALLS	
218R.1434	METAL UNINSULATED SIDING	
218R.144	ROOF DECK	
218R.1442	METAL ROOF DECK UNINS'PL	
218R.145	ROOFING + FLASHING	
218R.1454	FLASHING	
218R.147	DOORS + WINDOWS	

000002

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
218R.1471	ROLLING STEEL DOORS	
218R.1472	PERSONNEL DOORS	
218R.2	BUILDING SERVICES	
218R.22	HEATING, VENT + AIR COND	
218R.24	LIGHTING + SERVICE POWER	
218T.	LOCOMOTIVE REPAIR GARAGE	
218T.1	BUILDING STRUCTURE	
218T.11	EXCAVATION WORK	
218T.111	EXCAVATION-EARTH	
218T.114	BACKFILL-EARTH	
218T.13	SUBSTRUCTURE CONCRETE	
218T.131	FORMWORK	
218T.132	REINFORCING STEEL	
218T.133	CONCRETE	
218T.134	EMBEDDED STEEL	
218T.135	FLOOR FINISH	
218T.139	WIRE FABRIC	
218T.14	SUPERSTRUCTURE	
218T.141	CONCRETE WORK	
218T.142	STRUCTURAL + MISC STEEL	
218T.1421	STRUCTURAL STEEL	
218T.143	EXTERIOR WALLS	
218T.1433	METAL INSULATED SIDING	

204057

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
218T.144	ROOF DECK	
218T.1441	METAL ROOF DECK	
218T.147	DOORS + WINDOWS	
218T.1471	ROLLING STEEL DOORS	
218T.1472	PERSONNEL DOORS	
218T.2	BUILDING SERVICES	
218T.22	HEATING, VENT + AIR COND	
218T.24	LIGHTING + SERVICE POWER	
218U.	MATERIAL HANDL+SERVICE BLD	
218U.1	BUILDING STRUCTURE	
218U.11	EXCAVATION WORK	
218U.111	EXCAVATION-EARTH	
218U.114	BACKFILL-EARTH	
218U.13	SUBSTRUCTURE CONCRETE	
218U.131	FORMWORK	
218U.132	REINFORCING STEEL	
218U.133	CONCRETE	
218U.134	EMBEDDED STEEL	
218U.135	FLOOR FINISH	
218U.139	WIRE FABRIC	
218U.14	SUPERSTRUCTURE	
218U.141	CONCRETE WORK	
218U.142	STRUCTURAL + MISC STEEL	

204068

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
218U.143	EXTERIOR WALLS	
218U.1433	METAL INSULATED SIDING	
218U.1434	METAL UNINSULATED SIDING	
218U.144	ROOF DECK	
218U.1441	METAL ROOF DECK	
218U.145	ROOFING + FLASHING	
218U.1451	B.U. ROOF, INSUL + FLASHING	
218U.146	INTERIOR WALLS	
218U.1462	MASONRY	
218U.1463	TOILET PARTITIONS	
218U.147	DOORS + WINDOWS	
218U.1471	ROLLING STEEL DOORS	
218U.1472	PERSONNEL DOORS	
218U.1473	SASH + GLAZING	
218U.148	WALLS, FLOOR+CEIL FINISH	
218U.1481	VINYL FLOOR TILE	
218U.1482	CERAMIC FLOOR TILE	
218U.1485	SUSPENDED CEILING	
218U.1486	CEMENT PLASTER CEILING	
218U.2	BUILDING SERVICES	
218U.21	DRAINS + PIPING	
218U.211	ROOF DRAINS + PIPING	
218U.212	FLOOR DRAINS + PIPING	

204069

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
218U.22	HEATING, VENT + AIR COND	
218U.23	FIRE PROTECTION	
218U.24	LIGHTING + SERVICE POWER	
218V.	WASTE WATER TREATMENT BLDG	
218V.1	WASTE WATER EQUIPMENT BLDG	
218V.11	BUILDING STRUCTURE	
218V.111	EXCAVATION WORK	
218V.1111	EXCAVATION-EARTH	
218V.1114	BACKFILL-EARTH	
218V.113	SUBSTRUCTURE CONCRETE	
218V.1131	FORMWORK	
218V.1132	REINFORCING STEEL	
218V.1133	CONCRETE	
218V.1134	EMBEDDED STEEL	
218V.1135	FLOOR FINISH	
218V.1139	WIRE FABRIC	
218V.114	SUPERSTRUCTURE	
218V.1141	CONCRETE WORK	
218V.1142	STRUCTURAL + MISC STEEL	
218V.1143	EXTERIOR WALLS	
218V.11433	METAL INSULATED SIDING	
218V.1145	ROOFING + FLASHING	
218V.11455	METAL ROOF DECK	

020702

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
218V.1147	DOORS + WINDOWS	
218V.11471	ROOLING STEEL DOORS	
218V.11472	PERSONNEL DOORS	
218V.1149	PAINTING	
218V.11495	DOORS	
218V.12	BUILDING SERVICES	
218V.121	PLUMBING + DRAINS	
218V.1212	FLOOR DRAINS + PIPING	
218V.122	HEATING, VENT + AIR COND	
218V.1221	ROTATING MACHINERY	
218V.12211	POWER ROOF VENTILATOR+MTR	
218V.1222	HEAT TRANSFER EQUIPMENT	
218V.12221	ELECTRIC UNIT HEATERS+MTR	
218V.1226	VALVES + DAMPERS	
218V.12269	WALL LOUVERS	
218V.123	FIRE PROTECTION EQUIPMENT	
218V.1231	PORTABLE FIRE EXTINGUISH	
218V.124	LIGHTING + SERVICE POWER	
218V.2	WASTE WATER SETTLING BASIN	
218V.21	EXCAVATION WORK	
218V.211	EXCAVATION-EARTH	
218V.214	BACKFILL-EARTH	
218V.23	SUBSTRUCTURE CONCRETE	

704071

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
218V.231	FORMWORK	
218V.232	REINFORCING STEEL	
218V.233	CONCRETE	
218V.3	API OIL SEPARATOR	
218V.31	BUILDING STRUCTURE	
218V.311	EXCAVATION WORK	
218V.3111	EXCAVATION-EARTH	
218V.3114	BACKFILL-EARTH	
218V.313	SUBSTRUCTURE CONCRETE	
218V.3131	FORMWORK	
218V.3132	REINFORCING STEEL	
218V.3133	CONCRETE	
218V.314	SUPERSTRUCTURE	
218V.3141	CONCRETE WORK	
218V.3142	STRUCTURAL + MISC STEEL	
218V.31421	CARBON STEEL FLUME	
218W.	MISC COAL HANDLING STRUCT	
218W.1	CONVEYOR GALLERIES	
218W.11	BUILDING STRUCTURE	
218W.111	EXCAVATION WORK	
218W.1111	EXCAVATION-EARTH	
218W.1114	BACKFILL-EARTH	
218W.113	SUBSTRUCTURE CONCRETE	

220002

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
218W.1131	FORMWORK	
218W.1132	REINFORCING STEEL	
218W.1133	CONCRETE	
218W.1134	EMBEDDED STEEL	
218W.114	SUPERSTRUCTURE	
218W.1141	CONCRETE WORK	
218W.1142	STRUCTURAL + MISC STEEL	
218W.11421	STRUCTURAL STEEL	
218W.11423	MISC. FRAMES, ETC.	
218W.11425	METAL WALKWAYS	
218W.1143	EXTERIOR WALLS	
218W.11433	METAL INSULATED SIDING	
218W.1144	ROOF DECK	
218W.11441	METAL ROOF DECK-INSULATED	
218W.11443	TRANSLUCENT PANELS	
218W.2	ROTARY PLOW ACCESS TUNNEL	
218W.21	BUILDING STRUCTURE	
218W.211	EXCAVATION WORK	
218W.2111	EXCAVATION-EARTH	
218W.2112	EXCAVATION - ROCK	
218W.2114	BACKFILL-EARTH	
218W.2115	DEWATERING	
218W.213	SUBSTRUCTURE CONCRETE	

22010/

09/16/77

EQUIPMENT LIST - REPORT 1

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
218U.2131	FORMWORK	
218W.2132	REINFORCING STEEL	
218W.2133	CONCRETE	
218W.214	SUPERSTRUCTURE	
218W.2141	CONCRETE WORK	
218W.2142	STRUCTURAL + MISC STEEL	
218W.21421	STRUCTURAL STEEL	
218W.2144	ROOF DECK	
218W.21441	METAL ROOF DECK-INSULATED	
218W.2146	INTERIOR WALLS	
218W.21462	MASONRY	
218W.2147	DOORS + WINDOWS	
218W.21472	PERSONNEL DOORS	
218W.3	COAL PILE MEMBRANE BARRIER	
218W.31	EARTHWORK	
218W.32	MEMBRANE BARRIER	
218W.4	LOWERING WELLS	
218W.41	BUILDING STRUCTURE	
218W.411	EXCAVATION WORK	
218W.412	SUBSTRUCTURE+SUPERSTRUCTRE	
218W.4121	FORMWORK	
218W.4122	REINFORCING STEEL	
218W.4123	CONCRETE	

204074

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
218W.4124	STRUCTURAL + MISC. STEEL	
218W.5	BUILDING SERVICES	
218W.54	LIGHTING + SERVICE POWER	
219.	STACK STRUCTURE	
219.1	STRUCTURE	
219.11	EXCAVATION WORK	
219.111	EXCAVATION-EARTH	
219.112	EXCAVATION-ROCK	
219.114	BACKFILL-EARTH	
219.115	DEWATERING	
219.13	SUBSTRUCTURE CONCRETE	
219.131	FORMWORK	
219.132	REINFORCING STEEL	
219.133	CONCRETE	
219.14	SUPERSTRUCTURE	
219.141	CONCRETE WORK	
219.1412	REINFORCING STEEL	
219.1413	CONCRETE	
219.1414	BRICK LINER	
219.142	STRUCTURAL + MISC STEEL	
219.1421	STRUCTURAL STEEL	
219.2	CHIMNEY SERVICES	
219.24	AIRCRAFT WARNING LIGHTS	

704075

EQUIPMENT LIST - REPORT 1

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
219.25	ELEVATOR	
219.26	LIGHTNING PROTECTION	
22 .	BOILER PLANT EQUIPMENT	
220A.	FOSSIL STEAM SUPPLY SYSTEM	
220A.1	QUOTED FSSS PRICE	
220A.2	DISTRIBUTED FSSS COST	
220A.21	STEAM GENERATING EQUIPMENT	
220A.211	SUPERCRITICAL PRESS BOILER	
220A.212	ASSOCIATED BOILER SYSTEMS	
220A.213	MISC BOILER SYSTEMS	
220A.214	SOOTBLOWERS	
220A.22	DRAFT EQUIPMENT	
220A.221	FORCED DRAFT FAN + MOTOR	
220A.222	PRIMARY AIR FAN + MOTOR	
220A.223	INDUCED DRAFT FAN + MOTOR	
220A.224	REGENERATIVE AIR HTR+MOTOR	
220A.25	FUEL HANDLING EQUIPMENT	
220A.251	COAL FEEDER + MOTOR	
220A.252	COAL PULVERIZER + MOTOR	
220A.27	INSTRUMENTATION + CONTROL	
221.	STEAM GENERATING SYSTEM	
221.1	STEAM GENERATING EQUIPMENT	
221.11	SUPERCRITICAL PRESS BOILER	

920502

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
221.12	ASSOCIATED BOILER SYSTEMS	
221.13	MISC BOILER SYSTEMS	
221.2	STEAM GENERATING ACCESSORY	
221.21	BOILER BYPASS SYSTEM	
221.215	PIPING	
221.2152	2.5 IN + LARGER	
221.21521	CS/NNS	
221.216	VALVES	
221.2161	GATE	
221.2162	CHECK	
221.217	PIPING-MISC ITEMS	
221.2171	HANGERS + SUPPORTS	
221.2172	INSULATION	
221.22	BOILER VENTS AND DRAINS	
221.225	PIPING	
221.2251	2 IN + SMALLER	
221.22511	CS	
221.2252	2.5 IN + LARGER	
221.22521	CS/NNS	
221.226	VALVES	
221.2265	RELIEF	
221.227	PIPING-MISC ITEMS	
221.2271	HANGERS + SUPPORTS	

704077

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
221.3	SOOTBLOWING SYSTEM	
221.31	ROTATING MACHINERY	
221.311	SOOTBLOWERS	
221.312	S.B. COMPRESSOR + MOTOR	
221.3121	S.B. COMPRESSOR	
221.3122	S.B. COMPRESSOR MOTOR	
221.33	TANKS AND PRESSURE VESSELS	
221.331	S.B. AIR RECEIVER	
221.35	PIPING	
221.351	2 IN + SMALLER	
221.3511	CS/NNS	
221.352	2.5 IN + LARGER	
221.3521	CS/NNS	
221.36	VALVES	
221.361	GATE	
221.362	CHECK	
221.363	GLOBE	
221.365	RELIEF	
221.37	PIPING-MISC ITEMS	
221.371	HANGERS + SUPPORTS	
221.38	INSTRUMENTATION + CONTROL	
221.39	FOUNDATIONS/SKIDS	
221.397	COMPRESSORS + AIR RECEIVER	

82070

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
221.3971	EXCAVATION WORK	
221.3973	SUPERSTRUCTURE CONCRETE	
221.39731	FORMWORK	
221.39732	REINFORCING STEEL	
221.39733	CONCRETE	
221.39734	EMBEDDED STEEL	
222.	DRAFT SYSTEM	
222.1	ROTATING MACHINERY	
222.11	FORCED DRAFT FAN + MOTOR	
222.111	FORCED DRAFT FAN	
222.112	FORCED DRAFT FAN MOTOR	
222.12	PRIMARY AIR FAN + MOTOR	
222.121	PRIMARY AIR FAN	
222.122	PRIMARY AIR FAN MOTOR	
222.13	INDUCED DRAFT FAN + MOTOR	
222.131	INDUCED DRAFT FAN	
222.132	INDUCED DRAFT FAN MOTOR	
222.14	AIR HEATER DRAIN PUMP+MTR	
222.141	AIR HEATER DRAIN PUMP	
222.142	AIR HEATER DRAIN PUMP MTR	
222.2	HEAT TRANSFER EQUIPMENT	
222.21	REGENERATIVE AIR HEATERS	
222.211	SECONDARY AIR HEATER+MOTOR	

04029

EQUIPMENT LIST - PORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
222.2111	SECONDARY AIR HEATER	
222.2112	SECONDARY AIR HEATER MOTOR	
222.212	PRIMARY AIR HEATER + MOTOR	
222.2121	PRIMARY AIR HEATER	
222.2122	PRIMARY AIR HEATER MOTOR	
222.22	INLET COMBUST AIR STM COIL	
222.23	COMBST AIR PREHEAT ST COIL	
222.3	TANKS AND PRESSURE VESSELS	
222.31	AIR HEATER DRAIN TANK	
222.4	PURIFICATION+FILTRATION EQ	
222.41	ELECTROSTATIC PRECIPITATOR	
222.5	PIPING + DUCTWORK	
222.51	AIR PREHEAT STEAM PIPING	
222.511	2 IN + SMALLER	
222.5111	CS/NNS	
222.512	2.5 IN + LARGER	
222.5121	CS/NNS	
222.52	DUCTWORK	
222.521	AIR DUCTS	
222.5211	FD FAN DUCTWORK	
222.5212	PRIMARY AIR DUCTWORK	
222.522	GAS DUCTS	
222.5221	AIR HTR TO STACK DUCTWORK	

204080

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - G794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
222.5222	DUCT INSULATION	
222.6	VALVES	
222.61	GATE	
222.62	CHECK	
222.63	GLOBE	
222.7	PIPING-MISC ITEMS	
222.72	INSULATION	
222.73	SPECIALTIES	
222.731	AIR INLET SILENCERS	
222.8	INSTRUMENTATION + CONTROLS	
222.9	FOUNDATIONS/SKIDS	
222.91	PRECIPITATOR+DUCT FOUND	
222.911	EXCAVATION WORK	
222.9111	EXCAVATION-EARTH	
222.9114	BACKFILL-EARTH	
222.913	SUBSTRUCTURE CONCRETE	
222.9131	FORMWORK	
222.9132	WEINFORCING STEEL	
222.9133	CONCRETE	
222.914	SUPERSTRUCTURE	
222.9142	STRUCTURAL + MISC STEEL	
222.91421	STRUCTURAL STEEL	
222.91423	MISCELLANEOUS STEEL	

70A081

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
222.91425	FLOOR GRATING (GALVANIZED)	
222.91426	STAIR TREADS	
222.91427	HANDRAIL	
222.9149	PAINTING	
222.91492	STRUCTURAL STEEL	
222.91494	HANDRAIL	
222.92	PA, FD + ID FAN FOUNDATIONS	
222.921	EXCAVATION WORK	
222.9211	EXCAVATION-EARTH	
222.9214	BACKFILL-EARTH	
222.923	SUBSTRUCTURE CONCRETE	
222.9231	FORMWORK	
222.9232	REINFORCING STEEL	
222.9233	CONCRETE	
222.924	SUPERSTRUCTURE	
222.93	AIR HEATER FOUNDATIONS	
222.931	EXCAVATION WORK	
222.9311	EXCAVATION-EARTH	
222.9314	BACKFILL-EARTH	
222.933	SUBSTRUCTURE CONCRETE	
222.9331	FORMWORK	
222.9332	REINFORCING STEEL	
222.9333	CONCRETE	

204082

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
222.9334	EMBEDDED STEEL	
222.934	SUPERSTRUCTURE	
222.9342	STRUCTURAL + MISC STEEL	
222.93421	STRUCTURAL STEEL	
222.93423	MISCELLANEOUS STEEL	
222.93425	FLOOR GRATING/CHECKER PLT	
222.93426	STAIR TREADS	
222.93427	HANDRAIL	
222.9349	PAINTING	
222.93492	STRUCTURAL STEEL	
222.93494	HANDRAIL	
223.	ASH + DUST HANDLING SYSTEM	
223.1	ASH + DUST HANDLING EQUIP	
223.11	FLY ASH EQUIPMENT	
223.11914	BACKFILL-EARTH	
223.12	BOTTOM ASH + PYRITES EQUIP	
223.18	INSTRUMENTATION + CONTROL	
223.19	FOUNDATIONS/SKIDS	
223.191	DEWATERING BIN FOUNDATIONS	
223.1911	EXCAVATION WORK	
223.19111	EXCAVATION-EARTH	
223.19114	BACKFILL-EARTH	
223.1913	SUBSTRUCTURE CONCRETE	

704087

EQUIPMENT LIST - REPORT 1

MODEL 040 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
223.19131	FORMWORK	
223.19132	REINFORCING STEEL	
223.19133	CONCRETE	
223.19134	EMBEDDED STEEL	
223.192	FLY ASH SILO FOUNDATIONS	
223.1921	EXCAVATION WORK	
223.19211	EXCAVATION-EARTH	
223.19214	BACKFILL-EARTH	
223.1923	SUBSTRUCTURE CONCRETE	
223.1923	FORMWORK	
223.19232	REINFORCING STEEL	
223.19233	CONCRETE	
223.19234	EMBEDDED STEEL	
223.193	PYRITES HOLDING BIN FOUND	
223.1931	EXCAVATION WORK	
223.1933	SUBSTRUCTURE CONCRETE	
223.19331	FORMWORK	
223.19332	REINFORCING STEEL	
223.19333	CONCRETE	
223.19334	EMBEDDED STEEL	
223.194	SETTLING TANK FOUNDATION	
223.1941	EXCAVATION WORK	
223.19411	EXCAVATION-EARTH	

704084

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 07'4 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
223.19414	BACKFILL-EARTH	
223.1943	SUBSTRUCTURE CONCRETE	
223.19431	FORMWORK	
223.19432	REINFORCING STEEL	
223.19433	CONCRETE	
223.19434	EMBEDDED STEEL	
223.195	RECIRCULATING TANK FOUND	
223.1951	EXCAVATION WORK	
223.19511	EXCAVATION-EARTH	
223.19514	BACKFILL-EARTH	
223.1953	SUBSTRUCTURE CONCRETE	
223.19531	FORMWORK	
223.19532	REINFORCING STEEL	
223.19533	CONCRETE	
223.19534	EMBEDDED STEEL	
223.2	MISC ASH+DUST HANDLING EQ	
223.21	ROTATING MACHINERY	
223.211	ASH HOPPER SEAL PUMP+MOTOR	
223.2111	ASH HOPPER SEAL PUMP	
223.2112	ASH HOPPER SEAL PUMP MOTOR	
223.25	PIPING	
223.251	RECIRCULATION+SEAL WATER	
223.2511	2 IN + SMALLER	

204085

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
223.25111	CS/NNS	
223.2512	2.5 IN + LARGER	
223.25121	CS/NNS	
223.26	VALVES	
223.261	GATE	
223.262	CHECK	
223.263	GLOBE	
224.	FUEL HANDLING SYSTEMS	
224.1	COAL UNLOADING EQUIPMENT	
224.11	RAILROAD CAR POSITIONER	
224.12	ROTARY CAR DUMPER	
224.13	COAL CAR THAWING EQUIPMENT	
224.2	CONVEYING EQUIPMENT	
224.21	BELT CONVEYORS	
224.3	BREAKER+CRUSHER EQUIPMENT	
224.31	BRADFORD BREAKER + MOTOR	
224.311	BRADFORD BREAKER	
224.312	BRADFORD BREAKER MOTOR	
224.32	MAGNETIC SEPARATORS	
224.33	ROTARY PLOW	
224.34	COAL CRUSHER + MOTOR	
224.341	COAL CRUSHER	
224.342	COAL CRUSHER MOTOR	

704086

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
224.4	PULVERIZING SYSTEMS	
224.41	COAL FEEDER + MOTOR	
224.411	COAL FEEDER	
224.412	COAL FEEDER MOTOR	
224.42	PULVERIZER + MOTOR	
224.421	PULVERIZER	
224.422	PULVERIZER MOTOR	
224.45	PIPING + DUCTWORK	
224.49	FOUNDATIONS/SKIDS	
224.491	PULVERIZER FOUNDATIONS	
224.4911	FORMWORK	
224.4912	REINFORCING STEEL	
224.4913	CONCRETE	
224.4914	EMBEDDED STEEL	
224.5	STORAGE EQUIPMENT	
224.51	LOWERING WELL EQUIP + MOTOR	
224.511	LOWERING WELL EQUIP	
224.512	LOWERING WELL EQUIP MOTOR	
224.52	COAL SILO	
224.521	COAL SILO A283*3/8IN PLATE	
224.522	COAL SILO A306*3/8IN PLATE	
224.523	COAL SILO A 36 STEFFENERS	
224.6	OTHER COAL HANDLING EQUIP	

704087

09/16/77

EQUIPMENT LIST - REPORT 1

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
224.61	SLIDEGATE + MOTOR	
224.611	SLIDEGATE	
224.612	SLIDEGATE MOTOR	
224.62	WEIGHT SCALES	
224.63	MISC VIBRATING FEEDERS+MTR	
224.631	MISC VIBRATING FEEDERS	
224.632	MISC VIBRATING FEEDER MTR	
224.64	COAL SAMPLING SYSTEMS	
224.65	DUST SUPPRESSION SYSTEMS	
224.66	FIRE PROTECTION SYSTEM	
224.67	SUMP DRAIN SYSTEM	
224.671	ROTATING MACHINERY	
224.6711	SUMP PUMPS + MOTORS	
224.67111	SUMP PUMPS	
224.67112	SUMP PUMP MOTORS	
224.675	PIPING	
224.7	IGNITION OIL SYSTEM	
224.71	ROTATING MACHINERY	
224.711	IGNITION OIL PUMP + MOTOR	
224.7111	IGNITION OIL PUMP	
224.7112	IGNITION OIL PUMP MOTOR	
224.75	PIPING	
224.751	2 IN + SMALLER	

880702

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
224.7511	CS/NNS	
224.752	2.5 IN + LARGER	
224.7521	CS/NNS	
224.76	VALVES	
224.762	CHECK	
224.768	PLUG	
224.8	INSTRUMENTATION + CONTROL	
225.	FLUE GAS DESULFUR STRUCT	
225.1	LIME SLAKING BUILDING	
225.11	BUILDING STRUCTURE	
225.111	EXCAVATION WORK	
225.1111	EXCAVATION-EARTH	
225.1114	BACKFILL-EARTH	
225.113	SUBSTRUCTURE CONCRETE	
225.1131	FORMWORK	
225.1132	REINFORCING STEEL	
225.1133	CONCRETE	
225.1134	EMBEDDED STEEL	
225.1135	FLOOR FINISH	
225.114	SUPERSTRUCTURE	
225.1141	CONCRETE WORK	
225.11411	FORMWORK	
225.114111	FORMWORK-WOOD	

680304

MODEL 640 - 0794 MWE/2200 MWF COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
225.114112	FORMWORK-METAL	
225.11412	REINFORCING STEEL	
225.11413	CONCRETE	
225.1142	STRUCTURAL + MISC STEEL	
225.11421	STRUCTURAL STEEL	
225.11423	MISC. FRAMES, ETC.	
225.11425	FLOOR GRATING (GALV)	
225.11426	STAIR TREADS	
225.11427	HANDRAIL	
225.1143	EXTERIOR WALLS	
225.11433	METAL INSULATED SIDING	
225.1144	ROOF DECK	
225.11441	METAL ROOF DECK	
225.1145	ROOFING + FLASHING	
225.11451	B.U. ROOF INSUL. + FLASH	
225.1147	DOORS + WINDOWS	
225.11471	ROLLING STEEL DOORS	
225.11472	PERSONNEL DOORS	
225.1149	PAINTING	
225.11492	STEELWORK	
225.11493	DOORS	
225.11494	HANDRAIL	
225.12	BUILDING SERVICES	

060102

09/16/77

EQUIPMENT LIST - REPORT 1

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
225.121	PLUMBING + DRAINS	
225.122	HEATING+VENT + AIR COND	
225.1221	ROTATING MACHINERY	
225.12211	ROOF VENTILATOR + MOTOR	
225.122111	ROOF VENTILATOR	
225.122112	ROOF VENTILATOR MOTOR	
225.12212	WALL EXHAUST FAN + MOTOR	
225.122121	WALL EXHAUST FAN	
225.122122	WALL EXHAUST FAN MOTOR	
225.1222	HEAT TRANSFER EQUIPMENT	
225.12221	ELECTRIC UNIT HEATER+MOTOR	
225.122211	ELECTRIC UNIT HEATERS	
225.122212	ELECTRIC UNIT HEATER MOTOR	
225.12222	ELECTRIC BASEBOARD HEATERS	
225.12223	AIR CONDITIONING UNIT+MTR	
225.122231	AIR CONDITIONING UNIT	
225.122232	AIR CONDITIONING UNIT MTR	
225.12224	HEATING+VENT AIR UNIT+MTR	
225.122241	HEATING+VENT AIR UNIT	
225.122242	HEATING+VENT AIR UNIT MTR	
225.12225	AIR COOLED COMPRESSOR COND	
225.1226	VALVES + DAMPERS	
225.12269	SPECIAL VALVES + DAMPERS	

704091

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
225.122691	WALL LOUVERS	
225.124	LIGHTING + SERVICE POWER	
225.2	LIME SLAKING SERVICE BLDG	
225.21	BUILDING STRUCTURE	
225.211	EXCAVATION WORK	
225.2111	EXCAVATION-EARTH	
225.2114	BACKFILL-EARTH	
225.213	SUBSTRUCTURE CONCRETE	
225.2131	FORMWORK	
225.2132	REINFORCING STEEL	
225.2133	CONCRETE	
225.2134	EMBEDDED STEEL	
225.2135	FLOOR FINISH	
225.2139	WIRE FABRIC	
225.214	SUPERSTRUCTURE	
225.2141	CONCRETE WORK	
225.2142	STRUCTURAL + MISC STEEL	
225.21421	STRUCTURAL STEEL	
225.21423	MISC. FRAMES, ETC.	
225.2143	EXTERIOR WALLS	
225.21433	METAL INSULATED SIDING	
225.2144	ROOF DECK	
225.21442	PRECAST CONCRETE PANELS	

704092

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
225.2145	ROOFING + FLASHING	
225.21451	B.U. ROOF INSUL. + FLASH	
225.2147	DOORS + WINDOWS	
225.21472	PERSONNEL DOORS	
225.2149	PAINTING	
225.21492	STEELWORK	
225.21493	DOORS	
225.22	BUILDING SERVICES	
225.3	DESULFUR CTRL+ELEC EQ BLDG	
225.31	BUILDING STRUCTURE	
225.311	EXCAVATION WORK	
225.3111	EXCAVATION-EARTH	
225.3114	BACKFILL-EARTH	
225.313	SUBSTRUCTURE CONCRETE	
225.3131	FORMWORK	
225.3132	REINFORCING STEEL	
225.3133	CONCRETE	
225.3134	EMBEDDED STEEL	
225.3135	FLOOR FINISH	
225.3139	WIRE FABRIC	
225.314	SUPERSTRUCTURE	
225.3141	CONCRETE WORK	
225.31411	FORMWORK	

701033

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
225.314112	FORMWORK-METAL	
225.31412	REINFORCING STEEL	
225.31413	CONCRETE	
225.31415	FLOOR FINISH	
225.3142	STRUCTURAL + MISC STEEL	
225.31421	STRUCTURAL STEEL	
225.31423	MISC. FRAMES, ETC.	
225.31426	STAIR TREADS	
225.31427	HANDRAIL	
225.3143	EXTERIOR WALLS	
225.31432	MASONRY	
225.31433	METAL INSULATED SIDING	
225.3144	ROOF DECK	
225.31442	PRECAST CONCRETE PANELS	
225.3145	ROOFING + FLASHING	
225.31451	B.U. ROOF INSUL. + FLASH	
225.3147	DOORS + WINDOWS	
225.31472	PERSONNEL DOORS	
225.3148	WALLS, FLOOR + CEIL FINISHS	
225.31481	VINYL FLOOR TILE	
225.31486	ACOUSTICAL CEILING	
225.3149	PAINTING	
225.31492	STEELWORK	

MIDDLETOWN

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
225.31494	HANDRAIL	
225.31495	METAL DECK	
225.32	BUILDING SERVICES	
225.321	PLUMBING + DRAINS	
225.322	HEATING+VENT + AIR COND	
225.3222	HEAT TRANSFER EQUIPMENT	
225.32221	ELECTRIC UNIT HEATER+MOTOR	
225.322211	ELECTRIC UNIT HEATERS	
225.322212	ELECTRIC UNIT HEATER MOTOR	
225.32222	ELECTRIC BASEBOARD HEATER	
225.32223	HEATING+VENT AIR UNIT+MTR	
225.322231	HEATING+VENT AIR UNIT	
225.322232	HEATING+VENT AIR UNIT MTR	
225.32224	AIR CONDITIONING UNIT+MTR	
225.322241	AIR CONDITIONING UNIT	
225.322242	AIR CONDITIONING UNIT MTR	
225.3226	VALVES + DAMPERS	
225.32269	SPECIAL VALVES + DAMPERS	
225.322691	WALL LOUVERS	
225.324	LIGHTING + SERVICE POWER	
225.5	PROCESS+SEAL WATER PUMPHSE	
225.51	BUILDING STRUCTURE	
225.511	EXCAVATION WORK	

204095

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
225.5111	EXCAVATION-EARTH	
225.5114	BACKFILL-EARTH	
225.513	SUBSTRUCTURE CONCRETE	
225.5131	FORMWORK	
225.5132	REINFORCING STEEL	
225.5133	CONCRETE	
225.5134	EMBEDDED STEEL	
225.5135	FLOOR FINISH	
225.5139	WIRE FABRIC	
225.514	SUPERSTRUCTURE	
225.5141	CONCRETE WORK	
225.5142	STRUCTURAL + MISC STEEL	
225.5143	EXTERIOR WALLS	
225.51433	PREFAB METAL INSUL. SIDING	
225.5145	ROOFING + FLASHING	
225.51455	PREFAB STANDING RIB & INSL	
225.5147	DOORS + WINDOWS	
225.51472	PERSONNEL DOORS	
225.52	BUILDING SERVICES	
225.521	PLUMBING + DRAINS	
225.522	HEATING, VENT + AIR COND	
225.5221	ROTATING MACHINERY	
225.52211	WALL EXHAUST FAN + MOTOR	

204036

EQUIPMENT LIST - REPORT 1

09/ 6/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
225.522111	WALL EXHAUST FAN	
225.522112	WALL EXHAUST FAN MOTOR	
225.5222	HEAT TRANSFER EQUIPMENT	
225.52221	ELECTRIC UNIT HEATER+MOTOR	
225.522211	ELECTRIC UNIT HEATERS	
225.522212	ELECTRIC UNIT HEATER MOTOR	
225.5226	VALVES	
225.52269	SPECIAL VALVES + DAMPERS	
225.522691	WALL LOUVERS	
225.524	LIGHTING + SERVICE POWER	
225.6	THICKENER EQUIPMENT BLDG	
225.61	BUILDING STRUCTURE	
225.611	EXCAVATION WORK	
225.6111	EXCAVATION-EARTH	
225.6114	BACKFILL-EARTH	
225.613	SUBSTRUCTURE CONCRETE	
225.6131	FORMWORK	
225.6132	REINFORCING STEEL	
225.6133	CONCRETE	
225.6134	EMBEDDED STEEL	
225.6135	FLOOR FINISH	
225.6139	WIRE FABRIC	
225.614	SUPERSTRUCTURE	

704097

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MW: COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
225.6141	CONCRETE WORK	
225.6142	STRUCTURAL + MISC STEEL	
225.6143	EXTERIOR WALLS	
225.61433	METAL INSULATED SIDING	
225.6145	ROOFING + FLASHING	
225.61455	STANDING RIB + INSUL	
225.6146	INTERIOR WALLS + PARTITION	
225.61462	MASONRY	
225.6147	DOORS + WINDOWS	
225.61471	ROLLING STEEL DOORS	
225.61472	PERSONNEL DOORS	
225.62	BUILDING SERVICES	
225.621	PLUMBING + DRAINS	
225.622	HEATING, VENT + AIR COND	
225.6221	ROTATING MACHINERY	
225.62211	WALL EXHAUST FAN + MOTOR	
225.622111	WALL EXHAUST FAN	
225.622112	WALL EXHAUST FAN MOTOR	
225.6222	HEAT TRANSFER EQUIPMENT	
225.62221	ELECTRIC UNIT HEATER+MOTOR	
225.622211	ELECTRIC UNIT HEATERS	
225.622212	ELECTRIC UNIT HEATER MOTOR	
225.6226	VALVES	

704038

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
225.62269	SPECIAL VALVES + DAMPERS	
225.622691	WALL LOUVERS	
225.624	LIGHTING + SERVICE POWER	
225.7	SLUDGE STABILIZATION BLDG	
225.71	HANGERS AND SUPPORTS	
225.711	EXCAVATION WORK	
225.7111	EXCAVATION-EARTH	
225.7114	BACKFILL-EARTH	
225.713	SUBSTRUCTURE CONCRETE	
225.7131	FORMWORK	
225.7132	REINFORCING STEEL	
225.7133	CONCRETE	
225.7134	EMBEDDED STEEL	
225.7135	FLOOR FINISH	
225.7139	WIRE FABRIC	
225.714	SUPERSTRUCTURE	
225.7141	CONCRETE WORK	
225.7142	STRUCTURAL + MISC STEEL	
225.71421	STRUCTURAL STEEL	
225.71423	MISC. FRAMES, ETC.	
225.71426	STAIR TREADS	
225.71427	HANDRAIL	
225.7143	EXTERIOR WALLS	

660102

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - CO' BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
225.71433	METAL INSULATED SIDING	
225.7144	ROOF DECK	
225.71441	METAL ROOF DECK	
225.71443	CONCRETE FILL	
225.71444	REINFORCING STEEL	
225.7145	ROOFING + FLASHING	
225.71451	B.U. ROOF INSUL + FLASH	
225.7146	INTERIOR WALLS + PARTITION	
225.71462	MASONRY	
225.71463	METAL PARTITIONS	
225.7147	DOORS + WINDOWS	
225.71471	ROLLING STEEL DOORS	
225.71472	PERSONNEL DOORS	
225.71473	SASH + GLAZING	
225.7148	WALLS, FLOOR+CEIL FINISHS	
225.71481	VINYL FLOOR TILE	
225.71486	ACOUSTICAL CEILING	
225.7149	PAINTING	
225.71492	STEELWORK	
225.71493	DOORS+WALLS	
225.71494	HANDRAIL	
225.72	BUILDING SERVICES	
225.721	PLUMBING + DRAINS	

704100

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0774 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
225.7211	ROOF DRAINS + PIPING	
225.7212	FLOOR DRAINS + PIPING	
225.7213	PLUMBING FIXTURES + PIPING	
225.72131	FIXTURES	
225.72135	PIPING	
225.722	HEATING+VENT + AIR COND	
225.7221	ROTATING MACHINERY	
225.72211	POWER ROOF VENTILATORS+MTR	
225.722111	POWER ROOF VENTILATORS	
225.722112	POWER ROOF VENT MOTORS	
225.72212	WALL EXHAUST FANS+MOTORS	
225.722121	WALL EXHAUST FANS	
225.722122	WALL EXHAUST FAN MOTORS	
225.72213	RETURN AIR FANS + MOTORS	
225.722131	RETURN AIR FANS	
225.722132	RETURN AIR FAN MOTORS	
225.7222	HEAT TRANSFER EQUIPMENT	
225.72221	ELECTRIC UNIT HEATER+MOTOR	
225.722211	ELECTRIC UNIT HEATERS	
225.722212	ELECTRIC UNIT HEATER MOTOR	
225.72222	HEATING+VENT AIR UNIT+MTR	
225.722221	HEATING+VENT AIR UNIT	
225.722222	HEATING+VENT AIR UNIT MTR	

704101

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
225.72223	AIR CONDITIONING UNIT+MTR	
225.722231	AIR CONDITIONING UNIT	
225.722232	AIR CONDITIONING UNIT MTR	
225.7226	VALVES	
225.72269	SPECIAL VALVES + DAMPERS	
225.722691	WALL LOUVERS	
225.724	LIGHTING + SERVICE POWER	
225.8	SLUDGE PUMP HOUSE	
225.81	BUILDING STRUCTURE	
225.811	EXCAVATION WORK	
225.8111	EXCAVATION-EARTH	
225.8114	BACKFILL-EARTH	
225.813	SUBSTRUCTURE CONCRETE	
225.8131	FORMWORK	
225.8132	REINFORCING STEEL	
225.8133	CONCRETE	
225.8134	EMBEDDED STEEL	
225.8135	FLOOR FINISH	
225.8139	WIRE FABRIC	
225.814	SUPERSTRUCTURE	
225.8141	CONCRETE WORK	
225.8142	STRUCTURAL + MISC STEEL	
225.81421	STRUCTURAL STEEL	

704102

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
225.8143	EXTERIOR WALLS	
225.81433	METAL INSULATED SIDING	
225.8144	ROOF DECK	
225.81442	PRECAST CONCRETE PANALS	
225.8145	ROOFING + FLASHING	
225.81451	B.U. ROOF INSUL + FLASH	
225.8147	DOORS + WINDOWS	
225.81471	ROLLING STEEL DOORS	
225.81472	PERSONNEL DOORS	
225.81473	SASH + GLAZING	
225.8149	PAINTING	
225.81492	STEELWORK	
225.82	BUILDING SERVICES	
225.821	PLUMBING + DRAINS	
225.822	HEATING, VENT + AIR COND	
225.8221	ROTATING MACHINERY	
225.82211	WALL EXHAUST FAN + MOTOR	
225.822111	WALL EXHAUST FAN	
225.822112	WALL EXHAUST FAN MOTOR	
225.8222	HEAT TRANSFER EQUIPMENT	
225.82221	ELECTRIC UNIT HEATER+MOTOR	
225.822211	ELECTRIC UNIT HEATER	
225.822212	ELECTRIC UNIT HEATER MOTOR	

004103

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
225.8226	VALVES	
225.82269	SPECIAL VALVES + DAMPERS	
225.822691	INTAKE LOUVERS	
225.824	LIGHTING + SERVICE POWER	
225.9	LIME HANDL HOPPER + TUNNEL	
225.91	BUILDING STRUCTURE	
225.911	EXCAVATION WORK	
225.9111	EXCAVATION-EARTH	
225.9112	EXCAVATION-ROCK	
225.9114	BACKFILL-EARTH	
225.9115	DEWATERING	
225.913	SUBSTRUCTURE CONCRETE	
225.9131	FORMWORK	
225.9132	REINFORCING STEEL	
225.9133	CONCRETE	
225.9134	EMBEDDED STEEL	
225.914	SUPERSTRUCTURE	
225.9141	CONCRETE WORK	
225.9142	STRUCTURAL + MISC STEEL	
225.91421	STRUCTURAL STEEL	
225.91423	MISC. FRAMES, ETC.	
225.91425	FLOOR GRATING (GALV)	
225.91426	STAIR TREADS	

204104

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
225.91427	HANDRAIL	
225.9143	EXTERIOR WALLS	
225.91434	METAL UNINSULATED SIDING	
225.9144	ROOF DECK	
225.91441	METAL ROOF DECK	
225.9147	DOORS + WINDOWS	
225.91471	ROLLING STEEL DOORS	
225.91472	PERSONNEL DOORS	
225.9149	PAINTING	
225.91492	STEELWORK	
225.92	BUILDING SERVICES	
225.921	FLOOR DRAINS	
225.924	LIGHTING + SERVICE POWER	
226.	DESULFURIZATION EQUIPMENT	
226.1	LIME HANDLING SYSTEM	
226.11	ROTATING MACHINERY	
226.111	SILO VIBRATORY FEEDER+MTR	
226.1111	SILO VIBRATORY FEEDER	
226.1112	SILO VIBRATORY FEED MOTOR	
226.112	SILO LOAD/BYPASS CONVEY+MTR	
226.1121	SILO LOAD/BYPASS CONVEYOR	
226.1122	SILO LOAD/BYPASS CONVEY MTR	
226.113	RECLAIM CONVEYOR + MOTOR	

704105

ACCOUNT NUMBER	ITEM	DESCRIPTION
226.1131	RECLAIM CONVEYOR	
226.1132	RECLAIM CONVEYOR MOTOR	
226.114	FD SILO DIST BELT CONV+MTR	
226.1141	FEED SILO DIST BELT CONVYR	
226.1142	FD SILO DIST BELT CONV MTR	
226.115	HOP TRANS+SILO UNLD CON+MR	
226.1151	HOP TRANS+SILO UNLOAD CONV	
226.1152	HOP TRAN+SILO UNLD CON MTR	
226.116	FEED BIN BUCKET ELEVTR+MTR	
226.1161	FEED BIN BUCKET ELEVATOR	
226.1162	FEED BIN BUCKET ELEVTR MTR	
226.117	SILO BUCKET ELEVATOR+MOTOR	
226.1171	SILO BUCKET ELEVATOR	
226.1172	SILO BUCKET ELEVATOR MOTOR	
226.118	RL UNLD HOP VIB FEEDER+MTR	
226.1181	RAIL UNLD HOP VIB FEEDER	
226.1182	RL UNLD HOP VIB FEEDER MTR	
226.13	TANKS AND PRESSURE VESSELS	
226.131	SILO WITHDRAWAL HOPPER	
226.132	RAIL UNLOADING HOPPER	
226.14	PURIFICATION+FILTRATION EM	
226.141	FEED+RECLM DUST COLLECT+MTR	
226.1411	FEED+RECLM DUST COLLECTOR	

704106

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
226.1412	FEED+RECLM DUST COLLCT MTR	
226.142	RAIL UNLOAD DUST COLCT+MTR	
226.1421	RAIL UNLOAD DUST COLLECTOR	
226.1422	RAIL UNLOAD DUST COLCT MTR	
226.15	CHUTES + SKIRTS	
226.151	FEEDER CHUTES + SKIRTS	
226.152	ELEV CHR+DISCHR CHUTES	
226.153	CONVEYOR CHUTES	
226.154	BIN CHUTES	
226.16	GATES + DIVERTERS	
226.161	SLIDE GATES	
226.162	DIVERTERS	
226.1621	TWO WAY DIVERTER	
226.1622	THREE WAY DIVERTER	
226.19	FOUNDATIONS/SKIDS	
226.191	LIME STORAGE SILO + TUNNEL	
226.1911	EXCAVATION WORK	
226.19111	EXCAVATION-EARTH	
226.19112	EXCAVATION-ROCK	
226.19114	BACKFILL-EARTH	
226.19115	DEWATERING	
226.1913	SUBSTRUCTURE CONCRETE	
226.19131	FORMWORK	

204107

09/16/77

EQUIPMENT LIST - REPORT 1

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
226.19132	REINFORCING STEEL	
226.19133	CONCRETE	
226.19134	EMBEDDED STEEL	
226.19135	FLOOR FINISH	
226.1914	SUPERSTRUCTURE	
226.19141	CONCRETE WORK	
226.191411	FORMWORK	
226.191412	REINFORCING STEEL	
226.191413	CONCRETE	
226.19145	FLOOR FINISH	
226.1915	STRUCTURAL + MISC STEEL	
226.19153	MISCELLANEOUS STEEL	
226.2	FEED PREPARATION SYSTEM	
226.21	ROTATING MACHINERY	
226.211	LIME SLRY TNK AGITATOR+MTR	
226.2111	LIME SLURRY TANK AGITATOR	
226.2112	LIME SLRY TNK AGITATOR MTR	
226.212	LIME SLURRY TRAYS PUMP+MTR	
226.2121	LIME SLURRY TRANSFER PUMP	
226.2122	LIME SLURRY TRANS PUMP MTR	
226.213	VOLUMETRIC BELT FEEDER+MTR	
226.2131	VOLUMETRIC BELT FEEDER	
226.2132	VOLUMETRIC BELT FEEDER MTR	

704108

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
226.214	LIME SLAKER AND MOTOR	
226.2141	LIME SLAKER	
226.2142	LIME MIXER MOTOR	
226.2143	LIME DEGRITTER MOTOR	
226.22	TANKS AND PRESSURE VESSELS	
226.221	GRIT BIN	
226.222	LIME SLURRY SURGE TANK	
226.223	LIME FEED SILO/HOPPER	
226.25	PIPING	
226.252	2.5 IN + LARGER	
226.2521	CS/NNS	
226.26	VALVES	
226.261	GATE	
226.27	PIPING-MISC ITEMS	
226.271	HANGERS + SUPPORTS	
226.29	FOUNDATIONS/SKIDS	
226.291	LIME SLRY TRANS PUMP FOUND	
226.2911	EXCAVATION WORK	
226.2913	SUBSTRUCTURE CONCRETE	
226.29131	FORMWORK	
226.29132	REINFORCING STEEL	
226.29133	CONCRETE	
226.29134	EMBEDDED STEEL	

704109

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
226.29135	FLOOR FINISH	
226.292	LIME SLURRY TANK FOUND	
226.2921	EXCAVATION WORK	
226.29214	BACKFILL-SAND	
226.2923	SUBSTRUCTURE CONCRETE	
226.29231	FORMWORK	
226.29232	REINFORCING STEEL	
226.29233	CONCRETE	
226.3	SUL DIOXIDE SCRUBBING SYS	
226.31	ROTATING MACHINERY	
226.311	QUENCH RECIRCULAT PUMP+MTR	
226.3111	QUENCH RECIRCULATION PUMP	
226.3112	QUENCH RECIRCULAT PUMP MTR	
226.312	ABSORB RECIRCULAT PUMP+MTR	
226.3121	ABSORB RECIRCULATION PUMP	
226.3122	ABSORB RECIRCULAT PUMP MTR	
226.313	FEED SLURRY PUMP + MOTOR	
226.3131	FEED SLURRY PUMP	
226.3132	FEED SLURRY PUMP MOTOR	
226.314	RECIRCULATION TANK MIX+MTR	
226.3141	RECIRCULATION TANK MIXER	
226.3142	RECIRCULATION TANK MIX MTR	
226.315	FEED SLURRY TANK MIXER+MTR	

001110

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 M4E/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
226.3151	FEED SLURRY TANK MIXER	
226.3152	FEED SLURRY TANK MIXER MTR	
226.316	MOIST WASH TANK AGITAT+MTR	
226.3161	MOIST WASH TANK AGITATOR	
226.3162	MOIST WASH TANK AGITAT MTR	
226.33	TANKS AND PRESSURE VESSELS	
226.331	LOW VELOCITY SUMP TANK	
226.332	RECIRCULATION TANK	
226.333	SLURRY FEED TANK	
226.334	MOIST SEPARATOR WASH TANK	
226.34	PURIFICATION+FILTRATION EQ	
226.341	QUENCHER	
226.342	ABSORBER	
226.343	MOISTURE SEPARATOR	
226.344	CYCLONE SEPARATOR	
226.35	PIPING	
226.351	2 IN + SMALLER	
226.3511	316L SS/NNS	
226.352	2.5 IN + LARGER	
226.3521	CS/NNS	
226.36	VALVES	
226.361	GATE	
226.37	PIPING - MISC ITEMS	

704111

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
226.373	SPECIALTIES	
226.3731	HEAT TRACING	
226.38	INSTRUMENTATION + CONTROL	
226.39	FOUNDATIONS/SKIDS	
226.391	FEED SLURRY PUMP FOUND	
226.3911	EXCAVATION WORK	
226.39111	EXCAVATION-EARTH	
226.39114	BACKFILL-EARTH	
226.3913	SUBSTRUCTURE CONCRETE	
226.39131	FORMWORK	
226.39132	REINFORCING STEEL	
226.39133	CONCRETE	
226.39134	EMBEDDED STEEL	
226.392	SLURRY FEED TANK FOUND	
226.3921	EXCAVATION WORK	
226.39211	EXCAVATION-EARTH	
226.39214	BACKFILL-EARTH	
226.3923	SUBSTRUCTURE CONCRETE	
226.39231	FORMWORK	
226.39232	REINFORCING STEEL	
226.39233	CONCRETE	
226.393	SUL DIOXIDE SCRUBBER FOUND	
226.3931	EXCAVATION WORK	

226.392

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - JST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
226.39311	EXCAVATION-EARTH	
226.39314	BACKFILL-EARTH	
226.3933	SUBSTRUCTURE CONCRETE	
226.39331	FORMWORK	
226.39332	REINFORCING STEEL	
226.39333	CONCRETE	
226.39334	EMBEDDED STEEL	
226.39335	FLOOR FINISH	
226.3934	SUPERSTRUCTURE	
226.39341	CONCRETE WORK	
226.393411	FORMWORK-METAL	
226.393412	REINFORCING STEEL	
226.393413	CONCRETE	
226.393415	FLOOR FINISH	
226.39342	STRUCTURAL + MISC STEEL	
226.393421	STRUCTURAL STEEL	
226.393423	MISC. FRAMES, ETC.	
226.393425	FLOOR GRATING	
226.393426	STAIR TREADS	
226.393427	HANDRAIL	
226.39349	PAINTING	
226.393492	STEELWORK	
226.393494	HANDRAIL	

204113

UNITED ENGINEERS & CONSTRUCTORS INC.

PROG. CM-711 *PEG030*

EQUIPMENT LIST - REPORT 1

MODEL 640 - 0794 MWE/2200 MMT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
226.3935	S02 STRUCTURE MISC EQUIP	
226.39354	LIGHTING + SERVICE POWER	
226.39355	ELEVATOR	
226.393551	ELEVATOR EQUIPMENT	
226.4	GAS HANDLING SYSTEM	
226.41	ROTATING MACHINERY	
226.411	SUL DIOXIDE BOOSTR FAN+MTR	
226.4111	SUL DIOXIDE BOOSTER FAN	
226.4112	SUL DIOXIDE BOOSTR FAN MTR	
226.412	DAMPER BLOWER AND MOTOR	
226.4121	DAMPER BLOWER	
226.4122	DAMPEN BLOWER MOTOR	
226.45	PIPING, DUCTS & EXPANSION JTS	
226.451	PIPING	
226.4511	2 IN + SMALLER	
226.45111	CS/NNS	
226.452	DUCTS AND EXPANSION JOINTS	
226.4522	S02 SUPPLY+BYPASS DUCTS	
226.4523	DUCT INSULATION	
226.453	HANGERS	
226.46	VALVES + DAMPERS	
226.461	ISOLATION DAMPER AND MOTOR	
226.4611	ISOLATION DAMPER	

704114

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07776

ACCOUNT NUMBER	ITEM	DESCRIPTION
226.4612	ISOLATION DAMPER MOTOR	
226.49	FOUNDATIONS/SKIDS	
226.491	SUL DIOXID BOOST FAN FOUND	
226.4911	EXCAVATION WORK	
226.49111	EXCAVATION-EARTH	
226.49114	BACKFILL-EARTH	
226.4913	SUBSTRUCTURE CONCRETE	
226.49131	FORMWORK	
226.49132	REINFORCING STEEL	
226.49133	CONCRETE	
226.49134	EMBEDDED STEEL	
226.492	DUCTWORK FOUND + SUPPORT	
226.4921	EXCAVATION WORK	
226.49211	EXCAVATION-EARTH	
226.4923	SUBSTRUCTURE CONCRETE	
226.49231	FORMWORK	
226.49232	REINFORCING STEEL	
226.49233	CONCRETE	
226.49234	EMBEDDED STEEL	
226.4924	SUPERSTRUCTURE	
226.49241	CONCRETE WORK	
226.49242	STRUCTURAL + MISC STEEL	
226.492421	STRUCTURAL STEEL	

70115

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
226.492423	MISC. FRAMES, ETC.	
226.492425	FLOOR GRATING (GALV)	
226.492426	STAIR TREADS	
226.492427	HANDRAIL	
226.49249	PAINTING	
226.492492	STEELWORK	
226.492493	HANDRAIL	
226.5	SLUDGE HANDLING SYSTEM	
226.51	ROTATING MACHINERY	
226.511	AGITATORS + MOTORS	
226.5111	THICK SURGE TNK AGITAT+MTR	
226.51111	THICK SURGE TANK AGITATOR	
226.51112	THICK SURGE TNK AGITAT MTR	
226.512	PUMPS + MOTORS	
226.5121	THICK UNDERFLOW PUMP+MOTOR	
226.51211	THICKENER UNDERFLOW PUMP	
226.51212	THICK UNDERFLOW PUMP MOTOR	
226.5122	SLUDGE TRANSFER PUMP+MOTOR	
226.51221	SLUDGE TRANSFER PUMP	
226.51222	SLUDGE TRANSFER PUMP MOTOR	
226.5123	THICK OVERFLOW PUMP OTOR	
226.51231	THICKENER OVERFLOW PJMP	
226.51232	THICK OVERFLOW PUMP MOTOR	

704116

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MMT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
226.5124	THICK OVFLOW SUMP PUMP+MTR	
226.51241	THICK OVERFLOW SUMP PUMP	
226.51242	THICK OVFLOW SUMP PUMP MTR	
226.5125	SLDG DISPOS TRANS PUMP+MTR	
226.51251	SLDG DISPOSAL TRANS PUMP	
226.51252	SLUG DISPOS TRANS PUMP MTR	
226.5126	FILTRATE RETURN PUMP+MOTOR	
226.51261	FILTRATE RETURN PUMP	
226.51262	FILTRATE RETURN PUMP MOTOR	
226.513	SLUDGE PROCESSING EQUIP	
226.5131	ROT DRUM VAC FILT PL + MTR	
226.51311	ROTARY DRUM VACUUM PUMP	
226.51312	ROTARY DRUM MOTOR	
226.51313	VACUUM PUMP MOTOR	
226.51314	FILTRATE PUMP MOTOR	
226.5132	SLUDGE MIXER AND MOTOR	
226.51321	SLUDGE MIXER	
226.51322	SLUDGE MIXER MOTOR	
226.514	MATERIAL HANDLING EQUIP	
226.5141	BELT FEEDER + MOTOR	
226.51411	BELT FEEDER	
226.51412	BELT FEEDER MOTOR	
226.5142	BELT CONVEYOR/SC MTR	

704117

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
226.51421	BELT CONVEYOR/SCALE	
226.51422	BELT CONVEYOR/SCALE MOTOR	
226.5143	BELT CONVEYOR + MOTOR	
226.51431	BELT CONVEYOR	
226.51432	BELT CONVEYOR MOTOR	
226.5144	RADIAL BELT STACKER + MTR	
226.51441	RADIAL BELT STACKER	
226.51442	RADIAL BELT STACKER MOTOR	
226.5145	LIME SCREW FEEDER + MOTOR	
226.51451	LIME SCREW FEEDER	
226.51452	LIME SCREW FEEDER MOTOR	
226.53	TANKS AND PRESSURE VESSELS	
226.531	THICKENER TANK/RAKE+MOTOR	
226.5311	THICKENER TANK/RAKE	
226.5312	THICKENER TANK/RAKE MOTOR	
226.5313	RAKE LIFT MOTOR	
226.532	SLUDGE SURGE TANK	
226.533	THICKENER OVERFLOW TANK	
226.534	LIME SILO	
226.535	SLUDGE DISPOSAL SURGE TANK	
226.536	FILTRATE SURGE TANK	
226.55	PIPING	
226.552	2.5 IN + LARGER	

704118

EQUIPMENT LIST - REPORT

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
226.5521	CS/NNS	
226.55211	CS/NNS	
226.55212	CS/NNS	
226.55213	CS/NNS	
226.56	VALVES	
226.561	GATE	
226.57	PIPING-MISC ITEMS	
226.571	SLUDGE PIPE SUPPORT SYSTEM	
226.5711	TREATED RR TIE SUPPORTS	
226.5712	SUPPORT BALLAST	
226.5713	CLEARING/GRUB PIPE ROUTE	
226.5714	STEEL FASTENERS - 55 TNS	
226.59	FOUNDATIONS/SKIDS	
226.591	THICKENER FOUNDATION	
226.5911	EXCAVATION WORK	
226.59111	EXCAVATION-EARTH	
226.59112	EXCAVATION-ROCK	
226.59114	BACKFILL-EARTH	
226.59115	DEWATERING	
226.5913	SUBSTRUCTURE CONCRETE	
226.59131	FORMWORK	
226.59132	REINFORCING STEEL	
226.59133	CONCRETE	

704119

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
226.592	SLUDGE SURGE TANK FOUND	
226.5921	EXCAVATION WORK	
226.59211	EXCAVATION-EARTH	
226.59214	BACKFILL-SAND	
226.5923	SUBSTRUCTURE CONCRETE	
226.59231	FORMWORK	
226.59232	REINFORCING STEEL	
226.59233	CONCRETE	
226.593	THICKENER PIPE BRIDGE	
226.5931	EXCAVATION WORK	
226.59311	EXCAVATION-EARTH	
226.59314	BACKFILL-EARTH	
226.5933	SUBSTRUCTURE CONCRETE	
226.59331	FORMWORK	
226.59332	REINFORCING STEEL	
226.59333	CONCRETE	
226.5934	SUPERSTRUCTURE	
226.59341	STRUCTURAL + MISC STEEL	
226.593411	STRUCTURAL STEEL	
226.593413	MISCELLANEOUS STEEL	
226.593415	FLOOR GRATING (GALV.)	
226.593416	STAIR TREADS	
226.593417	HANDRAIL	

001130

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
226.59349	PAINTING	
226.593492	STEELWORK	
226.593494	HANDRAIL	
226.594	THICK OVERFLOW TANK FOUND	
226.5941	EXCAVATION WORK	
226.59411	EXCAVATION-EARTH	
226.59414	BACKFILL-SAND	
226.5943	SUBSTRUCTURE CONCRETE	
226.59431	FORMWORK	
226.59432	REINFORCING STEEL	
226.59433	CONCRETE	
226.595	SLUDGE TRANSFER PUMP FOUND	
226.5951	EXCAVATION WORK	
226.59511	EXCAVATION-EARTH	
226.59514	BACKFILL-EARTH	
226.5953	SUBSTRUCTURE CONCRETE	
226.59531	FORMWORK	
226.59532	REINFORCING STEEL	
226.59533	CONCRETE	
226.59534	EMBEDDED STEEL	
226.596	SLDG DISPOSAL SRG TK FOUND	
226.5961	EXCAVATION WORK	
226.59611	EXCAVATION-EARTH	

201121

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
226.59614	BACKFILL-SAND	
226.5963	SUBSTRUCTURE CONCRETE	
226.59631	FORMWORK	
226.59632	REINFORCING STEEL	
226.59633	CONCRETE	
226.597	EMERGENCY SLURRY STRG POND	
226.5971	EXCAVATION WORK	
226.59711	EXCAVATION-EARTH	
226.59714	BACKFILL-EARTH	
226.5973	SUBSTRUCTURE CONCRETE	
226.59753	POND LINER	
226.6	MISC DESULFURIZATION EQUIP	
226.61	ROTATING MACHINERY	
226.611	PROCESS WATER PUMP + MOTOR	
226.6111	PROCESS WATER PUMP	
226.6112	PROCESS WATER PUMP MOTOR	
226.612	SEAL WATER PUMP + MOTOR	
226.6121	SEAL WATER PUMP	
226.6122	SEAL WATER PUMP MOTOR	
226.63	TANKS AND PRESSURE VESSELS	
226.631	PROCESS WATER SURGE TANK	
226.632	SEAL WATER TANK	
226.64	PURIFICATION+FILTRATION EQ	

201102

09/16/77

UNITED ENGINEERS & CONSTRUCTORS INC.

PROG. CM-711 *PEG030*

EQUIPMENT LIST - REPORT 1

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
226.641	SEAL WATER FILTER	
226.65	PIPING	
226.651	2 IN + SMALLER	
226.6511	CS/NNS	
226.652	2.5 IN + LARGER	
226.6521	CS/NNS	
226.66	VALVES	
226.663	GLOBE	
226.67	PIPING - MISC. ITEMS	
226.671	HANGERS + SUPPORTS	
226.69	FOUNDATIONS/SKIPS	
226.691	PROCESS WATER PUMP FOUND	
226.6911	EXCAVATION WORK	
226.69111	EXCAVATION-EARTH	
226.69114	HACKFILL-EARTH	
226.6913	SUBSTRUCTURE CONCRETE	
226.69131	FORMWORK	
226.69132	REINFORCING STEEL	
226.69133	CONCRETE	
226.69134	EMBEDDED STEEL	
226.69135	FLOOR FINISH	
226.692	SEAL WATER PUMP FOUNDATION	
226.6921	EXCAVATION WORK	

704123

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
226.69211	EXCAVATION-EARTH	
226.69214	BACKFILL-EARTH	
226.6923	SUBSTRUCTURE CONCRETE	
226.69231	FORMWORK	
226.69232	REINFORCING STEEL	
226.69233	CONCRETE	
226.69234	EMBEDDED STEEL	
226.693	PRCS WATER SURGE TNK FOUND	
226.6931	EXCAVATION WORK	
226.69311	EXCAVATION-EARTH	
226.69314	BACKFILL-SAND	
226.6933	SUBSTRUCTURE CONCRETE	
226.69331	FORMWORK	
226.69332	REINFORCING STEEL	
226.69333	CONCRETE	
226.694	SEAL WATER TANK FOUNDATION	
226.6941	EXCAVATION WORK	
226.69411	EXCAVATION-EARTH	
226.69414	BACKFILL-EARTH	
226.6943	SUBSTRUCTURE CONCRETE	
226.69431	FORMWORK	
226.69432	REINFORCING STEEL	
226.69433	CONCRETE	

204424

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
226.7	INSTRUMENTATION+CONTROL	
226.82	BUILDING SERVICES	
227.	INSTRUMENTATION + CONTROL	
227.1	BENCHBOARD, PANELS + RACKS	
227.11	BOILER - TG CONTROL PANEL	
227.17	AUXILIARY PANELS+CABINETS	
227.18	INSTRUMENT RACKS	
227.2	PLANT COMPUTER SYSTEM	
227.3	STACK GAS MONITORING SYS	
227.4	PLANT CONTROL SYSTEM	
227.41	COORDINATED CONTROL SYSTEM	
227.42	BURNER CONTROL SYSTEM	
227.5	INSTRUMENT TUBING+FITTINGS	
228.	BOILER PLANT MISC ITEMS	
228.1	MISC SUSPENSE ITEMS	
228.11	FINAL ALIGNMENT + CHECKING	
228.12	FIELD PAINTING	
228.13	QUALIFICATION OF WELDERS	
228.3	BOILER PLANT INSULATION	
228.31	PIPE INSULATION	
228.32	EQUIPMENT INSULATION	
228.4	SAMPLING EQUIPMENT	
228.7	MISC PIPE BRIDGE	

204125

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
228.71	EXCAVATION WORK	
228.711	EXCAVATION-EARTH	
228.73	SUBSTRUCTURE CONCRETE	
228.731	FORMWORK	
228.733	CONCRETE	
228.734	EMBEDDED STEEL	
23 .	TURBINE PLANT EQUIPMENT	
231.	TURBINE GENERATOR	
231.1	TURBINE GENERATOR +ACCESSRY	
231.11	TURBINE FACTORY COST	
231.12	OTHER TURBINE COSTS	
231.13	EXCITER & VOLTAGE REGULTR.	
231.2	FOUNDATIONS	
231.21	T-G PEDESTAL	
231.211	EXCAVATION WORK	
231.2111	EXCAVATION - EARTH	
231.2112	EXCAVATION - ROCK	
231.2114	BACKFILL - EARTH	
231.2115	DEWATERING	
231.213	SUBSTRUCTURE CONCRETE	
231.2131	FORMWORK	
231.2132	REINFORCING STEEL	
231.2133	CONCRETE	

201128

UNITED ENGINEERS & CONSTRUCTORS INC.

PROG. CM-711 *PEGO30*

EQUIPMENT LIST - REPORT 1

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
231.2134	EMBEDDED STEEL	
231.2137	RUBBING CONCRETE SURFACE	
231.2138	EXPANSION JOINT	
231.214	SUPERSTRUCTURE	
231.2141	CONCRETE WORK	
231.21411	FORMWORK	
231.21412	REINFORCING STEEL	
231.21413	CONCRETE	
231.21414	EMBEDDED STEEL	
231.21417	RUBBING CONCRETE SURFACES	
231.21418	EXPANSION JOINT	
231.2142	STRUCTURAL + MISC STEEL	
231.21421	STRUCTURAL STEEL	
231.21425	GRATING	
231.4	LUBRICATING OIL SYSTEM	
231.43	TANKS + PRESSURE VESSELS	
231.431	LUBE OIL STORAGE TANK	
231.45	PIPING	
231.451	2IN. + SMALLER	
231.4511	CS/MNS	
231.452	2.5IN + LARGER	
231.4521	CS/MNS	
231.46	VALVES	

704127

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
231.461	GATE	
231.47	PIPING-MISC. ITEMS	
231.471	HANGERS + SUPPORTS	
231.472	INSULATION	
231.473	SPECIALTIES	
231.48	INSTRUMENTATION + CONTROL	
231.49	SKIDS / FOUNDATIONS	
231.491	LUBE OIL CONDNG EQPT SKID	
231.492	FIRE PROTECTION EQPT.	
231.5	GAS SYSTEMS	
231.51	HYDROGEN STORAGE SYSTEM	
231.513	TANKS + PRESSURE VESSELS	
231.5131	HYDROGEN STORAGE BOTTLES	
231.515	PIPING	
231.5151	2 IN + SMALLER	
231.5152	2.5 IN + LARGER	
231.51521	CS/NNS	
231.516	VALVES	
231.5163	GLOBE	
231.517	PIPING-MISC ITEMS	
231.5171	HANGERS + SUPPORTS	
231.5172	INSULATION	
231.5173	SPECIALTIES	

204128

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
231.52	CARBON DIOXIDE STORAGE SYS	
231.523	TANKS + PRESSURE VESSELS	
231.5231	CARBON DIOXIDE TANKS	
231.525	PIPING	
231.5251	2 IN + SMALLER	
231.5252	2.5 IN + LARGER	
231.52521	CS/MNS	
231.526	VALVES	
231.5263	GLOBES	
231.527	PIPING-MISC ITEMS	
231.5271	HANGER + SUPPORT	
233.	CONDENSING SYSTEMS	
233.1	CONDENSER EQUIPMENT	
233.12	HEAT TRANSFER EQUIPMENT	
233.121	CONDENSERS	
233.2	CONDENSATE SYSTEM	
233.21	ROTATING MACHINERY	
233.211	CONDENSATE PUMP + MOTOR	
233.2111	COND PUMP	
233.2112	COND PUMP MOTOR	
233.212	BOOSTER PUMP + MOTOR	
233.2121	BOOSTER PUMP	
233.2122	BOOSTER PUMP MOTOR	

204129

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
233.213	TRANSFER PUMP + MOTOR	
233.2131	TRANS. PUMP	
233.2132	TRANS. PUMP MOTOR	
233.221	COND. STORAGE TK HEATER	
233.23	TANKS & PRESSURE VESSELS	
233.231	CONDENSATE STORAGE TANK	
233.25	PIPING	
233.251	2 IN. + SMALLER	
233.2511	CS/NNS	
233.252	2.5 IN. + LARGER	
233.2521	CS/NNS	
233.26	VALVES	
233.261	GATE VALVES	
233.262	CHECK VALVES	
233.263	GLOBE VALVES	
233.266	BUTTERFLY	
233.267	BALL VALVES	
233.27	PIPING-MISC. ITEMS	
233.271	HANGERS + SUPPORTS	
233.272	INSULATION	
233.273	SPECIALTIES	
233.28	INSTRUMENTATION + CONTROL	
233.29	FOUNDATIONS	

00100

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
233.291	CONDENSATE TANK FDTN	
233.2911	FORMWORK	
233.2912	REINFORCING STEEL	
233.2913	CONCRETE	
233.292	CONDENSATE PUMP FDTN	
233.2921	FORMWORK	
233.2922	REINF. STEEL	
233.2923	CONCRETE	
233.2924	EMBEDDED IRON	
233.2925	STRUCTURAL STEEL	
233.2926	MISC. STEEL	
233.293	BOOSTER PUMP FDTN	
233.2931	FORMWORK	
233.2932	REINF. STEEL	
233.2933	CONCRETE	
233.2934	EMBEDDED IRON	
233.2935	STRUCTURAL STEEL	
233.2936	MISC. STEEL	
233.3	GAS REMOVAL SYSTEM	
233.31	CONDENSER GAS REMOVAL SYS.	
233.311	ROTATING MACHINERY	
233.3111	MECH VACUUM PUMP & MOTOR	
233.31111	MECH VAC PUMP	

704134

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
233.31112	MECH VAC PUMP MOTOR	
233.315	PIPING	
233.3151	2 IN. + SMALLER	
233.31511	CS/NNS	
233.3152	2.5 IN. + LARGER	
233.31521	CS/NNS	
233.316	VALVES	
233.3161	GATE	
233.3163	GLOBE	
233.317	PIPING-MISC. ITEMS	
233.3171	HANGERS + SUPPORTS	
233.3172	INSULATION	
233.3173	SPECIALTIES	
233.318	INSTRUMENTATION + CONTROL	
233.319	FOUNDATIONS/SKIDS	
233.3191	VACUUM PUMP FDN.	
233.31911	FORMWORK	
233.31912	REINFORCING STEEL	
233.31913	CONCRETE	
233.31914	EMBEDDED STEEL	
233.5	CONDENSATE POLISHING	
233.51	ROTATING MACHINERY	
233.511	ACID REGEN PUMP + MOTOR	

704132

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
233.5111	ACID REGEN PUMP	
233.5112	ACID REGEN PUMP MOTOR	
233.512	CAUSTIC REGEN PUMP + MOTOR	
233.5121	CAUSTIC REGEN PUMP	
233.5122	CAUSTIC REGEN PUMP MOTOR	
233.513	AMMONIA REGEN PUMP + MOTOR	
233.5131	AMMONIA REGEN PUMP	
233.5132	AMMONIA REGEN PUMP MOTOR	
233.514	SLUICE WATER REGEN P+M	
233.5141	SLUICE WATER REGEN PUMP	
233.5142	SLUICE WATER REGEN P MOTOR	
233.515	RECYCLE PUMP + MOTOR	
233.5151	RECYCLE PUMP	
233.5152	RECYCLE PUMP MOTOR	
233.516	AIR BLOWER + MOTOR	
233.5161	AIR BLOWER	
233.5162	AIR BLOWER MOTOR	
233.53	TANKS + PRESSURE VESSELS	
233.531	RESIN SEPRTR+CATION RGN TK	
233.532	ANION REGEN TANK	
233.533	RESIN STORAGE TANK	
233.534	HOT WATER HEATING TANK	
233.535	BULK ACID STORAGE TANK	

204133

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
233.536	BULK CAUSTIC STORAGE TANK	
233.537	BULK AMMONIA STORAGE TANK	
233.54	PURIFICATION EQUIPMENT	
233.541	MIXED BED DEMINERALIZERS	
233.58	INSTRUMENTATION + CONTROL	
234.	FEED HEATING SYSTEM	
234.1	FEEDWATER HEATERS	
234.12	HEAT TRANSFER EQUIPMENT	
234.121	NO.1 LP HEATERS	
234.122	NO.2 LP HEATERS	
234.123	NO.3 LP HEATERS	
234.124	NO 4 LP HEATER	
234.125	NO 5 LP HEATER/DEAERATOR	
234.1251	DEAERATOR	
234.1252	DEAERATOR STORAGE TANK	
234.126	NO 6 HP HEATER	
234.127	NO 7 HP HEATER	
234.2	FEEDWATER SYSTEM	
234.21	ROTATING MACHINERY	
234.211	MAIN BOILER FEED PUMP-MBFP	
234.212	MBFP TURBINE DRIVES	
234.216	MAIN BF BOOSTER PUMP + MTR	
234.2161	MAIN BF BOOSTER PUMP	

201134

EQUIPMENT LIST - REPORT 1

09/14/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
234.2162	MAIN BF BOOSTER PUMP MTR.	
234.22	HEAT TRANSFER EQUIPMENT	
234.221	MAIN BOILER FP CONDENSER	
234.25	PIPING	
234.251	2 IN + SMALLER	
234.2511	CS/PC	
234.2512	CS/BC	
234.252	2.5IN + LARGER	
234.2521	CS/PC	
234.26	VALVES	
234.261	GATE	
234.262	CHECK	
234.263	GLOBE	
234.27	PIPING-MISC. ITEMS	
234.271	HANGERS & SUPPORTS	
234.272	INSULATION	
234.273	SPECIALTIES	
234.28	INSTRUMENTATION + CONTROL	
234.29	SKIDS/FOUNDATIONS	
234.291	MBFP	
234.2911	FORMWORK	
234.2912	REINFORCING STEEL	
234.2913	CONCRETE	

704135

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
234.2914	EMBEDDED STEEL	
234.3	EXTRACTION STEAM SYSTEM	
234.35	PIPING	
234.351	2 IN + SMALLER	
234.3511	CS/NNS	
234.352	2.5IN + LARGER	
234.3521	CS/NNS	
234.36	VALVES	
234.361	GATE	
234.362	CHECK	
234.363	GLOBE	
234.37	PIPING-MISCELLANEOUS	
234.371	HANGER + SUPPORTS	
234.372	INSULATION	
234.373	SPECIALTIES	
234.38	INSTRUMENTATION + CONTROL	
234.4	FWH VENT + DRAIN SYSTEM	
234.41	ROTATING MACHINERY	
234.411	HEATER DRAIN PUMP + MOTOR	
234.4111	HEATER DRAIN PUMP	
234.4112	HEATER DRAIN PUMP MOTOR	
234.43	TANKS + PRESSURE VESSELS	
234.431	HEATER DRAIN TANK	

704136

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
234.45	PIPING	
234.451	2 IN + SMALLER	
234.4511	CS/PC	
234.452	2.5IN + LARGER	
234.4521	CS/PC	
234.4522	CR-MO/PC	
234.46	VALVES	
234.461	GATE	
234.462	CHECK	
234.463	GLOBE	
234.47	PIPING-MISC. ITEMS	
234.471	HANGERS & SUPPORTS	
234.472	INSULATION	
234.473	SPECIALTIES	
234.48	INSTRUMENTATION + CONTROL	
235.	OTHER TURBINE PLANT EQUIP.	
235.1	MAIN VAPOR PIPING SYSTEM	
235.11	MAIN STEAM SYSTEM	
235.115	PIPING	
235.1151	2 IN + SMALLER	
235.11511	CR-MO	
235.1152	2.5 IN + LARGER	
235.11521	CR-MO	

204137

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
235.116	VALVES	
235.1161	GATE	
235.1162	CHECK	
235.1163	GLOBE	
235.1165	RELIEF	
235.117	PIPING-MISC ITEMS	
235.1171	HANGERS + SUPPORTS	
235.1172	INSULATION	
235.1173	SPECIALTIES	
235.11732	STEAM TRAPS + STRAINERS	
235.118	INSTRUMENTATION+CONTROL	
235.12	HOT REHEAT SYSTEM	
235.125	PIPING	
235.1251	2 IN + SMALLER	
235.12511	CR-MO/PC	
235.1252	2.5IN + LARGER	
235.12521	CR-MO/PC	
235.126	VALVES	
235.1261	GATE	
235.1263	GLOBE	
235.1265	SAFETY/RELIEF	
235.127	PIPING-MISC. ITEMS	
235.1271	HANGERS + SUPPORTS	

704138

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
235.1272	INSULATION	
235.1273	SPECIALTIES	
235.12732	TRAPS + STRAINERS	
235.128	INSTRUMENTATION + CONTROL	
235.13	COLD REHEAT SYSTEM	
235.135	PIPING	
235.1351	2 IN + SMALLER	
235.13511	CS/PC	
235.1352	2.5 IN + LARGER	
235.13521	CS/PC	
235.136	VALVES	
235.1361	GATE	
235.1362	CHECK	
235.1363	GLOBE	
235.1365	RELIEF	
235.137	PIPING-MISC. ITEMS	
235.1371	HANGERS + SUPPORTS	
235.1372	INSULATION	
235.1373	SPECIALTIES	
235.13732	TRAPS + STRAINERS	
235.138	INSTRUMENTATION + CONTROL	
235.15	ATTEMPERATING SYSTEM	
235.155	PIPING	

201130

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
235.1551	2 IN + SMALLER	
235.15511	CS/PC	
235.1552	2.5 IN + LARGER	
235.15521	CS/PC	
235.156	VALVES	
235.1561	GATE	
235.1562	CHECK	
235.157	PIPING-MISC ITEMS	
235.1571	HANGERS + SUPPORTS	
235.1572	INSULATION	
235.1573	SPECIALTIES	
235.15732	STEAM TRAPS + STRAINERS	
235.158	INSTRUMENTATION + CONTROL	
235.173	SPECIALTIES	
235.2	TURBINE AUXILIARIES	
235.21	MAIN STM/RHT VENTS & DRAIN	
235.215	PIPING	
235.2151	2 IN + SMALLER	
235.21511	CS/PC	
235.21512	CR-MO/PC	
235.2152	2.5 IN + LARGER	
235.21521	CS/PC	
235.21522	CR-MO/PC	

204110

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
235.216	VALVES	
235.217	PIPING-MISC. ITEMS	
235.2171	HANGERS + SUPPORTS	
235.2172	INSULATION	
235.2173	SPECIALTIES	
235.218	INSTRUMENTATION + CONTROL	
235.3	TB CLOSED CLG WATER SYS	
235.31	ROTATING MACHINERY	
235.311	TB CLOSED CLG WTR PUMP	
235.3111	TB CCW PUMP	
235.3112	TB CCW PUMP MOTOR	
235.32	HEAT TRANSFER EQUIPMENT	
235.321	HEAT EXCHANGERS	
235.33	TANKS + PRESSURE VESSELS	
235.331	HEAD TANK	
235.35	PIPING	
235.351	2 IN. + SMALLER	
235.3511	CS/NNS	
235.352	2.5 IN + LARGER	
235.3521	CS/NNS	
235.36	VALVES	
235.361	GATE	
235.362	CHECK	

701111

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
235.363	GLOBE	
235.36.	RELIEF	
235.366	BUTTERFLY	
235.368	PLUG	
235.37	PIPING-MISC. ITEMS	
235.371	HANGERS + SUPPORTS	
235.372	INSULATION	
235.373	SPECIALTIES	
235.38	INSTRUMENTATION + CONTROL	
235.4	DEMIN.WATER MAKE-UP SYSTEM	
235.45	PIPING	
235.451	2 IN + SMALLER	
235.4511	CS/NNS	
235.452	2.5 IN + LARGER	
235.4521	CS/NNS	
235.46	VALVES	
235.47	PIPING-MISC ITEMS	
235.48	INSTRUMENTATION + CONTROL	
235.49	SKIDS / FOUNDATIONS	
235.491	DEMINERALIZER PACKAGE	
235.4911	ROTATING MACHINERY	
235.49111	ACID REGENERANT P+M	
235.491111	ACID REGENERANT PUMP	

704112

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
235.491112	ACID REGENERANT PUMP MOTOR	
235.49112	CAUSTIC REGENERANT P+M	
235.491121	CAUSTIC REGEN PUMP	
235.491122	CAUSTIC REGEN PUMP MOTOR	
235.49113	DEGASIFIER EVACUATING P+M	
235.491131	DEGASIFIER EVAC PUMP	
235.491132	DEGASIFIER EVAC PUMP MOTOR	
235.49114	DEGASIFIER BOOSTER P+M	
235.491141	DEGASIFIER BOOSTER PUMP	
235.491142	DEGASIFIER BOOSTER P MOTOR	
235.49121	DILUTE CAUSTIC WATER HTR.	
235.4913	TANKS + PRESSURE VESSELS	
235.49131	VACUUM DEGASIFIER	
235.49132	ACID REGENERANT DAY TANK	
235.49133	CAUSTIC REGENERANT DAY TK	
235.49134	HT WTR CAUSTIC DILUTION TK	
235.4914	PURIFICATION+FILTRATION EQ	
235.49141	FILTERS	
235.49142	CATION ION EXCHANGE BEDS	
235.49143	ANION ION EXCHANGE BEDS	
235.49144	MIXED-BED ION EXCHANGE BED	
235.5	CHEMICAL TREATMENT SYSTEM	
235.51	ROTATING MACHINERY	

201113

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
235.511	AMMONIA FEED PUMP + MOTOR	
235.5111	AMMONIA FEED PUMP	
235.5112	AMMONIA FEED PUMP MOTOR	
235.512	HYDRAZINE FEED PUMP+MOTOR	
235.5121	HYDRAZINE FEED PUMP	
235.5122	HYDRAZINE FEED PUMP MOTOR	
235.53	TANKS + PRESSURE VESSELS	
235.531	AMMONIA STORAGE TANK	
235.532	HYDRAZINE STORAGE TANK	
235.55	PIPING	
235.551	2 IN + SMALLER	
235.5511	SS/NNS	
235.552	2.5 IN + LARGER	
235.56	VALVES	
235.563	GLOBE	
235.57	PIPE-MISC. ITEMS	
235.571	HANGERS + SUPPORTS	
235.572	INSULATION	
235.573	SPECIALTIES	
235.58	INSTRUMENTATION + CONTROL	
235.6	NEUTRALIZATION SYSTEM	
235.61	ROTATING MACHINERY	
235.611	OVERBOARD/RECIR PUMP+MOTOR	

204111

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
235.6111	OVERBOARD/RECIR PUMP	
235.6112	OVERBOARD/RECIR PUMP MOTOR	
235.612	BLOWER + MOTOR	
235.6121	BLOWER	
235.6122	BLOWER MOTOR	
235.63	TANKS AND PRESSURE VESSELS	
235.631	NEUTRALIZATION TANK	
235.65	PIPING	
235.651	2IN & SMALLER	
235.6511	CS/NNS	
235.652	2.5 IN & LARGER	
235.6521	CS/NNS	
235.66	VALVES	
235.67	PIPING - MISC ITEMS	
235.671	HANGERS + SUPPORTS	
235.672	INSULATION	
235.673	SPECIALTIES	
235.68	INSTRUMENTATION + CONTROL	
236.	INSTRUMENTATION + CONTROL	
236.1	PROCESS IC EQUIPMENT	
236.11	BENCHBOARD, PANELS + RACKS	
236.111	TURBINE PLT MAIN CONTRL BD	
236.112	TURBINE PANELS	

704145

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
236.1121	TURBINE SUPERVISORY PANELS	
236.1122	EHC CONTROL CABINET	
236.1123	TURBINE ACCESSORY PANELS	
236.113	TURBINE PLANT HVAC PANELS	
236.115	INSTRUMENT RACK-TURB PLANT	
236.116	TURBINE + UNIT MISC PANEL	
236.13		
236.2	PROCESS COMPUTER	
236.3	TURB PLT I+C TUBING	
237.	TURBINE PLANT MISC ITEMS	
237.1	MISC SUSPENSE ITEMS	
237.11	PIPE	
237.12	FIELD PAINTING	
237.13	QUALIFICATION OF WELDERS	
237.3	TURBINE PLANT INSULATION	
237.31	PIPE INSULATION	
237.32	EQUIPMENT INSULATION	
24 .	ELECTRIC PLANT EQUIPMENT	
241.	SWITCHGEAR	
241.1	GEN EQPT SWITCHGEAR	
241.11	GEN LOAD BREAK SWITCH	
241.12	GEN NEUTRAL GROUNING EQPT	
241.13	GEN CURRENT+POTENTIAL XFMR	

701115

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AU - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
241.131	GEN. CURRENT TRANSFORMERS	
241.132	GEN. POTENTIAL TRANSFORMERS	
241.14	GEN SURGE PROTECTION EQPT	
241.15	GEN EXCITATION SWITCHGEAR	
241.2	STATION SERVICE SWITCHGEAR	
241.21	MEDIUM VOLTAGE METAL CLAD	
241.211	13.8 KV	
241.212	6.9 KV	
241.213	4.16 KV	
241.2131	350 MVA	
241.2132	250 MVA	
241.22	STATION MOTOR CONTROL CNTR	
241.221	GENERAL PLANT	
242.	STATION SERVICE EQUIPMENT	
242.1	STATION SERV&STARTUP XFMR	
242.11	UNIT AUXILIARY TRANSFORMER	
242.111	13.8 KV TRANSFORMERS	
242.112	4.16 KV TRANSFORMERS	
242.12	RESERVE AUXILIARY XFMR	
242.121	13.8 KV TRANSFORMER	
242.122	4.16 KV TRANSFORMER	
242.13	FOUNDATIONS FOR XFMRs	
242.131	EXCAVATION WORK	

201177

EQUIPMENT LIST - REPORT 1

09/10/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
242.1311	EARTH EXCAVATION	
242.1312	ROCK EXCAVATION	
242.1313	CONCRETE FILL	
242.1314	FILL + BACKFILL	
242.1315	DEWATERING	
242.132	SUPSTRUCTURE CONCRETE	
242.1321	FORMWORK	
242.1322	REINFORCING STEEL	
242.1323	CONCRETE	
242.1324	EMBEDDED STEEL	
242.1325	FLOOR FINISH	
242.1326	WATERPROOFING	
242.1327	CONSTRUCTION JOINTS	
242.1328	RUBBING CONCRETE SURFACES	
242.133	CRUSHED STONE FILL	
242.2	UNIT SUBSTATIONS	
242.21	LOAD CENTER SWITCHGEAR	
242.211	GENERAL PLANT SWITCHGEAR	
242.2111	COOLING TOWER	
242.2112	BALANCE OF PLANT-NO CT	
242.212	PRECIPITATOR SWITCHGEAR	
242.22	LOAD CENTER TRANSFORMERS	
242.221	GENERAL PLANT LD CTR XFMRs	

704118

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
242.2211	COOLING TOWER	
242.2212	BALANCE OF PLT 13800-480V	
242.2213	BALANCE OF PLT 4160-480V	
242.222	PRECIPITATOR LD CTR XFMRs	
242.23	MISCELLANEDUS XFMRs	
242.3	AUXILIARY POWER SOURCES	
242.31	BATTERY SYSTEMS	
242.311	STATION BATTERIES	
242.3111	BATTERIES	
242.312	BATTERY CHARGERS	
242.3121	CHARGERS	
242.32	EMERGENCY DIESEL GEN SYS	
242.321	DIESEL GENERATOR UNITS	
242.322	DIESEL GEN SUBSYSTEMS	
242.34	INVERTERS	
242.341	GENERAL PLANT INVERTERS	
243.	SWITCHBOARDS	
243.1	CONTROL PANELS	
243.11	GEN+AUX POWER SYS CTRL PNL	
243.12	CONSOLES	
243.13	VERTICAL PANELS	
243.14	GEN PROTECTIVE RELAY PANEL	
243.2	AUX. POWER & SIGNAL BOARDS	

204149

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
243.21	POWER DISTRIBUTION PANELS	
243.211	AC PANELS	
243.22	BATTERY CNTRL+DC DIST PNL	
243.221	DC PANELS	
243.223	MISC.PUSHBUTTONS,PNLS+FUSE	
243.224	BATTERY FUSES	
244.	PROTECTIVE EQUIPMENT	
244.1	GENRL STATION GROUND SYS	
244.11	EQUIPMENT GROUNDING SYSTEM	
244.12	YARD + STRUCTURE GROUNDING	
244.2	FIRE DETECTION+SUPPRESSION	
244.3	LIGHTNING PROTECTION	
244.4	CATHODIC PROTECTION	
244.5	HEAT TRACING + FREEZE PROT	
245.	ELECT.STRUC +WIRING CONTR	
245.	UNDERGROUND DUCT RUNS	
245.11	DUCT BANKS	
245.111	PVC DUCT	
245.112	STEEL CONDUIT	
245.113	STRUCTURAL WORK	
245.1131	EXCAVATION WORK	
245.1132	SUBSTRUCTURE CONCRETE	
245.11321	FORMWORK	

701150

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
245.11322	REINFORCING STEEL	
245.11323	CONCRETE	
245.2	CABLE TRAY	
245.3	CONDUIT	
246.	POWER & CONTROL WIRING	
246.1	GENERATOR CIRCUITS WIRING	
246.11	MAIN GENERATOR BUS DUCT	
246.12	DG UNIT BUS DUCT	
246.2	STATION SERVICE PWR WIRING	
246.21	HIGH VOLTAGE BUS+CABLE	
246.211	BUS DUCT	
246.2111	15 KV BUS DUCT	
246.2112	8 KV BUS DUCT	
246.2113	5 KV BUS DUCT	
246.212	CABLE	
246.2121	15 KV CABLE	
246.2122	8 KV CABLE	
246.2123	5 KV CABLE	
246.22	LOW VOLTAGE BUS+CABLE	
246.221	BUS DUCT	
246.222	CABLE	
246.2221	LOW VOLTAGE POWER CABLE	
246.3	CONTROL CABLE	

701151

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
246.4	INSTRUMENT WIRE	
25 .	MISCELLANEOUS PLANT EQUIPT	
251.	TRANSPORTATION & LIFT EQPT	
251.1	CRANES & HOISTS	
251.11	TURBINE BUILDING CRANE	
251.111	TG OVERHEAD TRAVELING CRAN	
251.112	HEATER BAY CRANE	
251.14	INTAKE STRUCTURE CRANE	
251.15	CIRC WATER PUMPHOUSE CRANE	
251.16	MISC. CRANES, HOIST, MONORLS	
251.161	10 TON CRANE	
251.162	5 TON CRANES	
251.17	DIESEL BUILDING CRANES	
251.2	RAILWAY EQUIPMENT	
251.21	DIESEL LOCOMOTIVE	
251.3	ROADWAY EQUIPMENT	
251.34	BULLDOZERS	
252.	AIR, WATER + STEAM SERVICE SY	
252.1	AIR SYSTEMS	
252.11	COMPRESSED AIR SYSTEM	
252.111	ROTATING MACHINERY	
252.1111	AIR COMPRESSORS + MOTORS	
252.11111	AIR COMPRESSORS	

704152

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
252.11112	AIR COMPRESSOR MOTOR	
252.113	TANKS AND PRESSURE VESSELS	
252.1131	AIR RECEIVERS	
252.1132	AIR DRYERS	
252.115	PIPING	
252.1151	2IN + SMALLER	
252.11511	CS/NNS	
252.1152	2.5IN + LARGER	
252.11521	CS/NNS	
252.116	VALVES	
252.1161	GATE	
252.1162	CHECK	
252.1163	GLOBE	
252.1165	RELIEF	
252.117	PIPING - MISC ITEMS	
252.1171	HANGERS + SUPPORTS	
252.1172	INSULATION	
252.1173	SPECIALTIES	
252.118	INSTRUMENTATION+CONTROL	
252.2	WATER SYSTEMS	
252.21	SERVICE WATER SYSTEM	
252.211	ROTATING MACHINERY	
252.2111	SERVICE WATER PUMP & MOTOR	

704153

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 W HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
252.21111	SERVICE WATER PUMP	
252.21112	SERVICE WATER PUMP MOTOR	
252.215	PIPING	
252.2151	2IN & SMALLER	
252.21511	CS/NNS	
252.2152	2.5IN & LARGER	
252.21521	CS/NNS	
252.216	VALVES	
252.2161	GATE	
252.2162	CHECK	
252.2163	GLOBE	
252.2166	BUTTERFLY	
252.217	PIPING-MISC ITEMS	
252.2171	HANGERS AND SUPPORTS	
252.2172	INSULATION	
252.2173	SPECIALTIES	
252.2174	PIPE TRENCHING	
252.218	INSTRUMENTATION & CONTROL	
252.22	YARD FIRE PROTECTION	
252.221	ROTATING MACHINERY	
252.2211	DIESEL ENGINE FIRE PUMPS	
252.2212	MOTOR DRIVEN FIRE PUMPS	
252.22121	FIRE PUMP	

204154

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
252.22122	FIRE PUMP MOTOR	
252.2213	JOCKEY PUMP + MOTOR	
252.22131	JOCKEY PUMP	
252.22132	JOCKEY PUMP MOTOR	
252.225	PIPING	
252.2252	2.5IN + LARGER	
252.22521	CS/NNS	
252.22522	CS/NNS	
252.226	VALVES	
252.2261	STANDARD VALVES	
252.2262	E-RATED VALVES	
252.22621	GATE	
252.22622	CHECK	
252.22625	RELIEF	
252.22629	SPECIAL VALVES	
252.226291	POST INDICATOR GATE	
252.226292	DELUGE	
252.227	PIPING - MISC ITEMS	
252.2271	HANGERS + SUPPORTS	
252.2272	INSULATION	
252.2273	SPECIALTIFS	
252.22731	HOSE HOUSES	
252.22732	FIRE HYDRANTS	

704155

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
252.228	INSTRUMENTATION+CONTROL	
252.24	POTABLE WATER SYSTEM	
252.245	PIPING	
252.2451	2IN + SMALLER	
252.24511	GALV/NNS	
252.24512	CU/NNS	
252.2452	2.5IN + LARGER	
252.24521	GALV/NNS	
252.246	VALVES	
252.2461	GATE	
252.2462	CHECK	
252.2463	GLOBE	
252.2465	SAFETY/RELIEF	
252.2466	SPECIAL VALVES	
252.24691	SAFETY SHOWER	
252.24692	EYE WASH	
252.24693	HOSE BIBBS	
252.247	PIPING-MISC ITEMS	
252.2471	HANGERS + SUPPORTS	
252.2472	INSULATION	
252.2473	SPECIALTIES	
252.248	INSTRUMENTATION + CONTROL	
252.3	AUXILIARY STEAM SYSTEM	

704156

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
252.31	AUXILIARY BOILER SYSTEM	
252.312	HEAT TRANSFER EQUIPMENT	
252.3121	AUXILIARY BOILERS	
252.315	PIPING	
252.3151	2IN + SMALLER	
252.31511	CS/NNS	
252.3152	2.5IN + LARGER	
252.31521	CS/NNS	
252.316	VALVES	
252.3161	GATE	
252.3162	CHECK	
252.3163	GLOBE	
252.317	PIPING - MISC ITEMS	
252.3171	HANGERS + SUPPORTS	
252.3172	INSULATION	
252.3173	SPECIALTIES	
252.32	AUX BOILER FEEDWATER SYS	
252.321	ROTATING MACHINERY	
252.3211	AUX FW PUMPS + MOTORS	
252.32111	AUX FW PUMPS	
252.32112	AUX FW MOTORS	
252.325	PIPING	
252.3251	2 IN + SMALLER	

704157

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
252.32511	CS/NNS	
252.3252	2.5 IN + LARGER	
252.32521	CS/NNS	
252.326	VALVES	
252.3261	GATE	
252.3262	CHECK	
252.3263	GLOBE	
252.327	PIPING - MISC. ITEMS	
252.3271	HANGERS + SUPPORTS	
252.3272	INSULATION	
252.3273	SPECIALTIES	
252.33	AUX FUEL OIL SYSTEM	
252.331	ROTATING MACHINERY	
252.3311	FUEL OIL PUMPS + MOTORS	
252.33111	FUEL OIL PUMP	
252.33112	FUEL OIL PUMP MOTOR	
252.335	PIPING	
252.3351	2IN + SMALLER	
252.33511	CS/NNS	
252.3352	2.5IN + LARGER	
252.33521	CS/NNS	
252.336	VALVES	
252.3362	CHECK	

704158

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
252.3368	PLUG	
252.337	PIPING - MISC ITEMS	
252.3371	HANGERS + SUPPORTS	
252.3372	INSULATION	
252.3373	SPECIALTIES	
252.34	AUX DEAR + MAKEUP SYSTEM	
252.341	ROTATING MACHINERY	
252.3411	CONDENSATE RETURN PUMP+MT	
252.34111	CONDENSATE RETURN PUMPS	
252.34112	CONDENSATE RETURN PUMP MT	
252.343	TANKS AND PRESSURE VESSELS	
252.3431	DEAERATOR	
252.345	PIPING	
252.3451	2 IN + SMALLER	
252.34511	CS/NNS	
252.3452	2.5 IN + LARGER	
252.34521	CS/NNS	
252.346	VALVES	
252.3461	GATE	
252.3462	CHECK	
252.3463	GLOBE	
252.347	PIPING - MISC. ITEMS	
252.3471	HANGERS + SUPPORTS	

704159

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
252.3472	INSULATION	
252.3473	SPECIALTIES	
252.35	AUX CHEM FEED SYSTEM	
252.351	ROTATING MACHINERY	
252.3511	CHEM FEED PUMPS + MOTORS	
252.35111	CHEM FEED PUMP	
252.35112	CHEM FEED PUMP MOTOR	
252.353	TANKS AND PRESSURE VESSELS	
252.3531	CHEM FEED TANKS	
252.355	PIPING	
252.3551	2 IN + SMALLER	
252.35511	SS/NNS	
252.3552	2.5 IN + LARGER	
252.356	VALVES	
252.3561	GATE	
252.3562	CHECK	
252.3563	GLOBE	
252.3569	SPECIAL VALVES	
252.35691	NEEDLE	
252.357	PIPING - MISC ITEMS	
252.3571	HANGERS + SUPPORTS	
252.3572	INSULATION	
252.3573	SPECIALTIES	

05/11/02

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
252.36	AUX. STEAM+CONDENSATE RETRN	
252.361	ROTATING MACHINERY	
252.3611	HEATING DRAIN TANK PUMP+MT	
252.36111	HEATING DRAIN TANK PUMP	
252.36112	HEATING DRAIN TANK PUMP MT	
252.363	TANKS AND PRESSURE VESSELS	
252.3631	HEATING DRAIN TANK	
252.365	PIPING	
252.3651	2 IN + SMALLER	
252.36511	CS/NNS	
252.3652	2.5 IN + LARGER	
252.36521	CS/NNS	
252.366	VALVES	
252.3661	GATE	
252.3662	CHECK	
252.3663	GLOBE	
252.367	PIPING - MISC. ITEMS	
252.3671	HANGERS + SUPPORTS	
252.3672	INSULATION	
252.3673	SPECIALTIES	
252.37	AUX BOILER STACKS + DUCT	
252.38	AUX BOILER BLOWDOWN	
252.383	TANKS AND PRESSURE VESSELS	

204161

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
252.3831	AUX BOILER BLOWDOWN TANK	
252.385	PIPING	
252.3851	2 IN + SMALLER	
252.38511	CS/NNS	
252.3852	2.5 IN + LARGER	
252.386	VALVES	
252.3861	GATE	
252.3862	CHECK	
252.3869	SPECIAL VALVES	
252.38691	BLOWDOWN	
252.387	PIPING - MISC ITEMS	
252.3871	HANGERS + SUPPORTS	
252.3872	INSULATION	
252.3873	SPECIALTIES	
252.39	AUX STEAM SYS COMPLETE I+C	
252.4	PLANT FUEL OIL SYSTEM	
252.41	ROTATING MACHINERY	
252.411	FUEL OIL UNLOAD PUMP+MOTOR	
252.4111	FUEL OIL UNLOADING PUMP	
252.4112	FUEL OIL UNLOAD PUMP MOTOR	
252.43	TANKS AND PRESSURE VESSELS	
252.431	PLANT FUEL OIL STORAGE TK	
252.45	PIPING	

004162

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
252.451	2 IN + SMALLER	
252.4511	CS/NNS	
252.452	2.5 IN + LARGER	
252.4521	CS/NNS	
252.46	VALVES	
252.468	PLUG	
252.47	PIPING-MISC ITEMS	
252.471	HANGERS + SUPPORTS	
252.472	INSULATION	
252.473	SPECIALTIES	
252.49	FOUNDATIONS/SKIDS	
252.491	PLANT FUEL OIL STG TK FNDR	
252.4911	EXCAVATION WORK	
252.49111	EARTH EXCAVATION	
252.49112	BACKFILL	
252.4912	CONCRETE WORK	
252.49121	FORMWORK	
252.49122	REINFORCING STEEL	
252.49123	CONCRETE	
252.4913	COMPACTED SAND BED	
252.4914	DIKE	
253.	COMMUNICATIONS EQUIPMENT	
253.1	LOCAL COMMUNICATIONS SYS	

704163

09/16/77

EQUIPMENT LIST - REPORT 1

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
253.11	GEN.PURPOSE TELEPHONE SYS	
253.12	GROUND POW TELEPHONE SYS	
253.15	PA + INTERCOM SYS.	
253.2	SIGNAL SYSTEMS	
253.21	FIRE DETECTION SYSTEM	
253.211		
253.212		
254.	FURNISHINGS + FIXTURES	
254.1	SAFETY EQUIPMENT	
254.11	PORTABLE FIRE EXTINGUISHRS	
254.2	CHEMICAL LAB + INSTR SHOP	
254.223	INSTRUMENT SHOP APPARATUS	
254.23	SPEC LAB FURNITURE+FIXTURE	
254.3	OFFICE EQUIP+FURNISHINGS	
254.31	OFFICE FURNITURE	
254.4	CHANGE ROOM EQUIPMENT	
254.41	LOCKERS+BENCHES	
254.5	ENVIRONMENT MONIT EQUIP	
254.52	METEOROLOGICAL MONIT.EQUIP	
254.53	WATER QUALITY MONITORING	
254.54	THERMAL EFFLUENT MONITOR	
254.56	AIR QUALITY MONITORING	
254.6	DINING FACILITIES	

704164

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
254.61	CAFETERIA EQUIPMENT	
255.	WASTE WATER TREATMENT EQPT	
255.1	ROTATING MACHINERY	
255.11	GROUP I -	
255.111	BATCH WASTE TRANS PUMP+MTR	
255.1111	BATCH WASTE TRANSFER PUMP	
255.1112	BATCH WASTE TRANS PUMP MTR	
255.112	SLUDGE FEED PUMP + MOTOR	
255.1121	SLUDGE FEED PUMP	
255.1122	SLUDGE FEED PUMP MOTOR	
255.113	FILTRATE SUMP PUMP + MOTOR	
255.1131	FILTRATE SUMP PUMP	
255.1132	FILTRATE SUMP PUMP MOTOR	
255.114	LIME SLURRY PUMP + MOTOR	
255.1141	LIME SLURRY PUMP	
255.1142	LIME SLURRY PUMP MOTOR	
255.115	REGENERATION WASTE PMP+MTR	
255.1151	REGENERATION WASTE PUMP	
255.1152	REGENERATION WASTE PMP MTR	
255.116	BATCH HOLD TK BLOWER + MTR	
255.1161	BATCH HOLDING TANK BLOWER	
255.1162	BATCH HOLD TK BLOWER MOTOR	
255.117	ROT DRUM VAC FILT PUMP+MTR	

204165

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
255.1171	ROTARY DRUM VACUUM PUMP	
255.1172	ROTARY DRUM MOTOR	
255.1173	VACUUM PUMP MOTOR	
255.12	GROUP II	
255.121	SULFURIC ACID FEED PMP+MTR	
255.1211	SULFURIC ACID FEED PUMP	
255.1212	SULFURIC ACID FEED PMP MTR	
255.122	CAUSTIC FEED PUMP + MOTOR	
255.1221	CAUSTIC FEED PUMP	
255.1222	CAUSTIC FEED PUMP MOTOR	
255.123	LIME SLRY TNK AGITATOR+MTR	
255.1231	LIME SLRY TANK AGITATOR	
255.1232	LIME SLRY TNK AGITATOR MTR	
255.124	REGENER TANK AGITATOR+MTR	
255.1241	REGENERATION TANK AGITATOR	
255.1242	REGENER TANK AGITATOR MTR	
255.125	PH ADJUST TNK AGITATOR+MTR	
255.1251	PH ADJUST TANK AGITATOR	
255.1252	PH ADJUST TNK AGITATOR MTR	
255.126	SLUDGE CONVEYOR + MOTOR	
255.1261	SLUDGE CONVEYOR	
255.1262	SLUDGE CONVEYOR MOTOR	
255.3	TANKS AND PRESSURE VESSELS	

20465

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 643 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
255.31	BATCH HOLDING TANK	
255.32	LIME SLURRY HOLDING TANK	
255.33	API SEPARATOR TANK	
255.34	CAUSTIC STORAGE TANK	
255.35	SULFURIC ACID STORAGE TANK	
255.36	REGENERANT HOLDING TANK	
255.37	PH ADJUSTMENT TANK	
255.5	PIPING	
255.51	2 IN + SMALLER	
255.511	CS/NNS	
255.52	2.5 IN + LARGER	
255.521	CS/NNS	
255.6	VALVES	
255.61	GATE	
255.7	PIPING-MISC ITEMS	
255.71	HANGERS AND SUPPORTS	
255.8	WASTE WATER I+C	
255.9	FOUNDATIONS/SKIDS	
255.91	BATCH HOLDING TANK FOUND	
255.911	EXCAVATION WORK	
255.9111	EXCAVATION-EARTH	
255.913	SUBSTRUCTURE CONCRETE	
255.9131	FORMWORK	

201101

EQUIPMENT LIST - REPORT 1

MODEL 640 - 0794 MWS/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
255.9132	REINFORCING STEEL	
255.9133	CONCRETE	
255.92	LIME SLURRY HOLD TNK FOUND	
255.921	EXCAVATION WORK	
255.923	SUBSTRUCTURE CONCRETE	
255.9231	FORMWORK	
255.9232	REINFORCING STEEL	
255.9233	CONCRETE	
255.93	PH ADJUSTMENT TANK FOUND	
255.931	EXCAVATION WORK	
255.933	SUBSTRUCTURE CONCRETE	
255.9331	FORMWORK	
255.9332	REINFORCING STEEL	
255.9333	CONCRETE	
255.94	DEWATERING MACHINE FOUND	
255.941	EXCAVATION WORK	
255.9411	EXCAVATION-EARTH	
255.9414	BACKFILL-EARTH	
255.943	SUBSTRUCTURE CONCRETE	
255.9431	FORMWORK	
255.9432	REINFORCING STEEL	
255.9433	CONCRETE	
255.95	CAUSTIC + ACID TANKS FOUND	

204158

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
255.951	EXCAVATION WORK	
255.9511	EXCAVATION-EARTH	
255.9514	BACKFILL-EARTH	
255.953	SUBSTRUCTURE CONCRETE	
255.9531	FORMWORK	
255.9532	REINFORCING STEEL	
255.9533	CONCRETE	
255.96	PUMP FOUNDATIONS	
255.961	MAN WORK	
255.9611	EXCAVATION-EARTH	
255.9614	BACKFILL-EARTH	
255.963	SUBSTRUCTURE CONCRETE	
255.9631	FORMWORK	
255.9632	REINFORCING STEEL	
255.9633	CONCRETE	
255.9634	EMBEDDED STEEL	
255.97	BATCH WASTE TNK BLOW FOUND	
255.971	EXCAVATION WORK	
255.9711	EXCAVATION-EARTH	
255.9714	BACKFILL-EARTH	
255.973	SUBSTRUCTURE CONCRETE	
255.9731	FORMWORK	
255.9732	REINFORCING STEEL	

704159

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
255.9733	CONCRETE	
255.98	REGENERAT WASTE TANK FOUND	
255.981	EXCAVATION WORK	
255.9811	EXCAVATION-EARTH	
255.9814	BACKFILL-EARTH	
255.983	SUBSTRUCTURE CONCRETE	
255.9831	FORMWORK	
255.9832	REINFORCING STEEL	
255.9833	CONCRETE	
255.99	BATCH WST TRANS PUMP FOUND	
255.991	EXCAVATION WORK	
255.9911	EXCAVATION-EARTH	
255.9914	BACKFILL-EARTH	
255.993	SUBSTRUCTURE CONCRETE	
255.9931	FORMWORK	
255.9932	REINFORCING STEEL	
255.9933	CONCRETE	
26 .	MAIN COND HEAT REJECT SYS	
261.	STRUCTURES	
261.1	MAKEUP WTR INT + DISCH STR	
261.11	INTAKE STRUCTURE	
261.111	EXCAVATION WORK	
261.1111	EARTH EXCAVATION	

204170

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
261.1112	ROCK EXCAVATION	
261.1113	SHEETING (TEMP COFFERDAM)	
261.1114	STRCT STL (TEMP COFFERDAM)	
261.1115	PUMPING	
261.112	BEARING PILES (STEEL)	
261.113	SUBSTRUCTURE CONCRETE	
261.1131	FORMWORK	
261.1132	REINFORCING STEEL	
261.1133	CONCRETE	
261.1134	EMBEDDED STEEL	
261.1135	CONCRETE FINISH	
261.1136	WATERPROOFING	
261.1137	CONSTRUCTION JOINTS	
261.1138	RUBBING CONCRETE SURFACES	
261.114	SUPERSTRUCTURE	
261.1141	CONCRETE WORK	
261.1142	STRUCTURAL + MISC. STEEL	
261.11421	STRUCTURAL STEEL	
261.11422	GRATING (GALV)	
261.11423	HANDRAIL	
261.1143	EXTERIOR WALLS	
261.11431	CONCRETE	
261.11432	MASONRY	

20114

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
261.1144	ROOF DECK	
261.11441	METAL ROOF DECK	
261.1145	ROOFING + FLASHING	
261.11451	B.U. ROOFG, INSULTN, + FLA	
261.1146	INTERIOR WALLS	
261.11461	CONCRETE WALLS	
261.11462	MASONRY WALLS	
261.11463	PARTITIONS	
261.1147	DOORS + WINDOWS	
261.11471	ROLLING STEEL DOORS	
261.11472	PERSONNEL DOORS	
261.11473	SASH + GLAZING	
261.1149	PAINTING	
261.11491	CONCRETE	
261.11492	STEELWORK	
261.11493	METAL DECK	
261.11494	HANDRAIL	
261.117	BULKHEAD	
261.1171	STEEL SHEETING	
261.1172	STRUCTURAL STEEL	
261.1173	GRAVEL FILL	
261.1174	DREDGING	
261.1175	RIP-RAP (12 IN. THICK)	

261.1170

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
261.1176	CHAIN LINK FENCE(7FT HIGH)	
261.118	PROTECTIVE DOLPHINS	
261.1181	WOOD PILES	
261.119	BUILDING SERVICES	
261.1191	FLOOR DRAINS + PIPING	
261.1192	HEATING + VENTILATING	
261.11921	AXIAL WALL FANS	
261.11922	ELECTRIC UNIT HEATERS	
261.11928	INSTRUMENTATION + CONTROL	
261.12	DISCHARGE STRUCTURE	
261.121	EXCAVATION WORK	
261.1211	EARTH EXCAVATION	
261.1212	BACKFILL	
261.1213	DREDGING	
261.122	BEARING PILES (STEEL)	
261.127	RIP-RAP (12 IN. THICK)	
261.128	MARKER PILES (WOOD)	
261.2	CIRC WATER PUMP HOUSE	
261.21	BUILDING STRUCTURE	
261.211	EXCAVATION WORK	
261.2111	EARTH EXCAVATION	
261.2112	ROCK EXCAVATION	
261.2113	CONCRETE FILL	

201173

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
261.2114	BACKFILL	
261.2115	PUMPING	
261.213	SUBSTRUCTURE CONCRETE	
261.2131	FORMWORK	
261.2132	REINFORCING STEEL	
261.2133	CONCRETE	
261.2134	EMBEDDED STEEL	
261.2135	FLOOR FINISH	
261.2136	WATERPROOFING	
261.2137	CONSTRUCTION JOINTS	
261.2138	RUBBING CONCRETE SURFACES	
261.2139	WIRE FABRIC	
261.214	SUPERSTRUCTURE	
261.2141	CONCRETE WORK	
261.21411	FORMWORK	
261.214111	FORMWORK-WOOD	
261.214112	FORMWORK-METAL	
261.21412	REINF. STEEL	
261.21413	CONCRETE	
261.21414	EMBEDDED STEEL	
261.21415	FLOOR FINISH	
261.21416	WATERPROOFING	
261.21417	RUBBING CONCRETE SURFACES	

201174

EQUIPM * LIST - REPORT 1

09/16/77

MODEL 640 - G794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
261.21418	CONSTRUCTION JOINTS	
261.2142	STRUCT + MISC. STEEL	
261.21421	STRUCT. STEEL	
261.21423	MISC. FRAMES, ETC.	
261.21425	FLOOR GRATING (GALV.)	
261.21426	STAIR TREADS	
261.21427	HANDRAILS	
261.2143	EXTERIOR WALLS	
261.21431	CONCRETE WALLS	
261.21432	METAL SIDING(INSULATED)	
261.2144	ROOF DECK	
261.21441	METAL ROOF DECK	
261.2145	ROOFING + FLASHING	
261.21451	B.U. ROOFING, FLASHING+INS	
261.2146	INTERIOR WALLS + PARTIT.	
261.21461	CONCRETE WALLS	
261.21462	MASONRY WALLS	
261.21463	PARTITIONS	
261.2147	DOORS + WINDOWS	
261.21471	ROLLING STEEL DOORS	
261.21472	PERSONNEL DOORS	
261.21473	SASH + GLAZING	
261.2149	PAINTING	

704175

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
261.21491	CONCRETE	
261.21492	STEELWORK	
261.21493	METAL DECK	
261.21494	HANDRAIL	
261.22	BUILDING SERVICE	
261.221	PLUMBING + DRAINS	
261.2211	ROOF DRAINS & PIPING	
261.22111	DRAINS	
261.22115	PIPING (ALL 2.5 IN + LGR)	
261.221151	GALV STEEL/NNS	
261.2212	FLOOR DRAINS & PIPING	
261.22121	DRAINS	
261.22125	PIPING (ALL 2.5 IN + LGR)	
261.221251	CI/NNS	
261.221252	PVC/NNS	
261.222	HEATING, VENT, + AIR COND	
261.2221	ROTATING MACHINERY	
261.22211	PROPELLER FAN + MOTOR	
261.222111	PROPELLER FAN	
261.222112	PROPELLER FAN MOTOR	
261.2222	HEAT TRANSFER EQUIPMENT	
261.22221	ELECTRIC UNIT HEATERS+MTR	
261.222211	ELECTRIC UNIT HEATERS	

204176

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - CGST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
261.222212	ELECTRIC UNIT HTR MOTORS	
261.2226	VALVES + DAMPERS	
261.22269	SPECIAL VALVES + DAMPERS	
261.222691	INTAKE LOUVERS	
261.224	LIGHTING & SERVICE POWER	
261.228	INSTRUMENTATION + CONTROL	
261.3	MAKEUP WTR PRETREATMNT BLDG	
261.31	BUILDING STRUCTURE	
261.311	EXCAVATION WORK	
261.3111	EARTH EXCAVATION	
261.3112	ROCK EXCAVATION	
261.3113	CONCRETE FILL	
261.3114	FILL + BACKFILL	
261.3115	DEWATERING	
261.313	SUBSTRUCTURE CONCRETE	
261.3131	FORMWORK	
261.3132	REINFORCING STEEL	
261.3133	CONCRETE	
261.3134	EMBEDDED STEEL	
261.3135	FLOOR FINISH	
261.3136	WATERPROOFING	
261.3137	CONSTRUCTION JOINTS	
261.3138	RUBBING CONCRETE SURFACES	

204177

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
261.314	SUPERSTRUCTURE	
261.3141	CONCRETE WORK	
261.31411	FORMWORK	
261.314111	FORMWORK-WOOD	
261.314112	FORMWORK-METAL	
261.31412	REINFORCING STEEL	
261.31413	CONCRETE	
261.31414	EMBEDDED STEEL	
261.31415	FLOOR FINISH	
261.31416	WATERPROOFING	
261.31417	RUBBING CONCRETE SURFACES	
261.31418	CONSTRUCTION JOINTS	
261.3142	STRUCTURAL + MISC STEEL	
261.31421	STRUCTURAL STEEL	
261.31423	MISCELLANEOUS FRAMES,ETC.	
261.31425	FLOOR GRATING (GALV.)	
261.31426	STAIR TREADS	
261.31427	HANDRAIL	
261.3143	EXTERIOR WALLS	
261.31431	CONCRETE WALLS	
261.31432	MASONRY WALLS	
261.31433	METAL INSULATED SIDING	
261.31434	WINDOW WALL	

201178

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
261.3144	ROOF DECK	
261.31441	METAL ROOF DECK	
261.31442	PRECAST CONCRETE PANELS	
261.31443	CONCRETE FILL	
261.31444	REINFORCING STEEL	
261.3145	ROOFING + FLASHING	
261.31451	B.U. ROOFING+INSUL.+FLASH.	
261.31452	B.U. ROOF+FLASH(NO INSUL)	
261.3146	INTERIOR WALLS + PARTITION	
261.31461	CONCRETE WALLS	
261.31462	CONCRETE BLOCK	
261.31463	METAL PARTITIONS	
261.31464	PLASTER BD PARTITIONS	
261.3147	DOORS + WINDOWS	
261.31471	ROOFING STEEL DOORS	
261.31472	PERSONNEL DOORS	
261.31473	SASH + GLAZING	
261.3148	WALLS+FLOORS+CEILG FINISHS	
261.3149	PAINTING	
261.31491	CONCRETE	
261.31492	STEELWORK	
261.31493	METAL DECK	
261.31494	SPECIAL METALLIC PAINT	

201179

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
261.31495	HANDRAIL	
261.31496	EPOXY	
261.32	BUILDING SERVICES	
261.321	PLUMBING + DRAINS	
261.3211	ROOF DRAINS + PIPING	
261.32111	DRAINS	
261.32115	PIPING (ALL 2.5 IN+LARGER)	
261.321151	GALV STEEL/NNS	
261.3212	FLOOR DRAINS + PIPING	
261.32121	DRAINS	
261.32125	PIPING (ALL 2.5 IN+LARGER)	
261.321251	CS/NNS	
261.321252	CI/NNS	
261.322	HEATING, VENT, + AIR COND	
261.3221	ROTATING MACHINERY	
261.32211	ROOF VENTILATORS + MOTORS	
261.322111	ROOF VENTILATORS	
261.322112	ROOF VENTILATORS MOTORS	
261.3222	HEAT TRANSFER EQUIPMENT	
261.32221	ELECTRIC UNIT HEATER+MOTOR	
261.322211	ELECTRIC UNIT HEATER	
261.322212	ELECTRIC UNIT HEATER+MOTOR	
261.3226	VALVES + DAMPERS	

704180

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
261.32269	SPECIAL	
261.322691	INTAKE LOUVERS	
261.3228	INSTRUMENTATION + CONTROL	
261.324	LIGHTING + SERVICE POWER	
261.4	CHLORINATION BUILDING	
261.41	BUILDING STRUCTURE	
261.411	EXCAVATION WORK	
261.4111	EARTH EXCAVATION	
261.4114	BACKFILL	
261.413	SUBSTRUCTURE CONCRETE	
261.4131	FORMWORK	
261.4132	REINF. STEEL	
261.4133	CONCRETE	
261.4134	EMBEDDED STEEL	
261.4135	FLOOR FINISH	
261.4136	WATERPROOFING	
261.4137	CONSTRUCTION JOINTS	
261.4138	RUBBING CONCRETE SURFACES	
261.4139	WIRE FABRIC	
261.414	SUPERSTRUCTURE	
261.4141	CONCRETE WORK	
261.4142	STRUCT. + MISC. STEEL	
261.41421	STRUCT. STEEL	

204181

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
261.41423	MISC. FRAMES, ETC.	
261.4143	EXTERIOR WALLS	
261.41432	MASONRY	
261.4144	ROOF DECK	
261.41441	METAL ROOF DECK	
261.4145	ROOFING + FLASHING	
261.41451	B.U. ROOFING, FLASHING + INSUL	
261.4147	DOORS + WINDOWS	
261.41472	PERSONNEL DOORS	
261.41473	SASH + GLAZING	
261.4149	PAINTING	
261.41492	STEELWORK	
261.41493	METAL DECK	
261.424	LIGHTING + SERVICE POWER	
262.	MECHANICAL EQUIPMENT	
262.1	HEAT REJECTION SYSTEM	
262.11	WATER INTAKE EQUIPMENT	
262.111	ROTATING MACHINERY	
262.1111	SCREEN WASH PUMP + MOTOR	
262.11111	SCREEN WASH PUMP	
262.11112	SCREEN WASH PUMP MOTOR	
262.114	PURIFICATION + FILTRATION EQ	
262.1141	TRAVELING SCREENS	

004488

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
262.1142	TRASH RACK	
262.1143	TRASH RAKE	
262.1144	STOP LOGS	
262.1145	SCREEN WASH STRAINER	
262.115	PIPING-SCREEN WASH	
262.1151	2 IN. + SMALLER	
262.1152	2.5 IN. + LARGER	
262.11521	CS/VNS	
262.116	VALVES-SCREEN WASH	
262.1162	CHECK	
262.1166	BUTTERFLY	
262.117	PIPING-MISC ITEMS	
262.1171	HANGERS + SUPPORTS	
262.1172	INSULATION	
262.1173	SPECIALTIES	
262.12	CIRCULATING WATER SYSTEM	
262.121	ROTATING MACHINERY	
262.1211	CIRCULATING WATER PUMP+MTR	
262.12111	CIRC WATER PUMP	
262.12112	CIRC WATER PUMP MOTOR	
262.125	PIPE	
262.1251	2 IN + SMALLER	
262.1252	2.5 IN + LARGER	

704183

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
262.12521	CONCRETE/NNS	
262.12522	CS/NNS	
262.126	VALVES	
262.1266	BUTTERFLY	
262.127	PIPING / MISC. ITEMS	
262.1271	HANGERS + SUPPORTS	
262.1272	INSULATION	
262.1273	SPECIALTIES	
262.1274	PIPE TRENCHING	
262.12741	EXCAVATION	
262.127411	EARTH EXCAVATION	
262.127412	ROCK EXCAVATION	
262.12742	BACKFILL	
262.12743	COMPACTED SAND BED	
262.12744	SUBSTRUCTURE CONCRETE	
262.127441	FORMWORK	
262.127442	REINF STEEL	
262.127443	CONCRETE	
262.128	INSTRUMENTATION + CONTROL	
262.129	SKIDS / FOUNDATIONS	
262.1291	CHLORINATION SYSTEM	
262.1292	SULPHURIC ACID FEED SYSTEM	
262.12921	ROTATING MACHINERY	

704184

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
262.129211	SULFURIC ACID FEED PUMP+MT	
262.129212	SULF ACID FEED PUMP MOTOR	
262.12923	TANKS AND PRESSURE VESSELS	
262.12925	PIPING	
262.129251	2 IN + SMALLER-CS/NNS	
262.129252	2.5 IN + LARGER	
262.12926	VALVES	
262.13	COOLING TOWERS	
262.132	HEAT XFER EQUIPMENT	
262.1321	COOLING TOWERS(CT)-MAIN	
262.138	INSTRUMENTATION + CONTROL	
262.15	MAIN CT. MAKEUP+BLOWDN SYS.	
262.151	MAKE-UP WATER SYSTEM	
262.1511	ROTATING MACHINERY	
262.15111	MAKE-UP PUMP + MOTOR	
262.151111	MAKE-UP PUMP	
262.151112	MAKE-UP PUMP MOTOR	
262.1515	PIPING	
262.15151	2IN.+ SMALLER	
262.15152	2.5IN + LARGER	
262.151521	CONCRETE/NNS	
262.1516	VALVES	
262.15162	CHECK VALVES	

204185

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/75

ACCOUNT NUMBER	ITEM	DESCRIPTION
262.15163	GLOBE VALVES	
262.15166	BUTTERFLY VALVES	
262.1517	PIPING - MISC. ITEMS	
262.15171	HANGERS + SUPPORTS	
262.15172	INSULATION	
262.15173	SPECIALTIES	
262.15174	PIPE TRENCHING	
262.151741	EXCAVATION	
262.151742	BACKFILL	
262.151743	COMPACTED SAND BED	
262.1518	INSTRUMENTATION + CONTROL	
262.152	BLOWDN SYSTEM	
262.1525	PIPING	
262.15251	2 IN. + SMALLER	
262.15252	2.5 IN. + LARGER	
262.152521	CONCRETE/NNS	
262.1526	VALVES	
262.15266	BUTTERFLY	
262.1527	PIPING-MISC ITEMS	
262.15271	HANGERS + SUPPORTS	
262.15272	INSULATION	
262.15273	SPECIALTIES	
262.15274	PIPE TRENCHING	

704186

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN, USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
262.1528	INSTRUMENTATION & CONTROL	
262.153	MAKEUP WTR PRETREATMNT SYS	
91	CONSTRUCTION SERVICES	
911.	TEMPORARY CONSTRUCTION FAC	
911.1	TEMPORARY BUILDINGS	
911.11	FIELD OFFICE, SHOPS, WHSE.	
911.12	JANITOR SERVICES	
911.13	GUARDS - SECURITY	
911.2	TEMPORARY FACILITIES	
911.21	ROADS, PARKING, LAYDOWN AREA	
911.22	TEMPORARY ELECTRICAL SUCE	
911.23	TEMPORARY MECH. & PIPING	
911.24	TEMPORARY HEAT	
911.25	BARGE UNLOAD, FAC. - NONE	
911.26	GENERAL CLEANUP	
911.27	SNOW REMOVAL-INCL. IN 911.21	
912.	CONSTRUCTION TOOLS & EQUIP	
912.1	MAJOR EQUIPMENT	
912.11	PURCHASE MAJOR EQUIPMENT	
912.12	RENTAL INCL. IN 912.11	
912.13	EQUIPMENT MAINTENANCE	
912.14	FUEL + LUBRICANTS	
912.2	MISCELLANEOUS VEHICLES	

204187

EQUIPMENT LIST - REPORT 1

09/16/76

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
912.21	PURCHASE INCL. IN 912.11	
912.22	RENTAL-INCL. IN 912.12	
912.23	MAINTENANCE-INCL. IN 912.13	
912.24	FUEL&LUB.-INCL. IN 912.14	
912.3	PURCHASE OF SMALL TOOLS	
912.4	EXPENDABLE SUPPLIES	
913.	PAYROLL INSURANCE & TAXES	
913.1	SOCIAL SECUR. TAX .055 X L	
913.2	STATE+FED.UNEMPLOY.035 X L	
913.3	WORKMENS COMP.INS .040 X L	
913.4	P.L.+P.D. INS. .005 X L	
914.	PERMITS,INS. & LOCAL TAXES	
914.1	BUILDERS ALL RISK INS	
914.2	FEES & PERMITS	
914.3	STATE & LOCAL SALES TAXES	
915.	TRANSPORTATION	
92 .	HOME OFFICE ENGRG.&SERVICE	
921.	HOME OFFICE SERVICES	
921.1	SALARIES	
921.11	ENGINEERING AND DESIGN	
921.13	PURCHASING & EXPEDITING	
921.14	ESTIMATING & COST CONTROL	
921.16	PLANNING AND SCHEDULING	

004158

EQUIPMENT LIST - REPORT 1

09/16/77

MODEL 640 - 0794 MWE/2200 MWT COAL - 2.5/1.7 IN HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/76

ACCOUNT NUMBER	ITEM	DESCRIPTION
921.17	REPRODUCTION	
921.2	EXPENSES -	
921.3	DIRECT PAYROLL COST	
921.4	OVERHEAD LOADING	
921.5	OUTSIDE CONSULTANTS SVCS.	
921.6	FEE FOR H/O SERVICES	
922.	HOME OFFICE Q/A	
923.	HOME OFFICE CONSTRCTN MGMT	
923.1	SALARIES	
923.2	DIRECT PAYROLL COST	
923.3	OVERHEAD LOADING	
923.4	EXPENSES	
93 .	FIELD OFFICE ENGRG&SERVICE	
931.	FIELD OFFICE EXPENSES	
931.1	OFFICE FURNITURE & EQUIP.	
931.2	TELEPHONE & COMMUNICATIONS	
931.3	OFFICE SUPPLIES	
931.4	FIRST AID & MEDICAL EXP.	
932.	FIELD JOB SUPERVISION	
932.1	SALARIES	
932.3	DIRECT PAYROLL COST	
932.4	OVERHEAD LOADING	
932.5	RELOCATION EXPENSE-ALLWNC	

704189

09/16/77

UNITED ENGINEERS & CONSTRUCTORS INC.

PROJ. CM-711 *PE6030*

EQUIPMENT LIST - REPORT 1

MODEL 640 - 0794 MWE/2200 HWT COAL - 2.5/1.7 1/2 HG AV - MIDDLETOWN,USA - HIGH SULFUR - COST BASIS 07/71

ACCOUNT NUMBER	ITEM	DESCRIPTION
932.6	FEE FOR CONSTR SRVCS	
932.61	HOME OFFICE	
932.62	FIELD	
933.	FIELD QA/QC	
933.1	SALARIES	
933.2	DIRECT PAYROLL COST	
933.3	OVERHEAD LOADING	
933.4	EXPENSES	
934.	PLANT STARTUP & TEST	
934.1	SALARIES	
934.2	DIRECT PAYROLL COST	
934.3	OVERHEAD LOADING	
934.4	EXPENSES	

704150

SECTION 12
SITE DESCRIPTION

704151

POOR
ORIGINAL

SECTION 12

SITE DESCRIPTION

12.1 GENERAL

This section provides the site and environmental data as derived from Appendix A of "Guide for Economic Evaluation of Nuclear Reactor Plant Designs", USAEC Report NUS-531, and modified to reflect Coal Plant Siting. These data form the bases of the criteria used for designing the facility and for evaluating the release of liquids and gases to the environment.

12.2 TOPOGRAPHY AND GENERAL SITE CHARACTERISTICS

The site is located on the east bank of the North River at a distance of approximately twenty-five miles south of Middletown, the nearest large city. The North River flows from north to south and is one-half mile (2600 ft) wide adjacent to the plant site. A flood plain extends from both river banks an average distance of one-half mile, ending with hilltops generally 150 to 250 ft above the river level. Beyond this area, the topography is gently rolling, with no major critical topographical features. The plant site itself extends from river level to elevations to 50 ft above river level. The primary structures and the switchyard are located on level ground at an elevation of 18 ft above the mean river level. This elevation is ten feet above the 100 year maximum river level, according to U. S. Army Corps of Engineers studies of the area.

In order to optimize land area requirements for the coal fueled plant site, maximum use of the river location is employed. The primary structure

is located 1200 ft from the east bank of the river. The site land area is approximately 500 acres. An additional 2,000 acres, approximately six miles from the plant site, are available for solid waste disposal.

12.3 SITE ACCESS

Highway access is provided to the hypothetical site by five miles of secondary road connecting to a State highway. This road is in good condition and needs no additional improvements. Railroad access is provided by constructing a railroad spur which intersects the B&M Railroad. The length of the required spur from the main line to the plant site is assumed to be five miles in length. The North River is navigable throughout the year with a 40 ft wide by 12 ft deep channel. The distance from the shoreline to the center of the ship channel is 2,000 ft. All plant shipments are assumed to be made overland except that heavy equipment may be transported by barge. The Middletown Municipal Airport is located three miles west of the State highway, 15 miles south of Middletown, and ten miles north of the site.

12.4 POPULATION DENSITY AND LAND USE

The hypothetical site is near a large city (Middletown, of 250,000 population) but in an area of low population density. Variation in population with distance from the site boundary is:

704193

<u>Miles</u>	<u>Cumulative Population</u>
0.5	0
1.0	310
2.0	1,370
5.0	5,020
10.0	28,600
20.0	133,000
30.0	1,010,000

There are five industrial manufacturing plants within 15 miles of the hypothetical site. Four are small plants employing less than 100 people each. The fifth, near the airport, employs 2,500 people. Closely populated areas are found only in the centers of the small towns, so the total land area used for housing is small. The remaining land, including that across the river, is used as forest or cultivated crop land, except for railroads and highways.

12.5 NEARBY FACILITIES

Utilities are available as follows:

- o Natural gas service is available two miles from the site boundary on the same side of the river
- o Communication lines will be furnished to the project boundaries at no cost
- o Power and water for construction activities are available at the southwest corner of the site boundary
- o Two connections to the utility grid (one at 500 kv for the generator connection and one at 230 kv for the reserve auxiliary transformer connection) are available at the switchyard.

704194

12.6 METEOROLOGY AND CLIMATOLOGY

12.6.1 Ambient Temperatures

The winters in the Middletown area are moderately cold, with average temperatures in the low 30's. The summers are fairly humid with average temperatures in the low 70's, and with high temperatures averaging around 82 F. The historic maximum wet bulb and dry bulb temperatures are 78 F and 99 F respectively.

The year-round temperature duration curves for the dry bulb temperatures and coincident wet bulb temperatures are shown in Figure 12-1.

6.6.2 Prevailing Wind

According to Weather Bureau records at the Middletown Airport, located ten miles North of the site on a low plateau just east of the North River, surface winds are predominantly southwesterly 4-10 knots during the warm months of the year, and westerly 6-13 knots during the cool months.

There are no large diurnal variations in wind speed or direction. Observations of wind velocities at altitudes indicate a gradual increase in mean velocity and a gradual veering of the prevailing wind direction from southwest and west near the surface to westerly and northwesterly aloft.

In addition to the above, studies of the area indicate that there is a significant channeling of the winds below the surrounding hills into the north-south orientation of the North River. It is estimated that these winds within the river valley blow approximately parallel to the valley orientation in excess of 50 percent of the time.

12.6.3 Atmospheric Diffusion Properties

The transport and dilution of materials in the form of aerosols, vapors, or gases released into the atmosphere from the Middletown coal power station are a function of the state of the atmosphere along the plume path, the topography of the region, and the characteristics of the effluents themselves. For a routine airborne release, the concentration of materials in the surrounding region depends on the amount of effluent released, the height of the release, the windspeed, atmospheric stability, and airflow patterns of the site, and various effluent removal mechanisms. Geographic features such as hills and valleys influence diffusion and airflow patterns. Of the diffusion models that have been developed, the straight line trajectory model is utilized to calculate the atmospheric diffusion from the Middletown site.

The straight-line trajectory model assumes that the airflow transports and diffuses effluents along a straight line through the entire region of interest in the airflow direction at the release point. The version of this model which is used is the Gaussian straight-line trajectory model. In this model, the windspeed and atmospheric stability at the release point are assumed to determine the atmospheric diffusion characteristics in the direction of airflow.

12.6.4 Severe Meteorological Phenomena

A maximum instantaneous wind velocity of 100 mph has been recorded at the site. During the past 50 years, three tropical storms, all of them in

the final dissipation stages, have passed within 50 miles of the site. Some heavy precipitation and winds in excess of 40 miles/hr were recorded, but no significant damage other than to crops resulted.

The area near the site experiences an average of 35 thunderstorms a year, with maximum frequency in early summer. High winds near 60 mph, heavy precipitation, and hail are recorded about once every four years.

In forty years of record, there have been twenty tornadoes reported within fifty miles of the site. Maximum tornado frequency occurs during the months of May and June.

During the past forty years, there have been ten storms in which freezing rain has caused power transmission line disruptions. Most of these storms have occurred early in December.

12.6.5 Ambient Background Concentrations

Background concentrations of SO_2 , NO_x and particulates are typical of a rural area approximately 30 miles from a major industrial metropolitan center. They are considered when determining the plant's adherence to the guidelines.

12.6.6 Air Quality Estimation

Ambient pollutant levels are estimated through the application of atmospheric diffusion models. The estimates are based primarily upon the pollutant emissions, meteorology, topography, and background concentration as previously described. Modeling techniques described in the Turner Atmospheric Dispersion Workbook are used for concentration estimates.*

12.7 HYDROLOGY

The North River provides an adequate source of raw makeup water for the station. The average maximum temperature is 75 F and the average minimum is 39 F. The mean annual temperature is 57 F.

U.S. Army Corps of Engineers' studies indicate that the 100 year maximum flood level rose to eight feet above the mean river level. There are no dams near the site whose failure could cause the river to rise above the eight foot level.

12.8 GEOLOGY AND SEISMOLOGY

12.8.1 Soil Profiles and Load Bearing Characteristics

Soil profiles for the site show alluvial soil and rock fill to a depth of eight feet; Brassfield limestone to a depth of 30 ft; blue weathered shale and fossiliferous Richmond limestone to a depth of 50 ft; and bedrock over a depth of 50 ft. Allowable soil bearing is 6,000 psf and rock bearing characteristics are 18,000 psf and 15,000 psf for Brassfield and Richmond strata, respectively. No underground cavities exist in the limestone.

* Turner, D. B., "Workbook of Atmospheric Dispersion Estimates", Public Health Service Publication No. 999-AP-26, U.S. Department of Health, Education, and Welfare, Public Health Service, Consumer Protection and Environmental Health Service, National Air Pollution Control Administration, Cincinnati, Ohio Revised 1969.

12.8.2 Seismology

The site is located in a generally seismically inactive region. Historical records show three earthquakes have occurred in the region between 1870 and 1975.

12.9 SEWAGE AND LIQUID EFFLUENTS

All sewage receives primary and secondary treatment prior to discharge into the North River. Other wastewater is discharged in compliance with EPA effluent standards as promulgated in 40 CFR 423.

13.0 AIR EMISSIONS

Air emissions comply with EPA New Source Performance Standards as promulgated in 40 CFR 60. Discharge of SO_2 , does not exceed 1.2 lb per million Btu heat input; NO_x does not exceed 0.70 lb per million Btu heat input; and particulate does not exceed 0.1 lb per million Btu heat input.

The plant air emissions do not cause air quality levels to exceed national primary and secondary air quality standards as defined in 42 CFR 410.

704139

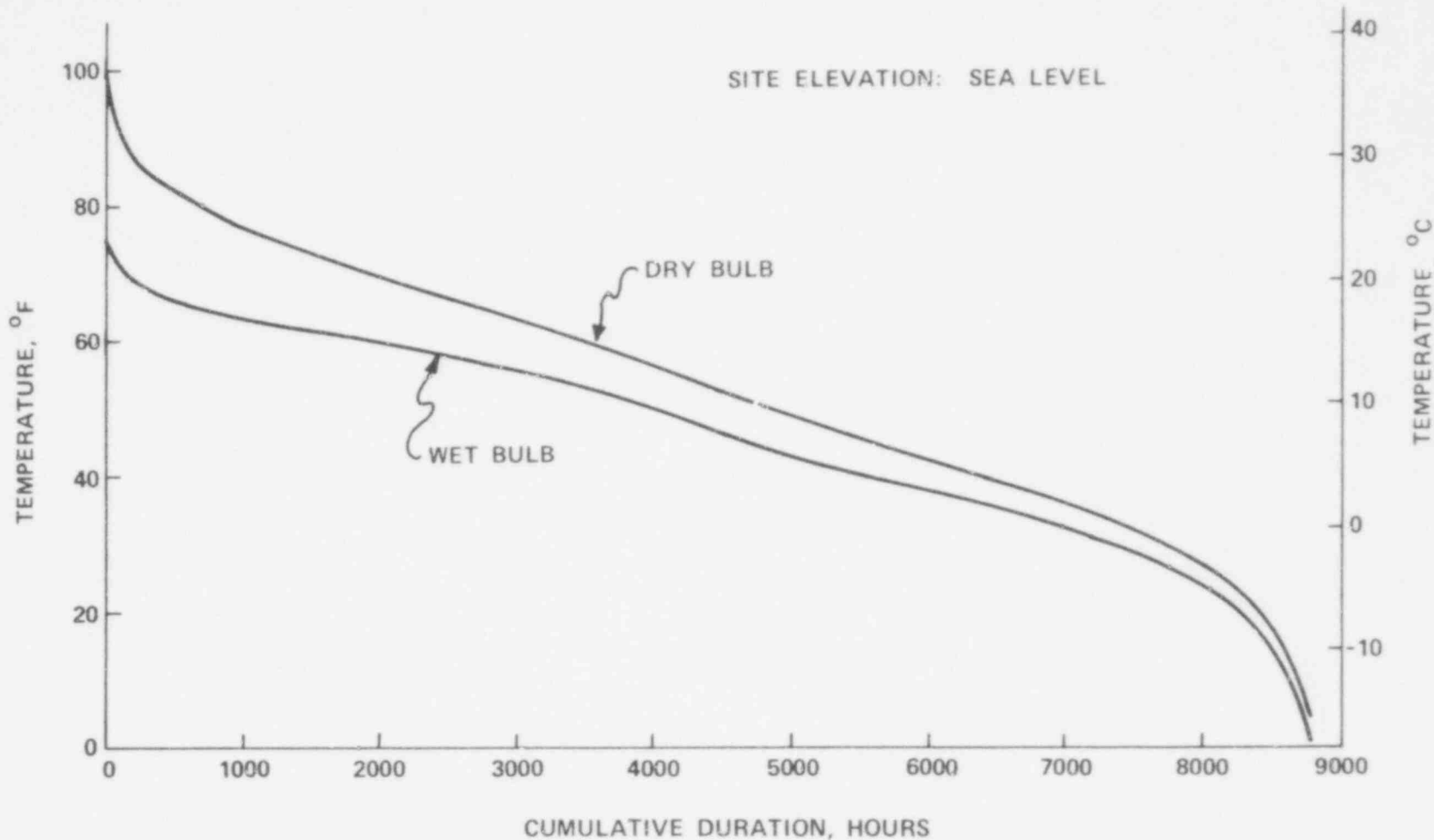


FIGURE 12-1 TEMPERATURE DURATION CURVES: MIDDLETOWN, U.S.A.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, \$300

POSTAGE AND FEES PAID
UNITED STATES NUCLEAR
REGULATORY COMMISSION



704201

7949040535