3
THE PLANT

CHAPTER 3

TABLE OF CONTENTS

CHAPTER 3.0

THE PLANT

LIST OF FIGURES

LIST OF TABLES

Section		Page

LIST OF FIGURES

LIST OF TABLES

LIST OF TABLES

Section		Page

LIST OF FIGURES

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES

3. THE PLANT

3.1 EXTERNAL APPEARANCE

The rendering of the two proposed 600 megawatt (MW) coal-fired units, found on the cover, conceptualizes the plant's finished appearance and aesthetic qualities. The depiction is a view from northwest to southeast. Brown's Creek marsh which is not distinguishable in the rendering is located in the background on the horizon. The industrial district is to the south of the St. Johns River which shows up just right of the chimney. Blount Island can be seen on the opposite shore of the river.

Wherever practicable trees and other vegetation will be preserved along roads to serve as a visual buffer or screen. The buffer will vary between 100 and 200 feet in width. The cooling towers (425 feet high) and chimney (640 feet high) are the two tallest facility structures. The degree to which the cooling towers and chimney will be noticeable will be partially dependent on the weather. Cloudy skies will tend to blend with the light colored cooling towers, the water vapor plumes from the cooling towers, and the natural concrete shade of the chimney. The chimney and cooling tower will be fitted with flashing stroboscopic lights for aircraft warning purposes and therefore will always be a noticeable feature both from the ground and the air.

The switchyard and transmission lines in the plant vicinity will be screened by trees and by the dikes of the bottom ash disposal area which is located behind the cooling towers as depicted in the rendering.

For comparison, the rendering should be studied along with the plant layout (Figure 3.1-1) as well as the station profile (Figure 3.1-2). A comparison of these drawings will demonstrate the relationship of the plant structures to their surroundings.

Chapter 2, Sections 2.1.1 and 2.1.2 present information concerning the acreages involved for plant components and facilities, and for undisturbed areas.

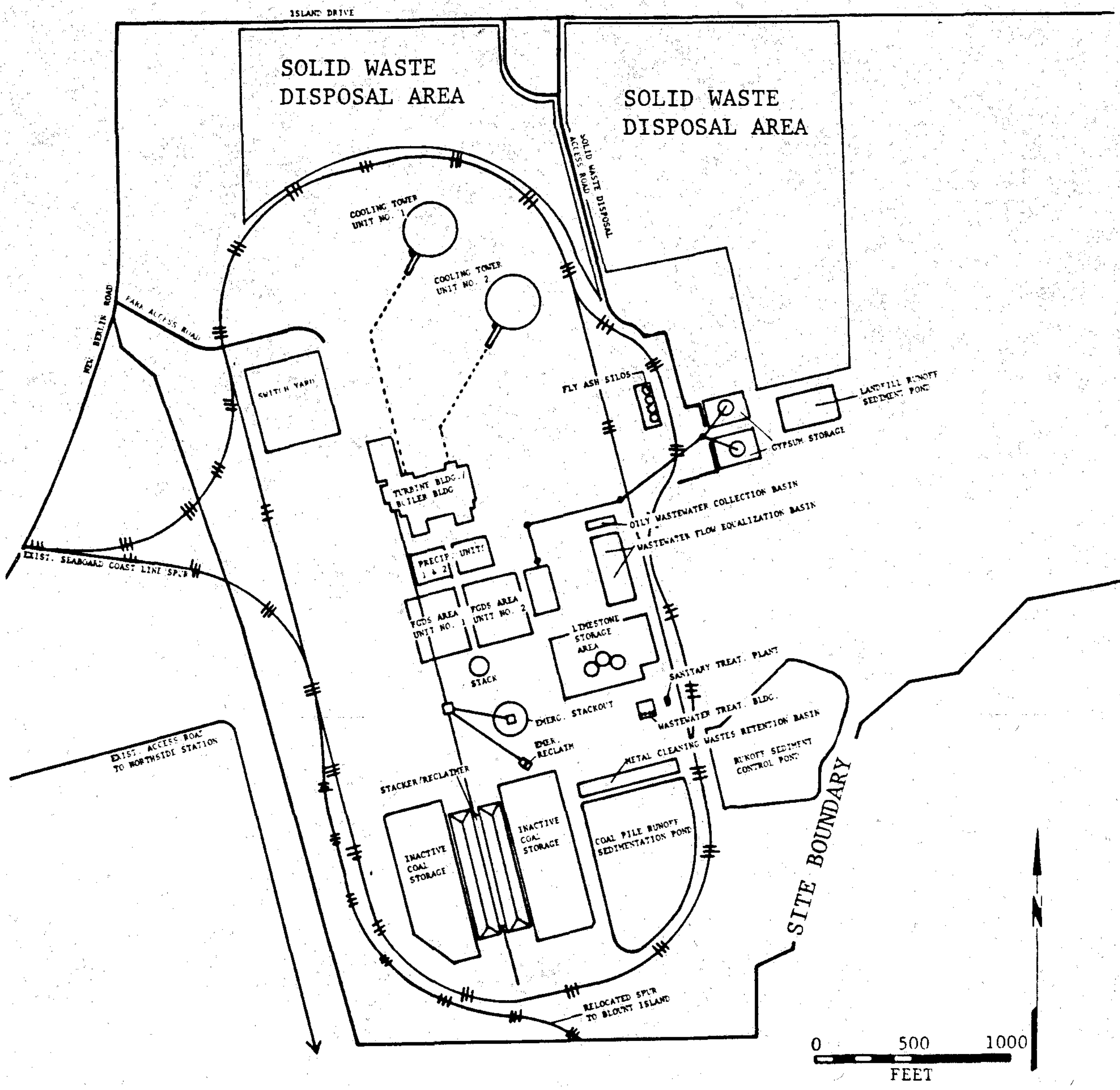


Figure 3.1-1 Plant Layout

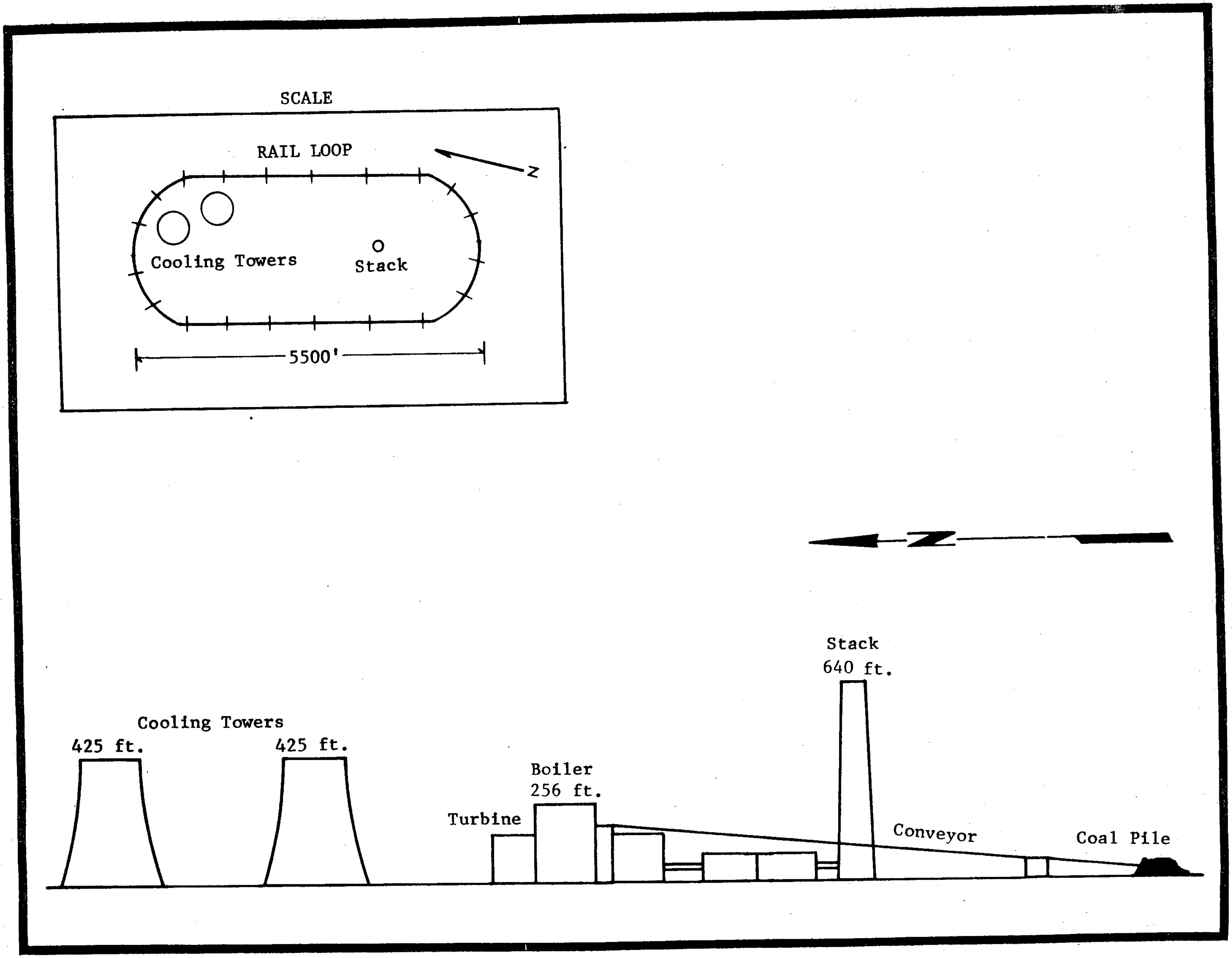


Figure 3.1-2 Station Profile

3.2 FUEL

3.2.1 Fuel Type

The units are planned for coal-fired operation; however, provisions are being made in the design to allow for possible conversion to oil, gas or refuse firing (Ebasco, 1980a and 1980b). Based on a study of availability of coal, over the anticipated life of the project, east of the Mississippi River (Ebasco, 1980c), there are practical sources of coal adequate to meet the plant's needs (approximately 3,500,000 tons per year). The above referenced study has identified coal supplies in Tennessee, Kentucky, and Ohio as the most likely sources. In addition, partial supplies could be obtained from several foreign sources.

The plant is designed to retain the flexibility to change its coal supply (to insure against disruptions in supply, local market upsets and to maintain competitive prices) with the minimum reduction in efficiency and without violating air quality standards. Analyses of potential coal supplies were therefore necessary so that the plant could be designed to accommodate coals with a variety of characteristics. Coals from the above sources were analyzed to determine the ranges of constituents. The coal analyses' specified ranges are listed in Table 3.2-1.

The air quality control system is designed on a "worst case" basis assuming maximum sulfur (4 percent) and ash (18 percent) in the coal and a minimum heating value (10,500 Btu/lb). This approach assumes the sulfur and ash contents of the coal are 3.8 lb/MMBtu (million Btu) and 17.1 lb/MMBtu, respectively. The ash remaining after the coal is burned is assumed to be 80 percent fly ash and 20 percent bottom ash. The above values were used to develop collection efficiencies, investment estimates and long and short-term ground level ambient air quality concentrations. This approach requires a more sophisticated, complex, efficient and costly air quality control system than would be required on the basis of average coal characteristics.

The solid waste disposal requirements (discussed in Section 3.5.2) have been based on the anticipated average coal characteristics over the 40 year life of the plant. These are 2.3 lb/MMBtu (2.7 percent) and 7.9 lb/MMBtu (9.2 percent) for sulfur and ash contents respectively. Average coal characteristics were used to determine solid waste disposal requirements because average conditions, in the main, will prevail over the plant life, whereas worst case conditions are only a short term phenomenon.

It is anticipated that the steam generator will burn No. 2 fuel oil for light-off and flame stabilization during start-up and low load operation. This light oil will be stored on site and pumped to the steam generator as required. Approximately 1,000,000 gal/yr will be utilized on an intermittent basis, which represents less than 2 percent (by heat input) of the steam generator annual fuel consumption. The fuel oil is expected to have a maximum sulfur content of 0.76 percent by weight, a maximum ash content of 0.01 percent by weight, and a heating value of 19,000 Btu/lb.

3.2.2 Fuel Handling and Storage

The coal handling system will provide for delivery of coal by ocean vessel to a marine terminal on Blount Island with shuttle train delivery to the plant, as well as rail delivery directly to the plant by unit train or in trainload lots. A rotary car dumper will be used to unload coal from the trains. The system will also include the yard area coal storage, transfer system, coal silos, and the tripper floor distribution system.

Off-Site Facilities

The ocean vessel coal unloading facility will be located on Blount Island and will be capable of handling up to 3,500,000 tons of coal per year (the entire annual requirement of the plant). A 30-acre coal pile located on Blount Island will be required. Coal will be transferred from this facility to the plant site by a shuttle train. Figure 3.10-2 depicts the proposed layout for this facility. Section 3.10 discusses the ocean vessel coal unloading facilities in greater detail.

On-Site Facilities

A train track will be looped around the plant and coal storage area. The train unloading facility will be capable of handling approximately 3,500,000 tons of coal per year. The coal will be unloaded at the coal rotary car dump as shown in Figure 3.1-1.

The function of the coal handling equipment located in the yard area is to transport the coal from the unloading area to either the plant island coal silos or to the active storage piles, or to both. As indicated on the plant layout, there will be an active coal pile of about 8 acres and two inactive coal piles of about 15 acres each. At the present time it is planned to line the coal pile storage area. If the coal leachate characteristics expected for the purchased coal are better than those assumed in the present analysis (Appendix D, Table D-21), the validity of the liner concept will be re-evaluated.

The coal for each unit will be delivered to the tripper floor transfer point which is located in the head structure of the boiler auxiliary bay. Chutes transfer the coal from the yard conveyors to the two trippers located on the tripper floor. Each tripper will be capable of distributing the coal to the seven coal storage silos of each unit. The coal is then conveyed from the coal storage silos to the pulverizer, and the pulverized coal pneumatically delivered to the furnaces.

The No. 2 fuel oil will be delivered to the plant by barge, rail, or truck and will be stored on site in one 600,000 gallon fixed roof fuel oil storage tank. This tank will be designed to utilize a vapor recovery system during refilling operations to minimize hydrocarbon emissions.

3.2.3 References

Ebasco Services Incorporated, 1980a. Conceptual Engineering for Future Conversion to Alternate Fuels. For Jacksonville Electric Authority. Norcross, Georgia.

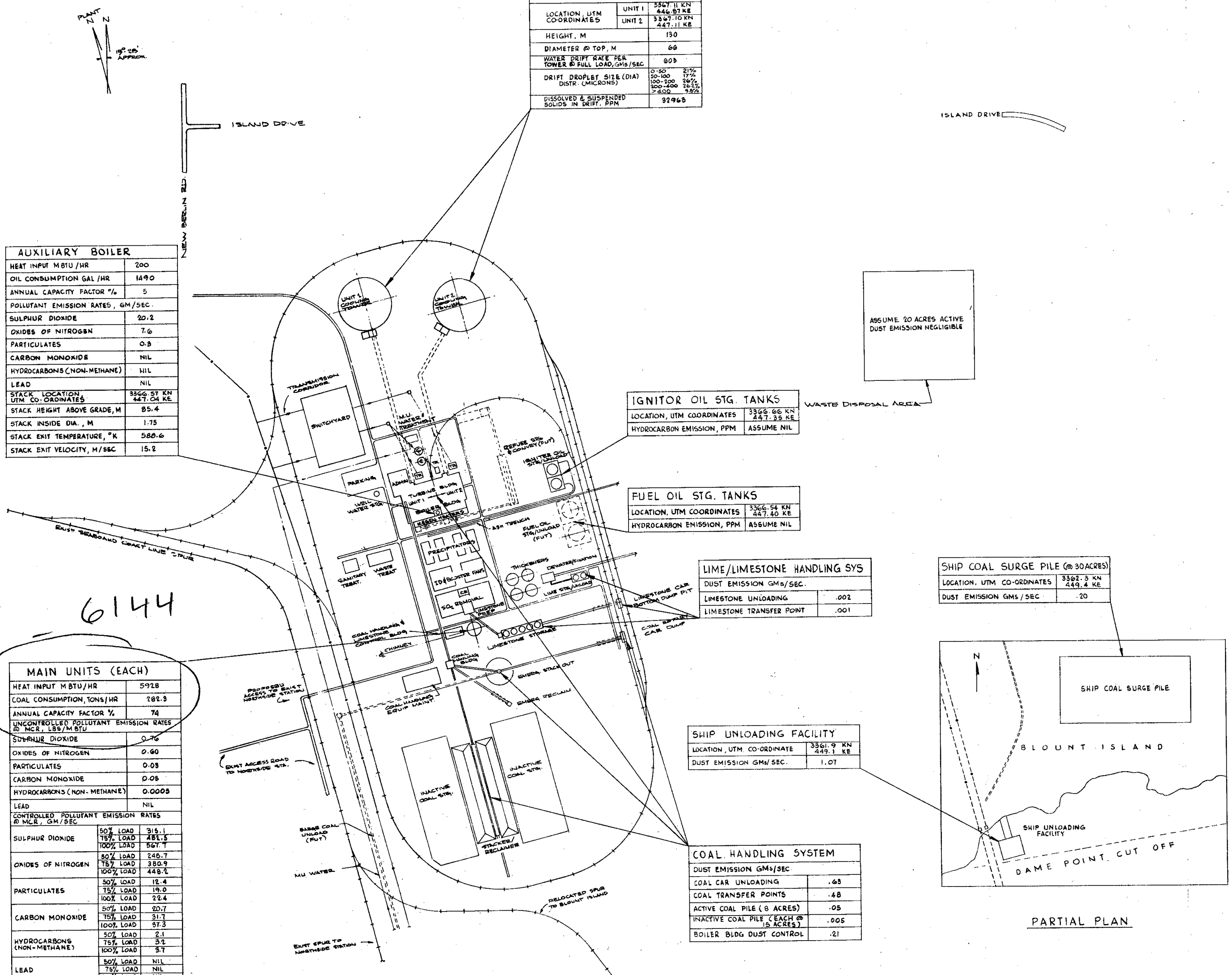
Ebasco Services Incorporated, 1980b. Refuse Co-firing System Study. For Jacksonville Electric Authority. Norcross, Georgia

Ebasco Services Incorporated, 1980c. Coal Procurement Study - Phase I (Preliminary) for Jacksonville Electric Authority. Norcross, Georgia

Table 3.2-1

PROJECT COAL ANALYSIS RANGES

Proximate Analysis - weight percent, as received from coal supplier	
Moisture	4.0 to 15.0
Ash	6.0 to 18.0
Volatile Matter	23.0 to 40.0
Fixed Carbon	37.0 to 57.0
Ultimate Analysis - weight percent, as received from coal supplier	
Moisture	4.0 to 15.0
Carbon	49.3 to 78.0
Hydrogen	3.4 to 5.8
Nitrogen	0.9 to 1.9
Chlorine	0.1 to 0.3
Sulfur	0.5 to 4.0
Ash	6.0 to 18.0
Oxygen	3.4 to 9.8
Heating Value (Btu/lb)	10,500 to 13,250
Hardgrove Grindability Index	40 to 80
Ash Mineral Analysis - weight percent	
Phosphorus Pentoxide, P_2O_5	0.04 to 3.0
Silica, SiO_2	30.0 to 58.0
Ferric Oxide, Fe_2O_3	2.9 to 45.0
Alumina, Al_2O_3	18.0 to 36.0
Titania, TiO_2	0.3 to 3.0
Lime, CaO	0.9 to 9.0
Magnesia, MgO	0.2 to 2.0
Sulfur Trioxide, SO_3	0.1 to 7.0
Potassium Oxide, K_2O	0.4 to 4.0
Sodium Oxide, Na_2O	0.2 to 2.0



AUXILIARY BOILER	
HEAT INPUT M BTU/HR	200
OIL CONSUMPTION GAL/HR	1490
ANNUAL CAPACITY FACTOR %	5
POLLUTANT EMISSION RATES, GM/SEC.	
SULPHUR DIOXIDE	20.2
OXIDES OF NITROGEN	7.6
PARTICULATES	0.8
CARBON MONOXIDE	NIL
HYDROCARBONS (NON-METHANE)	NIL
LEAD	NIL
STACK LOCATION, UTM CO-ORDINATES	3366.57 KN 447.04 KE
STACK HEIGHT ABOVE GRADE, M	85.4
STACK INSIDE DIA., M	1.75
STACK EXIT TEMPERATURE, °K	588.6
STACK EXIT VELOCITY, M/SEC	15.2

6144

MAIN UNITS (EACH)		
HEAT INPUT M BTU/HR		5928
COAL CONSUMPTION, TONS/HR		282.3
ANNUAL CAPACITY FACTOR %		74
UNCONTROLLED POLLUTANT EMISSION RATES @ MCR, LBS/M BTU		
SULPHUR DIOXIDE		0.76
OXIDES OF NITROGEN		0.60
PARTICULATES		0.08
CARBON MONOXIDE		0.05
HYDROCARBONS (NON-METHANE)		0.0005
LEAD		NIL
CONTROLLED POLLUTANT EMISSION RATES @ MCR, GM/SEC		
SULPHUR DIOXIDE	50% LOAD	315.1
	75% LOAD	482.5
	100% LOAD	567.7
OXIDES OF NITROGEN	50% LOAD	248.7
	75% LOAD	380.9
	100% LOAD	448.2
PARTICULATES	50% LOAD	12.4
	75% LOAD	19.0
	100% LOAD	22.4
CARBON MONOXIDE	50% LOAD	20.7
	75% LOAD	31.7
	100% LOAD	37.3
HYDROCARBONS (NON-METHANE)	50% LOAD	2.1
	75% LOAD	3.2
	100% LOAD	3.7
LEAD	50% LOAD	NIL
	75% LOAD	NIL
	100% LOAD	NIL
STACK LOCATION, UTM CO-ORDINATES		3366.27 KN 447.14 KE
STACK HEIGHT ABOVE GRADE, M		194.2
STACK INSIDE DIA. M		10.13
STACK GAS EXIT TEMPERATURE °K	50% LOAD	327.6
	75% LOAD	327.6
	100% LOAD	327.6
STACK GAS EXIT VELOCITY, M/SEC	50% LOAD	10.15
	75% LOAD	15.55
	100% LOAD	18.29

COOLING TOWERS		
LOCATION, UTM CO-ORDINATES	UNIT 1	3367.11 KN 446.87 KE
	UNIT 2	3367.10 KN 447.11 KE
HEIGHT, M		130
DIAMETER @ TOP, M		66
WATER DRIFT RATE PER TOWER @ FULL LOAD, GMs/SEC		603
DRIFT DROPLET SIZE (DIA) DISTR. (MICRONS)		0-50 21% 50-100 17% 100-200 26% 200-400 26.2% >400 9.8%
DISSOLVED & SUSPENDED SOLIDS IN DRIFT, PPM		32968

IGNITOR OIL STG. TANKS	
LOCATION, UTM COORDINATES	3366.66 KN 447.35 KE
HYDROCARBON EMISSION, PPM	ASSUME NIL

FUEL OIL STG. TANKS	
LOCATION, UTM COORDINATES	3366.54 KN 447.40 KE
HYDROCARBON EMISSION, PPM	ASSUME NIL

LIME/LIMESTONE HANDLING SYS	
DUST EMISSION GMs/SEC.	
LIMESTONE UNLOADING	.002
LIMESTONE TRANSFER POINT	.001

SHIP COAL SURGE PILE (@ 30 ACRES)	
LOCATION, UTM CO-ORDINATES	3362.3 KN 449.4 KE
DUST EMISSION GMs/SEC	.20

SHIP UNLOADING FACILITY	
LOCATION, UTM CO-ORDINATE	3361.9 KN 449.1 KE
DUST EMISSION GMs/SEC.	1.07

COAL HANDLING SYSTEM	
DUST EMISSION GMs/SEC	
COAL CAR UNLOADING	.63
COAL TRANSFER POINTS	.48
ACTIVE COAL PILE (8 ACRES)	.05
INACTIVE COAL PILE (EACH @ 15 ACRES)	.005
BOILER BLDG DUST CONTROL	.21

PARTIAL PLAN

JACKSONVILLE ELECTRIC AUTHORITY
FIGURE 3-2
SITE/PLOT PLAN
DATE: 5/5/80
DR. V LANGDON
1000 500 0
FEET
SK-3332
M-107

3.3 PLANT WATER USE

The two primary sources of water for the plant will be surface water from the St. Johns River and groundwater from the Floridan aquifer. Surface water, withdrawn from the existing NGS discharge channel, will be used as makeup to the recirculating cooling water system. Groundwater, from on-site deep wells, will be used for plant potable water supply, fire protection system, plant service water system, influent to the demineralized water system, and as makeup to the flue gas desulfurization system (FGDS). In addition, plant effluents will be reused where feasible. Quantitative estimates for water requirements (i.e., water use) are expressed as annual average and/or maximum flows, whichever best describe system operation. In all cases, water requirements are for full load (two unit) plant operating conditions. Water use variations for plant operation at less than full load are discussed in Section 3.3.9. The water requirements for the two units will be approximately as follows:

	Gallons per Minute (gpm)	
Plant Makeup/Withdrawals	Annual Average	Maximum
Surface Water from Northside Generating Station's (NGS) Discharge	34,400	34,400
Groundwater from Deep Wells	2,600	5,400
Consumptive Use	12,000	12,900
Plant Discharge to NGS Discharge	25,900	28,100

For the sake of clarity, water requirements listed above are approximated to the nearest 100 gpm. Also, consumptive use is the sum of water lost in evaporation, water contained in solid wastes and water used for coal dust suppression. Because of rainfall runoff contributions, plant discharge is not equal to surface water and groundwater makeup minus consumptive use.

The overall plant water management plan is presented schematically in Figure 3.3-1. The anticipated water quality for the plant water sources (St. Johns River and Floridan aquifer) is discussed in Chapter 2, Section 2.5. Water requirements for various plant systems are discussed in the following sections. Unless otherwise noted, the flow quantities are total flows for both Units 1 and 2.

3.3.1 Makeup Demineralizer System

The boiler makeup water supply system produces high quality water for use in the steam generating cycle. Because the boiler operates at high-pressures and temperatures, certain constituents in the makeup water, such as dissolved salts (mainly calcium and magnesium), must be maintained at very low levels to prevent scaling of the boiler tubing. Demineralized water is required for initial boiler fill, soot blowing, boiler fill after routine cleaning operations, demineralizer and condensate polisher regeneration, and makeup for small losses through boiler blowdown and evaporation.

The makeup demineralizer trains will consist of two separate trains rated at 340 gpm each. These trains will consist of cation exchangers followed by anion exchangers, and mixed-bed polishing demineralizers. Water from deep wells will be demineralized and stored in condensate storage tanks. Average groundwater requirements are expected to be approximately 91 gpm for the boiler/steam cycle and an additional 64 gpm for boiler soot blowing. The 64 gpm is lost to the atmosphere through evaporation. The 91 gpm boiler blowdown will be reused in the FGD system. An average of 22 gpm will be required for demineralizer and condensate polisher regeneration. Makeup demineralizer regeneration will occur approximately once every three days for each train. Condensate polisher regeneration will be infrequent, occurring primarily during start-up.

3.3.2 Cooling Water System

A recirculating cooling water system will be employed to remove waste heat from the steam cycle. Two evaporative natural draft cooling towers will be utilized to dissipate heat from the main condenser and auxiliary cooling water systems. Approximately 425,000 gpm of surface water will be recirculated through the main condensers of both units. On an annual basis, the average rate of evaporation is expected to be approximately 10,500 gpm, and the maximum monthly rate will be about 11,300 gpm.

Due to the highly saline nature of the makeup water, a maximum of 1.5 cycles of concentration has been established for the proposed plant, a typical level for saline water systems. At this level, the water may have a tendency toward scale formation. Therefore, provisions will be made for addition of sulfuric acid to the makeup water to reduce the level of bicarbonate alkalinity and minimize the potential for calcium carbonate scale formation. Preliminary calculations indicate that approximately 25 to 50 ppm sulfuric acid may be required in the cooling tower makeup water for alkalinity removal.

Chlorine also will be added to the main condenser cooling systems to prevent biological fouling. Control is achieved by adding sufficient chlorine to obtain a biocidal residual which must be maintained throughout the system long enough to control microorganisms. To comply with EPA regulations, an intermittent chlorination system will be used. Alternative chlorination operating schemes to determine the optimal chlorine levels for each unit will be studied when the plant becomes operational.

Auxiliary cooling water prevents excess operating temperatures in the auxiliary equipment. Major auxiliary equipment includes main turbine lube oil coolers, condenser vacuum pump coolers, duplex alternator air coolers, soot blower air compressor inter and after coolers, and hydrogen coolers. Cooling this equipment is accomplished by a completely closed system utilizing heat exchangers. Stored condensate water (closed cooling water) cools the equipment and heat exchangers cool this water using main condenser cooling water, which is returned to the cooling tower, thus completing the cooling loop.

Because this system is completely closed and utilizes the same circulating water as the main condenser cooling system, there are no additional water usage requirements.

To limit the cycles of concentration at 1.5 with a maximum design evaporation rate of 11,500 gpm, a makeup of 34,400 gpm and a blowdown of 22,900 gpm will be required. Makeup to the cooling towers will be maintained at 34,400 gpm and average blowdown will be approximately 23,900, based on an average evaporation rate of 10,500 gpm. See Section 3.4 for detailed discussions of evaporative losses.

3.3.3 Coal Handling System

Reclaimed water from other plant systems will be used for dust suppression at the coal handling facilities. Average requirements are expected to be about 50 gpm, with some consumptive loss occurring. An instantaneous maximum demand of up to 350 gpm is anticipated.

Water requirements for coal handling at the Ocean Vessel Coal Unloading Facility are discussed in Section 3.10.2, and dust control for the various systems is discussed further in Section 3.8.2.8.

3.3.4 Ash Handling System

Should a market exist for fly ash as a recoverable resource, trucks or railroad cars will transport the fly ash, from the silo area, off-site. On-site disposal is provided, however, should a market not materialize or if sale of the ash should be interrupted for periods exceeding the three day temporary storage capacity.

Recommended disposal practices are discussed in detail in Section 3.5.2.2. Water requirements for fly ash should be minimal as only small quantities of water will be required for dust suppression at the on-site disposal area. This water will be supplied from the bottom ash system.

Bottom ash produced from the combustion of coal is collected continuously in a water impounded bottom ash hopper located directly beneath the boiler. To reduce water requirements, the bottom ash sluicing system has been designed to be a recirculating system. A continuous source of low-pressure water will be required for cooling as well as for makeup to the water impounded equipment. Intermittent high-pressure water flow of about 400 gpm will be required for equipment sprays and flushes and for sluicing pyrites from the pyrites pulverizing hoppers to the pyrites storage tank. Pyrites from the storage tank and bottom ash from the bottom ash hoppers periodically will be sluiced separately to dewatering bins for dewatering at an average rate of 650 gpm. In addition, bottom ash hopper cooling and sealing flow of about 1200 gpm also will be conveyed to the dewatering bins.

Despite the high system flow rates, a fresh water demand of only 200 gpm groundwater will be needed because this is a recirculating system. An average of approximately 2250 gpm sluice water will be recirculated from the dewatering system. Approximately 100 gpm of the groundwater flow will be used as makeup, as some water is lost through evaporation and by binding to the ash particles. The "dry" bottom ash produced is actually about 20 percent water. In addition, about 100 gpm will be drawn from the dewatering system for wetting fly ash which must be disposed of on-site.

3.3.5 Flue Gas Desulfurization System

Water used in the flue gas desulfurization (FGD) system to remove sulfur dioxide and hydrogen chloride from the hot gases is expected to average 2150 gpm with a maximum of 3150 gpm. Although the system will recycle quench water, makeup water will be needed continually to replace that lost through evaporation, approximately 1000 gpm. In addition, water will be periodically blown down at an average rate of about 1000 gpm to remove excess chlorides from the system. The chloride concentration of water circulating in the FGD system is critical because chlorides are highly corrosive. Acceptable chloride levels for reliable system operation can be maintained with the aforementioned quantity of fresh water available. Higher chloride concentrations would require use of yet to be developed technology, including exotic metallurgy to prevent corrosion. The FGD system has been designed to produce wallboard grade gypsum for which chloride concentration also must be made fairly low. Too high chloride and total dissolved solids concentrations in the gypsum cake wash water creates an inferior quality product. Approximately 50 to 180 gpm of makeup water will be removed from the FGD system with the gypsum by-product.

3.3.6 Service Water System

Other than FGD system requirements, miscellaneous service water uses at the proposed plant include pump bearing cooling, pump seals, air preheater washing, equipment maintenance cleaning, and other miscellaneous plant uses. Groundwater will supply the service water system serving these uses with an estimated average flow of 113 gpm and a maximum flow of approximately 1215 gpm. For infrequent events or during an emergency (e.g., during air preheater washing or for air preheater fire control), service water maximum flow requirements will be much higher. See Figure 3.3-1.

3.3.7 Potable Water System

Potable water for domestic and sanitary use will be supplied from deep wells via the main plant storage tanks at an average rate of 11 gpm. Maximum demand is expected to be 240 gpm. These figures are based on a total plant staff of 375 people and an average potable water requirement of 40 gallons per capita per day. All lines leading from the storage tanks for uses other than potable water will be provided with backflow preventers to prevent return flow into the storage tanks and eliminate potential contamination of the potable water source. Potable water receives secondary chlorination treatment prior to distribution, in accordance with state requirements.

3.3.8 Fire Protection System

Large quantities of water must be available for fire protection at the plant. Although average demand is zero, maximum instantaneous demand can be as high as 2500 gpm. Approximately 600,000 gallons of water will be stored on site for fire protection, with a maximum makeup rate of 625 gpm required during actual use. The fire protection system will be a closed-loop system except during actual use in extinguishing fires. The system will be tested periodically to ensure proper operation. Water will be pumped through the main system pumps and recirculated back to the storage tanks without circulating through the entire system. Thus, no consumptive use of water will occur. After installation of the system, a small amount of water, about 30 gpm for several minutes, will be released during the initial test of the sprinkler system. Water released through the system cannot return to the storage tanks since backflow preventers will be installed in the fire protection lines. Sprinkler valves and other components throughout the fire protection loop will be tested locally at regular intervals during plant operation, without the use of water.

3.3.9 Water Use Variations

Depending on varying conditions at the plant, there will be variations in the water use requirements of plant systems. All water requirements discussed in the preceding sections are either average or maximum requirements for the plant operating at full load. When the plant operates at less than full load, the evaporative losses from the cooling towers will decrease in direct proportion to the plant load. Since the cooling towers' makeup remains constant, the smaller evaporative losses will result in an increase in blowdown to keep the system in balance. However, when the cooling towers are shut down because of prolonged plant shutdown, no makeup or blowdown will be necessary, eliminating the withdrawal of surface water. With one unit shut down, fresh water requirements also will be reduced as one FGD system will not be operating. In addition, variations in the amount of FGD system blowdown will occur due to varying chloride concentrations in the coals burned. Other plant water requirements are not expected to change significantly with plant load variations. Some maximum service water uses will not occur concurrently with others. For example, during an air preheater fire, the generating unit will be shut down; thus, although water will be required for fire control, normal unit water requirements will not be present.

In summary, total plant water requirements are not expected to change significantly with variations in plant load except in the case of prolonged plant shutdown. During these shutdown periods, no surface water requirements are anticipated. Although no groundwater makeup will be required by the FGD system during shutdowns, other systems' (i.e., demineralizer, equipment cleaning, etc.) water usages will increase. Therefore, overall groundwater use is not expected to change significantly during plant shutdown.

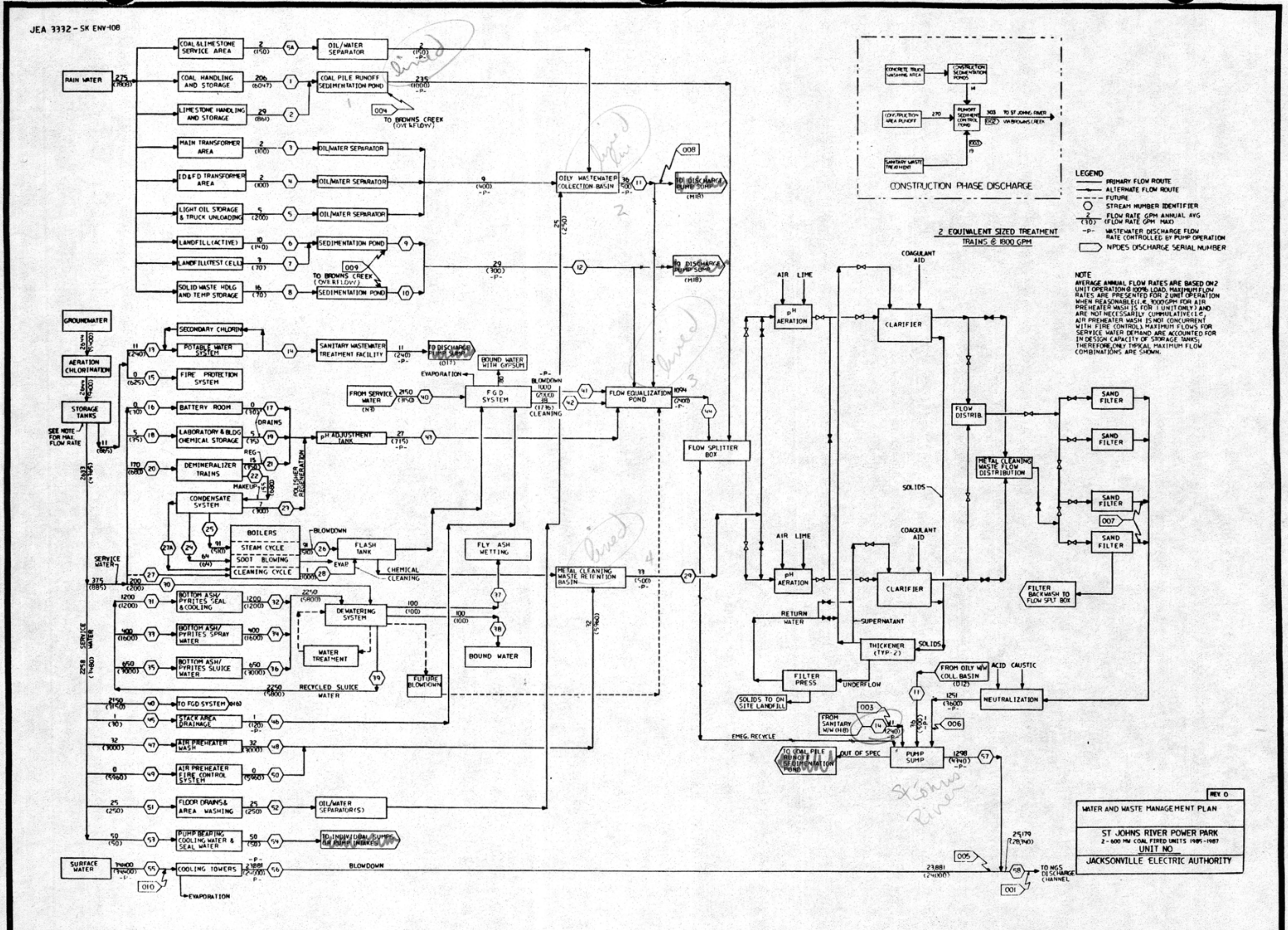


Figure 3.3-1 Water Management Plan

3.4 HEAT DISSIPATION SYSTEM

The heat dissipation system design presented in this section is conceptual in nature. Although the detailed design of this system may require some changes, such changes will be minor with respect to the system's construction and operation. Therefore, the system as it will be built will not be significantly different from the description presented herein.

3.4.1 Circulating Water System

Each of the two units will operate with a steam supply system of approximately 2,400 psig pressure and 1000°F temperature. Each turbine-generator is to be rated at 612 MWe at a turbine exhaust pressure of 3.5 inches of mercury. This will result in a heat rejection rate of about 2.33×10^9 Btu per hour per unit, at 100 percent load, to the condenser.

Each unit's circulating water system will include 183,500 gpm of condenser cooling water, 10,900 gpm of component cooling water and 800 gpm of mechanical vacuum pump cooling water. In addition to these flows there will be 17,200 gpm of makeup water, for a total of 212,400 gpm, the design flow rate for each cooling tower.

One natural draft counterflow cooling tower has been selected to dissipate the heat from each unit. At the design wet bulb temperature of 80°F, dry bulb temperature of 93°F, and 100 percent plant load, the design parameters for each tower will be as follows:

Cooling Range	25.8°F
Approach	10.0°F
Cold Water Temperature	90.0°F
Hot Water Temperature	119.6°F
Heat Load	2.75×10^9 Btu/hour
Drift and Blow-Through Rate	0.002 percent of total tower flow

600 MW

The natural draft towers will be located north of the power plant, approximately 1,650 feet from the centerline of the boilers (see Figure 3.1-1). Each tower will have a base diameter of approximately 340 feet and a height of about 425 feet.

Two one-half capacity vertical wet pit pumps will serve each cooling tower. Each pump will have a design capacity of 110,650 gpm at a rated total dynamic head of approximately 84 feet. The pump pits will be connected to the reinforced concrete basin provided below each cooling tower by a rectangular concrete intake channel. A cast-in-place concrete transition block will connect each pair of pumps to its respective circulating water piping. The circulating water pipe between the pumps and each condenser, as well as the return pipe from each condenser to its respective cooling tower, will be approximately 9 feet in diameter and approximately 1600 feet long. The residence time within the circulating water system is expected to be on the order of 25 minutes.

Makeup for each cooling tower will be withdrawn from the existing Northside Generating Station (NGS) discharge channel. Blowdown from each cooling tower will be discharged to the NGS discharge channel as well, at a location downstream of the makeup withdrawal point (see Chapter 9, Figure 9.1-1).

3.4.2 Makeup Intake System

Plant makeup will be withdrawn from the western end of the NGS discharge channel through perforated pipes or a screened channel with a design average entrance velocity of 0.25 feet per second. Because of the intake location, no trash is expected to be present. The design cooling tower makeup flow rate is to be 17,200 gpm per unit. Makeup is considered to be a constant flow rate producing a maximum of 1.5 cycles of concentration in each cooling tower. Because of the intake location, the makeup water is considered for design purposes to be salt water.

From the makeup pumps, a header will connect to a pipe which will run to the condenser discharge blocks. The retention time within the makeup system will be about 14 minutes.

Best technology available will be used for the location, design, construction and capacity of the cooling water intake structure for the purpose of minimizing adverse environmental impact in accordance with the requirements of Section 316(b) of P.L. 92-500. In summary, the circulating water system will include the following features:

- Intake Location - NGS discharge channel.

- Design - Closed recirculating system with perforated pipes, or screened channel with a design average entrance velocity of 0.25 feet per second.

- Construction - Dredging for and construction of new intake and/or discharge structures in the St. Johns River will not be required.

- Capacity - Approximate annual withdrawal of 0.2 percent of the average St. Johns River flow.

3.4.3 Blowdown Discharge System

The cooling tower blowdown will be pumped to a common discharge line to the NGS discharge channel by 2 wet pit pumps at each tower. The design maximum flow rate is 24,000 gpm per tower.

The blowdown is the difference between the makeup and the evaporation (ignoring drift). Estimates of average monthly evaporation rates (for both units at 100 percent load) have been made, and corresponding blowdown rates calculated, as well as blowdown cycles of concentration. They are presented in Table 3.4-1.

Estimates of average monthly blowdown temperatures have also been made for the historical period from November, 1978 through October, 1979. Table 3.4-2 presents these blowdown temperatures, as well as the NGS average monthly discharge and intake temperatures which occurred during that period.

Using the same procedure for extreme monthly wet bulb temperatures, the corresponding evaporation and blowdown rates and concentrations have been estimated and are presented in Table 3.4-3. Similarly, extreme blowdown temperatures have been estimated, assuming both NGS and the proposed plant are in operation, and are presented in comparison to NGS minimum intake and discharge temperatures which actually occurred during the period November, 1978, through October, 1979, in Table 3.4-4.

The design of the blowdown discharge system includes a discharge line with a 42-inch diameter and a length of approximately 10,800 feet. The system retention time, from the towers to the NGS intake channel, will be about 17 minutes.

3.4.4 Other Heat Dissipation Systems

At this time, the heat load from all water-cooled heat dissipation systems will be dissipated in each unit's main cooling tower, as well as a portion of the NGS heat load which enters through the makeup system.

Table 3.4-1

AVERAGE MONTHLY EVAPORATION, BLOWDOWN AND BLOWDOWN CONCENTRATIONS TWO UNITS

Month	Dew Point (°F)	Dry Bulb (°F)	Evap[a] (gpm)	Blowdown[b] (gpm)	Blowdown[b] Concentrations
J	47.0	65.0	10294	24106	1.43
F	43.0	56.0	9679	24721	1.39
M	52.0	67.0	10336	24064	1.43
A	56.0	72.0	10610	23790	1.45
M	63.0	75.0	10652	23748	1.45
J	69.0	80.0	10840	23560	1.46
J	71.0	82.0	10920	23480	1.47
A	72.5	82.0	10876	23524	1.46
S	71.5	81.0	10836	23564	1.46
O	64.0	74.0	10552	23848	1.44
N	50.0	67.0	10381	24019	1.43
D	48.5	66.0	10254	24146	1.42

a Estimated
b Calculated based on estimated evaporation rate

Table 3.4-2

AVERAGE MONTHLY BLOWDOWN SYSTEM AND RELATED TEMPERATURES[a]
(Degrees F)

Month	St. Johns River Power Park[b] Blowdown	Northside[c] Discharge		Northside[c] Intake
N	78.0	78.8	-.8	70.9
D	77.3	76.1	+1.8	67.0
J	76.7	70.3	+ 6.4	59.5
F	72.6	67.4		57.1
M	78.3	70.3	+8	61.8
A	81.0	80.8		70.8
M	83.6	87.5	-3.9	76.5
J	86.8	90.7		79.6
J	88.0	96.5	- 8.5	83.6
A	88.4	97.7	-9.3	84.0
S	87.8	99.1	-11.3	82.7
O	83.4	91.8		77.1

a Dew Point and Dry Bulb as in Table 3.4-1
b Estimated
c Northside Generating Station records November, 1978 to October, 1979.

Table 3.4-3

EXTREME MONTHLY EVAPORATION, BLOWDOWN AND BLOWDOWN CONCENTRATIONS TWO UNITS

Month	Dew Point (°F)	Dry Bulb (°F)	Evap[a] (gpm)	Blowdown[b] (gpm)	Blowdown[b] Concentrations
J	67	68	9985	24415	1.41
F	69	76	10549	23851	1.44
M	66	78	10783	23617	1.46
A	71	82	10921	23479	1.47
M	77	85	10944	23456	1.47
J	76	90	11307	23093	1.49
J	79	86	10945	23455	1.47
A	78	89	11184	23216	1.48
S	80	88	11051	23349	1.47
O	74	83	10900	23500	1.46
N	70	74	10363	24037	1.43
D	73	74	10254	24146	1.42

a Estimated
b Calculated based on estimated evaporation rate

Table 3.4-4

EXTREME MONTHLY BLOWDOWN SYSTEM AND RELATED TEMPERATURES[a]
(Degrees F)

Month	St. Johns River Power Park[b] Blowdown		Northside[c] Discharge	Northside[c] Intake
J	82.2	+(18.1)	64.1	55.3
F	85.4	23.2	62.2	52.4
M	85.3		66.3	56.0
A	88.0		77.1	68.6
M	90.7		84.2	75.2
J	92.0		86.4	77.3
J	91.6		93.1	80.3
A	92.3	-2.2	94.5	81.7
S	92.6	-3.4	96.0	81.5
O	89.1		86.6	75.9
N	85.0		74.1	69.0
D	85.9		70.6	64.3

a Dew Point and Dry Bulb as in Table 3.4-3
b Estimated
c Northside Generating Station records November, 1978 to October, 1979.

3.5 CHEMICAL AND BIOCIDE WASTES

3.5.1 Liquid Wastes

Plant liquid wastes will be incorporated into an overall plant water management plan (see Appendix O). The plan integrates water requirements and effluents for the various systems to minimize total plant makeup and discharge and to comply with applicable regulations. The proposed water management plan is presented schematically in Figure 3.3-1.

A portion of the discharge from the circulating water system of the existing NGS will be used as makeup to the recirculating cooling water system. The blowdown from the cooling towers will be discharged to the existing NGS discharge channel. Groundwater will be utilized for the plant potable water supply, demineralized water systems, flue gas desulfurization system, fire protection system, and plant service water.

Plant systems' effluents will be reused where feasible, within operating or regulatory constraints and when necessary, treated prior to reuse. Those effluents unsuitable for reuse, other than cooling tower blowdown, will be directed to one of several wastewater treatment facilities, including sedimentation ponds, oil/water separators, retention basins, or a central wastewater treatment facility. These facilities are described below and in the following subsections, with respect to the liquid wastes being treated. In all cases, the facilities have been designed to produce an effluent in compliance with existing effluent limitations for steam electric generating stations. All plant effluents will be discharged via the common cooling tower blowdown line to the NGS discharge channel.

The central wastewater treatment facility will treat plant wastewaters unsuitable for further reuse or direct discharge into the St. Johns River via the NGS discharge channel. A schematic diagram of the central facility is presented in Figure 3.3-1. This figure also indicates the major wastewater sources to be treated in the central facility. The wastewater treatment system will be designed to treat contaminated rainfall runoff and miscellaneous plant effluents at a maximum design flow rate of 3600 gpm total or 1800 gpm through each of two parallel treatment trains.

Both trains will operate at or near design capacity under conditions of increased flow such as may happen during electrostatic precipitator and air preheater washdowns and during periods of excessive rainfall.

The central treatment facility will be designed to remove suspended solids and iron from, and adjust the pH of, the plant effluent. Treatment methods consist of a combination of neutralization, precipitation, coagulation, gravity separation, and media filtration. To meet effluent standards for new sources, the final effluent will meet or surpass the following on a daily average basis:

Total suspended solids	30 mg/l
pH	6 to 9.0
Total iron	1.0 mg/l
Total copper	1.0 mg/l

Major components of the central wastewater treatment facility will include pH adjustment/aeration tanks, flocculator clarifiers, chemical feed equipment, dual media sand filters, solids thickeners, and a dewatering facility.

The two identical treatment trains allow segregated, yet concurrent, treatment of metal cleaning wastes and other plant wastes. As shown in Figure 3.3-1, all plant wastes except those generated by metal cleaning operations first will be directed to a flow splitter box for distribution to the treatment facility. Metal cleaning wastes will enter the system through a separate line which can direct the wastewater to either of the two treatment trains. Whichever train is not being used to treat the metal cleaning wastes will treat all remaining plant wastewaters. This segregation of wastes will be maintained throughout the treatment system, including the sand filters, up to the point of final neutralization. Treatment of metal cleaning wastes generally will be accomplished at a time when other plant waste flows are relatively low.

Treated effluent from the chemical wastewater facility will be reused when appropriate within the facility for reactor clarifier backflush water, line slurry makeup, and cooling of some pump bearings. Effluent reuse pumps will withdraw water from the final effluent pump sump and return it to a hydropneumatic tank at the treatment facility for use when required by the aforementioned systems. Service water will be interconnected with this system as a backup water supply.

3.5.1.1 Low Volume Wastes

The low volume wastes are comprised of the demineralizer regeneration wastes, coal dust suppression drainage, and miscellaneous wastes.

Regeneration wastes result from the operation of the demineralizer trains. The regeneration cycle consists of backwashing, acid and caustic regeneration and rinsing of the demineralizer beds. The ion exchange beds must be periodically regenerated to strip adsorbed ions from the resin surface and replace them with hydrogen and hydroxyl ions for the cation and anion exchangers, respectively. This process is achieved by adding the regenerating chemcials, e.g., sulfuric acid (H_2SO_4) and sodium hydroxide (NaOH), in quantities in excess of the exchange capacity of the bed. Thus, demineralizer wastes are characterized by extremes in pH (i.e., from 2 to 12 pH units) and a high dissolved solids concentration. Suspended solids may also be present due to inefficient pretreatment or precipitation reactions. Average total dissolved solids levels in the neighborhood of 12,000 mg/l would be typical, composed of anions and cations in nearly the same proportion as the influent raw water. With certain exceptions (i.e., sodium, sulfates, carbonate), the average concentrations of constituents in the regeneration wastes will be approximately equal to 7 times the respective concentrations in the makeup groundwater. Estimated characteristics are presented in Table 3.5-1.

The volume of regeneration wastes is estimated to be 44,000 gallons per train per regeneration, including rinse water. Average flow rate will be about 15 gpm and maximum instantaneous flow may be 350 gpm. It is anticipated that one demineralizer train will be regenerated every three to four days, depending on demineralized water usage. The demineralizer regeneration wastes, including condensate polisher regeneration, will be directed to a pH adjustment tank for elementary neutralization. From this tank, the combined streams will be directed to a flow equalization basin for equalization with other plant waste streams. The basin will be lined with synthetic material similar to that described in Section 3.5.1.7 and will hold up to two million gallons in each of two cells.

A portion of the water used for dust suppression during coal handling will be retained in the coal. The remainder will drain, producing a wastewater with a suspended solids concentration in excess of 30 mg/l and showing wide variations in pH. This flow, which is directed to the coal pile runoff sedimentation pond, is expected to average about 30 gpm with a maximum of approximately 100 gpm. Treatment will be required to reduce suspended solids and adjust pH to acceptable levels.

The miscellaneous wastes include those resulting from routine equipment cleaning, laboratory drains, sampling streams, floor drains, etc. Collectively, these wastes are expected to average about 81 gpm. Maximum instantaneous flow may be as high as 485 gpm. Waste characteristics are expected to vary considerably, depending on the source, and consequently, treatment will vary also. Some of this wastewater will be reused in other plant systems without prior treatment. The remaining wastes will require treatment for solids removal, pH adjustment, oil and grease removal, or some combination of these treatments. Those wastewaters requiring oil and grease removal, such as water used for floor washing during equipment maintenance, will be treated in oil-water separators before being combined in an oily wastewater collection basin. The oil-water separators will be designed to produce an effluent with oil and grease concentrations of less than 15 mg/l. The basin will be lined with an impervious synthetic material to prevent groundwater contamination in the event large quantities of oil are discharged into the basin.

The effluent from the oily wastewater collection basin ordinarily will be discharged directly through the final effluent pump station; however, an alternative route to the flow equalization pond has been provided, in the event monitoring indicates noncompliance with EPA effluent limitations. Disposal of the separated oil and grease is discussed in Section 3.5.2.3. Other wastes, e.g., laboratory drains, will require pH adjustment prior to combining with other wastewaters in the flow equalization pond for additional treatment in the central facility.

3.5.1.2 Bottom Ash Transport Water

Present design for the bottom ash handling system precludes generation of a liquid discharge requiring treatment. The recirculating bottom ash handling system recycles an average sluice water flow of 2250 gpm. A makeup flow of 200 gpm is required, to makeup that water lost by binding to bottom ash particles and used in the wetting of fly ash for on-site disposal. Bottom ash system water balance calculations indicate that sufficient dissolved solids will be removed in the water bound to the dewatered ash to eliminate the need for blowdown. However, provisions have been made to incorporate a future blowdown should the solids content in the recirculating sluice water exceed acceptable operating levels. Blowdown from the bottom ash system could be as much as five percent of the daily average recirculating flow and would require treatment for suspended solids removal. If necessary, this blowdown would be directed to the flow equalization pond for subsequent treatment in the central treatment facility.

3.5.1.3 Fly Ash Transport Water

Fly ash will be collected dry and pneumatically transported to storage silos. The fly ash transport system will not generate a liquid waste.

3.5.1.4 Metal Cleaning Wastes

Metal cleaning wastes result from scheduled periodic maintenance cleaning of the air preheaters, boiler firesides, and boiler watersides. Air operated sootblowers will remove accumulated material during boiler fireside cleaning.

Air preheater cleaning is required periodically to remove accumulated soot and fly ash on the air pass surfaces. Preheaters will be cleaned by hosing them down with high-pressure water. Resulting wastes may be acidic and normally should contain sulfates, fly ash and soot, and metallic ions such as iron and copper. Air preheater washing is expected to occur about twice a year per unit, with approximately 100,000 gallons of water required per washing. Maximum flow rate is estimated to be 3000 gpm, averaging 32 gpm on an annual basis.

Boiler waterside cleaning to remove corrosion products and scale will be required every three to five years for each unit to maintain normal operating performance. Corrosion products would be characteristic of the boiler tube material and would contain primarily iron oxide. Boiler scale consists of precipitated salts and may include calcium and/or magnesium phosphates, and silica, depending on boiler feed water and materials of construction.

The chemicals used in boiler cleaning specifically depend on the requirements of the boiler system, based on analysis of boiler scale. The chemicals are generally highly acidic and alkaline and considerable quantities of water are required for flushing. The total volume of wastes per event is estimated to be between 0.5 to 1.5 million gallons, averaging 1 gpm on an annual basis.

Both air preheater and boiler waterside cleaning wastes will require treatment for iron removal, pH adjustment, and suspended solids removal. These wastes will be directed to the metal cleaning waste retention basin for equalization and storage prior to treatment in a segregated train of the chemical wastewater treatment facility. This retention basin will be designed in two cells with a capacity of between 1.5 and 2 million gallons, enough to contain the maximum expected discharge from a routine maintenance cleaning operation. The basin will be lined with a synthetic material, as described in Section 3.5.1.7, to protect groundwater from potential contamination. Floating mechanical agitators will be installed in each cell to produce a waste with uniform pH.

3.5.1.5 Boiler Blowdown

Boiler blowdown will be fairly continuous to control the buildup of dissolved constituents in the boiler/steam cycle and is expected to average 91 gpm with a maximum flow of about 510 gpm. The blowdown will be very low in dissolved and suspended solids and will be slightly alkaline. The estimated range of boiler blowdown water quality characteristics is as follows:

Parameter	Concentration (mg/l)
pH	9.4 - 9.6
Total suspended solids	1 - 10
Oil and Grease	0 - 5
Iron	0.01 - 2.0
Phosphate, PO_4	2 - 10

Because the boiler blowdown quality is quite high, this water will be reused as makeup to the FGD system, unless its use adversely affects the quality of gypsum produced. The blowdown will flow first to a flash tank, then will be routed to the FGD system.

3.5.1.6 Cooling Tower Blowdown

Discharge from the recirculating cooling water system will be in the form of cooling tower blowdown. Blowdown quantity will vary depending somewhat on meteorological conditions; that is, when meteorological conditions are such that cooling tower evaporation losses decrease, the rate of blowdown will increase under conditions of constant makeup flow. The expected average blowdown flow is about 23,900 gpm (see Section 3.4), on a constant makeup flow of 34,400 gpm and an annual average evaporation of approximately 10,500 gpm.

The only contaminants expected to be added to the blowdown are thermal energy, chlorine, and perhaps sulfate. The increases in temperature (16.4^{o}F average in winter and 5.3^{o}F average in summer) will be dissipated in a designated mixing zone in the river beyond the NGS's point of discharge (POD). Thermal input effects are discussed in detail in Section 5.1.2. Chlorine will be added to the cooling tower system to control biological fouling.

The concentration of free available chlorine in the blowdown is not expected to exceed the current standard of 0.2 mg/l at the POD for more than two hours per day per unit. Chlorination will be carefully controlled at the minimum levels necessary for efficient operation after the plant goes into commercial operation. Sulfate concentration in the cooling tower blowdown may increase slightly as a result of acid addition for scale control. The addition of 25 to 50 mg/l of sulfuric acid may increase sulfate (SO_4) levels by 24 to 48 mg/l and decrease bicarbonate levels (as $CaCO_3$) by 25 to 50 mg/l. Th pH of the water may decrease slightly but will be maintained above 6.0 pH units. It is not anticipated that additional chemicals, such as corrosion inhibitors, will be required in the cooling tower flow.

Blowdown quality will depend primarily on the makeup water characteristics and will vary directly with river water quality and the operating cycles of concentration in the cooling towers. In most instances, the concentration of substances in the makeup water will increase in direct proportion to the cycles of concentration (see Chapter 5, Section 5.1.3.2). Estimated blowdown characteristics are presented in Table 3.5-1. These estimates are based on approximately 1.5 cycles of concentration and average and worst case ambient river water quality. The blowdown will be discharged to the existing NGS discharge channel downstream of the proposed intake location, and will discharge ultimately to the St. Johns River via the existing NGS submerged discharge.

3.5.1.7 Area Runoff

Rainfall runoff from certain plant areas will require treatment to maintain compliance with federal regulations and policies. These areas include coal handling and storage, limestone handling and storage, main transformer area, oil storage and unloading, solid waste handling and temporary storage, and the solid waste landfill areas. Runoff quantities have been estimated based on area involved and expected rainfall. The average runoff is based on the highest mean monthly rainfall of 7.89 inches for the period 1941 through 1980 (see Chapter 2, Table 2.6-4). Maximum flows have been calculated using a once in 10 years, 24-hour design storm of 7.6 inches, with maximum intensity of 5.2 inches occurring within a six hour period.

The following table indicates average and maximum expected runoff from various plant areas and the estimated size of each area. A runoff coeffieient of one (1) has been assumed for all areas except the active and test cell solid waste landfills. For these areas, a runoff coefficient of 0.6 has been assumed. The table also indicates the parameters for which treatment will be necessary.

Area	Size	Average Runoff(gpm)	Maximum Runoff(gpm)	Treatment Necessary
Coal Handling and Storage	42 acres	206	6047	pH, TSS, Iron
Limestone Handling and Storage	6 acres	29	861	pH, TSS
Landfill (Active)	10 acres	10	140	pH, TSS
Landfill (Test Cell)	5 acres	3	70	pH, TSS
Solid Waste Handling and Temporary Storage	3 acres	16	70	pH, TSS
Light Oil Storage and Truck Unloading	1 acre	5	200	Oil and Grease
Coal and Limestone Service	16,553 ft^2	2	150	Oil and Grease
ID and FD Transformer Area	14,000 Ft^2	2	100	Oil and Grease
Main Transformer Area	5,000 ft^2	2	100	Oil and Grease

The major contributor to runoff quantity is the coal pile storage area. Estimated coal pile runoff quality is presented in Table 3.5-1, assuming the proposed plant will burn coal from regions of east Kentucky and east Tennessee.

Rainfall runoff from the various plant areas will be collected by drainage ditches, piping, and catch basins and routed to appropriate sedimentation ponds prior to further treatment or discharge. Potentially oily runoff from certain areas will be treated for oil removal in oil-water separators prior to discharge into a central oily wastewater collection basin. The oil-water separators will be designed to produce an effluent with oil and grease concentrations of less than 15 mg/l. Effluent from the basin wil be pumped to the final effluent pump station for discharge. An alternate route to the flow equalization basin will be provided if further treatment of these wastes is required. Oil skimmers will be provided for in the collection basin, if required. Disposal of the separated oil and grease is discussed in Section 3.5.2.3.

Runoff from the two solid waste landfills north of the plant loop and from the solid waste handling and temporary storage areas will be collected in sedimentation ponds then pumped to the flow equalization pond. Treatment in the central facility will adjust the pH of the runoff, remove additional solids not removed in the pond, and reduce small concentrations of certain metal constituents. An alternate route for the runoff from the solid waste areas has been planned should the runoff quality be in compliance with guidelines for pH, total suspended solids, and other water quality criteria. This route will pump the effluent from the sedimentation pond directly to the final effluent discharge pump sump.

The largest rainfall runoff flow will be from the coal and limestone handling and storage areas due to the larger areas involved. This runoff will be collected in the coal pile runoff sedimentation pond, pumped to the flow splitter box, then treated in the central treatment facility for pH adjustment and solids and iron removal.

Of the rainfall runoff sedimentation ponds at the main plant site, only the coal pile runoff sediment control pond will be lined. The coal pile also will be lined. The liners to be used will be high density polyethelene, which is a flexible, impervious synthetic material, or equal, designed to protect groundwater resources from industrial liquid wastes. Other plant facilities which will be lined with the same material include the metal cleaning waste retention basin, the flow equalization basin, and the oily wastewater collection basin. The proposed lining system will be designed for the life of the project and will have had proven satisfactory service for at least five years under similar service conditions. All seams (joints) between individual liner sheets will overlap with at least two inches of weld seam, which will be tested to insure a strong, water-tight bond between the sheets. Liners will have resistance to wear and abrasion at points of contact with concrete structures and fittings.

The sedimentation ponds will be designed with sufficient capacity to satisfy the regulatory requirements for runoff control, to process the volume associated with the once in ten year, 24-hour rainfall event. Capacity will be provided in each pond, except the coal pile pond, to allow accumulation of settled soilds of up to 20 percent of total pond volume. At this level, solids will be removed. The coal pile runoff sediment control pond will be designed to provide for sludge accumulation of up to two feet averaged over the total pond area.

3.5.1.8 Flue Gas Desulfurization Blowdown

The FGD system will require a blowdown of approximately 1,000 gpm to remove dissolved solids from the system. Chloride concentrations must be maintained at about 4,000 mg/l for reliable system operation as described in Section 3.3.3.5. The blowdown will contain the same constituents as those present in the makeup water. Concentrations of these constituents will vary in direct proportion to the makeup flow plus contributions from the flue gas and limestone processed. Table 3.5-1 presents estimated FGD system blowdown characteristics. Depending on which FGD system is selected, makeup water requirements might increase to 3150 gpm and blowdown flow may increase to 2000 gpm. Blowdown quality should remain essentially the same, however.

Blowdown from the FGD system and wastewater generated from system cleaning will be pumped to the flow equalization pond, the flow splitter box, and then to the central treatment facility for pH adjustment and suspended solids removal.

3.5.2 Solid Waste

The largest quantity of solid wastes produced by the operation of the plant will be generated by the flue gas desulfurization (FGD) system. Coal combustion ash, in the form of fly ash and bottom ash, will be the other major solid waste. Collectively, FGD waste and coal ash are referred to as "high volume solid wastes." Other comparatively small quantities of solid

Table 3.5-1 (Revision 1)

PLANT EFFLUENT CHARACTERISTICS[a]

Parameter	Cooling Tower Blowdown		FGDS Blowdown	Demin. Regen.	Landfill Area Runoff	Coal Pile Runoff
	Avg.	Max.				
Chlorides, mg/l	18,740	30,390	6,905	149	59	10
Sulfates, mg/l	2,500	3,873	10,000	8,000	766	5,000
Calcium, mg/l	391	588	3,000	394	130	300
Iron, mg/l	1.1	4.0	8.1	.178	1.2	200
Magnesium, mg/l	1,215	1,788	2,750	162	4.3	250
Potassium, mg/l	385	544	32	8.17	---	---
Sodium, mg/l	10,300	13,630	2,400	2,200	---	---
Cyanide, mg/l	.01	.13	---	---	< 0.01	0
Aluminum, mg/l	.703	5.4	0.3	.131	.9	260
Antimony, ug/l	.27	1.4	2,300	---	---	600
Arsenic, ug/l	.99	1.5	300	7.1	15	150
Beryllium, ug/l	.13	.28	140	---	< 7	40
Boron, mg/l	4.5	7.0	46	2.91	---	---
Cadmium, ug/l	.42	3.3	110	5.68	1.8	0.9
Chromium, ug/l	2.3	7.4	500	---	< 10	6.0
Copper, ug/l	100	410	200	28.4	23	900
Lead, ug/l	0.5	15	400	149	12	9
Manganese, ug/l	39.3	134.1	2,500	14.2	---	28
Mercury, ug/l	.35	.89	70	.71	.46	0.4
Nickel, ug/l	4.8	25	1,500	24.9	64	2,500
Selenium, ug/l	.72	1.1	2,200	35.5	10	5
Silver, ug/l	.23	.52	60	2.84	< 10	---
Zinc, ug/l	66.6	222	350	49.7	50	6,500

a See Appendix C, Section C.6 and Table C-36 wastes, generated by the operation of the plant include sludges from the sedimentation pond, retention basin, cooling towers, and wastewater treatment facilities.

Ash is the residue produced by the combustion of coal. It consists of the unburned organic matter and the inorganic mineral constituents present in the coal. The quantity and chemical characteristics of ash depend on the coal, boiler operating conditions, and air pollution control devices. Two types of ash are produced during combustion, fly ash and bottom ash. Fly ash consists of the finer particles that are entrained in the flue gas stream. Bottom ash is the coarser, heavier material that accumulates in the furnace bottom in the form of a loose ash or slag.

For the proposed wet limestone FGD scrubber, the sulfur dioxide in the flue gas reacts with the limestone slurry producing a waste. The principal constituent of the waste produced at the proposed plant will be calcium sulfate (gypsum) based on a forced oxidation system.

The following conditions have been used to estimate the quantities of high volume solid wastes:

Plant

Two 600 MW Units
Heat input rate = 5928 x 10^6 Btu/hour/unit
Plant life = 40 years
Average capacity factor = 60 percent (not levelized)

Coal

Heating value = 11,590 Btu/lb
Ash content = 9.2 percent
Sulfur content = 2.7 percent

Fly Ash

Removal efficiency = 100 percent

Percent of total ash produced = 80 percent

Bulk density at disposal site (dry) = 60 lbs/ft^3

Bottom Ash

Percent of total ash produced = 20 percent

Bulk density at disposal site (dry) = 80 lbs/ft^3

FGD System

Scrubber type = Wet limestone with forced oxidation

Waste composition = $CaSO_4 \cdot 2H_2O$ (Gypsum)

Removal Efficiency = 100 percent

Excess sludge = 10 percent

Solid content = 80 percent

Bulk density at disposal site (dry) = 64 lbs/ft^3

Values used are estimated averages over the anticipated 40 year life of the plant. Removal efficiencies of 100 percent are assumed for the sake of conservatism.

3.5.2.1 Bottom Ash

Approximately 1.99 million tons of bottom ash are expected to be generated over the life of the plant. The total volume is estimated to be about 1140 acre-feet. Maximum rate of production of bottom ash is expected to be about 20 tons/hour for both units.

Bottom ash will be sluiced to a dewatering system for water removal. The water is recycled back to the bottom ash hopper and the dry ash is removed from the dewatering bins for reuse off-site or disposal on-site.

Potential markets for bottom ash include sectors of the construction industry. Non-marketed bottom ash will be combined with the other combustion by-product solid wastes and disposed of in an on-site landfill.

3.5.2.2 Air Quality Control Systems Waste

The Air Quality Control Systems (AQCS) wastes consist of fly ash collected in the electrostatic precipitators and the FGD waste. Fly ash will be generated at a maximum rate of about 81 tons/hour from Units 1 and 2.

Approximately 7.95 million tons or 6,080 acre-feet of fly ash will be generated over the life of the plant. Fly ash will be pneumatically conveyed to temporary storage silos. The silos will provide a minimum of three days storage.

The maximum rate of production of dry gypsum for the two units is estimated at about 134 tons/hour. Total gypsum produced over the life of the plant will be approximately 17.2 million tons or 12,400 acre-feet. Temporary storage up to seven days at full load generation will be provided for marketable gypsum.

Fly ash is a valuable, recoverable resource. Several alternatives are currently available for the use of fly ash. With the congressional encouragement of resource recovery activities through the passage of the Resource Conservation and Recovery Act of 1976, and with a potential nearby market for fly ash, it is anticipated that fly ash generated by the proposed plant will be sold as a by-product.

The gypsum produced by the FGD system will be of a commercial grade, comparable in quality to natural gypsum deposits. This quality can be achieved through special equipment design and quality control procedures. Wallboard manufacturing facilities exist in the vicinity of the proposed plant and it is anticipated that the gypsum produced at the proposed plant will be utilized in the manufacture of wallboard.

In the event markets for fly ash, bottom ash, and gypsum do not materalize, or during temporary market interruptions, on-site storage will be necessary. Due to the conservative assumptions used in the solid waste area impacts assessment which have been necessary because of the absence of a specific plant coal and leachate characteristics, a storage program having two elements will be implemented. These elements include an on-site solid waste disposal test program and an on-site landfilling operation for material not directly associated with the test program.

The test program will be designed to characterized the handleability, structural stability, and other physical and chemical properties of fly ash, bottom ash, and gypsum mixtures, and to develop criteria for establishing an environmentally acceptable and cost effective long term disposal plan.

During the testing period (approximately five years), the material not directly associated with the test program will be placed into a secure, on-site, monitored landfill. The landfill will be developed in cells of approximately 10 acres each. The base of the landfill will be above the seasonal high water table. The base material will be compacted to achieve a permeability of approximately 9×10^{-4} cm/sec and designed to minimize leachate caused by rainfall infiltration within the limitations of water quality standards in the area. The waste material will be placed and compacted in lifts (layers) up to a total height of about 60 feet above grade. Compaction of this material further reduces infiltration of rainwater through the waste.

Before initial waste placement within each cell, diversion berms for diverting water runoff from surrounding areas will be constructed. In addition, a perimeter ditch inside the berm will collect precipitation runoff from the landfill. Collected runoff will be treated as discussed in Section 3.5.1.7. During placement, drainage will be maintained toward perimeter ditches.

For closure of the landfill, the tops of the completed cells will be sloped to enhance surface runoff while reducing infiltration. A cover consisting of a granular base (such as bottom ash) and topsoil will be placed on the sides of completed outside cells and on the landfill top surface. Interfacing side slopes of the cells will not be covered since they serve as initial sides for the next cell. The final step in closure will be to seed the covered landfill.

A system of groundwater monitoring wells will be installed prior to the disposal of the waste material and a monitoring program will be initiated. The system will include wells upgradient and downgradient of the disposal area. Water levels will be periodically monitored and water samples will be periodically collected for analysis of selected indicator parameters.

The solid waste mixture (fly ash, bottom ash, and gypsum) has a moisture content of approximately 20 percent; thus, fugitive dust emissions from the waste are anticipated to be minimal. The continual placement and compaction of new (moist) material over the old during construction of each landfill lift will also prevent the formation of dust should the surface be disturbed due to working. Covering the waste with soil and seeding will eliminate possible future dust emissions after closure of each cell.

3.5.2.3 Other Wastes

Compared to the high volume solid wastes, quantities of miscellaneous solid wastes generated by operation of the plant will be insignificant. These wastes include settled solids from various sedimentation ponds, the metal cleaning retention basin, and the cooling tower basin; separated oil and grease from oil-water separators; and, sludges from the santitary waste treatment facility and the central wastewater treatment facility. The quantities of the miscellaneous solid wastes generated will depend on a number of factors.

Solids which have accumulated in the various sedimentation basins will be removed periodically to maintain sufficient liquid holding capacity in the ponds. Solids build up will depend primarily on rainfall frequency and duration and the concentration of suspended solids in the influent to the ponds. Solids in these ponds will consist mainly of coal dust and ash. Material from the coal pile runoff sedimentation control pond at the plant and will be removed and returned to the coal pile. Solids from the other runoff sedimentation ponds will be placed in the on-site landfill after removal. Frequency of solids removed from these ponds is estimated to be about once per year.

Removal of wastes from the metal cleaning waste retention basin will be required once every three to five years, corresponding with the frequency of one or two boiler cleaning operations. Because of the potentially corrosive nature of the liquid waste held in the basin, the settled solids remaining may be considered hazardous under the rules of RCRA. If the wastes are considered hazardous, a RCRA permitted contractor will remove the wastes from the basin in accordance with the applicable regulations and dispose of them off-site. Should these wastes not be determined to be hazardous, the RCRA permitted contractor requirement will be dropped and on-site disposal considered.

Solids accumulated in the flow equalization basin (primarily from the FGD system blowdown) will be removed for disposal in the on-site landfill for fly ash, gypsum, and bottom ash.

Suspended solids and particulates from the atmosphere will build up over time in the cooling tower basins. These basins will be cleaned once or twice a year and the accumulated solids will be removed and disposed of in an on-site landfill.

Sludge will be produced from operation of the chemical wastewater treatment facility, generated during the solids clarification and precipitation processes. The quantity of sluges produced will depend on the influent wastewater characteristics and length of operation of the facility. The sludge will be removed when required, dewatered and disposed of in the landfill.

Although, the extended aeration sanitary waste treatment facility is not expected to produce significant quantities of sludge, this material will be removed as necessary and disposed of off-site.

Oily waste removed from the oil-water separators will be collected for off-site disposal or reuse by licensed vendors. These wastes also may be incinerated in the boilers with the coal at selected times.

OMIT

Figure 3.5-1 Chemical Wastewater Treatment Facility

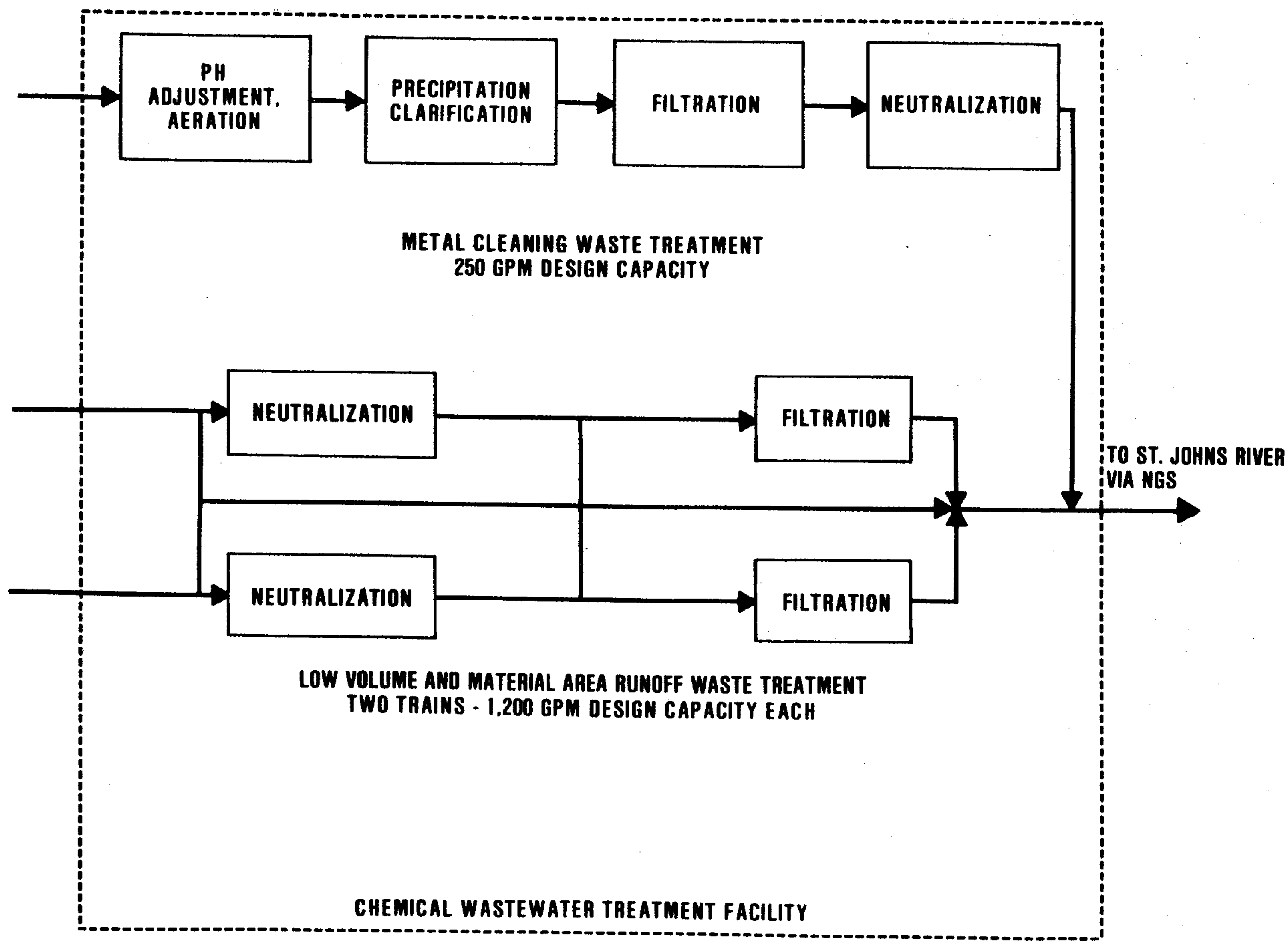


Figure 3.5-1 Chemical Wastewater Treatment Facility

3.6 SANITARY WASTES

3.6.1 Volumes and Quantity

Sanitary wastes from plant locker rooms, showers, and toilets, estimated at an average daily flow of 15,000 gpd, 11 gpm, for the estimated operational staff of 375 people. Wastewater characteristics are expected to be similar to municipal wastewater. The five-day biological oxygen demand (BOD_5) is expected to be about 26 pounds per day, using a loading of 0.07 pound BOD_5 per capita per day. General composition of the plant sanitary wastes is as follows:

Composition of Sanitary Wastes
(Construction Phase and Operational Phase)

Constituent	Range of Concentrations, mg/l
Solids, Total	700 - 1,500
Dissolved	500 - 1,000
Suspended	200 - 500
Biological Oxygen Demand, (BOD_5-20°C)	150 - 250
Chemical Oxygen Demand (COD)	500 - 1,200
Nitrogen (Total as N)	40 - 100
Phosphrous (Total as P)	10 - 25
Oil and Grease	100 - 200

During plant construction, the peak work force is expected to be approximately 2,000. Of these, approximately 650 people will use portable, self-contained facilities. Wastes from the portable facilities will be disposed off-site either by the facilities's supplier or by some contractor who would collect the wastes and transport them to the nearest municipal sanitary waste treatment facility with available capacity. Approximately 1,350 of the construction personnel will use permanent and temporary toilets, located in several site areas. The average wastewater generated is expected to be approximately 30,000 gpd at a rate of 22 gallons per capita per day. The biological oxygen demand is expected to be about 54 pounds per day, using a loading of 0.04 pounds per capita per day.

3.6.2 Treatment and Disposal

The plant sanitary waste treatment facility will be designed to provide secondary treatment to some domestic wastes generated during construction and all domestic wastes generated once the proposed plant is operational. Two 15,000 gallons per day (gpd) extended aeration package plants will be provided. The two plants will operate together or separately and will have some common components. Both plants will be required during construction; however, after this phase is completed, one plant will provide treatment for the anticipated average flow of 15,000 gpd for the estimated operational staff of 375 people. The other plant will be maintained as a spare unit.

The extended aeration process to be used is a modification of the conventional activated sludge process which has been designed to minimize the amount of biological sludge produced. Treatment will consist of pre-screening, followed by aeration, sedimentation, aerobic sludge digestion, and finally chlorination. A 90 to 95 percent removal efficiency for BOD and suspended solids is anticipated. Characteristics of the treated effluent is discussed are Chapter 5, Section 5.1.3.4.

During construction, the treated effluent from the sanitary waste treatment facility will be directed to the construction runoff sediment control pond discussed in Section 3.7. Upon completion of construction, the effluent from the treatment facility will be pumped to the final effluent pump station for discharge into the NGS discharge channel, in accordance with the overall station water management plan discussed in Section 3.5.1. Sludge disposal is discussed in Section 3.5.2.3.

3.7 ON-SITE DRAINAGE SYSTEM

3.7.1 Construction Phase

Approximately 300 acres of land within the railroad loop will be cleared and grubbed (see Figure 3.1-1). Of this, approximately 10 acres will be paved (construction building, roads, etc.) having an assumed 100 percent runoff. The runoff coefficient for the remaining 290 acres (a sandy type soil) is expected to be approximately 0.30. The average runoff coefficient for the cleared area is expected to be approximately 0.32. The total runoff from the 300 acre site is expected to be about 61 acre-feet, based on the 10 year, 24-hour design storm of 7.6 inches. During construction, temporary sedimentation ponds will be located southeast of the railroad loop and within the area enclosed by the loop. All runoff waters generated within the general boundaries of the rail loop during construction will be directed to these ponds, where the majority of sedimentation will take place. The runoff collection system will consist of grassed drainage ditches, storm sewers, and a circumferential grassed main drainage ditch directing flow from the construction sedimentation ponds to the runoff sediment control pond. The runoff sediment control pond will provide 24-hour retention of the design storm and will be sized to retain accumulated solids. Effluent from this pond will overflow via a control pipe and follow existing drainage paths to the St. Johns River via Brown's Creek. Figure 3.7-2 shows the on-site drainage plan during construction. A schematic diagram of the construction phase drainage is presented as Figure 3.7-1.

The runoff is expected to contain little, if any, chemical contamination. However, until all construction is completed, there will be a potential for soil loss from uncovered areas. It is expected that some of the settleable material will be taken out of the runoff by filtering in the grass-covered drainage ditches. Additional settling will take place in the runoff sediment control pond prior to discharge to Brown's Creek. Total suspended solids are expected to be 50 mg/l on a daily average with a maximum of 100 mg/l. The runoff sediment control pond will be designed with sloping embankments, thus allowing growth of vegetation along the edges of the pond and facilitating biological uptake of nutrients and metals which may be contained in runoff entering the pond.

3.7.1.1 Concrete Truck Washing

Concrete trucks leaving the construction site after delivery will be hosed down at a paved truck washing area. Washout from trucks will be directed to a 2.2 million gallon sedimentation pond. Overflow from this pond will be directed to the construction phase runoff sediment control pond (see Chapter 4, Section 4.1.1.1). Peak drainage from the washing activity is expected to be approximately 20,000 gallons per day.

3.7.1.2 Heavy Equipment Refueling Area

One or more areas will be lined with gravel to serve as refueling areas for heavy construction equipment. These areas will include temporary fuel storage tanks. Rainfall runoff from these areas will be directed to gravity type oil-water separators designed to handle the once in 10 year, 24-hour storm. The effluent from the oil-water separators will be directed to the construction phase runoff sediment control pond.

3.7.1.3 Erosion Control

Development of the construction phase runoff sediment control pond will be during the first stages of construction. Erosion during construction as a result of runoff from precipitation events will be minimized through sediment and erosion control practices (see Chapter 4, Section 4.1.8.1). Measures to minimize the sediment load of the runoff will include various diversion and interceptor dikes, critical area stabilization with semi-permanent and permanent seedings, temporary mulch or rock cover, and a routine inspection program. The control practices will include limiting the amount of land disturbed, reducing time of disturbed area exposure, installation of sedimentation basins, and scheduling construction activities to reduce construction time. As construction activities are completed in the specific areas, ground cover proposed for final plant landscaping will be applied.

3.7.2 Operational Phase

Rainfall runoff from certain plant areas will be collected for treatment as specified in the water management plan discussed in Section 3.5.1.7.

Runoff from all other areas will be collected in a stormwater collection and drainage system and discharged into the surrounding areas to approximate the discharge of natural runoff which occurred with pre-construction drainage patterns. The collection and drainage system will be designed to handle the 10 year, 24-hour design storm.

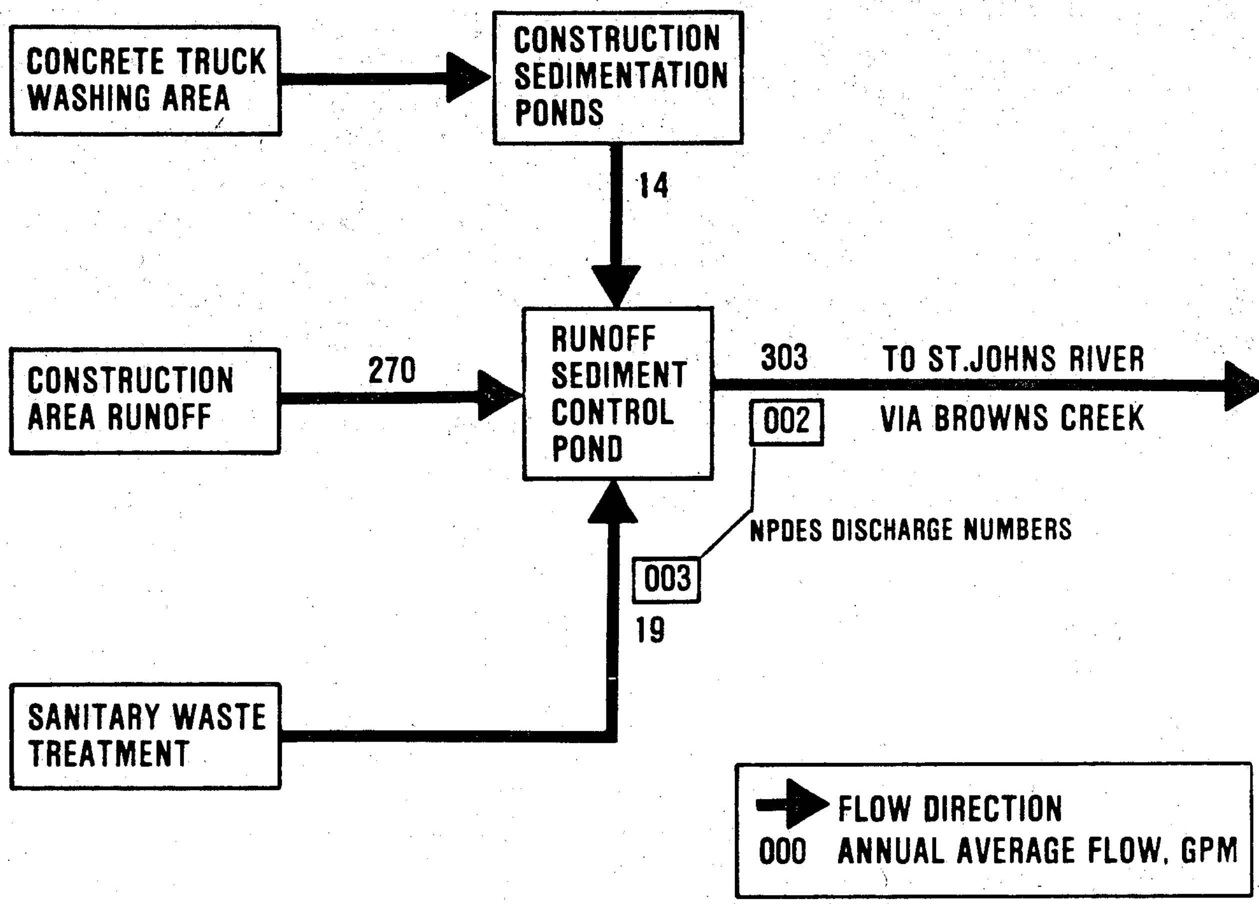


Figure 3.7-1 Construction Phase Drainage-Schematic

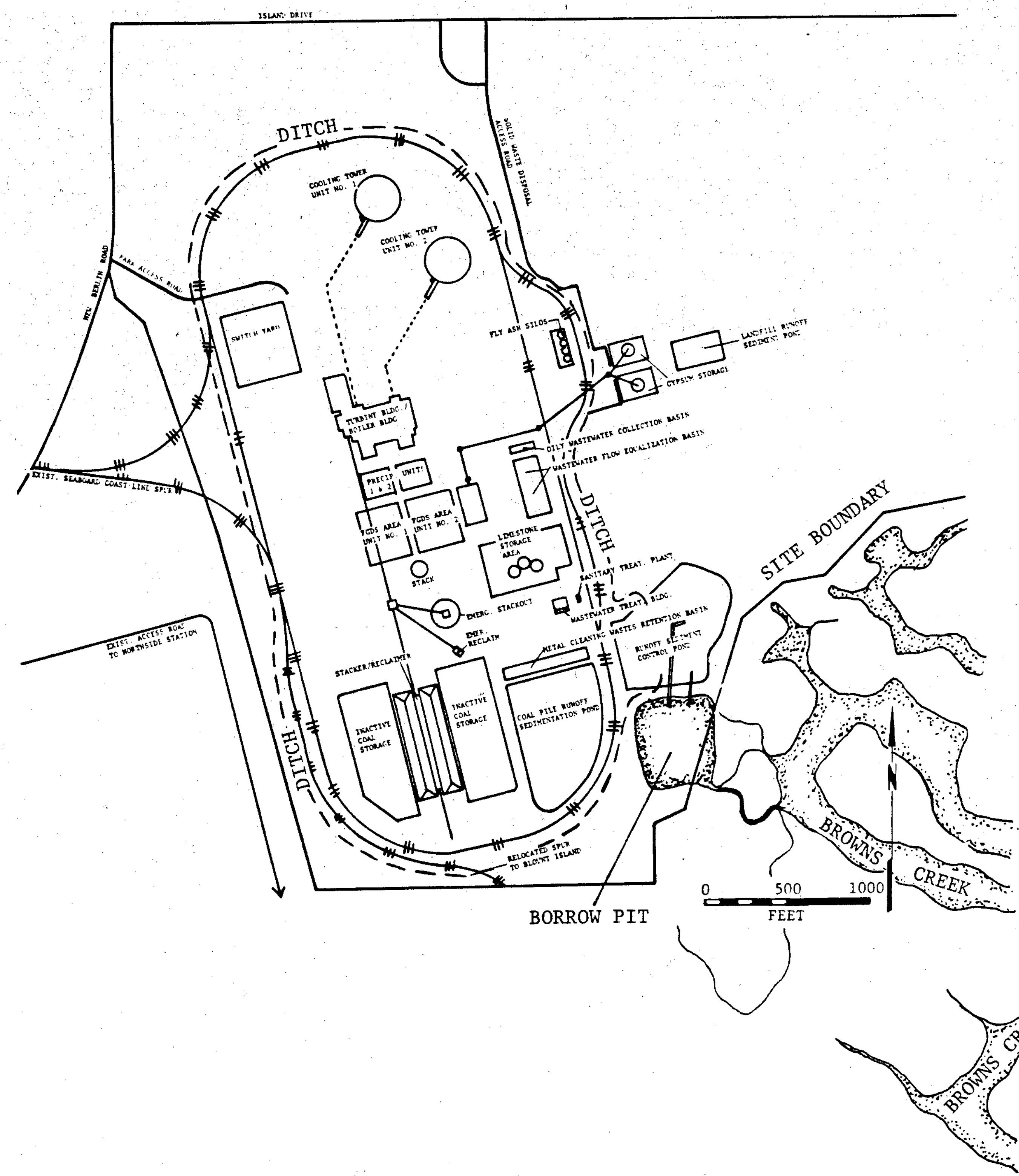


Figure 3.7-2 Construction Phase Drainage-Plot Plan

3.8 AIR EMISSIONS

3.8.1 Combustion and Flue Gas Systems

Using pulverized coal, each steam generating unit (boiler) will be capable of delivering 4,897,000 pounds of steam per hour continuously at 2,400 psig and 1000°F. Assuming "worst case" coal characteristics (maximum pollutant content and minimum heating value), the expected uncontrolled emissions from each boiler for the criteria pollutants are as follows:

Pollutant	Lbs/MMBtu	Lbs/Hr
Sulfur Dioxide	7.6	46,694
Oxides of Nitrogen	.60	3,686
Particulates (fly ash)	13.71	84,232
Carbon Monoxide	.05	307
Hydrocarbons (non-methane)	.0005	3
Lead	Negligible	Negligible

3.8.2 Air Pollution Control System

3.8.2.1 Regulatory Requirements

This section describes the systems that have been selected to control the emissions from the steam generator described above. The emission control systems required are governed principally by two federal regulations: New Source Performance Standards (NSPS) and the Best Available Control Technology (BACT) requirements associated with the Prevention of Significant Deterioration (PSD) regulations. These federal regulations both have similar counterparts in the rules of the Florida Department of Environmental Regulation (Florida Administrative Code, 1979).

Fossil fuel-fired steam generating units of more than 250 MMBtu/hr of heat input produce three types of emissions for which the U.S. Environmental Protection Agency (USEPA) has established NSPS [44 FR (113) 33579-33624, June 11, 1979]. The applicable NSPS for these pollutants from coal-fired units and the related Florida emission standards are as follows:

Particulate Matter - 0.03 lb/MMBtu heat input and 20 percent opacity based upon a six minute average. The Florida standard is 0.1 lb/MMBtu, two hour average and 20 percent opacity.

Sulfur Dioxide - 1.2 lb/MMBtu heat input and a 90 percent reduction in potential sulfur dioxide emissions is required at all times except when atmospheric emissions are less than 0.60 lb/MMBtu heat input. When sulfur dioxide emissions are less than 0.60 lb/MMBtu heat input, a 70 percent reduction in potential emissions is required. Compliance with the emission limit and percent reduction requirements is determined by continuous monitoring to obtain a 30-day rolling average. The Florida standard is 1.2 lb/MMBtu, with no percent reduction requirement, maximum two hour average.

Nitrogen Oxides - 0.6 lb/MMBtu heat input for bituminous coal and a 65 percent reduction in potential nitrogen oxide emissions based upon a 30-day rolling average and expressed as nitrogen dioxide. The percent reduction is not controlling as USEPA has determined that compliance with the emission limitation will assure compliance with the percent reduction requirement. The Florida standard is 0.7 lb/MMBtu, maximum two hour average.

In addition to these requirements, the Clean Air Act as amended in 1977 and the implementing PSD regulations as well as the Florida Administrative Code rules on air pollution require a case-by-case evaluation of BACT for projects the size of this facility. BACT is defined as follows in the federal regulations (the Florida definition is similar):

"Best available control technology means an emission limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under the Act which would be emitted from any proposed major stationary source or major modification, which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques, for control of such pollutant. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR Part 60 and Part 61..."

An evaluation of alternative air quality control systems has been conducted in the PSD application for this project (Envirosphere, 1980) and a BACT system has been selected for control of particulate matter, sulfur dioxide, nitrogen oxides, carbon monoxide, hydrocarbons, and fugitive dust. Systems for control of these pollutants were evaluated because the proposed facility will be a "major" source of these pollutants (except hydrocarbons), as defined in the PSD regulations which were applicable at the time the PSD application was submitted [43 FR (118) 26379-26410, June 19, 1978]. The proposed facility was considered a "major" source since it will have the potential to emit these pollutants in excess of 100 tons per year and because it will not be exempt as provided in Paragraph (k) of those regulations.

As indicated, the BACT portions of the revised PSD regulations [45 FR (154) 52675-52748, August 7, 1980] are not applicable to this project because a complete PSD application was submitted to USEPA before the new rules were promulgated. These new regulations would require BACT demonstrations not only for the pollutants for which the source is "major", but also for all other pollutants regulated under the Clean Air Act that would be emitted in greater than "de minimis" amounts, except pollutants for which the area is nonattainment. Although there is some uncertainty at this point because the specific project coal(s) has not been selected, it is believed on the basis of generic eastern coal analyses that no additional pollutants fall into this category. A discussion on hydrocarbons is presented since the Jacksonville area is nonattainment for ozone, even though projected hydrocarbon emissions will be too small to trigger any nonattainment area requirements existing in the regulations applicable to this project.

An evaluation of alternative air quality control methods is presented in Chapter 9, Section 9.4. This evaluation includes an assessment of technology, removal efficiencies, auxiliary power requirements, environmental considerations and economics for applicable control methods for the proposed facility in accordance with the USEPA guidance document (USEPA, 1978a). Based upon this evaluation and the level of control required to meet applicable NSPS, PSD increments, and ambient air quality standards, the BACTs are selected. The BACTs thus selected will provide emission levels offering the maximum level of environmental protection consistent with the efficient use of energy and capital. These BACTs are described in the remainder of this section, along with a discussion of the stack.

3.8.2.2 Stack Height

The stack is designed such that it is tall enough to ensure that emissions do not result in excessive pollutant concentrations in the immediate vicinity of the stack as a result of plume downwash due to wake effects that may be created by the stack itself, nearby structures, or nearby terrain obstacles. The Clean Air Act Amendments of 1977 require that dispersion modelling estimates of ground level pollutant concentrations not take credit for stack heights in excess of the value known as the "Good Engineering Practice (GEP)" stack height. The GEP value for any particular facility is governed by regulations proposed by the USEPA (44 FR 2608, January 12, 1979) and a draft Technical Support Document (USEPA, 1978).

In accordance with this guidance, the GEP value for the proposed project was determined using the formula GEP = H + 1.5W, where H is the obstruction height and W is a factor which is equal to the obstruction width if the width is less than the height, otherwise W is set equal to the height. The obstruction in this case is the combination of connected buildings which comprise the power block.

This combination results in a building width which is greater than the height; thus "W" is set equal to the building height (Nagler, 1979). Therefore, since the boiler building height is expected to be 256 feet above grade, GEP = 256 + 1.5 (256) = 640 feet.

3.8.2.3 Sulfur Dioxide

The system selected as BACT for the control of sulfur dioxide emissions is a limestone flue gas scrubbing system with the following characteristics (based on the worst case coal):

Design Removal Efficiency	90 percent
Maximum Emission Rate	0.76 lb/MMBtu
Number of Operating Modules Per Unit at Full Load	Three
Number of Spare Modules Per Unit	One
Type of Absorber	Spray Tower
Type of Absorber Reagent	Limestone

The FGDS will be designed for near 100 percent availability (including use of the spare module). It will be furnished with a flue gas reheating system in order to increase the temperature of the flue gas exiting the absorber modules. The increased flue gas temperature will serve to increase the plume rise characteristics of the flue gas, as well as to help prevent condensation of flue gas moisture within the stack. Depending upon the sulfur content of the fuel, a small fraction of the untreated flue gas will be bypassed around the absorbers to reheat the gases exiting the absorber.

3.8.2.4 Particulate Matter (Stack Emissions)

The analysis of alternatives described in Chapter 9, Section 9.4 indicates that an electrostatic precipitator with the following characteristics is the BACT for control of particulate matter from the main units (again, assuming worst case coal):

Design Removal Efficiency	99.78 Percent
Maximum Emission Rate	0.03 lb/MMBtu
Maximum Opacity	20 Percent
Number of Precipitators Per Unit	Two
Number of Electrical Fields in Direction of Gas Flow	Seven
Number of Electrical Bus Sections per Unit	82

3.8.2.5 Nitrogen Oxides

The control technology for nitrogen oxides (NO_x) consists of design parameters and operating practices for the steam generator rather than a distinct process or system. Nitrogen oxides emissions from large coal-fired units are a function of furnace size, burner spacing, burner design, fuel nitrogen and moisture content, excess air, off stoichiometric firing with overfire air and flame temperature. The fuel burning characteristics of the boilers for this project will be designed to limit the NO_x emission rate to a maximum of 0.6 lb/MMBtu as required by NSPS.

3.8.2.6 Carbon Monoxide

Carbon monoxide is a by-product of the combustion of coal in large utility steam generators. The generation of carbon monoxide is a function of excess air, off stoichiometric firing with overfire air, and low flame temperatures, and varies inversely as a function of the nitrogen oxides production rates. In practice, the steam generator manufacturers optimize their designs in order to minimize and balance the emissions of both air pollutants. Therefore, there are no specific control technologies available at this point in time. Based upon the BACT NO_x emission rates in Section 3.8.2.5, the boiler vendor anticipates that the carbon monoxide emission rate would be on the order of 0.05 lb/MMBtu, although they cannot guarantee this level. Thus, the carbon monoxide BACT for the project is the variety of combustion controls and practices rather than a specific emission limitation.

3.8.2.7 Hydrocarbons

It is not expected that non-methane hydrocarbons will be a "major" pollutant from the proposed plant (i.e., emitted in quantities greater than 100 tons/year). However, since the Jacksonville area is nonattainment for ozone, a discussion of hydrocarbon emissions has been included.

Non-methane hydrocarbon emissions from steam electric generators have not been well defined to date. However, the limited information available (Neligan, 1978), indicates that uncontrolled non-methane hydrocarbon emissions would be on the order of 0.0005 lbs/MMBtu. Since there is no known specific control technology for these emissions, and based upon the extremely low emission levels, no specific measures will be taken to control or limit non-methane hydrocarbon emissions for the proposed project and no specific emission rate can be guaranteed.

3.8.2.8 Fugitive Dust

Fugitive dust is produced by a number of sources associated with the project. These include the Coal Handling System, Limestone Handling System, Fly Ash Handling System, and FGD Waste Handling and Disposal Systems. Also, since brackish water cooling towers will be used, EPA has indicated (Nagler, 1980) that dissolved and suspended solids in the small droplets fraction (less than 50 microns diameter) of cooling tower drift would be considered fugitive dust in the impact assessment. The following paragraphs describe the control systems and/or methods proposed as BACT for these fugitive dust sources.

Coal Handling Fugitive Dust Collection

Control and collection of fugitive particulates in the coal handling system will be accomplished by several different methods, including totally enclosed conveying systems, water spray dust suppression systems, and dry dust collection systems utilizing fabric filters. Collection efficiencies are expected to be 99.9 percent for the dry dust collection systems (used on the unloader receiver hopper of the ocean coal unloading facility and surge bins of the coal handling building), 97 percent for the water spray dust suppression systems (used in the stacker-reclaimer conveyors and plant site unloading building), and 90-99 percent for the wetting agent system (such as those used in various coal pile areas).

Limestone Fugitive Dust Collection

Control and collection of fugitive dust particulates from the limestone addition system for the FGD equipment will be accomplished by fabric filter dust collectors and wet dust suppression systems.

Limestone will be hard rock type and unloaded from rail cars in the coal unloading building where a wet dust suppression system will be utilized. It will be transported at the site by totally enclosed belt conveyors. All hoppers utilized by the limestone system will be vented to fabric filter dust collectors. Similar collectors will be located at all conveyor discharge points. The limestone will be stored on-site in a five acre pile; it has been assumed that fugitive emissions from this pile will be negligible because of the type of limestone to be used.

Control and Collection of Fugitive Fly Ash Particulates

The fly ash handling system consists essentially of ash hoppers located beneath the flue gas particulate collection equipment. Pneumatic conveyors are utilized to transfer fly ash to ash storage silos. Pneumatic conveyors are enclosed conduits, and fugitive fly ash particulate will be controlled at all transfer and discharge locations by fabric filters. The disposal method for fly ash is discussed in detail in Section 3.5.2.2.

FGD Waste Fugitive Dust

The disposal of gypsum is discussed in detail in Section 3.5.2.2.

Cooling Tower Drift

The dissolved and suspended solids in the small droplet size fraction of cooling tower drift are considered by EPA to contribute to total suspended particulate concentrations. Drift is minimized by using high efficiency drift eliminators in two natural draft towers (which limit drift to approximately 0.002 percent of circulating water flow) and by maintaining the cycles of concentration of the circulating water to a low level (in this case a value of 1.5 will be used).

3.8.2.9 Auxiliary Boilers

As indicated in the project description, the auxiliary boilers planned will burn No. 2 fuel oil and have emissions which are much smaller than those from the main units. Also, it is expected that the auxiliary boilers will have an annual capacity factor of only 5 percent compared to 74 percent for the main units during the first few years of operation. Thus, there would be no cost benefit for installing a pollution control system on the auxiliary boilers, since the emissions are so small. The auxiliary boiler heat rate is approximately 127 MMBtu/hr for each of the two units. At an annual capacity factor of 5 percent, the SO_2 emissions will only total 44 tons/yr. This is below the amount which triggers the requirement for a control system according to new source performance standards.

3.8.3 Expected Emissions

The expected air pollutant emissions from each of the main units, without the use of the air pollution control systems described above, are presented in Section 3.8.1. Table 3.8-1 presents the expected air pollution emissions after the use of the pollution control systems and contrasts these values with the uncontrolled emission rates.

The two unit controlled emission rates in English and metric units as well as the other emission parameters important in air pollution dispersion modelling are presented in Table 3.8-2 for various plant loads. Auxiliary boiler emissions are also presented in that table.

Table 3.8-3 presents the fugitive emission rates that are anticipated from the various fugitive dust sources associated with the plant. The fugitive dust control techniques which are identified in the table were described in Section 3.8.2.8.

3.8.4 References

Envirosphere Company, 1980. Revised Prevention of Significant Deterioration Report to Environmental Protection Agency, Region IV. Jacksonville Electric Authority, Two 600 MW Coal-Fired Plants. Norcross, Georgia.

Federal Register, August 7, 1980. Requirements for Preparation, Adoption and Submittal of State Implementation Plans; Approval and Promulgation of State Implementation Plans. Vol. 45, No. 154, p. 52675-53748.

Federal Register, June 11, 1979. New Stationary Sources Performance Standards; Electric Utility Steam Generating Units. Vol. 44, No. 113, p. 33579-33624.

Federal Register, January 12, 1979. 1977 Clean Air Act Amendments for Stack Heights; Proposed Regulatory Revisions. Vol. 44, p. 2608.

Federal Register, June 19, 1978. 1977 Clean Air Act; Prevention of Significant Air Quality Deterioration. State Implementation Plans; Requirements. Vol. 44, No. 118, p. 26379-26410.

Florida Department of Environmental Regulation, June 26, 1979. Chapter 17-2, Florida Administrative Code - Air Pollution. Tallahassee, Florida.

Nagler, L. January 28, 1980. Meeting with Ebasco and JEA Personnel. U.S. Environmental Protection Agency, Region IV. Atlanta, Georgia.

Nagler, L. December 27, 1979. Telephone Conversation with D. Fulle of Envirosphere. U.S. Environmental Protection Agency, Region IV. Atlanta, Georgia.

Neligan, R.E. January 23, 1978. Memorandum to D. Wagoner on Reactive VOC from Coal-Fired Power Plants. U.S. Environmental Protection Agency. Office of Air Quality Planning and Standards. Research Triangle Park, North Carolina.

Pedco, 1977. Technical Guidance for Control of Industrial Process Fugitive Particulate Emissions. U.S. Environmental Protection Agency. Report No. EPA-450/3-77-010. Research Triangle Park, North Carolina.

Stoughton, T.B. April 3, 1980. Meeting with Ebasco Personnel. Stoughton and Associates, Inc. - Representative for Johnson-March Corp. Dust Control Systems. Atlanta, Georgia.

U.S. Environmental Protection Agency, 1978. Draft Technical Support Document for Determination of Good Engineering Practice Stack Height. Office of Air Quality Planning and Standards. Research Triangle Park, North Carolina.

U.S. Environmental Protection Agency, 1978a. Guidelines for Determining Best Available Control Technology (BACT). Office of Air Quality Planning and Standards. Research Triangle Park, North Carolina.

U.S. Environmental Protection Agency, Region VIII, December 10, 1979. Compilation of Past Practices and Interpretations by EPA Region VIII on Air Quality Mining. Denver, Colorado.

Table 3.8-1 (Revision 1)

MAIN UNITS AIR POLLUTION EMISSION RATES[a]

(CONTROLLED AND UNCONTROLLED)

	Uncontrolled Emissions (lbs/hr)	Controlled Emissions (lbs/hr)	Removal Efficiency (%)
Sulfur Dioxide	46,694	4,669	90
Particulates	84,232	184	99.78
Nitrogen Oxides	3,686	3,686[b]	-
Carbon Monoxide	307	307[b]	-
Hydrocarbons	3	3[b]	-

a Emissions are per unit at 100 percent load and assuming worst case fuel characteristics (maximum sulfur and ash and minimum heating value).

b Controlled and uncontrolled emission rates are the same since controls for these pollutants are by boiler design and firing practices rather than with a pollutant removal system.

Table 3.8-2 (Revision 1)

MAIN UNITS AND AUXILIARY BOILER
EMISSION CHARACTERISTICS

	2-Unit Emission Rate lbs/hr (g/s)			Stack Height	Stack Temp.	Exit Vel.	Stack Dia.
	SO_2	NO_2	TSP	(m)	(°k)	(m/s)	(m)
Main Units (100% Load)	9338 (1176.6)	7372 (928.9)	368 (46.4)	195	327.6	18.29	10.13
(75% Load)	7937 (1000.1)	6266 (789.5)	313 (39.4)	195	327.6	15.55	10.13
(50% Load)	5182 (652.9)	4092 (515.6)	204 (25.7)	195	327.6	10.16	10.13
Auxiliary Boilers	203 (25.6)	76 (9.6)	2.5 (0.3)	85.4	441.0	12.2	2.08

Table 3.8-3 (Revision 1)
FUGITIVE EMISSION AND CONTROL SUMMARY

Process	Type	Amount	Factor	Control	Technique	Emissions (Grams/Sec)
Ship Unloading	Grab Bucket	10,000 Tons/Day	0.4 lb/Ton[a]	(99.9%)[b]	Dry Collection on Hoppers	0.04
Ship Unloading Transfer Points	6 Points	10,000 Tons/Day	0.2 lb/Ton[c]	(99.9%)[b]	Dry Collection	0.06
Ship Unloading Transfer Points	3 Points	10,000 Tons/Day	0.2 lb/Ton[c]	(97%)[b]	Wet Suppression	0.95
Ship Unloading Facility Train	Loading Shed	10,000 Tons/Day	0.4 lb/Ton[a]	(99.9%)[b]	Dry Collection	0.02
Ship Unloading Facility Coal Surge Pile	Active	30 Acres	13 lb/Acre/Day[a]	(90%)[a]	Wetting Agent	0.20
Rail Car Unloading	Rotary Dumper	10,000 Tons/Day	0.4 lb/Ton[a]	(97%)[b]	Wet Suppression	0.63
Coal Handling Transfer Points	2 Points	10,000 Tons/Day	0.2 lb/Ton[c]	(99.9%)[b]	Dry Collection	0.02
Coal Handling Transfer Points	2 Points	3,300 Tons/Day	0.2 lb/Ton[c]	(99.9%)[b]	Dry Collection	0.01
Coal Handling Transfer Points	6 Points	3,300 Tons/Day	0.2 lb/Ton[c]	(97%)[b]	Wet Suppression	0.62
Coal Handling Transfer Points	7 Points	5,000 Tons/Day	0.2 lb/Ton[c]	(99.9%)[b]	Dry Collection	0.04
Coal Storage at Plant	Active	8 Acres	13 lb/Acre/Day[a]	(90%)[a]	Wetting Agent	0.05
Coal Storage at Plant	2 Inactive Piles	15 Acres	3.5 lb/Acre/Day[a]	(99%)[a]	Wetting Agent	0.01
Limestone Unloading	Rail Dumper	750 Tons/Day	0.4 lb/Ton[a]	(97%)[b]	Wet Suppression	0.05
Limestone Transfer	1 Point	750 Tons/Day	0.2 lb/Ton[a]	(99.9%)[b]	Dry Collection	0.001
Cooling Towers	Drift	2 x 243,500 gal/min	51,450 ppm solids (maximum) (40% <50 microns diameter)	99.998%	Drift Eliminators	12.66
Solid Waste Disposal Area	Active	10 Acres	13 lb/Acre/Day[a]	(90%)[a]	Wetting Agent	0.07

a Pedco, 1977
b Stoughton, 1980
c USEPA, 1979

Table 3.8-1

MAIN UNITS AIR POLLUTION EMISSION RATES[a]

(CONTROLLED AND UNCONTROLLED)

	Uncontrolled Emissions (lbs/hr)	Controlled Emissions (lbs/hr)	Removal Efficiency (%)
Sulfur Dioxide	45,170	4,517	90
Particulates	81,285	178	99.78
Nitrogen Oxides	3,557	3,557[b]	-
Carbon Monoxide	296	296[b]	-
Hydrocarbons	3	3[b]	-

a Emissions are per unit at 100 percent load and assuming worst case fuel characteristics (maximum sulfur and ash and minimum heating value).

b Controlled and uncontrolled emission rates are the same since controls for these pollutants are by boiler design and firing practices rather than with a pollutant removal system.

Table 3.8-2

MAIN UNITS AND AUXILIARY BOILER
EMISSION CHARACTERISTICS

	2-Unit Emission Rate lbs/hr (g/s)			Stack Height (m)	Stack Temp. (^{o}k)	Exit Vel. (m/s)	Stack Dia. (m)
	SO_2	NO_2	TSP				
Main Units (100% Load)	9034 (1138.3)	7114 (896.3)	356 (44.8)	195	327.6	18.29	10.13
(75% Load)	7679 (967.6)	6047 (761.9)	302 (38.1)	195	327.6	15.55	10.13
(50% Load)	5014 (631.8)	3951 (497.8)	195 (24.6)	195	327.6	10.16	10.13
Auxiliary Boiler	160 (20.2)	60 (7.6)	2.4 (0.3)	85.4	588.6	15.2	1.75

Table 3.8-3
FUGITIVE EMISSION AND CONTROL SUMMARY

Process	Type	Amount	Factor	Control	Technique	Emissions (Grams/Sec)
Ship Unloading	Grab Bucket	10,000 Tons/Day	0.4 lb/Ton[a]	(99.9%)[b]	Dry Collection on Hoppers	0.04
Ship Unloading Transfer Points	6 Points	10,000 Tons/Day	0.2 lb/Ton[c]	(99.9%)[b]	Dry Collection	0.06
Ship Unloading Transfer Points	3 Points	10,000 Tons/Day	0.2 lb/Ton[c]	(97%)[b]	Wet Suppression	0.95
Ship Unloading Facility Train	Loading Shed	10,000 Tons/Day	0.4 lb/Ton[a]	(99.9%)[b]	Dry Collection	0.02
Ship Unloading Facility Coal Surge Pile	Active	30 Acres	13 lb/Acre/Day[a]	(90%)[a]	Wetting Agent	0.20
Rail Car Unloading	Rotary Dumper	10,000 Tons/Day	0.4 lb/Ton[a]	(97%)[b]	Wet Suppression	0.63
Coal Handling Transfer Points	2 Points	10,000 Tons/Day	0.2 lb/Ton[c]	(99.9%)[b]	Dry Collection	0.02
Coal Handling Transfer Points	2 Points	3,300 Tons/Day	0.2 lb/Ton[c]	(99.9%)[b]	Dry Collection	0.01
Coal Handling Transfer Points	6 Points	3,300 Tons/Day	0.2 lb/Ton[c]	(97%)[b]	Wet Suppression	0.62
Coal Handling Transfer Points	7 Points	5,000 Tons/Day	0.2 lb/Ton[c]	(99.9%)[b]	Dry Collection	0.04
Coal Storage at Plant	Active	8 Acres	13 lb/Acre/Day[a]	(90%)[a]	Wetting Agent	0.05
Coal Storage at Plant	2 Inactive Piles	15 Acres	3.5 lb/Acre/Day[a]	(99%)[a]	Wetting Agent	0.01
Limestone Unloading	Rail Dumper	750 Tons/Day	0.4 lb/Ton[a]	(99.9%)[b]	Dry Collection	0.002
Limestone Transfer	1 Point	750 Tons/Day	0.2 lb/Ton[a]	(99.9%)[b]	Dry Collection	0.001
Cooling Towers	Drift	2 x 603 grams/sec	32,963 ppm Solids	21% 50 Microns	Drift Eliminators	8.40
Solid Waste Disposal Area	Active	25 Acres	13 lb/Acre/Day[a]	(90%)[a]	Wetting Agent	0.17

a Pedco, 1977
b Stoughton, 1980
c USEPA, 1979

3.9 DIRECTLY ASSOCIATED TRANSMISSION LINES

Transmission lines associated with the proposed plant will terminate at the Normandy Substation on the west side of Jacksonville and at the Fort Caroline and Robinwood Substations to the east of Jacksonville (Figure 3.9-1). Transmission lines will be routed within the proposed preferred corridor.

3.9.1 Route and Size

Corridors are identified in Chapter 9, Section 9.6. The preferred corridor includes an existing transmission right-of-way (ROW). Where it is feasible from an engineering, environmental, and system reliability standpoint, the final new ROW will be located parallel and adjacent to the existing system. A preliminary estimate is that this should occur in over 90 percent of its length. The new ROW will normally be 150 feet to 200 feet in width. As the ROW approaches sensitive areas, it may be constricted to minimize impact. New maintenance roads will generally be required only where the new ROW will not be adjacent to the existing ROW. Existing ROW maintenance roads should also provide adequate access to the new maintenance roads for the new ROW where it does not occur parallel to the existing ROW. All transmission line ROW will be cleared and maintained in accordance with the National Electrical Safety Code.

3.9.2 Structures

The transmisson lines must be both reliable and aesthetically acceptable. The new lines, tower, and substation appearance will differ little from the existing system. Substation size will not increase as a result of new line addition. Alternative tower designs will not substantially alter the environmental effects of tower construction and maintenance. All the towers are self-supporting, double circuit and have enough longitudinal capability to withstand the tension required to string a conductor or shield wire by the controlled tension stringing method. The tower designs include:

1. Single Steel Pole - The single steel pole requires the narrowest ROW and is the least susceptible to differential settlement. Its structural flexibility is preferred in an area that might be affected by hurricane winds. Corrosion resistant steel is utilized. Curved upswing cross-arms are to be used for aesthetic reasons (Figure 3.9-2). Most of the new towers not used to span waterways will employ this design.

2. Steel H-Frame Pole - In this alternative a horizontal configuration is used. In the transverse direction, this structure is susceptible to differential settlement and requires two independent foundations. The erection cost is increased compared to the single pole configuration, due to the 22 foot wide column spread (Figure 3.9-3).

3. Concrete H-Frame Pole - These are similar to the steel H-frame except that the columns are made of prestressed concrete poles (Figure 3.9-3). Their cross-arms may be fabricated of steel or pre-cast concrete whichever is to be more economical at the time when the order is placed.

4. Lattice-Type Towers - These are conventional, self-supporting, vertical configuration, lattice type towers with a square base, which have been used extensively on transmission lines (Figure 3.9-4). This structure, like the steel pole H-frame configuration is also susceptible to differential settlement. It is proposed that this configuration be used at the river crossings due to the increased tower height required here.

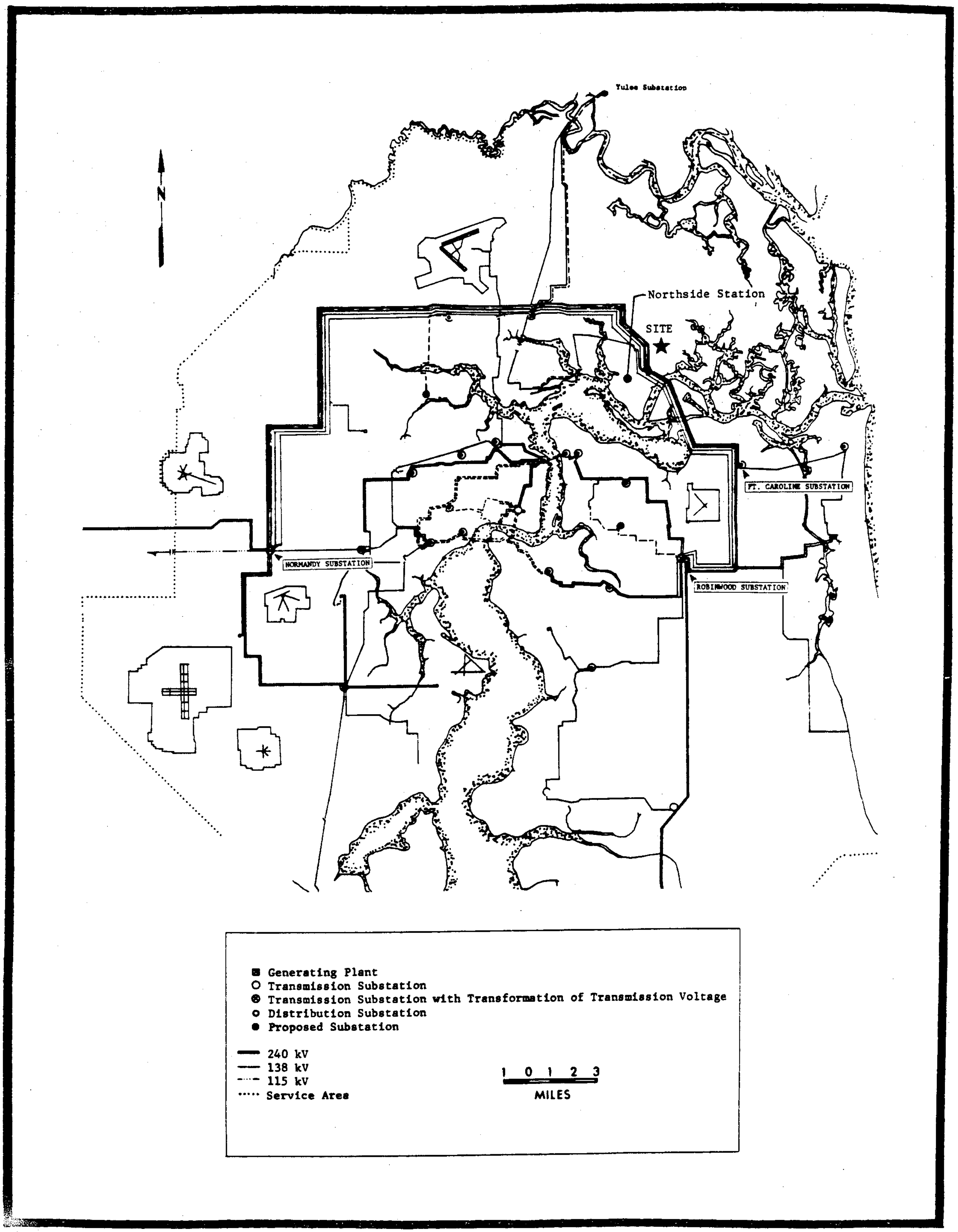


Figure 3.9-1 Existing Transmission System

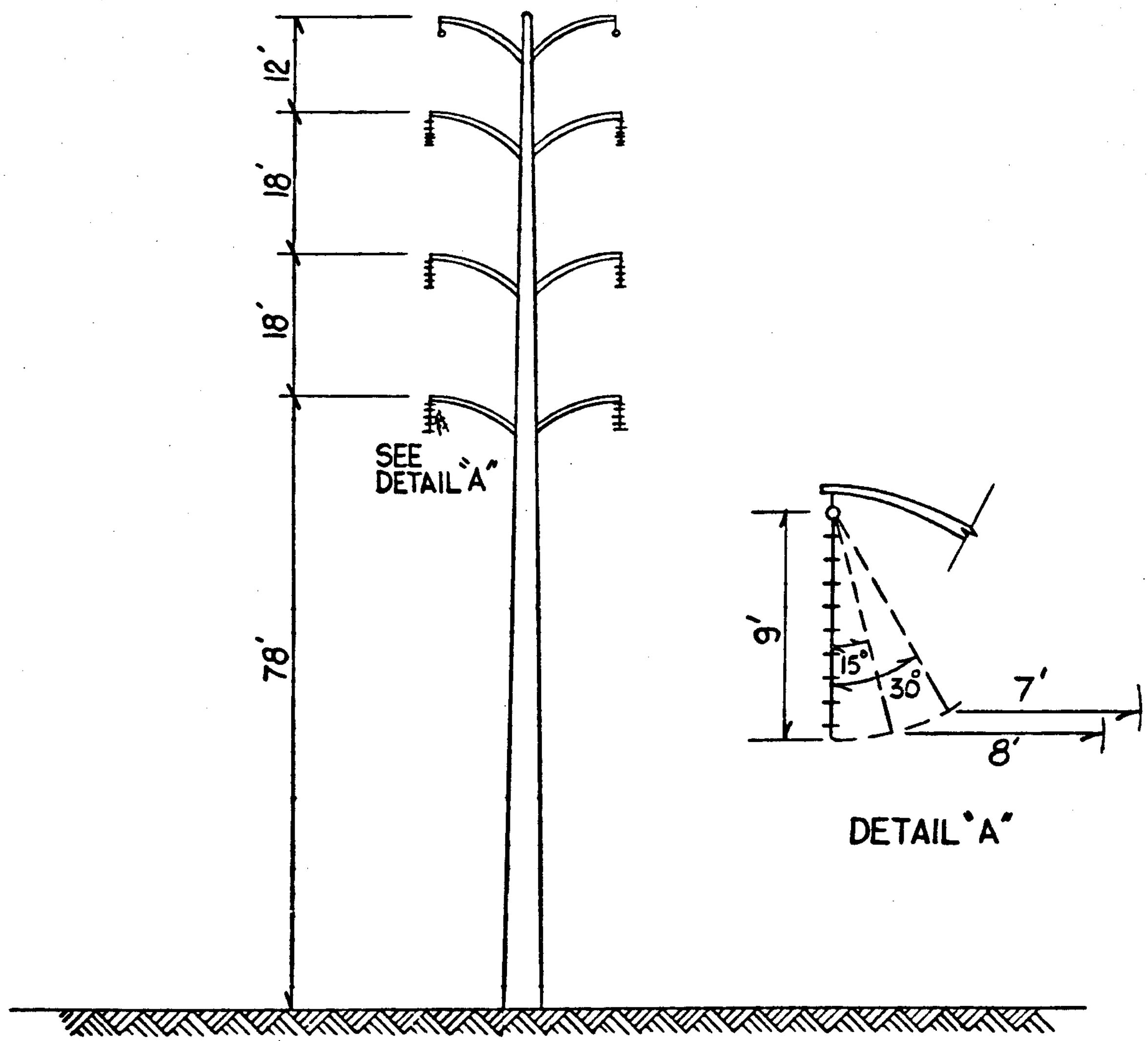


Figure 3.9-2 Single Steel Pole Tower

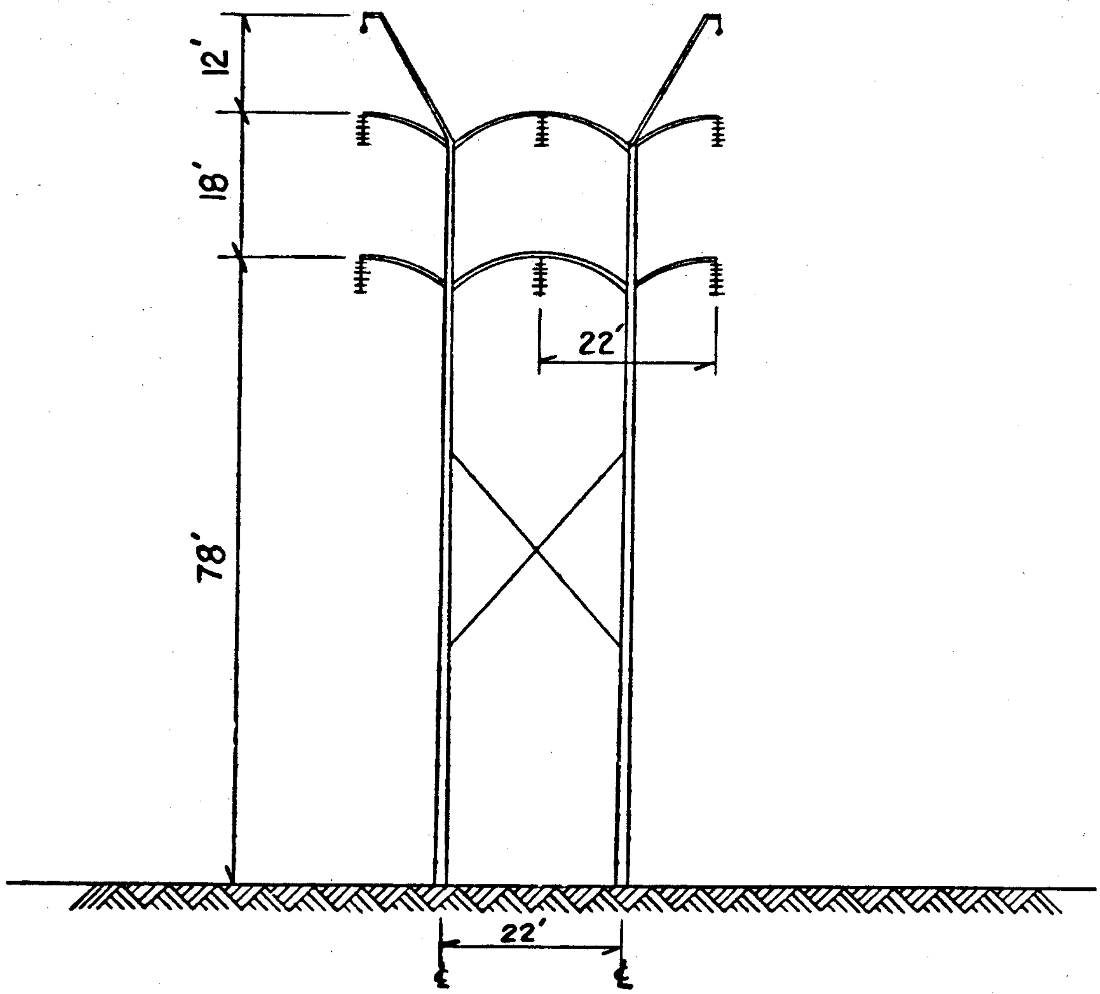


Figure 3.9-3 Steel/Concrete H-Frame Pole

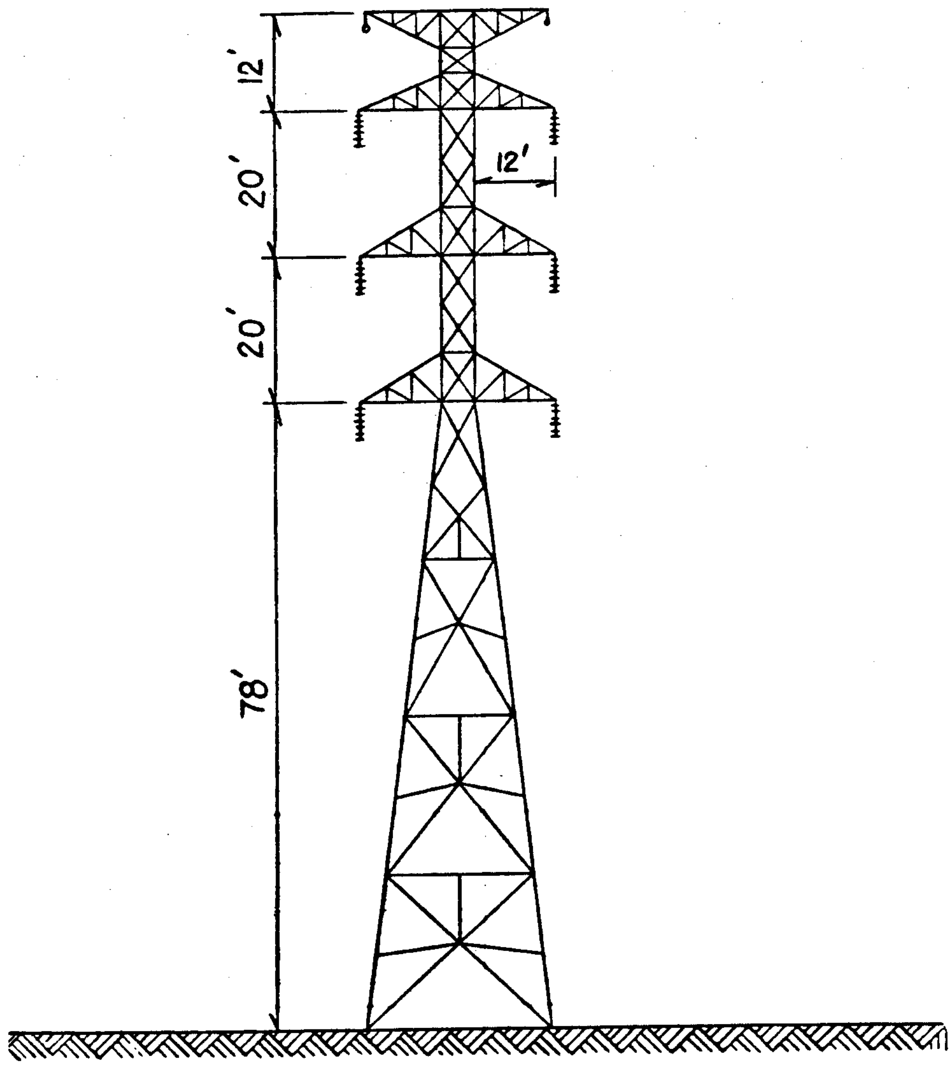


Figure 3.9-4 Lattice-Type Steel Tower

The ocean vessel coal unloading facility is directly associated with the proposed plant. It will be designed with the capability to unload colliers and barges and store and load coal into shuttle or unit trains for transport to the plant site. The terminal will be located on the north bank of the Fulton-Dames Point Cutoff on the St. Johns River, adjacent to the Jacksonville Port Authority (JPA) Facility area on the south side of Blount Island as shown in Figure 3.10-1.

3.10.1 General Description

The facility will be designed to unload coal at an average rate of 3000 tons/hour using two bucket-type unloaders. It will take about 22 hours to unload a typical ocean vessel carrying 65,000 tons of coal if both unloaders are used on a single vessel. The coal will be conveyed from the unloaders to a stacker-reclaimer in an area capable of storing up to 70,000 tons. It will then be transferrable to rail cars also at a rate of 3000 tons/hour via the rail car loading building. An emergency stackout and reclaim system is also provided for use when the stacker-reclaimer or rail car loading systems are not available or operational. Distribution to the stacker-reclaimer and emergency stackout from the unloaders will be routed by the coal handling building which will also include sampling and iron separation equipment. The emergency reclaim system is provided to feed the rail car loading building when the stacker-reclaimer is not operational. These facilities are shown in Figure 3.10-2.

3.10.1.1 Unloading System

A wharf with a 40-year design life will be provided. The wharf will be capable of docking large colliers, sea-going barges, and river barges. It will be fitted with bumpers, bitts, and cleats for docking. The wharf deck will carry two rails, each designed for 60 ton wheel loads. The rails will be parallel to the river, with a span of 115 feet, and with one rail

10 feet from the river side of the wharf. The proposed wharf will be approximately 1,200 feet long, and will be able to accommodate two vessels at a time for coal unloading.

Two 1,500 ton per hour grab-bucket type unloaders will be provided. The unloaders can be used either one or both to a vessel, depending upon the unloading requirements. These will be rope-trolley machines with onboard receiving bins, bin discharge feeders and transverse conveyors discharging to a gathering conveyor parallel to the river.

The unloading rate was established as a function of ship usage (optimum turn around time). This unloading rate of 3,000 tons per hour enables about six times as much coal to be unloaded in an hour as the plant will consume during that time (500 tons per hour), assuming two unit operation burning performance coal at 90 percent load.

3.10.1.2 Conveying System

The conveying system will consist of the following components:

Gathering Conveyor at Wharf
Elevating Conveyor from Coal Handling Building to Emergency Stackout
Elevating Conveyor from Coal Handling Building to Rail Car Loading Building
Stacker-Reclaimer Yard Belt to Coal Handling Building
Emergency Reclaim Conveyor to Coal Handling Building
Stacker-Reclaimer Yard Belt
Stacker-Reclaimer Transfer Belt

Both the normal conveying system and the emergency conveying components will have a capability to operate at 3,000 tons per hour.

All conveyor galleries will be enclosed, except for the gathering conveyor and yard belt. Conveyor galleries will be provided with service water for wash down and fire protection, and with vacuum cleaning systems.

3.10.1.3 Rail Car Loading Building

The rail car loading building will discharge coal to rail cars after receiving coal via the coal handling building from the:

stacker-reclaimer,
emergency reclaim, or
unloaders

The Rail Car Loading System will be designed to accurately load each car with its design capacity of coal.

3.10.1.4 Stacker-Reclaimer System

The stacker-reclaimer system consists of the stacker-reclaimer machine, the reversing yard conveyor, reversing boom conveyor, tripper conveyor, two crane rails mounted on two concrete grade beams, and suitable manual and automatic controls, including a small programmable logic controller. It will be capable of 70,000 tons of active storage.

The machine will stack out coal as received from the unloading system at a maximum rate of 3000 tons per hour. At this rate, the active storage area can be filled in about the same time as a typical ocean vessel is unloaded. The machine will reclaim coal for loading into rail cars at a rate of 3000 tons/hour. Flow rate will be modulated to maintain a level in the surge bins over the granular feeders in the coal handling building.

3.10.1.5 Emergency Reclaim System

The emergency reclaim system will include an elevating conveyor and two reclaim pits, each consisting of a grizzly, stainless steel hopper, stainless steel slide gate, and belt feeder. Each grizzly, hopper, gate and feeder will be enclosed in a reinforced concrete pit, which will be drained by sump pumps which will discharge to a sedimentation pond located on-site on Blount Island. Where below grade, the elevating conveyor will be enclosed in a reinforced concrete tunnel. The emergency reclaim system will operate at a reclaim rate of 2,000 tons per hour.

This system will be used to reclaim coal from storage when the conventional systems are not operational. Coal will be reclaimed from the storage piles using dozers, front-end loaders, etc.; then dumped into the emergency reclaim hoppers. From there, it will be transported via the feeder and elevating conveyor to the rail car loading building.

3.10.1.6 Emergency Stackout System

The emergency stackout system will include a motorized stainless steel flop gate at the end of the elevating conveyor from the unloading system, a concrete lowering well, and an elevating conveyor from the coal handling building. It will be capable of stacking out 3000 tons per hour of coal. The total active storage capacity will be 10,000 tons, or sufficient capacity to allow for mobilization of mobile equipment. At the maximum rate of operation, the storage area will be filled in slightly more than 3 hours.

Normal operation will bypass the emergency stackout system. If the coal handling system downstream is out of service during unloading, the emergency stackout system will then be utilized. Coal will be transported back into the system using the bulldozers or front-end loaders.

3.10.1.7 Coal Handling Building

This building will include chutes and gates to distribute coal to the stacker-reclaimer or emergency stackout systems, a primary sample cutter for each incoming conveyor, a single sampling system capable of accepting coal from each primary sample cutter and magnetic separators to remove tramp iron from each incoming conveyor.

Normal operations of the coal handling building will be to accept coal from the unloading system, while simultaneously transporting coal to loadout or active storage systems. Alternatively, coal could be directed to the emergency stackout system.

3.10.2 Water and Wastewater Management

3.10.2.1 Water Requirements

Water requirements at the ocean vessel coal unloading facility will be potable water and service water. Water supply will be from the existing Jacksonville Port Authority (JPA) facilities located on Blount Island.

Approximately 400 gpd of potable water and an average of 20 gpm (200 gpm maximum) service water will be required. Service water uses include coal dust suppression and occasional equipment washing. Water from the treatment facility to be constructed on the island will be reused whenever available for coal dust suppression.

3.10.2.2 Wastewater Management

Wastewater generated at the facility will consist of sanitary wastes, rainfall runoff, and area drainage resulting from coal dust suppression and equipment washing operations.

Area drainage is expected to average 5 gpm with a maximum flow of 50 gpm. This wastewater will be similar to that generated at the main plant's coal handling area and will require treatment for solids removal and pH adjustment. Oil and grease concentrations may be above acceptable levels due to contributions from equipment washing, in which case oil-water separation would be required.

Sanitary wastes generated at the unloading facility will average approximately 400 gallons per day (gpd). Characteristics of these wastes are the same as those for sanitary wastes generated at the main plant location, as described in Section 3.6. These wastes will be pumped to the existing JPA sanitary waste treatment facility on the island.

Rainfall runoff requiring treatment will be primarily from the lined coal pile. Average runoff is expected to be about 100 gpm, based on a total area of 35 acres, an annual rainfall average of 54.5 inches, and a runoff coefficient of 1.0. Total runoff quantity produced will be approximately 22.2 acre feet, determined from a 10-year, 24-hour design storm of 7.6 inches. The wastewater produced from draining off the coal pile will be similar in character to that generated at the main plant coal storage area (see Section 3.5.1.7).

Facility area drainage and rainfall runoff from the lined coal pile will be directed to a lined sedimentation pond located at the unloading facility site. The pond will be designed to process the rainfall runoff from the 24-hour, ten year design storm. The effluent from the sedimentation pond will be treated in an on-site physical/chemical treatment facility, which will be designed to process pond effluent at a maximum rate of 900 gpm, the anticipated flow during periods of excessive rainfall. Treatment provided will include pH adjustment and iron and suspended solids removal. The treatment facility will consist of a combination of neutralization, coagulation, precipitation, gravity separation, and media filtration. The effluent from the treatment plant then will be discharged into a two cell percolation pond, also designed to accommodate the maximum expected flow.

Solids which have accumulated in the sedimentation pond will be removed periodically and returned to the coal pile.

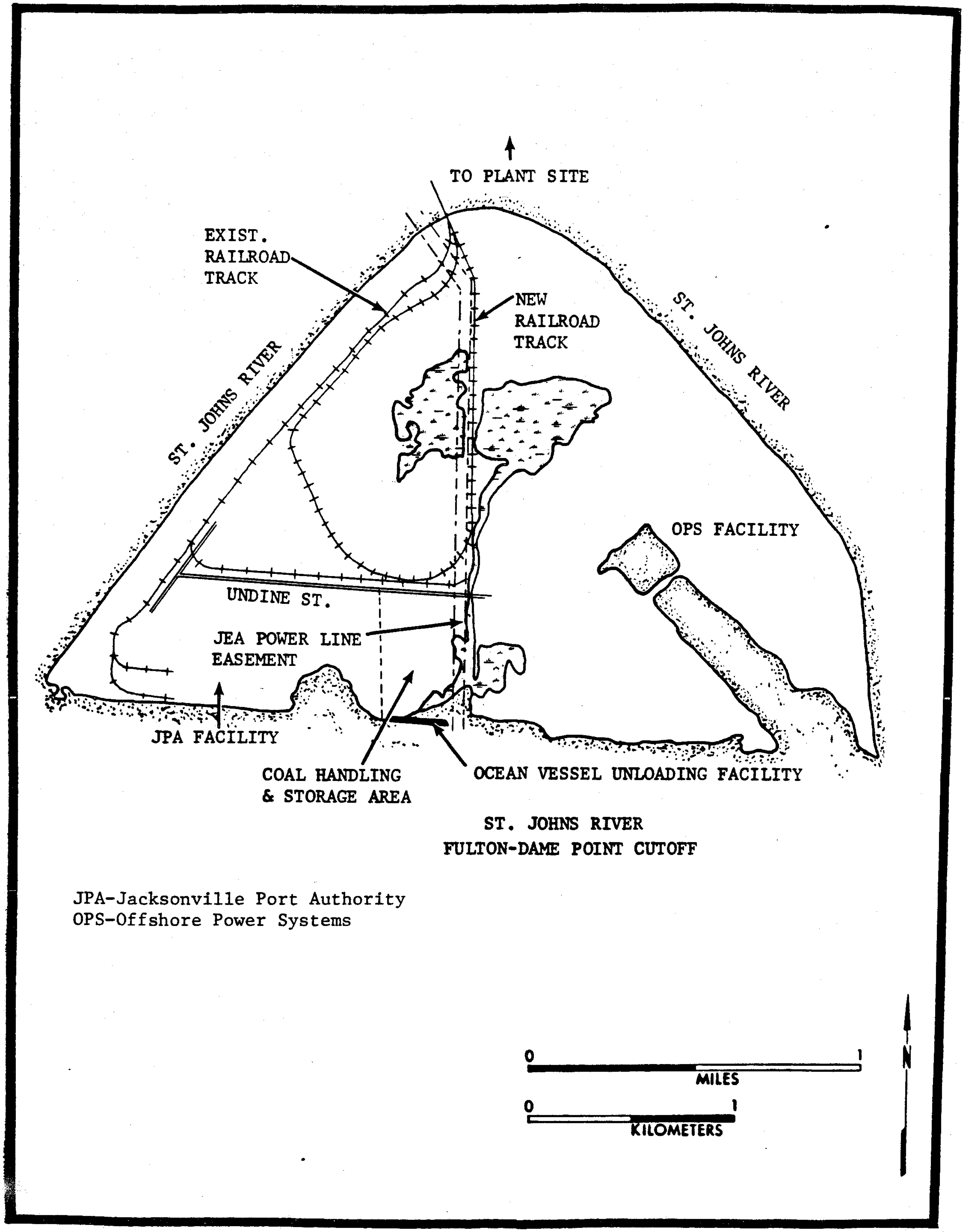


Figure 3.10-1 Coal Unloading Facility Location on Blount Island

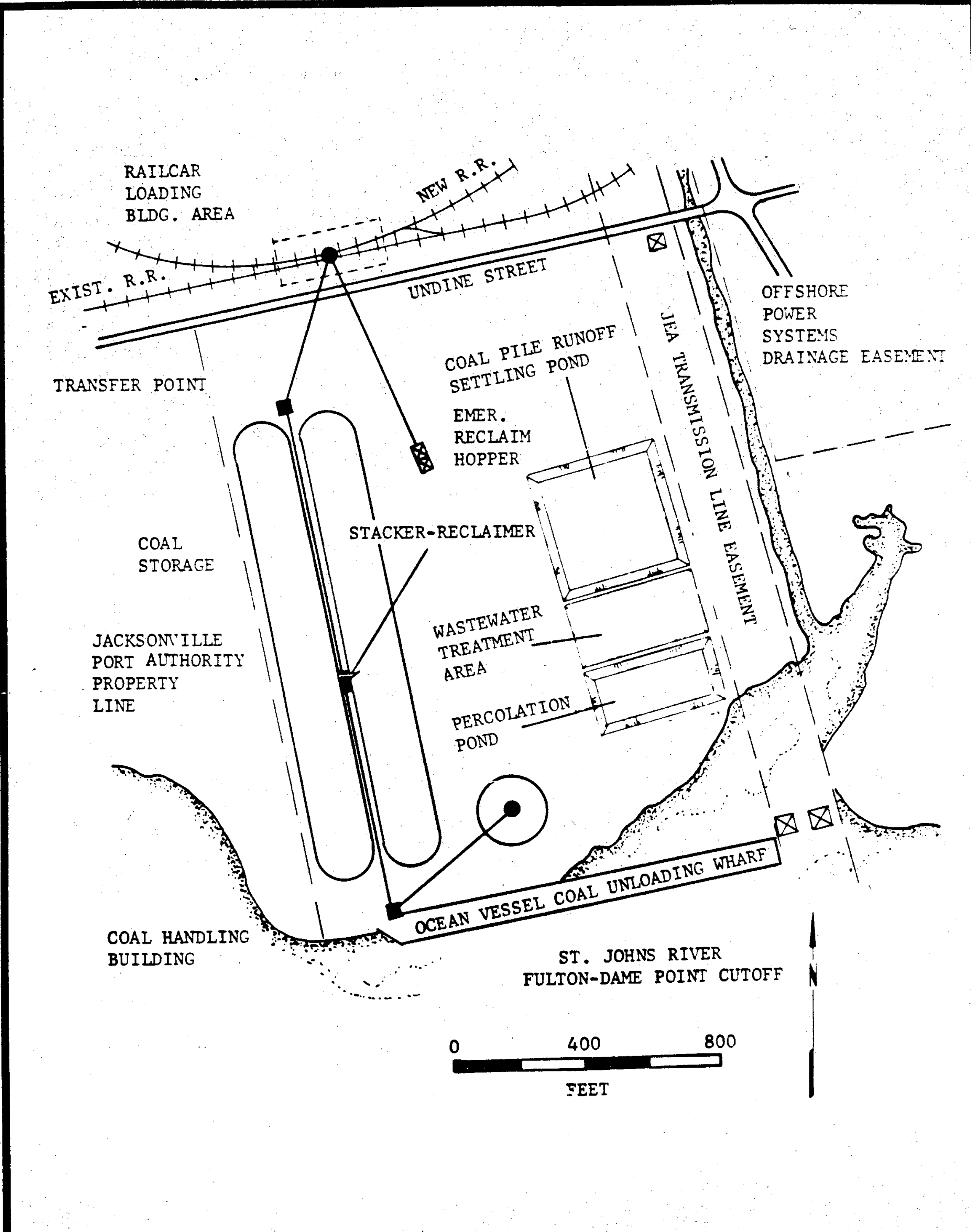


Figure 3.10-2 Coal Unloading Facility