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ENVIRONMENTAL REPORT
IN SUPPORT OF
APPLICATION FOR SITE CERTIFICATION
FOR
EXPANSION OF EXISTING PALATKA POWER PLANT

FLORIDA POWER & LIGHT COMPANY
P. O. BOX 3100
MIAMI, FLORIDA 33101

APRIL 12, 1974

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INTRODUCTION

An analysis of Florida Power & Light Company's (FP&L) projected 1975 generating capacity and service requirements indicate that additional generating capacity will be needed to meet expected peak demands. In 1975, the projected power load will be 8,775 mw. With all existing units on line, FP&L's generating capacity is only 9,356 mw; hense, a reserve of 581 mw (6.6 percent). This reserve is unacceptable. If the FP&L Turkey Point No. 3 generator (760 mw) should inadvertently have to be brought off line, FP&L would not be able to generate service equal to the demand.

In response to the projected power needs, FP&L made application (November, 1973) for permits to construct four, 70 mw gas turbine generating units at FP&L's Palatka Plant. In December, 1973, an additional 225 mw of steam electric generating capacity at the Palatka Plant was proposed. The addition of the waste heat boilers needed to produce steam to drive the proposed additional steam electric generators reduces the gas turbine output to 68.75 mw each from the original 70 mw. The inclusion of these generators would increase the reserve capability to 1,077 mw (12.3 percent).

The proposed steam generating facility will entail the addition of waste heat recovery boilers to the proposed gas turbines at the Palatka Plant. Steam produced in the waste heat recovery boilers will be used to drive steam turbine generators. The combined system will be the most efficient package, when converting fuel energy to electrical energy, available to FP&L by April 1, 1975.

Engineering and environmental investigations and analyses indicate that this project can be designed, constructed and operated so as to comply with all applicable Federal, State, and local environmental standards and regulations.

In accordance with the Florida Department of Pollution Control guidelines concerning steam generator siting, FP&L respectively submits this report entitled "Environmental Report in Support of Application for Site Certification for Expansion of Existing Palatka Power Plant."

1. PERTINENT APPLICANT INFORMATION

1. Company or Applicant's Official Name - Florida Power & Light Company

2. Address - P. O. Box 3100, Miami, Florida 33101

3. Address of Official Headquarters - P. O. Box 3100, Miami, Florida 33101

4. Business Entity (Corporation, Partnership, Co-op, Etc.) - Florida Power & Light Company is a corporation chartered in Florida in December, 1925.

5. Name and Title of Business Head - Company official directly responsible for obtaining certification is Dr. Donald D. Dunlop. He is Vice President of the Environmental Planning and Research Department. The Project Coordinator from the Environmental Planning and Research Department, Environmental Affairs section responsible for obtaining this certification is W. J. Barrow, Jr. Any questions pertaining to this application should be directed to him at Florida Power & Light Company, P. O. Box 013100, Miami, Florida 33101, Phone 305/446-3161 Extension 288

6. Site Location - Putnam County

7. Nearest Incorporated City - Palatka, Florida

8. Latitude and Longitude - Lat. 29°37'43", Long. 81°35'25"

9. Initial Generating Capacity: 512 MW Gross
   500 MW Net

10. Proposed Generating Capacity: 512 MW Gross
    500 MW Net

11. Additional Remarks

2. THE SITE

2.1 Site Location and Layout

The proposed Westinghouse Combined Cycle Gas Turbine units (two) are to be located on the east bank of the St. Johns River, Putnam County, Florida (Figure 2.1). The site is approximately 2 miles north of the town of San Mateo and 1.5 miles south of the center of East Palatka (Figure 2.2).

The site consists of approximately 127 acres of which 37.6 acres are being utilized by Florida Power & Light's (FP&L) existing Palatka Plant. Approximately 89.4 acres are maintained in a natural or near-natural state (mowed grasslands under transmission lines); construction of the proposed facility will utilize about 10 acres of the natural or near-natural land.

2.2 Regional Demography and Water Use

Three towns (Palatka, East Palatka, and San Mateo) are located within a 5-mile radius of the proposed facility (Figure 2.2). The area is serviced by both the Sea-Board Coast and the Florida East Coast. Railroad lines and by water transportation on the St. Johns River.

Between 1960 and 1970 the population within a 25-mile radius of Palatka increased 14.5 percent ; during the 1970-1973 period the population increase was 23.9 percent, and for the period 1973-1980, a 56.6 percent increase in population has been estimated (Table 2.1).

Most of the water used in the project area is groundwater from either the secondary artesian aquifers (60 to 120-foot wells) or from the Floridan Aquifer (upper and lower zones, to about 600-foot deep). The actual amount of water withdrawn from these sources has not been determined since most users are not required to report their rate of use. Using U. S. Geological Survey data, population growth data, and other demographic data, Black, Crow, and Eidsness, Inc. (1974) estimated groundwater use in the Palatka

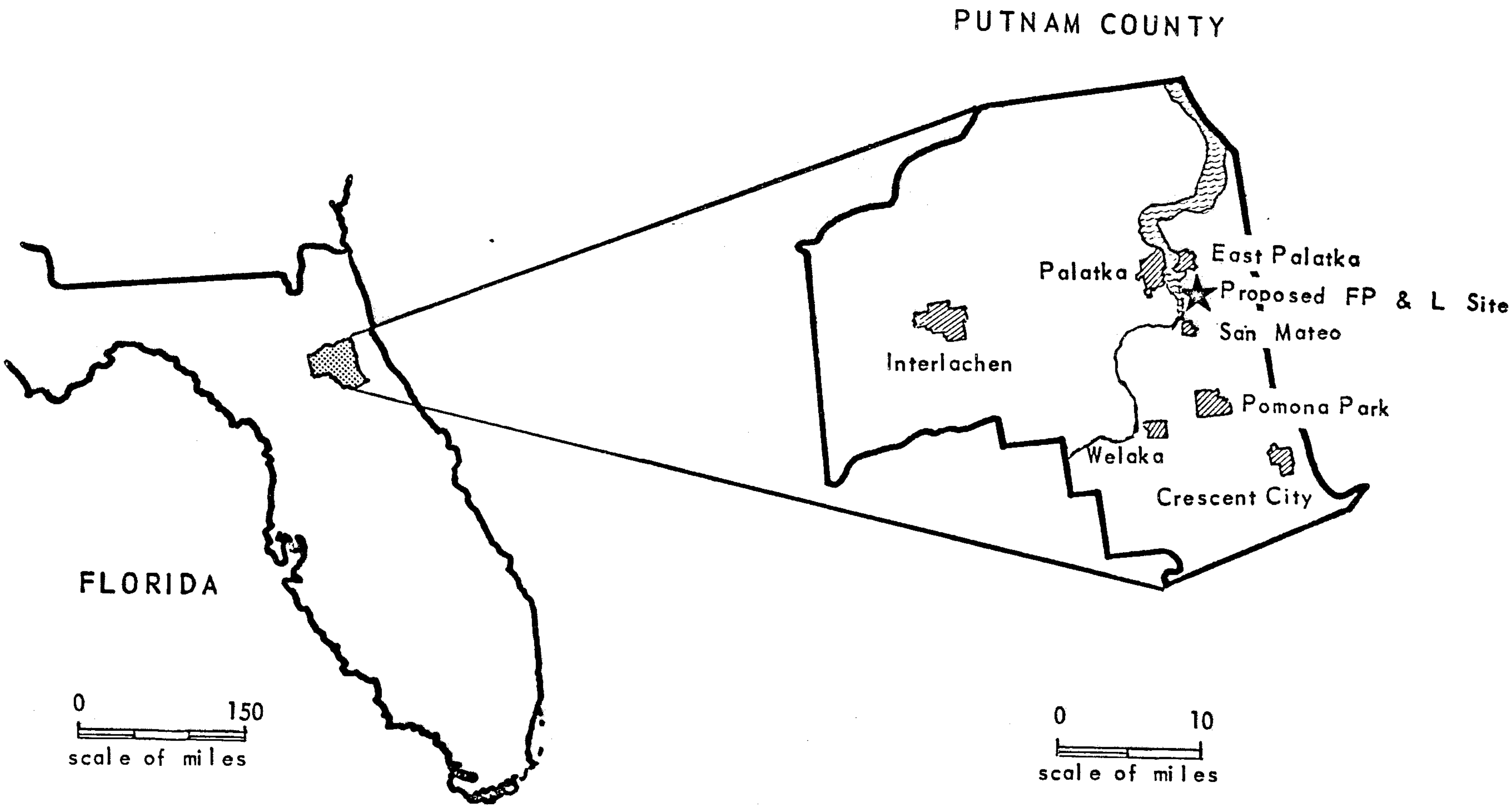


FIGURE 2.1. PROPOSED SITE FOR FLORIDA POWER AND LIGHT PALATKA PEAKING FACILITY

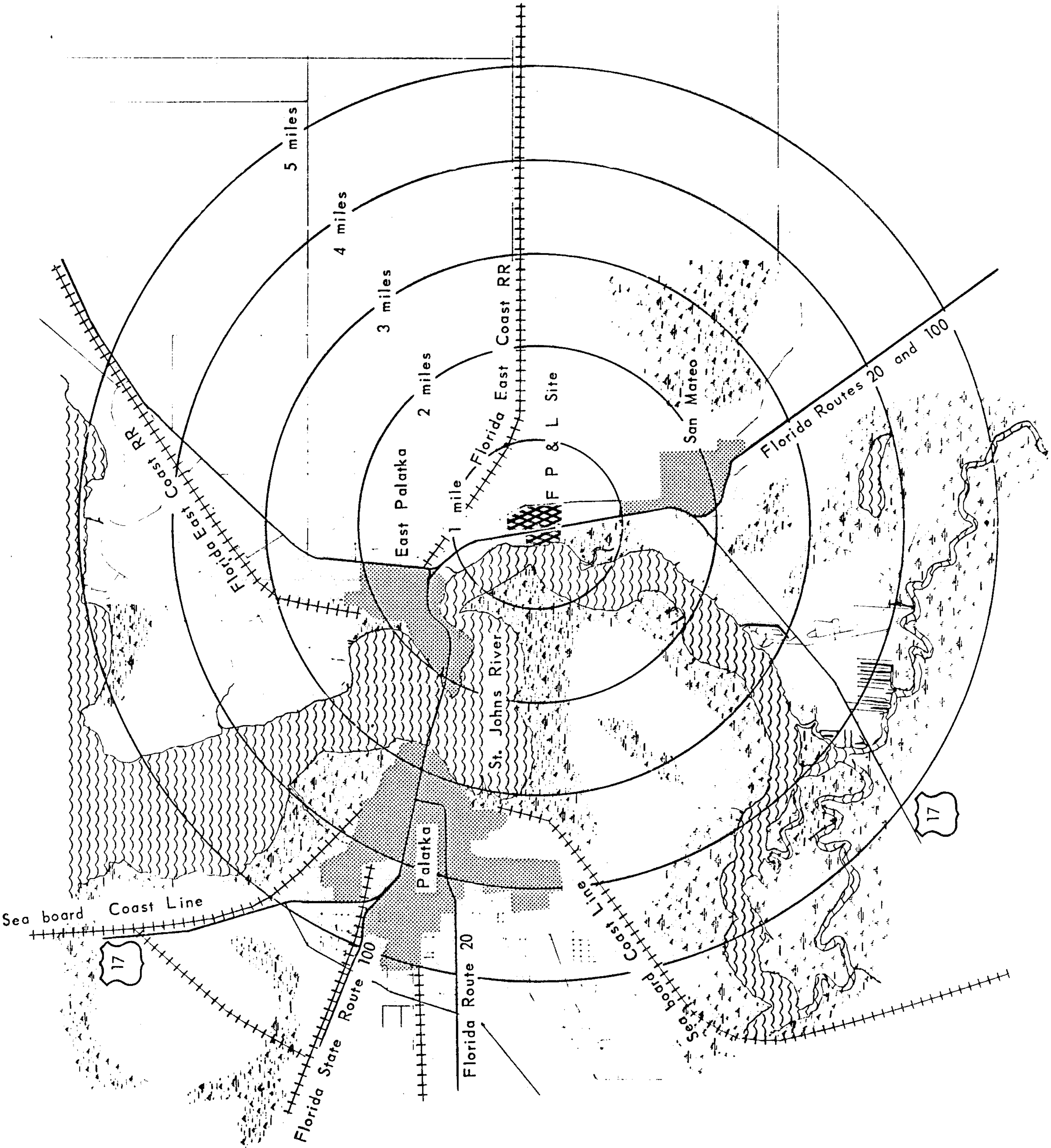


FIGURE 2.2. URBAN AREAS WITHIN A 5-MILE RADIUS OF THE PROPOSED SITE

TABLE 2.1 SIX COUNTY POPULATION SURVEY: 25-MILE RADIUS OF PALATKA, FLORIDA[(a)]

Location	Census Population 1960	1970	1973 People	% Change '60 to '70	% Change '70 to '73	% Change '73 to '80	1980 Estimate
Palatka City	11,028	9,310	9,575	-15.6	2.8	4.2	9,977
East Palatka City	1,133	1,446	1,486	27.6	2.8	4.2	1,548
East Palatka Rural	3,181	3,853	5,520	21.1	43.3	43.3	7,894
Palatka Rural	7,413	9,163	12,273	23.5	33.9	33.9	16,434
Pomona Park	516	578	697	12.0	20.6	30.9	912
Welaka Town	526	496	593	- 5.7	19.6	29.4	767
Crescent City	1,629	1,734	1,975	6.4	13.9	20.9	2,388
Crescent City Rural	2,388	3,345	6,106	40.1	82.5	82.5	11,143
Interlachen Town	349	478	582	37.0	21.8	32.7	772
Interlachen Rural	1,778	2,697	5,756	51.7	113.4	85.1	10,654
Florahome Rural	2,266	3,190	5,028	40.8	57.6	86.4	9,372
PUTNAM	32,212	36,290	49,591	12.7	36.7	44.9	71,861
Green Cove Sp. City	4,233	3,857	4,084	- 8.9	5.9	8.9	4,431
Green Cove Sp. Rural	3,720	3,047	2,796	-18.1	8.2	150.0	6,990
Penney Farms Town	182	187	190	2.7	1.6	2.4	195
Penney Farms Rural	99	196	242	98.0	23.5	70.5	414
Keystone Hts. Town	655	800	1,018	22.1	27.3	41.0	1,435
Keystone Hts. Rural	1,308	2,196	3,075	67.9	40.0	80.0	5,535
CLAY	10,197	10,283	11,405	0.8	10.9	66.6	19,000
N. St. Johns Rural	1,657	2,184	2,407	31.8	10.2	30.6	3,144
Tocoi-Picolata Rural	4,364	4,997	4,949	14.5	- 1.0	20.0	5,939
Hastings Town	617	320	759	-48.1	137.2	25.0	949
Hastings Rural	3,316	2,841	3,008	-14.3	5.9	17.7	3,362
Mantanzas Rural	1,587	2,956	3,565	86.3	20.6	300.0	14,260
ST. JOHNS	11,541	13,298	14,688	15.2	10.5	88.3	27,654
East Flagler Rural	NA	322	230	----	-28.6	400.0	1,150
West Flagler Rural	NA	530	645	----	21.7	43.4	925
	859	852	875	0.0	2.7	137.1	2,075
River Rural	1,693	1,633	1,943	- 3.5	19.0	38.0	2,681
Lakes Rural	1,243	3,907	3,953	214.3	1.2	50.0	5,930
MARION	2,936	5,540	5,896	88.7	6.4	46.0	8,611
VOLUSIA-Seville	1,045	1,036	903	- 0.9	-12.8	50.0	1,355
TOTAL	58,790	67,299	83,358	14.5	23.9	56.6	130,556

(a) Reynolds, Smith and Hills, May 1, 1973.

Region (Table 2.2). The estimates are for water withdrawn within a 10-mile radius of the project site. No distinction was made between consumptive and nonconsumptive uses since essentially none of the water withdrawn may be feasibly recovered within the area.

2.3 Geology

The geologic structure underlying the eastern flank of the proposed site is a part of the Peninsular arch, a relatively old and stable structure. Bedrock is sedimentary in origin, essentially horizontal, and dips gently to the north-northeast by approximately 9 feet per mile (0.1 degree). The U. S. Geological Survey has mapped a subsurface fault about 6.5 miles west of the area. Vertical displacement of the fault is about 50 feet with the upthrown side being east of the fault plane. The top of the Hawthorn formation apparently has not been disturbed by the fault.

Approximately 3,500 feet of cretaceous or younger carbonate rocks, chiefly limestone and dolomite, underlie the project area. These formations are described briefly in Table 2.3 which also summarizes their characteristics as aquifers. Formations older than the Lawson Limestone are not included in the table.

2.4 Hydrology

2.4.1 Surface Hydrology

The proposed project site is adjacent to and east of the north-flowing St. Johns River and approximately 84 river miles from the river mouth which discharges to the Atlantic Ocean at Jacksonville, Florida. At the proposed site, drainage area of the St. Johns River is approximately 7,320 square miles. Occasionally, the direction of river flow reverses because of ocean tidal effects being propagated upstream from the coast. Collection of discharge data for the St. Johns River at Palatka commenced

TABLE 2.2 ESTIMATED GROUNDWATER USE IN THE PALATKA REGION[a]

Category	Estimated Use
Public supply	3.7 to 4 mgd, mostly by the City of Palatka Principal source is the upper zone of the Floridan Aquifer.
Domestic and livestock self-supplied	3 to 4 mgd, mostly from secondary artesian and upper zone of the Floridan Aquifer
Industrial self-supplied	(1) 3 to 4 mgd, mostly from the upper zone of the Floridan Aquifer. Used principally for cooling in agricultural operations. (2) About 30 mgd is used in processing wood pulp in north central Putnam County, about 12 miles west of the project area.
Irrigation	30 mgd, from upper and lower zones of the Floridan Aquifer. This withdrawal is seasonal, occurring mostly in February and March.

(a) Black, Crow, and Eidsness, Inc. 1974.

TABLE 2.3. GEOLOGIC FORMATIONS UNDERLYING THE PROPOSED PALATKA PEAKING FACILITY[a]

Approx. Depth (ft.	Formation Name or Geologic Age	Description and Aquifer Properties
0-15	Recent and Pleistocene	Fine quartz sand with some clay and shells. Water table aquifer, freshwater.
15-60	Pliocene to late Miocene	Fine sand, interbedded with green clay, marl, and shells. Confining beds and minor water table aquifers. Freshwater.
60-120	Hawthorn Formation	Green phosphatic sandy clay and marl, and soft sandy limestone confining beds and secondary artesian aquifer. Freshwater.
120-280	Ocala Limestone including Crystal River, Williston, and Inglis formation	White to cream soft chalky to granular limestone with seams of hard dolomite. Floridan Aquifer, upper zone. Fresh to slightly brackish water.
280-500	Avon Park Limestone	Chalky gray limestone and hard, dense brown to gray crystalline dolomite confining bed in part; Floridan Aquifer, lower zone. Brackish water.
500-1,200	Lake City Limestone	Dense gray and brown crystalline dolomite alternating with porous tan dolomite and limestone. Confining beds in part. Salt water in lower part.
1,200-1,800	Oldsmar Limestone	Chalky, white to light brown limestone and dark brown crystalline porous dolomite. Probably confining beds. Salt water.
1,800-2,400	Cedar Keys Formation	Light gray, hard dolomite with gypsum and anhydrite. Possible injection zone. Salt water.
2,400-3,500	Upper Cretaceous including Lawson Limestone	Gray to tan chalky limestone. Confining bed. Salt water.

[a] Black, Crow, and Eidsness, Inc. 1974.

in January, 1968. The maximum daily discharge of record is 31,300 cfs (14.1 x 10^6 gpm). During periods of reverse flow, a maximum rate of 20,400 cfs (9.2 x 10^6 gpm) has been recorded. Average discharge has been estimated at 6,000 cfs (2.7 x 10^6 gpm). Minimum discharge would, of course, be zero at time of flow reversal, but this has no meaning for determining minimum water available.

The depth of the river at the project site is about 14 feet at a distance of 625 feet from the eastern shore. Average across-stream slope of the channel is very small and over the 625-foot distance is only 27 inches per 100 feet. Elevation of mean low water is 0.4 foot; mean high water elevation is +1.01 feet. Maximum and minimum river stages are +3.9 and -1.09 feet mean sea level, respectively.

2.4.2 Groundwater

Groundwater in the project area occurs in usable quantity and quality in at least four district zones (aquifers) ; all are approximately within the upper 700 feet of the strata present beneath the project area and are discussed below.

Water Table Aquifer. Unconsolidated beds of sand, shell, clay and marl are present to a depth of about 60 feet. The more permeable beds within this interval are the source of water for some of the small domestic supply wells in the area. Wells in these beds commonly yield from 10 to 50 gallons per minute. This aquifer contains water that is fresh and moderately hard.

Secondary Artesian Aquifer. Beds of clay and marl, present to a depth of about 120 feet, enclose relatively thin, permeable beds of shell and limestone. The impermeable clay and marl beds confine water in the more permeable beds under artesian pressure. The pressure in these zones is normally substantially less than that in underlying zones, thus, the designation "secondary artesian aquifer". This aquifer furnishes water to domestic and small irrigation wells. Feed water for the existing FP&L

Palatka Plant is also obtained from this aquifer. Wells in the secondary artesian aquifer will yield up to about 150 gpm. The water is fresh and moderately hard.

<u>Floridan Aquifer (upper zone)</u>. The Floridan Aquifer is the principal source of groundwater in northern peninsular Florida. In the project area the U. S. Geological Survey has identified two permeable zones within the aquifer which are separated from each other by dense limestone and dolomite beds. The upper zone, from about 120 to 300 feet in depth, includes the Ocala Limestone and the upper part of the Avon Park Limestone. The upper zone of the Floridan Aquifer is the principal source of groundwater in the area and is used extensively for irrigation in the farming districts to the north and east. The water is much more highly mineralized than in the overlying aquifers with total dissolved solids content ranging up to 1,000 milligrams per liter or about the maximum permitted for public water supplies. In general, total dissolved solids content of the aquifer water is lower to the south and west and higher to the north and east. Wells completed in this aquifer yield up to 600 gpm. Most wells in the area will produce water by natural artesian flow except during periods of irrigation when the artesian head declines substantially due to the heavy withdrawal.

<u>Floridan Aquifer (lower zone)</u>. The lower zone of the Floridan Aquifer begins at a depth of approximately 450 feet and extends to about 600 feet in depth. The strata making up this zone of the aquifer are the lower part of the Avon Park Limestone and the upper 50 to 100 feet of the Lake City Limestone. This aquifer is used for irrigation in the area, although the water is highly mineralized with total dissolved solids in the range of 2,000 to 3,000 milligrams per liter. Most wells which penetrate this zone are also open to and produce water from the upper zone thereby producing a blend of waters from both zones which is of suitable quality for irrigation use. The quality of water from such wells deteriorates during the irrigation season when water in the upper zone becomes depleted. Water yields of wells finished in the lower zone is normally 500 to 1,000 gpm although higher yields can be obtained by pumping. The artesian head in this zone also declines substantially during the irrigation season in the farming area.

Water supply wells drilled in the project area do not penetrate strata deeper than the upper part of the Lake City Limestone because of the rapid increase in chlorides and total dissolved solids with depth of penetration into this formation. Projections of data from nearby areas indicate that the strata present to a depth of about 2,200 feet may contain two or more permeable zones (aquifers). Test well drilling at the project site has shown that at least one highly permeable zone containing brackish water is present at a depth of 790 feet. It is anticipated that other such zones will be found as the test drill progresses.

However, data from deep wells indicate that most of the strata between about 600 and 2,200 feet in depth are of relatively low vertical permeability. The strata below 2,200 feet contain a high percentage of evaporites (gypsum and anhydrite) which generally are indicative of very low permeability. Thus, no vertical movement from the injection zone to the freshwater aquifers is expected.

2.5 Meteorology

2.5.1 General

Complete meteorological data are not available for the Palatka area. The National Weather Service receives temperature and precipitation data from Palatka and freeze data from Crescent City and Federal Point. The nearest locations for detailed wind summaries are Jacksonville and Daytona Beach, although wind summaries specifically related to aircraft operations are available from Gainesville and Ocala. Detailed relative humidity summaries are available for Jacksonville with less elaborate summaries for Daytona Beach, Gainesville, and Ocala. Summaries of severe winds are available for Jacksonville and Daytona Beach.

2.5.2 Temperature, Dewpoint, and Humidity

The only summary available for Palatka is the normal or average temperature by month and for the year which are given in Table 2.4. The average temperatures and relative humidities of the surrounding stations

TABLE 2.4. TEMPERATURE, DEW POINT AND HUMIDITY DATA

Month	Palatka[a] Average Temp., F	Daytona Beach[a] Temp., F Max.	Daytona Beach Temp., F Min.	Daytona Beach Temp., F Ave.	Daytona Beach Relative Humidity Percent	Gainesville[a,b] Temp., F Max.	Gainesville Temp., F Min.	Gainesville Temp., F Ave.	Gainesville Dew Point	Gainesville Relative Humidity Percent	Jacksonville[a,c] Temp., F Max.	Jacksonville Temp., F Min.	Jacksonville Temp., F Ave.	Jacksonville Dew Point	Jacksonville Relative Humidity Percent
Jan	59.2	69.6	40.7	59.2	79	69	47	58.0	45	75	66.8	45.0	55.8	46.4	73
Feb	61.0	70.9	50.2	60.6	78	71	48	59.6	49	73	68.5	46.5	57.6	46.7	70
Mar	65.0	74.2	53.4	63.8	77	76	53	63.6	50	71	73.3	51.1	62.6	50.3	67
Apr	70.6	78.8	59.0	68.9	76	81	58	69.5	56	70	79.6	57.8	69.6	57.4	68
May	76.8	83.5	64.9	74.2	77	87	64	75.8	64	72	86.4	65.1	75.7	63.7	69
June	81.2	86.9	69.9	78.4	80	90	69	80.1	70	76	90.5	71.1	79.7	70.0	74
July	82.5	88.2	72.0	80.1	82	91	71	81.1	73	79	92.0	73.2	81.1	72.6	77
Aug	82.5	88.3	73.1	80.7	84	91	71	81.2	72	80	91.4	73.2	81.1	72.9	78
Sept	80.3	86.2	72.2	79.2	83	89	70	79.2	71	82	87.6	71.1	78.7	70.7	78
Oct	73.2	81.2	65.6	73.4	80	83	61	72.1	62	78	80.2	61.8	71.6	63.1	77
Nov	64.8	74.4	56.1	65.3	80	75	52	63.7	53	77	72.2	51.2	62.7	53.5	74
Dec	59.4	70.1	50.4	60.3	80	69	47	58.5	46	76	66.7	45.5	56.6	47.7	75
Annual	71.4	79.4	61.3	70.4	80	81	59	70.2	59	76	79.6	59.4	69.4	59.6	73

(a) Buston, K. 1962.

(b) U. S. Naval Weather Service. 1970

(c) Naval Weather Service. 1973.

are all similar and therefore it is expected that the Palatka values would also be within the range of these data.

2.5.3 Winds

No wind summaries are available for Palatka. The nearest stations for which detailed wind summaries are available are Jacksonville and Daytona Beach. The consultants to FP&L who performed the air quality calculations, Environmental Science and Engineering, Inc. (ESE), believed that the Jacksonville data were more representative of the Palatka area (see Appendix A). The wind summaries used by ESE (1974) in their air quality calculations are based on 1967 and 1970 data and are shown in Table 2.5. The average mixing height estimated by ESE for Palatka is 1,450 meters.

2.5.4 Precipitation

Precipitation summaries for Palatka are shown in Table 2.6 along with summaries for Jacksonville and Daytona Beach for comparison. All three stations show the dominance of summer rainfall in that more than one-half the average annual rainfall occurs in the 4-month period June through September. In the summer "rainy season" there is close to a 50-50 chance that some rain will fall on any given day. However, most of the summer rainfall is derived from heavy showers lasting only an hour or two during the hottest part of the day.

2.5.5 Storms

High local winds of short duration occur occasionally in connection with thunderstorms in summer and with cold fronts moving across the State in other seasons. Tornadoes, funnel clouds, and waterspouts also occur,

TABLE 2.5. RELATIVE FREQUENCY OF OCCURRENCE OF WINDSPEED CLASSES AT JACKSONVILLE INTERNATIONAL AIRPORT BASED ON 1967 AND 1970 DATA(a)

	Windspeed Class (knots)					
Wind Direction	0-3	4-6	7-10	11-16	17-21	Greater than 21
Stability Class A						
N	0.0	0.0	0.0	0.0	0.0	0.0
NNE	0.0	0.0	0.0	0.0	0.0	0.0
NE	0.0000	0.0007	0.0	0.0	0.0	0.0
ENE	0.0	0.0	0.0	0.0	0.0	0.0
E	0.0000	0.0007	0.0	0.0	0.0	0.0
ESE	0.0000	0.0007	0.0	0.0	0.0	0.0
SE	0.0000	0.0003	0.0	0.0	0.0	0.0
SSE	0.0	0.0	0.0	0.0	0.0	0.0
S	0.0004	0.0	0.0	0.0	0.0	0.0
SSW	0.0000	0.0003	0.0	0.0	0.0	0.0
SW	0.0000	0.0003	0.0	0.0	0.0	0.0
WSW	0.0	0.0	0.0	0.0	0.0	0.0
W	0.0004	0.0007	0.0	0.0	0.0	0.0
WNW	0.0	0.0	0.0	0.0	0.0	0.0
NW	0.0	0.0	0.0	0.0	0.0	0.0
NNW	0.0	0.0	0.0	0.0	0.0	0.0
Stability Class B						
N	0.0007	0.0014	0.0010	0.0	0.0	0.0
NNE	0.0004	0.0007	0.0010	0.0	0.0	0.0
NE	0.0000	0.0007	0.0003	0.0	0.0	0.0
ENE	0.0007	0.0007	0.0007	0.0	0.0	0.0
E	0.0004	0.0017	0.0020	0.0	0.0	0.0
ESE	0.0000	0.0010	0.0020	0.0	0.0	0.0
SE	0.0004	0.0027	0.0024	0.0	0.0	0.0
SSE	0.0000	0.0017	0.0014	0.0	0.0	0.0
S	0.0000	0.0014	0.0017	0.0	0.0	0.0
SSW	0.0007	0.0010	0.0014	0.0	0.0	0.0
SW	0.0008	0.0027	0.0048	0.0	0.0	0.0
WSW	0.0004	0.0020	0.0020	0.0	0.0	0.0
W	0.0011	0.0020	0.0024	0.0	0.0	0.0
WNW	0.0011	0.0007	0.0010	0.0	0.0	0.0
NW	0.0004	0.0017	0.0003	0.0	0.0	0.0
NNW	0.0004	0.0020	0.0058	0.0	0.0	0.0

TABLE 2.5 (Continued)

Wind Direction	Windspeed Class (knots) 0-3	4-6	7-10	11-16	17-21	Greater than 21
Stability Class C						
N	0.0004	0.0007	0.0	0.0	0.0	0.0
NNE	0.0007	0.0010	0.0017	0.0003	0.0	0.0
NE	0.0000	0.0007	0.0027	0.0003	0.0	0.0
ENE	0.0000	0.0010	0.0027	0.0	0.0	0.0
E	0.0000	0.0007	0.0089	0.0027	0.0003	0.0
ESE	0.0000	0.0003	0.0092	0.0041	0.0	0.0
SE	0.0004	0.0014	0.0103	0.0041	0.0	0.0
SSE	0.0007	0.0003	0.0041	0.0010	0.0	0.0
S	0.0004	0.0014	0.0041	0.0003	0.0	0.0
SSW	0.0004	0.0010	0.0051	0.0010	0.0	0.0
SW	0.0008	0.0017	0.0075	0.0020	0.0003	0.0
WSW	0.0008	0.0024	0.0079	0.0010	0.0	0.0
W	0.0002	0.0044	0.0082	0.0027	0.0	0.0
WNW	0.0001	0.0017	0.0038	0.0003	0.0	0.0
NW	0.0004	0.0024	0.0024	0.0003	0.0	0.0
NNW	0.0008	0.0014	0.0014	0.0	0.0	0.0
Stability Class D						
N	0.0004	0.0024	0.0029	0.0048	0.0	0.0003
NNE	0.0004	0.0007	0.0041	0.0058	0.0	0.0
NE	0.0000	0.0010	0.0051	0.0147	0.0010	0.0
ENE	0.0000	0.0003	0.0082	0.0103	0.0007	0.0
E	0.0005	0.0044	0.0140	0.0192	0.0010	0.0
ESE	0.0000	0.0017	0.0096	0.0151	0.0010	0.0
SE	0.0001	0.0027	0.0144	0.0226	0.0003	0.0003
SSE	0.0004	0.0024	0.0103	0.0062	0.0003	0.0
S	0.0001	0.0024	0.0154	0.0079	0.0007	0.0
SSW	0.0000	0.0014	0.0130	0.0072	0.0010	0.0
SW	0.0001	0.0038	0.0250	0.0168	0.0020	0.0
WSW	0.0004	0.0027	0.0130	0.0103	0.0007	0.0
W	0.0005	0.0048	0.0147	0.0157	0.0038	0.0
WNW	0.0001	0.0024	0.0079	0.0086	0.0024	0.0
NW	0.0001	0.0034	0.0072	0.0051	0.0020	0.0
NNW	0.0000	0.0014	0.0041	0.0041	0.0003	0.0

TABLE 2.5 (Continued)

Wind Direction	Windspeed Class (knots) 0-3	4-6	7-10	11-16	17-21	Greater than 21
Stability Class E						
N	0.0074	0.0127	0.0096	0.0	0.0	0.0
NNE	0.0023	0.0038	0.0007	0.0	0.0	0.0
NE	0.0041	0.0048	0.0020	0.0	0.0	0.0
ENE	0.0030	0.0086	0.0017	0.0	0.0	0.0
E	0.0079	0.0137	0.0048	0.0	0.0	0.0
ESE	0.0055	0.0082	0.0072	0.0	0.0	0.0
SE	0.0036	0.0113	0.0106	0.0	0.0	0.0
SSE	0.0036	0.0116	0.0051	0.0	0.0	0.0
S	0.0074	0.0219	0.0089	0.0	0.0	0.0
SSW	0.0031	0.0140	0.0041	0.0	0.0	0.0
SW	0.0061	0.0147	0.0092	0.0	0.0	0.0
WSW	0.0044	0.0130	0.0103	0.0	0.0	0.0
W	0.0100	0.0212	0.0134	0.0	0.0	0.0
WNW	0.0085	0.0130	0.0055	0.0	0.0	0.0
NW	0.0050	0.0151	0.0079	0.0	0.0	0.0
NNW	0.0081	0.0079	0.0055	0.0	0.0	0.0

(a) Environmental Science and Engineering. 1974.

TABLE 2.6. PRECIPITATION SUMMARIES FOR PALATKA, JACKSONVILLE, AND DAYTONA BEACH[a]

Month	Precipitation, inches		
	Palatka	Jacksonville	Daytona Beach
January	2.17	2.45	1.96
February	3.27	2.91	2.75
March	3.95	3.49	3.56
April	3.52	3.55	2.97
May	3.34	3.47	2.85
June	6.54	6.33	5.81
July	7.54	7.68	6.74
August	7.27	6.85	6.37
September	7.13	7.56	7.00
October	4.92	5.16	5.61
November	1.77	1.69	2.33
December	2.44	2.22	1.95
Annual	53.86	53.36	49.90

(a) Buston, K. 1962.

averaging 10 to 15 per year. Tornadoes have occurred in all seasons but are most frequent in spring. Tornadoes also occur in connection with tropical storms. Generally, tornado paths in Florida are short and damages have not been extensive. Occasionally waterspouts come inland, but they usually dissipate soon after reaching land and affect only very small areas.

Tropical storms produce the principal high winds. These storms are often destructive. The chances of hurricane force winds in any given year varies from 1 in 50 at Jacksonville to 1 in 7 at Key West and Miami. The probability for Daytona Beach is 1 in 30 and Palatka is likely to fall somewhere between the probabilities for Jacksonville and Daytona Beach. On the extreme northeast coast from St. Augustine to Jacksonville no tropical storm of full hurricane force has been experienced during the period of record. The City of Jacksonville is unique in that it is the only large city in Florida and, indeed, the only one on the Atlantic coast from Boston southward, that has never had sustained winds of hurricane force in a tropical storm in modern times. This is probably fortuitous since the weighted averages indicate the probability of hurricane force winds once in 50 years.

2.6 Ecology

2.6.1 Terrestrial Ecology

Vegetation. The terrestrial environment of the FP&L property near East Palatka can be divided into six distinct habitats or communities, each exhibiting a distinct association of plants, mammals, and birds (Figure 2.3).

Of the approximately 127 acres of FP&L property nearly 90 acres are in a natural or near-natural state (maintained grasslands of transmission lines). Table 2.7 indicates the relative amounts of the various communities within the property at the present time.

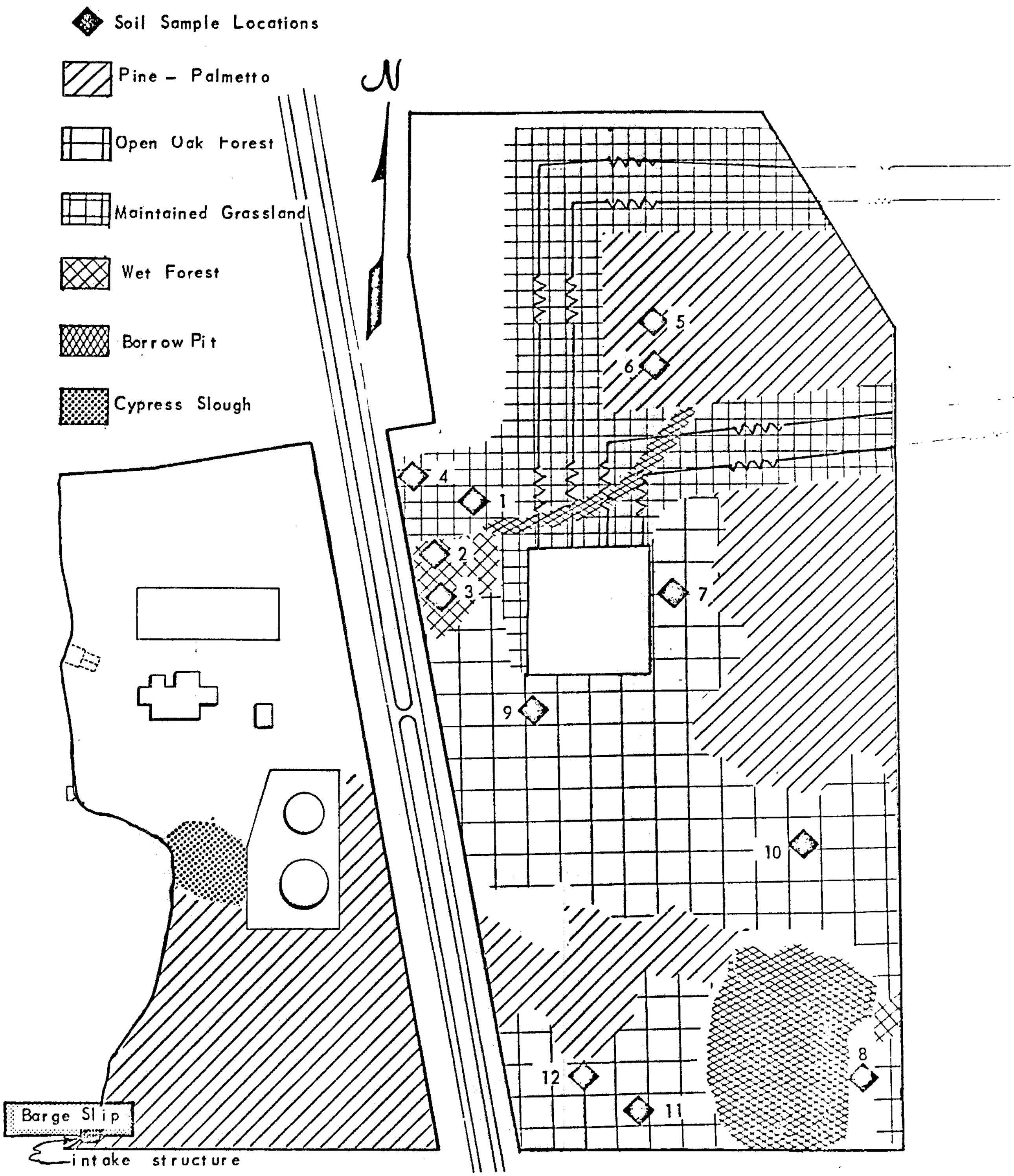


FIGURE 2.3. VEGETATION DISTRIBUTION AND SOIL SAMPLE LOCATIONS

TABLE 2.7. APPROXIMATE AREA OF HABITAT TYPES ON FP&L PROPERTY - EAST PALATKA[a]

Number	Habitat	Area (acres)	Percent
1	Borrow Pit	2.3	1.8
2	Wet Forest	1.75	1.4
3	Pine Palmetto	40.1	31.5
4	Open Oak Forest	28.75	22.7
5	Cypress Slough	1.3	1.0
6	Maintained Grassland	15.2	12.0
		89.4	70.4
	Existing Facilities	37.6	29.6
	Total Property Area	127.0	

(a) Applied Biology, Inc. 1974.

Relative abundance of plant species within each of the communities was determined to provide an estimation of the number or relative dominance of a species within a given habitat or community. Four categories were employed; analyses are presented within each habitat discussion.

1. Very common - species which are extremely numerous throughout the community
2. Common - species widespread in the communities, but with many fewer individuals than above
3. Infrequent - species found throughout the community, but with few individuals
4. Sparce - species found only sporadically in the community with very few individuals.

Along the banks of two small streams which traverse the property is a localized swamplike or wet forest. It is dominated by 60-foot loblolly bay (*Gordonia lasianthus*) trees which make up 60 percent of the canopy. Large mockernut hickories (*Carya tomentosa*), water oaks (*Quercus nigra*), sweetbays (*Magnolia virginiana*), and sweetgums (*Liquidambar styraciflua*) also are found in the canopy. The understory of this community is a dense tangle of small trees, shrubs, and vines which is dominated by tree sparkleberry (*Vaccinium arboreum*), smilax (*Smilax* sp.), grape (*Vitis vulpina*), and dewberry (*Rubus trivialis*). Ground cover is sparce.

Species composition and abundance category for the wet forest habitat are shown in Table 2.8.

Approximately 31 percent of the property is occupied by a secondary pine-palmetto community which is characterized by open stands of pine and large, open areas of low palmetto and shrub (Table 2.9). Slash pine (*Pinus elliotii*) is the dominant tree species; saw palmetto (*Serenoa* sp.), tree lyonia (*Lyonia ferruginea*), and tawnberry holly (*Ilex kruginana*) are the dominant shrubs. The understory and ground cover are extremely dense and often impenetrable, whereas the canopy is open and disjunct in many places. There is also a major herbaceous element to this community which , in the winter , is represented primarily by dead plants such as goldenrod, blazing star, etc.

TABLE 2.8. VEGETATION COMPOSITION OF WET FOREST[(a)]

Abundance Category	Scientific Name	Common Name
4	*Acer rubrum*	Red Maple
4	*Carya tomentosa*	Mockernut Hickory
1	*Gordonia lasianthus*	Loblolly Bay
3	*Ilex cassine*	Dahoon Holly
3	*Liquidambar styraciflua*	Sweetgum
3	*Magnolia virginiana*	Sweetbay
3	*Persea borbonia*	Redbay
4	*Quercus laurifolia*	Laurel Oak
3	*Quercus nigra*	Water Oak
3	*Rubus trivialis*	Dewberry
4	*Sambucus simpsonii*	Southern Elderberry
3	*Serenoa repens*	Saw Palmetto
2	*Smilax bona-nox*	Catbrier
3	*Smilax laurifolia*	Bamboo Vine
2	*Tillandsia usneoides*	Spanish Moss
4	*Trachelospermum difforme*	Climbing Dogbane
1	*Vaccinium arboreum*	Tree Sparkleberry
4	*Viburnum rufidulum*	Rusty Blackhaw
2	*Vitis vulpina*	Frost Grape

(a) Applied Biology, Inc. 1974.

TABLE 2.9. VEGETATION COMPOSITION OF PINE-PALMETTO FOREST[a]

Abundance Category	Scientific Name	Common Name
1	*Andropogon* sp.	Beardgrass
4	*Cirsium horridulum*	Purple Thistle
3	*Heterotheca graminifolia*	NCN
2	*Ilex decidua*	Possumhaw
1	*Ilex krugiana*	Tawnberry Holly
3	*Liatris* sp.	Blazing Star
1	*Lyonia ferruginea*	Tree Lyonia
3	*Myrica cerifera*	Wax Myrtle
2	*Pinus elliottii*	Slash Pine
2	*Pinus palustris*	Longleaf Pine
2	*Pinus taeda*	Loblolly Pine
1	*Quercus chapmanii*	Chapman Oak
1	*Quercus laevis*	Turkey Oak
1	*Quercus myrtifolia*	Myrtle Oak
1	*Serenoa repens*	Saw Palmetto
3	*Solidago* sp.	Goldenrod
4	*Vaccinium myrsinites*	Shiny Blueberry

(a) Applied Biology, Inc. 1974.

Located on the highest elevations of the property is an open oak forest which is dominated by very large specimens of live oak (Quercus virginiana). There are also several turkey oaks (Q. laevis) and an occasional southern magnolia (M. grandifolia) and cabbage palm (Sabel palmetto) in the canopy. Both the understory and the ground cover of this community are very sparse. Clumps of saw palmetto and myrtle oak are fairly common. There is a dense bed of lichen on the floor of the forest as well as a thick cover of spanish moss in the trees. Live oaks make up 85 percent of the canopy, although there are relatively few stems widely-spaced (Table 2.10).

A young cypress (Taxodium distichum) slough occupies a small area (1.3 acres) adjacent to the existing discharge structure. Fifty to sixty young cypress trees draped with spanish moss occupy this area. A small stream flows over the area. The ground surface remains wet most of the year and is inundated during high river water stages.

Due to runoff from precipitation, a small aquatic community is present within the confines of the borrow pit (Table 2.11). Willows (Salix caroliniana) and cattails border the pit, with leafy pondweed being abundant when standing water is present.

The area under the transmission line rights-of-way is maintained in low ground cover by periodical mowing. Native grass species predominate with some herbaceous species and small woody shrubs.

Soil. Two soil associations exist within the proposed site: (1) the Coxville-Bladen-Weston which is associated with the pine-palmetto, open oak, and maintained grassland habitat types, and (2) the Fresh Water Swamp-Marsh Association which is associated with the wet forest and cypress slough habitats (Figure 2.3). The Coxville-Bladen-Weston association is characterized by soils with a thick-to-thin, sand to sandy-loam surface soils overlying finer-textured acid subsoils. Fresh Water Swamp-Marsh soils are sandy in texture overlain by accumulations of organic material. Percent moisture, percent organic matter, and pH of soil samples collected at various locations at the proposed site are shown in Table 2.12.

TABLE 2.10. VEGETATION COMPOSITION OF OPEN OAK FOREST [a]

Abundance Category	Scientific Name	Common Name
4	*Asimina triloba*	Pawpaw
4	*Carya tomentosa*	Mockernut Hickory
4	*Eupatorium* sp.	JoePye/Dogfennel
3	*Ilex decidua*	Possumhaw
3	*Magnolia grandiflora*	Southern Magnolia
4	*Panicum* sp.	Panic Grass
1	*Quercus chapmanii*	Chapman Oak
1	*Quercus laevis*	Turkey Oak
1	*Quercus myrtifolia*	Myrtle Oak
1	*Quercus virginiana*	Live Oak
4	*Rhyncospora* sp.	Beak Rush
4	*Sabal palmetto*	Cabbage Palm
1	*Serenoa repens*	Saw Palmetto
4	*Sisyrinchium arenicola*	Blue-eyed Grass
2	*Smilax bona-nox*	Catbrier
3	*Solidago* sp.	Goldenrod
2	*Vaccinum arboreum*	Tree Sparkleberry
3	*Vitis aestavilis*	Summer Grape

(a) Applied Biology, Inc. 1974.

TABLE 2.11. VEGETATION IN BORROW PIT[a]

Abundance Category	Scientific Name	Common Name
1	*Hydrocotyle umbellata*	Marsh Pennywort
2	*Juncus effusus*	Soft Rush
2	*Juncus megacephalus*	Large-headed Rush
1	*Lemna perpusilla*	Duckweed
1	*Potamogeton foliosus*	Leafy Pondweed
1	*Salix caroliniana*	Southern Willow
1	*Typha latifolia*	Broad-leaf Cattail
2	*Utricularia foliosa*	Bladderwort
3	*Xyris elliottii*	Yellow-Eye Grass

(a) Applied Biology, Inc. 1974.

TABLE 2.12. SOIL DATA - EAST PALATKA SITE [a]

Sample Location[b]	Sample Depth (cm)	% Moisture	% Organic	pH
1	11	48.34	25.17	5.9
	39	24.54	2.30	4.9
2	8	84.40	89.75	4.4
	92	70.80	40.64	4.3
3	19	83.74	77.87	4.9
	64	28.80	3.28	4.5
4	22	7.80	1.23	5.2
	113	11.47	1.11	6.0
5	12	21.87	6.92	5.8
	80	21.80	1.03	4.4
6	12	12.74	3.98	5.7
	118	27.00	5.30	4.4
7	8	13.60	0.47	4.5
	120	13.60	0.47	6.3
8	57	18.34	0.41	4.7
9	8	19.74	10.80	6.6
	120	5.94	0.50	6.6
10	16	7.07	1.22	6.4
	120	8.40	0.88	5.9
11	11	7.30	1.88	6.5
12	120	16.40	0.72	4.6
13	Surface	33.40	1.11	5.5

(a) Applied Biology, Inc. 1974.

(b) See Figure 2.3 for sample locations.

Mammals. According to Burt and Grassenheider (1964) and Golley (1962), 45 species of mammals are found within the Palatka region (Table 2.13). However, a quantitative mammal survey was conducted by Applied Biology, Inc. (1974) to assess actual resident mammal populations.

Small mammals were trapped in two areas; 4 acres of maintained grassland and 4 acres of pine-palmetto forest habitat. This 8-acre sampling site had 144 trapping points charged with two Victor #4 spring-type rat traps. A total of 288 traps were set and baited with a mixture of 50 percent peanut oil and 50 percent peanut butter.

Nine rodents were captured in the 8-acre census area for an average of three individuals per day (See Table 2.14). This number is consistent with the findings from other pine-palmetto and grassland habitats typical of Florida. These habitats do not appear to be nearly as productive in terms of small mammal populations when compared to wetland prairie or estuarine areas where a rodent capture rate of 8-10 per day has been observed using identical sampling techniques.

Mid-range mammals (rabbit, raccoon, etc.) were live sampled by 24 large wire fabric traps with spring-trap doors at each end. Traps were set in a line from State Road 20 to Old Brick Road from west to east, respectively, through the open oak habitat type (Figure 2.3). Traps were baited with turkey necks and pig tails. No mid-range mammals were captured during the collecting period (February 6, 7, and 8, 1974).

Large mammals were surveyed by examining the proposed site for tracks or feces, examining hunting records, and by asking local residents about sitings of large mammals.

Local residents reported no sightings of bear, bobcat, Florida panther, gray fox, deer, or wild pigs on the proposed site. However, deer and wild pigs have been sited in the general area. The track and sign survey established eight mammal species as site residents (Table 2.15).

Birds. This Florida region, including the East Palatka area, is characterized by a vast diversity of bird fauna. A large number of species are permanent or year-round residents, another large group winter in the warm, productive climate, and another group migrates through the area some-

TABLE 2.13. MAMMALS WHOSE RANGE INCLUDE THE PROPOSED FLORIDA POWER AND LIGHT PEAKING FACILITY SITE (a)

Common Name	Scientific Name	Habitat Utilized (b)
Opossum	*Didelphis marsupialis*	2, 3, 4
Southeastern Shrew	*Sorex longirostris*	1, 2, 4
Least Shrew	*Cryptotis parva*	5
Shorttail Shrew	*Blarina brevicauda*	1, 2, 4
Eastern Mole	*Scalopus aquaticus*	1, 2, 5
Eastern Pipistrel	*Pipistrellus subflavus*	7
Big Brown Bat	*Eptesicus fuscus*	3, 4, 7
Red Bat	*Lasiurus borealis*	2, 3, 4
Hoary Bat	*Lasiurus cinereus*	2, 3, 4
Seminole Bat	*Lasiurus seminolus*	2, 3, 4
Evening Bat	*Nycticeius humeralis*	2, 3, 4, 7
Eastern Yellow Bat	*Lasiurus intermedius*	2, 3, 4
Eastern Big-eared Bat	*Plecotus rafinesquei*	2, 3, 4
Mexican Freetail Bat	*Tadarida brasiliensis*	7
Black Bear	*Ursus americanus*	3,4
Raccoon	*Procyon lotor*	1, 2, 3, 4
Longtail Weasel	*Mustela frenata*	1, 2, 4
Mink	*Mustela vison*	3, 4
River Otter	*Lutra canadensis*	6
Spotted Skunk	*Spilogale putorius*	1, 2
Striped Skunk	*Mephitis mephitis*	1, 2
Gray Fox	*Urocyon cinereoargenteus*	1
Cougar	*Felis concolor*	3,4
Bobcat	*Lynx rufus*	1, 2, 4
Eastern Gray Squirrel	*Sciurus carolinensis*	2, 4
Eastern Fox Squirrel	*Sciurus niger*	2
Southern Flying Squirrel	*Glaucomys volans*	2, 3, 4
Southeastern Pocket Gopher	*Geomys pinetis*	1, 2, 5

TABLE 2.13 (continued)

Common Name	Scientific Name	Habitat Utilized
Eastern Harvest Mouse	*Reithrodontomys humulis*	2, 5
Oldfield Mouse	*Peromyscus polionotus*	5
Cotton Mouse	*Peromyscus gossypinus*	3, 4
Golden Mouse	*Ochrotomys nuttalli*	2, 4
Eastern Woodrat	*Neotoma floridana*	4
Rice Rat	*Oryzomys palustris*	4
Cotton Rat	*Sigmodon hispidus*	1, 2, 5
Round-tailed Muskrat	*Neofiber alleni*	3
Norway Rat	*Rattus norvegicus*	7
Roof Rat	*Rattus rattus*	7
House Mouse	*Mus musculus*	5, 7
Eastern Cottontail	*Sylvilagus floridanus*	1, 2, 5
Marsh Rabbit	*Sylvilagus palustris*	3, 4
Wild Pig	*Sus scrofa*	1, 2, 4
Whitetail Deer	*Odocoileus virginianus*	1, 2, 4
Armadillo	*Dasypus novemcinctus*	1, 2, 4
Manatee	*Trichechus manatus*	River

(a) List compiled from Burt and Grossenheider, 1964 and Golley, 1962.

(b)

Number	Habitat Type
1	Borrow Pit
2	Wet Forest
3	Pine-Palmetto
4	Open Oak Forest
5	Cypress Slough
6	Maintained Grassland
7	Man-made structures

TABLE 2.14. RODENT SURVEY[a]

Common Name	Scientific Name	Sex		Total	Approx. Weight	Date of Capture
		F	M			
Eastern Wood Rat	Neotoma floridana	2	0	2	200 gm	2/6/74
		2	3	5	500 gm	2/7/74
		0	2	2	200 gm	2/8/74
Cotton Rat	Sigmodon hispidus	2	0	2	200 gm	2/7/74
		0	1	1	100 gm	2/8/74

(a) Applied Biology, Inc. 1974.

TABLE 2.15. MAMMAL TRACK SURVEY [a]

Common Name	Scientific Name	Observations	Date Observed
Skunk	Mephitis mephitis	Probable road kill	March 6
Armadillo	Dasypus novemcinctus	Tracks and digging	March 6 & 13
Rabbit	Sylvilagus sp.	Tracks	March 6 & 13
Mouse	Unknown	Tracks	March 6 & 13
Raccoon	Procyon lotor	Tracks	March 6 & 13
Dog	Canis sp.	Tracks	March 6 & 13
Cat	Felis sp.	Tracks	March 6 & 13
Shrew	Blarina sp. or Cryptotis sp.	Tracks	March 6 & 13
Opossum	Didelphis marsupialis	Tracks	March 13

(a) Applied Biology, Inc. 1974.

times pausing briefly in the early spring and fall. Christmas bird counts (wintering plus year-round species) are taken annually at Gainesville and Jacksonville (American Birds, 1973). Results of the 1972 Christmas count at Gainesville and Jacksonville produced 133 species and 161 species, respectively. Of these species, 112 were found in both locations, thus 70 species were observed at one location but not at the other. The environment of the proposed site is somewhat intermediate between the two censused areas and is expected to attract an avian fauna which are also intermediate.

Bird surveys were made on the site on February 6, 7, and 8 and March 7 and 14, 1974. Species observed during these periods are listed in Table 2.16.

2.6.2 Aquatic Ecology

The St. Johns River. The St. Johns is a large river with headwaters in the region of Melbourne; it flows northward, and empties into the Atlantic Ocean at Jacksonville. The slow-moving river supports an important commercial shad (*Alosa sapidissima*) fishery and is one of the major sport fishing rivers in the United States. At present, the shad fishery is declining apparently due to over-harvesting and the tendency for gill nets to select ovigerous females at twice the rate for males.

The river is used by industry to transport goods and materials by barge. There is also a sizable population which uses the St. Johns for other water-related sports.

Fish. The fishes of the St. Johns have been well documented by McLane (1955) and Tagatz (1967) (Appendix B). However, as the St. Johns ranges from an estuarine condition at Jacksonville to a freshwater condition at Melbourne, not all fishes reported by McLane and Tagatz are found throughout the river's reaches.

In January, 1974, Applied Biology, Inc., conducted a fish survey of the St. Johns River area adjacent to the proposed site. Fishes were observed and collected by trap and by harvesting fishes from the traveling screens of the existing FP&L's Palatka Power Plant intake structure (Figure 2.4).

TABLE 2.16. AVIAN SPECIES IDENTIFIED AT THE PROPOSED SITE(a)

Common Name	Scientific Name
Cooper's Hawk	*Accipter cooperii*
Red-winged Blackbird	*Agelaius phoeniceus*
Cattle Egret	*Bubulcus ibis*
Red-tailed Hawk	*Buteo jamaicensis*
Red-shouldered Hawk	*Buteo lineatus*
Boat-tailed Grackle	*Cassidix major*
Turkey Vulture	*Cathartes aura*
Bobwhite	*Colinus virginianus*
Ground Dove	*Columbina passerina*
Common Crow	*Corvus brachyrhynchos*
Blue Jay	*Cyanocitta cristata*
Belted Kingfisher	*Megaceryle alcyon*
Mockingbird	*Mimus polyglottos*
Vesper Sparrow	*Pooecetes gramineus*
Purple Grackle	*Quiscalus quiscula*
Cardinal	*Cardinalis cardinalis*
Eastern Phoebe	*Sayornis phoebe*
American Robin	*Turdus migratorius*
Mourning Dove	*Zenaid macroura*

(a) Applied Biology, Inc. 1974.

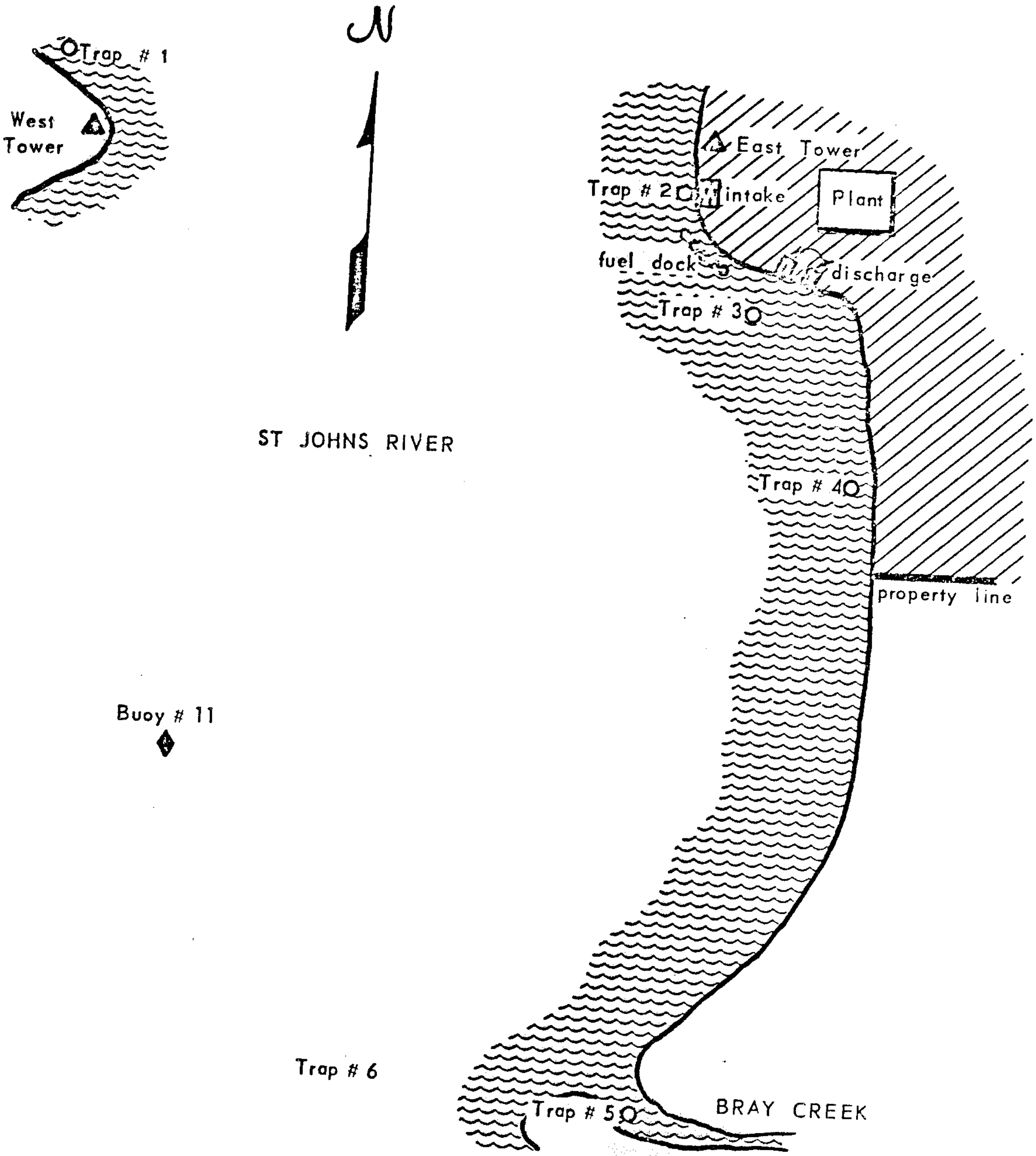


FIGURE 2.4. TRAP LOCATIONS AND SCREEN SAMPLING SITE

A few bluegill sunfish (<u>Lepomis</u> <u>macrochinus</u>) were collected from traps 5 (1 fish) and 6 (16 fish) (Figure 2.4).

The traveling screens were harvested continuously for a 24-hour period in order to detect relative numbers of species at all hours of the day and night. The total catch was 59 specimens representing eight species (Table 2.17). Four additional species were collected by drop nets from the wells in front of the traveling screens (Table 2.18) and by additional washings. The fauna are characteristically estuarine with <u>Lepomis</u> alone being considered a typical freshwater fish.

Benthos. Twelve bottom samples were obtained using a 6" x 6" Ekman grab sampler. A series of sampling points were established commencing 50 ft from the plant effluent discharge region. Another series of samples were obtained adjacent to the existing dock facility. Grab samples were wet washed in 1/16 -inch wire mesh screen and specimens preserved in 10 percent formalin. Tables 2.19 and 2.20 list results obtained from each sampling area.

Plankton. Five plankton samples were obtained from points located off the dock facility of the Florida Power and Light generating facility, St. Johns River, East Palatka, Florida. Plankton tows were made such that approximately 246 liters of water passed through the plankton net. Following each tow, organisms were washed from the net and preserved in 10 percent formalin. Each sample was diluted to 500 ml, mixed, and ten 1-ml aliquots were removed for microscopic examination and enumeration of species. The mean of organisms found per aliquot was computed for each sample and then extrapolated to number of organisms per liter. Results are presented in Table 2.21.

2.6.3 Rare, Endangered, or Threatened Species

The State of Florida is unique in that 31 species of wildlife (Table 2.22) considered rare, endangered, or threatened are found within the State boundaries (Bureau of Sport Fisheries & Wildlife, 1973). Of these 31 species, the American alligator (<u>Alligator</u> <u>mississypiensis</u>)

TABLE 2.17. FISH SPECIES COLLECTED FROM 24-HOUR WASHINGS OF TRAVELING SCREENS (a)

Scientific Name	Common Name	Number
Alosa aestivalis	Blueback herring	1
Dorosoma cepedianum	Gizzard shad	6
Dorosoma petenense	Threadfin shad	27
Ictalurus natalis	Yellow bullhead	11
Ictalurus punctatus	Channel catfish	1
Lepomis macrochirus	Bluegill	2
Micropogon undulatus	Atlantic croaker	1
Trinectes maculatus	Hogchoker	10

(a) Applied Biology, Inc. 1974.

TABLE 2.18. SPECIES COLLECTED BY DROP NET AND ADDITIONAL SCREEN WASHINGS (a)

Scientific Name	Common Name	Number
Alosa aestivalis	Blueback herring	4
Anchoa mitchilli	Bay anchovy	102
Dorosoma petense	Threadfin shad	94
Gambusia affinis	Mosquitofish	1
Ictalurus punctatus	Channel catfish	1
Lepomis macrochirus	Bluegill	4
Menidia beryllina	Tidewater silverside	48
Strongylura marina	Atlantic needlefish	3
Trinectes maculatus	Hogchoker	1

(a) Applied Biology, Inc. 1974.

TABLE 2.19. BENTHIC SAMPLING AT POINT OF FP&L EXISTING FACILITY EFFLUENT DISCHARGE[a]

Sampling Point Number	Distance From Outfall, ft	Number Grabs per Station	Area Sampled, ft^2	Total No. Organisms	Organisms Name and Quantity	
1	50	3	.75	8	_Cyathura polita_	(1)
					Gammarus faciatus	(7)
2	70	2	.5	7	_Cyathura polita_	(3)
					Gammarius faciatus	(4)
3	90	2	.5	5	_Limnodrilus_ sp.	(1)
					Gammarus faciatus	(4)
4	110	2	.5	3	_Cyathura polita_	(2)
					Gammarus faciatus	(1)
5	130	2	.5	1	_Cyathura polita_	(1)
6	150	2	.5	1	Tanypodinae	(1)
7	170	2	.5	3	_Limnodrilus_ sp.	(1)
					Tanypodinae	(2)
8	180	2	.5	0		

(a) Applied Biology, Inc. 1974.

TABLE 2.20. BENTHIC SAMPLING OFF EXISTING DOCK FACILITY [a]

Sampling Point Number	Distance From Dock, ft	Number Grabs per Station	Area Sampled, ft^2	Total No. Organisms	Organism Name and Quantity
9	50	2	.5	2	*Cyathura polita* (1)
					Callinecte sapidus (1)
10	50	2	.5	0	
11	50	2	.5	1	Naiidae (fragments)
12	50	2	.5	2	*Cyathura polita* (1)
					Callinecte sapidus (1)

(a) Applied Biology, Inc. 1974

TABLE 2.21. PLANKTON ORGANISMS, ST. JOHNS RIVER EAST PALATKA, FLORIDA, MARCH 14, 1974 [(a)]

Taxonomic Group	Organisms/liter
Chrysophyta	
Bacillariophyceae - diatoms	
Coscinodiscus	152
Rhizosolenia	61
Asterionella	20
Fragilaria	10
Synedra	20
Pinnularia	30
Nitzschia	81
unidentified	213
Chloraphyta - green algae	
Volvox	37
Scenedesmus	16
Pediastrum	30
Pyrrophyta - dinoflagellates	
Massartia	2
Cyanophyta - blue-green algae	
Anabaena	112
Rotifers	
Branchionidae	30
Synchaetidae	18
Crustaceans	
Entomostracans	41
Copepods	12
Crab larvae	4

(a) Applied Biology, Inc. 1974.

TABLE 2.22. RARE, ENDANGERED, OR THREATENED SPECIES OF FLORIDA

Common Name	Scientific Name	Authority	Status w/ respect to FP&L property
Shortnosed sturgeon	Acipenser brevirostrum	USDI	Report from St. Johns River
Okaloosa darter	Etheostoma okaloosa	USDI, FlaG & FWFC	Okaloosa County, Fla. only
Pine Barrens tree frog	Hyla andersoni	USDI, FLaG & FWFC	Probably south of present range
Indigo snake	Drymarchon corais couperi	FlaG & FWFC	Within range
American crocodile	Crocodylus acutus	USDI, FlaG & FWFC	North of present range
American alligator	Alligator mississippiensis	USDI	Present in river adjacent to site
Eastern brown pelican	Pelecanus occidentalis carolinensis	USDI	Present on coast, but limited to occassional strays inland
Florida great white heron	Ardea occidentalis occidentalis	USDI	Probably north of present range
Eastern reddish egret	Dichromanassa rufescens rufescens	FlaG & FWFC	Probably north of range/salt flats
Wood Ibis	Mycteria americana	FlaG & FWFC	Within present range
Florida Everglades kite	Rosthrhamus sociabilis plumbens	USDI	North of present range/within former range
Southern bald eagle	Haliaeetus leucocephalus leucocephalus	USDI	Within present range, none observed on site
American peregrine falcon	Falco peregrinus anatum	USDI	Probably south of present winter range.
Whooping crane	Grus âmericana	USDI	Former distribution only
Red-cockaded woodpecker	Dendrocopos borealis	USDI	Potentially present in old pinelands of the region - if any
Florida sandhill crane	Grus canadensis pratensis	USDI	Habitat unsuitable
American ivory-billed woodpecker	Campehilus principalis principalis	USDI	Former range - no recent reports probably extinct
Bachman's warbler	Vermivora bachmanii	USDI	Migrant only
Dusky seaside sparrow	Ammospiza nigrescens	USDI	Former range - present range centered on St. Johns River - eastside west of Titusville to Sharpe
Cape Sable sparrow	Ammospiza mirabilis	USDI	North of range
Roseate spoonbill	Ajaia ajaja	FlaG & FWFC	Probably not in present range
Florida mangrove cuckoo	Coccyzus minor maynardi	FlaG & FWFC	North of range
Florida scrub jay	Aphelocoma coerulescens coerulescens	FlaG & FWFC	Within range
Everglades fox squirrel	Sciurus niger avicennia	USDI	North of range
Key Largo woodrat	Neotoma floridana smalli	USDI	Key Largo, Monroe County, Fla. only
Red wolf	Canis rufus	USDI	Former distribution (?)
Florida panther	Felis concolor coryi	USDI	Probably within present range
Florida manatee	Trichechus manatus latirostris	USDI	Present in river adjacent to site
Key deer	Odocoileus virginianus clavium	USDI	Monroe County, Fla. only
Everglades mink	Mustela vison evergladensis	FlaG & FWFC	Everglades mangrove swamps only
Florida long-tailed weasel	Mustela frenata peninsula	FlaG & FWFC	Everglades only

(a) (USDI) Bureau of Sport Fisheries and Wildlife. 1974.
(FlaG & FWFC) Applied Biology, Inc. 1974.

Supplement to Environmental Report for Expansion of Existing Palatka Power Plant as requested by the Florida Department of Pollution Control.

Ref: Letter of May 14, 1974 from Hamilton S. Oven, Jr., to Mr. W. J. Barrow, Jr.

Subject: Clarification of Item (1) in referenced letter.

Page 62 of the Environmental Report should be replaced with the attached new page 62 correcting the last paragraph.

Additional Information: Page 30 of the Environmental Report should be replaced with attached new page 30 correcting the habitat of the manatee and defining habitat No. 7.

and the Florida manatee (Trichechus mamatus latirostris) are found in the St. Johns river adjacent to the proposed site.

2.6.4 Published Materials Dealing with the Ecology of the Palatka, Florida, Region

Published materials dealing with the ecology of the Palatka, Florida, region are listed in Appendix C.

2.7 Ambient Air

Ambient air quality sampling data are not presently available for the Palatka area. However, ESE (1974) estimated the existing air quality on the basis of (1) emission inventories of the two major sources, Hudson Pulp and Paper Corporation and FP&L, (2) calculations with the Air Quality Display Model (AQDM), and (3) calibrations derived for Duval County in 1972. ESE believes that calculations using AQDM overestimates the actual air concentrations.

The emission inventory used in the calculations is given in Table 2.23. The results of the calculations indicated that the estimated 1972 annual sulfur dioxide concentrations near the existing power plant are expected to be about 1 $\mu g/m^3$, well below the annual standard of 60 $\mu g/m^3$. The levels near the FP&L plant are dominated by the power plant, but the levels in the Palatka area are dominated by the pulp mill. The estimated 1972 annual suspended particulate matter concentrations near the existing power plant are expected to be in the range of 35 to 40 $\mu g/m^3$ with a background level of 30 $\mu g/m^3$. These existing levels are expected to be well below the standard of 60 $\mu g/m^3$ annual geometric mean concentrations.

TABLE 2.23. 1972 EMISSION INVENTORY USED IN ESTIMATING EXISTING POLLUTANT LEVELS (a)

Source	1972 Average Sulfur Dioxide Emissions (tons/day)	1972 Average Particulate Matter Emissions (tons/day)
Hudson Pulp and Paper		
No. 3 Recovery Boiler	0.0	18.0
No. 1 Lime Kiln	0.0	2.4
No. 2 Lime Kiln	0.0	2.8
No. 3 Lime Kiln	0.0	2.0
No. 4 Bark Boiler	12.7	8.5
No. 5 Power Boiler	5.1	0.6
Nos. 1 and 2 Recovery Stacks	0.0	29.5
Florida Power and Light		
Units 1 and 2 combined	13.7	0.3

(a) Environmental Science and Engineering, Inc. 1974.

3. THE PLANT

3.1 External Appearance

The proposed peaking facility will primarily consist of the following: (1) two Westinghouse Combined Cycle Gas Turbine units, (2) cooling tower and associated water treatment facilities, (3) fuel storage and transfer facilities, (4) a docking slip, and (5) an extension of the existing dock structure (Figure 3.1). Approximately 7 percent (10 acres) of the proposed site will be needed to construct these aforementioned facilities.

Visual impact should be minimal due to the secluded location, segregation of facilities, and an environmentally compatable paint scheme. The paint scheme is as follows:

Structure	Color
Gas Turbines/Boilers	Limpid Green
Control Building	Promise Green
Condensate Tanks	Dreamy Green
Water Tower	
Legs	Promise Green
Ball	Sapphire Blue
Cooling Tower	Concrete Buff
Oil Storage Tanks	Promise and Dreamy Green

No vegetation other than that required for construction will be removed. In addition, a 200-foot area around the site will be left undisturbed to provide a buffer zone between the facility units and the property limits. Also, shrubs and trees will be planted, as needed, to further blend the facility into the ambient background.

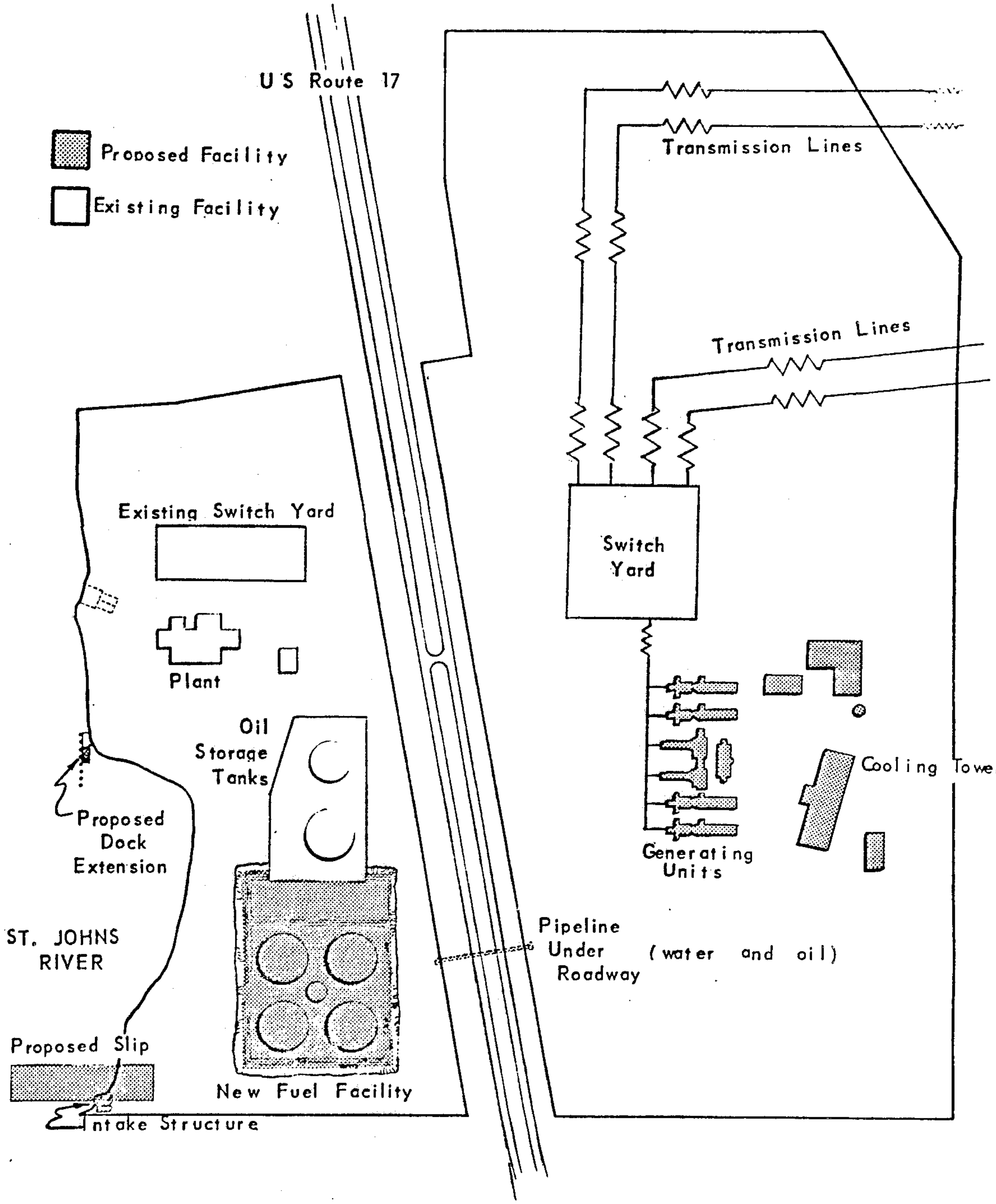


FIGURE 3.1 PLANT LAYOUT

3.2 Fuel

Low sulfur (0.7 percent) residual fuel oil will be used in the proposed combine cycle plant. Storage capacity of existing tanks is 155,000 barrels; an additional capacity of 525,000 barrels is proposed.

For the existing facility, fuel oil is supplied by barge where it is offloaded by a hose and pumped to storage tanks. Fuel for the proposed facility will also be supplied by barge. The increased barge traffic necessary to supply both the existing and proposed facilities naturally increases the probability of an oil spill. (Such a spill has not occurred to date.)

To handle the increased barge traffic and reduce the potential consequences of any spill, FP&L proposes to construct a barge slip approximately 900 feet south of the existing fuel oil unloading dock (Figure 3.2). The slip will be of driven sheet pile construction, 400 feet long, 100 feet wide, and approximately 14 feet deep. A concrete cap will be poured on the sheet pile. Two 15-foot diameter pile cells are currently anticipated (Figure 3.2). Approximately 43,000 cubic yards of spoil will be removed by hydraulic drédge. The spoil will be transferred to the borrow pit on FP&L property; some may be used in the construction of the fuel oil dike.

The three-sided configuration of the new slip will allow maximum control of any accidental spill. A floating boom will be placed behind a barge as it is being pumped to insure zero discharge to the St. Johns River in the unlikely event of an oil spill. With the increased barge traffic and until the new barge slip is completed, the existing dock may be expanded. Offloading from the dock and barge slip will be by suction so that a leak in fuel oil lines will not result in oil drips and spills.

To contain a terrestrial oil spill, the fuel washing facility and the fuel storage facility will be surrounded by an 8-foot retaining wall (Figure 3.2). The wall, with side slopes of 1 vertical to 2 horizontal, shall be of sufficient capacity to contain the oil from one large fuel storage tank. In the advent of a tank rupture, oil would be pumped from the containment area to the fuel washing facility for cleaning.

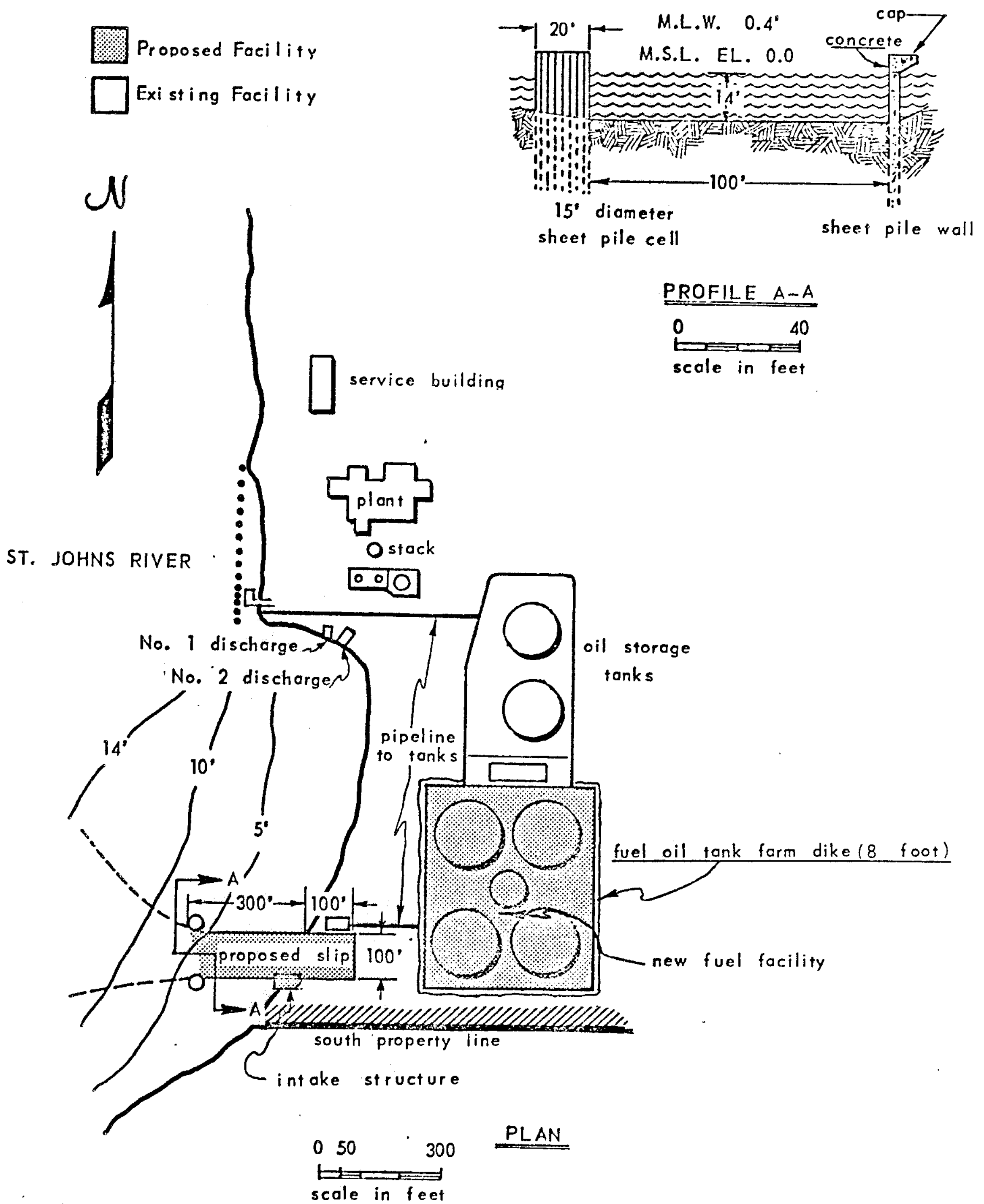


FIGURE 3.2 PROPOSED BARGE SLIP

3.3 Plant Water Use

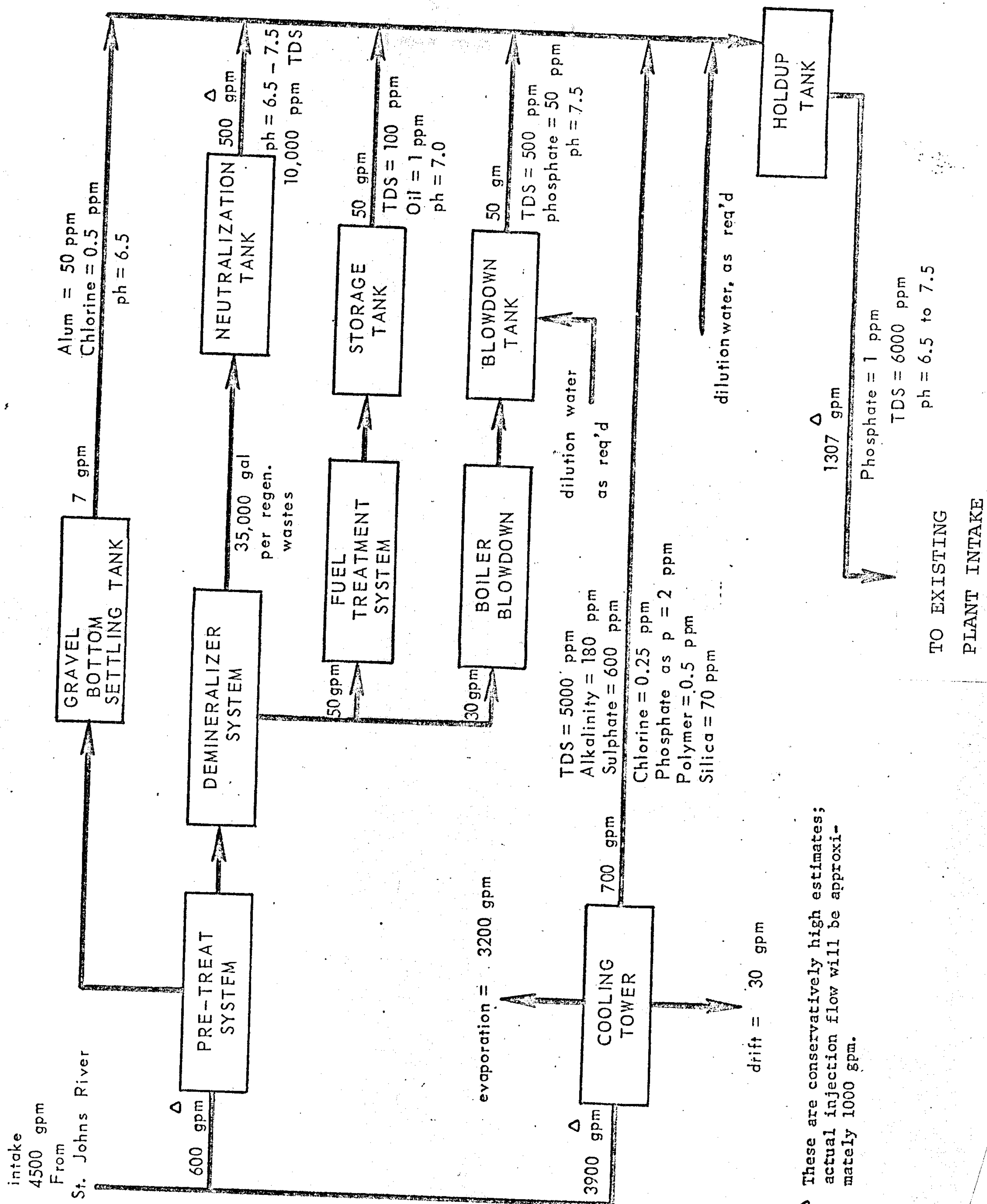
A flow diagram for water use in the proposed plant is shown in Figure 3.3. Approximately 4,500 gpm will be withdrawn from the St. Johns River through the intake structure shown in Figure 3.4. The major flow (3,900 gpm) will be to the cooling towers where it will be used to make up the approximately 3,200 gpm which is evaporated and the 700 gpm blowdown. The remainder of the water (600 gpm) will be utilized as process water and will be heated and used for such services as fuel treatment and boiler make-up. All wastewater, including the cooling tower blowdown, will be collected and injected into a disposal well. Groundwater (600 gpm) could be used for process water.

No
50

3.4 Heat Dissipation System

The total heat rejected by the plant, when operating at capacity, will be about 43 million Btu/min of which about 16 million Btu/min will be discharged to the air along with the combustion exhaust and the remaining 27 million Btu/min will be rejected by the condensers for the steam turbine to the circulating cooling water. The heat in the cooling water will be rejected to the air by means of a mechanical draft, wet cooling tower. The concrete cooling tower will have overall dimensions of approximately 265.5 feet in length, 87 feet in width, and 64.5 feet in height. The proposed location of the tower is shown in the plant layout diagram (Figure 3.1). A detailed drawing of the tower is shown in Figure 3.5.

The cooling water flow will be about 163,000 gpm and, at the design wet bulb temperature of 80° F, the inlet temperature to the cooling towers will be about 114°F and the outlet will be about 94°F. To accomplish this cooling the tower will evaporate about 3,200 gpm. The makeup water for the tower will be drawn from the St. Johns River through the intake structure shown in Figure 3.4. To keep the concentration of dissolved solids from building up to a high level in the cooling water, approximately 700 gpm blowdown will be discharged to a holding tank for injection into a disposal well (see Figure 3.3).



Δ These are conservatively high estimates; actual injection flow will be approximately 1000 gpm.

FIGURE 3.3 FACILITY WATER MATERIAL BALANCE

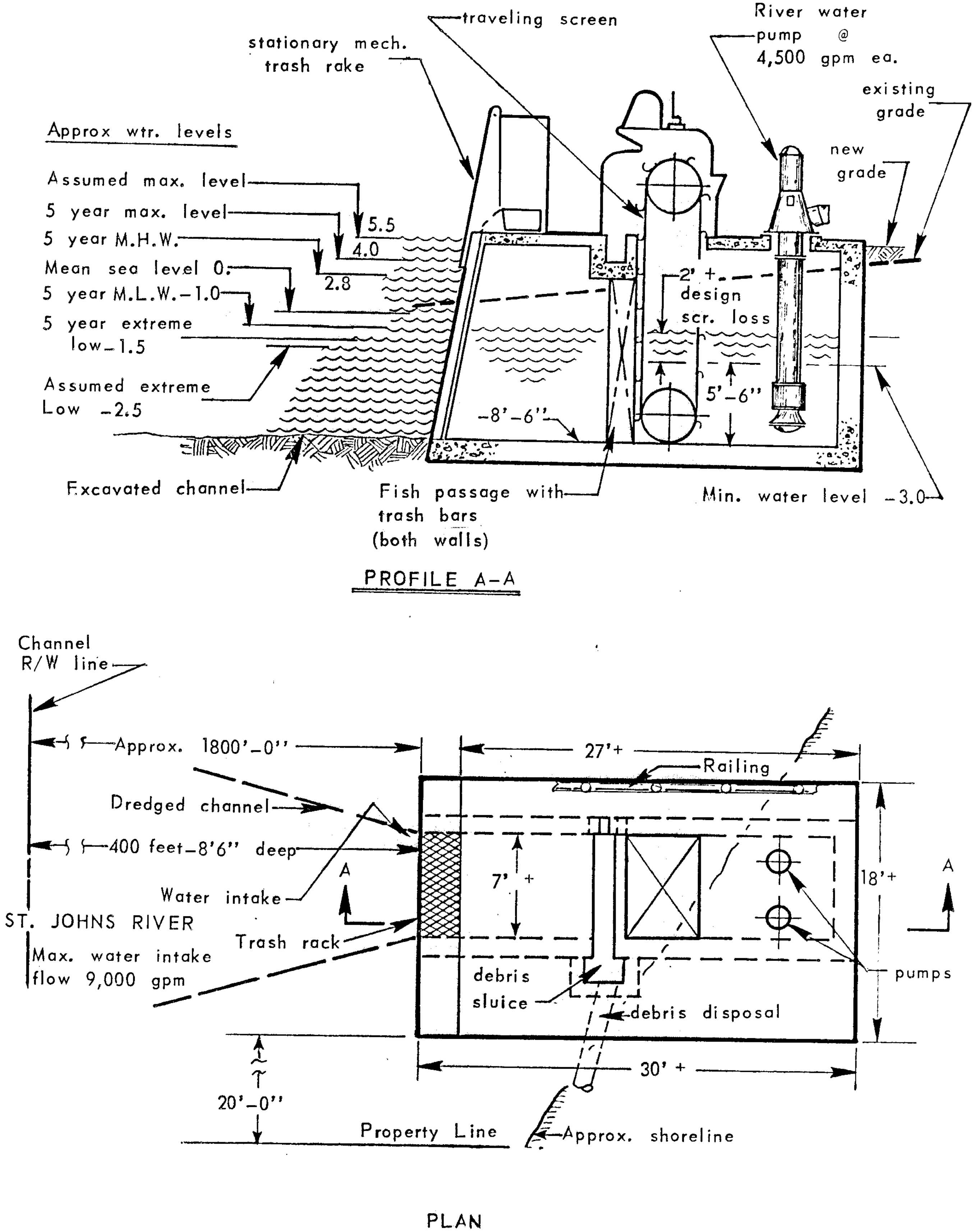


FIGURE 3.4. PROPOSED INTAKE STRUCTURE

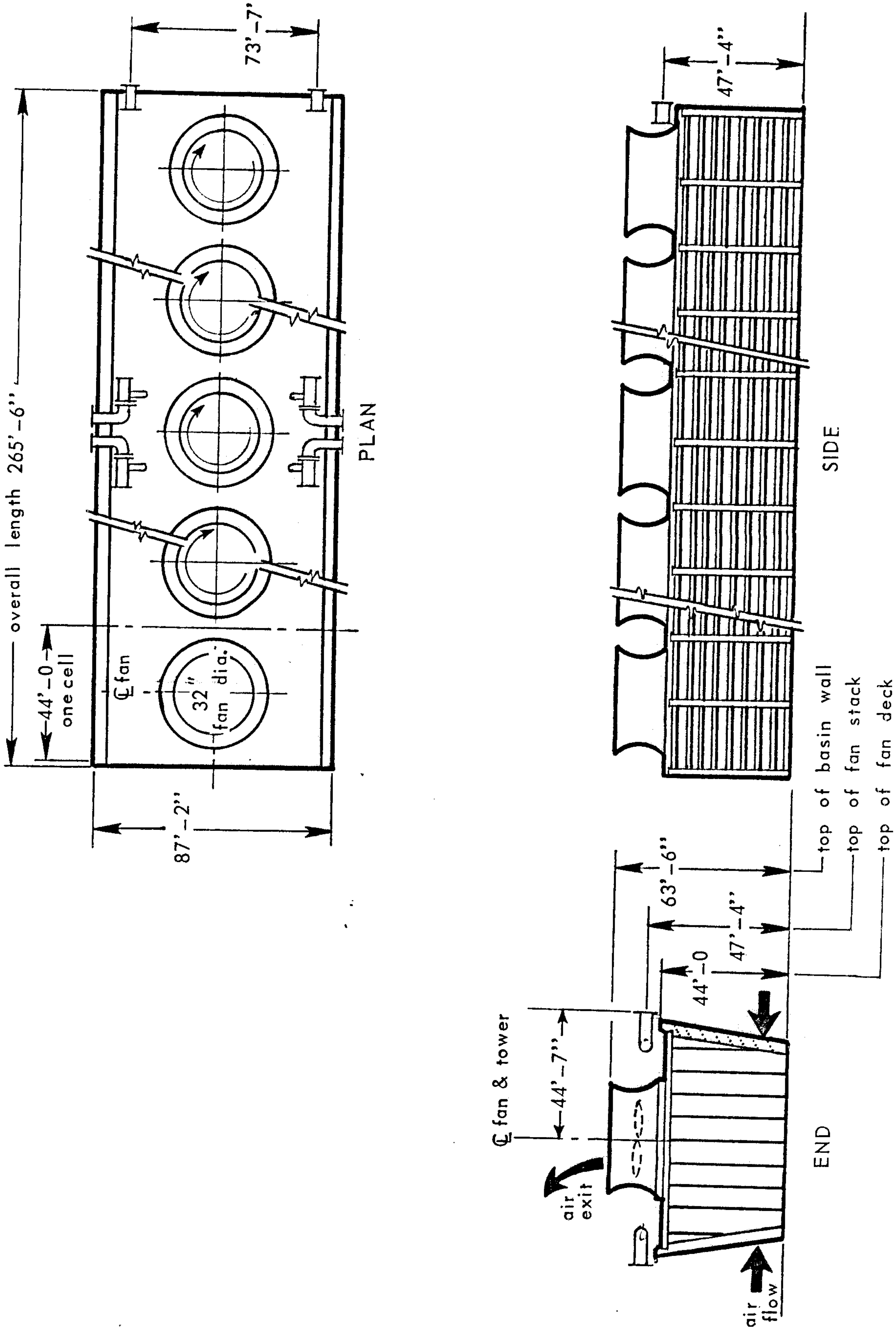


FIGURE 3.5. COOLING TOWER DESIGN

3.5 Chemical and Biocide Wastes

Wastewater from plant operations are to be deep-well injected into saltwater-bearing strata at depths of 1,300 feet or greater below the ground surface. Water quality at 1,380 feet in the on-site well currently being drilled and tested is given below:

Parameter	Value
pH	7.15
Magnesium as Mg	1,003 ppm
Chlorides	17,000 ppm
Sulfates	high
Calcium as Ca	912 ppm
Alkalinity at total $CaCO_3$	128 ppm
Hardness as $CaCO_3$	6,460 ppm
Conductivity	47,000 micromhos
Color	5 units

The volume of water to be injected will be approximately 1,000 gpm. The water quality by plant source is given below.

Water Use	Post-Treatment Quality
(1) Water to be treated prior to injection	
Settling tank	Alum 7 ppm
	Chlorine 0.5 ppm
	pH 6.5
Neutralization tank	TDS 10,000 ppm
	pH 6.5-7.5
Fuel treatment	TDS 100 ppm
	Oil 1 ppm
	pH 7
Boiler blowdown	TDS 500 ppm
	Phosphate 50 ppm
	pH 7.5

(2) Water not to be pretreated prior to injection

Cooling tower blowdown

TDS 5000 ppm

Alkalinity 180 ppm

Sulphate 600 ppm

Chlorine 0.25 ppm

Phosphate 2 ppm

Polymer 0.5 ppm

Silica 70 ppm

(3) Injection water quality (calculated at an injection rate of 1307 gpm and assuming complete mixing).

Alum <.05 ppm

Chlorine 1.5 ppm

TDS 6550 ppm

Oil < .01 ppm

Phosphate 3 ppm

Alkalinity 100 ppm

Sulfate 325 ppm

Polymer .3 ppm

Silica 40 ppm

pH 6.7

All waters go through a holding tank before going to the deep injection well. The quality of the water to be injected will always be better than that of the receiving aquifer. To insure injection water quality, dilution water may be added, if necessary. Sanitary quality of the injected water will be maintained by shock chlorination.

Plans call for 3 wells; an injection well, a standby injection well, and an on-site monitoring well. Depending on test results at the project site, the injection well design will be as follows.

A 20-inch surface casing will be set in the top of limestone bedrock and cemented in place. A 19-inch hole will be drilled through the cement plug and to the first saltwater zone which is expected to be at about 790 feet. A 14-inch casing will then be set inside the 20-inch surface casing and cemented in place in the limestone below all potable or potentially usable irrigation water. A 12-inch hole will be drilled through the 14-inch cement plug with drilling continuing until a suitable injection zone is found. (This zone has been found to be at a depth of 1300 feet or greater in the test well currently being drilled. Quality of the water in this zone has been given above.) Eight-inch casing will then be set through the 14-inch casing to the top of the injection zone and cemented in place.

Data to be collected during the drilling include the following:

1. Formation samples at 10-foot intervals
2. Water samples at 20-foot intervals or as conditions permit
3. Temperature of the water at 20-foot intervals
4. Water level measurements at the beginning of each day's operations as conditions permit
5. Specific capacity measurements at selected intervals
6. Geophysical logging at selected intervals to be arranged with U. S. Geological Survey or Department of Natural Resources. Logs to include electric, gamma ray, caliper, flowmeter, temperature, and conductivity.

Following the setting of the 8-inch casing, final testing will consist of both pumping from the well and injecting river water into the well. During these tests observation of water level changes in the annulus between the 8- and 14-inch casings will give an indication of the transfer of pressure from the injection zone to overlying zones.

After completion of the test hole, geophysical logs will be run by a commercial logging company. Logs are to consist of the following:

1. Induction electric
2. Gamma ray
3. Caliper
4. Temperature
5. Flowmeter (if appropriate)
6. Cement bond
7. Borehole compensated sonic.

The second phase of the program will follow successful completion of the test work described above. During this phase two additional wells will be drilled similar to the test well described above. Pumping tests will be run using these wells to obtain the data required to predict local and regional pressure effects of injection.

If wastewater were injected into a brackish or saltwater zone that is under, but too close to a freshwater aquifer, the resultant increase in head in the saltwater zone could drive saltwater into the freshwater aquifer. However, this circumstance should not occur because wastewater will be injected at depths of 1,300 feet or greater. This is about 500 feet below the lower Floridan Aquifer. Tests and results of calculations on radius of influence of the injection zone in the on-site well being drilled support this conclusion. Data are given below for injection rates of 1,000 gpm. Values for pressures are in feet above ambient artesian head in the injection zone.

	Radial Distance From Injection Well		
Time	500 Feet	2 Miles	10 Miles
10 days	10.5	2	0
1 year	16	7.5	3.5
10 years	19.5	10.5	6
30 years	21	12	7.5

From the above data chances of contamination of the brackish waters in or above the lower Floridan Aquifer are extremely remote to the point of being nonexistent. The U.S. Geological Survey has mapped one subsurface fault, with a vertical displacement of about 50 feet, approximately 6.5 miles west of the Palatka area. Relative displacement along the fault would have to be sufficient to bring the Floridan Aquifer to within close proximity to the injection zone. Available geological data indicate that this condition does not exist. Also, data (Section 2.4.2) indicate the rock strata at the injection depth are extremely impermeable to vertical water movements.

Water Supply and Wastewater Disposal Alternatives. Alternatives combining sources of water supply and disposal of wastewater are:

	Water Supply	Wastewater Disposal
(1)	Groundwater	St. Johns River
(2)	Groundwater	Deep-well injection
(3)	St. Johns River	St. Johns River
(4)	St. Johns River	Deep-well injection

Alternative (4), with the possibility of obtaining groundwater (approximately 600 gpm) for process water use, is the one that has been selected.

Alternatives (1) and (2) above are not believed to be viable for total water flow because they would require the use of groundwater from or above the Floridan Aquifers. Aquifers above the Floridan Aquifer are, in general, not considered to be potential sources of plant water for sustained yields of 4,500 gpm. This rate of withdrawal for any sustained period is likely to have serious impact on area groundwater users. The size of the area likely to be affected cannot be accurately predicted with data available, but the effect of the withdrawals could impact an area extending over several square miles.

The Floridan Aquifer could supply water at 4,500 gpm over sustained periods. Four or five wells 450- to 500-foot deep or a single 30-inch well 900-foot deep very likely could produce sustained total yields at this rate. Dissolved solids in water from 500-foot wells would probably amount to 2,000 to 3,000 mgl and over 5,000 mgl from 900-foot wells. However, a 1969 reconnaissance survey of the farming area immediately to the north and east of the project site indicated that the large irrigation withdrawals from the Floridan Aquifer occurring each year during the irrigation season resulted in increased TDS of the water and substantial decline in artesian head. At present the observed changes appear to be seasonal rather than permanent. However, there is concern that these changes may indicate an overdraft of the aquifer. If so, additional large withdrawals of Floridan Aquifer water for a sustained period of time would not reflect good water management practices, particularly during times of high irrigation demand.

Alternatives (1) and (3) involve returning plant wastewater to the St. Johns River. This would not be in the best interests of surface water quality and of downstream users. The river is already high in dissolved solids, particularly during periods of low flow.

3.6 Sanitary and Other Waste Systems

Sanitary waste will be deposited into portable toilets during construction; during process operation sanitary facilities at the existing FP&L power plant will be utilized.

All process waste will be deep-well injected (see Section 3.5).

3.7 Air Emissions

ESE (1974) estimated emissions of sulfur dioxide, particulate matter, and oxides of nitrogen from the new combined cycle units on the basis that the new units will average a 60 percent load. ESE also estimated the height and diameter of the gaseous discharge stacks as well as the temperatures and velocity of the gaseous discharges. In addition, ESE estimated the 1975 emissions from existing sources on the assumption that all existing sources would meet with Florida State emission standards and that they would be operating approximately as they were in 1972. These estimates are given in Table 3.1.

3.8 Associated Transmission Facilities

No associated transmission lines are necessary for this project. Existing transmission facilities have adequate capacity and will be utilized except from the proposed units to the adjacent switchyard.

TABLE 3.1. ESTIMATED 1975 EMISSION INVENTORY IN THE PALATKA AREA [a]

Source	Average Sulfur Dioxide Emissions, tons/day	Average Particulate Matter Emissions, tons/day	Nitrogen Oxides Emissions tons/day	Stack Dimensions		Gaseous Discharge	
				Height above ground, m	Diameter, m	Velocity, m/sec	Temp, C
Hudson Pulp and Paper							
No. 3 Recovery Boiler	0.0	0.4	-	40.5	3.0	7.3	90
No. 4 Recovery	0.0	0.3	-	40.0	1.4	19.0	71
No. 4 Lime Kiln	0.0	1.4	-	76.2	3.0	22.6	204
No. 4 Bark Boiler	1.7	0.4	-	48.2	3.0	15.5	57
No. 5 Power Boiler	4.3	0.6	-	48.2	2.7	15.1	232
Florida Power and Light							
Units No. 1 and 2	9.0	0.8	-	45.7	4.0	27.0	135
Total Combined Cycle Units	24.6	3.3	21.2	16.2	3.0	27.7	177

(a) Environmental Science and Engineering, Inc. 1974.

(b) Estimates for a 60 percent load.

4. ENVIRONMENTAL EFFECTS OF SITE PREPARATION, PLANT, AND ASSOCIATED TRANSMISSION FACILITIES CONSTRUCTION

4.1 Site Preparation and Plant Construction

Land Use. Site preparation and construction will necessitate the removal of natural habitat from approximately 10 acres. The area to be cleared includes habitat in the pine-palmetto and open-oak habitats (see Section 2.7). Utilization of the borrow pit on the site as a repository for refuse from clearing operations will not result in any significant environmental disturbance to the surrounding area.

Because of the physical location of the proposed generators, the fuel oil storage facilities and the existing steam plant, a tunnel (Figure 3.1) beneath Highway 17, will be required to house various oil, water, steam, and electrical cable feeder runs. FP&L has made contact with the Florida Department of Transportation and has satisfied all rules and specifications for underground tunnel construction and use.

The tunnel to house the aforementioned utilities will be constructed by excavating to the desired depth (approximately 18 feet below grade), exerting forms and placing reinforcing steel, and then pouring in place. During construction, it will be necessary to reduce traffic, on Highway 17, from four lanes to two lanes.

Water Use. The St. Johns River area adjacent to the proposed site will be subject to temporary disturbances during construction of the dock extension, barge ship, and water intake structure. Construction of the dock extension will require the placement of support structures and one new dolphin (Figure 4.1). Construction activities could result in a temporary displacement of fishes in the immediate area. However, when completed, the piles can be utilized for shelter and feeding surfaces by fishes.

Construction of the barge ship (Figure 3.2) will require cleaning fallen trees and water hyacinth from the entrance of Bray Creek. Also, 30,369 cubic yards of bottom materials will be removed by hydraulic dredge.

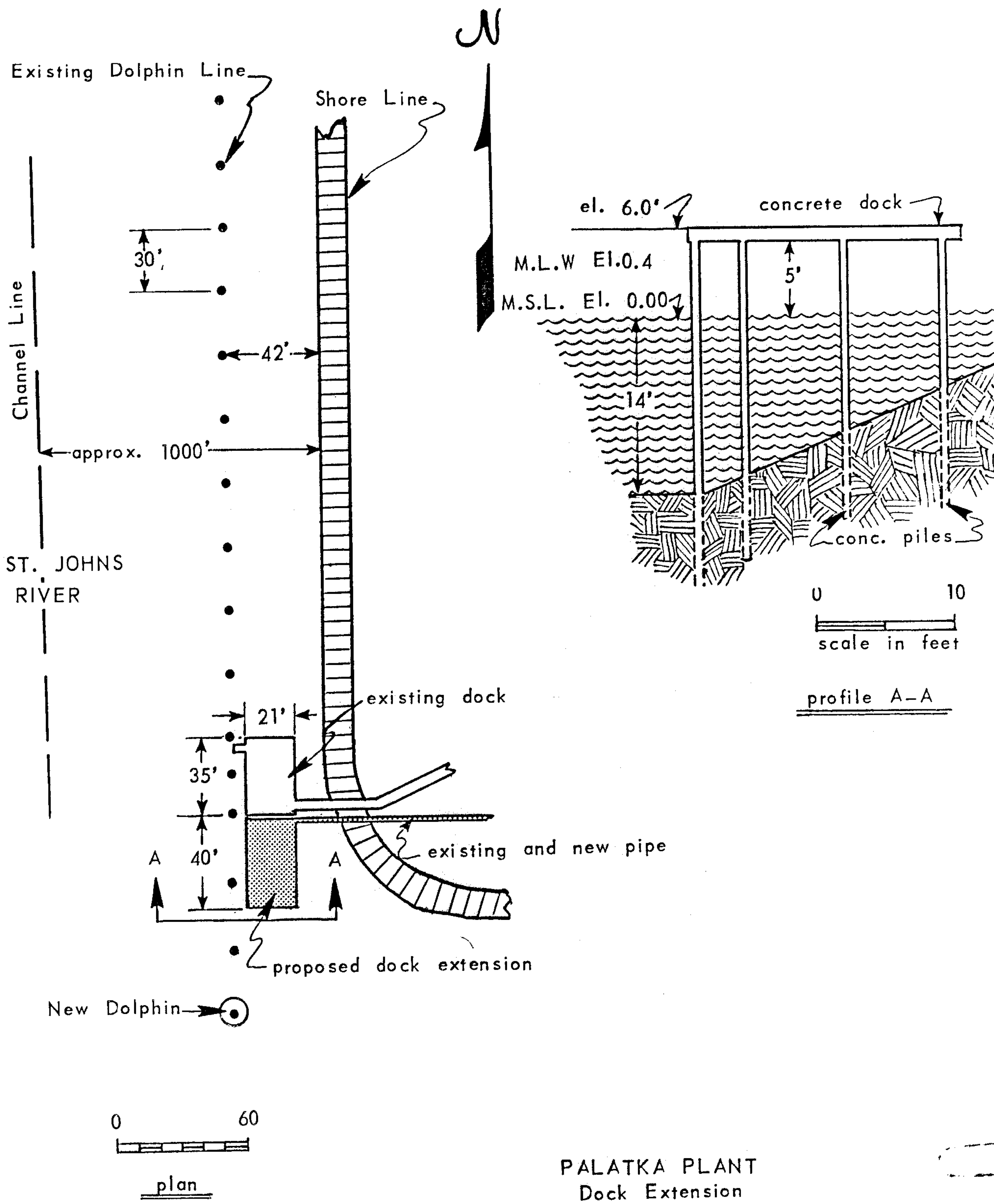


FIGURE 4.1. DOCK EXTENSION

Removal of the fallen trees and water hyacinth will have the positive effect of opening the creek for aquatic organisms (few of which currently exist) and will remove a breeding stock of water hyacinths presently unaffected by Federal weed control efforts.

Dredging operations will release large amounts of muck, fine sand, and decomposing peat to the aquatic environment. Also, a small amount of benthic fauna will be displaced although samples indicate the immediate area is virtually devoid of tube worms, mollusks, and crustaceans of importance as fish food (Applied Biology, Inc., 1974).

A hydraulic dredge will be utilized to reduce the impact of dredging. Spoil will be deposited on FP&L upland property. The upland site(s) will be chosen so as to minimize the environmental impact to the terrestrial community. Siltation and turbidity will also be controlled by using a silt barrier such as a polyethylene sheet suspended on flotation beams and chain weighted to the river bottom.

Construction of the slip will involve driving sheet piling and covering the piling with concrete. These activities will create a water disturbance that could temporarily displace biota in the immediate area.

Construction of the proposed water intake structure will require the dredging of approximately 1,500 cubic yards of bottom material. The same precautions used when dredging the barge slip will be applied here. Impacts due to construction activities will be similar to those described for the barge slip and are considered to be minimal.

Air. No problems are expected during construction of the proposed facility. State and local guidelines concerning dust, smoke, and equipment emissions will be complied with fully.

4.2 Associated Transmission Facilities Construction

No additional transmission facilities will be necessary for the proposed facility other than indicated in Paragraph 3.8.

5. ENVIRONMENTAL EFFECTS OF PLANT OPERATION

5.1 Effects of Operation of Heat Dissipation Systems

Aquatic. There will be no thermal effluent discharged into the St. Johns River; hence, there will be no thermal impact on the aquatic ecosystem.

Operation of the barge slip should have no detrimental impact on the aquatic environment. In fact, construction of the slip will reduce the potential for a major impact should an oil spill occur. The slip will be outfitted with a traveling boom which will be used to trap any oil released from oil transfer operations.

Entrainment of planktonic organisms and weak swimmers (phytoplankton, zooplankton, fish larvae, and fish fry) and the impingement of larger fishes on the traveling screens are potentially the most severe impacts that can occur affecting the aquatic community.

The plant will require about 4,500 gpm of water to be withdrawn from the St. Johns River. If the larger fishes (larger in diameter than the 3/8-inch mesh of the traveling screens) were randomly distributed in the river and could not avoid the intake structure, less than 1/6 of one percent of the fish population of that size would be caught by the traveling screens*. However, fishes are not randomly distributed, and they can, by swimming, avoid the intake structure. The horizontal intake velocity is less than 0.5 fps. At intake velocities below 1.0 fps, adult fishes should be able to avoid being caught on the traveling screens; young fishes or weak adults swimming too near the intake could be impinged (Hays, 1970; Laurence, 1972). Also, two flush mounted fish passages will be located on either side of the intake structure which will aid in minimizing the number of fishes impinged on the traveling screens. Therefore, it is not expected that even 1/6 of one percent of the fish population will be impinged on the traveling screens. In any case, a loss of 1/6 of one percent would not significantly affect the aquatic ecosystem.

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* Table 2.17, page 37, illustrates a 24-hour catch from the traveling screens for the existing facility. Because the cooling water flow for the existing facility is about 86 times the intake flow required for the proposed expansion, and because Table 2.17 indicates harvest on only 59 fish in 24 hours, it is therefore expected that very few fish would be impinged by the intake structure of the proposed expansion.

The proposed peaking facility at the Palatka site will utilize deep-well injection for effluent discharge. This means that all organisms entrained in the plant cooling water will be removed from the St. Johns River and a mortality of 100 percent will occur. However, based on data being collected at the existing facility, a small percentage of organisms are actually entrained. Further studies are in progress which will more exactly determine the population percentage to be affected.

The possibility of fishes being attracted to the general area of the proposed intake structure by the existing thermal effluent from the present plant has been considered. This condition should not have any marked increased in the number of impinged fishes. Because the intake structure is located upstream of the present effluent and will be located adjacent to and south of the proposed barge slip, it is very unlikely that this warm-water plume will come close to the new intake structure. Also, the fish passages and the loss intake velocity should provide adequate protection against impingement of large numbers of fishes.

Terrestrial. No adverse effects to the terrestrial environment are expected to result from operation of the proposed facility.

To maintain tunnel utilites and allow safe crossing of Highway 17, stairs will be provided at each end of the tunnel. Also, the tunnel floor will be sloped to insure adequate drainage. The sumps will be outfitted with pumps and will pump drainage water to the oil-water separator located in the diked area for proper disposal.

Atmosphere. The effects of plume visibility, fog, and drift from the proposed cooling towers were evaluated by Ray L. Lyerly & Associates (RLL) consultants to FP&L. In their evaluation (see Appendix D) RLL cited experience with similar towers at Lake Worth and Gainesville and concluded that it was reasonable to expect no visible plume over 70 percent of the time. RLL also concluded that it would be extremely unlikely that a ground fog would develop as a result of the tower and that drift will not create any measurable environmental effects.

Blowdown from the cooling towers will be injected into a disposal well. Consequently, no surface environmental effects from the blowdown are expected.

5.2 Effects of Chemical and Biocide Discharges

All thermal and chemical effluents are to be deep-well injected, hence, no surface terrestrial or aquatic impacts are expected.

Based on available data (Section 3.5) deep-well injection will not result in a negative impact to the receiving waters.

5.3 Effects of Sanitary and Other Waste Discharges

No new sanitary discharges will occur from the proposed facility; existing FP&L facilities will be utilized for waste disposal. The addition of approximately 50 employees for the proposed facility will not overload the existing sanitary waste system.

5.4 Effects of Air Emissions

The 1975 air quality in the Palatka area was estimated by ESE (1974) using AQDM and short-term models plus the emission inventory and the stack parameters listed in Table 5.1. Considering only the existing sources and assuming that they meet the State emission standards, the highest annual average is estimated to be approximately 0.8 $\mu g/m^3$. The estimated incremental annual average sulfur dioxide levels due to the new combined cycle units indicate that the new units will contribute a maximum of approximately 5 $\mu g/m^3$. When considering all the sources, the maximum annual average will be approximately 5 $\mu g/m^3$. With or without the new units, the annual average sulfur dioxide concentrations will be well below the air quality standard of 60 $\mu g/m^3$. The short-term models were used to estimate the maximum 24-hour and 3-hour concentrations resulting from the new combined cycle gas turbine units. The meteorological conditions assumed are expected to yield a "worst-day" situation and were based upon ESE's experience with the short-term model in Jacksonville, Florida. Table 5.2 summarizes the results of the short-term model. As shown, the short-term model indicatesthat the State standard of 260 $\mu g/m^3$ maximum 24-hour concentration for sulfur dioxide may be exceeded. ESE indicates that,

TABLE 5.1. MAXIMUM SULFUR DIOXIDE AND SUSPENDED PARTICULATE MATTER[a] LEVELS WITHIN THREE MILES OF FLORIDA POWER AND LIGHT IN PALATKA[b]. LONG-TERM MODEL CALCULATIONS ($\mu g/m^3$)[c]

Control Strategy	Maximum Annual Concentrations		Maximum 24-Hour		Maximum 3-Hour
	Sulfur Dioxide Annual Average	Suspended Particulate Matter Annual Geometric Mean	Sulfur Dioxide	Suspended Particulate Matter	Sulfur Dioxide
All significant sources, 1972	1	41	15	110	40
All existing sources meeting the Florida allowable Emissions Standards and same operating rate as 1972	<1	31	10	35	30
All existing sources and new combined cycle units meeting the Florida allowable Emissions Standards	6	32	70	45	200
Florida Standards	60	60	260	150	1300

(a) Includes a background concentration of 30 $\mu g/m^3$.
(b) Environmental Science and Engineering, Inc. 1974.
(c) Short-term maximum concentrations are calculated on the conservative basis of a standard 24-hour geometric deviation of 3.0 for sulfur dioxide and 2.0 for suspended particulate matter.

TABLE 5.2. ESTIMATED MAXIMUM SHORT-TERM SULFUR DIOXIDE AND SUSPENDED PARTICULATE MATTER CONCENTRATIONS ($\mu g/m^3$) NEAR THE COMBINED CYCLE UNITS[a]. SHORT-TERM MODEL CALCULATIONS[b]

	Sulfur Dioxide Levels		Suspended Particulate Matter Levels[b]
	Maximum 24-Hour	Maximum 3-Hour	Maximum 24-Hour
Incremental impact of the combined cycle units	250	570	64
All sources (including the combined cycle units)	290	670	67
Florida Standards	260	1300	150

(a) Environmental Science and Engineering, Inc. 1974.
(b) ESE indicated that, based on their experience, the estimates may be overcalculated by at least a factor of four.
(c) This includes an estimated background level of 30 $\mu g/m^3$.

based on their experience, the estimates may be overcalculated by at least a factor of four. All other concentrations are expected to be well below any applicable standard. The short-duration downwash situation may occur, but was not considered by ESE.

5.5 Effects of Operation and Maintenance of the Associated Transmission System

New transmission facilities are not required for the proposed facility.

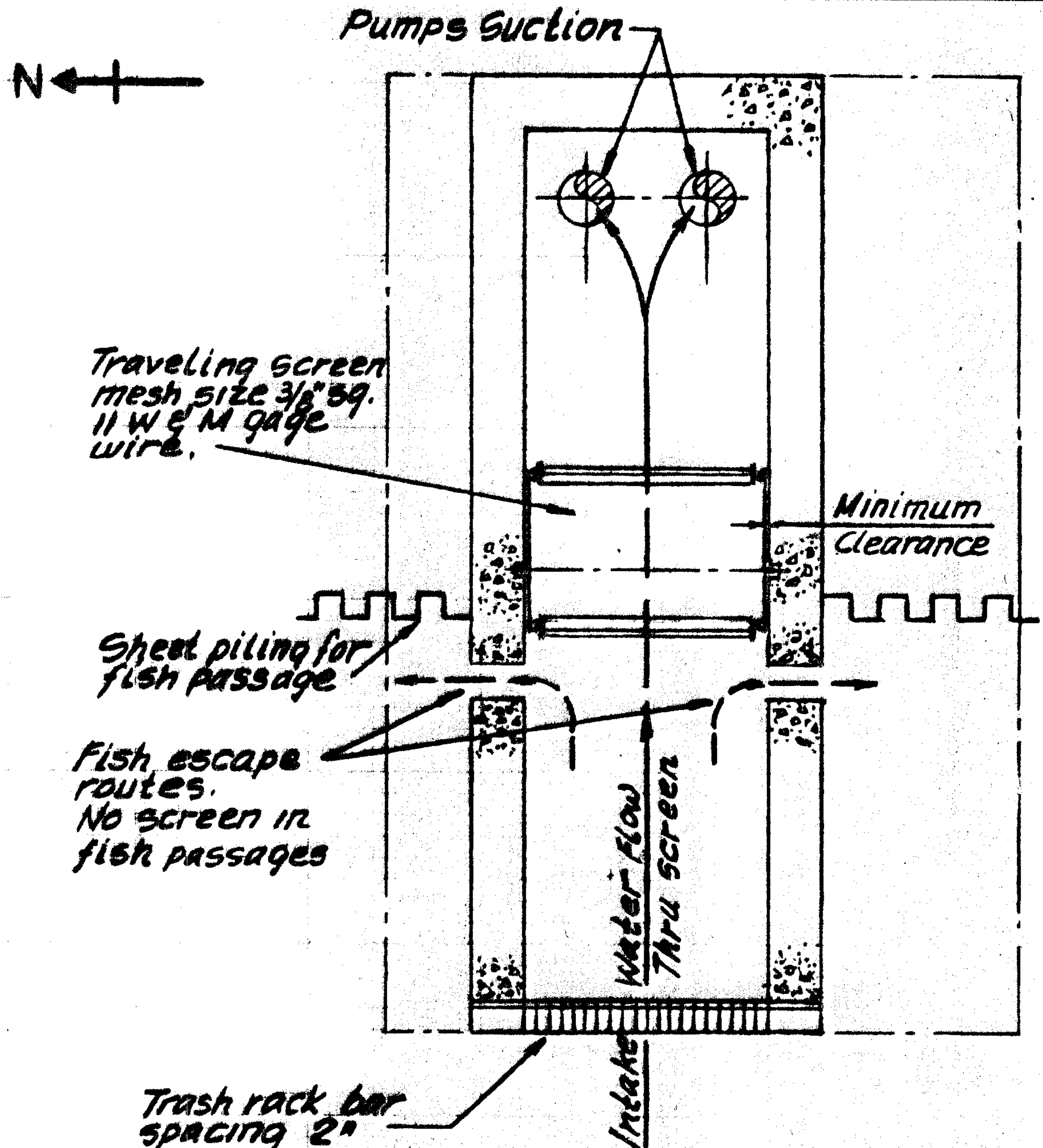
5.6 Other Effects

The effects of noise associated with the operation of the proposed facility are not included in this report. However, Battelle's Columbus Laboratories has work under way to collect and analyze the necessary data. The results of that study will be presented in a supplemental report within 30 days of submission of this report.

Supplement to Environmental Report
for Expansion of Existing Palatka
Power Plant as requested by the
Florida Dept. of Pollution Control

Section 5 - Environmental Effects of Plant Operation

Reference is made to page 62 paragraph 4 which describes the protection of aquatic life provided within the intake structure. The attached sketch of the proposed intake structure details the flow of water and entrained organisms. Fish passages are provided through the intake walls from the structure floor to the mean high water level to allow escape of weak swimmers. Sheet piling is provided at the exits of the fish escape passages to direct the fish back toward the river center and away from the shore.



PLAN AT MEAN SEA LEVEL

Scale of feet

Proposed Intake Structure

in ST. JOHNS RIVER

at PALATKA

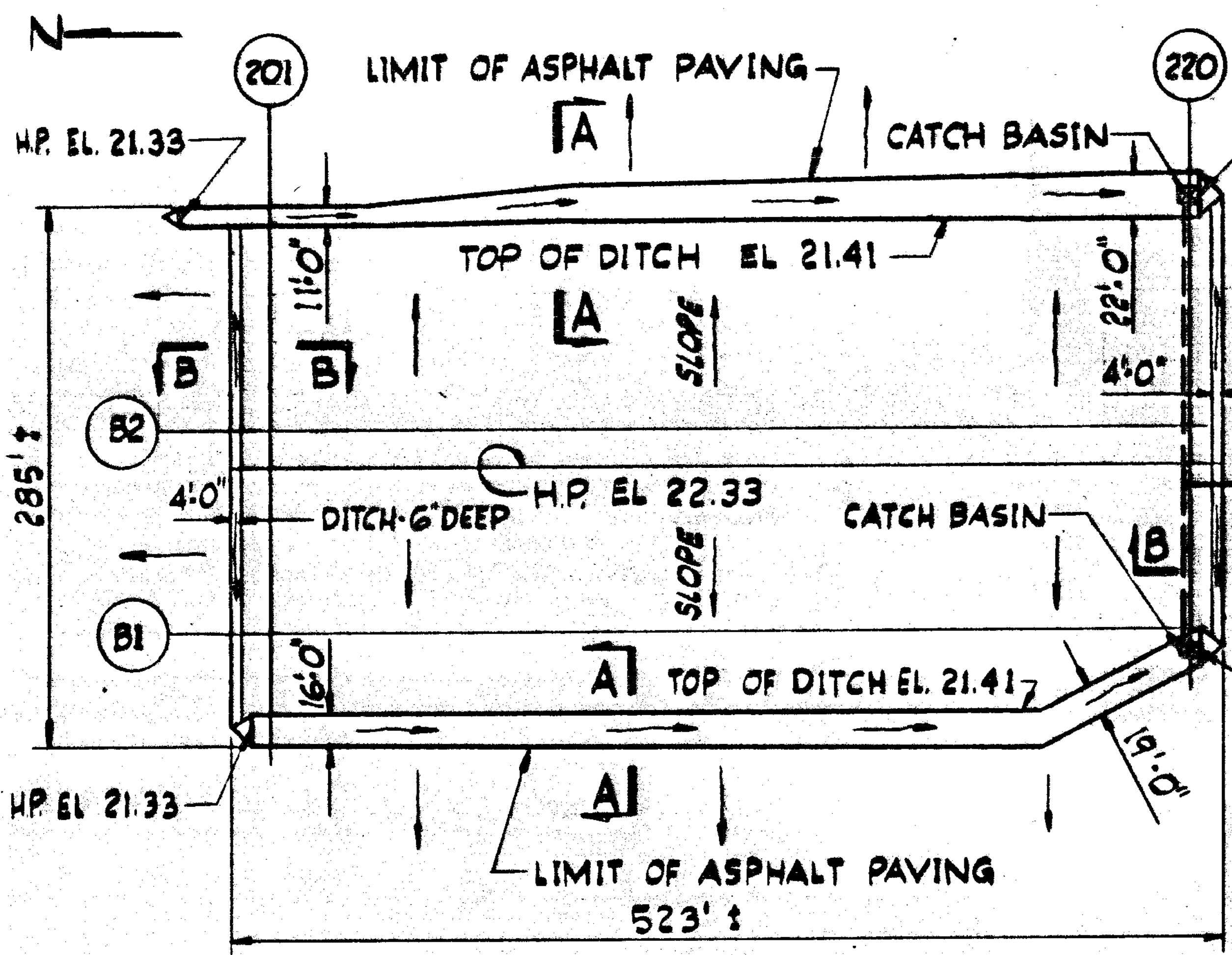
County of PUTNAM, State FLA.

Application by FLORIDA POWER & LIGHT CO. Date

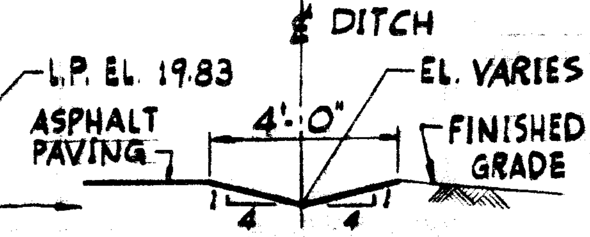
Supplement to Environmental Report
for Expansion of Existing Palatka
Power Plant as requested by the
Florida Dept. of Pollution Control

Section 5 - Environmental Effects of Plant Operation

Reference is made to section 5 pages 62-65 entitled "Environmental Effects of Plant Operation." Attached is sketch SK-S-524 74 illustrating the drainage from the power block area which might contain any chemical or oil contaminated runoff. All runoff will be routed as shown through an oil water separator to a holding tank. The contents of the holding tank will be discharged to the existing plant cooling water intake. Oil will be returned to the oil storage tanks.

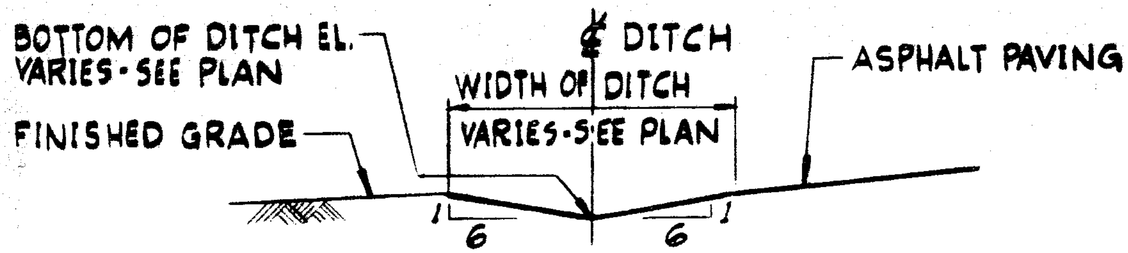


PLAN
SCALE: 1" = 100'



SECTION B-B

NOTE:
PIPING, LOCATION OF HOLDING TANK AND SEPARATOR IS SHOWN SCHEMATICALLY.



SECTION A-A

FLORIDA POWER & LIGHT
PALATKA PLANT
PROPOSED DRAINAGE FROM
POWER BLOCK AREA
SK-S-52474

Supplement to Environmental Report
for Expansion of Existing Palatka
Power Plant as requested by the
Florida Dept. of Pollution Control

<u>Section 3 - The Plant & Section 4 - Effects of Site, Plant and Transmission</u>

Reference is made to page 46 paragraphs 3 and 4 and pages 59, 60 and 61 the section "Water Use" which describes shoreline modifications. The proposed dock extension has been deleted from the job. The proposed intake structure and barge slip remain unchanged.

Supplement to Environmental Report
for Expansion of Existing Palatka
Power Plant as requested by the
Florida Dept. of Pollution Control

Section 3 - The Plant

The waste water from the Petreco fuel washing system will be treated in a primary system supplied as a Petreco effluent water treating system. The system consists of a Pielkenroad single pack, above ground, corregated plate oil and water separator in series with a Wemco No. 44 Depurator. A secondary treatment facility will consist of carbon filters to reduce the oil contamination to a 1 ppm level. Discharge effluent is then routed to the holding tank and deepwell injected. Reclaimed oil is returned to oil storage.

The waste water from the demineralizer system consisting of acid and caustic regenerative wastes plus all eluded material from the ion exchange resins is routed to the neutralization tank. The tank contents are metered with a pH meter and adjusted with either acid or caustic to approximately a pH of 6.5-7.5. Contents of the tank are then forwarded to the holding tank and deepwell injected.

Supplement to Environmental Report
for Expansion of Existing Palatka
Power Plant as requested by the
Florida Dept. of Pollution Control

Section 3-- The Plant

Reference is made to the first paragraph of page 48 which describes plant water use. The plant's 600 gpm of process water will be obtained from the St. John's River through the intake structure. Ground water will not be used for process water.

6. ENVIRONMENTAL MEASUREMENTS AND MONITORING PROGRAMS

6.1 Groundwater

The project design calls for the placement of 3 wells on the site: an injection well, a standby injection well, and an on-site monitoring well. Measurements and tests to be made during the construction phase are discussed in Section 3.5.

6.2 Other

Other monitoring will be conducted in accordance with established Florida Department of Pollution Control Requirements. These monitoring requirements shall be part of the certification for the Palatka Plant Site issued by the Department.

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APPENDIX A

JUSTIFICATION OF JACKSONVILLE'S WEATHER DATA FOR AIR QUALITY CALCULATIONS

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FISHERIES BIOLOGY
P[illegible]TION BIOASSAYS
W[illegible]LIFE ECOLOGY
B[illegible]NY
C[illegible]ISTRY
RADIOCHEMISTRY
BIOSTATISTICS
ENVIRONMENTAL ECONOMICS

REFERENCE ______________________

ENVIRONMENTAL ENGINEERING
AIR QUALITY MANAGEMENT
DISPERSION MODELING
OCEANOGRAPHY
COASTAL ENGINEERING
HYDROLOGY
GEOLOGY
GEOLOGICAL ENGINEERING
WASTEWATER MANAGEMENT
SOLID WASTE MANAGEMENT
OCCUPATIONAL SAFETY/HEALTH

March 13, 1974

Dr. Gilbert E. Raines
Battelle Corp.
Columbus Laboratories
505 King Ave.
Columbus, Ohio 43201

Dear Dr. Raines:

Please find enclosed one copy of the letter sent to Earl Weber on March 6.

If you have any questions or comments, please feel free to call me.

Sincerely,

ENVIRONMENTAL SCIENCE &
ENGINEERING, INC.

Bob Holden

Robert E. Holden
Associate Engineer

REH:peg

Enclosure

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HYDROLOGY
GEOLOGY
GEOLOGICAL ENGINEERING
WASTEWATER MANAGEMENT
SOLID WASTE MANAGEMENT
OCCUPATIONAL SAFETY HEALTH

REFERENCE ____________

March 6, 1974

Mr. Earl Weber, Consultant
Florida, Power and Light Company
Post Office Box 3100
Miami, Florida 33101

Dear Mr. Weber:

This letter is to confirm our telephone conversation of March 5, 1974.

At the time Environmental Science and Engineering, Inc. (ESE) was first awarded the contract to do the air quality impact study for the proposed new electrical generating units in Palatka, the meteorological data, utilized in the AQDM, was obtained from the nearest weather station for which the "star" data was available. This data was gathered at the Jacksonville Municipal airport in 1972.

Since that time, it has come to our attention that "star" data is available for the Daytona Beach area. Although Daytona Beach is several miles closer to Palatka than Jacksonville, it is still the opinion of the ESE staff that the data gathered in Jacksonville is more appropriate to the Palatka area than the Daytona Beach data. The reason is simple, a quick glance at a good map of Florida will show that the Jacksonville airport is at least ten miles further inland from the Atlantic Ocean than the Daytona Beach airport (the location of the Daytona Beach weather station). As this minimizes the localized "sea breeze" effect, it is felt that the Jacksonville meteorological data will more accurately reflect the Palatka area than the Daytona Beach data.

Sincerely,

ENVIRONMENTAL SCIENCE &
ENGINEERING, INC.

Bob

Robert E. Holden
Associate Engineer

REH:peg

OFFICE/LABORATORY LOCATION: FIVE MILES WEST OF INTERSTATE 75 ON STATE ROAD 26 (NEWBERRY ROAD)

APPENDIX B

FISHES REPORTED FROM THE ST. JOHNS RIVER BY FAMILY AND SPECIES

Compiled by

APPLIED BIOLOGY, INC.
1974

APPENDIX B

FISHES REPORTED FROM THE ST. JOHNS RIVER BY FAMILY AND SPECIES[1,2]

Scientific Name	Common Name
Petromyzontidae	
Petromyzon marinus	Sea lamprey
Sphyrnidae	
Sphyrna lewini	Scalloped hammerhead
Dasyatidae	
Dasyatis americana	Southern stingray
Dasyatis sabina	Atlantic stingray
Acipenseridae	
Acipenser brevirostrum	Shortnose sturgeon
Acipenser oxyrhynchus	Atlantic sturgeon
Lepisosteidae	
Lepisosteus osseus	Longnose gar
Lepisosteus platyrhinchus	Florida gar
Amiidae	
Amia calva	Bowfin
Elopidae	
Elops saurus	Ladyfish
Megalops atlantica	Tarpon
Anguillidae	
Anguilla rostrata	American eel
Clupeidae	
Alosa aestivalis	Blueback herring
Alosa mediocris	Hickory shad
Alosa sapidissima	American shad
Brevoortia smithi	Yellowfin menhaden
Brevoortia tyrannus	Atlantic menhaden
Dorosoma cepedianum	Gizzard shad
Harengula pensacolae[3]	Scaled sardine
Opisthonema oglinum[2,3]	Atlantic thread herring

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1 Modified from Tagatz (1967).
2 Bailey, R. M. *et al.* (1970).
3 Doubtful.

Engraulidae	
<u>Anchoa hepsetus</u>	Striped anchovy
<u>Anchoa mitchilli</u>	Bay anchovy
Umbridae	
<u>Umbra pygmaea</u>	Eastern mudminnow
Esocidae	
<u>Esox americanus</u>	Redfin pickerel
<u>Esox niger</u>	Chain pickerel
Synodontidae	
<u>Synodus foetens</u>	Inshore lizard fish
Cyprinidae	
<u>Hybopsis harperi</u>	Redeye chub
<u>Notemigonus crysoleucas</u>	Golden shiner
<u>Notropis chalybaeus</u>	Ironcolor shiner
<u>Notropis cummingsae</u>	Dusky shiner
<u>Notropis emilae</u>	Pugnose minnow
<u>Notropis hypselopterus</u>	Sailfin shiner
<u>Notropis maculatus</u>	Taillight shiner
<u>Notropis petersoni</u>	Coastal shiner
<u>Notropis welaka</u>	Bluenose shiner
Catostomidae	
<u>Erimyzon sucetta</u>	Lake chubsucker
Ictaluridae	
<u>Ictalurus brunneus</u>	Snail bullhead
<u>Ictalurus catus</u>	White catfish
<u>Ictalurus natalis</u>	Yellow bullhead
<u>Ictalurus nebulosus</u>	Brown bullhead
<u>Ictalurus punctatus</u>	Channel catfish
<u>Noturus gyrinus</u>	Tadpole madtom
<u>Noturus leptacanthus</u>	Speckled madtom
Ariidae	
<u>Bagre marinus</u>	Gafftopsail catfish
<u>Arius felis</u>	Sea catfish
Aphredoderidae	
<u>Aphredoderus sayanus</u>	Pirate perch
Batrachoididae	
<u>Opsanus tau</u>	Oyster toadfish

Gobiesocidae	
Gobiesox strumosus	Skilletfish
Ogcocephalidae	
Ogcocephalus nasutus	Shortnose batfish
Gadidae	
Urophycis floridanus	Southern hake
Urophycis regius	Spotted hake
Ophidiidae	
Ophidion welshi	Crested cusk-eel
Belonidae	
Strongylura marina	Atlantic needlefish
Cyprinodontidae	
Cyprinodon hubbsi	Lake Eustis minnow
Cyprinodon variegatus	Sheepshead minnow
Fundulus chrysotus	Golden topminnow
Fundulus cingulatus	Banded topminnow
Fundulus confluentus	Marsh killifish
Fundulus heteroclitus	Mummichog
Fundulus majalis	Striped killifish
Fundulus notti	Starhead topminnow
Fundulus seminolis	Seminole killifish
Fundulus similis	Longnose killifish
Jordanella floridae	Flagfish
Leptolucania ommata	Pygmy killifish
Lucania goodei	Bluefin killifish
Lucania parva	Rainwater killifish
Poeciliidae	
Gambusia affinis	Mosquitofish
Heterandria formosa	Least killifish
Poecilia latipinna	Sailfin molly
Atherinidae	
Labidesthes sicculus	Brook silverside
Membras martinica	Rough silverside
Menidia beryllina	Tidewater silverside
Menidia menidia	Atlantic silverside

Syngnathidae	
Oostethus lineatus	Opossum pipefish
Syngnathus fuscus	Northern pipefish
Syngnathus louisianae	Chain pipefish
Syngnathus scovelli	Gulf pipefish
Centropomidae	
Centropomus undecimalis	Snook
Serranidae	
Centropristis philadelphicus	Rock sea bass
Centropristis striata	Black sea bass
Mycteroperca microlepis	Gag
Morone saxatilis	Striped bass
Centrarchidae	
Acantharchus pomotis	Mud sunfish
Centrarchus macropterus	Flier
Lepomis gulosus	Warmouth
Elassoma evergladei	Everglades pygmy sunfish
Elassoma okefenokee	Okefenokee phgmy sunfish
Elassoma zonatum	Banded pygmy sunfish
Enneacanthus chaetodon	Blackbanded sunfish
Enneacanthus gloriosus	Bluespotted sunfish
Enneacanthus obesus	Banded sunfish
Lepomis auritus	Redbreast sunfish
Lepomis macrochirus	Bluegill
Lepomis marginatus	Dollar sunfish
Lepomis microlophus	Redear sunfish
Lepomis punctatus	Spotted sunfish
Micropterus salmoides	Largemouth bass
Pomoxis nigromaculatus	Black crappie
Percidae	
Etheostoma edwini	Brown darter
Etheostoma fusiforme barratti	Swamp darter
Etheostoma nigrum	Johny darter
Percina nigrofasciata	Blackbanded darter

Carangidae	
<u>Caranz hippos</u>	Crevalle jack
<u>Chloroscombrus chrysurus</u>	Atlantic bumper
<u>Oligoplites saurus</u>	Leatherjacket
<u>Selene vomer</u>	Lookdown
<u>Trachinotus falcatus</u>	Permit
<u>Vomer setapinnis</u>	Atlantic moonfish
Lutjanidae	
<u>Lutjanus analis</u>	Mutton snapper
<u>Lutjanus griseus</u>	Gray snapper
Gerridae	
<u>Diapterus olisthostomus</u>	Irish pompano
<u>Diapterus plumieri</u>	Striped mojarra
<u>Eucinostomus argenteus</u>	Spotfin mojarra
<u>Eucinostomus gula</u>	Silver jenny
Pomadasyidae	
<u>Orthopristis chrysoptera</u>	Pigfish
Sparidae	
<u>Archosargus probatocephalus</u>	Sheepshead
<u>Lagodon rhomboides</u>	Pinfish
Sciaenidae	
<u>Bairdiella chrysura</u>	Silver perch
<u>Cynoscion nebulosus</u>	Spotted seatrout
<u>Cynoscion regalis</u>	Weakfish
<u>Leiostomus xanthurus</u>	Spot
<u>Menticirrhus americanus</u>	Southern kingfish
<u>Micropogon undulatus</u>	Atlantic croaker
<u>Pogonias cromis</u>	Black drum
<u>Scianenops ocellata</u>	Red drum
<u>Stellifer lanceolatus</u>	Star drum
Ephippidae	
<u>Chaetodipterus faber</u>	Atlantic spadefish
Mugilidae	
<u>Agnonostomus monticola</u>	Mountain mullet
<u>Mugil cephalus</u>	Striped mullet
<u>Mugil curema</u>	White mullet

Sphyraenidae	
Sphyraena barracuda	Great barracuda
Uranoscopidae	
Astroscopus y-graecum	Southern star-gazer
Blenniidae	
Chasmodes bosquianus	Striped blenny
Hypsoblennius hentzi	Feather blenny
Hypsoblennius ionthas	Freckled blenny
Eleotridae	
Dormitator maculatus	Fat sleeper
Eleotris picta	Spotted sleeper
Gobiidae	
Awaous tajasica	River goby
Bathygobius soporator	Frillfin goby
Gobioides broussonneti	Violet goby
Gobionellus boleosoma	Darter goby
Gobionellus gracillimus	Slim goby
Gobionellus hastatus	Sharptail goby
Gobionellus shufeldti	Freshwater goby
Gobionellus smaragdus	Emerald goby
Gobiosoma bosci	Naked goby
Gobiosoma robustum	Code goby
Microgobius gulosus	Clown goby
Microgobius thalassinus	Green goby
Trichiuridae	
Trichiurus lepturus	Atlantic cutlassfish
Scombridae	
Scomberomorus maculatus	Spanish mackerel
Stromateidae	
Peprilus alepidotus	Harvestfish
Triglidae	
Prionotus scitulus	Leopard searobin
Prionotus tribulus	Bighead searobin

Bothidae	
Ancylopsetta quadrocellata	Ocellated flounder
Citharichthys spilopterus	Bay whiff
Etropus crossotus	Fringed flounder
Paralichthys albigutta	Gulf flounder
Paralichthys dentatus	Summer flounder
Paralichthys lethostigma	Southern flounder
Scophthalmus aquosus	Windowpane
Soleidae	
Achirus lineatus	Lined sole
Trinectes maculatus	Hogchoker
Cynoglossidae	
Symphurus plagiusa	Blackcheek tonguefish
Balistidae	
Monocanthus hispidus	Planehead filefish
Tetraodontidae	
Sphoeroides maculatus	Northern puffer
Diodontidae	
Chilomycterus schoepfi	Striped burrfish

APPENDIX C

PUBLISHED MATERIAL DEALING WITH THE ECOLOGY OF THE PALATKA REGION

PUBLISHED MATERIAL DEALING WITH THE ECOLOGY OF THE PALATKA REGION

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APPENDIX D

PALATKA PLANT, COOLING TOWER INFORMATION

Ray L. Lyerly & Associates
CONSULTANTS IN POWER PLANT ENGINEERING

March 13, 1974

Dr. Gilbert E. Raines
Battelle - Columbus Laboratories
505 King Avenue
Columbus, Ohio 43201

Reference: Florida Power & Light Company
Palatka Plant Cooling Tower Information

Dear Dr. Raines:

Attached is a writeup on Plume Visibility and Drift for your use in the Environmental Impact Statement that is being prepared for the Palatka Gas Turbine Plant. Please call me if you need additional information or clarification.

Very truly yours,

Ray L Lyerly

Ray L. Lyerly
Consulting Engineer

RLL/dw

cc: Mr. W. J. Barrow, Jr.
Mr. C. W. Broadhurst
Mr. E. C. Weber

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Palatka Plant Cooling Tower

Plume Visibility and Drift

by

Ray L. Lyerly
Consulting Engineer
March 13, 1974

The exhaust from a mechanical draft cooling tower is air that is saturated with water vapor. Prior to discharging up the stack the saturated air is invisible. Upon leaving the stack the saturated air becomes mixed with cooler ambient air, and under certain conditions the resulting mixture will become visible.

The plume will remain invisible if the mixture of the saturated air and the cooler ambient air continues to be below the psychometric saturation curve. However, if the mixture exceeds the saturation curve and becomes super-saturated, some of the water vapor will condense and the mist will create a visible condition. The persistence or length of a visible plume will depend upon the length of time required for the mist to re-evaporate as the plume becomes more and more dispersed in the ambient air.

In a warm climate there is less probability that the mixture will reach super-saturated conditions for two reasons. One, at a given humidity warm air can absorb more water vapor per degree F, and thereby can absorb more water vapor before reaching super-saturation. Two, in most situations the ambient air in a warm climate will have a smaller temperature differential between it and the exhaust air, and thereby the equilibrium temperature of the mixture will take place with a smaller temperature change. With a smaller temperature change there is less opportunity to reach super-saturation.

Cooling tower experience in the State of Florida supports the above statements. As an example, mechanical draft cooling towers (about the same size as the Palatka tower) have been in service for a number of years at Lake Worth (Lake Worth Utilities Authority) and at Gainesville (Regional Electric Utilities Board). A general observation* is that there is no visible plume about 70% or more of the time. When there is a visible plume on most occasions it feathers out and disappears within 100 feet or less. On a few of the colder winter days, when calm atmospheric conditions exist, a visible plume remains intact and the plume rises vertically to an elevation of about 500 to 1000 feet, and then drifts horizontally across the sky and dissipates. On no occasion has a visible plume been seen to flow downward to ground level and cause fog conditions.

Since Palatka has similar climatological characteristics as Gainesville and Lake Worth, it is reasonable to expect no visible

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* Personal communication with engineers familiar with these two installations.

plume over 70% of the time from the Palatka tower. Also, it is extremely unlikely that a ground fog will develop as a result of the tower.

The drift from the Palatka cooling tower will not create any measurable environmental effects for several reasons. First, the tower will be equipped with efficient drift eliminators. Second, the six-cell tower is a small installation, and at the guaranteed drift rate the total quantity of drift is small. Third, the concentration of the total dissolved solids in the circulating water will be kept acceptably low by continuous blowdown.