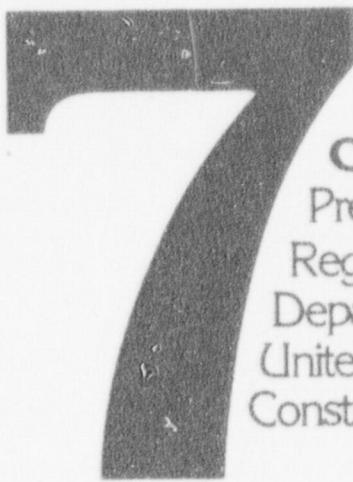


7 IN A SERIES OF 8



**Commercial Electric Power  
Cost Studies**

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

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**Cooling Systems  
Addendum:  
Capital and Total  
Generating  
Cost Studies**

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# Cooling Systems Addendum: **Capital and Total Generating Cost Studies**

## **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

September 1978

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- 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  
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
-

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COOLING SYSTEM ADDENDUM:  
CAPITAL AND TOTAL GENERATING COST STUDIES

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FOREWORD  
by the

United States Energy Research & Development Administration  
and United States Nuclear Regulatory Commission

In 1971 the Atomic Energy Commission authorized power plant investment cost studies, which culminated in the WASH-1230 reports (1000 MWe Central Station Power Plants - Investment Cost Study) published in 1972. Their purpose was to facilitate policy and economic decisions about electric generation facilities in the public and private sectors. The WASH-1230 report-series consists of five volumes: Pressurized Water Reactor, Boiling Water Reactor, Coal-Fired, Oil-Fired and High Temperature Gas-Cooled Reactor power plants. National priorities on energy, the regulatory environment and the cost of labor, equipment and material have changed significantly. These changes dictated the necessity of an update of these series of studies, and an expansion of scope to encompass consideration of the fuel cycle and the total generating cost. As a result, a program to study, reassess and produce a new set of updated reports was authorized and undertaken.

This report is one of the new series of commercial electric power cost studies that have been prepared by United Engineers & Constructors Inc. (UE&C). These studies have been completed under the cooperative direction of the Energy Research and Development Administration (ERDA), Division of Nuclear Research and Applications, and the Nuclear Regulatory Commission (NRC), Division of Site Safety and Environmental Analysis. The study effort was funded jointly by ERDA (Contract No. EY-76-C-02-2477) and NRC (Contract No. AT(49-24)-0351).

The current series includes investment cost reports for a Pressurized Water Reactor Plant, a Boiling Water Reactor Plant, High Sulfur Coal Plants, and Low Sulfur Coal Plants. The Oil Fired Power Plant Study was not updated because utilities are no longer expected to build significant numbers of these plants, and the High Temperature Gas-Cooled Reactor Plant Study was not updated because these reactors are not now being marketed. Investment cost reports on multi-unit stations and for different cooling system types are included. In addition, the series addresses fuel supply investment costs and total generating costs for both nuclear and coal-fired power plants.

Following is a list of the report titles and funding agency(ies) responsible for each:

<u>Funding Agency(ies)</u>	<u>Report Titles</u>
ERDA	Capital Cost - Pressurized Water Reactor Plant (NUREG-0241, COO-2477-5)
ERDA/NRC	Capital Cost - Boiling Water Reactor Plant (NUREG-0242, COO-2477-6)
ERDA/NRC	Capital Cost - High and Low Sulfur Coal Plants - 1200 MWe (NUREG-0243, COO-2477-7)
NRC/ERDA	Capital Cost - Low and High Sulfur Coal Plants - 800 MWe (NUREG-0244, COO-2477-8)
ERDA	Capital Cost Addendum - Multi-Unit Coal and Nuclear Stations (NUREG-0245, COO-2477-9)
NRC	Fuel Supply Investment Cost - Coal and Nuclear (NUREG-0246, COO-2477-10)
NRC	Cooling Systems Addendum - Capital and Total Generating Cost Studies (NUREG-0247, COO-2477-11)
NRC	Total Generating Costs - Coal and Nuclear Plants (NUREG-0248, COO-2477-12)

The studies in these series have a uniform set of economic and technical criteria and a uniform accounting system as contained in (Guide for Economic Evaluation of Nuclear Reactor Plant Designs, NUS-531, January 1969). The investment cost estimates in these series are developed for reference plants constructed at a hypothetical site called "Middletown, USA".

The reference investment and total generating cost estimates can be used for baseline comparisons of different generating systems. However, the major use of the investment cost data is as input to the CONCEPT computer code which was developed for ERDA at the Oak Ridge National Laboratory (ORNL). The CONCEPT computer program adjusts the baseline cost estimates contained in these studies for different plant sizes, regional variations in material and craft labor rates, different construction schedule lengths, and different escalation and interest rates. These adjustments result in preliminary sets of alternative cost estimates for electric power plants constructed anywhere in the United States.

## PREFACE

The capital cost of the six commercial electric power plants in this series of studies, utilized mechanical draft evaporative cooling tower systems for condenser heat removal. This cooling system addendum to these studies present the costs and design descriptions of alternate cooling systems.

The baseline construction costs for the plants with alternate cooling system costs are summarized in Section 1.

The design description and cost estimates contained in Section 2 is divided into seven parts. The first part presents data on the alternate cooling systems designed for use with the 1200 MWe Pressurized Water Reactor Plant (PWR). The next five parts present similiar information for the 1200 MWe Boiling Water Reactor Plant, (BWR), the 1200 MWe High and Low Sulfur Coal Plants, and the 800 MWe Low and High Sulfur Coal Plants, respectively. The seventh part contains an expansion of cost estimates for Accounts 23 Turbine Plant Equipment; and Account 24, Electric Plant Equipment for the three alternate types of cooling tower systems: Once-Through Cooling, Fan-Assisted Natural Draft and Natural Draft, respectively, used with the aforementioned PWR, BWR and coal-fired plants.

Section 3 describes an example and procedure for using the data presented in these studies, in conjunction with Total Generating Costs: Coal and Nuclear Plants (NUREG-0248, COO-2477-12), to develop total generating costs for the plants that incorporate these alternate cooling systems.

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SECTION 1

SUMMARY

SECTION 1  
SUMMARY

1.1 INTRODUCTION

These studies present the capital and total generating costs for alternate cooling systems designed for the six power plants:

1. 1200 MWe, Pressurized Water Reactor Plants
2. 1200 MWe, Boiling Water Reactor Plants
3. 1200 MWe, High Sulfur Coal-Fired plants
4. 1200 MWe, Low Sulfur Coal-Fired plants
5. 800 MWe, Low Sulfur Coal-Fired plants
6. 800 MWe, High Sulfur Coal-Fired plants

In these base capital cost studies, as referenced in subsection 2.9 all of the plants are designed using mechanical draft evaporative towers.

Alternate cooling systems evaluated and presented in this report include:

- a. Once-Through
- b. Fan-Assisted Natural Draft Towers
- c. Natural Draft Towers

These alternate cooling systems represent viable designs from both an economic and engineering standpoint. Other condenser cooling systems, including dry towers, wet-dry tower, cooling ponds and spray ponds, are not included in these studies. Dry and wet dry cooling towers have seen little use due to the large land requirements and high cost associated

with these systems. Typically, the use of dry and wet dry cooling towers are utilized only when water availability prohibit the use of the evaporative systems. Cooling ponds and spray ponds typically have large land requirements, and are cost-effective only when the site is conducive to their use.

## 1.2 COST SUMMARY

The estimated total base construction costs for the six plants incorporating the alternate cooling systems, are summarized in Table 1-1. The capital cost and fuel cost multipliers are presented in Table 1-2. These multipliers are given for all six plants incorporating the alternate cooling systems. Capital cost and fuel cost vary with each cooling system as compared to the base case: i.e., Mechanical Draft Evaporative Towers. An example illustrating the method of using the multipliers is shown in subsection 3.2. These cost estimates do not include the normal contingency costs for the equipment, material and labor components of the total base construction cost; nor do they include escalation and interest during construction.

The once-through cooling systems have the lowest capital cost of the alternate systems evaluated. In addition, a larger plant output is realized due to the lower operating turbine back pressure and lower auxiliary requirements. Lack of suitable sites to supply the large amount of water for the once-through cooling system preclude future wide spread use.

All of the cooling tower systems were designed at the same design temperatures. Differences in the total base construction costs for the alternate cooling tower systems are small. However, operating difference at off-design ambient temperatures, especially in the case of the natural draft system, result in different generator outputs at the average yearly ambient condition.

Figure 1-1, contained in this section, illustrates the year-around temperature duration curves for the dry bulb temperature and coincident wet bulb temperatures. The winters in the hypothetical Middletown site are moderately cold, with an average temperature in the low 30's. The summers are fairly humid with average temperatures in the low 70's, and with high temperatures averaging around 82F. The historic maximum wet bulb and dry bulb temperatures are 78F and 99F respectively.

Electrical outputs at the yearly average ambient temperature, in MWe, as well as other pertinent data for all cooling systems evaluated are presented on Tables 3-1 thru 3-6.

As noted in the Foreword, for each specific site, these baseline cost estimates must be adjusted for regional variations in material and labor rates, different construction schedule lengths, including escalation and interest rates incurred during construction.

TABLE 1-1

TOTAL BASE CONSTRUCTION COST  
INCORPORATING ALTERNATE COOLING SYSTEM  
(\$10<sup>6</sup>)

	<u>Base Case<sup>(1)</sup></u>	<u>Once-Through</u>	<u>Natural Draft</u>	<u>Fan-Assisted Natural Draft</u>
1200 MWe Pressurized Water Reactor Plant	568.8	554.9	569.7	569.2
1200 MWe Boiling Water Reactor Plant	582.7	568.4	583.0	583.3
1200 MWe High Sulfur Coal Plant	465.5	453.5	467.4	467.0
1200 MWe Low Sulfur Coal Plant	402.8	390.8	404.7	404.3
800 MWe Low Sulfur Coal Plant	287.4	278.4	289.4	287.4
800 MWe High Sulfur Coal Plant	335.2	326.2	337.3	335.3

(1) Mechanical Draft Evaporative Towers

TABLE 1-2  
TOTAL GENERATING COST MULTIPLIERS FOR ALTERNATE COOLING SYSTEMS

	<u>Base Case (1)</u>	<u>Once-Through</u>	<u>Natural Draft</u>	<u>Fan-Assisted Natural Draft</u>
1200 MWe Pressurized Water Reactor Plant				
Capital Cost Multiplier	Base	0.957	0.993	1.000
Fuel Cost Multiplier	Base	0.981	0.991	0.999
Operating and Maintenance Multiplier	Base	0.981	0.991	0.999
1200 MWe Boiling Water Reactor Plant				
Capital Cost Multiplier	Base	0.956	0.992	0.999
Fuel Cost Multiplier	Base	0.980	0.992	0.998
Operating and Maintenance Multiplier	Base	0.980	0.992	0.998
1200 MWe High Sulfur Coal Plant				
Capital Cost Multiplier	Base	0.959	0.997	1.002
Fuel Cost Multiplier	Base	0.984	0.993	1.000
Operating and Maintenance Multiplier	Base	0.984	0.993	1.000
1200 MWe Low Sulfur Coal Plant				
Capital Cost Multiplier	Base	0.956	0.997	1.003
Fuel Cost Multiplier	Base	0.985	0.993	0.999
Operating and Maintenance Multiplier	Base	0.985	0.999	0.999
800 MWe High Sulfur Coal Plant				
Capital Cost Multiplier	Base	0.962	1.001	1.000
Fuel Cost Multiplier	Base	0.989	0.995	1.000
Operating and Maintenance Multiplier	Base	0.989	0.995	1.000
800 MWe Low Sulfur Coal Plant				
Capital Cost Multiplier	Base	0.958	1.002	1.000
Fuel Cost Multiplier	Base	0.989	0.995	1.000
Operating and Maintenance Multiplier	Base	0.989	0.995	1.000

(1) Mechanical Draft Evaporative Towers

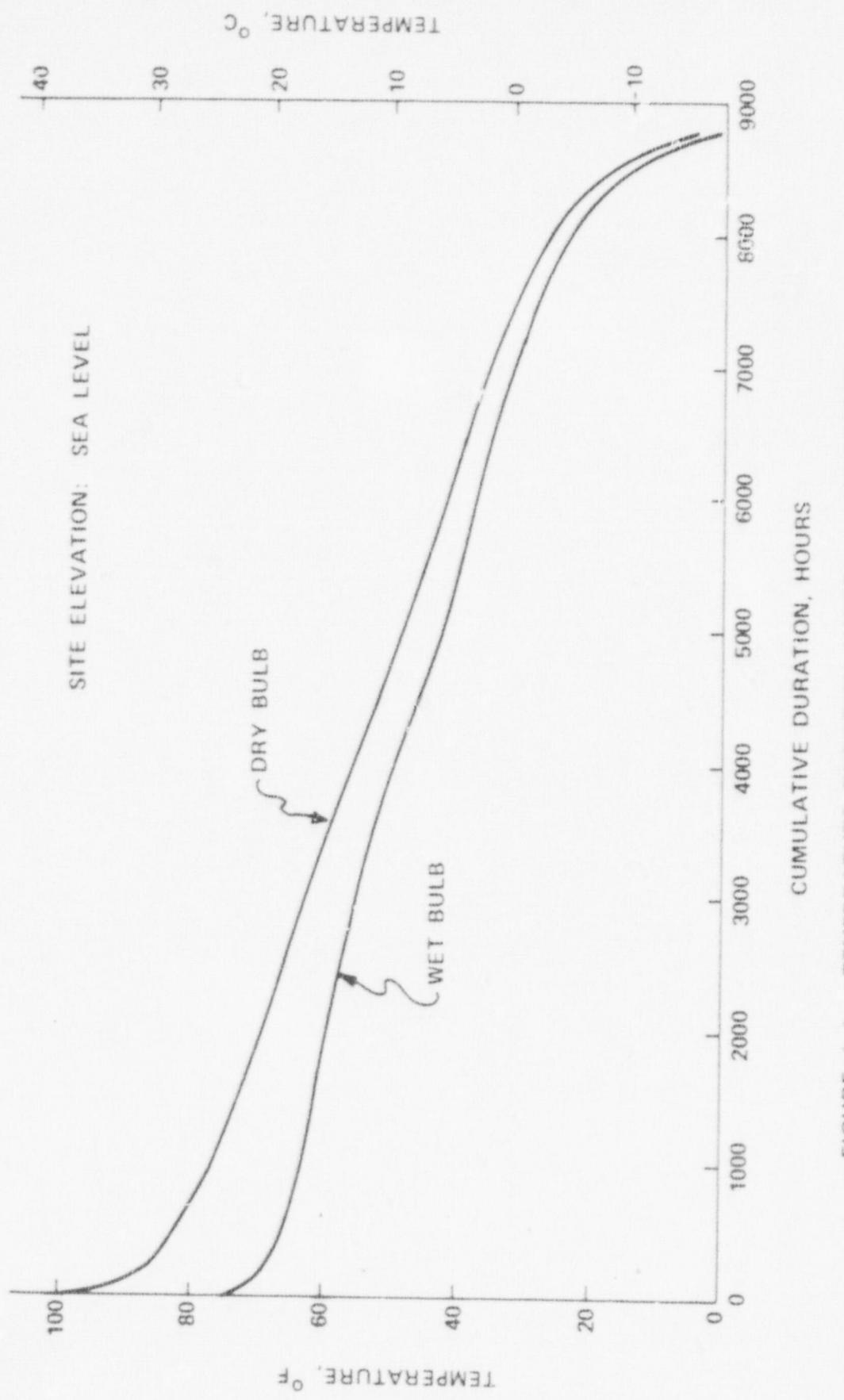


FIGURE 1-1 TEMPERATURE DURATION CURVES: MIDDLETOWN, U.S.A.

SECTION 2  
COOLING SYSTEM DESCRIPTIONS

## SECTION 2

### COOLING SYSTEM DESCRIPTIONS

#### 2.1 INTRODUCTION

This Section describes the alternate cooling systems design for the plant types covered by these alternate cooling system studies. The information presented is organized to correspond to the uniform system of accounts (USAEC Report NUS-531) used for the detailed cost estimate.

#### 2.2 COOLING SYSTEM DESIGN CRITERIA

##### 2.2.1 Major Study Ground Rules

In addition to the ground rules established for each of the plant types, the major criteria used in the cooling system evaluation are as follows:

- o The once-through cooling systems are designed for a condenser temperature rise of 15 F and a maximum intake water velocity at the intake structure of 0.5 fps.
- o All of the alternate tower systems are designed based on an 18 F approach to the 74 F wet bulb and a 26 F condenser temperature rise.

##### 2.2.2 Turbine Plant and Electric Plant Modifications

Differences in electric plant costs between alternate cooling systems reflect design modifications to transformers, switchgear and cable required by changes in the number, placement, and size of motors needed for system operation.

Although specific design descriptions for the turbine plant equipment are contained in subaccounts 233 for each plant, specific design descriptions for the electric plant modifications are not presented. Tables 2-19

through 2-42 present detailed costs for electric plant modifications with the exception of tables 2-19, -23, -27, -31, -34 and -39 which present cost details for the turbine plant, once-through cooling systems. Cost details for the two other cooling systems are identical to mechanical wet draft cooling systems.

#### 2.2.3 Mechanical Draft Wet Tower (Design used in References 1 thru 5)

The mechanical draft wet towers are of the circular crossflow design. A typical tower is shown in Figure 2-1. Air flows through the fill or packing horizontally and at right angle to the flow of water. Drift eliminators are positioned vertically inside the tower to reduce the drift rate to 0.002 percent of the circulating water flowrate. Airflow is induced by fans positioned on top of the tower. Other tower design information is presented in the design descriptions for each plant.

#### General Descriptions of Alternative Cooling Devices - Once-Through Cooling System

In the once-through cooling system the flow of water from the river serves as the cooling medium. River water is pumped to the condensers by a set of pumps located at the intake structure. The water is then discharged back to the river. A de-icing system is provided to eliminate ice buildup on the traveling screens. The intake and discharge structures require special considerations because of the potential environmental impact related to the large quantity and temperature of the water required.

#### Natural Draft Towers

Figure 2-2 shows a typical natural draft tower of counterflow design. The hyperbolic concrete shell is supported at the bottom by reinforced concrete columns to allow the free flow of air. The water distribution

system, packing material, and the drift eliminators are located near the bottom of the tower behind the air inlet louvers. Additional information is provided in the design descriptions for each plant.

#### Fan-Assisted Natural Draft Towers

Figure 2-3 shows a fan-assisted natural draft wet tower with the fans located about the periphery of the tower base. This tower is of counterflow design. The water distribution system, packing material and the drift eliminators are located near the bottom of the tower behind the fans and are similar in design to those for the natural draft tower. Additional information on the tower design and operation is provided in the design descriptions for each plant.

### 2.3 PRESSURIZED WATER REACTOR (PWR) COOLING SYSTEMS

Design and cost data for the PWR alternate cooling systems are presented in this subsection. The heat load of the unit is  $7.57(10)^9$  Btu/hr at a base turbine back pressure of 2.5 in HgA.

#### 2.3.1 Once-Through Cooling System Design Description

Following are the PWR once-through system design descriptions for Account 26 and other accounts impacted by a change from mechanical draft cooling towers to once-through cooling. Design descriptions for accounts not impacted by this change are presented in Reference 1.

#### Account 233 Condensing System

##### Condensing Equipment

Three condensers are used for the once-through cooling system. The three surface condensers are single stage one-pass design. The condensers are

designed to handle the total heat rejection from the main turbine and the two auxiliary turbine drives for the feedwater pumps. Each condenser has a condensing surface of 184,740 sq ft; 16,910 one and 1/8 inch diameter tubes, 37 ft long, and 20 BWG 90-10 CuNi. Cooling water flow in each condenser is 338,600 gpm resulting in a tube velocity of 7.25 ft/sec and a temperature rise at full load of 15 F.

The balance of the condensing equipment does not change and the equipment descriptions are presented in Reference 1.

#### ACCOUNT 261 Structures

##### Intake and Discharge Structures

The intake and discharge structures are Non-Seismic Category I, and are located along the riverbank west of the main plant structures. The intake basin is 194 ft long, 46 ft wide and 53 ft deep and is entirely below plant grade. The volume of the basin is approximately 473,000 cu ft. Attached to the north end of the structure is a service water pump basin founded 32 ft below grade. The structure is reinforced concrete with foundation mat bearing on rock. There are six circulating 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 of reinforced masonry concrete. Portions of the operating floor are

grated. A 750 sq ft electrical equipment room 13 ft high is located at grade adjacent to the basin.

The hot circulating water is discharged back to the river through a discharge canal. Discharge occurs sufficiently downstream of the intake to minimize recirculation.

#### Circulating Water Discharge Tunnel and Canal

The circulating water discharge tunnel begins in the turbine building at the condenser outlets and runs outside where it is channeled into the discharge canal. The tunnel is a reinforced concrete box structure 52 ft wide and 15 ft high inside.

The discharge canal is an extension of the tunnel which discharges into the North River 350 ft south of the intake structure. The canal is a reinforced concrete structure, with a flat bottom, vertical walls, and open top. The canal is 52 ft wide with walls 21 ft high. At the river, the canal widens, and the bottom slopes up to ensure sufficient water in the canal at all times for maintaining a seal for the circulating water system.

#### ACCOUNT 262 Mechanical Equipment

##### Circulating Water Pumps

There are six 16.7 percent capacity circulating water pumps, of the mixed flow vertical type. Each pump is designed for a flow rate of 169,300 gpm with a total dynamic head of 27 ft. Circulating water pump motors are 1,500 hp each, operating at a synchronous speed of 300 rpm. The pumps

discharge the water to the main condensers, where heat is absorbed. The water is then discharged through a tunnel and canal, and back to the river.

#### Circulating Water Intake System

Twelve traveling screens are provided to remove twigs, leaves and other debris from the river water that may otherwise enter the system and restrict the flow of water in the condenser tubes. The traveling screens are 14 ft wide by 48 ft long. They are sized to give a water velocity of 0.5 ft/sec at mean low water. Serving the traveling screens are two 100 percent capacity screen wash pumps with a flow rate of 3600 gpm and a total dynamic head of 100 ft to wash the screens when they require cleaning. Vertical trash racks with an automatic rake are provided ahead of the traveling screens.

Each screen well is provided with stop logs to allow dewatering (two screens and one pump) for maintenance purposes. In order to protect the traveling screens against ice during freezing water conditions, two vertical de-icing motor driven pumps, each designed for a flowrate of 30,500 gpm at 35 ft head, are used to pump warm water from the condenser discharge to the screens.

#### 2.3.2 Natural Draft Towers

#### ACCOUNT 26 MAIN CONDENSER HEAT REJECTION SYSTEM

##### ACCOUNT 261 Structures

All of the structures required for the natural draft tower are of identical design to those designed for the mechanical draft towers. Design

descriptions for the makeup water intake and discharge structures, circulating water pumphouse and makeup water pretreatment building, are presented in the mechanical draft wet tower system description.

#### ACCOUNT 262 Mechanical Equipment

There are four 25 percent capacity circulating water pumps, of the mixed flow vertical type. Each pump is designed for a flow rate of 147,500 gpm with a total dynamic head of 121 ft. Circulating water pump motors are 5,500 hp each, operating at a synchronous speed of 320 rpm.

#### Cooling Towers

There is one natural draft wet cooling tower designed to cool the entire circulating water flow of 588,000 gpm from 118 F to 92 F when operating at a wet bulb and dry bulb temperature of 74 F and 93 F. To provide the draft required for airflow, the tower employs a reinforced concrete hyperbolic shell 571 ft high. At the base the diameter is 441 ft. The tower's foundation is of the spread-footing type. The tower employs components for water distribution, fill splash service, reinforced concrete fill support and drift eliminators. Walkways, access ladders, railing, aircraft warning lights and a lightning protection system are also provided.

The hot water is fed into a network of distribution pipes, which are evenly spaced throughout the interior of the tower. The flow from these pipes is sent downwards through a system of nozzles and splash plates which spray the water to form a thin film over the heat exchanger surfaces. The distribution system is divided into quadrants to allow one quarter of the tower to be removed from service with the full flow distributed over the remainder of the tower.

### Main Cooling Tower Makeup and Blowdown Systems

The makeup water requirements are the same for the natural draft tower as the mechanical draft towers. This allows the use of identical makeup and blowdown systems, as designed for the mechanical draft tower.

#### 2.3.3 Fan-Assisted Natural Draft Towers

##### ACCOUNT 26 MAIN CONDENSER HEAT REJECTION SYSTEM

###### ACCOUNT 261 Structures

All of the structures required for the fan-assisted natural draft towers are of identical design to those designed for the mechanical draft towers. Design descriptions for the makeup water intake and discharge structures, circulating water pumphouse and makeup water pretreatment building, are presented in the mechanical draft wet tower system description.

###### ACCOUNT 262 Mechanical Equipment

###### Circulating Water Pumps

There are four 25 percent capacity circulating water pumps of the mixed flow vertical type. Each pump is designed for a flowrate of 147,500 gpm with a total dynamic head of 105 ft. Circulating water pump motors are 5,000 hp each, operating at a synchronous speed of 320 rpm.

###### Cooling Towers

There are two fan-assisted natural draft wet cooling towers each sized for one half of the requirements. Each tower is designed to cool 294,000 gpm of water from 118 F to 92 F when operating at a wet bulb of 74 F.

Each tower has a base diameter of 257 ft and an overall height of 205 ft. Twenty-four, 28 ft diameter fans are positioned about the periphery of each tower's base. Two-speed fan motors are provided to allow constant control of the temperature of cold water from the towers over a wide range of plant loads and weather conditions. The tower foundations are of the spread-footing type. The towers employ components for water distribution, fill splash service, reinforced concrete fill support and drift eliminators.

The hot water is fed into a network of distribution pipes, that are evenly spaced throughout the interior of each tower. The flow from these pipes is sent downwards through a system of nozzles and splash plates which spray the water to form a thin film over the heat exchanger surfaces. The distribution system in each tower is divided into quadrants in order to allow one quarter of a tower to be removed from services, with the full flow distributed over the remainder of the tower.

#### Main Cooling Tower Makeup and Blowdown Systems

The makeup water requirements are the same for the fan-assisted natural draft towers as the mechanical draft towers. This allows the use of identical makeup and blowdown systems as designed for the mechanical draft tower.



Figure 2-1 Typical Circular Mechanical Draft Tower

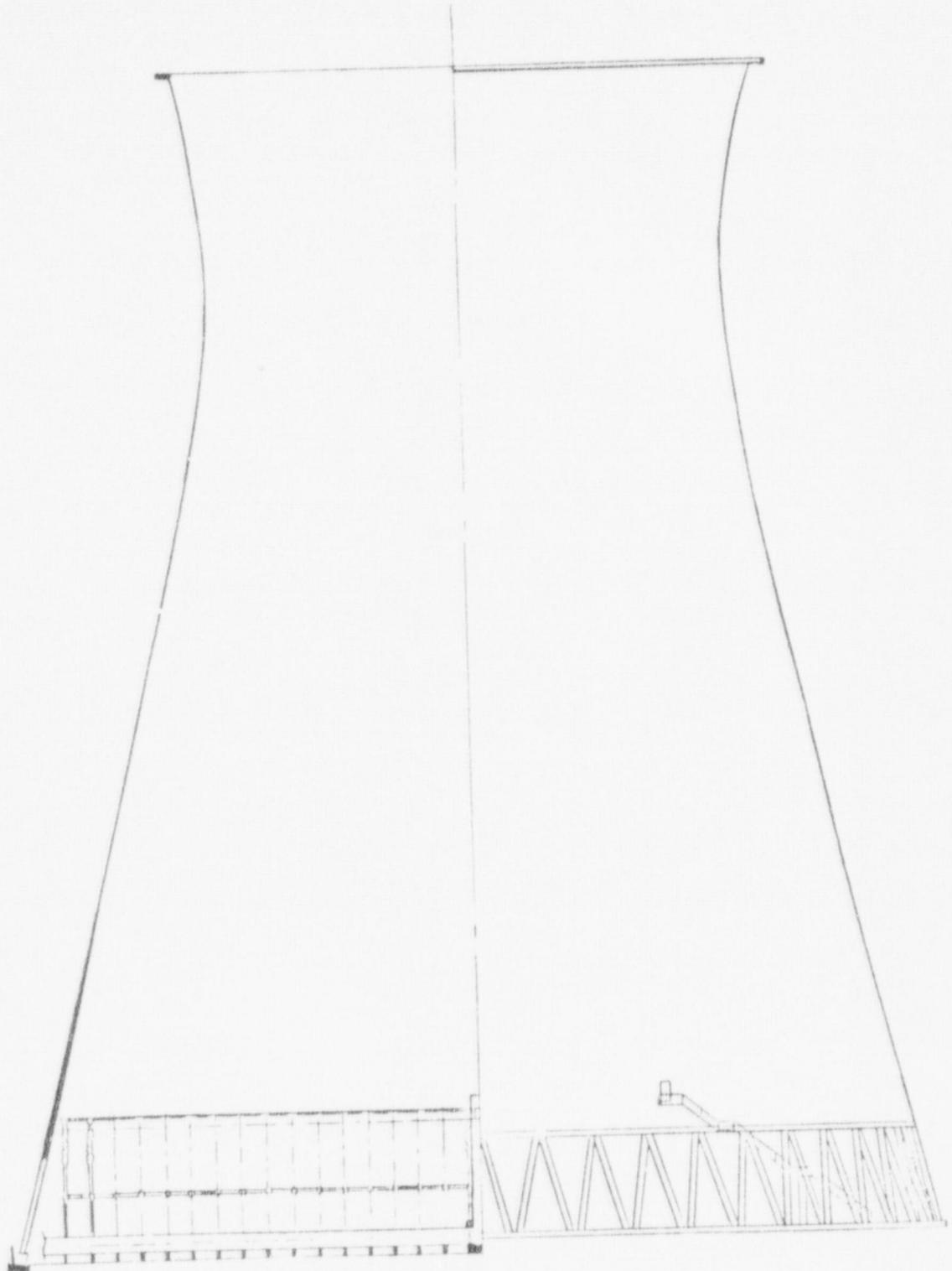


Figure 2-2 Typical Natural Draft Counter Flow Cooling Tower

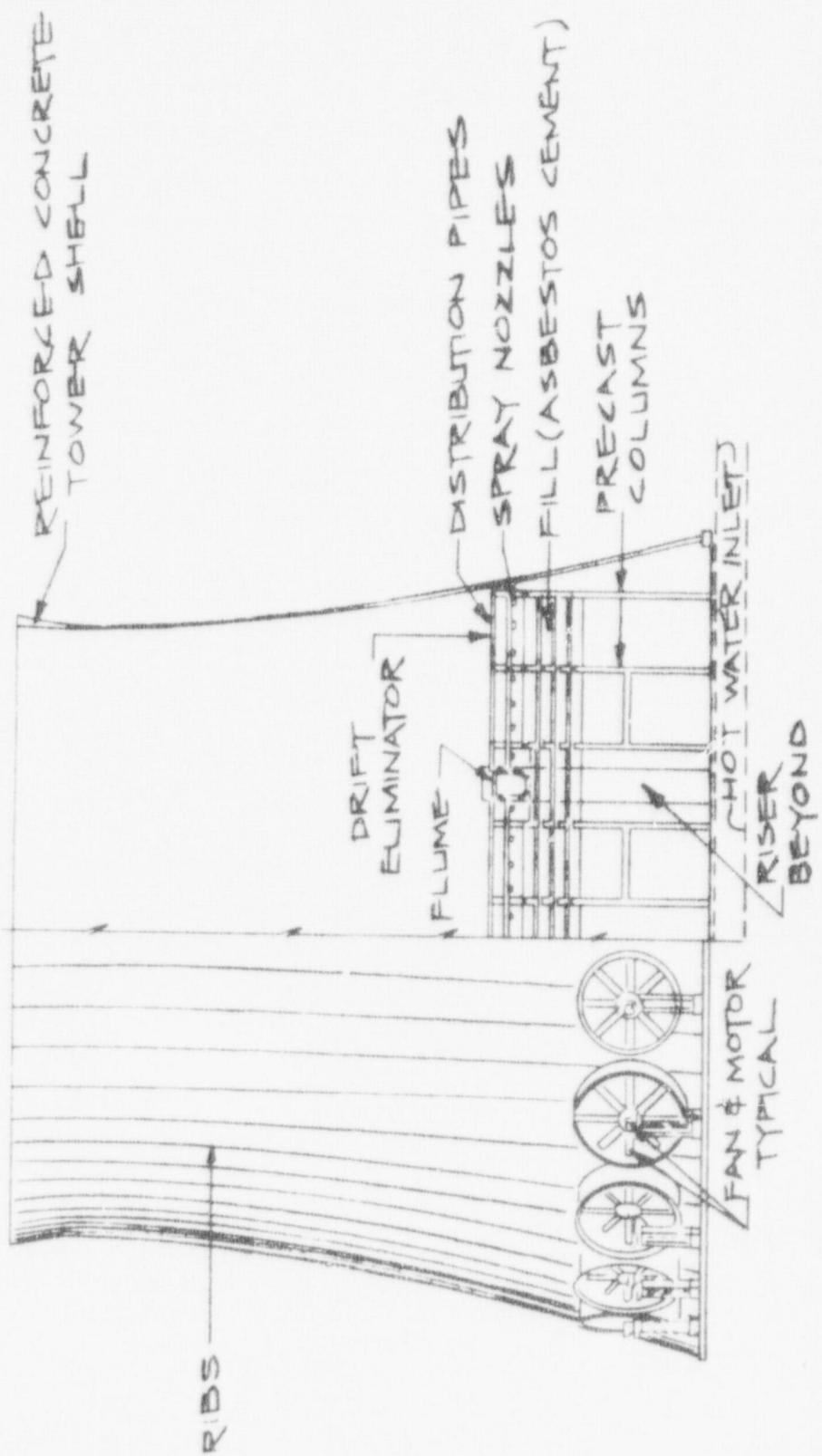


Figure 2-3 Typical Fan-Assisted Natural Draft Wet Cooling Tower

TABLE 2-1

PAGE 1

PLANT CODE  
199 COST BASIS  
07/76COST ESTIMATE - 1200 MWe PRESSURIZED WATER REACTOR  
ONCE-THROUGH COOLING SYSTEM

03/01/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY		SITE			TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	
<b>2 * TOTAL DIRECT COSTS</b>							
20 *	LAND AND LAND RIGHTS			1 LT			2,000,000
21 *	STRUCTURES + IMPROVEMENTS	1 LT	5,902,430	1 LT	4716266 MH	55,696,710	39,776,620
22 *	REACTOR PLANT EQUIPMENT	1 LT	96,568,790	1 LT	2145880 MH	27,768,660	9,142,990
23 *	TURBINE PLANT EQUIPMENT*	1 LT	80,929,270	1 LT	1804030 MH	23,028,820	5,284,800
24 *	ELECTRIC PLANT EQUIPMENT*	1 LT	12,460,450	1 LT	1364782 MH	16,751,510	8,031,310
25 *	MISCELLANEOUS PLANT EQUIPT	1 LT	7,197,437	1 LT	307827 MH	3,959,426	646,560
26 *	MAIN COND. HEAT REJECT SYS						
<b>N 261 * STRUCTURES</b>							
<b>261.1 MAKEUP WTR INT + DISCH STR</b>							
<b>261.11 INTAKE STRUCTURE</b>							
<b>261.111 EXCAVATION WORK</b>							
261.1111	EARTH EXCAVATION			3550 CY	888 MH	10,381	3,550
261.1112	ROCK EXCAVATION			14710 CY	11768 MH	137,567	58,840
261.1113	SHEETING (TEMP COFFERDAM)			140 TN	2800 MH	38,416	23,800
261.1114	STRUCT STL (TEMP COFFERDAM)						
261.1115	PUMPING			1 LT	8000 MH	74,560	75,000
261.1111	EXCAVATION WORK				23456 MH	260,924	161,190
261.112	BEARING PILES (STEEL)						422,114
261.113	SUBSTRUCTURE CONCRETE						
261.1131	FORMWORK			87000 SF	69600 MH	768,551	87,000

\* Detailed cost breakdown for these accounts are found in Tables 2-19 and 2-20 respectively

TABLE 2-1

PLANT CODE 199	COST BASIS 07/76	COST ESTIMATE - 1200 MWe PRESSURIZED WATER REACTOR ONCE-THROUGH COOLING SYSTEM				PAGE 2 03/01/78
ACCT NO.	ACCOUNT DESCRIPTION	***** FACTORY ***** QUANTITY COSTS	***** SITE ***** QUANTITY LABOR HRS LABOR COST MATERIAL COST			TOTAL COSTS
261.1132	REINFORCING STEEL		368 LB 12880 MH	166,322	147,200	
261.1133	CONCRETE		4900 CY 8575 MH	87,567	171,500	
261.1134	EMBEDDED STEEL		24 TN 3600 MH	43,297	36,000	
261.1135	CONCRETE FINISH		49000 SF 980 MH	10,008	490	
261.1136	WATERPROOFING					
261.1137	CONSTRUCTION JOINTS		1107 SF 1107 MH	12,223	1,107	
261.1138	RUBBING CONCRETE SURFACES					
261.113	SUBSTRUCTURE CONCRETE		96742 MH	1,087,968	443,297	1,531,265
261.114	SUPERSTRUCTURE					
261.1141	CONCRETE WORK					
261.1142	STRUCTURAL + MISC. STEEL					
261.11421	STRUCTURAL STEEL					
261.11422	GRATING (GALV)		1115 SF 222 MH	2,892	3,345	
261.11423	HANDRAIL		250 LF 188 MH	2,446	2,500	
261.1142	STRUCTURAL + MISC. STEEL		410 MH	5,338	5,845	11,183
261.1143	EXTERIOR WALLS					
261.11431	CONCRETE					
261.11432	MASONRY		1375 SF 344 MH	3,925	3,850	
261.1143	EXTERIOR WALLS		344 MH	3,925	3,850	7,775
261.1144	RCCF DECK					
261.11441	METAL ROOF DECK		750 SF 60 MH	782	750	

COST ESTIMATE - 1100 MWE PRESSURIZED WATER REACTOR  
ONCE-THROUGH COOLING SYSTEM

PLANT CODE	COST BASIS	ACCT NO.	ACCOUNT DESCRIPTION	FACTORY QUANTITY	COSTS	QUANTITY	LABOR HRS	SITE LABOR COST	MATERIAL COST	TOTAL COSTS
1100	07/76	261.11451	B.L. ROOFING + INSULTN. + FLASHING	55 SF	714	55 SF	714	938	938	1,652
		261.11455	ROOFING + FLASHING	53 MH	714	53 MH	714	938	938	1,652
		261.1146	INTERIOR WALLS	6 C MH	782	6 C MH	782	1,135	1,135	2,327
		261.11461	CONCRETE WALLS	25C SF	685	6 C MH	700	1,400	1,400	2,800
		261.11462	MASONRY WALLS	6 C SF	685	6 C MH	700	1,400	1,400	2,800
		261.11463	PARTITIONS	6 C SF	685	6 C MH	700	1,400	1,400	2,800
		261.11466	INTERIOR WALLS	6 C SF	685	6 C MH	700	1,400	1,400	2,800
		261.1147	DOORS + WINDOWS	1 C SF	782	6 C MH	782	1,400	1,400	2,800
		261.11471	ROLLING STEEL DOORS	1 C SF	782	6 C MH	782	1,400	1,400	2,800
		261.11472	PERSONNEL DOORS	96 SF	77	96 SF	77	893	893	1,786
		261.11473	SASH + GLAZING	137 MH	737	137 MH	737	1,552	1,552	3,104
		261.11477	DOORS + WINDOWS	1 C SF	782	6 C MH	782	1,400	1,400	2,800
		261.11479	PAINTING	1 C SF	782	6 C MH	782	1,400	1,400	2,800
		261.11491	CONCRETE	24 TN	1148	12 C MH	1148	144	144	288
		261.11492	STEELWORK	750 SF	15 MH	25 LF	144	150	150	300
		261.11493	METAL DECK	250 LF	50 MH	470	470	25	25	50
		261.11494	HANDRAIL	185 MH	319	185 MH	319	319	319	638
		261.11495	PAINTING	1 C SF	782	6 C MH	782	1,400	1,400	2,800

TABLE 2-1

PLANT CODE  
199 COST BASIS  
07/76

COST ESTIMATE - 1200 MWe PRESSURIZED WATER REACTOR  
ONCE-THROUGH COOLING SYSTEM

PAGE 4  
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ACCT NO.	ACCOUNT DESCRIPTION	***** FACTORY *****	*****	***** SITE *****		TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST MATERIAL COST
261.114	SUPERSTRUCTURE				1245 MH	14,890 14,954
261.117	BULKHEAD					29,844
261.1171	STEEL SHEETING			70 TN	700 MH	9,604 24,500
261.1172	STRUCTURAL STEEL			4 TN	80 MH	1,040 3,000
261.1173	GRAVEL FILL					
261.1174	DREDGING		20885 CY	4172 MH	52,129	41,770
261.1175	RIF-RAP (12 IN. THICK)		240 CY	360 MH	3,583	2,400
261.1176	CHAIN LINK FENCE(7FT HIGH)		460 LF	132 MH	1,230	2,860
261.117	BULKHEAD			5449 MH	67,586	74,530
261.118	PROTECTIVE DOLPHINS					142,116
261.1181	WOOD FILES			2750 LF	550 MH	7,546 11,000
261.118	PROTECTIVE DOLPHINS				550 MH	7,546 11,000
261.119	BUILDING SERVICES					18,546
261.1191	PLUMBING + DRAINS			5 EA	625 MH	8,099 5,000
261.1192	HEATING + VENTILATING	1 LT	3,400	1 LT	193 MH	2,494 249
261.1193	LIGHTING + SERVICE POWER			750 SF	226 MH	2,779 1,310
261.119	BUILDING SERVICES		3,400		1044 MH	13,372 6,599
261.11	INTAKE STRUCTURE		3,400		12849E MH	1,452,286 711,570
261.1	MAKEUP WTR INT + DISCH STR	3,400		12849C MH	1,452,286	711,570
261.4	CHLORINATION BUILDING					2,167,256

TABLE 2-1

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PLANT CODE  
199 COST BASIS  
07/76COST ESTIMATE - 1200 MWe PRESSURIZED WATER REACTOR  
ONCE-THROUGH COOLING SYSTEM

03/01/78

ACCT. NO.	ACCOUNT DESCRIPTION	FACTORY		SITE			TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	
261.41	BUILDING STRUCTURE						
261.411	EXCAVATION WORK						
261.4111	EARTH EXCAVATION	53 CY		13 MH		140	53
261.4114	BACKFILL	41 CY		12 MH		118	41
	261.411 EXCAVATION WORK			25 MH		258	94
261.413	SUBSTRUCTURE CONCRETE						
261.4131	FORMWORK	216 SF		173 MH		1,910	216
261.4132	REINF. STEEL	2 TN		73 MH		917	800
261.4133	CONCRETE	12 CY		21 MH		213	420
261.4134	EMBEDDED STEEL						
261.4135	FLOOR FINISH	105 SF		1 MH		9	1
261.4136	WATERPROOFING						
261.4137	CONSTRUCTION JOINTS	50 SF		50 MH		552	50
261.4138	RUBBING CONCRETE SURFACES						
261.4139	WIRE FABRIC	105 SF		2 MH		27	13
	261.413 SUBSTRUCTURE CONCRETE			318 MH		3,628	1,500
							5x128
261.414	SUPERSTRUCTURE						
261.4141	CONCRETE WORK						
261.4142	STRUCT. + MISC. STEEL						
261.41421	STRUCT. STEEL						
261.41423	MISC. FRAMES, ETC.	2 TN		120 MH		1,564	2,400

TABLE 2-1

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PLANT CODE  
199 COST BASIS  
07/78COST ESTIMATE - 1200 MWe PRESSURIZED WATER REACTOR  
ONCE-THROUGH COOLING SYSTEM

03/01/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY	QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	MATERIAL COST	TOTAL COSTS
261.4142	STRUCT. + MISCELL. STEEL				120 MH	1,564	2,400		3,964
261.4143	EXTERIOR WALLS								
261.4143.2	MASONRY		310 SF		78 MH	890		868	
261.4143.3	EXTERIOR WALLS				78 MH	890		868	1,758
261.4144	ROOF DECK								
261.4144.1	METAL ROOF DECK		170 SF		13 MH	171		170	
261.4144.2	ROOF DECK				13 MH	171		170	341
261.4145	RCCFING + FLASHING								
261.4145.1	BUL. ROOFING, FLASHING+INSUL.		170 SF		12 MH	162		213	
261.4145.2	ROOFING + FLASHING				12 MH	162		213	375
261.4147	DOORS + WINDOWS								
261.4147.2	PERSONNEL DOORS		50 SF		40 MH	464		600	
261.4147.3	SASH + GLAZING		25 SF		13 MH	151		300	
261.4147.4	DOORS + WINDOWS				53 MH	615		900	1,515
261.4149	PAINTING								
261.4149.2	STEELWORK		2 TN		10 MH	96		12	
261.4149.3	METAL DECK		170 SF		3 MH	29		17	
261.4149.4	PAINTING				13 MH	125		29	154
261.414	SUPERSTRUCTURE				285 MH	3,527	4,580		8,107

TABLE 2-1

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PLANT CODE  
199 COST BASIS  
07/76COST ESTIMATE - 1200 MWe PRESSURIZED WATER REACTOR  
ONCE-THROUGH COOLING SYSTEM

03/01/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY		SITE			TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	
261.41	BUILDING STRUCTURE			632 MH	7x413	6x174	13x587
261.424	LIGHTING + SERVICE POWER						
261.4	CHLORINATION BUILDING			632 MH	7x413	6x174	13x587
261.5	DISCHARGE TUNNEL + CANAL						
261.51	EXCAVATION						
261.511	EARTH EXCAVATION	26300 CY		6575 RH	70x421	26x300	
261.512	ROCK EXCAVATION	38300 CY		30640 MH	328x168	153x200	
261.514	BACKFILL	13050 CY		3915 MH	41x932	13x050	
261.515	DEWATERING						
261.51	EXCAVATION			41130 MH	440x521	192x550	633x071
261.53	SUBSTRUCTURE CONCRETE						
261.531	FORMWORK	120580 SF		98465 MH	1x065x205	120x580	
261.532	REINFORCING STEEL		953 TN	33355 MH	430x723	381x200	
261.533	CONCRETE	12700 CY		22225 MH	226x962	444x500	
261.534	EMBEDDED STEEL						
261.535	FLOOR FINISH						
261.536	WATERPROOFING						
261.537	CONSTRUCTION JOINTS	6736 SF		6735 MH	74x370	6x736	
261.538	RUBBING CONCRETE SURFACES						
261.53	SUBSTRUCTURE CONCRETE			158780 MH	1x797x260	953x016	2x750x276
261.5	DISCHARGE TUNNEL + CANAL			199910 MH	2x237x781	1x145x566	3x383x347

TABLE 2-1

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03/CT/78COST ESTIMATE - 1200 MEGA-PRESSURIZED WATER REACTOR  
ONCE-THROUGH COOLING SYSTEM

PLANT CODE	COST BASIS	ACCOUNT NO.	ACCOUNT DESCRIPTION	QUANTITY	COSTS	GROSS	LABOR HRS	LABOR COST	MATERIAL COST	TOTAL COST
100	07/76	261.	STRUCTURES	3400C	329032 MH	3,697,480	1 LT	1,863,310	5,564,190	
		262.	MECHANICAL EQUIPMENT							
		262.1	HEAT REJECTION SYSTEM							
		262.11	WATER INTAKE EQUIPMENT							
		262.111	ROTATING MACHINERY							
		262.1111	SCREEN WASH PUMP+MOTOR	2 EA	34,400	1 LT	700 MH	9,252	9,25	9,252
20		262.11111	SCREEN WASH PUMP							
		262.11112	SCREEN WASH PUMP MOTOR							
		262.11111	SCREEN WASH PUMP+MOTOR		34,400	700 MH	9,252	9,25	44,577	44,577
		262.111	ROTATING MACHINERY							
		262.11111	PURIFICATION+FILTRATION EQ							
		262.11141	TRAVELING SCREENS							
		262.111411	CIRCULATING WATER PUMPS	12 EA	740,400	1 LT	20400 MH	263,915	26,391	
		262.111412	SCREEN WASH PUMPS	2 EA	64,000	1 LT	600 MH	7,761	776	
		262.11141	TRAVELING SCREENS		804,400	21000 MH	271,674	27,167	1,103,241	
		262.1142	TRASH RACK	13 EA	148,200	1 LT	4355 MH	56,692	5,669	
		262.1143	TRASH RACK	1 LT	42,000	1 LT	800 MH	10,350	1,035	
		262.1144	STOP LOGS							
		262.11441	CIRCULATING WATER PUMPS							
		324 EA			4860 MH			45,295	10,530	

TABLE 2-1

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03/01/78

PLANT CODE  
199 COST BASIS  
07/76

COST ESTIMATE - 1200 MWe PRESSURIZED WATER REACTOR  
ONCE-THROUGH COOLING SYSTEM

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	MATERIAL COST	TOTAL COSTS
262.11442	SCREEN WASH PUMPS			54 EA	540 MH	5x033	972	
262.1144	STOP LOGS				5400 MH	50x328	11x502	61x830
262.114	PURIFICATION+FILTRATION EQ	994x600			31555 MH	389x044	45x373	1x429x017
262.115	PIPING-SCREEN WASH							
262.1151	2 IN. + SMALLER							
262.1152	2.5 IN. + LARGER							
262.11521	ES/NNS	29060 LB	43x590	1 LT	6975 MH	90x400	9x040	
262.1152	2.5 IN. + LARGER		43x590		6975 MH	90x400	9x040	143x030
262.115	PIPING-SCREEN WASH		43x590		6975 MH	90x400	9x040	143x030
262.116	VALVES-SCREEN WASH		1 LT	27x600				
262.1162	CHECK							
262.1166	BUTTERFLY							
262.116	VALVES-SCREEN WASH			27x600				27x600
262.117	PIPING-MISC ITEMS							
262.1171	HANGERS + SUPPORTS	4360 LB	6x540					
262.1172	INSULATION							
262.1173	SPECIALTIES							
262.117	PIPING-MISC ITEMS		6x540					6x540
262.11	WATER INTAKE EQUIPMENT	1x106x730		39230 MH	488x696	55x338	1x850x764	

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TABLE 2-1

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PLANT CODE  
199 COST BASIS  
07/76

COST ESTIMATE - 1200 Mw PRESSURIZED WATER REACTOR  
ONCE-THROUGH COOLING SYSTEM

03/01/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY		SITE			TOTAL COSTS		
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST			
<b>262.12 CIRCULATING WATER SYSTEM</b>									
<b>262.121 ROTATING MACHINERY</b>									
262.1211 CIRCULATING WATER PUMP+HTR		6 EA	1,590,000	1 LT	19320 HH	255,349	25,535		
<b>262.12111 CIRC WATER PUMP</b>									
262.12112 CIRC WATER PUMP MOTOR									
262.12111 CIRCULATING WATER PUMP+HTR		1,590,000		19320 HH	255,349	25,535	1,870,884		
262.1211 CIRCULATING WATER PUMP		1,590,000		19320 HH	255,349	25,535	1,870,884		
<b>262.125 PIPE</b>									
262.1251 2 IN + SMALLER									
262.1252 2.5 IN + LARGER									
262.12521 CONCRETE/NNS		2487 LF	711x158	1 LT	9500 HH	121,752	12,175		
262.12522 CS/NNS		122040 LB	183x060	1 LT	29290 HH	379,608	37,911		
262.1252 2.5 IN + LARGER			894x218		38790 HH	501,360	50,136		
262.125 PIPE			894x218		38790 HH	501,360	50,136		
<b>262.126 VALVES</b>									
262.1266 BUTTERFLY		18 EA	416x358	1 LT	1979 HH	25x652	2,565		
262.126 VALVES			416x358		1979 HH	25x652	2,565		
<b>262.127 PIPING / MISC. ITEMS</b>									
262.1271 HANGERS + SUPPORTS									

TABLE Z-1

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PLANT CODE  
199 COST BASIS  
07/76COST ESTIMATE - 1200 MWe PRESSURIZED WATER REACTOR  
ONCE-THROUGH COOLING SYSTEM

03/01/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY			SITE			TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	MATERIAL COST	
262.1272	INSULATION							
262.1273	SPECIALTIES							
262.12731	EXPANSION JOINTS	1 LT	92,880	1 LT	82 MH	1,066	107	
262.1273	SPECIALTIES		92,880		82 MH	1,066	107	94,053
262.1274	PIPE TRENCHING							
262.12741	EXCAVATION							
262.127411	EARTH EXCAVATION			16420 CY	4105 MH	43,966	16,420	
262.127412	ROCK EXCAVATION			13440 CY	10752 MH	115,159	53,760	
262.12741	EXCAVATION				14857 MH	159,125	70,180	229,305
262.12742	BACKFILL			14890 CY	4467 MH	44,455	14,890	
262.12743	COMPACTED SAND BED			6510 CY	6510 MH	64,788	39,060	
262.12744	SUSTRUCTURE CONCRETE							
262.127441	FORMWORK			6080 SF	4865 MH	53,722	6,080	
262.127442	REINF STEEL			56 TN	1960 MH	25,311	22,400	
262.127443	CONCRETE			750 CY	1313 MH	13,410	26,250	
262.12744	SUBSTRUCTURE CONCRETE				8138 MH	92,443	54,730	147,173
262.1274	PIPE TRENCHING				33972 MH	360,811	178,860	539,671
262.127	PIPING / MISC. ITEMS		92,880		34054 MH	361,877	178,967	633,724
262.128	INSTRUMENTATION + CONTROL	1 LT	8,025	1 LT	60 MH	733	37	
262.129	SKIDS / FOUNDATIONS							

TABLE 2-1

PLANT CODE 199	COST BASIS 07/76	COST ESTIMATE - 1200 MWe PRESSURIZED WATER REACTOR ONCE-THROUGH COOLING SYSTEM					PAGE 12 03/01/78	
ACCT NO.	ACCOUNT DESCRIPTION	QUANTITY	FACTORY COSTS	QUANTITY	LABOR HRS	SITE LABOR COST	MATERIAL COST	TOTAL COSTS
262.1291	CHLORINATION SYSTEM	1 LT	105x350	1 LT	2600 MH	33x636	3x364	
262.129	SKIDS / FOUNDATIONS		105x350		2600 MH	33x636	3x364	142x350
262.12	CIRCULATING WATER SYSTEM		3x106x831		96803 MH	1x178x607	260x604	4,546x042
262.16	DE-ICING SYSTEM							
262.161	ROTATING MACHINERY							
262.1611	DE-ICING PLMPS + MOTORS	2 EA	99x800	1 LT	1759 MH	23x248	2x325	
262.16111	DE-ICING PLMPS							
262.16112	DE-ICING PUMP MOTORS							
262.1611	DE-ICING PUMPS + MOTORS		99x800		1759 MH	23x248	2x325	125x373
262.161	ROTATING MACHINERY		99x800		1759 MH	23x248	2x325	125x373
262.165	PIPING							
262.1651	2 IN. + SMALLER							
262.1652	2.5 IN. + LARGER							
262.16521	CONCRETE	490 LF	11x647	1 LT	196 MH	2x511	251	
262.1652	2.5 IN. + LARGER		11x647		196 MH	2x511	251	14x409
262.165	PIPING		11x647		196 MH	2x511	251	14x409
262.166	VALVES	2 EA	17x640		75 MH	1x028		
262.167	EXCAVATION							
262.1671	EARTH EXCAVATION			2185 CY	546 MH	5x847	2x185	

TABLE 2-1

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PLANT CODE  
199 COST BASIS  
07/76

COST ESTIMATE - 1200 MWe PRESSURIZED WATER REACTOR  
ONCE-THROUGH COOLING SYSTEM

03/01/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY		SITE			TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	
262.1672	ROCK EXCAVATION			188 CY	150 MH	1,607	752
262.1673	BACKFILL			2283 CY	685 MH	7,335	2,283
262.167	EXCAVATION				1381 MH	14,789	5,220
262.16	DE-ICING SYSTEM	129,087			3415 MH	41,576	7,796
262.1	HEAT REJECTION SYSTEM	4,342,648		139448 MH	1,708,879	323,738	6,375,265
262.	MECHANICAL EQUIPMENT	4,342,648		139448 MH	1,708,879	323,738	6,375,265
26 .	MAIN COND HEAT REJECT SYS	4,346,048		468480 MH	5,406,359	2,187,048	11,939,455
2 .	TOTAL DIRECT COSTS	207,404,425		10807265 MH	132,611,485	67,069,328	407,085,238
9 .	TOTAL INDIRECT COSTS						
91 .	TOTAL INDIRECT COSTS	1 LT	95,850,000	1 LT	1870000 MH	19,453,000	32,500,000
*9 .	TOTAL INDIRECT COSTS		95,850,000		1870000 MH	19,453,000	32,500,000
	TOTAL BASE COST		303,254,425		12677265 MH	152,064,485	99,569,328
							554,888,238

\*Detailed Cost Breakdown for Account Number 9., Indirect Costs for Mechanical Wet Towers, is in NUREG-0241 Report.

TABLE 2-2

COST ESTIMATE - 1200 MW PRESSURIZED WATER REACTOR  
NATURAL DRAFT COOLING SYSTEM

Cost Basis		FACTORY						SITE					
Account Number	Description	Quantity	Costs	Quantity	Labor Hrs.	Material Cost	Total Cost	Account Number	Description	Quantity	Labor Hrs.	Material Cost	Total Cost
20 *	Land and Land Rights	500 AC					2,090,000	2,090,000					
21 *	Structures and Improvements	5,902,426			4716266 MH	55,696,709	39,766,622	101,375,757					
22 *	Reactor Plant Equipment	96,368,756			2145880 MH	27,768,659	9,142,990	133,680,645					
23 *	Turbine Plant Equipment	82,629,701			1827096 MH	23,335,789	5,315,396	111,290,986					
24 *	Electric Plant Equipment	12,669,910			1367560 MH	16,781,828	8,033,947	37,487,685					
25 *	Miscellaneous Plant Equipment	7,197,437			307827 MH	3,959,426	6,46,560	31,903,423					
26 *	Main Condenser Heat Reject System												
261 *	Structures	96,693			104736 MH	1,209,759	783,950	2,990,382					
262 *	Mechanical Equipment												
262.1	Heat Rejection System												
262.11	Water Intake Equipment												
262.111	Rotating Machinery	6,450				200 MH	2,643	264					
262.114	Purification & Filtration Equip.	142,625				4760 MH	59,440	6,685					
262.115	Piping - Screen Wash	2,730				436 MH	5,654	565					
262.116	Valves - Screen Wash	12,900											
262.117	Piping - Miscellaneous Items	405											
262.11	Water Intake Equipment	165,110				5396 MH	67,737	7,514	240,361				
262.12	Circulating Water System												
262.121	Rotating Machinery	2,728,000				13400 MH	177,106	17,710					
262.125	Pipe	921,774				38600 MH	599,235	49,924					
262.126	Valves	420,000				1500 MH	19,441	1,944					
262.127	Piping - Miscellaneous Items					20365 MH	213,476	95,192					

\* Detailed cost breakdown for this account is found in Table 2-22

TABLE 2-2

COST ESTIMATE - 1200 Mw PRESSURIZED WATER REACTOR  
NATURAL DRAFT COOLING SYSTEM

FACTORY-----SITE-----						
Account Number	Cost Basis 7-6	Account Description	Quantity	Costs	Labor Hrs.	Total Cost
262.128		Instrumentation and Control	5,350		45 MH	\$48 27
262.129		Skids/Foundations	60,200		1994 MH	25,860 3,142
262.12		Circulating Water System	4,135,324		75604 MH	945,664 168,939
262.13		Cooling Towers				5,239,927
262.132		Heat Transfer Equipment	10,527,000		247000 MH	3,196,180 319,618
262.138		Instrumentation and Control	36,000		350 MH	4,279 214
262.13		Cooling Towers	10,563,000		247350 MH	3,200,459 319,832
262.15		Main Cr., Make-up & Blowdown Sys.				16,083,291
262.151		Make-up Water System	507,059		6077 MH	69,759 17,933
262.152		Blowdown System	51,750		408 MH	5,216 512
262.153		Make-up Water Pretreatment System	925,000		38278 MH	493,200 99,040
262.15		Main Cr., Make-up & Blowdn. Sys.	1,483,809		44763 MH	570,175 117,505
262.		Mechanical Equipment	16,347,243		373113 MH	4,774,035 21,735,068
26 .		Main Cond. Ht. Reject. Sys.	16,443,936		477849 MH	5,983,774 1,397,740
2 .		Total Direct Costs	221,412,206		10842388 MH	133,528,185 66,313,355
#9 .		Total Indirect Costs	95,974,000		1870000 MH	19,457,000 32,500,000
		Total Base Cost	317,386,206		12712388 MH	152,981,185 98,813,355
						569,180,746

\*Detailed Cost Breakdown for Account Number 9, Indirect Costs for Mechanical Wet Towers, is in NUREG-0241 Report.

TABLE 2-3

COST ESTIMATE - 1200 MWe PRESSURIZED WATER REACTOR  
FAN-ASSISTED NATURAL DRAFT COOLING SYSTEM

		Cost Basis 7/76	FACTORY		SITE			
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hrs.	Labor Cost	Material Cost	Total Costs
20 .	Land and Land Rights			500 AC			2,000,000	2,000,000
21 .	Structures and Improvements	5,902,426		4716266 MH	55,696,709	39,776,622	101,375,757	
22 .	Reactor Plant Equipment	96,568,796		2145880 MH	27,768,659	9,142,990	133,480,445	
23 .	Turbine Plant Equipment	82,629,701		1827006 MH	23,335,789	5,315,496	111,280,986	
24 .	Electric Plant Equipment*	13,213,213		1460995 MH	17,928,865	8,597,479	39,739,557	
25 .	Miscellaneous Plant Equipment	7,197,437		307827 MH	3,959,426	646,560	11,803,423	
26 .	<u>Main Condenser Heat Reject System</u>							
261.	Structures	96,693		104736 MH	1,209,739	783,950	2,090,382	
262.	<u>Mechanical Equipment</u>							
262.1	<u>Heat Rejection System</u>							
262.11	<u>Water Intake Equipment</u>							
262.111	Rotating Machinery	6,450		200 MH	2,643	264		
262.114	Purification & Filtration Equip.	142,625		4760 MH	53,440	6,685		
262.115	Piping - Screen Wash	2,730		436 MH	5,654	565		
262.116	Valves - Screen Wash	12,900						
262.117	Piping - Miscellaneous Items	405						
262.11	Water Intake Equipment	165,110		5396 MH	67,737	7,514	240,361	
262.12	<u>Circulating Water System</u>							
262.121	Rotating Machinery	2,472,500		13000 MH	171,819	17,182		
262.125	Pipe	1,076,353		40370 MH	521,920	52,192		
262.126	Valves	420,000		1500 MH	19,441	1,944		
262.127	Piping - Miscellaneous Items			25755 MH	272,714	120,940		

\* Detailed cost breakdown for this account is found in Table 2-21

TABLE 2-3

COST ESTIMATE - 1200 MW PRESSURIZED WATER REACTOR  
FAIR-ASSISTED NATURAL DRAFT COOLING SYSTEM

Cost Basis		FACTORY			SITE			
Account Number	Description	Quantity	Costs	Quantity	Labor Hrs.	Labor Cost	Material Cost	Total Cost
262.128	Instrumentation and Control	5,350			45 MH	548		27
262.129	Skids Foundations	60,200		1992 MH	25,860		3,142	
262.132	Circulating Water System	4,034,403		82664 MH	1,012,302		195,427	5,242,132
262.133	Cooling Towers							
262.132	Heat Transfer Equipment	9,823,500		168600 MH	2,181,684			218,168
262.138	Instrumentation and Control	53,950		431 MH	5,514			276
262.133	Cooling Towers	9,877,450		169051 MH	2,187,198			218,444
262.15	Main Cr. Make-up & Blowdown Sys.							
262.151	Make-up Water System	507,059		6077 MH	69,759			17,953
262.152	Blowdown System	51,750		408 MH	5,216			512
262.153	Make-up Water Pretreatment Syst.	925,000		38278 MH	495,290			99,060
262.15	Main Cr. Make-up & Blowdn. Sys.	1,483,809		44763 MH	570,175			117,505
262.	Mechanical Equipment	15,560,772		301874 MH	3,837,412			538,890
26.	Main Cond. Ht. Reject. Sys.	15,657,465		406610 MH	5,047,151			19,937,074
2 *	Total Direct Costs	221,169,038		1,864584 MH	133,736,599			22,027,456
9 *	Total Indirect Costs	96,091,000		1870000 MH	19,453,000			32,500,000
	Total Base Cost	317,170,038		12734584 MH	153,189,599			99,301,967
								569,661,624

## 2.4 BOILING WATER REACTOR (BWR) COOLING SYSTEMS

Design and cost data for the BWR alternate cooling systems are presented in this subsection. The heat load of the unit is  $8.05(10)^9$  Btu/hr at a turbine back pressure of 2.5 in HgA.

### 2.4.1 Once-Through Cooling System Design Description

Following are the BWR once-through system design descriptions for Account 26 and other accounts impacted by a change from mechanical draft cooling towers to once-through cooling. Design descriptions for accounts not impacted by this change are presented in Reference 2.

#### ACCOUNT 233 Condensing System

##### Condenser Equipment

The three surface condensers are single stage one-pass design. The condensers are designed to handle the total heat rejection from the main turbine and the two auxiliary turbine drives for the feedwater pumps. Each condenser has a condensing surface of 195,040 sq ft; 17,860 one and 1/8 inch diameter tubes, 37 ft long, and 20 BWG 90-10 CuNi tubes. Cooling water flow in each condenser is 352,600 resulting in a tube velocity of 7.25 ft/sec and a temperature rise at full load of 15 F. The balance of the condensing equipment is not affected by the once-through cooling system design, and equipment descriptions are presented in Reference 2.

#### ACCOUNT 261 Structures

##### Intake and Discharge Structures

The intake and discharge structures are identical to those designed for the PWR once-through cooling system.

### Circulating Water Discharge Tunnel and Canal

The circulating water discharge tunnel and canal are identical to those designed for the PWR once-through cooling system.

### ACCOUNT 262 Mechanical Equipment

#### Circulating Water Pumps

There are six 16.7 percent capacity circulating water pumps, of the mixed flow vertical type. Each pump is designed for a flow rate of 176,300 gpm with a total dynamic head of 27 ft. Circulating water pump motors are 1,500 hp each, operating at a synchronous speed of 320 rpm.

#### Circulating Water Intake System

Twelve traveling screens are provided to remove twigs, leaves and other debris from the river water that may otherwise enter the system and restrict the flow of water in the condenser tubes. The traveling screens are 14 ft wide by 48 ft long. They are sized to give a water velocity of 0.5 ft/sec at mean low water. Serving the traveling screens are two 100 percent capacity screen wash pumps with a flow rate of 3,600 gpm and a total dynamic head of 100 ft to wash the screens, when they require cleaning. Vertical trash racks with an automatic rake are provided ahead of the traveling screens.

Each screen well is provided with stop logs to allow dewatering (two screens and one pump) for maintenance purposes. To protect the traveling screens against ice during freezing water conditions, two vertical de-icing motor driven pumps, each designed for a flowrate of 32,000 gpm at 35 ft

head, are used to pump warm water from the condenser discharge to the screens.

#### 2.4.2 Natural Draft Towers

##### ACCOUNT 26 MAIN CONDENSER HEAT REJECTION SYSTEM

###### ACCOUNT 261 Structures

All of the structures required for the natural draft tower are of identical design to those designed for the mechanical draft towers. Design descriptions for the makeup water intake and discharge structures, circulating water pumphouse and makeup water pretreatment building are presented in the mechanical draft wet tower system description.

###### ACCOUNT 262 Mechanical Equipment

###### Circulating Water Pumps

There are four 25 percent capacity circulating water pumps of the mixed flow vertical type. Each pump is designed for a flowrate of 153,125 gpm with a total dynamic head of 121 ft. Circulating water pump motors are 6,000 hp each, operating at a synchronous speed of 320 rpm.

###### Cooling Towers

There is one natural draft wet cooling tower designed to cool the entire circulating water flow of 610,500 gpm from 118 F to 92 F when operating at wet bulb and dry bulb temperatures of 74 F and 93 F respectively. To provide the draft required for airflow, the tower employs a reinforced concrete hyperbolic shell 576 ft high. At the base the diameter is 441 ft. Other design characteristics of the natural draft tower are as described in the PWR's natural draft cooling system in subsection 2.3.2.

### Main Cooling Tower Makeup and Blowdown Systems

The makeup water requirements are the same at the design condition for the natural draft tower as the mechanical draft towers. This allows the use of identical makeup and blowdown facilities, as designed for the mechanical draft tower.

#### 2.4.3 Fan-Assisted Natural Draft Towers

##### ACCOUNT 26 MAIN CONDENSER HEAT REJECTION SYSTEM

###### ACCOUNT 261 Structures

All of the structures required for the fan-assisted natural draft towers are of identical design to those designed for the mechanical draft towers. Design descriptions for the makeup water intake and discharge structures, circulating water pumphouse and makeup water pretreatment building are presented in the mechanical draft tower system description.

###### ACCOUNT 262 Mechanical Equipment

###### Circulating Water Pumps

There are four 25 percent capacity circulating water pumps of the mixed flow vertical type. Each pump is designed for a flow rate of 153,125 gpm with a total dynamic head of 105 ft. Circulating water pump motors are 5,000 hp each, operating at a synchronous speed of 320 rpm.

###### Cooling Towers

There are two fan-assisted natural draft wet cooling towers each sized for one half of the requirements. Each tower is designed to cool 305,250

gpm of water from 118 F to 92 F when operating at a wet bulb of 74 F.

Each tower has a base diameter of 257 ft and an overall height of 205 ft.

Twenty-four 28 ft diameter fans are positioned about the periphery of each tower's base. Other design characteristics of the fan-assisted natural draft tower are as described in Subsection 2.3.3 that discusses the PWR's fan-assisted natural draft cooling system.

#### Main Cooling Tower Makeup and Blowdown Systems

The makeup water requirements are the same at the design condition for the fan-assisted natural draft tower as the mechanical draft towers.

This allows the use of identical makeup and blowdown facilities, as designed for the mechanical draft tower.

TABLE 2-4

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PLANT CODE  
292 COST BASES  
07/76COST ESTIMATE - 1200 MWe BOILING WATER REACTOR  
ONCE-THROUGH COOLING SYSTEM

03/01/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY		SITE			TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	
<b>2 . TOTAL DIRECT COSTS</b>							
20 .	LAND AND LAND RIGHTS			1 LT			2,000,000
21 .	STRUCTURES + IMPROVEMENTS	1 LT	4,270,050	1 LT	5316754 MH	62,978,180	46,075,500
22 .	REACTOR PLANT EQUIPMENT	1 LT	90,832,140	1 LT	2025520 MH	26,178,940	8,723,080
23 .	TURBINE PLANT EQUIPMENT*	1 LT	85,472,190	1 LT	1859394 MH	23,751,730	5,385,560
24 .	ELECTRIC PLANT EQUIPMENT*	1 LT	13,394,250	1 LT	1378121 MH	16,919,790	8,246,690
25 .	MISCELLANEOUS PLANT EQUIPT	1 LT	6,821,276	1 LT	283036 MH	3,638,273	615,419
26 .	MAIN COND HEAT REJECT SYS						
2135	STRUCTURES						
	261. MAKEUP WTR INT + DISCH STR						
<b>261.1 INTAKE STRUCTURE</b>							
<b>261.11 EXCAVATION WORK</b>							
261.1111	EARTH EXCAVATION		3550 CY		888 MH	10,381	3,550
261.1112	ROCK EXCAVATION		14710 CY		11768 MH	137,567	58,840
261.1113	SHEETING (TEMP COFFERDAM)			140 TN	2800 MH	38,416	23,800
261.1114	STRICT STL (TEMP COFFERDAM)						
261.1115	PUMPING			1 LT	8000 MH	74,560	75,000
261.111	EXCAVATION WORK				23456 MH	260,924	161,190
261.112	BEARING PILES (STEEL)						422,114
261.113	SUBSTRUCTURE CONCRETE						
261.1131	FORMWORK		87000 SF		69600 MH	768,551	87,000

\* Detailed cost breakdown for these accounts are found in Tables 2-23 and 2-24

TABLE 2-4

PAGE 2

PLANT CODE COST BASIS  
292 07/76

COST ESTIMATE - 1200 MWe BOILING WATER REACTOR  
ONCE-THROUGH COOLING SYSTEM

03/01/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY		SITE			TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	MATERIAL COST	
261.1132	REINFORCING STEEL			368 TON	12880 MH	166,322	147,200
261.1133	CONCRETE			4900 CY	8575 MH	87,567	171,500
261.1134	EMBEDDED STEEL			24 TON	3600 MH	43,297	36,000
261.1135	CONCRETE FINISH			49000 SF	980 MH	10,008	490
261.1136	WATERPROOFING						
261.1137	CONSTRUCTION JOINTS			1107 SF	1107 MH	12,223	1,107
261.1138	RUPHING CONCRETE SURFACES						
261.113	SUBSTRUCTURE CONCRETE				96742 MH	1,087,968	443,297
261.114	SUPERSTRUCTURE						1,531,265
2-36							
261.1141	CONCRETE WORK						
261.1142	STRUCTURAL + MISC. STEEL						
261.11421	STRUCTURAL STEEL						
261.11422	GRATING (GALV)			1115 SF	222 MH	2,892	3,345
261.11423	HARDRAIL			250 LF	188 MH	2,446	2,500
261.1142	STRUCTURAL + MISC. STEEL				410 MH	5,338	5,845
261.1143	EXTERIOR WALLS						11,183
261.11431	CONCRETE						
261.11432	MASONRY			1375 SF	344 MH	3,925	3,850
261.1143	EXTERIOR WALLS				344 MH	3,925	3,850
261.1144	ROOF DECK						7,775
261.11441	METAL ROOF DECK			750 SF	60 MH	782	750

TABLE 2-4

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PLANT CODE 292	COST BASIS 07/76	COST ESTIMATE - 1200 MWe BOILING WATER REACTOR ONCE-THROUGH COOLING SYSTEM					PAGE 03/01/78	
ACCT NO.	ACCOUNT DESCRIPTION	***** FACTORY ***** QUANTITY	COSTS	***** SITE ***** QUANTITY	LABOR HRS	LABOR COST	MATERIAL COST	TOTAL COSTS
	261.1144 ROOF DECK			60 MH	782	750		1,532
	261.1145 ROOFING + FLASHING							
	261.11451 B.L. ROOFING INSULTNg + FLA		750 SF	53 MH	714	938		
	261.11452 ROOFING + FLASHING			53 MH	714	938		1,652
	261.1146 INTERIOR WALLS							
	261.11461 CONCRETE WALLS							
8-37	261.11462 MASONRY WALLS		250 SF	60 MH	685	700		
	261.11463 PARTITIONS							
	261.11464 INTERIOR WALLS			60 MH	685	700		1,385
	261.1147 DOORS + WINDOWS							
	261.11471 ROLLING STEEL DOORS		100 SF	60 MH	782	1,400		
	261.11472 PERSONNEL DOORS		96 SF	77 MH	893	1,152		
	261.11473 SASH + GLAZING							
	261.11474 DOORS + WINDOWS			137 MH	1,675	2,552		4,227
	261.1149 PAINTING							
	261.11491 CONCRETE							
	261.11492 STEELWORK		24 TN	120 MH	1,148	144		
	261.11493 METAL DECK		750 SF	15 MH	144	150		
	261.11494 HANDRAIL		250 LF	50 MH	479	25		
	261.11495 PAINTING			185 MH	1,771	319		2,090

TABLE 2-4

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PLANT CODE  
292 COST BASIS  
07/76

COST ESTIMATE - 1200 MWe BOILING WATER REACTOR  
ONCE-THROUGH COOLING SYSTEM

03/01/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY		SITE			TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	
261.114	SUPERSTRUCTURE			1249 MH		14,890	14,954
261.117	BULKHEAD						29,844
261.1171	STEEL SHEETING			70 TN	700 MH	9,604	24,500
261.1172	STRUCTURAL STEEL			4 TN	80 MH	1,940	3,000
261.1173	GRAVEL FILL						
261.1174	DREDGING			20885 CY	4177 MH	52,129	41,770
261.1175	RIF-RAP (12 IN. THICK)			240 CY	360 MH	3,583	2,400
261.1176	CHAIN LINK FENCE (7 FT HIGH)			440 LF	132 MH	1,230	2,860
261.117	BULKHEAD				5445 MH	67,586	74,530
261.118	PROTECTIVE DOLPHINS						142,116
261.1181	WOOD FILES			2750 LF	550 MH	7,546	11,000
261.118	PROTECTIVE DOLPHINS				550 MH	7,546	11,000
261.119	BUILDING SERVICES						18,546
261.1191	PLUMBING + DRAINS			5 EA	625 MH	8,099	5,000
261.1192	HEATING + VENTILATING	1 LT	3,400	1 LT	193 MH	2,494	249
261.1193	LIGHTING + SERVICE POWER			750 SF	226 MH	2,779	1,350
261.119	BUILDING SERVICES		3,400		1044 MH	13,372	6,599
261.11	INTAKE STRUCTURE		3,400		128490 MH	1,452,286	711,570
261.1	MAKEUP WTR INT + DISCH STR		3,400		128490 MH	1,452,286	711,570
261.4	CHLORINATION BUILDING						2,167,256

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TABLE 2-4

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PLANT CODE  
292COST BASIS  
67/76COST ESTIMATE - 1200 MWe BOILING WATER REACTOR  
ONCE-THROUGH COOLING SYSTEM

03/01/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY	QUANTITY	LABOR HRS	LABOR COST	MATERIAL COST	TOTAL COSTS
261.41	BUILDING STRUCTURE						
261.411	EXCAVATION WORK						
261.4111	EARTH EXCAVATION		53 CY	13 MH	140	53	
261.4114	BACKFILL		41 CY	12 RH	118	41	
261.411	EXCAVATION WORK			25 MH	258	94	352
261.413	SUPERSTRUCTURE CONCRETE						
261.4131	FORMWORK		216 SF	173 MH	1,910	216	
261.4132	REINF. STEEL		2 TN	71 RH	917	800	
261.4133	CONCRETE		12 CY	21 RH	213	420	
261.4134	EMBEDDED STEEL				9	1	
261.4135	FLOOR FINISH		105 SF	1 MH			
261.4136	WATERPROOFING						
261.4137	CONSTRUCTION JOINTS		50 SF	50 MH	552	50	
261.4138	RUBBING CONCRETE SURFACES						
261.4139	WIRE FABRIC		105 SF	2 RH	27	13	
261.413	SUBSTRUCTURE CONCRETE			318 RH	3,628	1,500	5,128
261.41	SUPERSTRUCTURE						
261.4141	CONCRETE WORK						
261.4142	STRUCT. + MISC. STEEL						
261.41421	STRUCT. STEEL		2 TN	120 MH	1,564	2,400	
261.41423	MISC. FRAMES, ETC.						

TABLE 2-6

PLANT CODE 292	COST BASIS C776	COST ESTIMATE - 1200 MWe BOILING WATER REACTOR ONCE-THROUGH COOLING SYSTEM					PAGE 6
ACCT NO.	ACCOUNT DESCRIPTION	***** FACTORY ***** QUANTITY COSTS	***** SITE ***** QUANTITY LABOR HRS LABOR COST MATERIAL COST				TOTAL COSTS
261.4142	STRUCT. + MISC. STEEL		120 MH	1,564	2,400		3,964
261.4143	EXTERIOR WALLS						
261.41432	MASONRY	310 SF	78 MH	890	868		
261.4143	EXTERIOR WALLS		78 MH	890	868		1,758
261.4144	ROOF DECK						
261.41441	METAL ROOF DECK	170 SF	13 MH	171	170		
261.4144	ROOF DECK		13 MH	171	170		341
261.4145	ROOFING + FLASHING						
261.41451	BILLY ROOFING+FLASHING+INSUL	170 SF	12 MH	162	213		
261.4145	ROOFING + FLASHING		12 MH	162	213		375
261.4147	DOORS + WINDOWS						
261.41472	PERSONNEL DOORS	50 SF	40 MH	464	600		
261.41473	SASH + GLAZING	25 SF	13 MH	151	300		
261.4147	DOORS + WINDOWS		53 MH	615	900		1,515
261.4149	PAINTING						
261.41492	STEELWORK	2 TN	10 MH	96	12		
261.41493	METAL DECK	170 SF	3 MH	29	17		
261.4149	PAINTING		13 MH	125	29		154
261.414	SUPERSTRUCTURE	289 MH	3,527	4,580	8,907		

TABLE 2-4

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PLANT CODE  
292 COST BASIS  
07/76

COST ESTIMATE - 1200 MWe BOILING WATER REACTOR  
ONCE-THROUGH COOLING SYSTEM

03/01/78

ACCT NO.	ACCOUNT DESCRIPTION	***** FACTORY *****	***** QUANTITY *****	***** COSTS *****	***** QUANTITY *****	***** LABOR HRS *****	***** LABOR COST *****	***** MATERIAL COST *****	TOTAL COSTS
261.41	BUILDING STRUCTURE				632 MH	72413	62174	13x587	
261.424	LIGHTING + SERVICE POWER								
261.4	CHLORINATION BUILDING				632 MH	72413	62174	13x587	
261.5	DISCHARGE TUNNEL + CANAL								
261.51	EXCAVATION								
261.511	EARTH EXCAVATION		26300 CY		6575 MH	70x421	26x300		
261.512	ROCK EXCAVATION		38700 CY		30640 MH	328x168	153x200		
261.514	BACKFILL		13050 CY		3915 MH	41x932	13x050		
261.515	DEWATERING								
261.51	EXCAVATION				41130 MH	440x521	192x550	633x071	
261.53	SLESTRUCTURE CONCRETE								
261.531	FORMWORK		120580 SF		96465 MH	1x065x205	120x580		
261.532	REINFORCING STEEL			953 TN	33355 MH	430x723	381x200		
261.533	CONCRETE		12700 CY		22225 MH	226x962	444x500		
261.534	EMBEDDED STEEL								
261.535	FLOOR FINISH								
261.536	WATERPROOFING								
261.537	CONSTRUCTION JOINTS		6736 SF		6735 MH	74x370	8x736		
261.538	RUBBING CONCRETE SURFACES								
261.53	SUBSTRUCTURE CONCRETE				158780 MH	1x797x260	953x016	2x750x276	
261.5	DISCHARGE TUNNEL + CANAL				199910 MH	2x237x781	1x145x566	3x383x347	

TABLE 2-4

PLANT CODE	COST BASIS	PAGE
29?	07/76	8
<b>COST ESTIMATE - 1200 MWe BOILING WATER REACTOR ONCE-THROUGH COOLING SYSTEM</b>		
ACCT NO.	ACCOUNT DESCRIPTION	
262.1	STRUCTURES	
262.10	YARD	3,607,480
262.11	MACHINERY EQUIPMENT	3,290,324
262.111	HEAT REJECTION SYSTEM	
262.1111	WATER INTAKE EQUIPMENT	
262.11111	ROTATING MACHINERY	
262.111111	SCREEN WASH PUMP+TUR.	2 EA
262.1111111	SCREEN WASH PUMP	34x600
262.1111112	SCREEN WASH PUMP MOTOR	700 MH
262.1111111	SCREEN WASH PUMP+MOTOR	34x400
262.1111112	ROTATING MACHINERY	34x400
262.1114	PURIFICATION+FILTRATION EQ	
262.11141	TRAVELING SCREENS	
262.111411	CIRCULATING WATER PUMPS	12 EA
262.1114111	CIRCULATING WATER PUMPS	740x400
262.1114112	SCREEN WASH PUMPS	2 EA
262.1114113	SCREEN WASH PUMPS	64x600
262.1114114	TRAVELING SCREENS	804x400
262.1142	TRASH RACK	13 EA
262.1143	TRASH RACK	1 LT
262.1144	STOP LOGS	42x200
262.11441	CIRCULATING WATER PUMPS	1 LT
262.114411	CIRCULATING WATER PUMPS	486C MH

TABLE 2-4

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PLANT CODE      COST BASIS  
292            07776

COST ESTIMATE - 1200 MWe BOILING WATER REACTOR  
ONCE-THROUGH COOLING SYSTEM

03/01/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY		SITE			TOTAL	
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	MATERIAL COST	COSTS
262.1144.2	SCREEN WASH PUMPS			54 EA	540 MH	52033	972	
262.1144	STOP LOGS				5400 MH	502328	112502	612830
262.114	PURIFICATION+filtration ER	994.600		31555 MH	3892044	452373	124292017	
262.115	PIPING-SCREEN WASH							
262.1151	2 IN. + SMALLER							
262.1152	2.5 IN. + LARGER							
262.1152.1	CS/NNS	29060 LP	432590	1 LT	6975 MH	902400	92040	
262.1152	2.5 IN. + LARGER		432590		6975 MH	902400	92040	1432030
262.115	PIPING-SCREEN WASH		432590		6975 MH	902400	92040	1432030
262.116	VALVES-SCREEN WASH		1 LT	272600				
262.1162	CHECK							
262.1166	BLITTERFLY							272600
262.116	VALVES-SCREEN WASH			272600				
262.117	PIPING-MISC ITEMS							
262.1171	HANGERS + SUPPORTS	4360 LB	62540					
262.1172	INSULATION							
262.1173	SPECIALTIES							62540
262.117	PIPING-MISC ITEMS		62540					
262.11	WATER INTAKE EQUIPMENT	121062730		39230 MH	4882696	552338	126502764	

TABLE 2-4

PLANT CODE      COST BASIS  
292            07/76

COST ESTIMATE - 1200 MWe BOILING WATER REACTOR  
ONCE-THROUGH COOLING SYSTEM

PAGE 10  
03/01/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY QUANTITY	COSTS	SITE QUANTITY	LABOR HRS	LABOR COST	MATERIAL COST	TOTAL COSTS
262.12	CIRCULATING WATER SYSTEM							
262.121	ROTATING MACHINERY							
262.1211	CIRCULATING WATER PUMP+MTR	6 EA	1x650x000	1 LT	19920 MH	263x342	26x334	
262.12111	CIRC. WATER PUMP							
262.12112	CIRC. WATER PUMP MOTOR							
262.12111	CIRCULATING WATER PUMP+MTR		1x650x000		19920 MH	263x342	26x334	1,939x676
262.121	ROTATING MACHINERY		1x650x000		19920 MH	263x342	26x334	1,939x676
262.125	PIPE							
262.1251	2 IN + SMALLER							
262.1252	2.5 IN + LARGER							
262.12521	CONCRETEZINS	2487 LF	711x158	1 LT	9500 MH	121x752	12x175	
262.12522	CSZINS	122040 LR	183x060	1 LT	29290 MH	379x608	37x961	
262.1252	2.5 IN + LARGER		894x218		38790 MH	501x360	50x136	1,445x714
262.125	PIPE		894x218		38790 MH	501x360	50x136	1,445x714
262.126	VALVES							
262.1266	BUTTERFLY	18 EA	416x358	1 LT	1979 MH	25x652	2x565	
262.126	VALVES		416x358		1979 MH	25x652	2x565	444x575
262.127	PIPING / MISC. ITEMS							
262.1271	HANGERS + SUPPORTS							

TABLE 2-4

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PLANT CODE  
292 COST BASIS  
07/76COST ESTIMATE - 1200 MWe BOILING WATER REACTOR  
ONCE-THROUGH COOLING SYSTEM

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY				SITE			TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	MATERIAL COST		
262.1272	INSULATION								
262.1273	SPECIALTIES								
262.12731	EXPANSION JOINTS	1 LT	92,880	1 LT	82 MH	1,066		107	
262.1273	SPECIALTIES		92,880		82 MH	1,066		107	94,053
262.1274	PIPE TRENCHING								
262.12741	EXCAVATION								
262.127411	EARTH EXCAVATION			1642 CY	4105 MH	43,966	16,420		
262.127412	ROCK EXCAVATION			1764 CY	10752 MH	115,150	53,760		
262.12741	EXCAVATION				14852 MH	159,125	70,180	229,305	
262.12742	BACKFILL			1489 CY	4467 MH	44,455	14,890		
262.12743	COMPACTED SAND BED			6510 CY	6510 MH	64,789	39,060		
262.12744	SUBSTRUCTURE CONCRETE								
262.127441	FORMWORK			6080 SF	4865 MH	53,722	6,080		
262.127442	REINF STEEL			56 TN	1960 MH	25,311	22,400		
262.127443	CONCRETE			750 CY	1313 MH	13,410	26,250		
262.12744	SUBSTRUCTURE CONCRETE				8138 MH	92,443	54,730	147,173	
262.1274	PIPE TRENCHING				33972 MH	360,811	178,860	539,671	
262.127	PIPING / MISC. ITEMS		92,880		34054 MH	361,877	178,967	633,724	
262.128	INSTRUMENTATION + CONTROL	1 LT	8,025	1 LT	60 MH	733		37	
262.129	SKIDS / FOUNDATIONS								

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TABLE 2-4

PLANT COST	COST BASIS	PAGE	12
272	273	03FC1778	
<b>COST ESTIMATE - 1200 Mw BOILING WATER REACTOR ONCE-THROUGH COOLING SYSTEM</b>			
ACCT NO.	DESCRIPTION	UNIT	TOTAL COSTS
262.1201	COOLING SYSTEM	L.T.	105,350
262.1202	SUPPLY & DRAIN TOWER	L.T.	175,750
262.1203	COOLING SYSTEM	L.T.	166,831
262.130	DE-ICING SYSTEM	L.T.	260,000
262.131	4 CIRCUIT DE-ICING	M.H.	33,836
262.132	DE-ICING PIPES + VALVES	M.H.	186,000
262.133	DE-ICING PLATES + SCREWS	M.H.	1,186,000
262.134	DE-ICING PLATES	M.H.	26,403
262.135	DE-ICING PLATES	M.H.	24,212
262.136	DE-ICING PLATES	M.H.	24,212
262.137	DE-ICING PLATES + SCREWS + SCREWS	M.H.	130,340
262.138	ROTATING MACHINERY	M.H.	183,219
262.139	PIPELINE	M.H.	24,212
262.140	2 IN. + SMALLER	M.H.	24,212
262.141	2.5 IN. + LARGER	M.H.	24,212
262.142	4.0 LF	M.H.	24,212
262.143	4.5 IN. + LARGER	M.H.	24,212
262.144	5.0 IN. + LARGER	M.H.	24,212
262.145	PIPELINE	M.H.	24,212
262.146	VALUES	M.H.	24,212
262.147	EARTH EXCAVATION	M.H.	24,212
262.148	EARTH EXCAVATION	M.H.	24,212

## TABLE 2-4

PLANT CODE COSTS - 1200 Mw BOILING WATER REACTOR  
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 ONCE-THROUGH COOLING SYSTEM

ACCT NO.	ACCOUNT DESCRIPTION	UNIT QUANTITY	UNIT COST	Labor	Material Cost	TOTAL COST
262, 4672	REC RENT, SELL	1	752	752		752
262, 4673	R&R FUEL	6,5	283	2,385		2,383
262, 4677	DATA PROCESS	1,373	016	96,792	5,227	102,009
262, 4717	DETAILED DESIGN	1,420	016	6,2547		6,2547
262, 4721	STRUCTURE, ETC.	1,607,231	016	1,717,913		1,717,913
262,	GENERAL CONTRACT	1,607,231	016	1,717,913		1,717,913
262,	GENERAL CONTRACT	1,607,231	016	1,717,913		1,717,913
262,	GENERAL CONTRACT	1,607,231	016	1,717,913		1,717,913
262,	GENERAL CONTRACT	1,607,231	016	1,717,913		1,717,913
262,	GENERAL CONTRACT	1,607,231	016	1,717,913		1,717,913
262,	GENERAL CONTRACT	1,607,231	016	1,717,913		1,717,913
9	TOTAL INDIRECT COSTS			1,681,534	102,590,000	103,634,000
91	TOTAL INDIRECT COSTS	1 LR	57,905,000			
99	TOTAL INDIRECT COSTS	47,975,000		108,153,000	102,590,000	151,129,000
	TOTAL BASE COST		303,104,854	132,2811	158,472,236	106,868,192
						568,445,282

\*Detailed Cost Breakdown for Account Number 9., Indirect Costs for Mechanical Wet Towers, is in NUREG-0241 Report.

TABLE 2-5

COST ESTIMATE - 1200 Mw BOILING WATER REACTOR  
NATURAL DRAFT COOLING SYSTEM

Cost Basis		FACTORY			SITE			
Account Number	Description	Quantity	Cost	Quantity	Labor hrs.	Labor Cost	Material Cost	Total Costs
20 .	Land and Land Rights	500 AC					2,000,000	2,000,000
21 .	Structures and Improvements	4,270,053		5116054 MH	62,978,177	46,075,562	113,323,732	
22 .	Reactor Plant Equipment	90,832,138		2025520 MH	26,178,935	8,723,084	125,734,157	
23 .	Turbine Plant Equipment	87,185,179		1883231 MH	24,070,576	5,417,434	116,673,289	
24 .	Electric Plant Equipment *	13,603,714		1380899 MH	16,952,108	8,249,333	38,895,155	
25 .	Miscellaneous Plant Equipment	6,821,276		283036 MH	3,638,273	615,419	11,074,968	
26 .	Salt Conductivity Rejection System							
261.	Structures	96,693		104746 MH	1,209,739	785,750	2,092,182	
262.	Mechanical Equipment							
262.1	Heat Rejection System							
262.1.1	Water Intake Equipment							
262.1.11	Rotating Machinery	6,450		200 MH	2,543	264		
262.1.14	Particulation & Filtration Equip.	142,525		4760 MH	59,440	6,685		
262.1.15	Piping - Screen Wash	2,730		436 MH	5,654	565		
262.1.16	Valves - Screen Wash	12,900						
262.1.17	Piping - Miscellaneous Items	405						
262.1.11	Water Intake Equipment	165,110		5396 MH	67,737	7,514	240,361	
262.1.2	Circulating Water System							
262.1.21	Rotating Machinery	2,800,000		13400 MH	177,106	17,710		
262.1.25	Pipe	945,895		38958 MH	503,825	50,383		
262.1.26	Valves	420,000		1500 MH	19,441	1,944		
262.1.27	Piping - Miscellaneous Items			20065 MH	213,474	96,192		

\* Detailed cost breakdown for this account is found in Table 2-26

TABLE 2-5  
COST ESTIMATE - 1200 MWe BOILING WATER REACTOR  
NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/76		FACTORY		SITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hrs.	Labor Cost	Material Cost	Total Costs
262.128	Instrumentation and Control		5,350		45 MH	548		27
262.129	Skids/Foundations		60,200		1994 MH	25,860		3,142
262.12	Circulating Water System	4,231,445			75962 MH	940,254	169,398	5,341,097
262.13	<u>Cooling Towers</u>							
262.132	Heat Transfer Equipment		10,660,400		249500 MH	3,228,530	322,853	
262.138	Instrumentation and Control	36,000			350 MH	4,279		214
262.13	Cooling Towers		10,696,400		249850 MH	3,232,809	323,067	14,252,276
262.15	<u>Main Ct. Make-up &amp; Blowdown Sys.</u>							
262.151	Make-up Water System		507,059		6077 MH	69,759		17,953
262.152	Blowdown System		51,750		408 MH	5,216		512
262.153	Make-up Water Pretreatment System	925,000			38278 MH	495,200		99,040
262.15	Main Ct. Make-up & Blowdn. Sys.	1,483,809			44763 MH	570,175	117,505	2,171,489
262.	Mechanical Equipment	16,576,764			375971 MH	4,810,975	617,484	22,005,223
26 .	Main Cond. Ht. Reject. Sys.	16,673,457			480707 MH	6,020,714	1,403,234	24,097,405
2 .	Total Direct Costs	219,386,017			11369467 MH	139,838,683	72,484,006	431,708,706
29 .	Total Indirect Costs	98,034,000			1881533 MH	19,590,000	33,634,000	151,258,000
	Total Base Cost	317,420,017			13251000 MH	159,428,683	106,118,006	582,966,706

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\*Detailed Cost Breakdown for Account Number 9., Indirect Costs for Mechanical Wet Towers, is in NUREG-0241 Report.

TABLE 2-6

COST ESTIMATE - 1200 MEG BOILING WATER REACTOR  
FAN-ASSISTED NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/76		FACTORY		SITE		Total Cost	
Account Number	Description	Quantity	Cost \$	Quantity	Labor Hrs.	Labor Cost	Material Cost
20 .	Land and Land Rights	500 AC	5316054 MH	62,978,177	46,075,502	113,323,732	2,000,000
21 .	Structures and Improvements	4,270,053					2,000,000
22 .	Reactor Plant Equipment	90,832,138	202,520 MH	26,178,935	8,723,084	125,736,157	
23 .	Turbine Plant Equipment	87,185,379	188,251 MH	24,070,476	5,417,434	116,673,289	
24 .	Electric Plant Equipment*	14,147,017	147,134 MH	18,047,145	8,812,865	41,057,927	
25 .	Miscellaneous Plant Equipment	6,821,276	28,036 MH	3,633,273	615,419	11,074,968	
26 .	Main Condenser Heat Rejection System						
261 .	Structures	96,693	100,736 MH	1,209,739	785,750	2,092,182	
262 .	Mechanical Equipment						
262.1	Heat Rejection System						
262.11	Water Intake Equipment						
262.111	Rotating Machinery	6,450		200 MH	2,643	264	
262.114	Particulation & Filtration Equip.	142,625		4760 MH	59,440	6,685	
262.115	Piping - Screen Wash	2,730		436 MH	5,654	565	
262.116	Valves - Screen Wash	12,300					
262.117	Piping - Miscellaneous Items	405					
262.11	Water Intake Equipment	165,110		5,396 MH	67,737	7,514	240,361
262.12	Circulating Water System						
262.121	Rotating Machinery	2,538,132		13000 MH	171,819	17,182	
262.125	Pipe	1,100,476		4,073.3 MH	526,574	52,658	
262.126	Valves	420,000		1500 MH	19,441	3,944	
262.127	Piping - Miscellaneous Items	25755 MH		272,714		120,940	

\* Detailed cost breakdown for this account is found in Table 2-25

TABLE 2-6

COST ESTIMATE - 1200 Mw BOILING WATER REACTOR  
FAN-ASSISTED NATURAL DRAFT COOLING SYSTEM

Cost Basis		FACTORY				SITE			
Account Number	Description	Quantity	Costs	Quantity	Labor Hrs.	Labor Cost	Material Cost	Total Costs	
262.128	Instrumentation and Control	5,350		45 MH	548			27	
262.129	Skids/Foundations	60,200		1994 MH	25,860			3,142	
262.12	Circulating Water System	4,124,158		83027 MH	1,016,956			5,337,007	
262.13	Cooling Towers								
262.132	Heat Transfer Equipment	9,826,500		168603 MH	2,181,686			218,168	
262.138	Instrumentation and Control	53,950		451 MH	5,514			276	
262.13	Cooling Towers	9,880,450		169051 MH	2,187,198			12,286,092	
262.15	Main Cr. Make-up & Blowdown Sys.								
262.151	Make-up Water System	507,059		6077 MH	69,759			17,953	
262.152	Blowdown System	51,750		408 MH	5,716			512	
262.153	Make-up Water Pretreatment System	925,000		38278 MH	495,200			99,040	
262.15	Main Cr. Make-up & Blowdn. Sys.	1,483,809		44763 MH	570,175			117,505	
262.	Mechanical Equipment	15,653,527		302277 MH	3,842,066			539,356	
26 ,	Main Cond. Ht. Reject. Sys.	15,750,220		406973 MH	5,051,805			1,325,106	
2 ,	Total Direct Costs	219,006,083		1189168 MH	140,016,811			72,969,410	
2-9 ,	Total Indirect Costs	98,058,000		1881533 MH	19,590,000			33,634,000	
	Total Base Cost	317,064,083		13270701 MH	159,606,811			106,603,410	
								583,272,304	

\*Detailed Cost Breakdown for Account Number 9., Indirect Costs for Mechanical Wet Towers, is in NUREG-0241 Report.

## 2.5 1200 MWe HIGH SULFUR COAL-FIRED PLANT COOLING SYSTEMS

Design and cost data for the 1200 MWe high sulfur coal-fired plant alternate cooling systems are presented in this subsection.

### 2.5.1 Once-Through Cooling System Design Description

Following are the once-through design descriptions for Account 26 and other accounts impacted by a change from mechanical draft cooling towers to once-through cooling. Design descriptions for accounts not impacted by this change are presented in Reference 3.

#### ACCOUNT 233 Condensing System

##### Condenser Equipment

The two surface condenser are single stage one-pass design. The condensers are designed to handle the total heat rejection from the main turbine. Each condenser has a condensing surface of 208,200 sq ft; 19,110 one and 1/8 inch diameter tubes, 37 ft long, and 20 BWG 90-10 CuNi. Cooling water flow in each condenser is 377,500 gpm resulting in a tube velocity of 7.25 ft/sec and a temperature rise at full load of 15 F.

The balance of the condensing equipment are not affected by the once-through cooling system design and equipment descriptions are presented in Reference 3.

#### ACCOUNT 261 Structures

Intake and discharge structures are located along the river bank west of the main plant structures. The intake basin is 170 ft long, 46 ft wide and 50 ft deep and is entirely below plant grade. The volume of the basin is approximately 391,000 cu ft. Attached to the north end of the structure

is a service water pump basin founded 30 ft below grade. The structure is reinforced concrete with foundation mat bearing on rock. There are six circulating 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 of reinforced masonry concrete. Portions of the operating floor are graded. A 750 sq ft electrical equipment room 13 ft high is located at grade adjacent to the basin.

The hot circulating water is discharged back to the river through a discharge canal. Discharge occurs sufficiently downstream of the intake to minimize recirculation.

#### Circulating Water Discharge Tunnel and Canal

The circulating water discharge tunnel begins in the turbine building at the condenser outlets and runs outside where it is channeled into the discharge canal. The tunnel is a reinforced concrete box structure 42 ft wide and 14 ft high inside.

The discharge canal is an extension of the tunnel which discharges into the North River 350 ft south of the intake structure. The canal is a reinforced concrete structure, with a flat bottom, vertical walls, and open top. The canal is 42 ft wide with walls 20 ft high. At the river, the canal widens, and the bottom slopes up to insure sufficient water in the canal at all times for maintaining a seal for the circulating water system.

## ACCOUNT 262 Mechanical Equipment

### Circulating Water Pumps

There are six 16.7 percent capacity circulating water pumps, of the mixed flow vertical type. Each pump is designed for 125,840 gpm with a total dynamic head of 27 ft. Circulating water pump motors are 1,250 hp each, operating at a synchronous speed of 400 rpm. The pumps discharge the water to the main condensers where heat is absorbed. The water is then discharged through a tunnel and canal, and back to the river.

### Circulating Water Intake System

Twelve traveling screens are provided to remove twigs, leaves and other debris from the river water. The traveling screens are 12 ft wide by 45 ft long. They are sized to give a water velocity of 0.5 ft/sec at mean low water. Serving the traveling screens are two 100 percent capacity screen wash pumps with a flow rate of 2,950 gpm and a total dynamic head of 100 ft to wash the screens, when they require cleaning. Vertical trash racks with an automatic rake are provided ahead of the traveling screens. Each screen well is provided with stop logs to allow dewatering (two screens and one pump) for maintenance purposes. To protect the traveling screens against ice during freezing water conditions, two vertical de-icing motor driven pumps each designed for a flowrate of 22,650 gpm at 35 ft head are used to pump warm water from the condenser discharge to the screens.

## 2.5.2 Natural Draft Towers

### ACCOUNT 26 MAIN CONDENSER HEAT REJECTION SYSTEM

#### ACCOUNT 261 Structures

All of the structures required for the natural draft tower are of identical design to those designed for the mechanical draft towers. Design descriptions for the makeup water intake and discharge structures, circulating water pumphouse and makeup water pretreatment building, are presented in the mechanical draft wet tower system description.

#### ACCOUNT 262 Mechanical Equipment

There are four 25 percent capacity circulating water pumps of the mixed flow vertical type. Each pump is designed for a flowrate of 111,000 gpm with a total dynamic head of 102 ft. Circulating water pump motors are 3500 hp each, operating at a synchronous speed of 400 rpm.

#### Cooling Towers

There is one natural draft tower designed to cool the entire circulating water flow of 460,000 gpm from 118 F to 92 F when operating at wet bulb and dry bulb temperatures of 74 F and 93 F, respectively. To provide the draft required for airflow, the tower employs a reinforced concrete hyperbolic shell 513 ft high. At the base the diameter is 396 ft. Other design characteristics of the natural draft tower are in the subsection 2.3.2 which describes the PWR's natural draft cooling system.

#### Main Cooling Tower Makeup and Blowdown Systems

The makeup water requirements are the same at the design condition for

the natural draft tower as the mechanical draft towers. This allows the use of identical makeup and blowdown facilities, as designed for the mechanical draft tower.

### 2.5.3 Fan-Assisted Natural Draft Towers

#### ACCOUNT 26 MAIN CONDENSER HEAT REJECTION SYSTEM

##### ACCOUNT 261 Structures

All of the structures required for the fan-assisted natural draft towers are of identical design to those designed for the mechanical draft towers. Design descriptions for the makeup water intake and discharge structures, circulating water pumphouse and makeup water pretreatment building, are presented in the mechanical draft tower system description.

#### ACCOUNT 262 Mechanical Equipment

##### Circulating Water Pumps

There are four 25 percent capacity circulating water pumps of the mixed flow vertical type. Each pump is designed for a flowrate of 111,000 gpm with a total dynamic head of 87 ft. Circulating water pump motors are 3,000 hp each, operating at a synchronous speed of 400 rpm.

##### Cooling Towers

There are two fan-assisted natural draft wet cooling towers each sized for one half of the requirements. Each tower is designed to cool 230,000 gpm of water from 118 F to 92 F when operating at a wet bulb of 74 F. Each tower has a base diameter of 207 ft and an overall height of 175 ft. Twenty 28 ft diameter fans are positioned about the periphery of each

tower's base. Other design characteristics of the fan-assisted natural draft tower are as described in subsection 2.3.3 for the PWR's fan-assisted natural draft cooling system.

TABLE 2-7

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PLANT CODE  
698 COST BASIS  
07/76COST ESTIMATE - 1200 MWe HIGH SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

03/01/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY QUANTITY	COSTS	FACTORY QUANTITY	LABOR HRS	SITE LABOR COST	MATERIAL COST	TOTAL COSTS
<hr/>								
2	TOTAL DIRECT COSTS							
20	LAND AND LAND RIGHTS			1 LT				2,000,000
21	STRUCTURES + IMPROVEMENTS	1 LT	2,555,560	1 LT	1453304 MH	17,106,860	27,524,930	
221	BOILER PLANT EQUIPMENT (1)	1 LT	52,660,980	1 LT	1801944 MH	22,706,540	8,386,420	
222	BOILER PLANT EQUIPMENT (2)	1 LT	52,660,980	1 LT	1801944 MH	22,706,540	8,386,420	
23	TURBINE PLANT EQUIPMENT*	1 LT	78,473,940	1 LT	1821069 MH	23,273,260	5,248,630	
24	ELECTRIC PLANT EQUIPMENT*	1 LT	8,629,170	1 LT	1202431 MH	14,752,240	8,919,270	
25	MISCELLANEOUS PLANT EQUIPT	1 LT	5,722,267	1 LT	259176 MH	3,323,701	811,186	
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			3125 CY	781 MH	9,130	3,125	
261.1112	ROCK EXCAVATION			12200 CY	9760 MH	114,095	48,800	
261.1113	SHEETING (TEMP COFFERDAM)			130 TN	2600 MH	35,672	22,100	
261.1114	STRCT STL (TEMP COFFERDAM)							
261.1115	PUMPING			1 LT	7250 MH	67,570	68,000	
261.111	EXCAVATION WORK				20391 MH	226,467	142,025	368,492
261.112	BEARING PILES (STEEL)							
261.113	SLESTRUCTURE CONCRETE							

\* Detailed breakdown for these accounts are found in Table 2-27 and 2-28 respectively

TABLE 2-7

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PLANT CODE 698	COST BASIS 07/76	COST ESTIMATE - 1200 MWe HIGH SULFUR COAL PLANT ONCE-THROUGH COOLING SYSTEM				PAGE 03/01/78		
ACCT NO.	ACCOUNT DESCRIPTION	FACTORY QUANTITY	COSTS	SITE QUANTITY	LABOR HRS	LABOR COST	MATERIAL COST	TOTAL COSTS
261.1131	FORMWORK			78800 SF	31520 MH	348,056	78,800	
261.1132	REINFORCING STEEL			330 TN	8251 MH	106,546	123,750	
261.1133	CONCRETE			4400 CY	3300 MH	33,700	140,800	
261.1134	EMBEDDED STEEL			22 TN	2750 MH	33,073	30,800	
261.1135	CONCRETE FINISH			44000 SF	440 MH	4,494	440	
261.1136	WATERPROOFING							
261.1137	CONSTRUCTION JOINTS			1091 SF	1092 MH	12,058	1,091	
261.1138	RIBBING CONCRETE SURFACES							
261.113	SUBSTRUCTURE CONCRETE				47353 MH	537,927	375,681	913,608
261.114	SUPERSTRUCTURE							
261.1141	CONCRETE WORK							
261.1142	STRUCTURAL + MISC. STEEL							
261.11421	STRUCTURAL STEEL							
261.11422	GRATING (GALV)			975 SF	166 MH	2,162	2,925	
261.11423	HANDRAIL			225 LF	135 MH	1,757	2,250	
261.1142	STRUCTURAL + MISC. STEEL				301 MH	3,919	5,175	9,094
261.1143	EXTERIOR WALLS							
261.11431	CONCRETE							
261.11432	MASONRY			1375 SF	344 MH	3,925	3,850	
261.1143	EXTERIOR WALLS				366 MH	3,925	3,850	7,775
261.1144	ROOF DECK							

TABLE 2-7

PLANT CODE      COST BASIS  
698            07/76

COST ESTIMATE - 1200 MWe HIGH SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

PAGE      3  
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ACCT NO.	ACCOUNT DESCRIPTION	FACTORY		SITE			TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	
261.11441	METAL ROOF DECK			750 SF	45 MH	586	750
	261.1144    ROOF DECK				45 MH	586	750
261.1145	RCCFNG + FLASHING						
261.11451	B.LL. ROOFING + INSULTN + FLG			750 SF	53 MH	714	938
	261.1145    ROOFING + FLASHING				53 MH	714	938
261.1146	INTERIOR WALLS						
261.11461	CONCRETE WALLS						
261.11462	MASONRY WALLS			250 SF	60 MH	685	700
261.11463	PARTITIONS						
	261.1146    INTERIOR WALLS				60 MH	685	700
261.1147	DOORS + WINDOWS						
261.11471	ROLLING STEEL DOORS			100 SF	50 MH	651	1,400
261.11472	PERSONNEL DOORS			96 SF	67 MH	777	1,152
261.11473	SASH + GLAZING						
	261.1147    DOORS + WINDOWS				117 MH	1,428	2,552
261.1149	PAINTING						
261.11491	CONCRETE						
261.11492	STEELWORK			22 TN	110 MH	1,053	132
261.11493	METAL DECK			750 SF	15 MH	144	150
261.11494	HANDRAIL			200 LF	40 MH	383	20
	261.1149    PAINTING				165 MH	1,580	302
							1,882

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TABLE 2-7

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PLANT CODE      COST BASIS  
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COST ESTIMATE - 1200 MWe HIGH SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

03/01/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY		SITE			TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	
261.114	SUPERSTRUCTURE			1085 MH	12x837	14x267	27x104
261.117	BULKHEAD						
261.1171	STEEL SHEETING			65 TN	650 MH	8x918	22x750
261.1172	STRUCTURAL STEEL			4 TN	60 MH	782	2x900
261.1173	GRAVEL FILL						
261.1174	DREDGING			19710 CY	3942 MH	49x196	39x420
261.1175	RIF-RAP (12 IN. THICK)			215 CY	323 MH	3x216	2x150
261.1176	CHAIN LINK FENCE(7FT HIGH)			413 LF	124 MH	1x156	2x685
261.117	BULKHEAD			5,99 MH	63x268	69x905	133x173
261.118	PROTECTIVE DOLPHINS						
261.1181	WOOD FILES			2450 LF	490 MH	6x723	9x800
261.118	PROTECTIVE DOLPHINS				490 MH	6x723	9x800
261.119	BUILDING SERVICES						
261.1191	PLUMBING + DRAINS			5 EA	625 MH	8x099	5x000
261.1192	HEATING + VENTILATING	1 LT	3x400	1 LT	193 MH	2x494	249
261.1193	LIGHTING + SERVICE POWER			750 SF	226 MH	2x779	1x350
261.119	BUILDING SERVICES		3x400		1044 MH	13x372	6x599
261.11	INTAKE STRUCTURE		3x400		75562 MH	860x594	618x277
261.1	MAKEUP WTR INT + DISCH STR		3x400		75462 MH	860x594	618x277
261.4	CHLORINATION BUILDING						

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PLANT CODE      COST BASIS  
698            07/76

COST ESTIMATE - 1200 MWe HIGH SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

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ACCT NO.	ACCOUNT DESCRIPTION	FACTORY		SITE			TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	
261.41	BUILDING STRUCTURE						
261.411	EXCAVATION WORK						
261.4111	EARTH EXCAVATION	53 CY		13 MH		140	53
261.4114	BACKFILL	41 CY		12 MH		118	41
261.4115	EXCAVATION WORK			25 MH		258	94
261.413	SUPERSTRUCTURE CONCRETE						
261.4131	FORMWORK	216 SF		85 MH		938	216
261.4132	REINF. STEEL	2 TN		51 MH		657	750
261.4133	CONCRETE	12 CY		9 MH		91	384
261.4134	EMBEDDED STEEL						
261.4135	FLLOOR FINISH	105 SF		1 MH		9	1
261.4136	WATERPROOFING						
261.4137	CONSTRUCTION JOINTS	50 SF		50 MH		552	50
261.4138	FLUEING CONCRETE SURFACES						
261.4139	WIRE FABRIC	105 SF		2 MH		27	13
261.4135	SUBSTRUCTURE CONCRETE			198 MH		2,274	1,614
261.414	SUPERSTRUCTURE						
261.4141	CONCRETE WORK						
261.4142	STRUCT. + MISC. STEEL						
261.41421	STRUCT. STEEL						
261.41423	MISC. FRAMES, ETC.	2 TN		100 MH		1,302	2,200

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PLANT CODE 698	COST BASIS 07/78	COST ESTIMATE - 1200 MWe HIGH SULFUR COAL PLANT ONCE-THROUGH COOLING SYSTEM				PAGE 03/01/78		
ACCT NO.	ACCOUNT DESCRIPTION	FACTORY QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	MATERIAL COST	TOTAL COSTS
	261.4142 STRUCT. + MISC. STEEL			100 MH	1x302	2x200		3x502
	261.4143 EXTERIOR WALLS							
	261.4143.2 MASONRY			310 SF	78 MH	890		868
	261.4143.3 EXTERIOR WALLS				78 MH	890		758
	261.4144 ROOF DECK							
	261.4144.1 METAL ROOF DECK			170 SF	10 MH	131		170
	261.4144.2 ROOF DECK				10 MH	131		170
	261.4145 ROOFING + FLASHING							
261.4145.1	BUL. ROOFING+FLASHING+INSUL			170 SF	12 MH	162		213
	261.4145.2 ROOFING + FLASHING				12 MH	162		213
	261.4147 DOORS + WINDOWS							
	261.4147.2 PERSONNEL DOORS			50 SF	35 MH	406		600
	261.4147.3 SASH + GLAZING			25 SF	10 MH	116		300
	261.4147.4 DOORS + WINDOWS				45 MH	522		900
	261.4149 PAINTING							
	261.4149.2 STEELWORK			2 TN	10 MH	96		12
	261.4149.3 METAL DECK			170 SF	3 MH	29		17
	261.4149.4 PAINTING				13 MH	125		29
	261.414 SUPERSTRUCTURE			258 MH	3x132	4x380		7x512

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PLANT CODE      COST BASIS  
698            07/76

COST ESTIMATE - 1200 MWe HIGH SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

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ACCT NO.	ACCOUNT DESCRIPTION	FACTORY	*****	SITE	*****	TOTAL	
		QUANTITY	COSTS	QUANTITY	LABOR HRS	MATERIAL COST	COSTS
261.41	BUILDING STRUCTURE			481 MH	5x664	5x888	11x552
261.424	LIGHTING + SERVICE POWER						
261.4	CHLORINATION BUILDING			481 MH	5x664	5x888	11x552
261.5	DISCHARGE TUNNEL + CANAL						
261.51	EXCAVATION						
261.511	EARTH EXCAVATION	21200 CY	5300 MH	56x765	21x200		
261.512	ROCK EXCAVATION	27500 CY	22000 MH	235x628	110x000		
261.514	BACKFILL	10630 CY	3189 MH	34x155	10x630		
261.515	Dewatering						
261.51	EXCAVATION			30489 MH	326x048	141x830	468x378
261.53	SUPERSTRUCTURE CONCRETE						
261.531	FORMWORK	104000 SF	41600 MH	459x364	104x000		
261.532	REINFORCING STEEL	780 TN	19500 MH	251x810	312x000		
261.533	CONCRETE	10400 CY	7800 MH	79x654	364x000		
261.534	EMBEDDED STEEL						
261.535	FLOOR FINISH						
261.536	WATERPROOFING						
261.537	CONSTRUCTION JOINTS	5400 SF	5400 MH	59x629	5x400		
261.538	RUBBING CONCRETE SURFACES						
261.53	SUBSTRUCTURE CONCRETE			74300 MH	850x457	785x460	1x635x857
261.5	DISCHARGE TUNNEL + CANAL			104789 MH	1x177x005	927x230	2x104x235

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PLANT CODE	COST BASIS	PAGE
698	07/76	03/01/78
261.	STRUCTURES	3,400 180732 MH 2,063 1,551,395 3,598,058
262.	MECHANICAL EQUIPMENT	
262.1	HEAT REJECTION SYSTEM	
262.11	WATER INTAKE EQUIPMENT	
262.111	ROTATING MACHINERY	
262.1111	SCREEN WASH PUMP+MOTOR	2 EA 32,000 1 LT 61C MH 8,002 806
262.11111	SCREEN WASH PUMP	
2-65	262.11112 SCREEN WASH PUMP MOTOR	32,000 61C MH 8,002 806
262.11111	SCREEN WASH PUMP+MOTOR	32,000 61C MH 8,002 806
262.11111	ROTATING MACHINERY	32,000 61C MH 8,002 806
262.114	PURIFICATION+FILTRATION EQ	
262.1141	TRAVELING SCREENS	
262.11411	CIRCULATING WATER PUMPS	12 EA 672,000 1 LT 19800 MH 256,152 25x615
262.11412	SCREEN WASH PUMPS	2 EA 62,000 1 LT 600 MH 7,761 776
262.1141	TRAVELING SCREENS	734,000 20400 MH 263,913 26x391
262.1142	TRASH RACK	13 EA 113,100 1 LT 3418 MH 44,696 4x450
262.1143	TRASH RAKE	1 LT 42,000 1 LT 800 MH 10,350 1x355
262.1144	STOP LOGS	
262.11441	CIRCULATING WATER PUMPS	288 EA 4320 MH 40,262 9x360

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PLANT CODE COST BASIS  
698 07776COST ESTIMATE - 1200 MWe HIGH SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

03/01/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY COSTS	QUANTITY	SITE LABOR HRS	LABOR COST	MATERIAL COST	TOTAL COSTS
262.11442	SCREEN WASH PUMPS		48 EA	480 MH	42,474	864	
262.1144	STOP LOGS			4800 MH	44,736	10,224	54,960
262.114	PURIFICATION+filtration eq	889,100		29418 MH	223,495	42,100	1,294,695
262.115	PIPING-SCREEN WASH						
262.1151	2 IN. + SMALLER						
262.1152	2.5 IN. + LARGER						
262.11521	CS/NNS	24910 LB	37x365	1 LT	3736 MH	48,423	4842
262.1152	2.5 IN. + LARGER		37x365		3736 MH	48,423	4842
262.115	PIPING-SCREEN WASH		37x365		3736 MH	48,423	4842
262.116	VALVES-SCREEN WASH		1 LT	22x680			
262.1162	CHECK						
262.1166	BUTTERFLY						
262.116	VALVES-SCREEN WASH		22x680				22x680
262.117	PIPING-MISC ITEMS						
262.1171	HANGERS + SUPPORTS	3740 LB		5x610			
262.1172	INSULATION						
262.1173	SPECIALTIES						
262.117	PIPING-MISC ITEMS		5x610				5x610
262.11	WATER INTAKE EQUIPMENT	986x255		33764 MH	419,980	47x748	1,454,483

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PLANT CODE  
698 COST BASIS  
07/76

COST ESTIMATE - 1200 MWe HIGH SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

03/01/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY		SITE			TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	
<hr/>							
262.12	CIRCULATING WATER SYSTEM						
<hr/>							
262.121	ROTATING MACHINERY						
262.1211	CIRCULATING WATER PUMP+MTR	6 EA	1,302,000	1 LT	16259 MH	214,892	214,892
<hr/>							
262.12111	CIRC WATER PUMP						
262.12112	CIRC WATER PUMP MOTOR						
262.1211	CIRCULATING WATER PUMP+MTR		1,302,000		16259 MH	214,892	214,892
<hr/>							
262.121	ROTATING MACHINERY		1,302,000		16259 MH	214,892	214,892
<hr/>							
262.125	PIPE						
<hr/>							
262.1251	2 IN + SMALLER						
262.1252	2.5 IN + LARGER						
262.12521	CONCRETE/NNS	1866 LF	454,408	1 LT	6306 MH	80,820	80,820
262.12522	CS/NNS	113914 LB	170,871	1 LT	17087 MH	221,455	221,455
262.1252	2.5 IN + LARGER		625,279		23393 MH	302,275	302,275
<hr/>							
262.125	PIPE		625,279		23393 MH	302,275	302,275
<hr/>							
262.126	VALVES						
262.1266	BUTTERFLY	12 EA	238,332	1 LT	1097 MH	14,217	14,222
262.126	VALVES		238,332		1097 MH	14,217	14,222
<hr/>							
262.127	PIPING / MISCELLANEOUS ITEMS						
<hr/>							
262.1271	HANGERS + SUPPORTS						

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PLANT CODE      COST BASIS  
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COST ESTIMATE - 1200 MWe HIGH SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

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ACCT NO.	ACCOUNT DESCRIPTION	***** FACTORY *****	*****	***** SITE *****		TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST MATERIAL COST
262.1272	INSULATION					
262.1273	SPECIALTIES					
262.12731	EXPANSION JOINTS	1 LT	60x180	1 LT	75 MH	974 97
262.1273	SPECIALTIES		60x180		75 MH	974 97 61x251
262.1274	PIPE TRENCHING					
262.12741	EXCAVATION					
262.127411	EARTH EXCAVATION		8868 CY	2217 MH	23x743	8x868
262.127412	ROCK EXCAVATION		8157 CY	4925 MH	52x749	24x828
262.12741	EXCAVATION			7142 MH	76x492	33x498 109x988
262.12742	BACKFILL		8326 CY	2498 MH	24x861	8x326
262.12743	COMPACTED SAND		3583 CY	3583 MH	35x619	21x498
262.12744	SLESTRUCTURE CONCRETE					
262.127441	FORMWORK		4100 SF	1640 MH	18x111	4x100
262.127442	REINF STEEL		38 TN	951 MH	12x278	15x200
262.127443	CONCRETE		506 CY	380 MH	3x880	17x710
262.12744	SUBSTRUCTURE CONCRETE			2971 MH	34x269	37x010 71x279
262.1274	PIPE TRENCHING			16744 MH	171x281	100x330 271x611
262.127	PIPING / MISCELLANEOUS ITEMS	60x180		16269 MH	172x255	100x427 332x862
262.128	INSTRUMENTATION + CONTROL	1 LT	8x025	1 LT	60 MH	733 37
262.129	SKIDS / FOUNDATIONS					

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PLANT CODE 698	COST BASIS 07/76	COST ESTIMATE - 1200 MWe HIGH SULFUR COAL PLANT ONCE-THROUGH COOLING SYSTEM					PAGE 03/01/78
ACCT NO.	ACCOUNT DESCRIPTION	***** FACTORY *****	*****	SITE	*****	*****	TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	MATERIAL COST
262.1291	CHLORINATION SYSTEM	1 LT	105x350	1 LT	2600 MH	33x636	3x364
262.129	SKIDS / FOUNDATIONS		105x350		2600 MH	33x636	3x364
262.12	CIRCULATING WATER SYSTEM		2x339x166		59678 MH	738x008	156x967
262.16	DE-ICING SYSTEM						3x234x141
262.161	ROTATING MACHINERY						
262.1611	DE-ICING PUMPS + MOTORS	2 EA	63x300	1 LT	1423 MH	18x808	1x881
262.16111	DE-ICING PUMPS						
262.16112	DE-ICING PUMP MOTORS						
262.169	262.1611 DE-ICING PUMPS + MOTORS		63x300		1423 MH	18x808	1x881
	262.161 ROTATING MACHINERY		63x300		1423 MH	18x808	1x881
262.165	PIPING						83x989
262.1651	2 IN. + SMALLER						
262.1652	2.5 IN. + LARGER						
262.16521	CONCRETE	700 LF	16x471	1 LT	239 MH	3x063	306
262.1652	2.5 IN. + LARGER		16x471		239 MH	3x063	306
262.165	PIPING		16x471		239 MH	3x063	306
262.166	VALVES	2 EA	14x000		74 MH	961	
262.167	EXCAVATION						
262.1671	EARTH EXCAVATION			4036 CY	1005 MH	10x807	4x038

TABLE 2-7

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PLANT CODE 698	COST BASIS 07/76	COST ESTIMATE - 1200 MWe HIGH SULFUR COAL PLANT ONCE-THROUGH COOLING SYSTEM				PAGE 03/01/78
ACCT NO.	ACCOUNT DESCRIPTION	***** FACTORY ***** QUANTITY	***** COSTS *****	***** SITE ***** QUANTITY LABOR HRS	LABOR COST MATERIAL COST	TOTAL COSTS
262.1672	ROCK EXCAVATION			226 CY 181 MH	1x939	904
262.1673	PACKFILL			4141 CY 1243 MH	13x314	4x141
262.1L	EXCAVATION			2433 MH	26x060	9x083
262.16	DE-ICING SYSTEM		93x771	4169 MH	48x892	11x270
262.1	HEAT REJECTION SYSTEM		3x419x692	97611 MH	1x206x880	215x985
262.	MECHANICAL EQUIPMENT		3x419x692	97611 MH	1x206x880	215x985
262.	MAIN COND HEAT REJECT SYS		3x423x092	278343 MH	3x250x143	1x767x380
2	TOTAL DIRECT COSTS		204x125x989	8618211 MH	107x119x284	63x044x236
2-70						374x289x509
9	TOTAL INDIRECT COSTS					
91.	TOTAL INDIRECT COSTS	1 LT	53x351x000	1 LT 1270000 MH	13x250x000	12x620x000
*9	TOTAL INDIRECT COSTS		53x351x000	1270000 MH	13x250x000	12x620x000
	TOTAL BASE COST		257x476x989	9888211 MH	120x369x284	75x664x236
						453x510x509

\*Detailed Cost Breakdown for Account Number 9., Indirect Costs for Mechanical Wet Towers, is in NUREG-0241 Report.

TABLE 2-8  
COST ESTIMATE - 1200 MWe HIGH SULFUR COAL PLANT  
NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/76		FACTORY		SITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hrs.	Labor Cost	Material Cost	Total Costs
20 .	Land and Land Rights			500 AC			2,000,000	2,000,000
21 .	Structures and Improvements	2,555,564		1453304 MH	17,106,859	27,524,934	47,187,357	
22 .	Boiler Plant Equipment	105,321,960		3603888 MH	45,413,075	16,772,845	167,507,880	
23 .	Turbine Plant Equipment	81,230,723		1853747 MH	23,706,125	5,291,549	110,228,397	
24 .	Electric Plant Equipment*	8,674,213		1203150 MH	14,760,464	8,949,691	32,384,368	
25 .	Miscellaneous Plant Equipment	5,722,267		259176 MH	3,323,701	811,186	9,857,154	
26 .	Main Condenser Heat Reject System							
261.	Structures	89,971		63552 MH	740,739	674,982	1,505,692	
262.	Mechanical Equipment							
262.1	Heat Rejection System							
262.11	Water Intake Equipment							
262.111	Rotating Machinery	2,500		159 MH	2,101	210		
262.114	Purification & Filtration Equip.	131,450		4739 MH	59,171	6,658		
262.115	Piping - Screen Wash	2,730		273 MH	3,539	354		
262.116	Valves - Screen Wash	12,900						
262.117	Piping - Miscellaneous Items	405						
262.11	Water Intake Equipment	149,985		5171 MH	64,811	7,222	222,018	
262.12	Circulating Water System							
262.121	Rotating Machinery	1,956,000		11200 MH	148,029	14,803		
262.125	Pipe	695,639		21513 MH	278,005	27,800		
262.126	Valves	289,600		751 MH	9,731	973		
262.127	Piping - Miscellaneous Items			12312 MH	130,264	68,965		

\* Detailed cost breakdown for this account is found in Table 2-30

TABLE 2-8  
COST ESTIMATE - 1200 MWe HIGH SULFUR COAL PLANT  
NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/76		FACTORY		SITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hrs.	Labor Cost	Material Cost	Total Costs
262.128	Instrumentation and Control		\$ 4,350		45.801	548	27	
262.129	Skids/Foundations		54,825		1646 MH	21,329	2,880	
262.12	Circulating Water System	3,001,414			47467 MH	587,906	115,448	3,074,768
262.13	<u>Cooling Towers</u>							
262.132	Heat Transfer Equipment		8,551,772		204180 MH	2,642,115	264,212	
262.138	Instrumentation and Control		36,000		350 MH	4,279	214	
262.13	Cooling Towers		8,857,772		204530 MH	2,646,394	264,426	11,498,592
262.15	<u>Main Ct. Make-up &amp; Blowdown Sys.</u>							
262.151	Make-up Water System		389,642		9930 MH	108,172	31,612	
262.152	Blowdown System		48,950		351 MH	4,487	439	
262.153	Make-up Water Pretreatment System		736,000		32000 MH	413,981	82,796	
262.15	Main Ct. Make-up & Blowdn. Sys.		1,174,592		42281 MH	526,640	114,647	1,815,879
262.	Mechanical Equipment		12,913,763		299449 MH	3,825,571	501,743	17,241,257
26 .	Main Cond. Ht. Reject. Sys.		13,003,734		363001 MH	4,566,490	1,176,725	18,746,949
2 .	Total Direct Costs		216,508,461		8736266 MH	108,876,714	62,526,930	387,912,105
*9 .	Total Indirect Costs		53,588,000		1270000 MH	13,250,000	12,620,000	79,458,000
	Total Base Cost		270,096,461		10006266 MH	122,126,714	75,146,930	467,370,105

\*Detailed Cost Breakdown for Account Number 9., Indirect Costs for Mechanical Wet Towers, is in NUREG-0241 Report.

TABLE 2-9

COST ESTIMATE - 1200 MWe HIGH SULFUR COAL PLANT  
FAN-ASSISTED NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/76		FACTORY		SITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hrs.	Labor Cost	Material Cost	Total Costs
20 .	Land and Land Rights			500 AC			2,000,000	2,000,000
21 .	Structures and Improvements		2,555,564		1453304 MH	17,106,859	27,524,934	47,187,357
22 .	Boiler Plant Equipment		105,321,960		3603888 MH	45,413,075	16,772,845	167,502,880
23 .	Turbine Plant Equipment		81,230,723		1853747 MH	23,706,125	5,291,549	110,228,397
24 .	Electric Plant Equipment*		9,122,078		1252348 MH	15,364,238	9,325,723	33,812,039
25 .	Miscellaneous Plant Equipment		5,722,267		259176 MH	3,323,701	811,186	9,857,154
26 .	Main Condenser Heat Reject System							
261.	Structures		89,971		63552 MH	740,739	674,982	1,505,692
262.	Mechanical Equipment							
262.1	Heat Rejection System							
262.11	Water Intake Equipment							
262.111	Rotating Machinery	*	2,500		159 MH	2,101	210	
262.114	Purification & Filtration Equip.		131,450		4739 MH	59,171	6,658	
262.115	Piping - Screen Wash		2,730		273 MH	3,539	354	
262.116	Valves - Screen Wash		12,900					
262.117	Piping - Miscellaneous Items		405					
262.11	Water Intake Equipment		149,985		5171 MH	64,811	7,222	222,018
262.12	Circulating Water System							
262.121	Rotating Machinery		1,796,000		10800 MH	142,742	14,274	
262.125	Pipe		838,832		24154 MH	311,851	31,185	
262.126	Valves		289,600		751 MH	9,731	973	
262.127	Piping - Miscellaneous Items				20988 MH	220,581	107,000	

\* Detailed cost breakdown for this account is found in Table 2-29

TABLE 2-9

COST ESTIMATE - 1200 MGE HIGH SULFUR COAL PLANT  
FAN-ASSISTED NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/76		FACTORY-----			SITE-----			Cost Basis 7/76	
Account Number	Description	Quantity	Costs	Quantity	Labor Hrs.	Labor Cost	Material Cost	Total Costs	
262.128	Instrumentation and Control	5,350		45 MH	548			27	
262.129	Skids/Foundations	54,825		1646 MH	21,329		2,880		
262.12	Circulating Water System	2,986,607		58386 MH	706,782	156,339		3,847,728	
262.13	Cooling Towers								
262.132	Heat Transfer Equipment	7,621,200		132260 MH	1,710,700			171,070	
262.138	Instrumentation and Control	53,950		451 MH	5,514			276	
262.13	Cooling Towers	7,675,150		132651 MH	1,716,214	171,346		9,362,710	
262.15	Main Cr., Make-up & Blowdown Sys.								
262.151	Make-up Water System	389,642		9830 MH	108,172			31,412	
262.152	Blowdown System	48,950		351 MH	4,487			439	
262.153	Make-up Water Pretreatment System	736,000		320000 MH	413,981			82,796	
262.15	Main Cr., Makeup & Blowdn. Sys.	1,174,592		42281 MH	526,640	114,647		1,815,879	
262.	Mechanical Equipment	11,934,334		238487 MH	3,014,447	449,554		15,448,335	
26 .	Main Cond. Ht. Reject. Sys.	12,074,305		302939 MH	3,755,186	1,124,536		16,954,027	
2 .	Total Direct Costs	216,026,897		8724502 MH	108,669,184	62,850,773		387,346,854	
*9 .	Total Indirect Costs	53,560,000		1270000 MH	13,250,000	12,620,000		79,430,000	
	Total Base Cost	269,586,897		9994502 MH	121,919,184	75,470,773		466,976,854	

\*Detailed Cost Breakdown for Account Number 9., Indirect Costs for Mechanical Wet Towers, is in NUREG-0241 Report.

2.6 1200 MWe LOW SULFUR COAL-FIRED PLANT COOLING SYSTEMS The cooling requirements for this plant are identical to the requirements of the 1200 MWe high sulfur coal-fired plant. Hence, the design of the alternate cooling systems remain identical and are as presented in subsection 2.5.

TABLE 2-10

PLANT CODE 698	COST BASIS 07/76	COST ESTIMATE - 1200 MWe LOW SULFUR COAL PLANT ONCE-THROUGH COOLING SYSTEM					PAGE 1 03/02/78	
ACCT NO.	ACCOUNT DESCRIPTION	***** FACTORY ***** QUANTITY	***** COSTS ***** COSTS	***** SITE ***** QUANTITY	LABOR HRS	LABOR COST	MATERIAL COST	TOTAL COSTS
<b>2 . TOTAL DIRECT COSTS</b>								
20 .	LAND AND LAND RIGHTS			1 LT				2,000,000
21 .	STRUCTURES + IMPROVEMENTS	1 LT	3,155,470	1 LT	1554655 MH	18,013,510	27,552,520	
22 .	BOILER PLANT EQUIPMENT	1 LT	87,151,220	1 LT	2174808 MH	27,375,740	5,951,000	
23 .	TURBINE PLANT EQUIPMENT	1 LT	78,473,940	1 LT	1821069 MH	23,273,260	5,248,630	
24 .	ELECTRIC PLANT EQUIPMENT*	1 LT	7,099,460	1 LT	1000657 MH	12,278,870	7,291,900	
25 .	MISCELLANEOUS PLANT EQUIP	1 LT	5,722,267	1 LT	259176 MH	3,323,701	811,186	
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			3125 CY	781 MH	9,130	3,125	
261.1112	ROCK EXCAVATION			12200 CY	9760 MH	114,095	48,800	
261.1113	SHEETING (TEMP COFFERDAM)			130 TN	2600 MH	35,672	22,100	
261.1114	STRET STL (TEMP COFFERDAM)							
261.1115	PUMPING			1 LT	7250 MH	67,570	6,800	
261.111	EXCAVATION WORK				20391 MH	226,467	142,025	368,492
261.112	BEARING PILES (STEEL)							
261.113	SUSTRUCTURE CONCRETE							
261.1131	FORMWORK			78800 SF	31520 MH	348,056	78,800	

\*Detailed Cost Breakdown for Accounts 23 and 24 are found in Tables 2-31 and 2-32.

TABLE 2-10

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PLANT CODE COST BASIS  
698 07/75

COST ESTIMATE - 1200 MWe LOW SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

03/02/78

ACCT. NO.	ACCOUNT DESCRIPTION	FACTORY		SITE			TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	
261.1132	REINFORCING STEEL			330 TN	8251 MH	106,546	123,750
261.1133	CONCRETE			4400 CY	3300 MH	33,700	140,800
261.1134	EXCEEDED STEEL			22 TN	2750 MH	33,073	30,800
261.1135	CONCRETE FINISH			44000 SF	460 MH	4,294	440
261.1136	WATERPROOFING						
261.1137	CONSTRUCTION JOINTS			1091 SF	1092 MH	12,058	1,091
261.1138	RUBBING CONCRETE SURFACES						
	261.113 SUBSTRUCTURE CONCRETE				47353 MH	537,927	375,681
							913,608
261.114	SUPERSTRUCTURE						
261.1141	CONCRETE WORK						
261.1142	STRUCTURAL + MISC. STEEL						
261.11421	STRUCTURAL STEEL						
261.11422	GRATING (GALV)			975 SF	166 MH	2,162	2,925
261.11423	HANDRAIL			225 LF	135 MH	1,757	2,250
	261.1142 STRUCTURAL + MISC. STEEL				301 MH	3,219	5,175
							9,094
261.1143	EXTERIOR WALLS						
261.11431	CONCRETE						
261.11432	MASONRY			1375 SF	344 MH	3,925	3,850
	261.1143 EXTERIOR WALLS				344 MH	3,925	3,850
							7,775
261.1144	RCCF DECK						
261.11441	METAL ROOF DECK			750 SF	45 MH	586	750

2-77

TABLE 2-10

PLANT CODE	COST BASIS	PLANT CODE	COST BASIS	PLANT CODE	COST BASIS	PLANT CODE	COST BASIS	PLANT CODE	COST BASIS
<b>ESTIMATE - 1200 HP LOW SULFUR COAL PLANT ONCE-THROUGH COOLING SYSTEM</b>									
<b>ACCT NO.</b> <b>ACCT NO.</b> <b>DESCRIPTION</b> <b>FACTORY QUANTITY</b> <b>COSTS</b> <b>QUANTITY</b> <b>COSTS</b> <b>LABOR HRS</b> <b>LABOR COST</b> <b>MATERIAL COST</b> <b>TOTAL COST</b>									
261.11464	261.11464	ROOF DECK	1	45 MH	586	586	750	750	1,356
261.11465	261.11465	ROOFING + FLASHING	1	52 WH	744	744	938	938	1,652
261.114651	261.114651	ROOFING INSULATION + FLA	750 SF	52 WH	744	744	938	938	1,652
261.11465	261.11465	ROOFING + FLASHING	1	52 WH	744	744	938	938	1,652
261.11466	261.11466	INTERIOR WALLS	1	6 C WH	685	685	700	700	1,385
261.114661	261.114661	CONCRETE WALLS	250 SF	6 C WH	685	685	700	700	1,385
261.114662	261.114662	MASONRY WALLS	1	6 C WH	685	685	700	700	1,385
261.11467	261.11467	PARTITIONS	1	6 C WH	685	685	700	700	1,385
261.11467	261.11467	INTERIOR WALLS	1	6 C WH	685	685	700	700	1,385
261.11467	261.11467	DOORS + WINDOWS	1	50 WH	651	651	651	651	1,300
261.114671	261.114671	ROLLING STEEL DOORS	100 SF	50 WH	651	651	651	651	1,300
261.114672	261.114672	PERSONNEL DOORS	96 SF	67 WH	777	777	777	777	1,552
261.114673	261.114673	SASH + GLAZING	1	117 MH	1,418	1,418	1,418	1,418	3,980
261.11467	261.11467	DOORS + WINDOWS	1	117 MH	1,418	1,418	1,418	1,418	3,980
261.11469	261.11469	PAINTING	1	11 C MH	1,053	1,053	1,053	1,053	1,321
261.114691	261.114691	CONCRETE	22 T	11 C MH	1,053	1,053	1,053	1,053	1,321
261.11492	261.11492	STEELWORK	750 SF	15 MH	146	146	146	146	150
261.11493	261.11493	METAL DECK	200 LF	4 C MH	383	383	383	383	20
261.11494	261.11494	HARDWARE	165 MH	1,580	1,580	1,580	1,580	1,580	1,882

TABLE 2-10

PLANT CODE	COST BASIS	07/76	PAGE	4
	COST ESTIMATE - 1200 M蒲E LOW SULFUR COAL PLANT			
	ONCE-THROUGH COOLING SYSTEM			
ACCT NO.	ACCOUNT DESCRIPTION		TOTAL COSTS	
	FACTORY COSTS	QUANTITY	LABOR HRS.	MATERIAL COST
261.114	SUPERSTRUCTURE	1065 MH	12,337	16,104
261.117	BULKHEAD		12,267	27,104
261.1171	STEEL SHEETING	65 TN	650 MH	8,918
261.1172	STRUCTURAL STEEL	4 TN	60 MH	782
261.1173	GRAVEL FILL			2,750
261.1174	DREDGING	1971 CY	3942 MH	4,7196
261.1175	RIF-RAP (12 IN. THICK)	215 CY	323 MH	3,215
261.1176	CHAIN LINK FENCE (7 FT HIGH)	472 LF	124 MH	1,156
261.117	BULKHEAD	5005 MH	63,268	69,905
261.118	PROTECTIVE DOLPHINS			133,173
261.1181	WOOD PILINGS	2450 LF	490 MH	6,723
261.118	PROTECTIVE DOLPHINS	690 MH	6,723	9,800
261.119	BUILDING SERVICES			16,523
261.1191	PLUMBING + DRAINS	5 EA	625 MH	5,000
261.1192	HEATING + VENTILATING	3,400	1 LT	193 MH
261.1193	LIGHTING + SERVICE POWER	750 SF	226 MH	2,779
261.119	BUILDING SERVICES	3,400	1044 MH	13,372
261.11	INTAKE STRUCTURE	3,400	75462 MH	6,594
261.1	WAKEUP WTR INT + DISCH STR	3,400	75462 MH	618,277
261.4	CHLORINATION BUILDING			1,482,271

TABLE 2-10

PLANT CODE      COST BASIS  
698            07/76

COST ESTIMATE - 1200 MWe LOW SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

PAGE      5  
03/02/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY		SITE			TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	
261.41	BUILDING STRUCTURE						
261.411	EXCAVATION WORK						
261.4111	EARTH EXCAVATION	53 CY		13 HH		140	53
261.4114	BACKFILL	41 CY		12 HH		118	41
	261.411    EXCAVATION WORK			25 HH		258	94
261.413	SUBSTRUCTURE CONCRETE						
261.4131	FORMWORK	216 SF		65 MH		933	216
261.4132	REINF. STEEL	2 TN		51 MH		657	750
261.4133	CONCRETE	12 CY		9 MH		91	384
261.4134	EMBEDDED STEEL						
261.4135	FLOOR FINISH	105 SF		1 MH		9	9
261.4136	WATERPROOFING						
261.4137	CONSTRUC ION JOINTS	56 SF		56 MH		552	50
261.4138	RUBBING CONCRETE SURFACES						
261.4139	WIRE FABRIC	105 SF		2 MH		27	13
	261.413    SUBSTRUCTURE CONCRETE			198 MH		2274	1,614
261.413	SUPERSTRUCTURE						
261.4141	CONCRETE WORK						
261.4142	STRUCT. + MISC. STEEL						
261.41421	STRUCT. STEEL						
261.41423	MISC. FRAMES, ETC.	2 TN		100 MH		1,302	2,200

## TABLE 2-10

PLANT CODE	COST BASIS	COST ESTIMATE - 1200' LOW SULFUR COAL PLANT ONCE-THROUGH COOLING SYSTEM	PAGE
698	Q + 7.6		6 03/C2/78
ACT NO.	ACCOUNT DESCRIPTION	***** FACTORY *****	TOTAL
		QUANTITY COSTS	LABOR COST MATERIAL COST
		*****	*****
261.4142	STRUCT. + MISC. STEEL	100' Q/H	1,302
261.4143	EXTERIOR WALLS	310' SF	2,200
261.41432	MASONRY	78' MH	868
261.41433	EXTERIOR WALLS	72' MH	8758
261.4144	RCCF DECK	170' SF	170
261.41441	METAL ROOF DECK	10' MH	171
261.4144	ROOF DECK	10' MH	170
261.4145	ROOFING + FLASHING	170' SF	213
261.41451	B+U. ROOFING + FLASHING + INSUL.	12' MH	162
261.41455	ROOFING + FLASHING	12' MH	213
261.4147	DOORS + WINDOWS	50' SF	356
261.41472	PERSONNEL DOORS	25' SF	406
261.41473	SASH + GLAZING	10' MH	116
261.41477	DOORS + WINDOWS	45' MH	522
261.4148	PAINTING		1,422
261.41492	STEELWORK	2 TN	96
261.41493	METAL DECK	170' SF	29
261.41499	PAINTING	13' MH	154
261.414	SUPERSTRUCTURE	258' MH	7,512

TABLE 2-10

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PLANT CODE		COST BASIS	COST ESTIMATE - 1200 MWe LOW SULPHUR COAL PLANT			PAGE 7	
695		37/76	ONCE-THROUGH COOLING SYSTEM			03/TC278	
ACCT NO.	ACCOUNT DESCRIPTION	QUANTITY	FACTORY COSTS	QUANTITY	SITE COST	LABOR HRS	MATERIAL COST
261.51	BUILDING STRUCTURE	481.44	5,666	481.44	5,666		11,552
261.424	LIFTING + SERVICE TOWER	681.44	5,888	681.44	5,888		11,552
261.4	CHIMNEYATION BUILDING						
261.5	DISCHARGE TUNNEL + CANAL						
261.51	EXCAVATION						
261.511	EARLIE EXCAVATION	21200 CY	5300 MH	56765		21,200	
261.512	RECK EXCAVATION	27500 CY	22000 MH	1356728		110,000	
261.514	boulders	10630 CY	3130 MH	36155		10,630	
261.515	DEWATERING			30485 MH	376x48	141,830	468,378
261.51	EXCAVATION						
261.53	SLESTRUCTURE CONCRETE						
261.531	FORMWORK	104000 SF	41600 MH	459364		104,000	
261.532	REINFORCING STEEL	780 TN	19500 MH	251,810		312,000	
261.533	CONCRETE	10400 CY	7800 MH	79,854		364,000	
261.534	EPOOED STEEL						
261.535	FLOOR FINISH						
261.536	WATERPROOFING						
261.537	CONSTRUCTION JOINTS	5400 SF	5400 MH	59,679		5,400	
261.538	BLUBING CONCRETE SURFACES						
261.51	SUBSTRUCTURE CONCRETE	74300 MH	850,657	785,400		1,635,857	
261.5	DISCHARGE TUNNEL + CANAL						
		104789 MH	1,177,005	927,230		2,104,235	

TABLE 2-10

PLANT CODE 698	COST BASIS 07/76	COST ESTIMATE - 1200 MWe LOW SULFUR COAL PLANT ONCE-THROUGH COOLING SYSTEM					PAGE 8 03/02/78	
ACCT NO.	ACCOUNT DESCRIPTION	QUANTITY	FACTORY COSTS	QUANTITY	SITE LABOR HRS	LABOR COST	MATERIAL COST	TOTAL COSTS
261.	STRUCTURES	3x400		180732 MH	2x043x263	1x551x395	3x598x058	
<hr/>								
262.	MECHANICAL EQUIPMENT							
262.1	HEAT REJECTION SYSTEM							
262.11	WATER INTAKE EQUIPMENT							
262.111	ROTATING MACHINERY							
262.1111	SCREEN WASH PUMP+MOTOR	2 EA	32x000	1 LT	610 MH	8x062	806	
<hr/>								
	262.11111 SCREEN WASH PUMP							
N	262.11112 SCREEN WASH PUMP MOTOR							
O								
W	262.11111 SCREEN WASH PUMP+MOTOR		32x000		610 MH	8x062	806	40x868
<hr/>								
	262.11111 ROTATING MACHINERY		32x000		610 MH	8x062	806	40x868
<hr/>								
262.114	PURIFICATION+FILTRATION EQ							
262.1141	TRAVELING SCREENS							
262.11411	CIRCULATING WATER PUMPS	12 EA	672x000	1 LT	19800 MH	256x152	25x615	
262.11412	SCREEN WASH PUMPS	2 EA	62x000	1 LT	600 MH	7x761	776	
	262.11411 TRAVELING SCREENS		734x000		20400 MH	263x913	26x391	1x024x304
<hr/>								
262.1142	TRASH RACK	13 EA	113x100	1 LT	3418 MH	44x496	4x450	
262.1143	TRASH RAKE	1 LT	42x000	1 LT	800 MH	10x350	1x035	
262.1144	STOP LOGS							
<hr/>								
262.11441	CIRCULATING WATER PUMPS	288 EA	4320 MH	40x262	9x360			

TABLE 2-10

 COST ESTIMATE - 1200 Mw LOW SULFUR COAL PLANT  
 ONCE-THROUGH COOLING SYSTEM

PLANT CODE	COST DATA	FACTORY	SITE	TOTAL		
ITEM	UNIT	QUANTITY	COST	LABOR COST	MATERIAL COST	COSTS
262,116,2	SUSPENDED WATER PUMP	6 X 1A	6.00	3.00	3.00	86.4
262,116,4	STAINLESS	4.87 (10)	4.87	2.24	2.24	54.960
262,116	PURIFICATION ILLUSTRATION	882.00	294.10	294.10	30.50	695
262,115	PITCH-5 CEMENT	4.85	4.85	1.94	1.94	5.80
262,115,1	2' DIA. + 1/2" FLANGE	3.72	3.72	1.48	1.48	5.20
262,115,2	2' X 1/8" THK. + 1.865"	3.72	3.72	1.48	1.48	5.20
262,115,3	US IRON	3.72 (10)	3.72	1.48	1.48	5.20
262,115,4	2' X 1/8" + 1/2" + 1/2" IRON	3.72	3.72	1.48	1.48	5.20
262,115,5	PITCH-5 CEMENT	4.85	4.85	1.94	1.94	5.20
262,116	VALVE-5 SCHEDULE 40 ASH	1.11	1.11	0.44	0.44	2.20
262,116,2	CFCC	22	22	8.80	8.80	204.40
262,116,6	BUTTERFLY	262,316	VALVES-S CHEN USA	22	22	48.00
262,117	PILING-MISC. ITEMS	87.61	87.61	34.96	34.96	122.57
262,117,1	HANGERS + SUPPORTS	5.61	5.61	2.24	2.24	7.85
262,117,2	INSULATION	98.6	98.6	39.44	39.44	138.04
262,117,3	SPECIALTIES	5.61	5.61	2.24	2.24	7.85
262,117	PILING-MISC. ITEMS	98.6	98.6	39.44	39.44	138.04
262,11	WATER UNLOAD EQUIPMENT	337.64	337.64	134.88	134.88	472.52

TABLE 2-10

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PLANT CODE  
698 COST BASIS  
07/76COST ESTIMATE - 1200 MWe LOW SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

03/02/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY		SITE			TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	
<b>262.12 CIRCULATING WATER SYSTEM</b>							
262.121	ROTATING MACHINERY						
262.1211	CIRCULATING WATER PUMP+MTR	6 EA	1x302,000	1 LT	1625.9 MH	214,892	21x489
<b>262.12111 CIRC WATER PUMP</b>							
262.12112	CIRC WATER PUMP MOTOR						
262.12111	CIRCULATING WATER PUMP+MTR		1x302,000		1625.9 MH	214,892	21x489
262.121	ROTATING MACHINERY		1x302,000		1625.9 MH	214,892	21x489
262.125	PIPE						
262.1251	2 IN + SMALLER						
262.1252	2.5 IN + LARGER						
262.12521	CONCRETE/NAS	1866 LF	454x408	1 LT	630.6 MH	80,820	8x082
262.12522	CS/NNS	113914 LB	170x871	1 LT	1708.7 MH	221,455	22x146
262.1252	2.5 IN + LARGER		625x279		2339.3 MH	302x275	30x228
262.125	PIPE		625x279		2339.3 MH	302x275	30x228
262.126	VALVES						
262.1266	BLITTERFLY	12 EA	238x332	1 LT	109.7 MH	14x217	1x422
262.126	VALVES		238x332		109.7 MH	14x217	1x422
262.127	PIPING / MISC. ITEMS						
262.1271	HANGERS + SUPPORTS						

TABLE Z-10

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PLANT CODE COST BASIS  
698 07776

COST ESTIMATE - 1200 MWe LOW SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

03/02/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY		SITE			TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	
<b>262.1272 INSULATION</b>							
262.1273	SPECIALTIES						
262.12731	EXPANSION JOINTS	1 LT	60x180	1 LT	75 MH	974	97
262.1273	SPECIALTIES		60x180		75 MH	974	97
262.1274 PIPE TRENCHING							
262.12741	EXCAVATION						
262.127411	EARTH EXCAVATION		8868 CY	2212 MH	23x743	8868	
262.127412	ROCK EXCAVATION		6157 CY	6925 MH	52x749	242628	
262.12741	EXCAVATION			7162 MH	76x492	33498	1092988
262.12742	BACKFILL		9326 CY	2498 MH	24x861	8326	
262.12743	COMPACTED SAND BED		3583 CY	3583 MH	35x659	21498	
262.12744	SUPERSTRUCTURE CONCRETE						
262.127441	FORMWORK		4100 SF	1640 MH	18x111	4100	
262.127442	REINF STEEL		38 TN	951 MH	12x278	15200	
262.127443	CONCRETE		506 CY	380 MH	3x880	17210	
262.12744	SUBSTRUCTURE CONCRETE			2971 MH	34x269	37010	71279
262.1274	PIPE TRENCHING			16194 MH	171x281	100330	2712611
262.127	PIPING / MISCELLANEOUS ITEMS	60x180		16269 MH	172x255	100422	3322862
262.128	INSTRUMENTATION + CONTROL	1 LT	82025	1 LT	60 MH	733	37
262.129	SKIDS / FOUNDATIONS						

TABLE 2-10

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PLANT CODE      COST BASIS  
698            07776

COST ESTIMATE - 1200 MWe LOW SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

03/02/78

ACCT NO.	ACCOUNT DESCRIPTION	***** FACTORY *****	***** SITE *****	TOTAL COSTS
		QUANTITY      COSTS	QUANTITY      LABOR HRS      LABOR COST      MATERIAL COST	
262.1291	CHLORINATION SYSTEM	1 LT      105,350	1 LT      2600 MH      33,636	33,636
262.129	SKIDS & FOUNDATIONS		2600 MH      33,636	33,636
262.12	CIRCULATING WATER SYSTEM	2,339,166	5,967.8 MH      738,008	156,967
262.16	DE-ICING SYSTEM			3,234,141
262.161	ROTATING MACHINERY			
262.1611	DE-ICING PUMPS + MOTORS	2 EA      63,300	1 LT      142.3 MH      18,808	18,881
262.16111	DE-ICING PUMPS			
262.16112	DE-ICING PUMP MOTORS			
262.1611	DE-ICING PUMPS + MOTORS	63,300	142.3 MH      18,808	18,881
262.161	ROTATING MACHINERY	63,300	142.3 MH      18,808	18,881
262.165	PIPING			83,989
262.1651	2 IN. + SMALLER			
262.1652	2.5 IN. + LARGER			
262.16521	CONCRETE	700 LF      16,471	1 LT      239 MH      3,063	306
262.1652	2.5 IN. + LARGER	16,471	239 MH      3,063	306
262.165	PIPING	16,471	239 MH      3,063	306
262.166	VALVES	2 EA      14,000	74 MH      961	
262.167	EXCAVATION			
262.1671	EARTH EXCAVATION		4038 CY      1009 MH      10,807	4,038

TABLE 2-10

PLANT CODE 698	COST BASIS C776	COST ESTIMATE - 1200 MWe LOW SULFUR COAL PLANT ONCE-THROUGH COOLING SYSTEM				PAGE 13 03/02/78
ACCT NO.	ACCOUNT DESCRIPTION	QUANTITY	FACTORY COSTS	QUANTITY	SITE LABOR HRS	TOTAL MATERIAL COSTS
					LABOR COST	
262.1672	ROCK EXCAVATION			226 CY	181 MH	1,939
262.1673	BACKFILL			4141 CY	1243 MH	13,314
262.167	EXCAVATION				2433 MH	26,060
262.16	DE-ICING SYSTEM	93,771			4169 MH	48,892
262.1	HEAT REJECTION SYSTEM	3,419,692			97611 MH	1,206,880
262.	MECHANICAL EQUIPMENT	3,419,692			97611 MH	1,206,880
26 .	MAIN COND HEAT REJECT SYS	3,423,092			278343 RH	3,250,143
2 .	TOTAL DIRECT COSTS	195,025,519			7088708 MH	87,515,224
2188						50,622,616
9 .	TOTAL INDIRECT COSTS					323,163,359
91 .	TOTAL INDIRECT COSTS	1 LT	37,589,000	1 LT	118000C MH	12,313,000
*9 .	TOTAL INDIRECT COSTS		37,589,000		118000C MH	12,313,000
						17,772,000
						67,674,000
	TOTAL BASE COST		222,614,519		8268708 MH	99,828,224
						68,394,616
						390,837,359

\*Detailed Cost Breakdown for Account Number 9., Indirect Costs for Mechanical Wet Towers, is in NUREG-0241 Report.

TABLE 2-11  
COST ESTIMATE - 1200 MWe LOW SULFUR COAL PLANT  
NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/76		FACTORY			SITE			
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hrs.	Labor Cost	Material Cost	Total Costs
20 .	Land and Land Rights			500 AC			2,000,000	2,000,000
21 .	Structures and Improvements	3,155,469			1554635 MH	18,013,514	27,552,514	48,721,497
22 .	Boiler Plant Equipment	87,151,285			2174808 MH	27,375,744	5,950,999	120,478,028
23 .	Turbine Plant Equipment	81,230,723			1853747 MH	23,706,125	5,291,549	110,228,397
24 .	Electric Plant Equipment*	7,144,513			1001376 MH	12,287,089	7,322,314	26,753,916
25 .	Miscellaneous Plant Equipment	5,722,267			259176 MH	3,323,701	811,186	9,857,154
26 .	<u>Main Condenser Heat Reject System</u>							
261.	Structures	89,971			63552 MH	740,739	674,982	1,505,692
262.	<u>Mechanical Equipment</u>							
262.1	<u>Heat Rejection System</u>							
262.11	<u>Water Intake Equipment</u>							
262.111	Rotating Machinery	2,500			159 MH	2,101	210	
262.114	Purification & Filtration Equip.	131,450			4739 MH	59,171	6,658	
262.115	Piping - Screen Wash	2,730			273 MH	3,539	354	
262.116	Valves - Screen Wash	12,900						
262.117	Piping - Miscellaneous Items	405						
262.11	Water Intake Equipment	149,985			5171 MH	64,811	7,222	222,018
262.12	<u>Circulating Water System</u>							
262.121	Rotating Machinery	1,956,000			11200 MH	148,029	14,803	
262.125	Pipe	695,639			21513 MH	278,005	27,800	
262.126	Valves	289,600			751 MH	9,731	973	
262.127	Piping - Miscellaneous Items				12312 MH	130,264	68,965	

\* Detailed cost summary for this account is found in Table 2-34.

TABLE 2-11

COST ESTIMATE - 1200 MWe LOW SULFUR COAL PLANT  
NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/76		FACTORY			SITE			
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hrs.	Labor Cost	Material Cost	Total Costs
262.128	Instrumentation and Control		5,350		45 MH	548	27	
262.129	Skids/Foundations		54,825		1646 MH	21,329	2,880	
262.12	Circulating Water System	3,001,414		47467 MH	587,906	115,448	3,704,768	
262.13	<u>Cooling Towers</u>							
262.132	Heat Transfer Equipment		8,551,772		204180 MH	2,642,115	264,212	
262.138	Instrumentation and Control		36,000		350 MH	4,279	214	
262.13	Cooling Towers		8,587,772		204530 MH	2,646,394	264,426	11,498,592
262.15	<u>Main Ct. Make-up &amp; Blowdown Sys.</u>							
262.151	Make-up Water System		389,642		9930 MH	108,172	31,412	
262.152	Blowdown System		48,950		351 MH	4,487	439	
262.153	Make-up Water Pretreatment System		736,000		32000 MH	413,981	82,796	
262.15	Main Ct. Make-up & Blowdn. Sys.	1,174,592		42281 MH	526,640	114,647	1,815,879	
262.	Mechanical Equipment	12,913,763		299449 MH	3,825,751	501,743	17,241,257	
26 .	Main Cond. Ht. Reject. Sys.	13,003,734		363001 MH	4,566,490	1,176,725	18,746,949	
2 .	Total Direct Costs	197,407,991		7206763 MH	89,272,663	50,105,287	336,785,941	
*9 .	Total Indirect Costs	37,826,000		1180000 MH	12,313,000	17,772,000	67,911,000	
	Total Base Cost	235,233,991		8386763 MH	101,585,663	67,877,287	404,696,941	

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\*Detailed Cost Breakdown for Account Number 9., Indirect Costs for Mechanical Wet Towers, is in NUREG-0241 Report.

TABLE 2-12

COST ESTIMATE - 1100 MW LOW SULFUR COAL PLANT  
FAN-ASSISTED NATURAL DRAFT COOLING SYSTEM

Cost Basis 7-76		FACTORY			SITE		
Account Number	Description	Quantity	Costs	Quantity	Labor Hrs.	Material Cost	Total Costs
20 .	Land and Land Rights	500 AC					2,000,000
21 .	Structures and Improvements	3,155,469	1554655 MH	18,013,514	27,552,514	48,721,497	
22 .	Boiler Plant Equipment	87,151,285	2174808 MH	27,375,744	5,950,999	120,478,028	
23 .	Turbine Plant Equipment	81,230,723	1853727 MH	24,706,125	5,291,549	110,228,397	
24 .	Electric Plant Equipment *	7,592,378	1050574 MH	12,890,863	7,698,346	28,181,587	
25 .	Miscellaneous Plant Equipment	5,722,267	259176 MH	3,323,701	811,186	9,857,154	
26 .	Main Condenser Heat Rejection System						
261.	Structures	89,971	63552 MH	740,739	674,982	1,305,692	
262.	Mechanical Equipment						
262.1	Heat Rejection System						
262.11	Water Intake Equipment						
262.111	Rotating Machinery	2,500	159 MH	2,101	210		
262.114	Purification & Filtration Equip.	131,450	4739 MH	59,171	6,658		
262.115	Piping - Screen Wash	2,730	273 MH	3,539	354		
262.116	Valves - Screen wash	12,900					
262.117	Piping - Miscellaneous Items	405					
262.11	Water Intake Equipment	149,985	5171 MH	64,811	7,222	222,016	
262.12	Circulating Water System						
262.121	Rotating Machinery	1,796,000	10800 MH	142,742	14,274		
262.125	Pipe	838,832	24154 MH	311,851	31,185		
262.126	Valves	289,600	751 MH	9,731	973		
262.127	Piping - Miscellaneous Items		20988 MH	220,581	107,000		

\* Detailed cost summary for this account is found in Table 2-33.

TABLE 2-17

COST ESTIMATE - 1200 MW LOW SULFUR COAL PLANT  
FAN-ASSISTED NATURAL DRAFT COOLING SYSTEM

Cost Basis		FACTORY				SITE			
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hrs.	Labor Cost	Material Cost	Total Cost	
262,128	Instrumentation and Control	5,350		45 MH	548		27		
262,129	Skids/Foundations	54,825		1646 MH	21,329		2,880		
262,12	Circulating Water System	2,984,607		58,384 MH	706,782	156,339		3,847,728	
262,13	Cooling Towers								
262,132	Heat Transfer Equipment	7,621,200		13,250 MH	1,710,700			171,070	
262,138	Instrumentation and Control	53,950		451 MH	5,514		276		
262,13	Cooling Towers	7,675,150		13,2651 MH	1,716,214	171,346		9,562,710	
262,15	Main Cr., Make-up & Blowdown Sys.								
262,151	Make-up Water System	389,642		9930 MH	108,172			31,412	
262,152	Blowdown System	48,950		351 MH	4,487			439	
262,153	Make-up Water Pretreatment System	736,000		32000 MH	413,981			82,796	
262,15	Main Cr., Make-up & Blowdn. Sys.	1,174,592		4,2281 MH	526,640			1,815,879	
262,	Mechanical Equipment	11,984,334		238487 MH	3,014,467			669,554	
26,	Main Cond., Ht., Reject. Sys.	12,074,305		302039 MH	1,755,186			15,48,335	
2	Total Direct Costs	196,926,427		7194999 MH	89,065,133	50,479,130		336,420,690	
*9	Total Indirect Costs	37,748,000		1180000 MH	12,313,000	17,772,000		67,883,000	
	Total Base Cost	234,724,427		8374999 MH	101,378,133	68,201,130		404,303,690	

\*Detailed Cost Breakdown for Account Number 9, Indirect Costs for Mechanical Wet Towers, is in NUREG-0241 Report.

## 2.7 800 MWe LOW SULFUR COAL FIRED PLANT COOLING SYSTEMS

Design and cost data for the 800 MWe low sulfur coal-fired plant alternate cooling systems are presented in this subsection.

### 2.7.1 Once-Through Cooling System Design Description

Following are the once-through design descriptions for Account 26 and other accounts impacted by a change from mechanical draft cooling towers to once-through cooling. Design description for accounts not impacted by this change are presented in Reference 4.

#### ACCOUNT 233 Condensing System

##### Condenser Equipment

The two surface condensers are single stage one-pass design. The condensers are designed to handle the total heat rejection from the main turbines. Each condenser has a condensing surface of 147,700 sq ft; 13,590 one and 1/8 inch diameter tubes, 37 ft long, and 20 BWG 90-10 CuNi. Cooling Water flow in each condenser is 268,500 gpm resulting in a tube velocity of 7.25 ft/sec and a temperature rise at full load of 15 F.

The balance of the condensing equipment is not affected by the once-through cooling system design and equipment descriptions are presented in Reference 4.

#### ACCOUNT 261 Structures

Intake and discharge structures are located along the riverbank west of the main plant structure. The intake basin is 146 ft long, 46 ft wide and 48 ft deep and is entirely below plant grade. The volume of the basin is approximately 322,000 cu ft. Attached to the north end of the structure

is a service water pump basin founded 30 ft below grade. The structure is reinforced concrete with foundation mat bearing on rock. There are six circulating 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 insure an adequate supply of water during low tide conditions. Interior walls are of reinforced masonry concrete. Portions of the operating floor are graded. A 750 sq ft electrical equipment room 13 ft high is located at grade adjacent to the basin.

The hot circulating water is discharged back to the river through a discharge canal. Discharge occurs sufficiently downstream of the intake to minimize recirculation.

#### Circulating Water Discharge Tunnel and Canal

The circulating water discharge tunnel begins in the turbine building at the condenser outlets and runs outside where it empties into the discharge canal. The tunnel is a reinforced concrete box structure 30 ft wide and 14 ft high inside.

The discharge canal is an extension of the tunnel which discharges into the North River 350 ft south of the intake structure. The canal is a reinforced concrete structure, with a flat bottom, vertical walls, and an open top. The canal is 30 ft wide with walls 20 ft high. At the river, the canal widens, and the bottom slopes up to ensure sufficient water in the canal at all times for maintaining a seal for the circulating water system.

## ACCOUNT 262 Mechanical Equipment

### Circulating Water Pumps

There are six 16.7 percent capacity circulating water pumps of the mixed flow vertical type. Each pump is designed for 89,500 gpm with a total dynamic head of 27 ft. Circulating water pump motors are 800 hp each, operating at a synchronous speed of 360 rpm. The pumps discharge the water to the main condensers where heat is absorbed. The water is then discharged through a tunnel and canal back to the river.

### Circulating Water Intake System

Twelve traveling screens are provided to remove twigs, leaves and other debris from the river water. The traveling screens are 10 ft wide and 43 ft long. They are sized to give a water velocity of 0.5 ft/sec at mean low water. Serving the traveling screens are two 100 percent screen wash pumps with a flow rate of 2,300 gpm and a total dynamic head of 100 ft to wash the screens when they require cleaning. Vertical trash racks with an automatic rake are provided ahead of the traveling screens.

Each screen well is provided with stop logs to allow dewatering (two screens and one pump) for maintenance purposes. To protect the traveling screens against ice during freezing water conditions, two vertical de-icing motor driven pumps each designed for a flowrate of 16,100 gpm at 35 ft head are used to pump warm water from the condenser discharge to the screens.

## 2.7.2 Natural Draft Towers

### ACCOUNT 26 MAIN CONDENSER HEAT REJECTION SYSTEM

#### ACCOUNT 261 Structures

All of the structures required for the natural draft tower are of identical design to those designed for the mechanical draft towers. Design descriptions for the makeup water intake and discharge structures, circulating water pumphouse and makeup water pretreatment building, are presented in the mechanical draft wet tower system description.

### 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 97 ft. Circulating water pump motors are 3,000 hp each, operating at a synchronous speed of 400 rpm.

#### Cooling Towers

There is one natural draft tower designed to cool the entire circulating water flow of 324,000 gpm from 118 F to 92 F when operating at wet bulb and dry bulb temperatures of 74 F and 93 F, respectively. In order to provide the draft required for airflow, the tower employs a reinforced concrete hyperbolic shell 450 ft high. At the base the diameter is 348 ft. Other design characteristics of the natural draft tower are in the subsection 2.3.2 which describes the PWR's natural draft cooling system.

### Main Cooling Tower Makeup and Blowdown Systems

The makeup water requirements are the same at the design conditions for the natural draft towers as the mechanical draft towers. This allows the use of identical makeup and blowdown facilities, as designed for the mechanical draft towers.

#### 2.7.3 Fan-Assisted Natural Draft Towers

##### ACCOUNT 26 MAIN CONDENSER HEAT REJECTION SYSTEM

###### ACCOUNT 261 Structures

All of the structures required for the fan-assisted natural draft towers are of identical design to those designed for the mechanical draft towers. Design descriptions for the makeup water intake and discharge structures, circulating water pumphouse and makeup water pretreatment building, are presented in the mechanical draft wet tower system description.

###### 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 89 ft. Circulating water pump motors are 3,000 hp each, operating at a synchronous speed of 400 rpm.

###### Cooling Towers

There is one fan-assisted natural draft wet cooling tower designed to cool the entire circulating water flow of 324,000 gpm from 118 F to 92 F when operating at a wet bulb of 74 F. The tower has a base diameter of 257 ft and an overall height of 205 ft. Twenty-four 28 ft diameter fans

are positioned about the periphery of the tower's base. Fan motors are 150 hp each. Other design characteristics of the fan-assisted natural draft tower are as described in subsection 2.3.3 for the PWR's fan-assisted natural draft cooling system.

Main Cooling Tower Makeup and Blowdown Systems

The makeup water requirements are the same at the design condition for the fan-assisted natural draft towers as the mechanical draft towers. This allows the use of identical makeup and blowdown facilities, as designed for the mechanical draft towers.

TABLE 2-13

PAGE 1

PLANT CODE  
692 COST BASIS  
07/76COST ESTIMATE - 800 MWe LOW SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

03/01/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY		SITE			TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	
<b>2 . TOTAL DIRECT COSTS</b>							
20 .	LAND AND LAND RIGHTS			1 LT			2,000,000
21 .	STRUCTURES + IMPROVEMENTS	1 LT	2,591,580	1 LT	123,9000 MH	14,363,990	21,428,980
22 .	BOILER PLANT EQUIPMENT	1 LT	63,614,520	1 LT	155,1622 MH	19,494,890	3,968,740
23 .	TURBINE PLANT EQUIPMENT*	1 LT	46,735,030	1 LT	97,8863 MH	12,427,010	3,230,340
24 .	ELECTRIC PLANT EQUIPMENT*	1 LT	5,922,910	1 LT	90,1782 MH	51,064,240	6,878,310
25 .	MISCELLANEOUS PLANT EQUIPT	1 LT	5,188,759	1 LT	22,1988 MH	2,842,632	704,962
26 .	MAIN COND HEAT REJECT SYS						
261 .	STRUCTURES						
261.1	MAKEUP NTR INT + DISCH STR						
261.11	INTAKE STRUCTURE						
261.111	EXCAVATION WORK						
261.1111	EARTH EXCAVATION			2700 CY	675 MH	7,890	2,700
261.1112	ROCK EXCAVATION			9700 CY	7760 MH	90,715	38,800
261.1113	SHEETING (TEMP COFFERDAM)			120 TN	2400 MH	32,928	20,400
261.1114	STRUCT STL (TEMP COFFERDAM)						
261.1115	PUMPING			1 LT	6500 MH	60,580	61,000
261.1111	EXCAVATION WORK				17335 MH	192,113	122,900
261.112	BEARING PILES (STEEL)						315,013
261.113	SLESTRUCTURE CONCRETE						
261.1131	FCRM WORK			70,600 SF	28240 MH	311,838	70,600

\*Detailed cost breakdowns for these accounts are found in Tables 2-35 and 2-36 respectively.

TABLE 2-13

PAGE 2

PLANT CODE  
692 COST BASIS  
07/76

COST ESTIMATE - 800 MWe LOW SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

03/01/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY		SITE			TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	
261.1132	REINFORCING STEEL			292 TN	7300 MH	94,267	109,500
261.1133	CONCRETE			3900 CY	2925 MH	29,871	124,800
261.1134	EMBEDDED STEEL			20 TN	2500 MH	30,067	28,000
261.1135	CONCRETE FINISH			39000 SF	391 MH	3,003	390
261.1136	WATERPROOFING						
261.1137	CONSTRUCTION JOINTS			1025 SF	1076 MH	11,882	1,075
261.1138	RUBBING CONCRETE SURFACES						
261.1139	SUBSTRUCTURE CONCRETE				42432 MH	481,918	334,365
261.1140	SUPERSTRUCTURE						836,283
261.1141	CONCRETE WORK						
261.1142	STRUCTURAL + MISCELLANEOUS STEEL						
261.11421	STRUCTURAL STEEL						
261.11422	GRATING (GALV)			840 SF	145 MH	1,861	2,520
261.11423	HANDRAIL			200 LF	120 MH	1,564	2,000
261.11424	STRUCTURAL + MISCELLANEOUS STEEL				263 MH	3,425	4,520
261.1143	EXTERIOR WALLS						7,945
261.11431	CONCRETE						
261.11432	MASONRY			1375 SF	344 MH	3,925	3,850
261.11433	EXTERIOR WALLS				344 MH	3,925	3,850
261.1144	ROOF DECK						7,775
261.11441	METAL ROOF DECK			750 SF	45 MH	586	750

TABLE 2-13

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PLANT CODE	COST BASIS	COST ESTIMATE - 800 MWe LOW SULFUR COAL PLANT ONCE-THROUGH COOLING SYSTEM				PAGE
ACCT NO.	ACCOUNT DESCRIPTION	FACTORY	QUANTITY	LABOR HRS	SITE	TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR COST	MATERIAL COST
	261.1144 ROOF DECK			45 MH	586	750
	261.1145 ROOFING + FLASHING					1,336
	261.11451 B.L. ROOFG + INSULTN + FLA		750 SF	57 MH	714	938
	261.1145 ROOFING + FLASHING			53 MH	714	938
	261.1146 INTERIOR WALLS					1,652
	261.11461 CONCRETE WALLS					
	261.11462 MASONRY WALLS		250 SF	60 MH	685	700
	261.11463 PARTITIONS					
2-101	261.1146 INTERIOR WALLS			60 MH	685	700
	261.1147 DOORS + WINDOWS					1,385
	261.11471 ROLLING STEEL DOORS		100 SF	50 MH	651	1,400
	261.11472 PERSONNEL DOORS		96 SF	67 MH	777	1,152
	261.11473 SASH + GLAZING					
	261.1147 DOORS + WINDOWS			117 MH	1,428	2,552
	261.1149 PAINTING					3,980
	261.11491 CONCRETE					
	261.11492 STEELWORK		20 YN	100 MH	957	120
	261.11493 METAL DECK		750 SF	15 MH	144	150
	261.11494 HANDRAIL		200 LF	40 MH	383	20
	261.1149 PAINTING			155 MH	1,484	290
						1,774

TABLE 2-13

PLANT CODE	COST BASIS	COST ESTIMATE - 800-ME Low Sulfur Coal Plant	PAGE
092	07/76		03/01/78
ACCY NO.	ACCOUNT DESCRIPTION	FACTORY QUANTITY COSTS	03/01/78
ACCY NO.	ACCOUNT DESCRIPTION	FACTORY QUANTITY COSTS	03/01/78
261.111	SUPERSTRUCTURE	1037 MH	124767
261.1117	BULKHEAD		275x847
261.1171	STEEL SHEETING	60 TN	8x287
261.1172	STRUCTURAL STEEL	4 T/Y	797
261.1173	GRAVEL FILL	60 M/H	2x900
261.1174	DREDGING	1854 CY	37x800
261.1175	RIG-RAP CLOTH THICK	185 CY	2x768
261.1176	CHAIN LINK FENCE(7FT HIGH)	38 CLF	1x081
261.117	BUTTHEAD	6762 M/H	65x380
261.1118	PROTECTIVE OILPINS		124x678
261.1181	WOOD FILES	215 CLF	5x500
261.1118	PROTECTIVE OILPINS	430 M/H	8x600
261.1119	BUILDING SERVICES		14x500
261.1191	PLUMBING + DRAINS	5 EA	5x000
261.1192	HEATING + VENTILATING	1 LT	2x494
261.1193	LIGHTING + SERVICE POWER	75 CLSF	1x350
261.119	BUILDING SERVICES	3x400	6x599
261.11	INTAKE STRUCTURE	3x400	2x3x371
261.1	MAKEUP AIR INT + DISCH STR	3x400	1x3x9492
261.1	CHLORINATION BUILDING	67040 M/H	764x689

TABLE 2-13

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PLANT CODE COST BASIS  
692 07/76COST ESTIMATE - 800 MWe LOW SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

03/01/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY		SITE			TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	
261.41	BUILDING STRUCTURE						
261.411	EXCAVATION WORK						
261.4111	EARTH EXCAVATION	53 CY		15 MH		140	53
261.4114	BACKFILL	41 CY		12 MH		118	41
	261.411 EXCAVATION WORK			25 MH		258	94
261.413	SUPERSTRUCTURE CONCRETE						
261.4131	FORMWORK	216 SF		85 MH		938	216
261.4132	REINF. STEEL	2 TN		51 MH		657	750
261.4133	CONCRETE	12 CY		9 MH		91	384
261.4134	EMBEDDED STEEL						
261.4135	FLOOR FINISH	105 SF		1 MH		9	†
261.4136	WATERPROOFING						
261.4137	CONSTRUCTION JOINTS	50 SF		50 MH		552	50
261.4138	RUBBING CONCRETE SURFACES						
261.4139	WIRE FABRIC	105 SF		2 MH		27	13
	261.413 SUBSTRUCTURE CONCRETE			198 MH		2,274	1,414
261.414	SUPERSTRUCTURE						
261.4141	CONCRETE WORK						
261.4142	STRUCT. + MISC. STEEL						
261.41421	STRUCT. STEEL						
261.41423	MISC. FRAMES, ETC.	2 TN		100 MH		1,302	2,200

TABLE 2-13

PLANT CODE 692	COST BASIS 07/76	COST ESTIMATE - 800 MWe LOW SULFUR COAL PLANT ONCE-THROUGH COOLING SYSTEM				PAGE 6 03/01/78
ACCT NO.	ACCOUNT DESCRIPTION	***** FACTORY ***** QUANTITY COSTS	***** SITE ***** QUANTITY LABOR HRS LABOR COST MATERIAL COST			TOTAL COSTS
	261.4142 STRUCT. + MISC. STEEL		100 MH	1,302	2,200	3,502
	261.4143 EXTERIOR WALLS					
	261.4143.2 MASONRY	310 SF	78 MH	890	868	
	261.4143.3 EXTERIOR WALLS		78 MH	890	868	1,758
	261.4144 RCCF DECK					
	261.4144.1 METAL ROOF DECK	170 SF	10 MH	131	170	
	261.4144.2 ROOF DECK		10 MH	131	170	301
2+104	261.4145 ROOFING + FLASHING					
	261.4145.1 BUL. ROOFING, FLASHING + INSUL	170 SF	12 MH	162	213	
	261.4145.2 ROOFING + FLASHING		12 MH	162	213	375
	261.4147 DOORS + WINDOWS					
	261.4147.2 PERSONNEL DOORS	50 SF	35 MH	406	600	
	261.4147.3 SASH + GLAZING	25 SF	10 MH	116	300	
	261.4147.4 DOORS + WINDOWS		45 MH	522	900	1,422
	261.4149 PAINTING					
	261.4149.2 STEELWORK	2 TN	10 MH	96	12	
	261.4149.3 METAL DECK	170 SF	3 MH	29	17	
	261.4149.4 PAINTING		13 MH	125	29	154
	261.414 SUPERSTRUCTURE	258 MH	3,132	4,380	7,512	

TABLE 2-13

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PLANT CODE COST BASIS  
692 07/76

COST ESTIMATE - 800 MWe LOW SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

03/01/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY		QUANTITY	COSTS	SITE		LABOR HRS	LABOR COST	MATERIAL COST	TOTAL COSTS
		*****	*****			*****	*****				
261.41	BUILDING STRUCTURE					481 MH		5x664		5x888	11x552
261.424	LIGHTING + SERVICE POWER										
261.4	CHLORINATION BUILDING					481 MH		5x664		5x888	11x552
261.5	DISCHARGE TUNNEL + CANAL										
261.51	EXCAVATION										
261.511	EARTH EXCAVATION			16070 CY		4018 MH		43x035		16x070	
261.512	ROCK EXCAVATION			15130 CY		15304 MH		163x912		76x520	
261.514	BACKFILL			8975 CY		2693 MH		28x844		8x975	
261.515	DEWATERING										
261.51	EXCAVATION					22015 MH		235x791		101x585	337x356
261.53	SUPERSTRUCTURE CONCRETE										
261.531	FORMWORK			85550 SF		34220 MH		377x871		85x550	
261.532	REINFORCING STEEL			593 TN		14825 MH		191x438		237x200	
261.533	CONCRETE			7900 CY		5925 MH		60x507		276x500	
261.534	EMBEDDED STEEL										
261.535	FLOOR FINISH										
261.536	WATERPROOFING										
261.537	CONSTRUCTION JOINTS			4690 SF		4690 MH		51x790		4x890	
261.538	RUBBING CONCRETE SURFACES										
261.53	SUBSTRUCTURE CONCRETE					59660 MH		681x606		603x940	1x285x546
261.5	DISCHARGE TUNNEL + CANAL					81675 MH		917x397		705x505	1x622x902

TABLE 2-13

PLANT CODE COST BASIS  
692 6776

COST ESTIMATE - 900 MM LNG SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY			SITE			TOTAL COSTS
		QUANTITY	COSTS	LABOR HRS	LABOR COST	MATERIAL COST		
261.	STRUCTURES	3,400		1,691,96 MH	1,687,750	1,262,796	2,953,946	
262.	MECHANICAL EQUIPMENT							
262.1	HEAT REJECTION SYSTEM							
262.11	WATER INTAKE EQUIPMENT							
262.111	ROTATING MACHINERY							
262.1111	SCREEN WASH PUMP+MOTOR	2 EA	28,200	1 LT	546 MH	7,190	719	
262.11111	SCREEN WASH PUMP							
262.11112	SCREEN WASH PUMP MOTOR							
2-106	262.11111 SCREEN WASH PUMP+MOTOR		28,200		546 MH	7,190	719	
262.111	ROTATING MACHINERY		28,200		546 MH	7,190	719	
262.114	PURIFICATION+FILTRATION EQ							
262.1141	TRAVELING SCREENS							
262.11411	CIRCULATING WATER PUMPS	12 EA	604,800	1 LT	1920C MH	248,388	248,389	
262.11412	SCREEN WASH PUMPS	2 EA	60,000	1 LT	600 MH	7,761	776	
262.11413	TRAVELING SCREENS		604,800		19800 MH	256,140	256,140	
262.1142	TRASH RACK	13	95,030	1 LT	2795 MH	36,383	36,383	
262.1143	TRASH RACK	1 LT	42,000	1 LT	800 MH	10,150	10,150	
262.1144	STOP LOGS							
262.11441	CIRCULATING WATER PUMPS	276 EA	4140 MH			38,585	38,585	

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PLANT CODE 692	COST BASIS 07/76	COST ESTIMATE - 800 MWe LOW SULFUR COAL PLANT ONCE-THROUGH COOLING SYSTEM					PAGE 03/01/78	
ACCT NO.	ACCOUNT DESCRIPTION	FACTORY QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	MATERIAL COST	TOTAL COSTS
262.11442	SCREEN WASH PUMPS			46 EA	460 MH	4,287	828	
262.1144	STOP LOGS				4600 MH	42,872	9,798	52,670
262.114	PURIFICATION+FILTRATION EQ	801x830			27995 MH	345x754	40,086	1,187,670
262.115	PIPING-SCREEN WASH							
262.1151	2 IN. + SMALLER							
262.1152	2.5 IN. + LARGER							
262.11521	CS INNS	20260 LB	30,390	1 LT	3039 MH	39,385	3,939	
262.1152	2.5 IN. + LARGER		30,390		3039 MH	39,385	3,939	73,714
262.115	PIPING-SCREEN WASH		30,390		3039 MH	39,385	3,939	73,714
262.116	VALVES-SCREEN WASH		1 LT	22,680				
262.1162	CHECK							
262.1166	BLITTERFLY							22,680
262.116	VALVES-SCREEN WASH			22,680				
262.117	PIPING-MISC ITEMS							
262.1171	HANGERS + SUPPORTS	3040 LB	4,560					
262.1172	INSULATION							
262.1173	SPECIALTIES							4,560
262.117	PIPING-MISC ITEMS		4,560					
262.11	WATER INTAKE EQUIPMENT	887x660		31578 MH	322x329	44,744	1,324,733	

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TABLE 2-13

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PLANT CODE  
692 COST BASIS  
07/76COST ESTIMATE - 800 MWe LOW SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	MATERIAL COST	TOTAL COSTS
<hr/>								
262.12	CIRCULATING WATER SYSTEM							
<hr/>								
262.121	ROTATING MACHINERY							
262.1211	CIRCULATING WATER PUMP+MTR	6 EA	1x026x000	1 LT	12841 RH	169x717	16x972	
<hr/>								
262.12111	CERC WATER PUMP							
262.12112	CERC WATER PUMP MOTOR							
262.12111	CIRCULATING WATER PUMP+MTR		1x026x000		12841 RH	169x717	16x972	1x212x689
<hr/>								
262.121	ROTATING MACHINERY		1x026x000		12841 RH	169x717	16x972	1x212x689
<hr/>								
262.125	PIPE							
262.1251	2 IN + SMALLER							
262.1252	2.5 IN + LARGER							
262.12521	CONCRETE/NNS	722 LF	349x022	1 LT	3508 RH	44x962	4x496	
262.12522	CS/NNS	69162 LB	103x743	1 LT	10374 RH	134x452	13x445	
262.1252	2.5 IN + LARGER		452x765		13882 RH	179x414	17x941	650x120
262.125	PIPE		452x765		13882 RH	179x414	17x941	650x120
<hr/>								
262.126	VALVES							
262.1266	BLTTERFLY	10 EA	240x430	1 LT	951 RH	12x322	1x232	
262.126	VALVES		240x430		951 RH	12x322	1x232	253x984
<hr/>								
262.127	PIPING / MISC. ITEMS							
262.1271	HANGERS + SUPPORTS							

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PLANT CODE  
692 COST BASIS  
07/76COST ESTIMATE - 800 MWe LOW SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

03/01/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY		SITE			TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	
262.1272	INSULATION						
262.1273	SPECIALTIES						
262.1273.1	EXPANSION JOINTS	1 LT	45,840	1 LT	74 MH	961	96
262.1273	SPECIALTIES		45,840		74 MH	961	96
							46,840
262.1274	PIPE TRENCHING						
262.1274.1	EXCAVATION						
262.1274.1.1	EARTH EXCAVATION		7508 CY	1872 MH	20x103	7,508	
262.1274.1.2	ROCK EXCAVATION		6643 CY	5314 MH	56x914	26,572	
262.1274.1	EXCAVATION			7191 MH	77x017	34,080	111,097
2-109							
262.1274.2	BACKFILL		8365 CY	2510 MH	24x980	8,365	
262.1274.3	COMPACTED SAND BED		2587 CY	2587 MH	25x744	15,522	
262.1274.4	SUPERSTRUCTURE CONCRETE						
262.1274.4.1	FORMWORK		2000 SF	800 MH	8x834	2,000	
262.1274.4.2	REINF STEEL		20 TN	500 MH	6x456	8,000	
262.1274.4.3	CONCRETE		265 CY	199 MH	2x032	9,275	
262.1274.4	SUBSTRUCTURE CONCRETE			1499 MH	17x322	19,275	36,597
262.1274	PIPE TRENCHING			13787 MH	145x063	77,242	222,305
262.127	PIPING / MISC. ITEMS	45,840		13861 MH	146x024	77,338	269,202
262.128	INSTRUMENTATION + CONTROL	1 LT	8x025	1 LT	60 MH	733	37
262.129	SKIDS / FOUNDATIONS						

TABLE 2-13

PLANT CODE 692	COST BASIS 07776	COST ESTIMATE - 800 MWe LOW SULFUR COAL PLANT ONCE-THROUGH COOLING SYSTEM					PAGE 12 03/01/78	
ACCT NO.	ACCOUNT DESCRIPTION	FACTORY ***** QUANTITY	COSTS	SITE ***** QUANTITY	LABOR HRS	LABOR COST	MATERIAL COST	TOTAL COSTS
262.1291	CHLORINATION SYSTEM	1 LT	80,000	1 LT	2000 MH	25,874	2,587	
262.129	SKIDS & FOUNDATIONS		80,000		2000 MH	25,874	2,587	108,461
262.12	CIRCULATING WATER SYSTEM		1,853,060		43595 MH	534,084	116,107	2,503,251
262.16	DE-ICING SYSTEM							
262.161	ROTATING MACHINERY							
262.1611	DE-ICING PUMPS + MOTORS	2 EA	49,900	1 LT	1120 MH	14,804	1,480	
262.16111	DE-ICING PUMPS							
262.16112	DE-ICING PUMP MOTORS							
262.1611	DE-ICING PUMPS + MOTORS		49,900		1120 MH	14,804	1,480	66,184
262.161	ROTATING MACHINERY		49,900		1120 MH	14,804	1,480	66,184
262.165	PIPING							
262.1651	2 IN. + SMALLER							
262.1652	2.5 IN. + LARGER							
262.16521	CONCRETE	680 LF	12,594	1 LT	218 MH	2,793	279	
262.1652	2.5 IN. + LARGER		12,594		218 MH	2,793	279	15,666
262.165	PIPING		12,594		218 MH	2,793	279	15,656
262.166	VALVES	2 EA	13,600		71 MH	920		
262.167	EXCAVATION							
262.1671	EARTH EXCAVATION		4003 CY	1000 MH	10,710	4,003		

TABLE 2-11

COST ESTIMATE - 800 Mw LOW SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

PLANT CODE 692	COST BASIS 07/76	ACCOUNT DESCRIPTION	FACTORY COSTS	QUANTITY	LABOR HRS	SITE LABOR COST	MATERIAL COST	TOTAL COSTS
262.1672	RCC EXCAVATION			166 CY	132 WH	1,414	664	
262.1673	BACR FILL			4066 CY	1220 WH	13,068	6,066	
262.167	EXCAVATION			2352 WH	25192	8,733	33,925	
262.16	DEFINING SYSTEM			3761 WH	43702	10,492	130,295	
262.1	HEAT REJECTION SYSTEM			76036 WH	970122	171,343	3,058,279	
262.	MECHANICAL EQUIPMENT			78934 WH	970122	171,343	3,058,279	
26-	MAIN COND HEAT REJECT SYS			228130 WH	2,657,872	1,436,132	6,912,225	
2-	TOTAL DIRECT COSTS			5121385 WH	62,850,634	39,645,471	226,369,118	
2-	TOTAL INDIRECT COSTS							
91-	TOTAL INDIRECT COSTS			1 LT	800000 WH	8,338,500	11,142,000	
91-	TOTAL INDIRECT COSTS			29,569,000	800000 WH	8,338,500	11,142,000	45,049,500
	TOTAL BASE COST			156,442,013	5921385 WH	71,189,134	50,787,671	278,418,618

\*Detailed Cost Breakdown for Account Number 9., Indirect Costs for Mechanical wet Towers, is in NUREG-0241 Report.

TABLE 2-14

COST ESTIMATE - 800 Mw LOW SULFUR COAL PLANT  
NATURAL DRAFT COOLING SYSTEM

Cost Basis		FACTORY				SITE			
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hrs.	Labor Cost	Material Cost	Total Cost	
20 .	Land and Land Rights	500 AC.				2,000,000		2,000,000	
21 .	Structures and Improvements	2,591,575		123900 MH	14,363,993	21,428,985		36,384,553	
22 .	Boiler Plant Equipment	63,614,516		155162 MH	19,494,886	3,968,738		87,078,140	
23 .	Turbine Plant Equipment	49,109,337		1001161 MH	12,805,021	3,268,137		65,182,495	
24 .	Electric Plant Equipment*	5,949,381		901154 MH	11,056,939	6,893,761		23,899,181	
25 .	Miscellaneous Plant Equipment	5,188,759		221988 MH	2,842,632	704,962		8,736,353	
26 .	Main Condenser Heat Rejection System			51157 MH	596,665	556,610		1,231,688	
261 .	Structures	78,213							
262 .	Mechanical Equipment								
262.1	Heat Rejection System								
262.11	Water Intake Equipment								
262.111	Rotating Machinery	2,000		151 MH	1,996	200			
262.114	Purification & Filtration Equip.	125,500		4620 MH	57,899	6,439			
262.115	Piping - Screen Wash	2,730		273 MH	3,539	354			
262.116	Valves - Screen Wash	12,900							
262.117	Piping - Miscellaneous Items	405							
262.11	Water Intake Equipment	143,535		5044 MH	63,434	6,993		213,962	
262.12	Circulating Water System								
262.121	Rotating Machinery	1,394,000		8250 MH	109,040	10,904			
262.125	Pipe	455,299		17254 MH	222,991	22,299			
262.126	Valves	201,250		560 MH	7,258	726			
262.127	Piping - Miscellaneous Items			11860 MH	125,196	65,496			

\* Detailed cost breakdown for this account if found in Table 2-38.

TABLE 2-14  
COST ESTIMATE - 800 MWe LOW SULFUR COAL PLANT  
NATURAL DRAFT COOLING SYSTEM

		Cost Basis 7-76	FACTORY		SITE			
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hrs.	Labor Cost	Material Cost	Total Costs
262.128	Instrumentation and Control		5,350		45 MH	548	27	
262.129	Skids Foundations		42,150		1346 MH	17,448	2,492	
262.12	Circulating Water System		2,099,049		39315 MH	482,481	101,944	2,683,474
262.13	<u>Cooling Towers</u>							
262.132	Heat Transfer Equipment		6,810,000		164700 MH	2,131,218	213,122	
262.138	Instrumentation and Control		36,000		350 MH	4,279	214	
262.13	Cooling Towers		6,846,000		165050 MH	2,135,497	213,336	9,194,833
262.15	<u>Main Ct. Make-up &amp; Blowdown Sys.</u>							
262.151	Make-up Water System		334,060		9665 MH	104,984	30,798	
262.152	Blowdown System		48,950		351 MH	4,487	439	
262.153	Make-up Water Pretreatment System		613,000		28531 MH	369,103	73,821	
262.15	Main Ct. Make-up & Blowdn. Sys.		996,010		38547 MH	478,574	105,058	1,579,642
262.	Mechanical Equipment		10,084,594		247956 MH	3,159,986	427,331	13,671,911
26 .	Main Cond. Ht. Reject. Sys.		10,162,807		299113 MH	3,756,651	984,141	14,903,599
2 .	Total Direct Costs		136,616,375		5220035 MH	64,319,222	39,248,724	240,184,321
*9 .	Total Indirect Costs		29,777,000		800600 MH	8,338,500	11,142,000	49,257,500
	Total Base Cost		166,393,375		6020038 MH	72,657,722	50,390,724	289,441,821

2-113

\*Detailed Cost Breakdown for Account Number 9., Indirect Costs for Mechanical Wet Towere, is in NUREG-0241 Report.

TABLE 2-15

COST ESTIMATE - 800 MWe LOW SULFUR COAL PLANT  
FAN-ASSISTED NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/76		FACTORY			SITE			
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hrs.	Labor Cost	Material Cost	Total Costs
20 .	Land and Land Rights			500 AC			2,000,000	2,000,000
21 .	Structures and Improvements	2,591,575		1239000 MH	14,363,993	21,428,985	38,384,553	
22 .	Boiler Plant Equipment	63,614,516		1551622 MH	19,494,886	3,968,738	87,078,140	
23 .	Turbine Plant Equipment	49,109,337		1007161 MH	12,805,021	3,268,137	65,182,495	
24 .	Electric Plant Equipment*	6,282,857		939146 MH	11,522,294	7,183,547	24,988,698	
25 .	Miscellaneous Plant Equipment	5,188,759		221988 MH	2,842,632	704,962	8,736,353	
26 .	Main Condenser Heat Reject System							
261.	Structures	78,213		51157 MH	596,665	556,810	1,231,688	
262.	Mechanical Equipment							
262.1	Heat Rejection System							
262.11	Water Intake Equipment							
262.111	Rotating Machinery	2,000		151 MH	1,996	200		
262.114	Purification & Filtration Equip.	125,500		4620 MH	57,899	6,439		
262.115	Piping - Screen Wash	2,730		273 MH	3,539	354		
262.116	Valves - Screen Wash	12,900						
262.117	Piping - Miscellaneous Items	405						
262.11	Water Intake Equipment	143,535		5044 MH	63,434	6,993	213,962	
262.12	Circulating Water System							
262.121	Rotating Machinery	1,347,000		8100 MH	107,057	10,706		
262.125	Pipe	455,299		17254 MH	222,991	22,299		
262.126	Valves	201,250		560 MH	7,258	726		
262.127	Piping - Miscellaneous Items			11860 MH	125,196	65,498		

\* Detailed cost breakdown for this account if found in Table 2-37.

TABLE 2-15

COST ESTIMATE - 800 MWe LOW SULFUR COAL PLANT  
FAN-ASSISTED NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/76		FACTORY		SITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hrs.	Labor Cost	Material Cost	Total Costs
262.128	Instrumentation and Control		5,350		45 MH	548	27	
262.129	Skids/Foundations		42,150		1346 MH	17,448	2,492	
262.12	Circulating Water System		2,051,049		39165 MH	480,498	101,746	2,633,293
262.13	<u>Cooling Towers</u>							
262.132	Heat Transfer Equipment		4,974,200		84350 MH	1,091,489	109,149	
262.138	Instrumentation and Control		53,950		451 MH	5,514	276	
262.13	Cooling Towers		5,028,150		84801 MH	1,097,003	109,425	6,234,528
262.15	<u>Main Ct. Make-up &amp; Blowdown Sys.</u>							
262.151	Make-up Water System		334,060		9665 MH	104,984	30,798	
262.152	Blowdown System		48,950		351 MH	4,487	439	
262.153	Make-up Water Pretreatment System		613,000		28531 MH	369,103	73,821	
262.15	Main Ct. Make-up & Blowdn. Sys.		996,010		38547 MH	478,574	105,058	1,579,642
262.	Mechanical Equipment		8,218,744		167557 MH	2,119,509	323,222	10,561,475
26 .	Main Cond. Ht. Reject. Sys.		8,296,957		218714 MH	2,716,174	880,032	11,893,163
2 .	Total Direct Costs		135,084,001		5177631 MH	63,745,000	39,434,401	238,263,402
*9 .	Total Indirect Costs		29,700,000		800000 MH	8,338,500	11,142,000	49,180,500
	Total Base Cost		164,784,001		5977631 MH	72,083,500	50,576,401	287,443,902

2-115

<sup>a</sup>Detailed Cost Breakdown for Account Number 9., Indirect Costs for Mechanical Wet Towers, is in NUREG-0241 Report.

## 2.8 800 MWe HIGH SULFUR COAL-FIRED PLANT COOLING SYSTEMS

The cooling requirements for this plant are identical to the requirements of the 800 MWe low sulfur coal-fired plant. Hence, the design of the alternate cooling systems remain identical and are as presented in subsection 2.7.

TABLE 2-16

PAGE 1

PLANT CODE  
692 COST BASIS  
07/76COST ESTIMATE - 800 MWe HIGH SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

03/02/78

ACCT. NO.	ACCOUNT DESCRIPTION	FACTORY		SITE			TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	
<b>2 . TOTAL DIRECT COSTS</b>							
20 .	LAND AND LAND RIGHTS			1 LT			2,000,000
21 .	STRUCTURES + IMPROVEMENTS	1 LT	2,054,780	1 LT	1126623 MH	14,065,050	21,865,140
22 .	BOILER PLANT EQUIPMENT	1 LT	75,728,940	1 LT	2581618 MH	32,449,810	11,967,200
23 .	TURBINE PLANT EQUIPMENT	1 LT	46,735,030	1 LT	978863 MH	12,427,010	3,230,340
24 .	ELECTRIC PLANT EQUIPMENT*	1 LT	7,237,910	1 LT	1646841 MH	12,843,940	7,858,580
25 .	MISCELLANEOUS PLANT EQUIPT	1 LT	5,188,759	1 LT	221988 MH	2,842,632	704,962
26 .	MAIN COND HEAT REJECT SYS						
261 .	STRUCTURES						
2-117	261.1 MAKEUP WTR INT + DISCH STR						
	261.11 INTAKE STRUCTURE						
	261.111 EXCAVATION WORK						
	261.1111 EARTH EXCAVATION			2700 CY	675 MH	7,890	2,700
	261.1112 ROCK EXCAVATION			9700 CY	7760 MH	90,715	38,800
	261.1113 SHEETING (TEMP COFFERDAM)			120 TN	2400 MH	32,928	20,400
	261.1114 STRET STL (TEMP COFFERDAM)						
	261.1115 PUMPING			1 LT	6500 MH	60,580	61,000
	261.111 EXCAVATION WORK				17335 MH	192,113	122,900
							315,013
	261.112 BEARING PILES (STEEL)						
	261.113 SUBSTRUCTURE CONCRETE						
	261.1131 FORMWORK			70600 SF	28240 MH	311,838	70,600

\*Detailed cost summaries for these accounts are found in Tables 2-39 and 2-40.

TABLE 2-16

PLANT CODE  
692 COST BASIS  
07776

COST ESTIMATE - 800 MWe HIGH SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

PAGE 2  
03702778

ACCT. NO.	ACCOUNT DESCRIPTION	FACTORY QUANTITY	COSTS	***** SITE *****	*****	*****	TOTAL COSTS
		*****	*****	QUANTITY	LABOR HRS	LABOR COST	MATERIAL COST
261.1132	REINFORCING STEEL			292 TN	7300 MH	96,267	109,500
261.1133	CONCRETE			3900 CY	2925 MH	29,871	124,800
261.1134	EMBEDDED STEEL			20 TN	2500 MH	30,067	28,000
261.1135	CONCRETE FINISH			39000 SF	391 MH	3,993	390
261.1135	WATERPROOFING						
261.1137	CONSTRUCTION JOINTS			1075 SF	1076 MH	11,882	1,075
261.1138	RUBBING CONCRETE SURFACES						
	261.113 SUBSTRUCTURE CONCRETE				42432 MH	481,918	334,365
	261.114 SUPERSTRUCTURE						816,283
2-118							
261.1141	CONCRETE WORK						
261.1142	STRUCTURAL + MISC. STEEL						
261.11421	STRUCTURAL ST						
261.11422	GRATING (GALV)			840 SF	143 MH	1,861	2,520
261.11423	HANDRAIL			200 LF	120 MH	1,564	2,000
	261.1142 STRUCTURAL + MISC. STEEL				263 MH	3,425	4,520
	261.1143 EXTERIOR WALLS						7,945
261.11431	CONCRETE						
261.11432	MASONRY			1375 SF	344 MH	3,925	3,850
	261.1143 EXTERIOR WALLS				344 MH	3,925	3,850
							7,775
261.1144	ROOF DECK						
261.11441	METAL ROOF DECK			750 SF	45 MH	586	750

TABLE 2-16

COST ESTIMATE - 800 Mw HIGH SULPHUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

PLANT CODE	COST BASIS	FACTORY COST	ACCOUNT DESCRIPTION	QUALITY	COSTS	QUANTITY	COSTS	SITE LABOR HRS.	LABOR COST	MATERIAL COST	TOTAL COSTS
692	0776										
261.1144	ROOF DECK					6.5 MH	585	750	1,336		
261.1145	ROOFING + FLASHING										
261.1151	BLW+ ROOFING INSULATING FIL.					750 SF	53.4H	714	938		
261.1165	ROOFING + FLASHING					5.5 MH	518	714	938		
261.1166	INTERIOR WALLS										
261.1168	PLASTER WALLS										
261.1162	MASONRY WALLS										
261.1163	PARTITIONS										
261.1160	INTERIOR WALLS										
261.1147	DOORS + WINDOWS										
261.11471	ROLLING STEEL DOORS										
261.11472	PERSONNEL DOORS										
261.11673	SASH + GLAZING										
261.1167	DOORS + WINDOWS										
261.1149	PAINTING										
261.11691	CONCRETE										
261.11492	STEELWORK										
261.11493	METAL DECK										
261.11694	HANDRAIL										
261.1149	PAINTING										

TABLE 2-16

PLANT CODE	COST BASIS	COST ESTIMATE - 800' HIGH SULFUR COAL PLANT ONCE-THROUGH COOLING SYSTEM	PAGE
032	07/76	03/02/78	4
ACCT NO.	ACCOUNT DESCRIPTION	FACTORY COSTS	TOTAL
	QUANTITY	LABOR HRS	LABOR COST
261.114	SUPERSTRUCTURE	*****	*****
261.117	BULKHEAD	*****	*****
261.1171	STEEL SHEETING	600 TN	8,232
261.1172	STRUCTURAL STEEL	600 MH	782
261.1173	GRAVEL FILL	6 TN	2,900
261.1174	DREDGING	1850 CY	3708 M.
261.1175	RIP-RAP (12 IN. THICK)	185 CY	278 MH
261.1176	CHAIN LINK FENCE (7 FT HIGH)	380 LF	116 MH
261.1177	BULKHEAD	4762 MH	59,339
261.118	PROTECTIVE DOLPHINS	*****	*****
261.1181	WOOD PILES	2150 LF	430 MH
261.118	PROTECTIVE DOLPHINS	430 MH	8,600
261.119	BUILDING SERVICES	*****	*****
261.1191	PLUMBING + DRAINS	5 EA	625 MH
261.1192	HEATING + VENTILATING	1 LT	193 MH
261.1193	LIGHTING + SERVICE POWER	750 SF	226 MH
261.119	BUILDING SERVICES	3400	1046 MH
261.11	INTAKE STRUCTURE	3400	67040 MH
261.1	MAKEUP AIR INT + DISCH STR	3400	760639
261.4	CHLORINATION BUILDING	*****	*****

TABLE 2-16

PAGE 5

PLANT CODE COST BASIS  
692 07/76

COST ESTIMATE - 800 MWe HIGH SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

03/02/78

ACCT. NO.	ACCOUNT DESCRIPTION	FACTORY		SITE			TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST	
261.41	BUILDING STRUCTURE						
261.411	EXCAVATION WORK						
261.4111	EARTH EXCAVATION	53 CY		13 MH		140	53
261.4114	BACKFILL	41 CY		12 MH		118	41
	261.411 EXCAVATION WORK			25 MH		258	94
							352
261.413	SUBSTRUCTURE CONCRETE						
261.4131	FORMWORK	216 SF		85 MH		938	216
261.4132	REINF. STEEL	2 TN		51 MH		657	750
261.4133	CONCRETE	12 CY		9 MH		91	384
261.4134	EMBEDDED STEEL						
261.4135	FLOOR FINISH	105 SF		1 MH		9	1
261.4136	WATERPROOFING						
261.4137	CONSTRUCTION JOINTS	50 SF		50 MH		552	50
261.4138	RUBBING CONCRETE SURFACES	105 SF		2 MH		27	13
261.4139	WIRE FABRIC			198 MH		2,274	1,414
	261.413 SUBSTRUCTURE CONCRETE						3,688
261.414	SUPERSTRUCTURE						
261.4141	CONCRETE WORK						
261.4142	STRUCT. + MISC. STEEL						
261.41421	STRUCT. STEEL	2 TN		100 MH		1,302	2,200
261.41423	MISC. FRAMES, ETC.						

TABLE 2-16

PLANT CODE	COST BASIS	PLANT CODE	COST BASIS	PAGE
692	OFFICE	692	OFFICE	6 0.370778
261,6165	BEDROOM	261,6165	BEDROOM	
261,6162	STRUCTURE + MASONRY	261,6162	STRUCTURE + MASONRY	
261,6165	FIREPLACE WALLS	261,6165	FIREPLACE WALLS	
261,6166	ROOF DECK	261,6166	ROOF DECK	
261,6165	METAL ROOF DECK	261,6165	METAL ROOF DECK	
261,6165	BOOKING + FLIRMING	261,6165	BOOKING + FLIRMING	
261,6165	DR. J. ROOFING + FLIRMING	261,6165	DR. J. ROOFING + FLIRMING	
261,6167	DOORS + WINDOWS	261,6167	DOORS + WINDOWS	
261,6169	PAINTING	261,6169	PAINTING	
261,6192	STRUCTURE	261,6192	STRUCTURE	
261,6193	METAL DECK	261,6193	METAL DECK	
261,6165	SUPPLY STRUCTURE	261,6165	SUPPLY STRUCTURE	

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PLANT CODE  
692 COST BASIS  
07/76

COST ESTIMATE - 800 MWe HIGH SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

03/02/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY		SITE			MATERIAL COST	TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	LABOR COST		
261.41	BUILDING STRUCTURE			481 RH		52654	5x888	11x552
261.424	LIGHTING + SERVICE POWER							
261.4	CHLORINATION BUILDING			481 RH		52664	5x888	11x552
261.5	DISCHARGE TUNNEL + CANAL							
261.51	EXCAVATION							
261.511	EARTH EXCAVATION	16070 CY		4018 MH		43x035	16x070	
261.512	ROCK EXCAVATION	19130 CY		15304 MH		163x912	76x520	
261.514	BACKFILL	8975 CY		2693 MH		28x844	8x975	
261.515	DEWATERING							
261.51	EXCAVATION			22015 MH		235x791	101x565	337x356
261.53	SUBSTRUCTURE CONCRETE							
261.531	FORMWORK	85550 SF		34220 MH		377x871	85x550	
261.532	REINFORCING STEEL	593 TN		14825 MH		191x438	237x200	
261.533	CONCRETE	7900 CY		5925 MH		60x507	276x500	
261.534	EMBEDDED STEEL							
261.535	FLOOR FINISH							
261.536	WATERPROOFING							
261.537	CONSTRUCTION JOINTS	4690 SF		4690 MH		51x790	4x690	
261.538	RUBBING CONCRETE SURFACES							
261.53	SUBSTRUCTURE CONCRETE			59660 MH		681x605	603x940	1x285x546
261.5	DISCHARGE TUNNEL + CANAL			81675 MH		917x397	705x505	1,622x902

TABLE 2-16

PLATE CODE 592 COST BASIS 07/75

**COST ESTIMATE - 800 MWE HIGH SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM**

0307021708

TABLE 2-16

COST ESTIMATE - 800 MM HIGH SULFUR COAL PLANT  
ONE-THROUGH COOLING SYSTEM

PAGE 9

PLANT CODE	COST BASIS	ACCOUNT DESCRIPTION	FACTORY QUANTITY	FACTORY COSTS	QUALITY QUANTITY	LABOR HRS.	LABOR COST	MATERIAL COST	TOTAL COSTS
692	07776								
262.11442	SCREEN WASH PUMPS	262.1144 STOP LOGS	6 EA	600 LB	460 AH	4287	828	52670	52670
262.1144	PURIFICATION+FLTRATION EQ	801,330			4600 MH	42872	9798		
262.115	PIPING-SCREEN WASH								
262.1151	2 IN. + SMALLER								
262.1152	2.5 IN. + LARGER								
262.11521	CS/VNS	20260 LB	50,390	1 LT	3039 MH	3935	3935		
262.1152	Z.5 IN. + LARGER				3039 MH	3935	3935	3935	73714
262.115	PIPING-SCREEN WASH				3039 AH	3935	3935	3935	73714
262.116	VALVES-SCREEN WASH				1 LT	22680			
262.1162	CHECK								
262.1166	BUTTERFLY								
262.116	VALVES-SCREEN WASH								
262.117	PIPING-MISC ITEMS								
262.1171	HANGERS + SUPPORTS				3020 LB	4560			
262.1172	INSULATION								
262.1173	SPECIALTIES								
262.117	PIPING-MISC ITEMS								
262.11	WATER INTAKE EQUIPMENT								
					887,660				
								64744	64744
								392329	392329
								1324733	1324733
								4560	4560

PLANT CODE      COST BASIS  
592      577.5

COST ESTIMATE - 800 MM HIGH SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY QUANTITY	FACTORY COST	SITE QUANTITY	SITE LABOR HRS	SITE LABOR COST	MATERIAL COST
262.12	CIRCULATING WATER SYSTEM						
262.121	ROTATING MACHINERY						
262.1211	CIRCULATING WATER PUMPING	6 EA	1,236,070	1 LT	1254.4	1,627.7	16,972
262.12111	CIRCULATING WATER PUMPING						
262.12111	CIRCULATING WATER PUMPING			1264.1 MH	162.717	10,472	1,212,689
262.1211	CIRCULATING WATER PUMPING						
262.121	ROTATING MACHINERY			1264.1 MH	162.717	10,472	1,212,689
262.125	PIPE						
262.1251	2 IN + SMALLER						
262.1252	2.5 IN + LARGER						
262.12521	CONCRETE/ANS	722 LF	342,022	1 LT	350.8 MH	4,649.62	6,496
262.12522	CS/ANS	69162 LB	103,743	1 LT	1037.6 MH	13,445.52	13,445.5
262.1252	2.5 IN + LARGER						
262.125	PIPE						
262.125	PIPE			452,755	1388.2 MH	17,941	650,120
262.126	VALVES						
262.126	BUTTERFLY	10 EA	240,430	1 LT	951 MH	12,322	1,232
262.126	VALVES						
262.127	PIPING / MISCELLANEOUS ITEMS						
262.1271	HANGERS + SUPPORTS						

TABLE 2-16

民法总则 11

PLANT CODE COST BASIS  
A92 57772

COST ESTIMATE - 800 MWe HIGH SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

03/02/28

TABLE 2-16

PLANT CODE COST BASIS  
632 07/76  
COST ESTIMATE - 800 MM HIGH SULPHUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

PAGE 12

03/02/78

ACCT NO.	ACCOUNT DESCRIPTION	FACTORY		SITE		TOTAL COSTS
		QUANTITY	COSTS	QUANTITY	LABOR HRS	
262.1291	CIRCULATION SYSTEM	1 LT	510,000	1 LT	2000 WH	2,537
262.1292	SKIDS & FOUNDATIONS	30,000		2000 WH	25,374	2,587
262.1293	CIRCULATING WATER SYSTEM	1,855,000		43595 WH	534,084	116,107
262.161	DE-ICING SYSTEM					2,537
262.1611	ROTATING MACHINERY					
262.16111	DE-ICING PUMPS + MOTORS	2 EA	49,900	1 LT	1120 WH	1,480
262.16112	DE-ICING PUMP MOTORS					
262.16111	DE-ICING PUMPS + MOTORS		49,900		1120 WH	1,480
262.16111	ROTATING MACHINERY		49,900		1120 WH	1,480
262.165	PIPING					
262.1651	2 IN. + SMALLER					
262.1652	2.5 IN. + LARGER					
262.16521	CONCRETE	680 LF	12,534	1 LT	218 WH	2,793
262.1652	2.5 IN. + LARGER		12,534		218 WH	2,793
262.165	PIPING					
262.166	VALVES	2 EA	13,600		71 WH	920
262.167	EXCAVATION					
262.1671	EXCAVATION					
			4003 CY		100 WH	10,710
						4,003

TABLE 2-16

COST ESTIMATE - 800 KW HIGH SULFUR COAL PLANT  
ONCE-THROUGH COOLING SYSTEM

PLANT COST	LOSS BASIS	ACCT NO.	ACCOUNT DESCRIPTION	FACTORY COSTS	QUANTITY	LITRE	LITER	LITER	MATERIAL COST	TOTAL COSTS
592	0776	262.1672	ROCK EXCAVATION	1556.00	1.556	1.556	1.556	1.556	1.556	3,325
		262.1673	BACKEFILL	4066.00	1.220	1.220	1.220	1.220	1.220	5,056
		262.1677	EXCAVATION	2582.00	2.582	2.582	2.582	2.582	2.582	6,735
		262.16	DE-ICING SYSTEM	760.00	4.127	4.127	4.127	4.127	4.127	130,295
		262.1	HEAT REJECTION SYSTEM	2,316.81	2.316	2.316	2.316	2.316	2.316	3,958,279
		262.	MECHANICAL EQUIPMENT	2,816.81	2.816	2.816	2.816	2.816	2.816	3,58279
		26	MAIN COKE HEAT REJECT SYS	2,820.21	2.820	2.820	2.820	2.820	2.820	6,912,225
		2	TOTAL DIRECT COSTS	159,795.683	52,563.00	77,285.324	49,060.361	266,142,568		
		2-129	TOTAL INDIRECT COSTS							
		91	TOTAL INDIRECT COSTS	1.117	972,000.00	10,12,500	10,12,500	10,12,500	10,12,500	1,113,000
		*9	TOTAL INDIRECT COSTS	35,876,000	35,876,000	972,000.00	972,000.00	972,000.00	972,000.00	1,113,000
			TOTAL BASE COST	175,671,683	722,603.00	87,598,824	63,173,361	326,243,868		

\*Detailed Cost Breakdown for Account Number 9, Indirect Costs for Mechanical Wet Towers, is in NUREG-0241 Report.

TABLE 2-17

COST ESTIMATE - 800 Mw HIGH SULPHUR COAL PLANT  
NATURAL DRAFT COOLING SYSTEM

Cost Basis		FACTORY		SITE		Total Costs	
Account Number	Description	Quantity	Cost	Quantity	Labor Hrs.	Labor Cost	Material Cost
20 .	Land and Land Rights	500 AC				2,000,000	2,000,000
21 .	Structures and 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	120,136,094
23 .	Turbine Plant Equipment	49,109,337		1007161 MH	12,895,021	3,268,137	65,182,495
24 .	Electric Plant Locomotive*	7,264,381		1046213 MH	12,835,745	7,874,039	27,974,165
25 .	Miscellaneous Plant Equipment	5,188,759		221988 MH	2,842,632	704,962	8,736,353
26 .	Main Condenser Heat Reject System						
261 .	Structures	78,213		51157 MH	596,665	556,810	1,231,688
262 .	Mechanical Equipment						
262.1	Heat Rejection System						
262.11	Water Intake Equipment						
262.111	Rotating Machinery	2,000		151 MH	1,996	200	
262.114	Purification & Filtration Equip.	125,500		4620 MH	57,899	6,439	
262.115	Piping - Screen Wash	2,730		273 MH	3,539	354	
262.116	Valves - Screen Wash	12,900					
262.117	Piping - Miscellaneous Items	405					
262.11	Water Intake Equipment	143,535		504 MH	53,434	6,993	213,962
262.12	Circulating Water System						
262.121	Rotating Machinery	1,395,000		8250 MH	109,040	10,904	
262.125	Pipe	455,299		17254 MH	222,991	22,299	
262.126	Valves	201,250		560 MH	7,258	726	
262.127	Piping - Miscellaneous Items			11860 MH	125,196	65,496	

TABLE 2-17

COST ESTIMATE - 800 MWe HIGH SULFUR COAL PLANT  
NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/76		FACTORY			SITE			
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hrs.	Labor Cost	Material Cost	Total Costs
262.128	instrumentation and Control		5,350		45 MH	548		27
262.129	Skids/Foundations		42,150		1346 MH	17,448	2,492	
262.12	Circulating Water System	2,099,049		39315 MH	482,481	101,944		2,683,474
262.13	<u>Cooling Towers</u>							
262.132	Heat Transfer Equipment		6,810,000		164700 MH	2,131,218	213,122	
262.138	Instrumentation and Control		36,000		350 MH	4,279		214
262.13	Cooling Towers		6,846,000		165050 MH	2,135,497	213,336	9,194,833
262.15	<u>Main Ct. Make-up &amp; Blowdown Sys.</u>							
262.151	Make-up Water System		334,060		9665 MH	104,984	30,798	
262.152	Blowdown System		48,950		351 MH	4,487		439
262.153	Make-up Water Pretreatment System		613,000		28531 MH	369,103	73,821	
262.15	Main Ct. Make-up & Blowdn. Sys.		996,010		38547 MH	478,574	105,058	1,579,642
262.	Mechanical Equipment		10,084,594		247956 MH	3,159,986	427,331	13,671,911
26 .	Main Cond. Ht. Reject. Sys.		10,162,807		299113 MH	3,756,651	984,141	14,903,599
2 .	Total Direct Costs		149,539,051		6352716 MH	78,754,920	48,663,616	276,957,587
*9 .	Total Indirect Costs		36,084,000		972000 MH	10,112,500	14,113,000	60,309,500
	Total Base Cost		185,623,051		7324716 MH	88,867,420	62,776,616	337,267,087

\*Detailed Cost Breakdown for Account Number 9., Indirect Costs for Mechanical Wet Towers, is in NUREG-0241 Report.

TABLE 2-18

COST ESTIMATE - 800 MWe HIGH SULFUR COAL PLANT  
FAN-ASSISTED NATURAL DRAFT COOLING SYSTEM

Cost Basis	Account Number	Description	Quantity	Costs	Quantity	Costs	Labor	hrs.	Material Cost	Total Cost
<u>FACTORY</u>										
<u>SITE</u>										
			\$00 AC							
20.		Land and Land Signs								
21.		Structures and 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			120,146,094
23.		Turbine Plant Equipment	49,109,337		1037161 MH	12,805,021	3,268,137			65,182,495
24.		Electric Plant Equipment*	7,597,857		1084205 MH	13,302,000	8,163,825			29,063,682
25.		Miscellaneous Plant Equipment	5,188,759		221988 MH	2,842,632	704,962			8,736,353
26.		Main Condenser Heat Reject System								
261.		Structures	78,213		52157 MH	596,665				556,810
262.		Mechanical Equipment								1,231,688
262.1		Heat Rejection System								
262.11		Water Intake Equipment								
262.111		Rotating Machinery	2,000		151 MH	1,996				200
262.114		Purification & Filtration Equip.	125,500		4620 MH	57,899				6,439
262.115		Piping - Screen Wash		2,730			273 MH			
262.116		Valves - Screen Wash		12,900			3,539			
262.117		Piping - Miscellaneous Items		405						
262.11		Water Intake Equipment		163,535			504 MH			
262.12		Circulating Water System								
262.121		Rotating Machinery	1,347,000		8100 MH	107,057				10,706
262.125		Pipe	455,299		17254 MH	222,991				22,299
262.126		Valves	201,250		560 MH	7,258				726
262.127		Piping - Miscellaneous Items			11860 MH	125,196				65,496

\* Detailed cost summary for this account is found in Table 2-41.

TABLE 2-18

COST ESTIMATE - 800 Mw HIGH SULFUR COAL PLANT  
FAN-ASSISTED NATURAL DRAFT COOLING SYSTEM

FACTORY							SITE		
Account Number	Description	Quantity	Costs	Labor Hrs.	Labor Cost	Material Cost	Total Costs		
262.128	Instrumentation and Control	5,350	568	45 MH	568		27		
262.129	Skids Foundations	42,150		1346 MH	17,448	2,492			
262.12	Circulating Water System	2,051,049		39165 MH	680,498	101,746	2,633,293		
262.13	Coating Towers								
262.132	Heat Transfer Equipment	4,974,290		84350 MH	1,091,489	109,149			
262.138	Instrumentation and Control	53,950		451 MH	5,514	276			
262.13	Cooling Towers	5,028,150		84801 MH	1,097,003	109,425	6,234,578		
262.15	Main Ct., Make-up & Blowdown Sys.*								
262.151	Make-up Water System	334,060		9665 MH	104,984	30,798			
262.152	Blowdown System	48,950		351 MH	4,487	439			
262.153	Make-up Water pretreatment System	613,000		28531 MH	369,103	73,821			
262.15	Main Ct., Make-up & Blowdn. Sys.	996,010		38547 MH	478,574	105,058	1,579,642		
262.	Mechanical Equipment	8,218,744		167357 MH	2,119,509	323,222	10,661,475		
26 .	Main Cond. Ht. Reject. Sys.	8,296,957		218714 MH	2,716,174	880,032	11,893,163		
2 .	Total Direct Costs	148,006,677		6301309 MH	78,180,698	48,849,293	275,036,668		
*9 .	Total Indirect Costs	36,006,000		972000 MH	10,112,500	14,113,000	60,221,500		
	Total Base Cost	184,012,677		7273309 MH	88,293,198	62,962,293	335,268,168		

\*Detailed Cost Breakdown for Account Number 9\*, Indirect Costs for Mechanical Wet Towers, is in NUREG-0241 Report.

TABLE 2-19

DETAILED COST ESTIMATE FOR ACCOUNT 23, TURBINE PLANT EQUIPMENT  
1200 MWe PRESSURIZED WATER REACTOR - ONCE THROUGH COOLING SYSTEM

Cost Basis 7/76		FACTORY		SITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
23 .	<u>Turbine Plant Equipment</u>							
231.	Turbine Generator	54,874,642		417379 MH	5,194,091	1,287,465		61,356,198
233.	<u>Condensing Systems</u>							
233.1	Condenser Equipment	4,238,084		76233 MH	1,018,197	101,821		5,358,102
233.2	Condensate System	2,488,200		156893 MH	2,004,885	406,057		4,899,142
233.3	Gas Removal System	324,186		8758 MH	113,848	11,512		449,546
233.4	Turbine Bypass System	150,000						150,000
233.5	Condensate Polishing	1,503,520		42102 MH	544,364	54,174		2,102,058
233	Condensing Systems	8,703,990		283986 MH	3,681,294	573,564		12,958,848
234.	<u>Feed Heating System</u>	8,807,502		427569 MH	5,548,535	632,545		14,988,582
235.	<u>Other Turbine Plant Equipment</u>	7,408,466		539642 MH	6,993,950	709,313		15,111,729
236.	<u>Instrumentation and Control</u>	1,134,670		13973 MH	170,805	15,487		1,320,962
237.	<u>Turbine Plant Miscellaneous Items</u>			121481 MH	1,440,145	2,066,426		3,506,571
23	Turbine Plant Equipment	80,929,270		18,1030 MH	23,028,820	5,284,800		109,242,890

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TABLE 2-20

DETAILED COST BREAKDOWN OF ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 MWe PRESSURIZED WATER REACTOR - ONCE THROUGH COOLING SYSTEM

Cost Basis 7/76		FACTORY		SITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
242.	<u>Station Service Equipment</u>							
242.1	<u>Station Serv&amp;Startup XPMR</u>							
242.11	Unit Auxiliary Transformer	423,987		4728 MH	58,483	5,851		
242.12	Reserve Auxiliary XPMR	816,873		5691 MH	70,401	7,040		
242.13	Foundations for XPMRS			11519 MH	129,586	70,619		
242.1	Station Serv&Startup XPMR	1,240,860		21938 MH	258,470	83,510		1,582,836
242.2	<u>Unit Substations</u>							
242.21	<u>Load Center switchgear</u>							
242.211	Non-Class IE Switchgear							
242.2111	Clg Tower+Fire Pump House	27,889		618 MH	7,646	765		
242.2112	Balance of Plant-No CT+FPH	588,001		11126 MH	137,636	13,764		
242.211	Non-Class IE Switchgear	615,890		11744 MH	145,282	14,529		775,701
242.212	Class IE Switchgear	445,000		5200 MH	64,328	6,433		
242.21	Load Center Switchgear	1,060,890		16944 MH	209,610	20,962		1,291,462
242.22	<u>Load Center Transformers</u>							
242.221	Non-Class IE Transformers							
242.2211	Clg Tower+Fire Pump House	11,778		450 MH	5,563	556		
242.2212	Balance of Plant-NO CT+FPH	212,000		8093 MH	100,114	10,011		
242.221	Non-Class IE Transformers	223,778		8543 MH	105,677	10,567		338,072
242.222	Class IE Transformers	124,000		3800 MH	47,009	4,701		
242.22	Load Center Transformers	347,778		12343 MH	152,686	15,268		15,732
242.23	Miscellaneous XPMRS	15,000		899 MH	11,123	1,112		
242.2	Unit Substations	1,423,668		30186 MH	373,419	37,342		1,834,429

2+136

TABLE 2-20

DETAILED COST BREAKDOWN OF ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 MWe PRESSURIZED WATER REACTOR - ONCE THROUGH COOLING SYSTEM

Cost Basis 7/76		FACTORY		SITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
242.3	<u>Auxiliary Power Sources</u>							
242.3	Auxiliary Power Sources	4,018,863		41723 MH	521,329	77,674		4,617,866
242.	Station Service Equipment	6,683,391		93847 MH	1,153,718	198,625		8,035,135
243.	<u>Switchboards</u>							
243.	Switchboards	460,000		10372 MH	128,205	61,093		649,298
244.	<u>Protective Equipment</u>							
244.	Protective Equipment			84003 MH	1,038,088	532,600		1,570,688
245.	<u>Elect. Struc + Wiring Contrr</u>							
245.1	<u>Underground Duct Runs</u>							
245.1	Underground Duct Runs			47902 MH	549,724	258,222		807,946
245.2	Cable Tray			213879 MH	2,629,728	1,056,622		
245.3	Conduit			263685 MH	3,242,110	741,702		
245.	Elec. Struc +Wiring Contrr			525466 MH	6,421,562	2,056,546		8,478,108
246.	<u>Power &amp; Control Wiring</u>							
246.1	<u>Generator Circuits Wiring</u>							
246.1	Generator Circuits Wiring	435,050		15368 MH	188,955	18,896		642,901
246.2	<u>Station Service Pwr Wiring</u>							
246.21	<u>High Voltage Bus+Cable</u>							
246.212	<u>Cable</u>							
246.2121	15 kV Cable			7629 MH	93,798	447,595		
246.2123	5 kV Cable			9041 MH	111,182	300,580		
246.212	Cable			16670 MH	204,960	748,175		953,135
246.21	High Voltage Bus+Cable			16670 MH	204,960	748,175		953,135

TABLE 2-20

DETAILED COST BREAKDOWN OF ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 MWe PRESSURIZED WATER REACTOR - ONCE THROUGH COOLING SYSTEM

Cost Basis 7/76		-FACTORY-		-SITE-				
<u>Account Number</u>	<u>Account Description</u>	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
246.22	<u>Low Voltage Bus+Cable</u>				61314 MH	753,807	313,031	1,066,918
246.22	Low Voltage Bus+Cable				77984 MH	958,847	1,061,206	2,020,053
246.2	Station Service				248524 MH	3,055,813	2,588,621	
246.3	Control Cable				221342 MH	2,721,584	1,405,346	
246.4	Instrument Wire				24430 MH	300,007	30,001	
246.5	Containment Penetrations	506,300			587618 MH	7,225,206	5,104,070	13,270,626
246.	Power & Control Wiring	941,350			1364782 MH	16,751,310	8,031,310	37,243,270
24.	Electric Plant Equipment	12,460,450						

TABLE 2-21

DETAILED COST BREAKDOWN FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 MWe PRESSURIZED WATER REACTOR - FAN-ASSISTED NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/76		FACTORY		SITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
24	<u>Electric Plant Equipment</u>							
241.	<u>Switchgear</u>							
241.	<u>Switchgear</u>	4,461,000		64453 MH	797,321	79,684		5,338,005
242.	<u>Station Service Equipment</u>							
242.1	<u>Station Serv&amp;Startup XFMR</u>							
242.1	<u>Station Serv&amp;Startup XFMR</u>	1,472,000		26059 MH	307,014	99,255		1,878,269
242.2	<u>Unit Substations</u>							
242.21	<u>Load Center Switchgear</u>							
242.211	<u>Non-Class IE Switchgear</u>							
242.2111	CIG Tower+Fire Pump House	334,666		7417 MH	91,755	9,176		
242.2112	Balance of Plant-No CT+FPH	588,001		11126 MH	137,636	13,764		
242.211	Non-Class IE Switchgear	922,667		18543 MH	229,391	22,940		1,174,998
242.212	<u>Class IE Switchgear</u>							
242.21	<u>Load Center Switchgear</u>	445,000		5200 MH	64,328	6,433		
242.21	Load Center Switchgear	1,367,667		23743 MH	293,719	29,373		1,690,759
242.22	<u>Load Center Transformers</u>							
242.221	<u>Non-Class IE Transformers</u>							
242.2211	CIG Tower+Fire Pump House	141,333		5396 MH	66,752	6,675		
242.2212	Balance of Plant-No CT+FPH	212,000		8093 MH	100,114	10,011		
242.221	Non-Class IE Transformers	353,333		13489 MH	166,866	16,686		536,885
242.222	<u>Class IE Transformers</u>							
242.22	<u>Load Center Transformers</u>	124,000		3800 MH	47,009	4,701		
242.22	Load Center Transformers	477,333		17289 MH	213,875	21,387		712,595

TABLE 2-21

DETAILED COST BREAKDOWN FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 MWe PRESSURIZED WATER REACTOR - FAN-ASSISTED NATURAL DRAFT COOLING SYSTEM

		Cost Basis 7/76		FACTORY		SITE		
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
242.23	Miscellaneous Xfmrs		15,000		899 MH	11,123	1,112	
242.2	Unit Substations		1,860,000		41931 MH	518,717	51,872	2,430,589
242.3	<u>Auxiliary Power Sources</u>							
242.3	Auxiliary Power Sources		4,018,863		41723 MH	524,329	77,674	4,617,866
242.	Station Service Equipment		7,350,863		109713 MH	1,347,060	228,801	8,926,724
243.	<u>Switchboards</u>							
243.	Switchboards		460,000		10372 MH	128,705	61,093	649,298
244.	<u>Protective Equipment</u>							
244.	Protective Equipment				84003 MH	1,038,088	532,600	1,570,688
245.	<u>Elect. Struc +Wiring Contrr</u>							
245.1	<u>Underground Duct Runs</u>							
245.1	Underground Duct Runs				53071 MH	609,061	286,075	895,136
245.2	<u>Cable Tray</u>				225855 MH	2,776,978	1,115,724	
245.3	<u>Conduit</u>				282508 MH	3,473,555	794,554	
245.	Elect. Struc +Wiring Contrr				561434 MH	6,859,574	2,196,353	9,055,927
246.	<u>Power &amp; Control Wiring</u>							
246.1	<u>Generator Circuits Wiring</u>							
246.1	Generator Circuits Wiring		435,050		368 MH	188,955	18,896	642,901
246.2	<u>Station Service PWR Wiring</u>							
246.21	<u>High Voltage Bus+Cable</u>							
246.21	High Voltage Bus+Cable				17184 MH	211,282	759,187	970,469

TABLE 2-21

DETAILED COST BREAKDOWN FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 MWe PRESSURIZED WATER REACTOR - FAN-ASSISTED NATURAL DRAFT COOLING SYSTEM

72 140

Cost Basis 7/16		FACTORY		SITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
246.22	<u>Low Voltage Bus+Cable</u>			62238 MB	765,240	340,757		1,105,997
246.22	Low Voltage Bus+Cable			79422 MB	976,522	1,099,944		2,076,466
246.2	Station Service PWR Wiring			270720 MB	3,328,600	2,819,250		
246.3	<u>Control Cable</u>			241110 MB	2,964,533	1,530,857		
246.4	<u>Instrument Wire</u>			24400 MB	360,007	30,001		
246.5	<u>Containment Penetrations</u>	506,300		631020 MB	7,758,617	5,498,948		14,198,915
246.	Power & Control Wiring	941,350		13,213,213	1460995 MB	17,928,865	8,597,479	39,739,557
246.	Electric Plant Equipment							

TABLE 2-22

DETAILED COST ESTIMATE FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 MWe PRESSURIZED WATER REACTOR - NATURAL DRAFT COOLING SYSTEM

		Cost Basis 7/76	FACTORY			SITE			
<u>Account Number</u>		<u>Account Description</u>	<u>Quantity</u>	<u>Costs</u>	<u>Quantity</u>	<u>Labor Hours</u>	<u>Labor Cost</u>	<u>Material Cost</u>	<u>Total Costs</u>
24		<u>Electric Plant Equipment</u>							
241.		<u>Switchgear</u>							
241.1		<u>Gen Eqpt Switchgear</u>							
	241.1	Gen Eqpt Switchgear		735,000		8430 MH	104,286	10,380	849,666
241.2		<u>Station Service Switchgear</u>							
241.21		<u>Medium Voltage Metal Clad</u>							
241.22		<u>Medium Voltage Metal Clad</u>		2,870,000		35341 MH	437,189	43,720	3,350,909
241.221		Non-Class 1E 480 V MCC		443,739		10263 MH	126,954	12,695	
241.222		Class 1E 480 V MCC		370,000		9442 MH	116,802	11,680	
241.22		Station Motor Control Cntr		813,739		19705 MH	243,756	24,375	1,081,870
241.2		Station Service Switchgear		3,683,739		55046 MH	680,945	68,095	4,432,779
241.		Switchgear		4,418,739		63476 MH	785,231	78,475	5,282,445
242.		<u>Station Service Equipment</u>							
242.1		<u>Station Serv&amp;Startup XPMR</u>							
242.11		Unit Auxiliary Transformer		481,599		5370 MH	66,433	6,643	
242.12		Reserve Auxiliary XPMR		925,691		6449 MH	72,780	7,978	
242.13		Foundations for Xfmrs							
242.13		Foundations for Xfmrs				13391 MH	150,641	82,094	232,735
242.1		Station Serv&Startup XPMR		1,407,290		25210 MH	296,854	96,715	1,800,859
242.2		<u>Unit Substations</u>							

TABLE 2-22

DETAILED COST ESTIMATE FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 MWe PRESSURIZED WATER REACTOR - NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/76		FACTORY		SITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
242.21	<u>Load Center Switchgear</u>							
242.211	<u>Non-Class IE Switchgear</u>							
242.2111	CLC Tower+Fire Pump House	27,889		618 MH	7,646		765	
242.2112	Balance of Plant-No CT+FPH		588,001	11126 MH	137,636		13,764	
242.2111	Non-Class IE Switchgear		615,890	11744 MH	145,282		14,529	775,701
242.212	<u>Class IE Switchgear</u>							
242.21	Load Center Switchgear		545,000		5200 MH	64,328		6,433
242.22	<u>Load Center Transformers</u>							
242.221	<u>Non-Class IE Transformers</u>							
242.2211	CLC Tower+Fire Pump House	11,778		450 MH	5,563		556	
242.2212	Balance of Plant-No CT+FPR		212,000	8093 MH	100,114		10,011	
242.2211	Non-Class IE Transformers		223,778		8543 MH	105,677		10,567
242.222	<u>Class IE Transformers</u>							
242.22	Load Center Transformers		124,000		3800 MH	47,009		4,701
242.23	<u>Miscellaneous XPMRS</u>							
242.2	<u>Unit Substations</u>		347,778		12343 MH	152,686		15,268
242.23	Miscellaneous XPMRS		15,000		899 MH	11,123		1,112
242.2	Unit Substations		1,423,668		30186 MH	373,419		1,834,429
242.3	<u>Auxiliary Power Sources</u>							
242.3	Auxiliary Power Sources		4,018,863		41723 MH	521,329		77,674
242.	Station Service Equipment		6,849,821		97119 MH	1,191,602		211,731
243.	<u>Switchboards</u>							
243.	Switchboards		460,000		10372 MH	128,205		649,298

TABLE L-22

DETAILED COST ESTIMATE FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 MWe PRESSURIZED WATER REACTOR - NATURAL DRAFT COOLING SYSTEM

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Cost Basis 7/76		FACTORY		SITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
244.	<u>Protective Equipment</u>							
244.	Protective Equipment			84003 MH	1,038,088	532,600		1,570,688
245.	<u>Elect. Struc +Wiring Centr</u>							
245.1	<u>Underground Duct Runs</u>							
245.1	Underground Duct Runs			47902 MH	549,724	258,222		807,946
245.2	<u>Cable Tray</u>			213879 MH	2,629,728	1,056,622		
245.3	<u>Conduit</u>			263685 MH	3,242,110	741,702		
245.	Elect. Struc +Wiring Centr			325466 MH	6,421,562	2,656,546		8,478,108
246.	<u>Power &amp; Control Wiring</u>							
246.1	<u>Generator Circuits Wiring</u>							
246.1	Generator Circuits Wiring	435,050		15368 MH	188,955	18,896		642,901
246.2	<u>Station Service PWR Wiring</u>							
246.21	<u>High Voltage Bus+Cable</u>							
246.212	<u>Cable</u>							
246.2121	15 kV Cable			7135 MH	87,732	437,027		
246.2123	5 kV Cable			9041 MH	111,162	300,580		
246.212	Cable			16176 MH	198,894	737,607		936,501
246.21	High Voltage Bus+Cable			16176 MH	198,894	737,607		936,501
246.22	<u>Low Voltage Bus+Cable</u>							
246.22	Low Voltage Bus+Cable			61314 MH	753,887	313,031		1,066,918
246.2	Station Service PWR Wiring			77490 MH	952,781	1,050,638		2,003,419

TABLE 2-22

DETAILED COST ESTIMATE FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 MWe PRESSURIZED WATER REACTOR - NATURAL DRAFT COOLING SYSTEM

	<u>Cost Basis</u> 7/76	<u>FACTORY</u>			<u>SITE</u>			
<u>Account Number</u>	<u>Account Description</u>	<u>Quantity</u>	<u>Costs</u>	<u>Quantity</u>	<u>Labor Hours</u>	<u>Labor Cost</u>	<u>Material Cost</u>	<u>Total Costs</u>
246.3	<u>Control Cable</u>				248524 MH	3,055,813	2,588,621	
246.4	<u>Instrument Wire</u>				221342 MH	2,721,584	1,405,346	
246.5	<u>Containment Penetrations</u>	506,300			24400 MH	300,007	30,001	
246.	Power & Control Wiring	941,350			587124 MH	7,219,140	5,093,502	13,253,992
24 .	Electric Plant Equipment	12,669,910			1367560 MH	16,783,828	8,033,947	37,487,685

TABLE 2-23

DETAILED COST ESTIMATE FOR ACCOUNT 23, TURBINE PLANT EQUIPMENT  
1200 MWe BOILING WATER REACTOR - ONCE-THROUGH COOLING SYSTEM

Cost Basis 7/76		FACTORY		SITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
23 .	<u>Turbine Plant Equipment</u>							
231.	<u>Turbine Generator</u>	55,979,726		431726 MH	5,378,099	1,305,285		62,663,110
233.	<u>Condensing Systems</u>							
233.1	Condenser Equipment	4,457,703		79236 MH	1,058,295	105,830		5,621,828
233.2	Condensate System	2,655,749		161029 MH	2,058,542	411,422		5,125,713
233.3	Gas Removal System	306,046		10775 MH	139 ..	14,932		462,896
233.4	Turbine Bypass System	116,880						116,880
233.5	Condensate Polishing	1,503,320		42102 MH	544,264	54,174		2,102,058
233.	Condensing Systems	9,041,898		293142 MH	3,801,119	586,358		13,429,375
234.	<u>Feed Heating System</u>	8,512,838		420022 MH	5,450,218	622,762		14,585,818
235.	<u>Other Turbine Plant Equip.</u>	10,795,728		581717 MH	7,572,086	767,385		19,135,199
236.	<u>Instrumentation &amp; Control</u>	1,142,000		14518 MH	177,465	16,535		1,336,000
237.	<u>Turbine Plant Misc. Items</u>			116269 MH	1,372,743	2,087,235		3,459,978
23 .	Turbine Plant Equipment	85,472,190		1859394 MH	23,751,730	5,385,560		114,609,480

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TABLE 2-24

DETAILED COST ESTIMATE FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 MWe BOILING WATER REACTOR + ONCE-THROUGH COOLING SYSTEM

Cost Basis 7/76		FACTORY		SITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
24	<u>Electric Plant Equipment</u>							
241.	<u>Switchgear</u>							
241.1	<u>Gen Eqpt Switchgear</u>							
241.1	Gen Eqpt Switchgear	735,000		8430 MH	104,286	10,380		849,666
241.2	<u>Station Service Switchgear</u>							
241.21	<u>Medium Voltage Metal Clad</u>							
241.211	<u>13.8 kV</u>							
241.211	13.8 kV	667,900		14773 MH	162,730	18,275		1,068,925
241.213	<u>4.16 kV</u>							
241.2131	Non-Class IE 4.16 kV	717,470		7081 MH	87,597	8,760		
241.2132	Class IE 4.16 kV	992,400		18268 MH	225,244	22,524		
241.213	4.16 kV	1,709,870		25289 MH	312,841	31,284		2,053,995
241.214	D-G Seq. Logic Puls	180,000		2022 MH	25,014	2,501		
241.21	<u>Medium Voltage Metal Clad</u>	2,757,770		42084 MH	520,605	52,060		3,330,435
241.22	<u>Station Motor Control Cntr</u>							
241.221	Non-Class IE 480 V MCC	436,539		10263 MH	126,954	12,695		
241.222	Class IE 480 V MCC	466,500		9642 MH	116,802	11,680		
241.22	Station Motor Control Cntr	903,039		19705 MH	243,756	24,375		1,171,170
241.2	<u>Station Service Switchgear</u>	3,660,809		61789 MH	764,361	76,435		4,501,605
241.	<u>Switchgear</u>	4,395,809		70219 MH	868,647	86,815		5,351,271
242.	<u>Station Service Equipment</u>							

TABLE 2-24

DETAILED COST ESTIMATE FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 MWe BOILING WATER REACTOR - ONCE-THROUGH COOLING SYSTEM

Cost Basis  
7/76

<u>Account Number</u>	<u>Account Description</u>	<u>FACTORY</u>		<u>SITE</u>			<u>Total Costs</u>
		<u>Quantity</u>	<u>Costs</u>	<u>Quantity</u>	<u>Labor Hours</u>	<u>Labor Cost</u>	
242.1	<u>Station Set &amp; Startup XFMR</u>						
242.11	Unit Auxiliary Transformer	377,983		4728 MH	58,483	5,845	
242.12	Reserve Auxiliary XFMR	762,873		5691 MH	70,401	7,040	
242.13	<u>Foundations for XFMRS</u>						
242.13	Foundations for XFMRS			11519 MH	129,586	10,619	200,205
2-147	242.1      Station Set & Startup XFMR	1,140,856		21938 MH	258,470	83,504	1,482,830
242.2	<u>Unit Substations</u>						
242.21	<u>Load Center Switchgear</u>						
242.211	<u>Non-Class IE Switchgear</u>						
242.2111	CLG Tower+Fire Pump House	27,889		618 MH	7,646	765	
242.2112	Balance of Plant-No CT+FPH	425,460		8653 MH	107,043	10,704	
242.211	Non-Class IE Switchgear	453,349		9271 MH	114,689	11,669	579,597
242.212	Class IE Switchgear	500,220		5851 MH	72,380	7,238	
242.21	Load Center Switchgear	953,569		15122 MH	187,069	18,707	1,159,345
242.22	<u>Load Center Transformers</u>						
242.221	<u>Non-Class IE Transformers</u>						
242.2211	CLG Tower+Fire Pump House	11,778		450 MH	5,563	556	
242.2212	Balance of Plant-No CT+FPH	164,889		6294 MH	77,859	7,786	
242.221	Non-Class IE Transformers	176,667		6744 MH	83,422	8,342	268,431
242.222	Class IE Transformers	149,256		4275 MH	52,885	5,289	
242.22	Load Center Transformers	325,923		11019 MH	136,307	13,631	475,861

TABLE 2-24

DETAILED COST ESTIMATE FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 MWe BOILING WATER REACTOR - ONCE-THROUGH COOLING SYSTEM

		Cost Basis 7/76		FACTORY		SITE		
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
242.23	Miscellaneous XPMRS	15,000		899 MH	11,123	1,112		
242.2	Unit Substations	1,294,492		27040 MH	334,499	33,450		1,662,441
242.3	<u>Auxiliary Power Sources</u>							
242.3	Auxiliary Power Sources	5,211,543		55007 MH	687,927	104,686		6,004,156
242.	Station Service Equipment	7,646,891		103985 MH	1,280,896	221,640		9,149,427
243.	<u>Switchboards</u>							
243.	Switchboards	460,000		10372 MH	128,205	61,093		649,298
244.	<u>Protective Equipment</u>							
244.	Protective Equipment			65971 MH	1,063,596	545,500		1,609,096
245.	<u>Elect. Struc +Wiring Contrr</u>							
245.1	<u>Underground Duct Runs</u>							
245.1	Underground Duct Runs			48543 MH	558,252	262,299		820,551
245.2	Cable Trav			221379 MH	2,721,944	1,093,672		
245.3	Conduit			223685 MH	2,750,294	629,202		
245.	Elect. Struc +Wiring Contrr			493707 MH	6,030,490	1,985,173		8,015,663
246.	<u>Power &amp; Control Wiring</u>							
246.1	<u>Generator Circuits Wiring</u>							
246.1	Generator Circuits Wiring	435,050		15368 MH	188,955	18,896		642,901
246.2	<u>Station Service Pwr Wiring</u>							
246.21	<u>High Voltage Bus+Cable</u>							
246.212	Cable							





TABLE 2-25

DETAILED COST ESTIMATE FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1,700 MG BOILING WATER REACTOR - FAN-ASSISTED NATURAL DRAFT COOLING SYSTEM

FACTORY SITE						Total Cost
Cost Breakdown	Account Description	Quantity	Labor Hours	Labor Cost	Material Cost	Total Cost
776						
	245.22 Load Center Transformers	655.478	1,963.9H	197,596	19,759	627,724
	242.23 Miscellaneous Items	15,000	899.9H	11,123	1,112	
	242.2 Unit Substations	1,730.826	36785.9H	579,797	47,980	2,258,601
	242.3 Auxiliary Power Sources	5,211.9A	53007.9H	687,927	104,686	6,096,136
	242.3 Auxiliary Power Sources	8,314.367	114651.9H	1,475,738	251,921	10,043,026
	243. Switchboards	405,000	10,372.0H	126,203	61,093	61,946
	244. Protective Equipment	153.	83971.9H	1,063,596	363,500	1,609,096
	245. Elect. Struc. wiring, Control	7.5				
	245.1 Underground Duct Banks		53812.0H	617,589	290,152	907,731
	245.2 Under-ground Duct Runs		73335.9H	2,869,196	1,152,774	
	245.3 Cable Tray		242508.9H	2,981,719	683,056	
	245.3 Conduite		329675.9H	6,358,302	2,126,980	
	245. Elect. Struc. wiring, Control					
	246. Power & Control Wiring					
	246.1 Generator Circuits Wiring		1548.9H	180,955	180,955	
	246.2 Station Service P&P Wiring					
	246.3 High Voltage Bus-Cable					
						662,901

TABLE 2-25

DETAILED COST ESTIMATE FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 MWe BOILING WATER REACTOR - FAN-ASSISTED NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/76		FACTORY			SITE			
<u>Account Number</u>	<u>Account Description</u>	<u>Quantity</u>	<u>Costs</u>	<u>Quantity</u>	<u>Labor Hours</u>	<u>Labor Cost</u>	<u>Material Cost</u>	<u>Total Costs</u>
246.21	High Voltage Bus+Cable			21767 MH	267,636	684,690		952,326
246.22	<u>Low Voltage Bus+Cable</u>							
246.22	<u>Low Voltage Bus+Cable</u>			60504 MH	743,922	340,704		1,084,626
246.2	Station Service Pwr Wiring			82271 MH	1,011,55d	1,025,394		2,036,952
246.3	<u>Control Cable</u>			309120 MH	3,800,744	3,219,150		
246.4	<u>Instrument Wire</u>			228510 MH	2,809,611	1,450,857		
246.5	Containment Penetrations	465,500		22000 MH	270,499	27,050		
246.	Power & Control Wiring	891,550		657269 MH	8,081,367	5,741,347		14,714,264
24	Electric Plant Equipment	14,147,017		1474334 MH	18,097,145	8,812,865		41,057,027

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TABLE 2-26

DETAILED COST ESTIMATE FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 MWe BOILING WATER REACTOR - NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/76		FACTORY		ITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
24 .	<u>Electric Plant Equipment</u>							
241.	<u>Switchgear</u>							
241.1	<u>Gen Eqpt Switchgear</u>							
241.1	Gen Eqpt Switchgear	735,000		8430 MH	104,286	10,380		849,666
241.2	<u>Station Service Switchgear</u>							
241.21	<u>Medium Voltage Metal Clad</u>							
241.21	Medium Voltage Metal Clad	2,800,800		42084 MH	520,605	52,060		3,373,465
241.22	<u>Station Motor Control Cntr</u>							
241.221	Non-Class 1E 480 V MCC	436,539		10263 MH	126,954	12,695		
241.222	<u>Class 1E 480 V MCC</u>							
241.22	Station Motor Control Cntr	466,500		9542 MH	116,802	11,680		
241.22	Station Service Switchgear	903,039		19705 MH	243,756	24,375		1,171,170
241.2	Station Service Switchgear	3,703,839		61789 MH	764,361	76,435		4,544,635
241.	<u>Switchgear</u>	4,438,839		7021 MH	868,647	86,815		5,394,301
242.	<u>Station Service Equipment</u>							
242.1	<u>Station Serv&amp;Startup XPMR</u>							
242.11	Unit Auxiliary Transformer	435,549		5370 MH	66,433	6,643		
242.12	Reserve Auxiliary XPMR	671,691		6149 MH	79,780	7,978		
242.13	Foundations for XPMRS							
242.13	Foundations for XPMRS			13391 MH	150,641	82,094		232,735
242.1	Station Serv&Startup XPMR	1,307,290		25210 MH	296,854	96,715		1,700,859
242.2	<u>Unit Substations</u>							

TABLE 2-26

DETAILED COST ESTIMATE FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 MWe BOILING WATER REACTOR - NATURAL DRAFT COOLING SYSTEM

	Cost Basis 7/76	FACTORY	SITE					
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
242.21	<u>Load Center Switchgear</u>							
242.211	Non-Class 1E Switchgear							
242.2111	CLG Tower+Fire Pump House	27,889		618 MH	7,646		765	
242.2112	Balance of Plant-No CT+FPH	425,460		8653 MH	107,043		10,704	
242.2111	Non-Class 1E Switchgear	453,349		9271 MH	114,689		11,469	579,457
242.212	Class 1E Switchgear	500,220		5851 MH	72,380		7,238	
242.21	Load Center Switchgear	953,569		15122 MH	187,069		18,707	1,159,345
242.22	<u>Load Center Transformers</u>							
242.221	Non-Class 1E Transformers							
242.2211	CLG Tower+Fire Pump House	11,778		450 MH	5,563		556	
242.2212	Balance of Plant-No CT+FPH	164,889		8294 MH	77,859		7,786	
242.2211	Non-Class 1E Transformers	176,667		6744 MH	83,422		8,342	268,431
242.222	Class 1E Transformers	149,256		4275 MH	52,885		5,289	
242.22	Load Center Transformers	325,923		11019 MH	136,307		13,631	475,861
242.23	Miscellaneous XFRS	15,000		899 MH	11,123		1,112	
242.2	Unit Substations	1,294,492		27040 MH	334,499		33,450	1,662,441
242.3	Auxiliary Power Sources							

TABLE 2-26

DETAILED COST ESTIMATE FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 MWe BOILING WATER REACTOR - NATURAL DRAFT COO: '86 SYSTEM

Cost Basis 7/76		FACTORY		SITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
242.3	Auxiliary Power Sources		5,211,543		55007 MH	687,927	104,586	6,004,156
242.	Station Service Equipment		7,813,325		107257 MH	1,319,280	234,851	9,367,456
243.	<u>Switchboards</u>							
243.	Switchboards	460,000		10372 MH	128,205	61,093		649,298
244.	<u>Protective Equipment</u>							
244.	Protective Equipment			85971 MH	1,063,596	545,500		1,609,096
245.	<u>Elect. Struc &amp; Wiring Contr</u>							
245.1	<u>Underground Duct Runs</u>							
245.1	Underground Duct Runs			48643 MH	558,252	262,299		820,551
245.2	<u>Cable Tray</u>				221379 MH	2,721,944	1,093,672	
245.3	<u>Conduit</u>				223685 MH	2,750,294	629,202	
245.	Elect. Struc & Wiring Contr			493707 MH	6,030,490	1,985,173		8,015,663
246.	<u>Power &amp; Control Wiring</u>							
246.1	<u>Generator Circuits Wiring</u>							
246.1	Generator Circuits Wiring	435,050		15368 MH	188,955	18,896		642,901
246.2	<u>Station Service PWR Wiring</u>							
246.21	High Voltage Bus+Cable							
246.212	Cable			7778 MH	95,640	280,200		
246.2121	15 kV Cable			12981 MH	159,608	382,910		
246.2123	5 kV Cable							

TABLE 2-26

DETAILED COST ESTIMATE FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 MWe BOILING WATER REACTOR - NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/26		FACTORY		SITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
246.212	Cable			20759 MH	255,248	663,110		918,358
246.21	High Voltage Bus+Cable			20759 MH	255,248	663,110		918,358
246.22	Low Voltage Bus+Cable			59580 MH	732,569	312,978		1,045,547
246.2	Station Service PWR Wiring			80339 MH	987,817	976,088		1,963,905
246.3	<u>Control Cable</u>			286924 MH	3,527,957	2,988,321		
246.4	<u>Instrument Wire</u>			208742 MH	2,566,662	1,325,346		
246.5	<u>Containment Penetrations</u>	436,500		22000 MH	270,499	27,050		
246.	Power & Control Wiring	891,550		613373 MH	7,541,890	5,335,901		12,769,341
24 .	Electric Plant Equipment	13,603,714		1380899 MH	16,952,108	8,249,333		38,805,155

TABLE 2-27

DETAILED COST ESTIMATE FOR ACCOUNT 23, TURBINE PLANT EQUIPMENT  
1200 MWe HIGH SULFUR COAL-FIRED PLANT - ONCE-THROUGH COOLING SYSTEM

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Cost Basis 7/76		FACTORY		SITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
23 .	<u>Turbine Plant Equipment</u>							
231.	<u>Turbine Generator</u>	45,288,261		339531 MH	4,179,574	1,580,551		51,048,386
233.	<u>Condensing Systems</u>							
233.1	Condenser Equipment	3,263,212		62675 MH	840,791	84,447		4,188,455
233.2	Condensate System	1,453,355		52299 MH	678,263	73,602		2,205,220
233.3	Gas Removal System	368,850		6847 MH	89,211	9,626		467,687
233.5	Condensate Polishing	1,198,52		20430 MH	263,995	26,137		1,488,652
	Condensing Systems	6,283,942		142251 MH	1,872,260	193,812		8,350,014
234.	<u>Feed Heating System</u>	14,310,145		313874 MH	4,071,810	407,590		18,789,545
235.	<u>Other Turbine Plant Equip.</u>	12,035,592		920579 MH	11,930,504	1,213,283		25,179,379
236.	<u>Instrumentation &amp; Control</u>	556,000		5383 MH	65,798	3,290		625,088
237.	<u>Turbine Plant Misc. Items</u>			99451 MH	1,153,314	1,850,104		3,003,418
23 .	Turbine Plant Equipment	78,473,940		1821069 MH	23,273,260	5,248,630		104,995,830

TABLE 2-28

DETAILED COST ESTIMATE FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 Mw HIGH SULFUR COAL-FIRED PLANT - OME-THROUGH COOLING SYSTEM

Cost Basis		FACTORY		SITE		Total Costs	
Account Number	Description	Quantity	Costs	Quantity	Labor Hours	Material Cost	Total Costs
241.	<u>Electric Plant Equipment</u>						
241.1	<u>Switchgear</u>						
241.1.1	Gen Engt Switchgear						
241.1.1.1	Gen Engt Switchgear	7080 MH	87,385	9,635	97,220		
241.1.2	Station Service Switchgear						
241.1.2.1	Medium Voltage Metal Clad						
241.1.2.1.1	13.8 kV	1,062,300	12000 MH	14,848	14,848		
241.1.2.1.2	6.16 kV	2,400,000	20000 MH	247,412	247,412		
241.1.2.2	Station Service Metal Clad						
241.1.2.2.1	Medium Voltage Metal Clad	3,462,300	32000 MH	395,960	395,960		
241.1.2.2.2	Station Motor Control Ctr						
241.1.2.2.2.1	Station Motor Control Ctr	1,123,253	30151 MH	372,986	372,986		
241.1.2.2.2.2	Station Service Switchgear	4,567,553	62151 MH	76,856	76,856		
241.1.2.2.2.3	Switchgear	5,587,553	69231 MH	856,531	856,531		
241.1.2.3	Station Service Equipment						
241.1.2.3.1	Station Service Transformer						
241.1.2.3.1.1	Unit Auxiliary Transformer	315,869	6053 MH	50,139	50,139		
241.1.2.3.1.2	13.8 kV Transformers						
241.1.2.3.1.2.1	4,16 kV Transformers	316,000	4000 MH	49,482	49,482		
241.1.2.3.1.2.2	Unit Auxiliary Transformer	630,569	8053 MH	99,662	99,662		
241.1.2.3.2	Service Auxiliary Transformer						
241.1.2.3.2.1	13.8 kV Transformer	323,748	2425 MH	29,998	29,998		

TABLE 2-28

DETAILED COST ESTIMATE FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 MWe HIGH SULFUR COAL-FIRED PLANT - ONCE-THROUGH COOLING SYSTEM

Cost Basis  
7/76

Account Number	Account Description	FACTORY		SITE			Total Costs
		Quantity	Costs	Quantity	Labor Hours	Labor Cost	
242.122	4.16 KV Transformer		344,000		2400 MH	29,690	2,969
242.12	Reserve Auxiliary XPMR		667,748		4825 MH	59,688	5,966
242.13	Foundations for XPMRS						
242.13	Foundations for XPMRS				7797 MH	88,639	45,343
242.1	Station Serv&Startup XPMR		1,298,317		20675 MH	247,948	61,271
242.2	<u>Unit Substations</u>						
242.21	Load Center switchgear						
242.211	General Plant Switchgear						
242.2111	Cooling Tower						
242.2112	Balance of Plant-No CT		864,000		9600 MH	118,758	11,876
242.211	General Plant Switchgear		864,000		9600 MH	118,758	11,876
242.212	Precipitator Switchgear		115,000		3500 MH	43,298	4,330
242.21	Load Center Switchgear		979,000		13100 MH	162,056	16,206
242.22	<u>Load Center Transformers</u>						
242.221	General Plant Ld Ctr XPMRS						
242.2211	Cooling Tower						
242.2212	Balance of Plt 13800-480v		138,000		3800 MH	51,378	5,938
242.2213	Balance of Plt 4160-480v		132,000		361.5 MH	44,534	4,653
242.221	General Plant Ld Ctr XPMRS		270,000		8400 MH	103,912	10,391
242.222	Precipitator Ld Ctr XPMRS		204,000		4000 MH	49,482	4,948
242.22	Load Center Transformers		474,000		12400 MH	153,394	15,339
							642,733

TABLE 2-28

**DETAILED COST ESTIMATE FOR ACCOUNT 24 - ELECTRIC PLANT EQUIPMENT  
1200 KW HIGH SULFUR COAL-FIRED PLANT - ONE-THROUGH COOLING SYSTEM**

FACTORY							SITEM		
Cost Basis	Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
776									
242.23	242.2	Miscellaneous Items	15,000	9,990					
		Unit Substations	1,408,000		26,000 9H	325,346	32,535	1,825,881	
242.3	242.3	Auxiliary Power Systems	272,700		5,251 9H	53,096	5,309	330,605	
		Auxiliary Power Sources	3,038,517		51226 9H	626,390	99,115	3,764,022	
242.4	242.4	Station Service Equipment							
		Switchboards	518,000		10530 9H	136,167	61,419	709,586	
243.	243.	Switchboards							
		Protective Equipment			85,000 9H	1,023,419	671,000	1,724,419	
245.	245.	protective equipment							
		Elect. Struc. & Lining, Control							
245.1	245.1	Underground Duct 3-10							
		Underground Duct 7-10							
245.2	245.2	Cable Tray			193751 9H	2,382,769	1,148,557		
245.3	245.3	Conduit			29561 9H	3,626,721	948,106		
246.	246.	Elect. Struc. & Lining, Control			552700 9H	6,737,620	2,603,661	9,361,301	
246.1	246.1	Power & Control Cables							
		Generator Circuits Lining	484,100						
246.2	246.2	Station Service Cables							
		High Voltage Busbar							
		Cables							

TABLE 2-28

DETAILED COST ESTIMATE FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 MWe HIGH SULFUR COAL-FIRED PLANT - ONCE-THROUGH COOLING SYSTEM

Cost Basis 7/76		FACTORY		SITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
246.2121	15 KV Cable			8395 MH	103,223	261,065		
246.2123	5 KV Cable			25969 MH	319,298	1,032,864		
246.212	Cable			34364 MH	422,521	1,293,929		1,716,450
246.21	High Voltage Bus+Cable			34364 MH	422,521	1,293,929		1,716,450
246.22	<u>Low Voltage Bus+Cable</u>							
246.22	Low Voltage Bus+Cable			67801 MH	833,649	460,754		1,294,403
246.2	Station Service PWR Wiring			102165 MH	1,256,176	1,754,683		3,010,853
246.3	<u>Control Cable</u>			220080 MH	2,705,787	2,933,719		
246.4	<u>Instrument Wire</u>			94736 MH	1,164,844	688,992		
246.	Power & Control Wiring	485,100		433344 MH	5,328,213	5,397,535		11,210,848
24 .	Electric Plant Equipment	8,629,170		1202431 MH	14,752,249	8,919,270		32,300,680

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TABLE 2-29

DETAILED COST ESTIMATE FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 MW HIGH SULPHUR COAL-FIRED PLANT - FAN-ASSISTED NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/76	Account Description	Quantity	Cost	Quantity	Labor Hours	Labor Cost	Total Costs
FACTORY							
24	<u>Electric Plant Equipment</u>						
241	<u>Switchgear</u>						
241.1	Switchgear	4,626,500	69231.90	856,431	86,520	\$,569,451	
242	<u>Station Service Equipment</u>						
242.1	<u>Station Service Startup XNSB</u>						
242.1.1	Station Service Startup XNSB	1,372,900	22020.84	263,586	101,084	\$,364,670	
242.2	<u>Unit Substation</u>						
242.2.1	Load Center Switchgear						
242.2.1.1	General Plant Switchgear						
242.2.1.1.1	Cooling Tower	280,760	3500.80	53,298	6,330		
242.2.1.1.2	Balance of Plant-Switchgear	864,000	9600.80	118,758	11,876		
242.2.1.2	General Plant Switchgear	1,142,760	13100.80	162,056	16,206	\$,323,022	
242.2.1.2.1	Precipitator Switchgear	113,000	3500.80	43,298	4,330		
242.2.1.2.2	Load Center Switchgear	1,259,760	16600.80	205,334	20,536	\$,483,650	
242.2.2	<u>Load Center Transformers</u>						
242.2.2.1	General Plant Transformers						
242.2.2.1.1	Cooling Tower	99,318	4000.80	59,574	5,948		
242.2.2.1.2	Balance of PIt 1360-480V	138,000	5800.80	59,378	5,938		
242.2.2.1.3	Balance of Pit 3400-480V	132,000	3600.80	65,536	6,533		
242.2.2.2	General Plant 100 kVA	369,318	12500.80	153,386	15,339		
242.2.2.2.1	Precipitator Load 100 kVA	204,000	4000.80	49,482	4,948		
242.2.2.2.2	Load Center Transformers	573,518	16400.80	202,866	20,287		

TABLE 2-29

DETAILED COST ESTIMATE FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 MWe HIGH SULFUR COAL-FIRED PLANT - FAN-ASSISTED NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/76		FACTORY		SITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
242.23	Miscellaneous XPNRS	15,000		800 MH	9,896	990		
242.2	Unit Substations	1,848,278		33830 MH	418,118	41,813		2,308,209
242.3	Auxiliary Power Sources							
242.3	Auxiliary Power Sources	272,200		4251 MH	53,096	5,309		330,605
242.*	Station Service Equipment	3,492,478		60071 MH	735,100	148,206		4,375,784
243.	<u>Switchboards</u>							
243.	Switchboards	518,000		10530 MH	130,167	61,419		709,586
244.	<u>Protective Equipment</u>							
244.	Protective Equipment			85400 MH	1,053,419	671,000		1,724,419
245.	<u>Elec. Struc +Wiring Contrlr</u>							
245.1	<u>Underground Duct Runs</u>							
245.1	Underground Duct Runs			66552 MH	778,642	527,333		1,305,975
245.2	Cable Tray			201305 MH	2,177,576	1,194,522		
245.3	Conduit			306818 MH	3,772,435	986,200		
245.	Elec. Struc +Wiring Contrlr			574875 MH	7,028,653	2,708,055		9,736,708
246.	<u>Power &amp; Control Wiring</u>							
246.1	Generator Circuits Wiring	485,100		16351 MH	201,412	20,141		706,653
246.2	Station Service Pwr Wiring							
246.21	High Voltage Bus+Cable							
246.21	High Voltage Bus+Cable			35088 MH	431,419	1,309,428		1,740,847

TABLE 2-29

DETAILED COST ESTIMATE FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
 1200 MWe HIGH SULFUR COAL-FIRED PLANT - FAN-ASSISTED NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/76		FACTORY			SITE			
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
246.22	Low Voltage Bus+Cable			69200 MH	850,839	506,298		1,357,137
246.22	Low Voltage Bus+Cable			104288 MH	1,282,258	1,815,726		3,097,984
246.2	Station Service Par Wiring			231800 MH	2,850,064	3,089,040		
246.3	Control Cable			99772 MH	1,226,734	725,616		
246.4	Instrument Wire			485,100	452241 MH	5,560,468	5,650,523	11,696,091
246.	Power & Control Wiring			9,122,078	1252358 MH	15,364,238	0,325,723	33,812,039
24.	Electric Plant Equipment							

TABLE 2-30

DETAILED COST ESTIMATE FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 MWe HIGH SULFUR COAL-FIRED PLANT - NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/76		FACTORY		SITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
24.	<u>Electric Plant Equipment</u>							
241.	<u>Switchgear</u>							
241.1	<u>Gen Eqpt Switchgear</u>							
241.1	Gen Eqpt Switchgear				7080 MH	87,585	9,635	97,220
241.2	<u>Station Service Switchgear</u>							
241.21	<u>Medium Voltage Metal Clad</u>							
241.21	Medium Voltage Metal Clad	3,454,000		32000 MH	395,860	39,586	3,889,446	
241.22	<u>Station Motor Control Cntr</u>							
241.22	Station Motor Control Cntr	1,125,253		30151 MH	372,986	37,299	1,535,538	
241.2	<u>Station Service Switchgear</u>							
241.	Switchgear	4,579,253		69231 MH	856,431	86,520	5,522,204	
242.	<u>Station Service Equipment</u>							
242.1	<u>Station Serv&amp;Startup XPMR</u>							
242.11	<u>Unit Auxiliary Transformer</u>							
242.111	13.8 kV Transformers	340,983		4377 MH	54,148	5,415		
242.112	4.16 kV Transformers	316,000		4000 MH	49,482	4,948		
242.11	Unit Auxiliary Transformer	656,983		8377 MH	103,630	10,363	770,976	
242.12	<u>Reserve Auxiliary XPMR</u>							
242.121	13.8 kV Transformer	350,677		2624 MH	32,460	3,246		
242.122	4.16 kV Transformer	344,000		2400 MH	29,690	2,969		
242.12	Reserve Auxiliary XPMR	694,677		5024 MH	62,150	6,215	763,042	

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TABLE 2-30

DETAILED COST ESTIMATE FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 MWe HIGH SULFUR COAL-FIRED PLANT - NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/76		FACTORY		SITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
242.13	<u>Foundations for XPMRS</u>							
242.13	Foundations for XPMRS				8420 MH	95,643	84,260	179,903
242.1	Station Serv&Setup XPMR	1,351,560		21821 MH	281,423	190,838		1,713,921
242.2	<u>Unit Substations</u>							
242.21	<u>Load Center Switchgear</u>							
242.211	<u>General Plant Switchgear</u>							
242.2111	Cooling Tower							
242.2112	Balance of Plant-No CT	864,000		9600 MH	118,758	11,876		
242.211	General Plant Switchgear	864,000		9600 MH	118,758	11,876		994,634
242.212	Precipitator Switchgear	115,000		3500 MH	43,298	4,330		
242.21	Load Center Switchgear	979,000		13100 MH	162,056	16,206		1,157,262
242.22	<u>Load Center Transformers</u>							
242.221	<u>General Plant Ld Ctr XPMRS</u>							
242.2211	Cooling Tower							
242.2212	Balance of Plt 13800-480V	138,000		4800 MH	59,378	5,938		
242.2213	Balance of Plt 4160-480V	132,000		3600 MH	44,534	4,453		
242.221	General Plant Ld Ctr XPMRS	270,000		8400 MH	103,912	10,391		384,303
242.222	Precipitator Ld Ctr XPMRS	204,000		4000 MH	49,482	4,948		
242.22	Load Center Transformers	474,000		12400 MH	153,394	15,339		642,733
242.23	Miscellaneous XPMRS	15,000		800 MH	9,896	990		
242.2	Unit Substations	1,468,000		26300 MH	325,346	32,535		1,825,881

TABLE 2-30

DETAILED COST ESTIMATE FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 Mw HIGH SULFUR COAL-FIRED PLANT - NATURAL DRAFT COOLING SYSTEM

<u>Cost Basis</u>	<u>Account Number</u>	<u>Account Description</u>	<u>Quantity</u>	<u>Cost</u>	<u>Quality</u>	<u>Labor Hours</u>	<u>Labor Cost</u>	<u>Material Cost</u>	<u>Total Cost</u>
<u>FACTORY</u>									
<u>SITE</u>									
7/76									
242.3		Auxiliary Power Sources							
	242.3	Auxiliary Power Sources	272,200		4251 SH	53,096	53,096		330,605
	242.	Station Service Equipment			52372 SH				
		Switchboards				639,865	138,682		3,870,547
	243.					10530 SH	130,167	61,419	709,586
	244.	Protective Equipment				855470 SH	1,053,419	671,000	1,725,419
	245.	Elect. Struc. & Wiring Control							
	245.1	Underground Duct Bins				630988 SH	748,650	507,020	1,255,670
	245.2	Cable Tray				193751 SH	2,382,259	1,158,557	
	245.3	Conduit				294561 SH	3,526,721	948,104	
	246.	Power & Control Wiring				552700 SH	6,737,620	2,603,681	9,361,301
	246.1	Generator Circuits Wiring							
	246.1	Generator Circuits Wiring	485,100		16,141 SH	201,412	20,141		706,653
	246.2	Station Service Per Wiring							
	246.21	High Voltage Bus+Cable							
	246.212	Cable				7948 SH	97,972	251,919	
	246.2123	15 kV Cable				25949 SH	319,298	1,032,864	
	246.212	5 kV Cable				33937 SH	417,270	1,285,783	1,702,053
	246.21	High Voltage Bus-Cable				39437 SH	417,270	1,284,783	1,702,053

TABLE 2-30

DETAILED COST ESTIMATE FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 MWe HIGH SULFUR COAL-FIRED PLANT - NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/76		FACTORY		SITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
246.22	Low Voltage Bus+Cable			67801 MH	833,649	460,754		1,294,403
246.22	Low Voltage Bus+Cable			101738 MH	1,250,919	1,745,537		2,996,456
246.2	Station Service Pwr Wiring			220062 MH	2,705,787	2,933,719		
246.3	Control Cable			94736 MH	1,164,844	688,992		
246.4	Instrument Wire			432917 MH	5,322,962	5,388,389		11,196,451
246	Power & Control Wiring	485,100		1203150 MH	14,760,464	8,949,691		32,384,368
24	Electric Plant Equipment	8,674,213						

TABLE 2-31

DETAILED COST ESTIMATE FOR ACCOUNT 23, TURBINE PLANT EQUIPMENT  
1200 LOW SULFUR COAL-FIRED PLANT - OXIDE-THROUGH COOLING SYSTEM

Cost Basis

<u>Account Number</u>	<u>Account Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Quantity</u>	<u>Labor Hours</u>	<u>Labor Cost</u>	<u>Total Costs</u>
23	Turbine Plant Equipment						
231.	Turbine Generator	45,288,261		3,195,319H	6,179,574	1,580,551	51,048,386
233.	Condensing Systems	6,283,942		1,6251,988	1,872,240	193,812	8,359,014
234.	Feed Heating System	14,310,145		31,874,981	4,021,810	407,580	18,789,545
235.	Other Turbine Plant Equipment	12,036,392		920579,301	11,930,504	1,213,283	35,179,379
236.	Instrumentation & Control	555,000		5383,981	65,798	3,290	625,088
237.	Turbine Plant Misc. Items			93451,981	1,153,314	1,850,104	3,003,418
23.	Turbine Plant Equipment	78,473,945		182,069,981	23,273,260	5,248,630	106,995,830

FACTORY							
SITE							

TABLE 2-32

DETAILED SUMMARY OF COSTS FOR ACCOUNT 2-\*, ELECTRIC PLANT EQUIPMENT  
1,200 MWe LOW SULFUR COAL-PIRED PLANT - ONCE THOROUGH COOLING SYSTEM

Cost Basis	Account Number	Account Description	FACTORY			SITE			Material Cost
			Quantity	Costs	Quantity	Labor Hours	Labor Cost		
7/76	241.	Switchgear	3,263,853	57380 MH	709,825	71,859	4,045,537		
	242.	Station Service Equipment	2,832,507	47290 MH	579,100	78,156	3,489,763		
	243.	Switchboards	518,000	1030 MH	130,167	61,419	709,586		
	244.	Protective Equipment		77400 MH	955,055	630,000	1,385,055		
	245.	Elec. Struct & Wiring, Control		147011 MH	5,465,436	2,105,193	7,570,629		
	246.	Power & Control Wiring	485,100	361046 MH	4,339,287	4,345,273	9,369,560		
	248.	Electric Plant Equipment	7,099,450	1000657 MH	12,278,870	7,291,200	26,670,230		

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TABLE 2-33

DETAILED SUMMARY OF COSTS FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
 1200 MWe LOW SULFUR COAL-FIRED PLANT - FAN-ASSISTED NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/76		FACTORY			SITE			
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
241.	Switchgear		3,302,800		57380 MH	709,825	71,859	4,084,484
242.	Station Service Equipment		3,286,478		56135 MH	687,805	127,240	4,101,523
243.	Switchboards		518,006		10530 MH	130,167	61,419	709,586
244.	Protective Equipment				77400 MH	955,055	630,000	1,585,055
245.	Elec. Struc & Wiring Contrr				469186 MH	5,736,469	2,209,567	7,946,036
246.	Power & Control Wiring		485,100		379943 MH	4,671,542	4,598,261	9,254,903
24.	Electric Plant Equipment		7,592,378		1050574 MH	12,890,863	7,698,346	20,181,587

DETAILED SUMMARY OF COSTS FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
1200 H.P. LOW SULFUR COAL-FIRED PLANT - NATURAL DRAFT COOLING SYSTEM

Cost Basis	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
-----FACTORY-----								
-----SITE-----								
776								
241.	Switchgear	3,255,553			57380 MH	703,825	71,859	4,037,237
242.	Station Service Equipment				48436 MH	582,510	117,716	3,596,146
243.	Switchboards	318,000		10530 MH	130,167	61,419	709,586	
244.	Protective Equipment			77460 MH	955,055	630,000		1,585,055
245.	Elect. Struc. & Wiring Constr.			447011 MH	5,455,430	2,105,193		7,570,629
246.	Power & Control Wiring	485,100		360619 MH	4,434,036	4,336,127		8,770,163
24.	Electric Plant Equipment	7,144,513		1901375 MH	112,287,089	7,322,384		26,753,916

TABLE 2-35

DETAILED COST ESTIMATE OF ACCOUNT 23 - TURBINE PLANT EQUIPMENT  
800 MWe LOW SULFUR COAL FIRED PLANT - ONCE-THROUGH COOLING SYSTEM

Cost Basis 7/76		FACTORY		SITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
23.	<u>Turbine Plant Equipment</u>							
231.	<u>Turbine Generator</u>	27,729,086		230575 MH	2,846,760	998,776		31,574,622
233.	<u>Condensing Systems</u>							
233.1	Condenser Equipment	2,405,693		51172 MH	683,495	68,354		3,157,542
233.2	Condensate System	944,682		32832 MH	426,194	46,470		1,467,346
233.3	Gas Removal System	230,101		4123 MH	53,678	5,491		289,270
233.5	Condensate Polishing	948,320		19400 MH	250,691	24,824		1,223,835
233.	Condensing Systems	4,578,796		107527 MH	1,414,058	145,139		6,137,993
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 Miscellaneous Items			85561 MH	972,467	1,347,774		2,318,241
23.	Turbine Plant Equipment	46,735,030		970863 MH	12,427,010	3,230,340		62,392,380

TABLE 2-36

DETAILED COST ESTIMATE OF ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
800 MW<sub>e</sub> LOW SULFUR COAL-FIRED PLANT - ONCE-THROUGH COOLING SYSTEM

Cost Basis  
7/76

<u>Account Number</u>	<u>Account Description</u>	<u>FACTORY</u>		<u>SITE</u>			<u>Total Costs</u>
		<u>Quantity</u>	<u>Costs</u>	<u>Quantity</u>	<u>Labor Hours</u>	<u>Labor Cost</u>	
24.	<u>Electric Plant Equipment</u>						
241.	<u>Switchgear</u>						
241.1	<u>Gen Eapt Switchgear</u>						
241.1	Gen Eapt Switchgear			3540 MH	43,790	4,817	48,607
241.21	<u>Medium Voltage Metal Clad</u>						
241.211	13.8 KV	1,090,053		12000 MH	148,448	14,845	
241.213	4.16 KV	823,500		10500 MH	129,891	12,989	
241.21	Medium Voltage Metal Clad	1,913,553		22500 MH	278,339	27,834	2,219,726
241.22	<u>Station Motor Control Cntr</u>						
242.22	Station Motor Control Cntr	788,458		21600 MH	267,204	26,720	1,082,382
241.2	<u>Station Service Switchgear</u>	2,702,011		44100 MH	545,543	54,554	3,302,108
241.	Switchgear	2,702,011		47640 MH	589,333	59,371	3,350,715
242.	<u>Station Service Equipment</u>						
242.1	<u>Station Serv+Startup XPMR</u>						
242.11	<u>Unit Auxiliary Transformer</u>						
242.111	13.8 KV Transformers	266,341		3620 MH	44,760	4,636	
242.112	4.16 KV Transformer (3W)	117,000		1600 MH	19,792	1,979	
242.113	4.16 KV Transformer (2W)	88,000		1300 MH	16,083	1,608	
242.11	Unit Auxiliary Transformer	471,341		6520 MH	80,635	8,223	560,199
242.12	<u>Reserve Auxiliary XPMR</u>						
242.121	13.8 KV Transformer	279,483		1980 MH	24,470	2,586	
242.122	4.16 KV Transformer	296,000		1900 MH	23,504	2,350	
242.12	Reserve Auxiliary XPMR	575,483		3880 MH	47,974	4,936	628,393

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TABLE 2-36  
DETAILED COST ESTIMATE OF ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
800 MW LOW SULFUR COAL-FIRED PLANT - ONCE-THROUGH COOLING SYSTEM

Cost Basis 7/76		Account Number	Account Description	FACTORY			ON-SITE		
Quantity	Costs			Quantity	Labor Hours	Labor Cost	Material Costs		
<b>GENERAL PLANT EQUIPMENT</b>									
2-2-13	Foundations for XPMSS	2-2-13	Foundations for XPMSS	5283 SH	58,369	22,187			
2-2-21	Station Service Startup XPMSS	2-2-21	Station Service Startup XPMSS	1,046,824	15,583 SH	187,578	35,346	1,269,748	
2-2-22	Unit Substations	2-2-22	Unit Substations						
2-2-211	Load Center Switchgear	2-2-211	Load Center Switchgear						
2-2-211	General Plant Switchgear	2-2-211	General Plant Switchgear	660,000	8000 SH	98,964	9,896		
2-2-211	Cooling Tower	2-2-211	Cooling Tower						
2-2-211	Balance of Plant XPMSS	2-2-211	Balance of Plant XPMSS	660,000	8000 SH	98,964	9,896	768,060	
2-2-212	General Plant Switchgear	2-2-212	General Plant Switchgear	64,000	2100 SH	25,979	2,598		
2-2-212	Precipitator Switchgear	2-2-212	Precipitator Switchgear	729,000	11100 SH	125,943	12,694	866,437	
2-2-212	Load Center Switchgear	2-2-212	Load Center Switchgear						
2-2-221	Load Center Transformers	2-2-221	Load Center Transformers						
2-2-221	General Plant Ld Ctr XPMSS	2-2-221	General Plant Ld Ctr XPMSS	149,500	5200 SH	64,328	6,433		
2-2-221	Cooling Tower	2-2-221	Cooling Tower	73,500	2100 SH	25,979	2,598		
2-2-221	Balance of Plt 13500-4800	2-2-221	Balance of Plt 13500-4800						
2-2-221	General Plant Ld Ctr XPMSS	2-2-221	General Plant Ld Ctr XPMSS	223,000	7300 SH	90,307	9,031	322,338	
2-2-222	Precipitator Ld Ctr XPMSS	2-2-222	Precipitator Ld Ctr XPMSS	122,600	2200 SH	29,690	2,968		
2-2-222	Load Center Transformers	2-2-222	Load Center Transformers	345,400	9700 SH	119,997	12,000	477,397	
2-2-222	Miscellaneous XPMSS	2-2-222	Miscellaneous XPMSS	15,000	800 SH	9,896	990		
2-2-222	Unit Substations	2-2-222	Unit Substations	1,069,400	20600 SH	254,836	25,484	1,369,720	

TABLE 2-36

DETAILED COST ESTIMATE OF ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
800 MWe LOW SULFUR COAL-FIRED PLANT - ONCE-THROUGH COOLING SYSTEM

Cost Basis 7/76		FACTORY			SITE			
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
242.3	<u>Auxiliary Power Sources</u>							
242.3	Auxiliary Power Sources	227,400		4051 MH	50,621	5,061		283,082
242.	Station Service Equipment	2,363,624		40234 MH	493,035	65,891		2,922,550
243.	<u>Switchboards</u>							
243.	Switchboards	428,000		9030 MH	111,609	59,563		599,172
244.	<u>Protective Equipment</u>							
244.	Protective Equipment			72400 MH	893,578	598,000		1,491,578
245.	<u>Elect. Struc +Wiring Control</u>							
245.1	<u>Underground Duct Runs</u>							
245.1	Underground Duct Runs			48972 MH	572,866	389,517		962,383
245.2	Cable Tray			146776 MH	1,804,620	872,030		
245.3	Conduit			225690 MH	2,774,903	727,062		
245.	Elect Struc +Wiring Control			421438 MH	5,152,389	1,988,609		7,140,998
246.	<u>Power &amp; Control Wiring</u>							
246.1	<u>Generator Circuits Wiring</u>							
246.1	Generator Circuits Wiring	429,275		14495 MH	178,222	17,822		625,319
246.2	<u>Station Service Pwr Wiring</u>							
246.21	<u>High Voltage Bus+Cable</u>							
246.212	Cable			9232 MH	113,499	309,984		
246.2121	15 kV Cable			19950 MH	245,294	900,600		
246.2123	5 kV Cable							

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TABLE 2-36

DETAILED COST ESTIMATE OF ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
800 MWe LOW SULFUR COAL-FIRED PLANT - ONCE-THROUGH COOLING SYSTEM

Cost Basis 7/76		FACTORY			SITE			
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
246.212	Cable			29182 MH	358,793	1,210,584		1,569,377
246.21	High Voltage Bus+Cable			29182 MH	358,793	1,210,584		1,569,377
246.22	<u>Low Voltage Bus+Cable</u>							
246.22	Low Voltage Bus+Cable			48680 MH	598,541	354,705		953,246
246.2	Station Service Pwr Wiring			77862 MH	957,334	1,565,289		2,522,623
246.3	Control Cable			152961 MH	1,880,674	2,044,528		
246.4	Instrument Wire			65722 MH	808,066	479,237		
246.	Power & Control Wiring	429,275		311040 MH	3,824,296	4,106,876		8,360,447
24.	Electric Plant Equipment	5,922,910		901782 MH	11,064,240	6,878,310		23,865,460

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TABLE 2-17

DETAILED COST ESTIMATE OF ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
8000 KW LOW SULFUR COAL-FIRED PLANT - FAN-ASSISTED NATURAL DRAFT COOLING SYSTEM

Cost Basis		FACTORY			SITE			Total Costs	
Account Number	Description	Quantity	Costs	Quantity	Labor Hours	Material Cost			
24.	<u>Electric Plant Equipment</u>								
241.	<u>Switchgear</u>								
242.	<u>Station Service Equipment</u>								
242.1	<u>Station Service Startup XPMR</u>	1,142,000		17294 MH	208,195	72,392		1,422,497	
242.2	<u>Unit Stations</u>								
242.21	<u>Load Center Switchgear</u>								
242.211	<u>General Plant Switchgear</u>	175,282		1610 MH	19,421	1,921			
242.212	<u>Cooling Tower</u>	660,000		8000 MH	98,944	9,896			
242.212.1	<u>Ballast for General Plant Switchgear</u>								
242.212.2	<u>General Plant Switchgear</u>	835,282		9610 MH	118,887	11,817		965,985	
242.212.3	<u>Precipitation Switchgear</u>	69,000		2400 MH	25,979	2,598			
242.212.4	<u>Load Center Switchgear</u>	905,282		11710 MH	14413	1,063,563			
242.22	<u>Load Center Transformers</u>								
242.221	<u>Load Center Transformers</u>	392,400		11300 MH	139,789	13,979		546,158	
242.222	<u>Switchgear XPMR</u>	15,000		800 MH	9,896	990			
242.23	<u>Switchgear XPMR</u>			1,311,682	29,784			1,633,617	
242.3	<u>Unit Stations</u>								
242.31	<u>Auxiliary Power Sources</u>								
242.311	<u>Generators</u>	237,400		6551 MH	50,621	5,061		283,082	
242.312	<u>Service Equipment</u>	2,681,082		31155 MH	553,277	106,827		3,341,199	
243.	<u>Stationary</u>								
243.1	<u>Load Center</u>	428,090		9030 MH	111,609	59,563		595,172	

TABLE 2-37

DETAILED COST ESTIMATE OF ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
800 MWe LOW SULFUR COAL-FIRED PLANT - FAN-ASSISTED NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/76		FACTORY		SITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
244.	<u>Protective Equipment</u>							
244.	Protective Equipment			72400 MH		893,578	598,000	1,491,578
245.	<u>Elec. Struc +Wiring Contrn</u>							
245.1	Underground Duct Runs							
245.1	Underground Duct Runs			51145 MH		598,314	405,293	1,003,607
245.2	Cable Tray			17303 MH		1,884,934	907,475	
245.3	Conduit			235741 MH		2,898,539	756,645	
245.	Elect. Struc +Wiring Contrn			140189 MH		5,381,787	2,069,413	7,451,200
246.	<u>Power &amp; Control Wiring</u>							
246.1	Generator Circuits Wiring							
246.1	Generator Circuits Wiring	429,275		14195 MH		178,222	17,822	625,319
246.2	Station Service Pwr. Line							
246.21	High Voltage Bus+Cable			29950 MH		368,248	1,226,100	1,594,348
246.21	High Voltage Bus+Cable							
246.22	Low Voltage Bus+Cable			50504 MH		620,965	405,268	1,026,233
246.2	Station Service Pwr. Wiring			80454 MH		989,213	1,631,368	2,620,581
246.3	Control Cable			160722 MH		1,976,143	2,139,533	
246.4	Instrument Wire			69051 MH		849,132	501,640	
246.	Power & Control Wiring	429,275		324732 MH		3,992,710	4,290,363	8,212,348
24.	Electric Plant Equipment	6,282,857		939146 MH		11,522,294	7,183,542	24,988,698

TABLE 2-38

DETAILED COST ESTIMATE FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
800 MWe LOW SULFUR COAL-FIRED PLANT - NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/76		FACTORY		SITE				
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
24	<u>Electric Plant Equipment</u>							
241	<u>Switchgear</u>							
241.1	<u>Gen Eopt Switchgear</u>							
241.	Gen Eopt Switchgear			3560 MH	43,790	4,817		48,607
241.2	<u>Station Service Switchgear</u>							
241.21	<u>Medium Voltage Metal Clad</u>							
241.21	Medium Voltage Metal Clad	1,904,500		22500 MH	278,339	27,834		7,210,673
241.22	<u>Station Motor Control Cntr</u>							
241.22	Station Motor Control Cntr	787,399		21600 MH	267,204	26,720		1,081,323
241.2	<u>Station Service Switchgear</u>							
241.	Switchgear	2,691,899		44100 MH	545,543	54,554		3,291,996
242.	<u>Station Service Equipment</u>							
242.1	<u>Station Serv&amp;Startup XPMR</u>							
242.11	<u>Unit Auxiliary Transformer</u>							
242.111	13.8 kV Transformers	284,971		3756 MH	46,457	4,747		
242.112	4 16 kV Transformer (3W)	117,000		1600 MH	19,792	1,979		
242.113	4 16 kV Transformer (2W)	88,000		1300 MH	16,083	1,608		
242.11	Unit Auxiliary Transformer	489,971		6656 MH	82,332	8,334		580,637
242.12	<u>Reserve Auxiliary XPMR</u>							
242.121	13.8 kV Transformer	297,436		2046 MH	25,291	2,621		
242.122	4 16 kV Transformer	298,000		1900 MH	23,504	2,350		
242.12	Reserve Auxiliary XPMR	593,436		3946 MH	48,795	4,971		642,202

TABLE 2-38

**DETAILED COST ESTIMATE FOR ACCOUNT 26, ELECTRIC PLANT EQUIPMENT  
800 Mole Lbs Sulfur Coal-Fired Plant - NATURAL DRAFT COOLING SYSTEM**

Cost Basis 7-76		FACTORY ----- SITE -----					Total Costs	
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	
242.13	Found. Foundations for XPS			579.4 MH	65,842	58,166	124,008	
242.1	Station Serv/SStartup XPS	1,083,407	1636 MH	196,949	71,471	1,351,847		
2-181	Unit Substations							
242.21	Load Center Switchgear							
242.211	General Plant Switchgear			8000 MH	93,964	9,896		
242.211	Cooling Tower			8000 MH	98,964	9,896	768,860	
242.212	Balance of Plant-XPS		660,000	2100 MH	25,979	2,598		
242.211	General Plant Switchgear		660,000	10100 MH	124,943	12,437		
242.212	Precipitator Switchgear		69,000					
242.21	Load Center Switchgear		729,000					
242.22	Load Center Transformers							
242.221	General Plant Ld Ctr XPS							
242.221	Cooling Tower			5200 MH	64,328	6,433		
242.2212	Balance of Plt 13800-480V	149,500		2100 MH	25,979	2,598		
242.2213	Balance of Plt 4160-480V	73,500		7300 MH	90,307	9,031	322,318	
242.221	General plant Ld Ctr XPS		223,000	2400 MH	29,690	2,969		
242.222	Precipitator Ld Ctr XPS	122,400		9700 MH	119,997	12,000	477,397	
242.22	Load Center Transformers		345,400					
242.23	Miscellaneous XPS	15,000		800 MH	9,896	990		
242.2	Unit Substations	1,089,400		2060 MH	254,836	25,484	1,369,720	

TABLE 2-38  
DETAILED COST ESTIMATE FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
800 MWe LOW SULFUR COAL-FIRED PLANT - NATURAL DRAFT COOLING SYSTEM

Cost Basis	Account Description	Quantity	Cost	Quantity	Labor Hours	Labor Cost	Material Cost	Total Cost
<b>FACTORY</b>								
242.3	Auxiliary Power Sources	227,400	4051.98	50,621	5,061	263,082		
242.3	Auxiliary Power Sources	2,400,207	41047.98	502,426	102,016	3,004,549		
243.	Switchboards	428,000	9030.98	111,609	59,563	599,172		
244.	Protective Equipment			72400.98	893,378	598,000		1,491,378
245.	Electrical Wiring Contr							
245.1	Underground Duct Runs	48890.98	572,023	78,495				940,718
245.1	Underground Duct Runs	146358.98	1,801,956	870,181				
245.2	Cable Trays	225355.98	2,770,802	725,518				
245.3	Conduit	420512.98	5,145,781	1,984,394				
245.	Elec. Struc. & Wiring Contr							7,129,175
246.	Power & Control Wiring							
246.1	Generator Circuits Wiring	429,275	14495.97	178,222	17,822			625,319
246.1	Generator Circuits Wiring							
246.2	Station Service Per Wiring							
246.21	High Voltage Busbar							
246.212	Cable							
246.2121	15 kv Cable							
246.2123	5 kv Cable							

TABLE 2-18

DETAILED COST ESTIMATE FOR ACCOUNT 2\*, ELECTRIC PLANT EQUIPMENT  
800 MW LOW SULFUR COAL-FIRED PLANT - NATURAL DRAFT COOLING SYSTEM

Cost Basis		FACTORY		MANUFACTURE		Labor Hours		MATERIAL COST		Total Cost*	
Account Number	Description	Quantity	Cost \$	Quantity	Cost \$	Hours	Rate	Quantity	Cost \$	Quantity	Total Cost \$
246.212	Cable					28802	\$14	356,127	1,202,483		1,556,610
246.21	High Voltage Insulated					28802	\$14	356,127	1,202,483		1,556,610
246.22	Low Voltage Insulated					489,28	\$14	597,908	352,618		950,556
246.22	Low Voltage Busbar					774,30	\$14	952,035	1,555,131		2,507,166
246.2	Station Service Wiring					152693	\$14	1,877,398	2,039,436		
246.3	Control Cable					65602	\$14	806,657	478,038		
246.4	Instrument Wire					310325	\$14	3,814,312	6,090,417		8,334,009
246.	Power & Control Wiring					5,949,381		901155	\$14	11,056,079	6,893,781
24	Electric Plant Equipment										23,899,181

TABLE 2-39

DETAILED COST ESTIMATE FOR ACCOUNT 23, TURBINE PLANT EQUIPMENT  
800 HIGH SIDEFOR COAL-FIRED PLANT - ONCE-THROUGH COOLING SYSTEM

Cost Basis		FACTORY				SITE			
Account Number	Description	Quantity	Cost	Quantity	Labor Hours	Labor Cost	Material Cost	Total Cost	
<u>Turbine Plant Equipment</u>									
231.	Turbine Generator	27,729,086		2,935,75 MH	2,806,760	998,776		31,574,622	
233.	Condensing System	4,575,796		10,732,7 MH	1,415,058	145,139			
234.	Feed Heating System	8,261,510		176,556 MH	2,388,392	279,313		10,779,233	
235.	Other Turbine Plant Equipment	5,609,618		373,61 MH	6,819,535	508,048		10,957,201	
236.	Instrumentation & Control	556,090		5,483 MH	65,798	3,240		625,088	
237.	Turbine Plant Misc. Items	40,735,030		8,556,1 MH	932,562	1,345,774		2,318,241	
	Turbine Plant Equipment			97863.96	1,437,010	3,230,340		62,392,380	

TABLE 2-40

DETAILED SUMMARY OF COSTS FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
800 MW HIGH SULFUR COAL-FIRED PLANT - ONCE THROUGH COOLING SYSTEM

Cost Basis	Account Number	Account Description	FACTORY			SITE			Total Cost
			Quantity	Cost		Quantity	Labor Hours	Labor Cost	
776	241.	Switchgear	3,750,511			5840 SH	725,412	72,980	4,548,903
	242.	Section Service Equipment	2,630,124			4476 SH	548,591	77,067	3,255,782
	243.	Switchboards	428,000			9030 SH	111,609	59,561	599,172
	244.	Protective Equipment				76400 SH	942,760	622,000	1,564,760
	245.	Elect. Struct. & Civil Constr				484270 SH	5,320,533	2,285,089	8,205,622
	246.	Power & Control Circuits	629,275			373725 SH	4,365,035	4,761,881	9,766,191
	24.	Electric Plant Equipment	7,337,910			1056841 SH	12,843,940	7,849,580	27,940,430

TABLE 2-41

DETAILED SUMMARY OF COSTS FOR ACCOUNT 24, ELECTRIC PLANT EQUIPMENT  
800 MWe HIGH SULFUR COAL-FIRED PLANT - FAN-ASSISTED NATURAL DRAFT COOLING SYSTEM

Cost Basis 7/76		FACTORY			SITE			
Account Number	Account Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Costs
241.	Switchgear		3,793,000		58640 MH	725,412	72,980	4,591,392
242.	Station Service Equipment		2,947,582		49697 MH	608,839	118,021	3,674,442
243.	Switchboards		428,000		9030 MH	111,609	59,563	599,172
244.	Protective Equipment				76400 MH	942,760	622,000	1,564,760
245.	Elec. Struc +Wiring Control				503021 MH	6,149,931	2,365,893	8,515,824
246.	Power & Control Wiring		429,275		387417 MH	4,763,445	4,925,368	10,118,092
24.	Electric Plant Equipment	7,597,857			1084205 MH	13,302,000	8,163,825	29,063,682

TABLE 2-42  
DETAILED SUMMARY OF COSTS FOR ACCOUNT 24, ELECTRIC PLANT FORTINENT  
800 Mw HIGH SULPHUR COAL-FIRED PLANT - NATURAL DRAFT COOLING SYSTEM

Cost Basis		FACTORY				SITE					
Account Number	Description	Quantity	Costs	Quantity	Labor Hours	Labor Cost	Material Cost	Total Cost			
241.	Switchgear	3,740,399	58640 MH	725,412	72,980			4,538,791			
242.	Station Service Equipment	2,666,707	4,589 MH	557,982	113,200			3,337,895			
243.	Switchboards	428,000	9030 MH	111,609	59,363			599,172			
244.	Protective Equipment		76400 MH	942,760	622,000			1,564,760			
245.	Electric Structure & Siting		483644 MH	5,912,925	2,280,874			8,193,799			
246.	Power & Control Wiring	429,275	37210 MH								
24.	Electric Plant Equipment	7,264,381	1046213 MH	12,835,745	7,874,039			27,974,165			

## 2.9 REFERENCES FOR CAPITAL COST STUDIES

<u>Reference No.</u>	<u>Report Title and Number</u>
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-Fired Plants - 1200 MWe (NUREG-0243, COO-2477-7)
4	Capital Cost: Low and High Sulfur Coal-Fired Plants - 800 MWe (NUREG-0244, COO-2477-8)
5	Total Generating Costs: Coal and Nuclear Plants (NUREG-0248, COO-2477-12)

SECTION 3  
TOTAL GENERATING COSTS

## SECTION 3.0

### TOTAL GENERATING COSTS

#### 3.1 INTRODUCTION

Data presented in these studies can be used in conjunction with those given in Reference 5 to develop the total generating costs for plants incorporating the alternate cooling systems. Tables 3-1 through 3-6 present pertinent cost and plant operational data for the alternate cooling systems.

The total generating cost is composed of the following components: Capital cost, mills/kWh; fuel cost, mills/kWh; and operating and maintenance (O&M) cost, mills/kWh. The capital cost of alternate cooling systems affects the capital cost component of total generating cost directly. Fuel cost and O&M cost components are influenced by the yearly total energy produced by the turbine as affected by the alternate cooling systems. Although the same design points are used for each system, the total energy produced by each alternate system is affected by the operating differences at off-design, ambient temperatures.

Multipliers for adjusting the capital cost, fuel cost and O&M cost from the plant with the base mechanical wet tower cooling system, are presented for the three alternate cooling systems of all six plants studied. These multipliers are used with the capital, fuel, and O&M costs, of the generating costs presented in Reference 5.

### 3.2 EXAMPLE

The following is an example illustrating the use of the capital cost multipliers given in Tables 3-1 thru 3-6, to adjust the total generating cost as alternate cooling systems are used. This specific example uses the base generating cost data given in Reference 5 for a single unit PWR plant with a 1985 year of operation and 70 percent capacity factor.

	<u>Mechanical Draft Towers</u>	<u>Multiplier</u>	<u>Once-through Cooling</u>
Capital Cost, mills/kWh	31.2	x 0.957	= 29.9
Fuel Cost, mills/kWh	12.6	x 0.981	= 12.4
Operating and Maintenance Cost, mills/kWh	<u>2.8</u>	x 0.981	<u>2.7</u>
Total Generating	46.6		45.0

Accordingly, the generating cost for the PWR plant changes from 46.6 mills/kWh to 45.0 mills/kWh when the cooling system is changed from the base mechanical draft cooling system to a once-through cooling system. Similar calculations can be completed for the varying capacity factors and plant operation dates presented in the Total Generating Cost studies, (NUREG-0248, COO-2477-12).

TABLE 3-1  
TOTAL GENERATING COSTS - 1200 MWe PRESSURIZED WATER REACTOR

	<u>Base Case</u> <sup>(1)</sup>	<u>Once-Through</u>	<u>Natural Draft</u>	<u>Fan-Assisted Natural Draft</u>
Total Base Construction Cost, \$10 <sup>6</sup>	568.8	554.9	569.7	569.2
Generator Output at Average Yearly Ambient, MWe <sup>(2)</sup>	1193	1203	1201	1195
Auxiliary Requirements, MWe	54	42	52	55
Net Power to Transformers, MWe	1139	1161	1149	1140
Capital Cost Multiplier	Base	0.957	0.993	1.000
Fuel Cost Multiplier	Base	0.981	0.991	0.999
Operating and Maintenance Multiplier	Base	0.981	0.991	0.999

(1) Mechanical Draft Evaporative Towers

(2) The Annual Average Dry Bulb and Wet Bulb Temperatures are 49.0 F and 42.0 F, respectively.

TABLE 3-2  
TOTAL GENERATING COSTS - 1200 BOILING WATER REACTOR

	<u>Base Case</u> <sup>(1)</sup>	<u>Once-Through</u>	<u>Natural Draft</u>	<u>Fan-Assisted Natural Draft</u>
Total Base Construction Cost, \$10 <sup>6</sup>	582.7	568.4	583.0	583.3
Generator Output at Average Yearly Ambient, MWe <sup>(2)</sup>	1235	1247	1244	1238
Auxiliary Requirements, MWe	45	33	44	46
Net Power to Transformers, MWe	1190	1214	1200	1192
Capital Cost Multiplier	Base	0.956	0.992	0.999
Fuel Cost Multiplier	Base	0.980	0.992	0.998
Operating and Maintenance Multiplier	Base	0.980	0.992	0.998

(1) Mechanical Draft Evaporative Towers

(2) The Annual Average Dry Bulb and Wet Bulb Temperatures are 49.0 F and 42.0 F, respectively.

TABLE 3-3  
TOTAL GENERATING COSTS - 1200 MWe HIGH SULFUR COAL PLANT

	<u>Base Case</u> <sup>(1)</sup>	<u>Once-Through</u>	<u>Natural Draft</u>	<u>Fan-Assisted Natural Draft</u>
Total Base Construction Cost, \$10 <sup>6</sup>	465.5	453.5	467.4	467.0
Generator Output at Average Yearly Ambient, MWe <sup>(2)</sup>	1304	1316	1312	1306
Auxiliary Requirements, MWe	77	70	76	78
Net Power to Transformers, MWe	1227	1246	1236	1228
Capital Cost Multiplier	Base	0.959	0.997	1.002
Fuel Cost Multiplier	Base	0.984	0.993	1.000
Operating and Maintenance Multiplier	Base	0.984	0.993	1.000

(1) Mechanical Draft Evaporative Towers

(2) The Annual Average Dry Bulb and Wet Bulb Temperatures are 49.0 F and 42.0 F, respectively.

TABLE 3-4  
TOTAL GENERATING COSTS - 1200 MWe LOW SULFUR COAL PLANT

	<u>Base Case</u> <sup>(1)</sup>	<u>Once-Through</u>	<u>Natural Draft</u>	<u>Fan-Assisted Natural Draft</u>
Total Base Construction Cost, \$10 <sup>6</sup>	402.8	390.8	404.7	404.3
Generator Output at Average Yearly Ambient, MWe <sup>(2)</sup>	1304	1316	1312	1306
Auxiliary Requirements, MWe	66	59	65	67
Net Power to Transformers, MWe	1238	1257	1247	1239
Capital Cost Multiplier	Base	0.956	0.997	1.003
Fuel Cost Multiplier	Base	0.985	0.993	0.999
Operating and Maintenance Multiplier	Base	0.985	0.993	0.999

(1) Mechanical Draft Evaporative Towers

(2) The Annual Average Dry Bulb and Wet Bulb Temperatures are 49.0 F and 42.0 F, respectively.

TABLE 3-5  
TOTAL GENERATING COSTS - 800 MWe LOW SULFUR COAL PLANT

	<u>Base Case (1)</u>	<u>Once-through</u>	<u>Natural Draft</u>	<u>Fan-Assisted Natural Draft</u>
Total Base Construction Cost, \$10 <sup>6</sup>	287.4	287.4	289.4	287.4
Generator Output at Average Yearly Ambient, MWe (2)	853	857	856	854
Auxiliary Requirements, MWe	53	48	52	54
Net Power to Transformers, MWe	800	809	804	800
Capital Cost Multiplier	Base	0.958	1.002	1.000
Fuel Cost Multiplier	Base	0.989	0.995	1.000
Operating and Maintenance Multiplier	Base	0.989	0.995	1.000

(1) Mechanical Draft Evaporative Towers  
 (2) The Annual Average Dry Bulb and Wet Bulb Temperatures are 49.0 F and 42.0 F, respectively.

TABLE 3-6  
TOTAL GENERATING COSTS - 800 MWe HIGH SULFUR COAL PLANT

	<u>Base Case</u> <sup>(1)</sup>	<u>Once-Through</u>	<u>Natural Draft</u>	<u>Fan-Assisted Natural Draft</u>
Total Base Construction Cost, \$10 <sup>6</sup>	335.2	326.2	337.3	335.3
Generator Output at Average Yearly Ambient, MWe <sup>(2)</sup>	853	857	856	854
Auxiliary Requirements, MWe	60	55	59	61
Net Power to Transformers, MWe	793	802	797	793
Capital Cost Multiplier	Base	0.962	1.001	1.000
Fuel Cost Multiplier	Base	0.989	0.995	1.000
Operating and Maintenance Multiplier	Base	0.989	0.995	1.000

(1) Mechanical Draft Evaporative Towers

(2) The Annual Average Dry Bulb and Wet Bulb Temperatures are 49.0 F and 42.0 F, respectively.

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