Florida Power
A Progress Energy Company

Supplemental

Site Certification Application

Hines Energy Complex

Power Block 3

September 2002

Volume 1

Florida Power
A Progress Energy Company

September 4, 2002

Mr. Hamilton Oven, P.E., Administrator
Office of Siting Coordination
Florida Department of Environmental Protection
2600 Blair Stone Road, MS 48
Tallahassee, Florida 32399-2400

Re: **Florida Power - Hines Energy Complex**
Power Block 3
Supplemental Site Certification Application to PA 92-33

Dear Mr. Oven:

Please find enclosed the Supplemental Site Certification Application for Hines Power Block 3 to be located at the existing Hines Energy Complex in Polk County. This additional 530 MW (nominal) natural gas fired combined-cycle unit, with secondary distillate fuel oil capability, is consistent with the ultimate site capacity for which the Hines Energy Complex was originally certified.

Enclosed is Check # 107303, payable to the department in the amount of $50,000.00, pursuant to 62-17.293(1)(d), F.A.C., for the supplemental certification of a combined cycle facility.

We look forward to working with you, the Department and other agencies participating in the certification process. Should you, your staff, or any other agency representatives have any questions regarding this application, please do not hesitate to contact me at (813) 826-4363.

Sincerely,

Jamie Hunter
Lead Environmental Specialist
Environmental Services

Enclosures

jjh/JJH042

P.O. Box 14042
St. Petersburg, FL 33733

SUPPLEMENTAL SITE CERTIFICATION

FOR THE

FLORIDA POWER

HINES ENERGY COMPLEX

POWER BLOCK 3

POLK COUNTY, FLORIDA

VOLUME I OF I

SEPTEMBER 2002

APPLICANT INFORMATION

Applicant's Official Name **Florida Power**

Address **P.O. Box 14042, St. Petersburg, FL 33733**

Address of Official Headquarters **P.O. Box 1551, Raleigh, NC 27602**

Business Entity (corporation, partnership, co-operative) **Corporation**

Names, owners, etc. **Florida Power (a Progress Energy Company)**

Name and Title of Chief Executive Officer **Mr. William Cavanaugh III**

Chairman, President and Chief Executive Officer of Progress Energy

Name, Address, and Phone Number of Official Representative responsible for obtaining certification **Mr. John James (Jamie) Hunter**

Florida Power

P.O. Box 14042, MAC BB1A, St. Petersburg, FL 33733

(727) 826-4363

Site Location (county) **Polk**

Nearest Incorporated City **Fort Meade**

Latitude and Longitude **Latitude 27 47 15" Longitude 81 52 21"**

UTM's Northerly **1,255,200**

Easterly **541,600**

Section, Township, Range **S13, T31S, R24E**

Location of any directly associated transmission facilities (counties) **Not Applicable**

Name Plate Generating Capacity **Power Block 3 - nominal 530 MW**

Capacity of Proposed Additions **nominal 530 MW**

Ultimate Site Capacity (where applicable) **3000 MW**

Remarks: (Additional information that will help identify the applicant) **Supplemental Certification Application to PA 92-33**

PROJECT PARTICIPANTS

Florida Power

St. Petersburg, Florida

- Overall Management and Direction
- Engineering

Foster Wheeler Environmental Services, Inc.

Stuart, Florida

- Ecology and Wildlife

Golder and Associates

Gainesville, Florida

- PSD Permit Application
- Noise

Schreuder, Inc.

Tampa, Florida

- Site Civil and Geotechnical Engineering
- Geohydrology

Consensus Builders, Inc.

Tampa, Florida

- Land Use and Socioeconomic

Hopping Green & Sams, P.A.

Tallahassee, Florida

- Environmental Attorneys for Florida Power

PREFACE

In February 1992, the Public Service Commission (PSC) determined the need existed for Florida Power (FP) to develop natural gas-fired combined-cycle generating capacity at FP's Hines Energy Complex, an approximate 8,000-acre site in southwest Polk County. Moreover, the PSC found the need existed for the electricity to be provided by an initial 470 MW (nominal) power plant (Power Block 1) at that site.

In addition, in 1992, the Polk County Board of County Commissioners found the Hines Energy Complex site (formerly referred to by Florida Power as the "Polk County site") to be consistent and in compliance with the County's land use plans and zoning ordinances. The Siting Board entered a final order in February 1993, confirming that the planned 3000 MW of generating capacity for the Hines Energy Complex is consistent and in compliance with the land use plans and zoning requirements of Polk County for that site. Since the site boundaries will not be increased by this application, land use and zoning issues are not at issue in this supplemental application, as provided by section 403.517(3), Florida Statutes.

In 1994, the Governor and Cabinet, sitting as the Siting Board, granted certification to Florida Power, to construct and operate Power Block 1 and for 3000 megawatts (MW) of ultimate site capacity at the Hines Energy Complex. Over a period of 20 years, generating units will be brought on line sequentially to meet needs for electricity up to the ultimate site capacity of 3000 MW.

In the 1994 Certification, the Siting Board made a determination that the Hines Energy Complex site has the ultimate site capacity to support 3000 MW of electrical generating facilities, fired by either natural gas or coal gas, with low sulfur fuel oil as backup. The original proceeding that culminated in that 1994 Certification included extensive evaluations of the worst case capacity constraints and maximum potential environmental effects of the operation of the expected 3000 MW of capacity. These evaluations included assessments of air quality impacts, water quality and wildlife impacts, water use and noise impacts, socioeconomic impacts and benefits, traffic impacts from construction and operation, and other impacts of the entire planned capacity of 3000 MW. This evaluation was undertaken to ensure that the time and expense for processing supplemental applications for additional generating units at the Hines Energy Complex would be significantly reduced, and to allow Florida Power to respond more quickly to changes in the growth in demand for new electrical generating facilities. Also as the Siting Board's 1994 Certification finds, the ultimate site capacity determination provides FLORIDA POWER with assurances that this site has adequate air, water and land resources to accommodate additional electrical generating units like those proposed in this application. The 2002 Supplement Certification for Power Block 2 reconfirmed the adequacy of the site for continued expansion.

As recognized in the 1994 Certification, the Hines Energy Complex site was selected by Florida Power for additional generating capacity after an extensive site selection process, conducted with the assistance of an Environmental Advisory Group. This interdisciplinary group selected a site that achieved the best balance of siting criteria including location near power needs, minimal environmental impact, and cost. Development of the Hines Energy Complex site takes advantage of utilizing an already disturbed phosphate mine site for current and future power needs. Many of the environmental impacts associated with power development on new sites are not at issue here, since the site has been previously altered and disturbed by prior mining activity. The site has the further advantages of being close to Florida Power's load center and being served by electric transmission and rail and highway transportation facilities, which minimizes ancillary impacts.

In 1999, Florida Power began operation of Power Block 1 at the Hines Energy Complex. In 2002, Florida Power began construction on Power Block 2, which is expected to be in service in late 2003. By this application, Florida Power is seeking Supplemental Certification for the construction and operation of Power Block 3, an additional 530 MW (nominal) of generation, under the Florida Electrical Power Plant Siting Act (PPSA), Chapter 403, Part II, and Florida Statutes (F.S.).

To the extent the Siting Board's previous ultimate site capacity determination has already addressed the ultimate impacts and benefits of the development of 3000 MW of electrical generating capacity at the Hines Energy Complex site, they are not addressed in detail in this application. Instead, each area of potential impact and benefit addressed in the 1994 and 2001 Certifications is explained for informational purposes.

This Supplemental Site Certification Application (SSCA) is being filed pursuant to the requirements of the PPSA and Chapter 62-17, F.A.C. The SSCA addresses the environmental and socioeconomic aspects of the additional generating unit at the Hines Energy Complex by presenting information on the existing natural and human environments, the additional generating facilities proposed to be constructed and operated, and the impacts of those additional facilities on those environments. Much of the information contained in this SCA is updated information from the Site Certification Application filed in 1992 (the 1992 SCA) for Power Block 1 and ultimate site certification for the Hines Energy Complex, as well as information provided in the Power Block 2 SSCA, with a focus on the environmental impacts of the construction and operation of Power Block 3. Similar to Power Blocks 1 and 2, Power Block 3 will consist of two combustion turbines (CTs), each equipped with one heat recovery steam generator (HRSG), and a single steam turbine electrical generator (ST). Existing and previously permitted infrastructure, including fuel delivery and storage facilities, electrical transmission lines, potable water supply and treatment, wastewater treatment/disposal and transportation facilities at the Hines Energy Complex are adequate for the operation of Power Blocks 1, 2 and 3.

The project continues to represent a beneficial reuse of an environmentally impacted mined-out phosphate area. Phased construction of numerous generating facilities over a number of years at a single site will enable Florida Power to meet the state's growing need for power with a minimum of environmental impact. The addition of Power Block 3 capacity at the Hines Energy Complex will be accomplished using very efficient generating technology consistent with protection of the environment.

TABLE OF CONTENTS

SECTION 1

SECTION 2

TABLE OF CONTENTS
(Continued)

SECTION 3

TABLE OF CONTENTS
(Continued)

SECTION 4

TABLE OF CONTENTS
(Continued)

SECTION 5

TABLE OF CONTENTS
(Continued)

SECTION 6

SECTION 7

SECTION 8

SECTION 9

LIST OF TABLES

LIST OF FIGURES

FIGURES | PAGE

LIST OF FIGURES
(Continued)

LIST OF ACRONYMS AND ABBREVIATIONS

1992 SCA	1992 Site Certification Application
ACOE	U.S. Army Corps of Engineers
ARRP	Aquifer Recharge and Recovery Project
BACT	Best Available Control Technology
BEBR	Bureau of Economic and Business Research
BOCC	Board of County Commissioners
BOMR	Bureau of Mine Reclamation
CAA	Clean Air Act
CFR	Code of Federal Regulations
CR	County Road
CT	Combustion Turbine
CUP	Conditional Use Permit
CWA	Clean Water Act
DACS	Florida Department of Agriculture and Consumer Services
dBA	Decibel (A-weighted level)
DCA	Florida Department of Community Affairs
DEP	Florida Department of Environmental Protection
DHR	Florida Department of State, Division of Historical Resources
DHRS	Florida Department of Health and Rehabilitative Services
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
FAA	Federal Aviation Administration
FAAQS	Florida Ambient Air Quality Standards
F.A.C.	Florida Administrative Code
FDLES	Florida Department of Labor and Employment Security
FDNR	Florida Department of Natural Resources
FDOT	Florida Department of Transportation
FEMA	Federal Emergency Management Agency
FFWCC	Florida Fish and Wildlife Conservation Commission (formerly known as Florida Game and Fresh Water Fish Comission)
FGT	Florida Gas Transmission Company
FIPR	Florida Institute for Phosphate Research
FLUCCS	Florida Land Use, Cover and Forms Classification System
FPC	Florida Power Corporation

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

F.S.	Florida Statutes
FWS	U.S. Fish and Wildlife Service
GPD	Gallons Per Day
GPM	Gallons Per Minute
HRSG	Heat Recovery Steam Generator
IMC	International Minerals & Chemical Corporation-Agrico
L_{eq}	Equivalent Noise Level
LOS	Level of Service
MGD	Million Gallons Per Day
MOR	Monthly Operating Reports
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NO_x	Nitrogen Oxides
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NSPS	New Source Performance Standards
PB	Power Block
Pb	Lead
PM_{10}	Particulate Matter with diameter of 10 microns or less
ppm	Parts Per Million
PPSA	Florida Electrical Power Plant Siting Act
PSC	Florida Public Service Commission
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation Recovery Act
SAM	Sulfuric Acid Mist
SCA	Supplemental Site Certification Application
SO_2	Sulfur Dioxide
SR	State Road
ST	Steam Turbine
SWFWMD	Southwest Florida Water Management District
TSP	Total Suspended Particulates
USAC	U.S. Agri-Chemical Company
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator
VOC	Volatile Organic Compound

TABLE OF CONTENTS
SECTION 1

1.1 NEED SUMMARY

Florida Power (or "the Company") plans to add 530 megawatts (nominal) of electrical generating resources to its system by November 30, 2005, in order to continue to provide reliable, adequate, cost-effective service to its customers. The most cost-effective way for Florida Power to meet this need is to construct a 530 MW (nominal) state of the art natural gas-fired, combined-cycle power plant at Florida Power's existing Hines Energy Complex ("HEC") in Polk County, Florida. This unit is called "Hines 3" or Power Block 3.

The Company has come to the decision to build the Hines 3 unit as the result of the Company's ongoing Resource Planning process involving an extensive analysis of supply-side and demand-side alternatives, based on feasibility, economics, reliability, fuel diversity, and Florida Power's evaluation of its Request for Proposal ("RFP") for competitive supply-side alternatives. As a resolution of the Florida Public Service Commission's Reserve Margin Docket No. 981890-EU, the Company committed to achieve at least a 20 percent Reserve Margin no later than the summer of 2004.

The Company has determined that the Hines 3 unit will best meet the Company's need for additional generating capacity in 2005. To ensure that Florida Power will be pursuing the best available alternative, the Company issued an RFP to solicit supply-side alternatives to building the Hines 3 unit. The Company carefully evaluated resulting proposals based on both price- and non-price attributes. After considering relevant price- and non-price attributes, the Company ultimately concluded that the Hines 3 unit was superior to the competing alternatives offered.

The Company plans to file its petition for a determination of need with the Florida Public Service Commission ("PSC" or the "Commission") for approval to build the Hines 3 unit in September 2002.

1.2 PSC ORDER ON NEED

Florida Power expects to file the Need Determination Petition with the PSC in September 2002. Copies of the Petition will be made available (once submitted) upon request to parties receiving this SSCA.

Florida Power expects to complete the PSC approval process and obtain an affirmative Determination of Need for building Power Block 3 by February 2002.

1.3 SITE SELECTION PROCESS

In January 1989, recognizing that its forecasts indicated a need for additional generation capacity, Florida Power began the comprehensive process of locating a suitable site for a large new generation facility hich resulted in the selection and initial development of the Hines Energy Complex in Polk County, Florida. A large site is desirable in order to maximize the economies of development and long-term operation.

Specifically, the objective of the site selection program was to determine a primary and alternate site that would be:

- Multi-unit and clean coal capable
- Technology- and fuel-flexible
- Cost effective
- Fully compatible with Florida Power's commitment to environmental protection
- In compliance with all government regulations
- Consistent with state and local land use policies

Florida Power used a systematic site selection approach to ensure that all of the above concerns were fully addressed. The process involved the following five phases, each with a specific objective:

<u>Phase I</u>

The first phase, **Area Screening**, began by screening the entire state of Florida. This phase screened out or eliminated areas that were either environmentally protected or clearly unsuited for development of the proposed facility. Phase I concluded by defining 172 large potential areas suitable for the project.

<u>Phase II</u>

The next phase, **Area Ranking**, ranked the 172 potential areas using criteria that evaluated environmental, socioeconomic and engineering issues. Phase II concluded by defining the top 60 candidate areas.

<u>Phase III</u>

The third phase, **Site Identification**, identified specific sites among the 60 candidate areas by conducting another screening process on a more refined geographic basis. Phase III concluded by defining 22 potential "semifinalist" sites.

Phase IV

The fourth phase, **Site Ranking**, ranked the 22 semifinalist sites using advanced criteria that further evaluated environmental, socioeconomic and engineering issues. Phase IV concluded by defining the top five candidate sites.

Phase V

The final phase, **Site Selection**, confirmed the Phase IV site ranking with additional field data and/or analytical evaluation. Phase V concluded in October 1990 by identifying the preferred and alternate sites.

Throughout this lengthy and careful process, Florida Power was assisted by an independent group of environmentalists, educators, and community leaders. This Environmental Advisory Group provided advice on matters of public concern, with their major function being to review plans for each of the five phases of the siting process and suggest changes in the evaluation process. Florida Power also systematically elicited the preferences of this independent panel to assist in the development of ranking criteria used in the evaluation process. In addition to the input received from the Environmental Advisory Group, Florida Power consulted with various regulatory agencies at specific points in the process to obtain their perspective on siting criteria.

As a result of this extensive statewide search, Florida Power selected a location in Polk County as the primary site of its next generating units and an alternative site in Hardee County. Both locations met Florida Power's goal for a large site capable of handling staged development of various generation and fuel options. The 1994 Certification found that the Hines Energy Complex site is capable of supporting 3,000 MW of total generation. The 2001 Supplemental Certification for the incremental expansion of the site to include Power Block 2, reconfirmed the appropriateness of the site for additional generation.

The expansion of the site to include Power Block 3 was anticipated in the 1994 Certification and is within the overall site capacity originally certified. The addition of Power Block 3 to the Hines Energy Complex is the most efficient and economical option currently available to Florida Power for generation expansion.

1.4 TECHNOLOGY SELECTION

1.4.1 Generation Alternatives

Florida Power's need for additional generation is based upon specific system reliability criteria. A system optimization tool was used to generate a significant number of potential generation expansion alternatives that would satisfy Florida Power's system reliability criteria. These alternatives were examined and compared to quantify the costs and benefits of a variety of generation expansion technologies, plant sizes, and construction options.

In developing these expansion alternatives, Florida Power considered three major constraints. First, Florida Power examined the commercial availability of each technology for use in utility-scale applications. In order for a particular technology to be considered commercially available, the technology must be able to be built and operated on an appropriate commercial scale in continuous service by or for an electric utility. Although many of the technologies evaluated are not currently commercially available, they were still assessed based on the other two criteria, technical feasibility and cost. Reasonable levels of detail for emerging technologies were developed to allow Florida Power to screen the technology options and to stay abreast of potential economic benefits as they mature.

Second, technical feasibility for commercially available technologies was satisfied if the technology met FP's particular generation requirements and would integrate well into FP's system.

Finally, for each alternative, an estimate of the levelized cost of energy production, or "busbar" cost, accounting for capital, fuel, and O&M costs over the typical life expectancy of the unit, was developed. For most technologies, the performance and costs are based on a specific size unit

The generation alternatives that were evaluated included Pulverized Coal (PC), Combustion Turbines (CTs), Combined Cycle (CCs), Atmospheric Fluidized Bed Combustion (AFBC), and coal gasification/combined cycle (CGCC). Each of the alternatives included generation units modeled to come into service between 2002 and 2011.

FP's economic evaluation of these alternatives included cumulative present worth revenue requirement comparisons. In addition, Florida Power evaluated several uncertainties for each alternative based on the high, base, and low demand and energy forecasts; and the high, base, and low fuel price forecasts. The final result of this analysis was a comparison of cumulative present worth revenue requirements of each of the alternatives on FP's system.

A third combined cycle unit at the Hines Energy Complex emerged from all of these calculations as the most cost-effective alternative. In other words, this unit is expected to lead to the lowest cost of service and the lowest rates, when viewed on a present value or present worth basis. The units also do not pose any unusual risks in the event that some of the key planning assumptions used by Florida Power turn out to vary according to their expected probability distribution.

1.4.2 Combined Cycle Design

The technology selected for the initial phases of the Hines Energy Complex is based on the use of modern, high efficiency gas-fired CTs and steam turbines (STs) configured in a "combined cycle" (CC). Generating stations are referred to as CC when they have two sequential electrical generating stages. The first stage of a CC plant is a CT, much like a utility peaking plant. In the second stage of the process, the hot gas from the CT is passed through a heat recovery steam generator (HRSG), where steam is produced and directed to the ST. The CT and ST can be designed to drive individual electrical generators or to drive a single generator.

The approximate average annual electrical output measured in MW for this unit is expressed as the "nominal" output. The proposed Power Block 3 has a nominal output of 530 MW. The actual output of this unit can vary seasonally above and below the nominal output.

In sum, because CC plants make excellent use of the energy in their input fuel, they have an extremely low heat rate. The modern CC power plant is one of the most efficient power cycles available today.

TABLE OF CONTENTS

SECTION 2

TABLE OF CONTENTS
SECTION 2
(Continued)

LIST OF TABLES
SECTION 2

LIST OF FIGURES
SECTION 2

LIST OF FIGURES
SECTION 2
(Continued)

2.1 SITE AND ASSOCIATED FACILITIES DELINEATION

The Hines Energy Complex is located in southwest Polk County, Florida, approximately 5 miles northwest of Fort Meade, 7 miles southwest of Bartow, and about 40 miles east of Tampa (Figure 2.1-1). Homeland, the nearest unincorporated community; lies about one mile to the northeast of the site boundary. The site is bounded on the north by County Road (CR) 640, and the south by U.S. Agri-Chemicals Corporation (USAC) property. CR 555 runs through the site.

2.1.1 Description of the Site and Surrounding Area

The Hines Energy Complex site encompasses approximately 8,000 acres. The portion of the site on which the combustion turbines, associated HSRGs, and steam turbine will be located is referred to as the Plant Island. The site lies in a region of the state dominated by phosphate mining operations including mines, settling ponds, sand tailings piles, gypsum stacks, and chemical and beneficiation plants. The adjacent land uses consist almost entirely of active phosphate mining, or mined and reclaimed lands. From the standpoint of land use compatibility, the availability of transportation facilities, the lack of noise and visual impacts during construction and operation activities, the Siting Board has already determined the site location to be suitable for power plant facilities. A discussion of land use in the area of the Hines Energy Complex site is presented in Section 2.2 of this SSCA.

2.1.2 Site Delineation

Figure 2.1.2-1 shows the facilities that will be located at the Hines Energy Complex during operation of Power Blocks 1, 2 and 3. During operation of Power Blocks 1, 2 and 3, the overall Hines Energy Complex site will be subdivided into six major areas as follows:

- Plant Island 704 acres
- Cooling Pond 722 acres
- Brine Pond 311 acres
- Buffer/Mitigation Area 2,128 acres
- Water Crop Areas 4,019 acres
- McCullough Creek Watershed 470 acres

No portion of the Hines Energy Complex is within the 100-year floodplain of any surface water body in the area. The site is located entirely within the Peace River basin. The only significant areas impacted by the addition of Power Block 3 are located within the Plant Island.

2.1.3 References

FDNR (Florida Department of Natural Resources). 1992 Mine Reclamation Monitoring Report. Unpublished. FDNR, Bureau of Mine Reclamation. Tallahassee, Florida.

FIPR (Florida Institute of Phosphate Research). 1990. Regional Study of Land Use Planning and Reclamation. Publication No. 04-041-085. Prepared by the Central Florida Regional Planning Council. Bartow, Florida. August, 1990.

Florida Power Corporation. 1992. Polk County Site. Site Certification Application.

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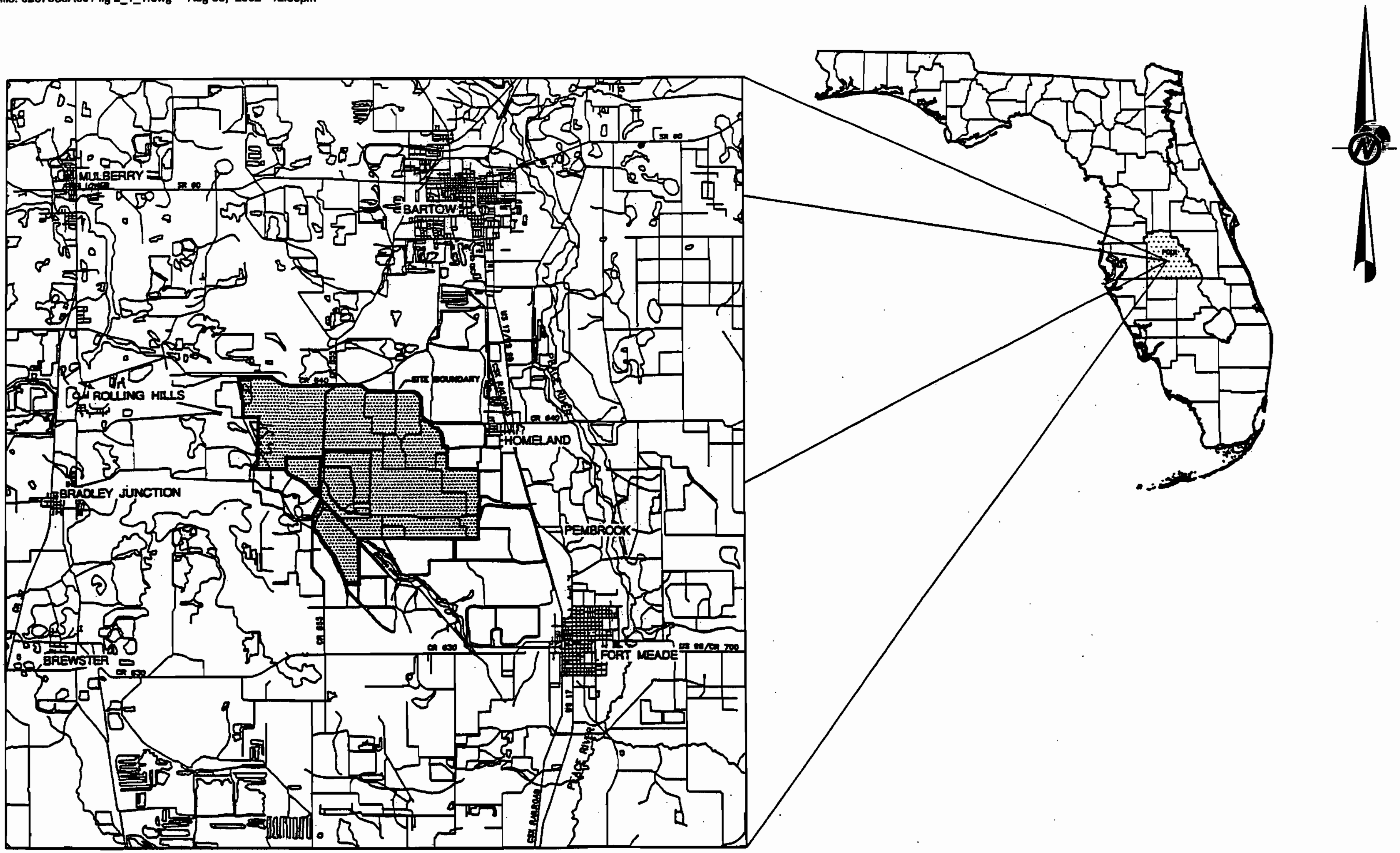

SOURCE: 1992 SCA

Florida Power
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Hines Energy Complex

FIGURE 2.1-1
SITE LOCATION MAP

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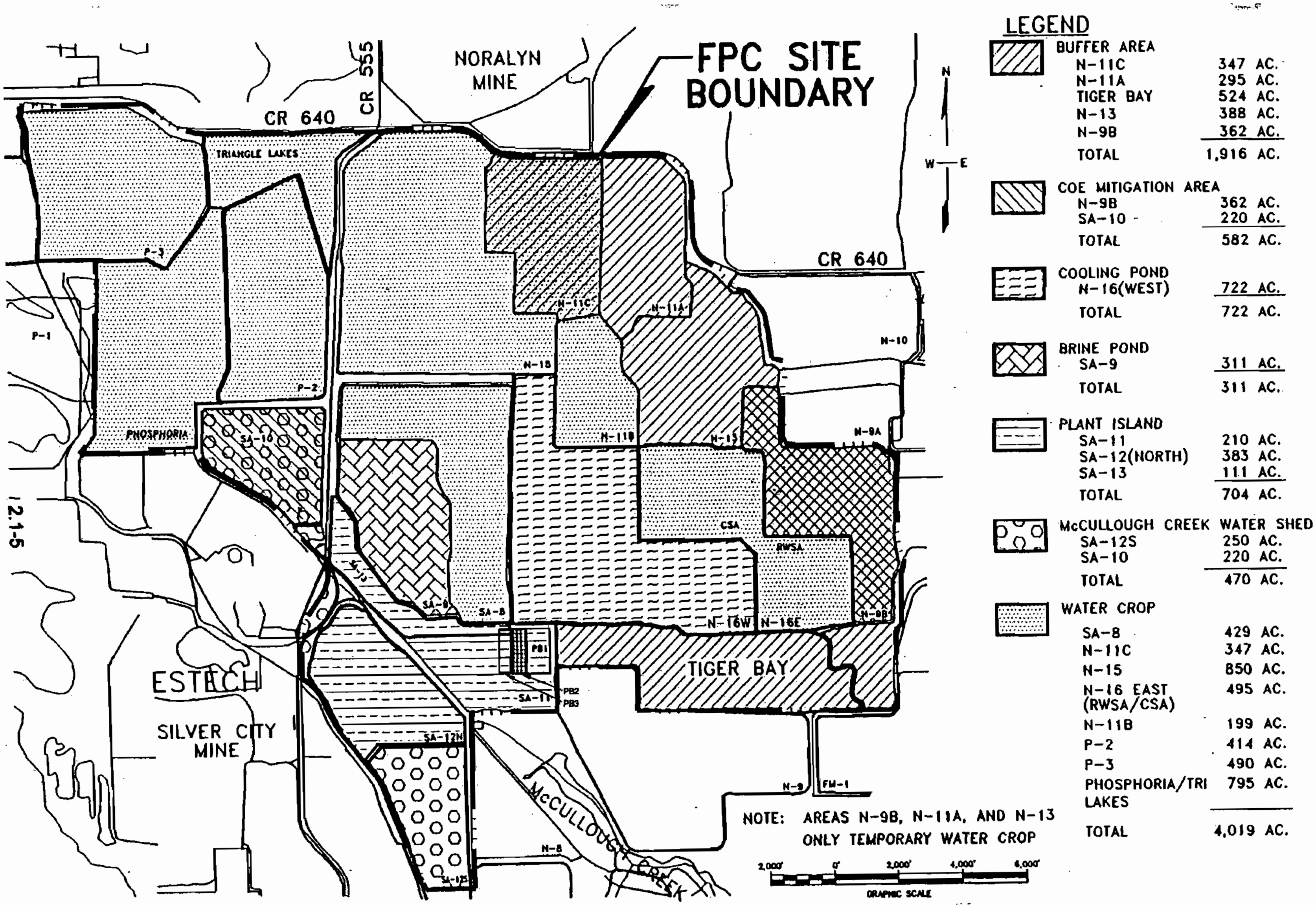

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FIGURE 2.1.2-1
HINES ENERGY COMPLEX POWER BLOCK 3 SITE PLAN

2.2 SOCIOPOLITICAL ENVIRONMENT

2.2.1 Governmental Jurisdictions

The Hines Energy Complex site is located in an unincorporated area of southwest Polk County, approximately 7 miles southwest of Bartow, 5 miles northwest of the city of Fort Meade, and 1 mile southwest of Homeland, an unincorporated community. As Figure 2.2.1-1 indicates, the city of Fort Meade is the only governmental jurisdiction within a five-mile radius of the Plant Island, where Power Block 3 will be located..

Figure 2.2.1-2 identifies the parks and recreation areas within 5 miles of the Plant Island. As shown in the Figure 2.2.1-2, there are none of these special areas within 1 mile of the Plant Island. In addition, none of the following areas are found within 5 miles of the Plant Island:

- National Parks
- National Forests
- National Seashores
- National Wildlife Refuges
- National Wilderness Areas
- National Memorials or Monuments
- National Marine and Estuarine Sanctuaries
- Roadless Area Review and Evaluation Areas
- National Wild and Scenic Rivers
- Critical Habitat of Endangered Species
- State Parks
- State Forests
- Areas of Critical State Concern
- Conservation and Recreation Lands
- State Archaeological Landmarks or Landmark Zones
- Save Our Rivers Lands
- State Aquatic Preserves
- Outstanding Florida Waters
- Scenic and Wild Rivers
- Special Management Areas
- Indian Reservations
- Military Lands

2.2.2 Zoning and Land Use Plans

The Hines Energy Complex has been determined to be consistent and in compliance with the Polk County zoning standards and land use plans. In November 1992, Polk County adopted a Comprehensive Plan in accordance with the Local Government Comprehensive Plan and Land Development Regulation Act, Chapter 163, Part II, F.S. The plan was revised in March and August 2000.

The Polk County Board of County Commissioners approved a conditional use permit (CUP) for the Hines Energy Complex on June 2, 1992. On January 26, 1994, the Siting Board entered its order finding the Hines Energy Complex site to be consistent and in compliance with the Polk County land use plans and zoning standards. Since the site boundaries will not be expanded and the additional generating capacity will be within the approved ultimate site capacity certified by the Siting Board, land use and zoning issues are not an issue in this proceeding, in accordance with section 403.517(3), F.S. The planned development of Power Block 3 is consistent with the approved final order and CUP.

2.2.3 Demography and Ongoing Land Use

Two municipalities, Bartow and Fort Meade, are located within 5 miles of the Hines Energy Complex site boundaries. According to the U.S. Census, the City of Bartow, with a 2000 population of 15,340, is the third largest city in Polk County. The City of Fort Meade had a 2000 population of 5,691. Unincorporated communities in southwest Polk County include Homeland, located about one mile northeast of the site boundaries; Bradley Junction, located about 5 miles west of the Hines Energy Complex site; and Rolling Hills, located about 5 miles northwest of the Hines Energy Complex site.

The rate of population growth in Florida and Polk County is illustrated on Figure 2.2.3-1. Florida's population increased 23.5 percent from 1990 to 2000. Polk County's population growth rate has changed from 40.8 percent growth in the 1970s, to 19 percent growth in the 1990s. Although Polk County's population increased 19 percent from the 1990 census to the 2000 census, most of the growth occurred in the northern part of the County. The 2000 census shows relatively little growth in population since 1990 in most areas in the southern portion of the County. Bartow's population increased only 4 percent from 14,716 in 1990 to 15,340 in 2000, while Fort Meade grew 14 percent, increasing from 4,993 inhabitants to 5,691. The census tract west of the site (161) and census tracts in and near Bartow actually lost population between 1990 and 2000. The census

Other census tracts in the area grew at a rate of 10 to 16 percent. The relatively low population growth in southern Polk County has been attributed to the loss of jobs in the area resulting from the migration of citrus and mining jobs to areas south of Polk County (Rufty, 1991).

The 2000 census calculated the Polk County population at 483,924, which made Polk County the eighth largest county in the state. The University of Florida Bureau of Economic and Business Research projects that Polk County's population will reach 554,900 by 2010 and 591,100 by 2015 (medium projections).

The Hines Energy Complex site is located in southwestern Polk County in an area, which has been dominated by phosphate mining operations, including mines, clay settling ponds, sand tailings piles, gypsum stacks, and chemical and beneficiation plants. Most of the area within a 5-mile radius of the Plant Island consists of lands being actively mined, unreclaimed mining land, and lands in various stages of reclamation. Most of the reclaimed lands revert to pastureland or land-and-lakes after reclamation. Other land uses found within a 5-mile area include pastureland, citrus groves, and limited residential, commercial and industrial uses. Land uses within the 5-mile radius of the Plant Island are mapped on Figure 2.2.3-2.

2.2.4 Easements, Title, Agency Works

County Road (CR) 555 runs through the Hines Energy Complex and CR 640 borders the site on the north. No new public easements, or public title, agency works or crossing approvals are required for development of Power Block 3.

2.2.5 Regional Scenic, Cultural and Natural Landmarks

The Hines Energy Complex is located in an area that has previously been dominated by phosphate mining operations for decades. There are no regional scenic, cultural, or natural landmarks within 5 miles of the Hines Energy Complex site.

2.2.6 Archaeological and Historic sites

According to a letter from the Florida Department of State, Division of Historical Resources (DHR), dated January 30, 1992, the Hines Energy Complex is in an area that has been dominated by phosphate mining operations for several decades.

There are no known archaeologically and historically significant sites within five miles of the site.

2.2.7 Socioeconomic and Public Services

2.2.7.1 Socioeconomic

EMPLOYMENT AND INCOME

Polk County's civilian labor force was 204,355 in 2000. Out of this total, 194,695 were employed, resulting in an unemployment rate of 5.5 percent. Major industries in terms of employment were retail trade (22.9 percent), services (25.2 percent), manufacturing (10.7 percent), and government employment (federal, state and local), which accounted for 14.8 percent of total employment (Figure 2.2.7-1). Mining employment accounted for 1.3 percent of total employment. The average annual earnings per job in Polk County in 1999 were $28,426.

Employment in Polk County is projected to increase to 226,203 by the year 2005, according to the Florida Department of Labor and Employment Security's publication on Industry and Occupational Employment Projections. The per capita personal income for Polk County was $23,294 in 1999, or 82 percent of the Florida average and 82 percent of the national average per capita income. The 1999 per capita income for Polk County represented a 5 percent increase over the 1998 per capita income of $22,217 (Table 2.2.7-1).

HOUSING

According to the 2000 census, conventional single family units make up 56 percent of all housing units in the county, mobile homes make up 29 percent, and multi-family units made up 14 percent.

The 2000 census reported that the percentage of occupied housing units occupied by renters was 26.6 percent, while the percentage occupied by owners was 73.4 percent. Vacant units accounted for 17 percent of all units in the county. Housing cost data from the 2000 census indicate that 91 percent of the rental units in the county rented for less than $1,000 per month, with a median monthly rent of $501. Approximately 67 percent of owners with a mortgage had monthly costs of less than $1,000 a month. The median monthly owner costs for units with a mortgage was $839. The median value of owner-occupied units was $83,300. A large majority of these units (87 percent) had a value less than $150,000, while 16 percent of these units were valued at less than $50,000. Table 2.2.7-2 illustrates the trend in building permits issued in Polk County between 1995 and 2000. The total value of residential building permits in Polk County rose from $161.6 million in 1995 to $330.7 million in 2000.

LOCAL GOVERNMENT REVENUES AND EXPENDITURES

Polk County's revenue sources include taxes, permits fees and fines, state and federal grants, charges for services, debt proceeds, interest and other sources. Polk County's total revenues in fiscal year 2000/2001 were approximately $406 million according to the Polk County Budget (Figure 2.2.7-2).

Polk County's expenditure categories include transportation, capital funds, Board of County Commissioners, elected officials, County Attorney, administrative services, community services, Office of Economic Development/Tourism, human services, public safety, county managers, debt service, and transportation. The total operating budget for the 2000/2001 fiscal year was approximately $483 million.

2.2.7.2 Public Services

PARKS AND RECREATION

Polk County contains a total of 4,303 acres of public parkland, which is owned and managed by both the county and municipalities. The Board of County Commissioners owns and manages approximately 2,461 acres of this total parkland acreage. Two county parks are located within 5 miles of the Hines Energy Complex Plant Island. The IMC Peace River Park is located just outside a 5-mile radius of the Plant Island. The IMC Peace River Park is a 640-acre regional park consisting of reclaimed phosphate lands. The partially developed park includes picnic facilities and a boardwalk in a 30-acre area along the Peace River. Bartow and Fort Meade also provide recreation facilities. Recreational facilities located in Bartow include a civic center, parks, ball fields, picnic areas, a recreation center, and a community center. Recreational facilities located in Fort Meade include parks, boat ramps, an outdoor recreation area, a sports complex, a skate park, and a community center.

EDUCATIONAL SERVICES

Several colleges and technical schools are located in Polk County, including Florida Southern College and Polk Community College. The University of South Florida is located in Tampa, 30 miles west of Polk County. USF also has a campus in Lakeland. There are 128 schools in the public school system, including 62 elementary schools, 15 middle schools, 11 high schools and 33 other schools including vocational centers, exceptional student centers and charter schools. Four elementary schools, a middle school, a junior high school, and a high school are located in Bartow. Fort Meade contains two elementary schools, a middle school, and a junior/senior high school. There are nine public libraries and one private library within the county, including public libraries in Bartow and Fort Meade.

PUBLIC SAFETY

Polk County provides public safety services for the entire county. The County's Public Safety offices are located at the Bartow Airbase on Highway 17 between Bartow and Eagle Lake. These offices include the Emergency Management Division, Fire Services, and Emergency Medical Services. The County's Fire Services Division provides fire protection throughout the county through county fire stations and volunteer fire stations. There are 150 full-time firefighters in the county and 350 volunteers. There is also a volunteer fire department located in Fort Meade staffed with 25 volunteers. In addition, there are two fire departments located in the city of Bartow: the Bartow Fire Department, staffed with 15 paid personnel and 35 volunteers; and the Bradley Junction Fire Department (located eight miles from the Hines Energy Complex) staffed with 2 paid personnel and 10 volunteers. The County has a Hazardous Materials Team of 12 persons per shift who are especially trained to handle chemicals and industrial incidents. This team is located in the City of Eagle Lake and throughout the County.

The County Emergency Medical Services has 27 Advanced Life Support units that provide services from response stations in 22 geographically strategic locations throughout the County, including one located in Bartow and one in Fort Meade. There are five hospitals in Polk County, with one major trauma hospital located in Lakeland.

Law enforcement in the area is provided by the Polk County Sheriff's Office located in downtown Bartow, the Highway Patrol, and the Cities of Bartow and Fort Meade, which each have a municipal police force.

UTILITY SERVICES

Central water and wastewater services are not currently available at the proposed site. The closest public water and wastewater systems are in the City of Fort Meade, approximately 4 miles southeast of the Plant Island. The Fort Meade Water Treatment Facility has a capacity of 1.44 million gallons per day (MGD) with current usage at 0.83 MGD or 58% of capacity. The Fort Meade wastewater treatment facility has a capacity of 1.0 MGD and a current usage of 0.68 MGD or 68% of capacity. According to the Fort Meade Comprehensive Plan, the wastewater facility is expected to provide sufficient capacity for the City through the year 2010.

SOLID WASTE SERVICES

Solid waste disposal in Polk County is handled by the County. The County operates three landfills, which are used by municipalities and unincorporated areas of the County. In addition to the County's landfills, the City of Lakeland operates city-owned incinerator. The County does not use this incinerator.

The County's North Central Landfill, located on SR 540 between Lakeland and Winter Haven serves the project site. The North Central Landfill serves 67 percent of the County's population. The landfill began operation in the 1970's and consists of 2,200 acres; 140 acres of which have been filled. The level of service provided by the landfill was 6.3 pounds per capita per day in 1996 and is projected to increase to 6.62 pounds per capita per day by 2010. The landfill is expected to have excess capacity through the year 2020.

TRANSPORTATION

Traffic conditions in the vicinity of the project were quantified in the 1992 SCA. As part of the development of Hines Power Block 1, traffic studies and roadway improvements were completed which addressed and mitigated the total transportation impacts for ultimate site capacity build out (3000 MW).

2.2.7.3 References

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Table 2.2.7-1
Per Capita Income Growth
1993 – 1999

LOCATION	1993	1994	1995	1996	1997	1998	1999
United States	21,718	22,581	23,562	24,651	25,874	27,321	28,546
Florida	21,652	22,340	23,512	24,616	245,721	26,931	27,781
Polk	17,437	18,440	19,462	20,428	20,893	22,217	23,294

Source: Florida Statistical Abstract 2001.

Table 2.2.7-2
Polk County Building Permits Issued
(Value in Thousands of Dollars)

YEAR	VALUE OF ALL RESIDENTIAL	# OF ONE FAMILY HOUSES	# OF MULTI-FAMILY BUILDINGS
1995	$161,592	2,187	179
1996	$187,822	2,504	122
1997	$222,090	2,648	719
1998	$236,329	2,852	450
1999	$284,806	2,967	912
2000	$330,684	3,520	1,226

Source: Florida Statistical Abstracts 1996 through 2001

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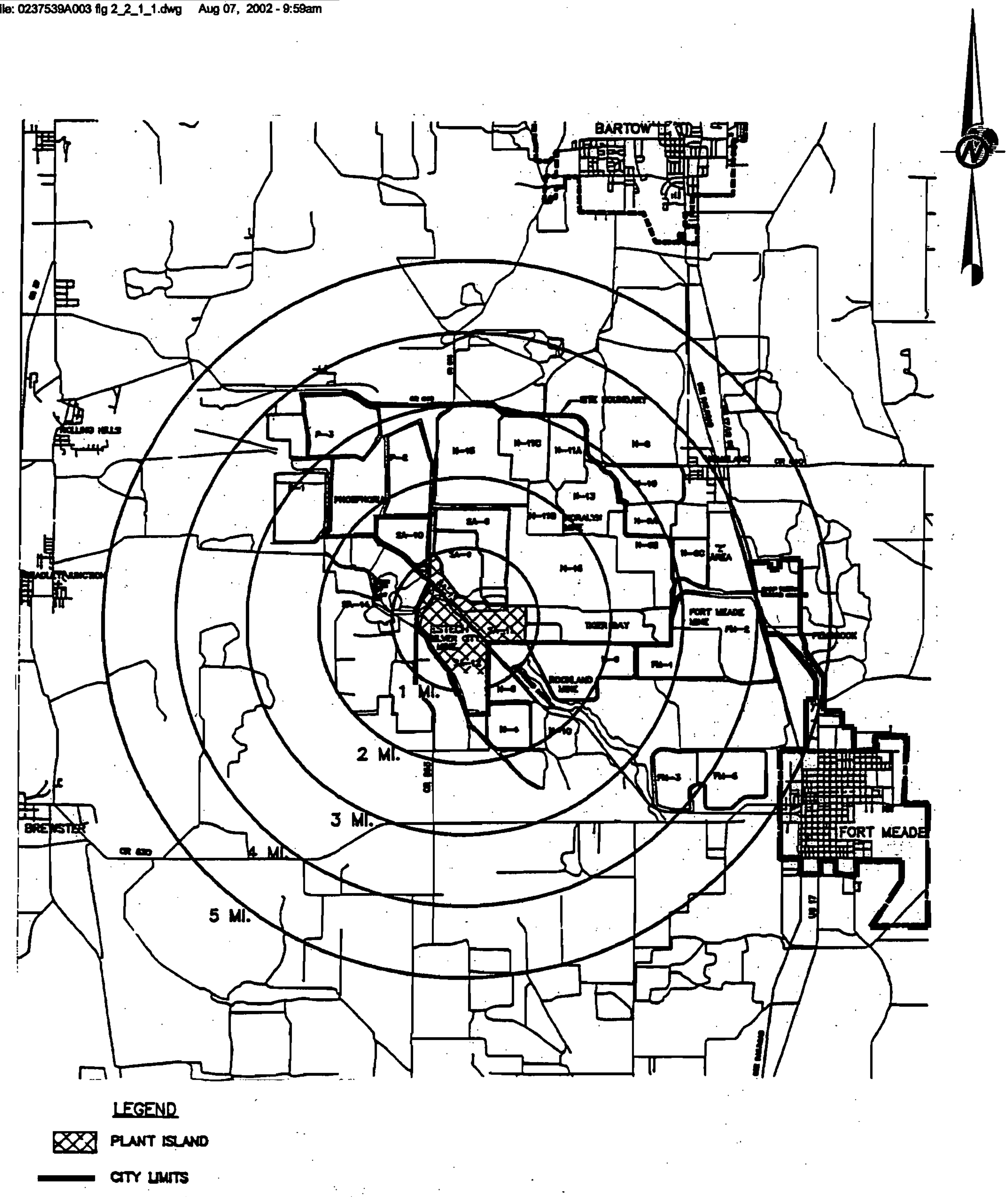

SOURCE: 1992 SCA

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FIGURE 2.2.1-1
GOVERNMENTAL JURISDICTIONS
WITHIN FIVE MILES OF THE PLANT ISLAND

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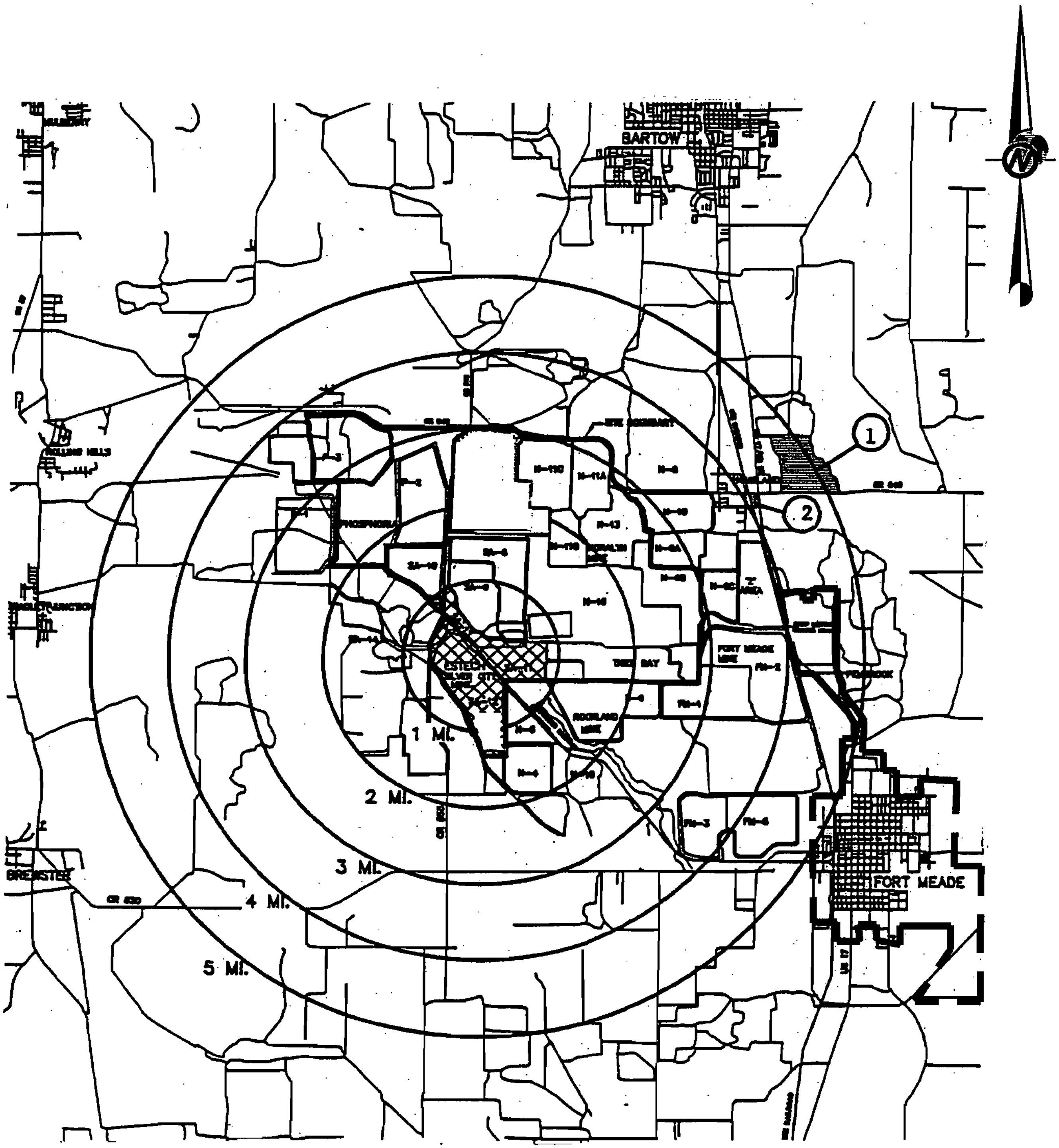

LEGEND

PLANT ISLAND

① IMC PEACE RIVER PARK

② HOMELAND HISTORIC AND PIONEER PARK

SOURCE: 1992 SCA

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FIGURE 2.2.1-2
PARKS AND RECREATION AREAS
WITHIN FIVE MILES OF THE PLANT ISLAND

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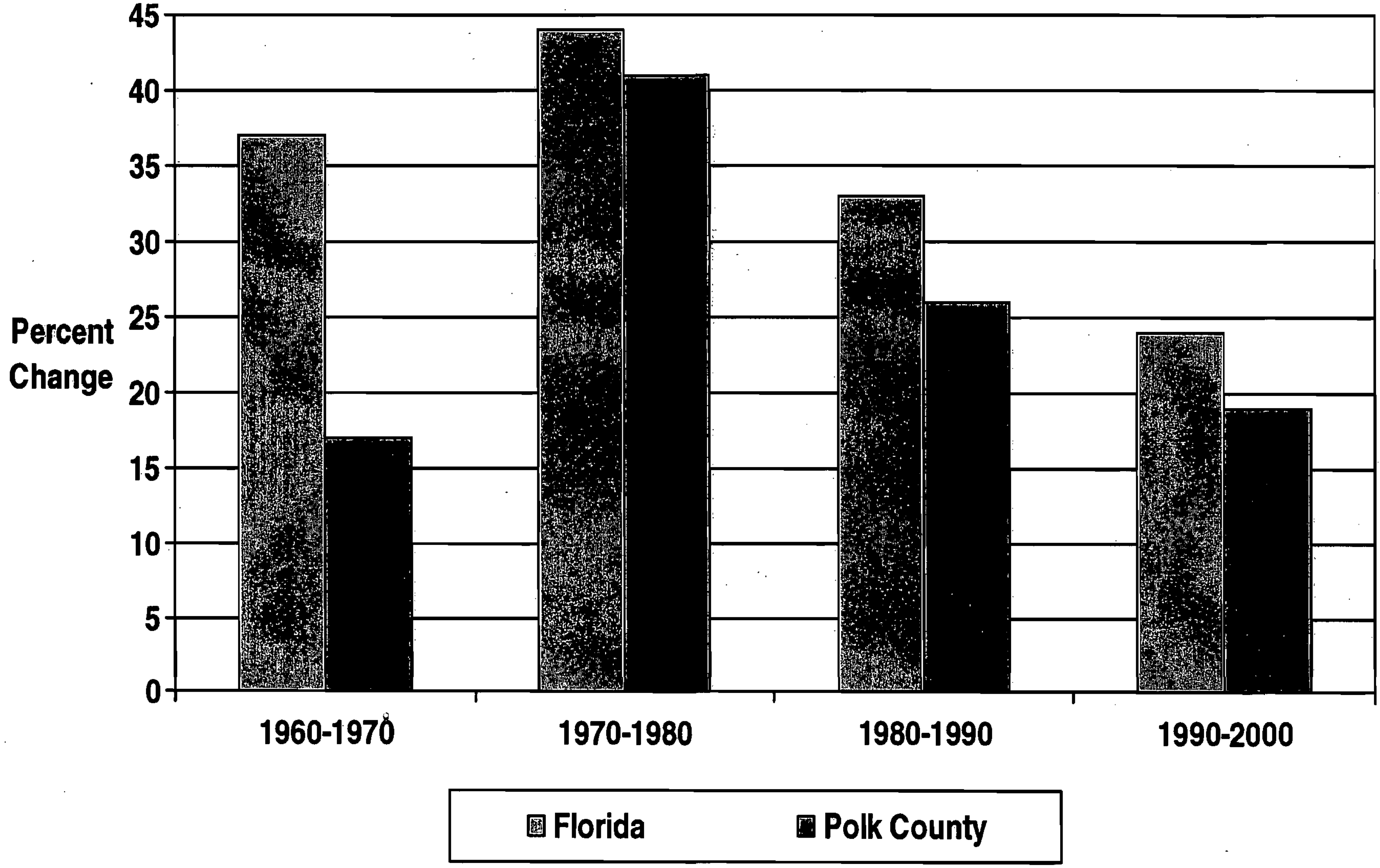

SOURCE: U.S. CENSUS BUREAU, 2002

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FIGURE 2.2.3-1
POPULATION GROWTH 1960-2000
FLORIDA AND POLK COUNTY

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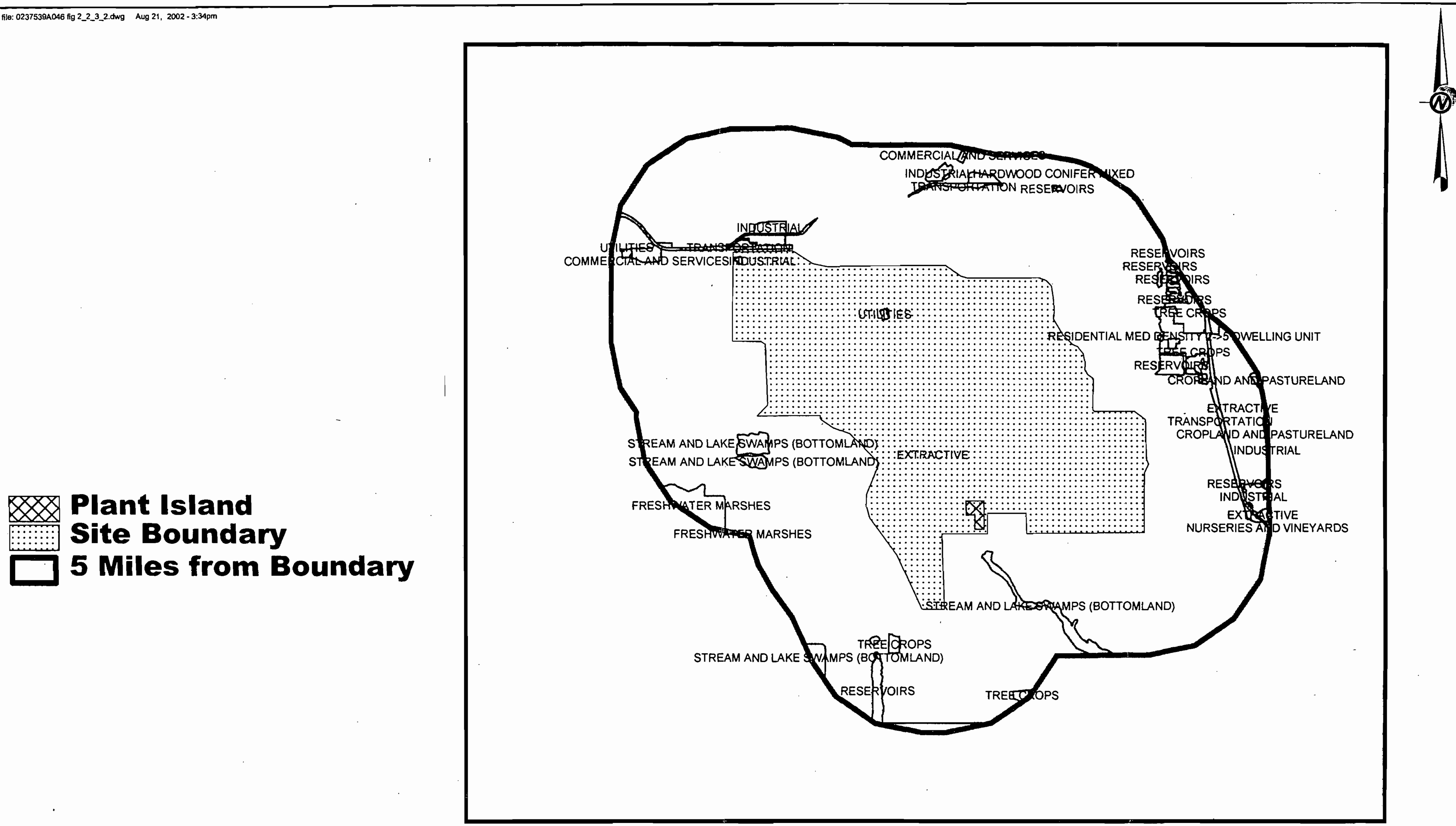

SOURCE: SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT 1999 LAND USE

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FIGURE 2.2.3-2
EXISTING LAND USE WITHIN
5 MILES OF THE PLANT

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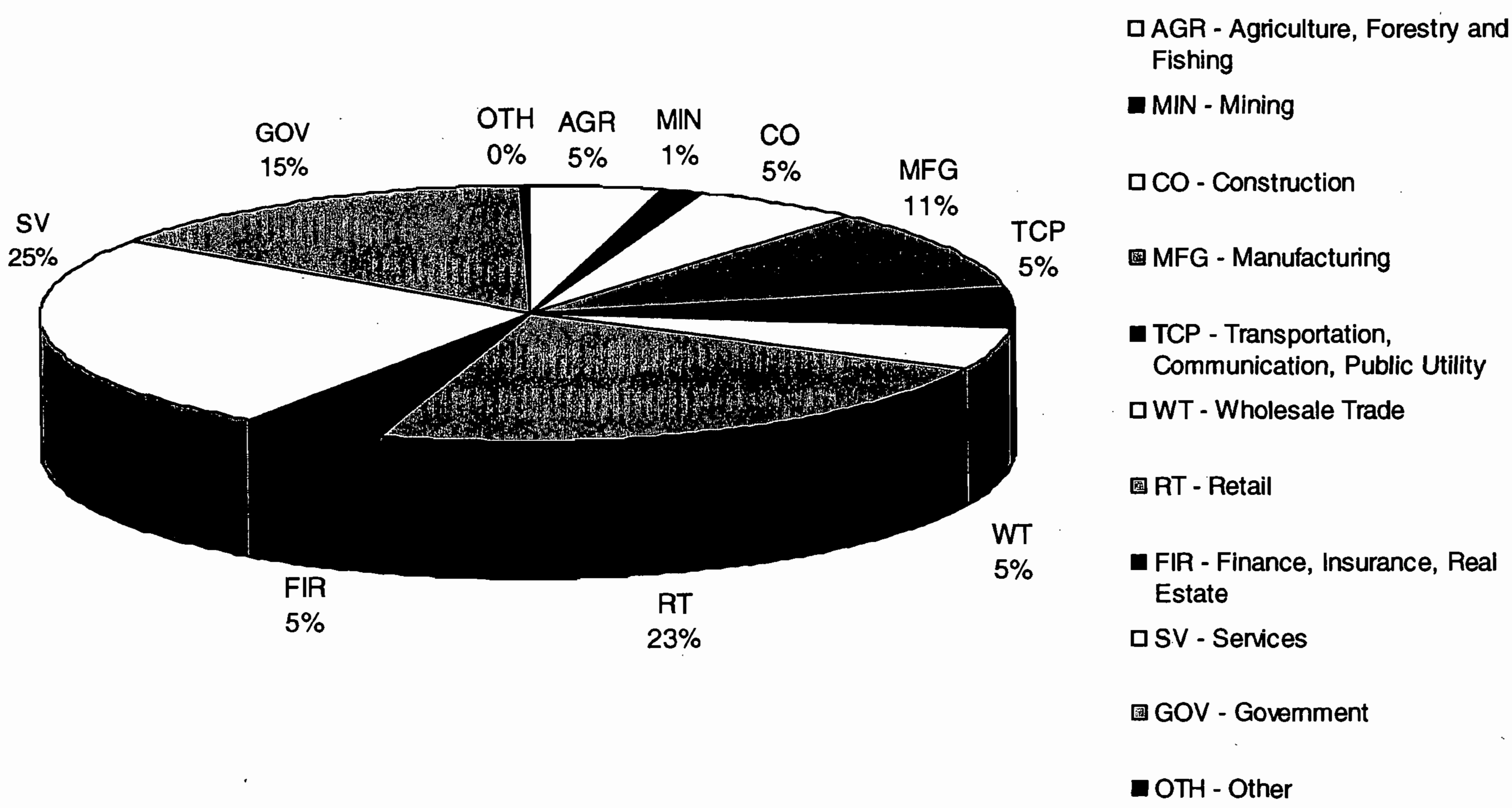

SOURCE: FLORIDA STATISTICAL ABSTRACT 2001

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FIGURE 2.2.7-1
EMPLOYMENT BY INDUSTRY (2002)

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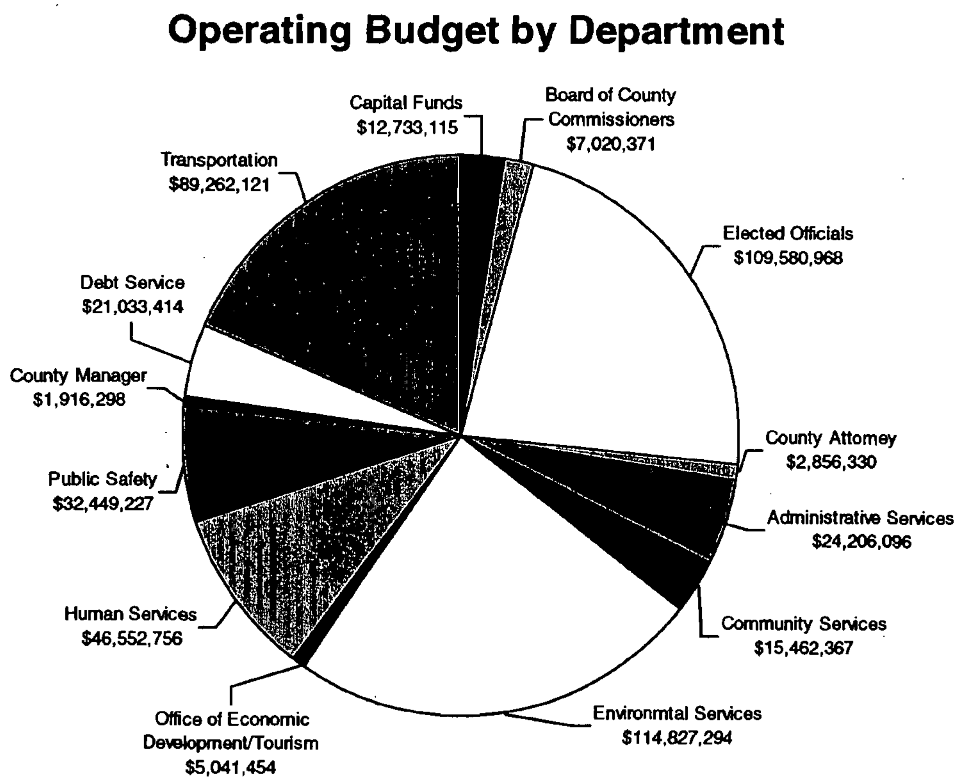

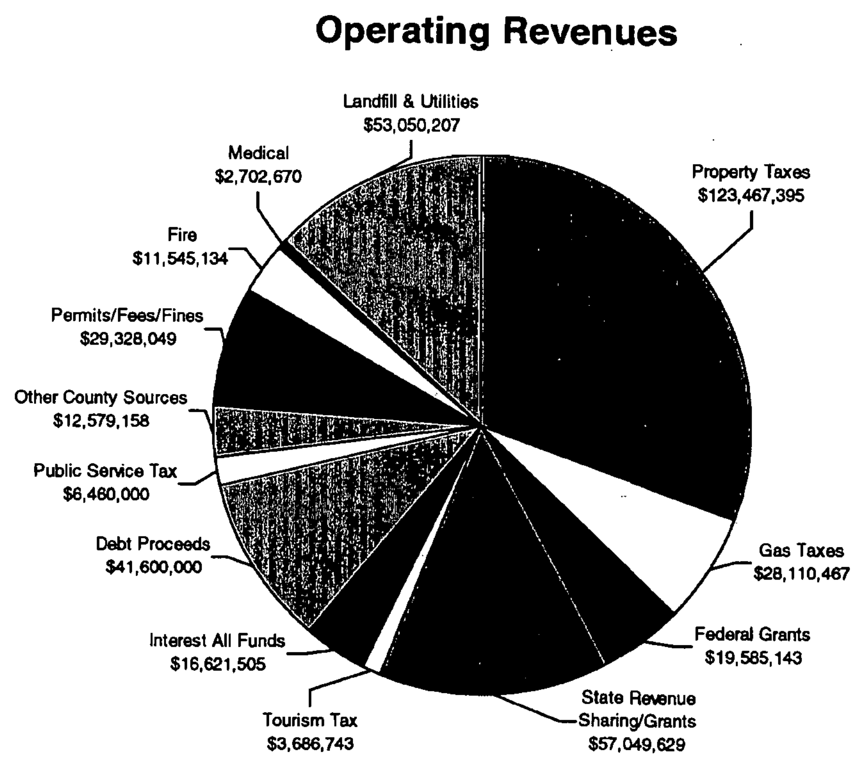

SOURCE: POLK COUNTY BOARD OF COUNTY COMMISSIONERS, 2002

Florida Power
A Progress Energy Company

Hines Energy Complex

FIGURE 2.2.7-2
POLK COUNTY OPERATING
BUDGET AND REVENUES

2.3 BIOPHYSICAL ENVIRONMENT

Following are descriptions of the general geohydrology, surface and subsurface hydrology, water budget and area uses, vegetation/land use, ecology, meteorology, ambient air quality, noise, and other environmental features that exist at or near the Hines Energy Complex site. It should be noted that the incremental impacts related to the proposed Power Block 3, above those related to the overall development of the site, are expected to be minimal.

2.3.1 General Geohydrology

This section describes the major geohydrologic aspects of the Hines Energy Complex site and discusses these geohydrology features on a regional setting.

2.3.1.1 Geologic Description of the Site-Area

Polk County is divided into nine major physiographic provinces: the Lakeland Ridge, Winter Haven Ridge, Lake Henry Ridge, Lake Wales Ridge, Bombing Range Ridge, Lake Upland, Polk Upland, Osceola Plain, and Western Valley (SWFWMD, 1988). These areas and their topographic relief and sediments were formed when sea levels were much higher than today.

The Hines Energy Complex site is located within the southern reaches of the Lakeland Ridge, which runs north to south in western Polk County from about 10 miles northwest of Lakeland to the vicinity of Fort Meade. The Ridge ranges in elevation from 150 to 270 ft MSL.

REGIONAL GEOLOGY

Surface and near-surface sediments in Polk County consist of quartz sand, silt, clay, phosphate and limestone. A simplified stratigraphic sequence, from top to bottom, includes unnamed Holocene deposits (predominantly sand), Pleistocene and Pliocene marine sands (some containing phosphate) overlying clays, sandy clays, and phosphatic limestone of the Miocene Hawthorn Group. These overlie a thick sequence of limestone, including the Miocene Tampa Member of the Hawthorn Group, Oligocene Suwannee Limestone, Eocene Ocala Group and Avon Park Formation (SWFWMD, 1988).

Figure 2.3.1-1 shows the generalized lithostratigraphic units and hydrogeologic framework underlying the site area. Figures 2.3.1-2 and 2.3.1-3 show the distribution of these sediments throughout Polk County in two geologic cross-sections.

POST-MIOCENE SURFACE SEDIMENTS

The surface sediments in Polk County consist of post-Miocene deposits of unlithified coastal sand, shell, silts, sand, gravelly sand, and beach and dune sands. In general, the Surficial sediments are thinnest in the southwest portion of Polk County, and are thicker to the north and east, and beneath ridges. The thickness of the undifferentiated Surficial deposits ranges from less than 10 feet to more than 120 feet. At the Hines Energy Complex site, most of the Surficial deposits were removed by mining operations and were typically 20 feet thick.

MIOCENE HAWTHORN GROUP

The Miocene Hawthorn Group in South Florida includes the Peace River Formation that overlies the Arcadia Formation. The Bone Valley Member, located in the upper portions of the Peace River Formation, is considered to be the top of the Hawthorn Group. The lower portion of the Hawthorn Group consists of silts, clays and limestone of the Arcadia Formation (Scott, 1988). The Peace River Formation is present throughout Polk County with the exception of the northernmost part of the County. The Arcadia Formation ranges in thickness from 0 feet in the north to approximately 300 feet in the southwest corner of the County. In general, these formations dip to the south and southeast. The Peace River Formation includes the Bone Valley Member that consists of yellowish gray to light olive-green interbedded sands, clays and dolomite with variable phosphate content. The Bone Valley Member is defined as phosphorite pebble or gravel matrix beds with sand-sized phosphorite in a sandy to clayey matrix. At the Hines Energy Complex site, the Bone Valley Member comprises most of the Peace River Formation. The Bone Valley member directly overlies the Arcadia Formation that consists of white to yellowish gray quartz, sandy phosphates and clayey dolomites and clay beds. The thickness of the Hawthorn Group is approximately 260 feet in the site vicinity.

OLIGOCENE SUWANNEE LIMESTONE

The Oligocene Suwannee Limestone is present throughout the western portion of Polk County. The Suwannee consists of a white, creamy, tan, variably textured calcarenite to calcilutite, fossiliferous, poor to well indurated to variably recrystallized limestone. The top of the Suwannee Limestone is reported to range from elevation 70 to 80 ft MSL in the north areas of Lakeland to -250 to -300 ft MSL and range in thickness from 100 to 150 feet in the western portions of Polk County (SWFWMD, 1988).

EOCENE OCALA GROUP

Below the Suwannee Limestone lies the Eocene series of the Ocala Group, the Avon Park Formation and the Oldsmar Formation. The Ocala Group underlies essentially all of Polk County. The Ocala Group (consisting of the Crystal River, Williston, and Inglis Formations) ranges in thickness from 75 to 335 feet throughout the County. The top of the Ocala Group is near the surface in the northern portion of the County and dips southward.

The Avon Park Formation is present below the Ocala Group. It is highly fractured, consists of finely crystalline dolomite with some fossiliferous limestone, and ranges up to 700 feet thick. Underlying the Avon Park Formation is the Oldsmar Formation containing gypsum and anhydrite, which degrades the overall water quality.

2.3.1.2 Detailed Site Lithologic Descriptions

A description of the drilling of boreholes, collection of samples for lithologic description, and results of downhole geophysical logging performed during the 1991 aquifer pump test program is provided in Appendix 10.5.8 of the 1992 SCA. In addition, hydrogeologic cross-sections were developed from lithology encountered in three 300-foot deep boreholes (SH-1, SH-2, and SH-3) at the site. Generally, the site-specific data obtained during the field activities can be correlated to the overall geologic framework as described for Polk County. Figure 2.3.1-4 shows the hydrogeologic framework of the Hines Energy Complex site as encountered during the field activities. Figure 2.3.1-5 is the cross-section location map for the Hines Energy Complex site. Figures 2.3.1-6 and 2.3.1-7 are hydrogeologic cross-sections underlying the Hines Energy Complex site in relation to the site lithologic data.

As shown in the hydrogeologic cross-sections, the majority of the post-Miocene undifferentiated sands and the Bone Valley Member of the Peace River Formation (the top of the Hawthorn Group) have been removed or disturbed by mining operations. The Surficial deposits (overburden) above the Bone Valley Member are typically 15 to 25 feet thick. The Bone Valley Member, typically 15 to 25 feet thick, has been mined to an elevation of approximately 120 to 130 ft MSL.

The Miocene Hawthorne Group below the mined areas consists of clays, silts, sand, and limestone of the Arcadian Formation. The Hawthorn Group, to the bottom of the Arcadian, is approximately 260 feet thick at the adjacent Estech Plant site with a base elevation of approximately -110 ft MSL. The bottom of the Hawthorn Group dips downward to the south.

The sandy limestone encountered below the gray silts at the bottom of the Arcadian Formation is most likely the Oligocene age Suwannee Limestone. Limestone of the Early Miocene Tampa Member could not be differentiated, and may or may not be present. The top of the Suwannee Limestone ranges from an elevation of -85 ft MSL to the north at boring SH-1, to an elevation of -110 ft MSL toward the south and southwest.

Below the Suwannee Limestone are the carbonates of the Eocene Ocala Group. The contact between these two could not be identified during the field investigations. However, literature by Ryder (1985) implies the bottom of the Suwannee Limestone is located at about 200 ft MSL in the site area, with a thickness of about 100 feet.

To the extent of the field activities performed, the limestones of the Ocala Group were encountered to the termination depth of well SC-1, which logged lithology to an elevation of -650 ft MSL.

PLANT ISLAND LITHOLOGY

Prior to development of the Hines Energy Complex, the Plant Island areas SA-11, SA-12N and SA-13 were mine pits undergoing reclamation. The Plant Island areas consisted of partially leveled, loose overburden placed on the undisturbed mine pit bottom. Overburden thickness ranged from 22 to 30 feet and typically extended down to elevation 130 to 133 ft MSL in SA-11, and 120 to 130 ft MSL in SA-12N with elevations trending lower to the south. As presented in the 1992 SCA, typically, the overburden soils were classified as either silty or clayey sand (SM or SC). These soils have been leveled in-place and covered with engineered fill as described on the As-Built Drawings for Earthwork Construction filed previously with the Florida Department of Environmental Protection (FDEP).

The underlying undisturbed ground to the termination depth of the Plant Island area borings typically consist of silty to clayey calcareous sands (SM) to clayey, sandy calcareous silts (MH). These soils are typically dense to very dense with occasional limestone fragments.

2.3.1.3 Geologic Maps

The geologic map of southwest Polk County adapted from Campell (1992) is shown on Figure 2.3.1-8.

2.3.1.4 Bearing Strength

All Power Block 3 facilities will be constructed within the Plant Island in previous mine areas SA-11 and SA-13. The Plant Island area was developed as approved by the 1994 Certification, by filling the mined areas with overburden obtained from N-16W. Existing overburden piles in the structural power block area were leveled to elevation +154 feet NGVD, and the valleys between piles were filled with loose bulldozed fill after mudwaving and excavation of soft bottom sediments. Engineered fill was subsequently placed above elevation +154 feet NGVD in a controlled manner. Engineered fill was placed in one-foot maximum compacted lift thickness and nominally compacted to in excess of 90% compaction per standard proctor density (ASTM D698). Upon completion of filling, a 10-foot high surcharge was rolled across designated areas of the power block for the purpose of preloading and consolidating the underlying fill and overburden piles. The entire Power Block 3 area will be surcharged in this fashion. The surcharging is applied to allow lightly loaded plant facilities such as small tanks and other miscellaneous foundations, to be placed on shallow foundations in lieu of deep foundations. For lightly loaded structures and miscellaneous small foundations constructed in surcharged areas, such structures can be placed on shallow footing or mat foundations at a maximum allowable bearing pressure of 1,000 PSF.

Due to the loose nature of the overburden piles and nominally compacted fill, the support of moderately to heavily loaded power plant structures requires that piles be installed down through the fill and seated well into the underlying dense carbonate silts and clays of the Intermediate aquifer.

The fuel oil storage tank put in with Power Block 1 was the only exception to the above criteria. For the heavily loaded tank, the footprint area was surcharged with a 25-foot height of fill placed to a diameter 10 feet larger than the diameter of the tank. Bearing pressures for the tank ring foundation were set at 2500 psf. No additional oil storage tank will be constructed in association with Power Block 3.

The Plant Island, formerly referred to as mining areas SA-11, SA-12N and SA-13, consisted of partially reclaimed mined-out pits with large amounts of loose overburden material. No phosphatic clays have been deposited in these areas. Fine clean sand tailings occupied a large portion of the north section of SA-13 and a smaller area in the north corner of SA-12N.

2.3.1.5 References

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SERIES	LITHOSTRATIGRAPHIC UNIT			MAJOR LITHOLOGIC UNIT	HYDROLOGIC UNIT	
POST-MIOCENE	UNDIFFERENTIATED DEPOSITS			SAND	SURFICIAL AQUIFER SYSTEM	
MIOCENE	HAWTHORN GROUP	PEACE RIVER FORMATION	BONE VALLEY MEMBER	CLASTIC	CONFINING UNITS	INTERMEDIATE AQUIFER SYSTEM
				CARBONATE AND CLASTIC	AQUIFER	
		ARCADIA FORMATION	TAMPA MEMBER		CONFINING UNITS	
OLIGOCENE	SUWANNEE LIMESTONE			CARBONATE	UPPER FLORIDAN AQUIFER	FLORIDAN AQUIFER SYSTEM
EOCENE	OCALA GROUP					
	AVON PARK FORMATION				CONFINING UNITS	
	OLDSMAR FORMATION			CARBONATE WITH EVAPORITES	LOWER FLORIDAN AQUIFER	

SOURCE: 1992 SCA

FIGURE 2.3.1-1
GENERALIZED LITHOSTRATIGRAPHIC AND HYDROGEOLOGIC FRAMEWORK POLK COUNTY AREA

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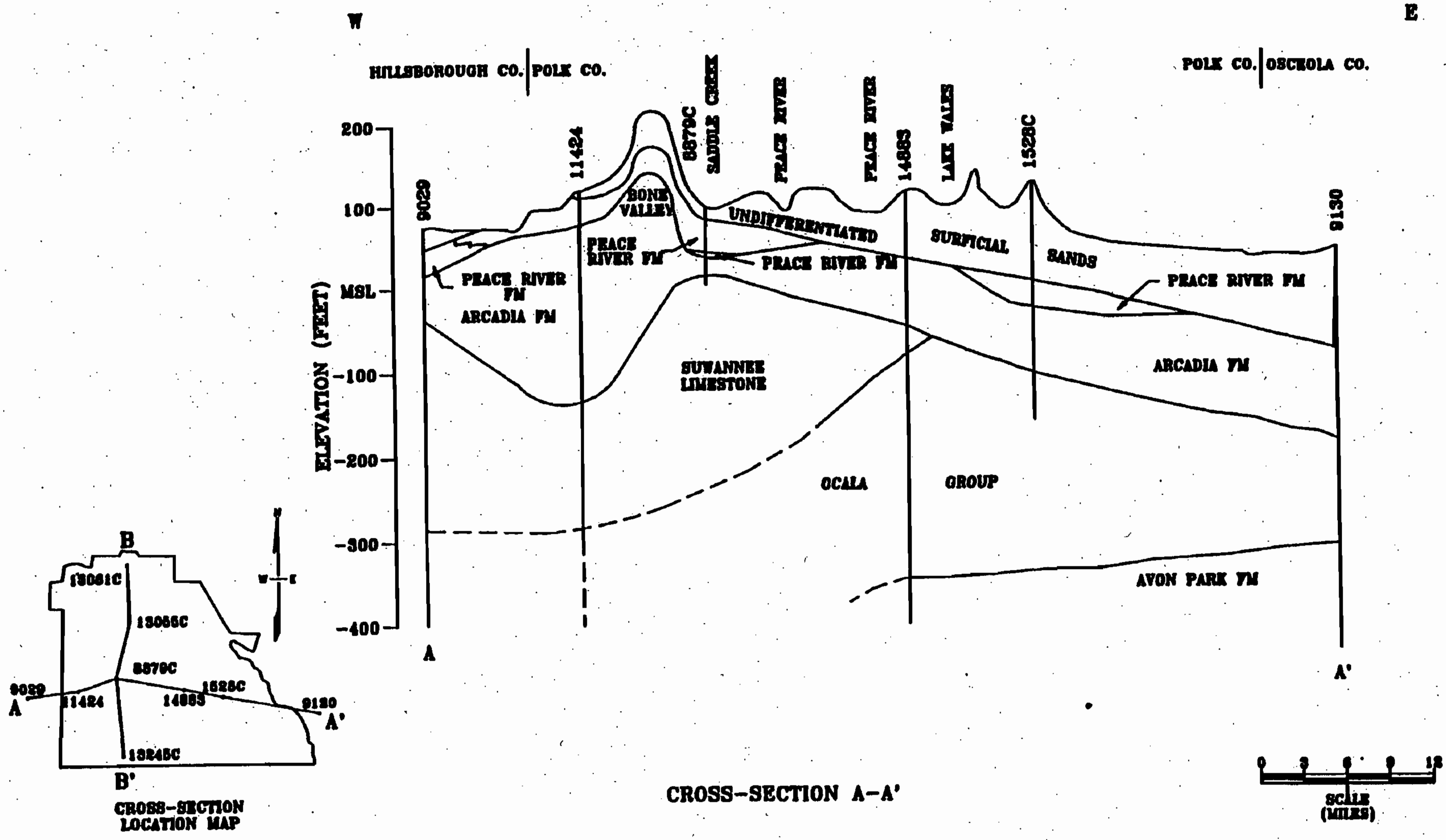

SOURCE: 1992 SCA

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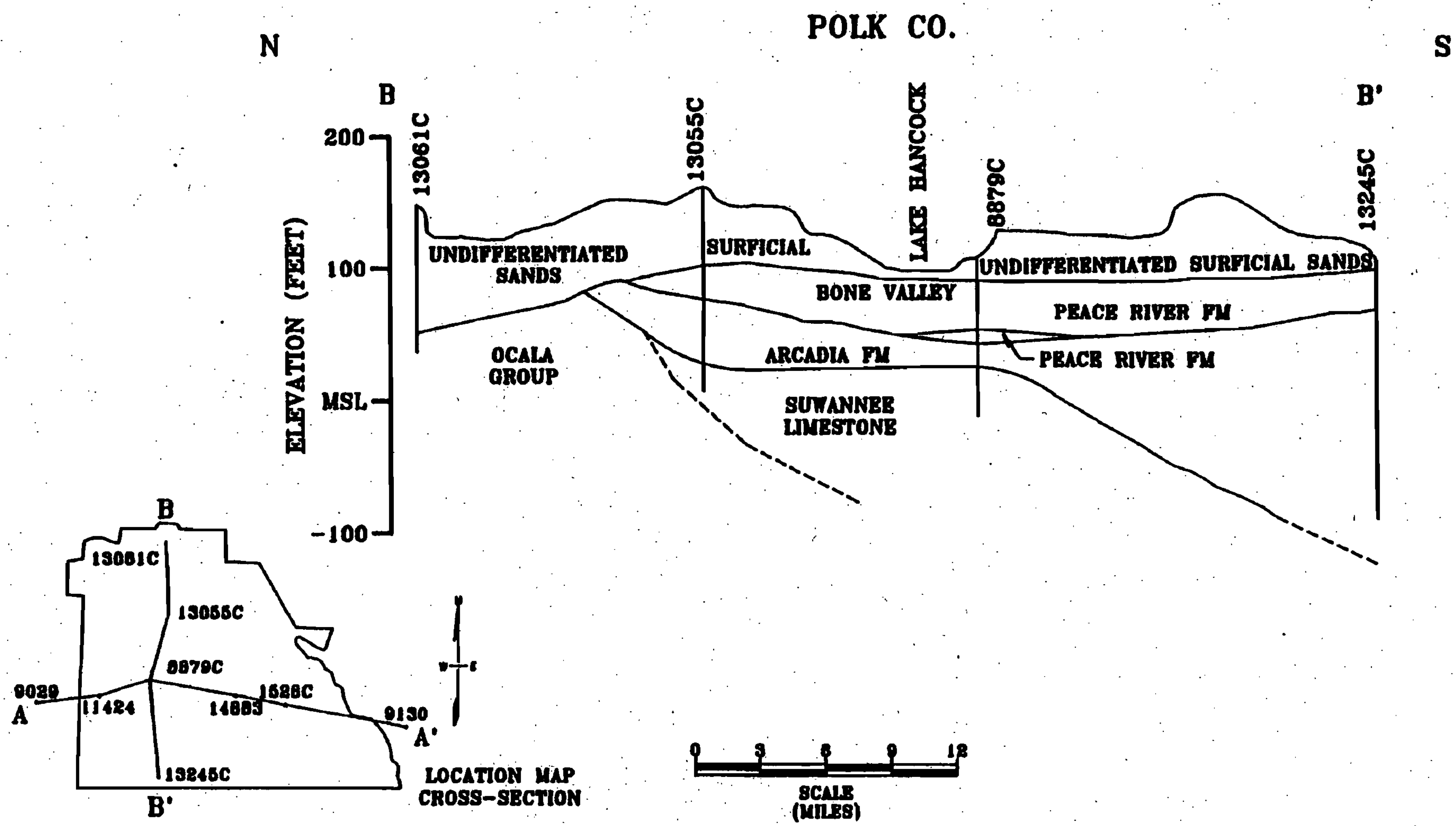
FIGURE 2.3.1-2
GENERALIZED GEOLOGICAL SECTION OF POLK COUNTY (EAST-WEST)



SOURCE: 1992 SCA

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Hines Energy Complex

FIGURE 2.3.1-3
GENERALIZED GEOLOGICAL SECTION OF POLK COUNTY (NORTH-SOUTH)

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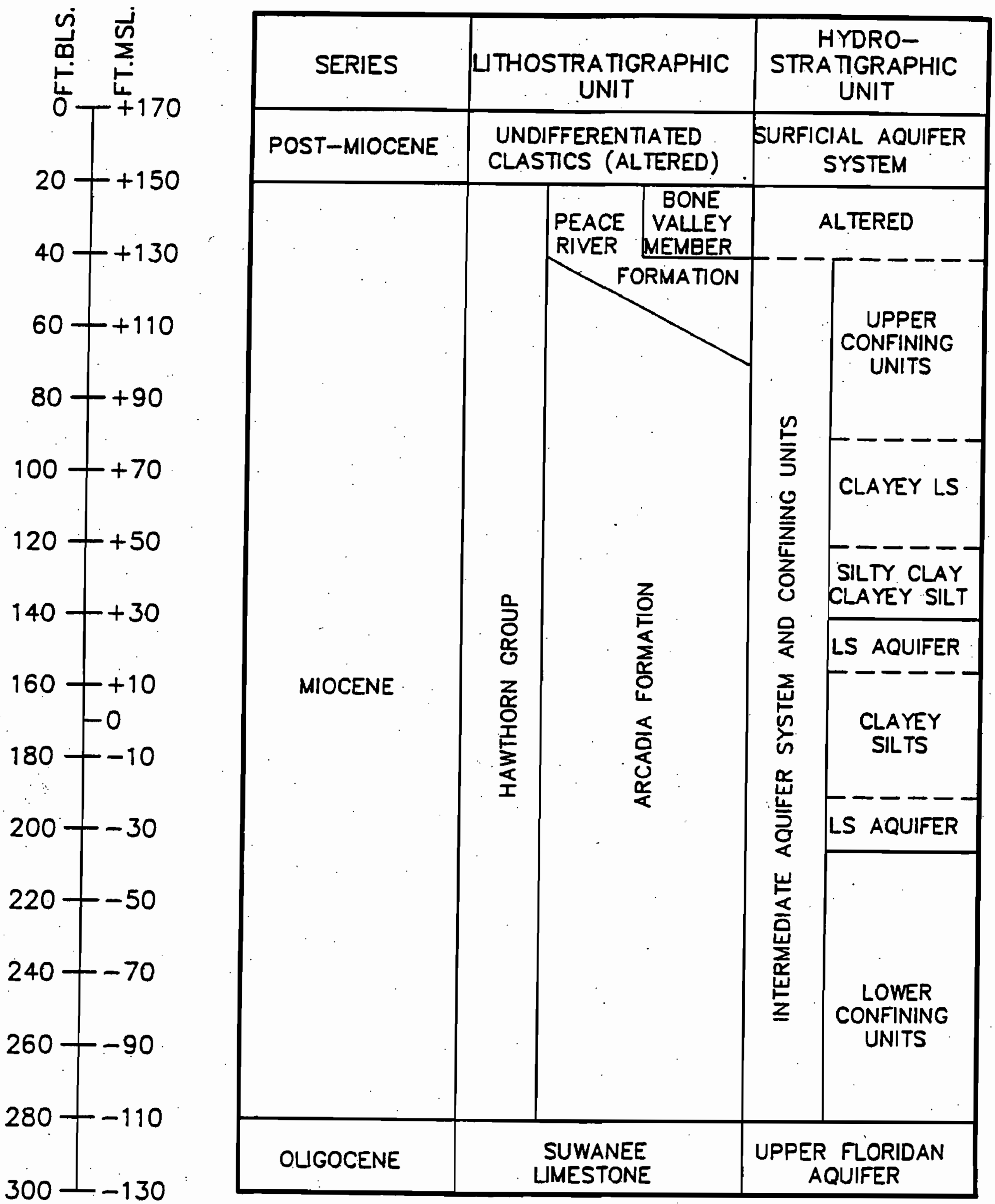

LEGEND:
FT. BLS: FEET BELOW LAND SURFACE
FT. MSL: FEET MEAN SEA LEVEL

SOURCE: 1992 SCA

Florida Power
A Progress Energy Company

Hines Energy Complex

FIGURE 2.3.1-4
HYDROGEOLOGIC FRAMEWORK
FPC SITE AREA

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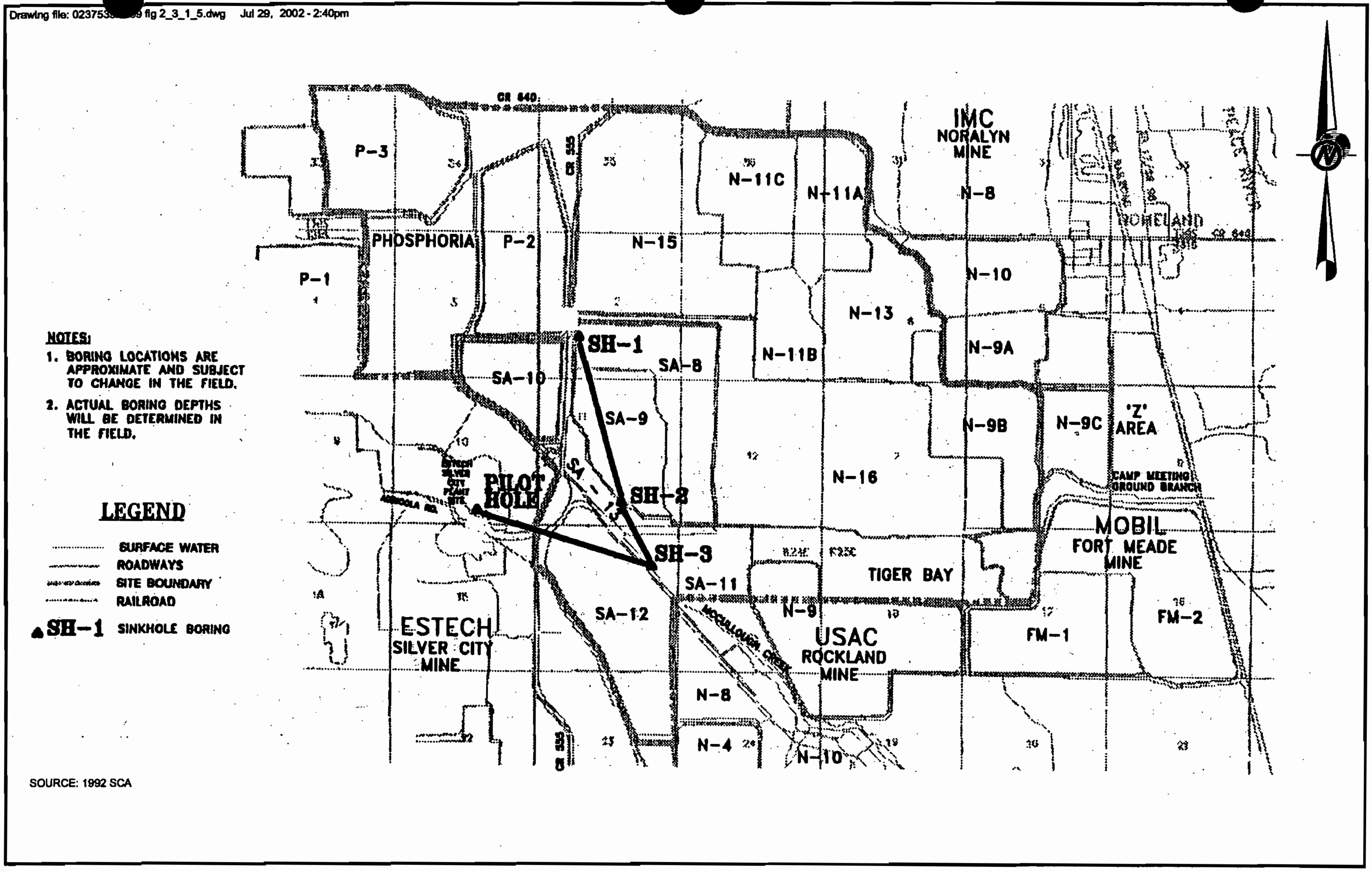

FIGURE 2.3.1-5
HYDROGEOLOGIC CROSS-SECTION LOCATION MAP
HINES ENERGY COMPLEX SITE AREA

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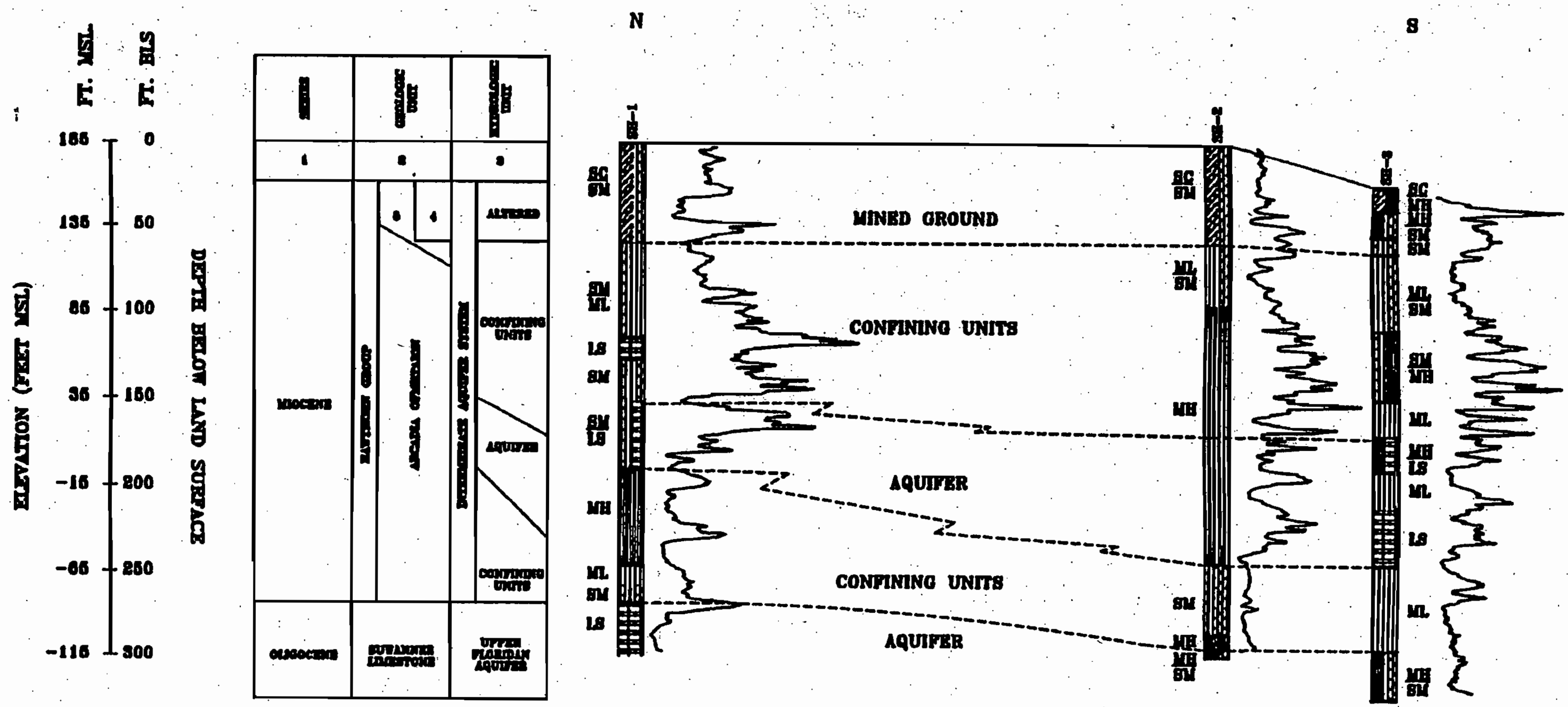

NOTES: THE GAMMA LOG OF THE DOWN HOLE GEOPHYSICAL SURVEY IS PRESENTED TO THE RIGHT OF THE BORE HOLE LOG.

① POST-MIOCENE DEPOSITS

② THIS GEOLOGIC UNIT OR UNITS HAVE BEEN REMOVED/ ALTERED BY MINING ACTIVITIES

③ FORMER SURFICIAL AQUIFER SYSTEM

④ BONE VALLEY MEMBER

⑤ PEACE RIVER FORMATION

LEGEND:

FT. MSL = FEET MEAN SEA LEVEL

FT. BLS = FEET BELOW LAND SURFACE

SOURCE: 1992 SCA

Florida Power

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Hines Energy Complex

FIGURE 2.3.1-6

NORTH - SOUTH HYDROGEOLOGIC CROSS-SECTION

HINES ENERGY COMPLEX SITE, DECEMBER 1991

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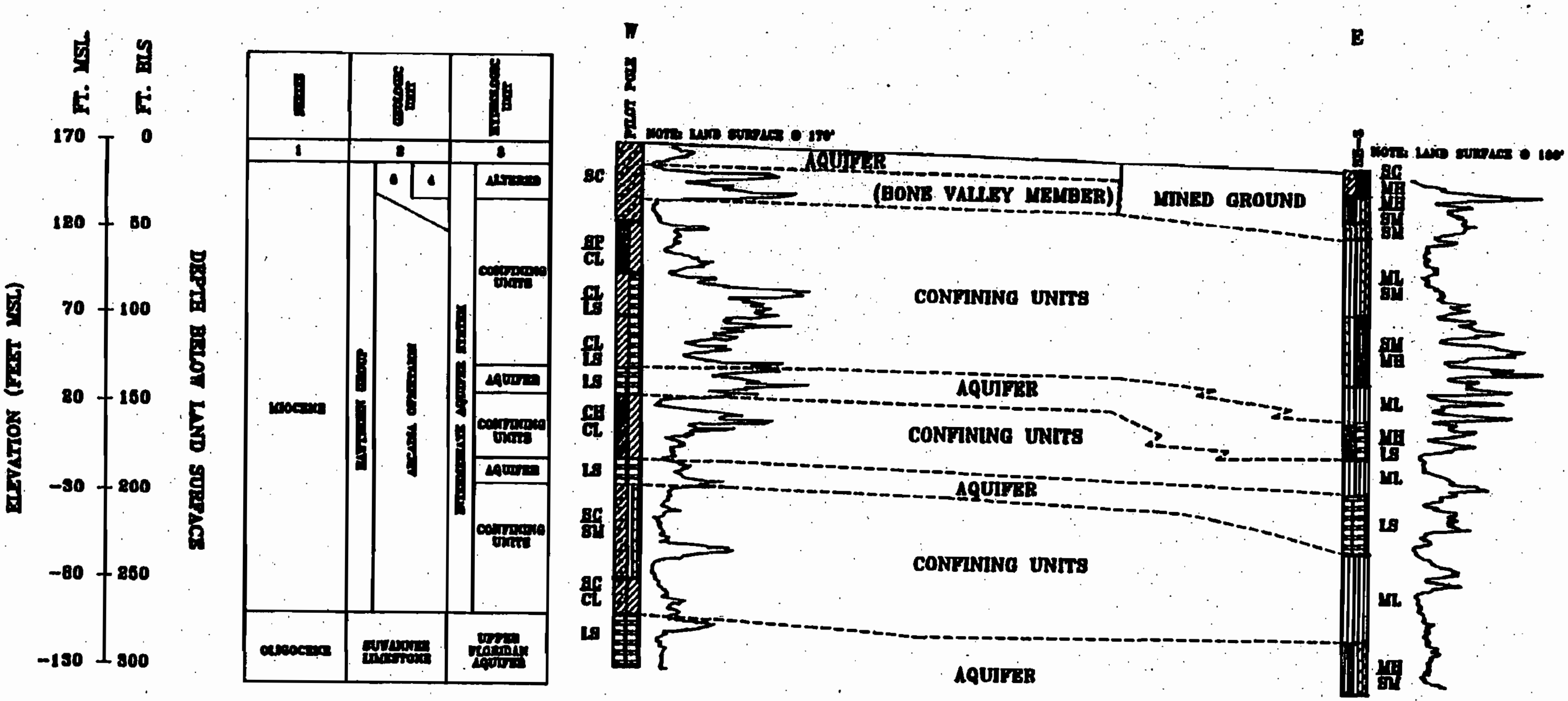

NOTES: THE GAMMA LOG OF THE DOWN HOLE GEOPHYSICAL SURVEY IS PRESENTED TO THE RIGHT OF THE BORE HOLE LOG.

① POST-MIOCENE DEPOSITS

② THIS GEOLOGIC UNIT OR UNITS HAVE BEEN REMOVED/ ALTERED BY MINING ACTIVITIES

③ FORMER SURFICIAL AQUIFER SYSTEM

④ BONE VALLEY MEMBER

⑤ PEACE RIVER FORMATION

LEGEND:

FT. MSL = FEET MEAN SEA LEVEL

FT. BLS = FEET BELOW LAND SURFACE

SOURCE: 1992 SCA

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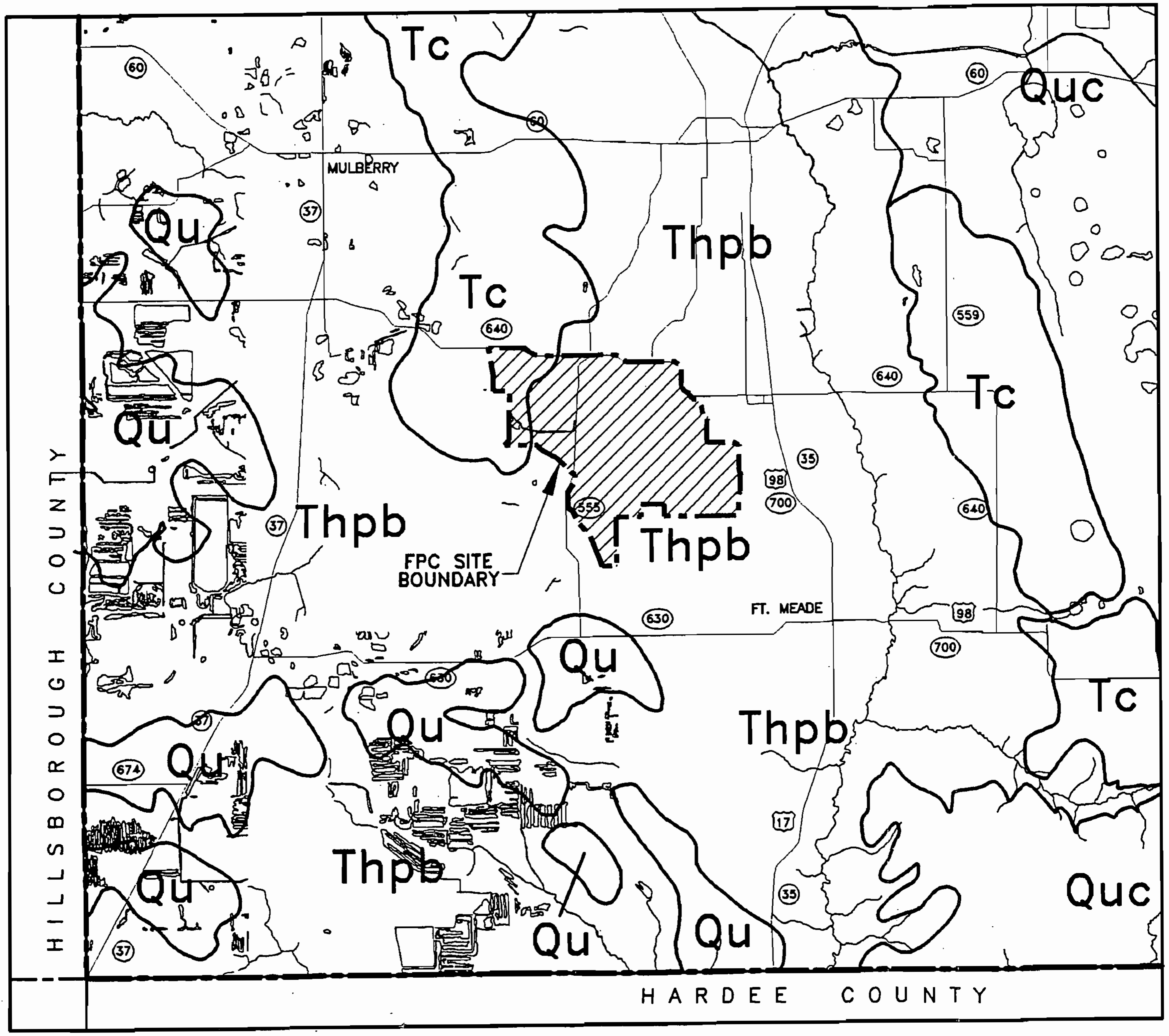
FIGURE 2.3.1-7
EAST - WEST HYDROGEOLOGIC CROSS-SECTION
HINES ENERGY COMPLEX SITE, DECEMBER 1991



EXPLANATION

QUATERNARY

Qu– Undifferentiated surficial sands, clayey sands, clays, marls and peats >20 feet thick. No formations recognized.

Quc– Undifferentiated sands reworked from Cypresshead Fm.. Also isolated occurrences of Cypresshead.

TERTIARY

Tc– Cypresshead Fm. quartz sands with minor clay. Lies on Hawthorn Group.

Thpb–Bone Valley Member of the Peace River Formation, Hawthorn Group. Consists of pebble– or gravel–sized phosphate fragments and sand–sized phosphate grains in a matrix of quartz sand and clay. Percentages of the various components are highly variable.

SOURCE: 1992 F.G.S. MAP, CAMPBELL, 1992

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FIGURE 2.3.1-8
GEOLOGIC MAP OF SOUTHWESTERN POLK COUNTY

2.3.2 Subsurface Hydrology

2.3.2.1 Subsurface Hydrological Data for Site Area

Generally, three hydrostratigraphic units underlie the Hines Energy Complex site area: the Surficial aquifer (previously removed/altered at the site); the Intermediate aquifer that includes upper and lower confining units; and the Floridan aquifer. This section provides background water quality data for each unit, aquifer characteristics, historical water level contour maps, and unit thickness. The discussion of aquifer definitions and the relationship of aquifers to geologic units are referenced to the publications by SWFWMD (1988) and Ryder (1985).

Background water quality data for the Surficial, Intermediate, and Upper Floridan aquifers were presented in the 1992 SCA as tabulated from the U.S. Geological Survey (USGS) Water Quality Data Printout dated May 29, 1991. Additional water quality data for the Surficial aquifer were obtained from Hutchinson (1978). Hines Energy Complex site-specific water quality data were obtained from FP's ground water monitoring program.

Historical water level data used to develop contour maps for the Surficial aquifer, as referenced from Hutchinson (1978), were presented in the 1992 SCA. Also presented were potentiometric contour maps for the Intermediate and Upper Floridan aquifers referenced from USGS water resources data reports (USGS, 1980-91). Additional water level data was obtained from FP's construction dewatering ground water level monitoring program conducted between May 1994 and March 1998.

SURFICIAL AQUIFER SYSTEM

Most of the materials that comprise the Surficial aquifer at the Hines Energy Complex site have been altered, or removed, due to mining activities by prior property owners. Where it occurs naturally and before being removed by mining at the Hines Energy Complex site, the Surficial aquifer system typically consists of clastic deposits of sands, silty sands, and clays of eolian and marine origins. In Polk County, the Surficial aquifer is used primarily for domestic and low volume irrigation uses. The Surficial aquifer thickness ranges from a few inches in lowlands to 250 feet in ridge areas. As defined by SWFWMD (1988), the base of the Surficial aquifer system is the clayey, less permeable beds of the Hawthorn Group. As previously discussed in the 1992 SCA, the top of the Hawthorn Group (the Bone Valley Member of the Peace River Formation) is laterally continuous across the Hines Energy Complex site at an elevation of approximately 150 ft NGVD. The bottom of the Surficial aquifer, to an elevation of about 150 ft NGVD, has been removed/altered during mining operations.

The elevation of the land surface, at boring locations SH-1, SH-2 and SH-3 and at the adjacent Estech Plant site, ranged from 185 to 160 ft NGVD. Where it exists, such as at the Estech Plant site and beneath county roads, the Surficial aquifer ranges in thickness from about 10 to 35 feet.

During the field activities at the Estech Plant site in November and December 1991, the elevation of the water table of the Surficial aquifer in an adjacent unmined area was measured to range from 153 to 163 ft NGVD. As reported in the Aquifer Characteristics Program (ACP) Summary Report (Appendix 10.5.8 of the 1992 SCA), the ground water flow direction at the Estech Plant site is to the southwest. Water level measurements were not collected at the Hines Energy Complex site itself, because of the lack of aquifer thickness or continuity. However, published data by Hutchinson (1978) provided water table elevations for the Surficial aquifer in September 1975. Figure 2.3.2-1 is a generalized water table contour map of the Surficial aquifer in the Hines Energy Complex site area before mining. These data show water level elevations of 150 ft NGVD near the Hines Energy Complex site with a ground water flow direction to the east along the east half of the site and to the southwest along the west half of the site. However, it is noted that these water levels are no longer indicative of present day flow conditions due to the extensive mining operations in the Hines Energy Complex site area. This information is provided solely as historical data on pre-mining ground water flow and elevation.

The hydraulic properties of the Surficial aquifer were not measured. However, as reported by Hutchinson (1978), the Surficial aquifer, where it exists and has been tested, has an average transmissivity of 1,900 ft^2/day and a specific yield of 0.29.

Hines Energy Complex site construction activities and mine reclamation activities have, in places, reconstructed the Surficial aquifer. Cast overburden placed during mining operations was excavated for construction of the Cooling Pond area. The Surficial aquifer framework at the Cooling Pond has therefore been removed. Cast overburden from the Cooling Pond excavation was placed as engineered fill within the Plant Island. The Surficial aquifer at the Plant Island is, therefore, engineered (compacted) fill. The engineered fill is described in the As-Built Drawings for Earthwork Construction on file with the DEP. Elsewhere on the property, the Surficial aquifer has been either reconstructed with recontoured overburden as part of the mine reclamation activities or replaced with waste clay in the waste clay settling areas.

Surficial aquifer ground water levels at the Hines Energy Complex site were monitored from April 1, 1993 through March 16, 1998. Ground water level monitoring was conducted as required under Condition XXVI.A.24.e of the Conditions of Certification for Power Block 1. The levels were monitored in 15 upper Surficial aquifer monitor wells and six lower Surficial aquifer monitor wells. Except during construction dewatering, the monitor wells constructed in the upper portion of the Surficial aquifer had ground water levels generally ranging from 145 to 165 feet NGVD. Monitor wells constructed in the lower portion of the Surficial aquifer had ground water levels typically one to three feet lower than the water levels in the shallower wells.

The background water quality of the Surficial aquifer system near the Hines Energy Complex site is tabulated from published data by the USGS (1991). The Surficial aquifer baseline water quality data sampling locations are shown on Figure 2.3.2-2. Water quality data at nine sampling locations near the Hines Energy Complex site are provided in Table 10.5.3-3 of the 1992 SCA. The minimum, maximum, and mean Surficial aquifer water quality data are presented in Table 10.5.3-4 of the 1992 SCA.

INTERMEDIATE AQUIFER SYSTEM

As shown on Figures 2.3.1-1 through 4, the Intermediate aquifer system is present in the Arcadia and Peace River Formations of the Miocene Age Hawthorn Group. The Intermediate aquifer system includes all water bearing units and confining units between the overlying Surficial aquifer system and the underlying Upper Floridan aquifer system (SWFWMD, 1988). The Intermediate aquifer system includes the upper confining units below the Surficial aquifer, the middle unit of limestone and clayey silts, and the lower confining units above the Suwannee Limestone, which corresponds to the upper sections of the Upper Floridan aquifer. Water withdrawals from the middle units of the Intermediate aquifer system are used primarily for domestic supply in Polk County. Large diameter wells (6 inches or larger) open to the Intermediate aquifer system generally can provide yields of 200 gpm or more. The aquifer is most productive in the central and southern parts of Polk County.

The upper confining layers of the Intermediate aquifer system consist of the clayey and silty sediments of the Bone Valley Member of the Peace River Formation. Mining activities have removed/altered the sediments of the Bone Valley Member, which were typically 15 to 25 feet thick. The geophysical logs taken at the Hines Energy Complex site in 1991 (FP 1992), show the bottom of the Bone Valley Member to be approximately 130 ft NGVD. Therefore, the remaining upper confining units of the Arcadia Formation are about 100 feet thick, beginning at approximately 130 ft NGVD and extending downward to the first production zones, consisting of limestone at an elevation of 30 ft NGVD. The lithologic data obtained from a 300-foot deep pilot hole at the adjacent Estech Plant site and the three 300-foot deep borings near the Plant Island area at the Hines Energy Complex show two limestone aquifer zones in the Arcadia Formation. As shown in the hydrogeologic cross-section and framework, the aquifer zones of the Intermediate aquifer range in elevation from 30 ft NGVD at the top to about -30 ft NGVD at the bottom. The units appear to be laterally extensive throughout the Hines Energy Complex site area as extrapolated from the boring locations.

The lower confining units of the Intermediate aquifer consist of gray clayey silts of the Arcadia Formation. The lower confining units are approximately 75 feet thick with the bottom at an elevation ranging from -110 ft NGVD at the Estech pilot hole, to -85 ft NGVD at SH-1, and to -115 ft NGVD at SH-3. (See Figures 2.3.1-6 and 2.3.1-7.)

Hutchinson (1978) discusses the hydraulic properties of the Intermediate aquifer system. The transmissivity for the Intermediate aquifer averaged 5,185 ft^2/day for six tests conducted in Polk County, and storage coefficients ranged between 1.0×10^{-4} and 4.2×10^{-5} for seven tests. One leakance coefficient value of 2×10^{-4} feet per day per foot (ft/day/ft) was reported (SWFWMD, 1988). Model-derived leakance values of the lowermost intermediate confining beds are estimated to range from 3×10^{-5} to 7×10^{-5} ft/day/ft (Ryder, 1985). A leakance value for the lower confining units evaluated from data generated during the aquifer performance testing at the adjacent Estech Plant site (Appendix 10.5.8 of the 1992 SCA) was calculated to be 2.4×10^{-4} gallons per day per cubic foot (gpd/ft^3). The leakance values are greatly affected by the variability in thickness of the confining beds, which is most likely the main reason for the observed differences.

Historical potentiometric surface contour maps of the Intermediate aquifer during wet and dry seasons were developed from USGS data files, as shown on Figures 2.3.2-3 and 2.3.2-4 during the months of May and September, for the year 2001. The potentiometric maps suggest variable flow directions influenced by pumping from water wells in Bartow, Fort Meade, and Homeland. The potentiometric level in the Hines Energy Complex site area ranged from approximately 60 ft NGVD to 75 ft NGVD during the May measurements with ground water flow to the southeast and east, and 75 ft NGVD to 90 ft NGVD during the September measurements with ground water flow to the east. As shown in Appendix 10.5.8 of the 1992 SCA, the potentiometric surface contours suggest a northwest ground water flow direction. Metz and Stelman (1995) reported potentiometric levels in the Hines Energy Complex site area to be between 90 and 110 feet NGVD in May 1995 with ground water flow direction ranging from northwest to northeast. In September 1995, Metz, Swenson, and Stelman (1996) reported potentiometric levels between 80 and 110 feet NGVD with ground water flow directions generally northeast. Figure 2.3.2-4 shows that the groundwater flow direction is southward at the Hines site.

Intermediate aquifer potentiometric levels at the Hines Energy Complex site were monitored from April 1, 1993 through March 16, 1998. The monitoring was conducted as required under Condition XXVI.A.24.e of the Conditions of Certification for Power Block 1. The levels were monitored in two Intermediate aquifer monitor wells DMWP-1D and DMWP-6D. The Intermediate aquifer potentiometric levels generally ranged from 70 to 92 feet NGVD.

The background water quality of the Intermediate aquifer is provided by data published by the USGS. The Intermediate aquifer baseline water quality data sampling locations are shown on Figure 2.3.2-5. Water quality data at six locations near the Hines Energy Complex are provided in Table 10.5.3-5 of the 1992 SCA. The minimum, maximum, and mean values of the water quality data are presented in Table 10.5.3-6 of the 1992 SCA. Overall, the water quality of the Intermediate aquifer system in Polk County is within FDEP primary and secondary drinking water standards (SWFWMD, 1988).

FP has conducted ground water sampling and analysis as part of the ground water monitoring program required by the 1994 certification. Six Intermediate aquifer monitor wells (IMW1, IMW-2, IMW-3, IMW-4, IMW-5, and IMW-6) were sampled on April 4, 2000. The samples were analyzed for Primary Drinking Water Standard parameters (inorganics and volatile organic compounds), Secondary Drinking Water Standard parameters, purgeable halocarbons, purgeable aromatics, phenols, phthalate esters, and PCB's. The water quality of the Intermediate aquifer system at the Hines Energy Complex is within FDEP primary and secondary drinking water standards. In addition, purgeable halocarbons, purgeable aromatics, phenols, phthalate esters, and PCB's were not present in detectable concentrations in any of the samples except one sample where cis-1,2-Dichloroethene was detected at a concentration fifty times lower than the drinking water standard contained in Chapter 62-550, F.A.C.

FLORIDAN AQUIFER SYSTEM

As shown in the generalized lithostratographic and hydrogeologic framework (Figure 2.3.1-1), the Floridan aquifer system near the Hines Energy Complex site consists of vertically persistent permeable carbonates of the Avon Park Formation, the Ocala Group, and the Suwannee Limestone.

As shown on Figure 2.3.1-4, the Upper Floridan aquifer begins at the encounter of the sandy carbonates of the Suwannee Limestone, followed by the limestones of the Ocala Group and consists of units below the bottom of the clayey silts of the Arcadia Formation of the Hawthorn Group, from which most of the potable water supplies are provided. The contact between the Suwannee Limestone and the Ocala Group could not be identified from the field activities performed at the Estech Plant site; however, the bottom of the Suwannee is estimated to be at approximately -200 ft NGVD (Ryder, 1985).

The 300-foot deep pilot hole at the Estech Plant site and the three 300-foot borings (SH-1, 2, and 3) at the FP Hines Energy Complex show the top of the Upper Floridan aquifer to range from -85 ft NGVD (SH-1) to -115 ft NGVD (SH-3). (See Figures 2.3.1-6 and 2.3.1-7.) Estimates of the aquifer's base elevation range from higher than -1,000 ft NGVD in central Polk County to deeper than -1,200 ft NGVD in southern Polk County (SWFWMD, 1988). The deepest well from which downhole geophysical data were obtained on the Estech Plant site was SC-1, to a bottom elevation of approximately -650 ft NGVD. During the field activities at the Estech Plant site, between October and December 1991, the potentiometric level of the Upper Floridan ranged in elevation from +57 ft NGVD to +58 ft NGVD as shown in the ACP Summary Report contained in Appendix 10.5.8 of the 1992 SCA.

Historical water level data from USGS files led to the potentiometric surface contour maps for the Upper Floridan during the wet and dry seasons shown on Figures 2.3.2-6 and 2.3.2-7 during the months of May and September for the year 2001. In the Hines Energy Complex site area, the potentiometric levels ranged from 40 ft NGVD to 50 ft NGVD during the May measurements and 55 ft NGVD to 65 ft NGVD during the September measurements. Based on USGS data, the ground water flow direction of the Upper Floridan aquifer is toward the southwest. Figure 2.3.2-8 shows a hydrograph of the water levels in Floridan Aquifer well ROMP 59, which is maintained by the Southwest Florida Water Management District. This well is located in Section 12, Township 30S, Range 24E and is about four miles north of the Hines Energy Complex site. Floridan Aquifer water levels vary from a low of 43 feet in April 1990 to a high of 83 feet in February 1998.

The hydraulic properties of the Upper Floridan aquifer are documented throughout Polk County. The areal variation in the Upper Floridan transmissivity is controlled primarily by the occurrence of solution features and fractures. The aquifer storage coefficient is controlled by thickness, and confining bed lithology and thickness control leakance (SWFWMD, 1988). Transmissivity values from four aquifer performance tests performed near the Hines Energy Complex ranged from 119,000 gpd/ft to 69,800,000 gpd/ft as shown on Table 1 of ACP Summary Report contained in Appendix 10.5.8 of the 1992 SCA. The upper range was reported for a well that most probably encountered a fracture system (SWFWMD, 1987). Storage coefficients ranged from 1.0×10^{-4} to 4.4×10^{-4}. An average transmissivity value of 552,000 gpd/ft was measured during the aquifer performance test performed on well SC-1 at the adjacent Estech Plant site. The average storage coefficient was 7.92×10^{-3} for the test at the adjacent Estech Plant site.

Background water quality data of the Upper Floridan aquifer was provided by the USGS. The Upper Floridan aquifer baseline water quality data sampling locations are shown on Figure 2.3.2-9. Water quality data for thirteen locations near the FP Hines Energy Complex are provided in Table 10.5.3-7 of the 1992 SCA. The minimum, maximum, and mean values of the water quality data are presented in Table 10.5.3-8 of the 1992 SCA.

One Floridan Aquifer monitor well (FMW-1) was sampled on September 23, 1998. The sample was analyzed for Primary Drinking Water Standard parameters (inorganic and volatile organic compounds), Secondary Drinking Water Standard parameters, purgeable halocarbons, purgeable aromatics, phenols, phthalate esters, and PCB's. The water quality of the Floridan aquifer system underlying the Hines Energy Complex site is within DEP primary and secondary drinking water standards. In addition, purgeable halocarbons, purgeable aromatics, phenols, phthalate esters, and PCB's were not present in detectable concentrations.

RECHARGE TO AQUIFER SYSTEMS

Primarily vertical hydraulic conductivity and thickness of confining units control the recharge and discharge to the Upper Floridan aquifer in Polk County. These variables have been used to calculate recharge rates to the Upper Floridan aquifer. Stewart (1980) reports that no recharge occurs along the Kissimmee River area of eastern Polk County. Areas of very low recharge (0 to 2 inches) occur in the southwest portions of the County. Very low to moderate areas of recharge (less than 2 inches to as much as 10 inches per year) are found in the northern Green Swamp area of Polk County.

The highest value of recharge occurs in a linear band directly associated with the upland sandy ridge areas, where recharge rates are estimated between 10 and 20 inches per year (SWFWMD, 1988). Estimates of recharge by SWFWMD (1988), Ryder (1985), and Stewart (1980), near the Hines Energy Complex site area range from no recharge to 2 inches, 3 to 6 inches, and 0 to 2 inches per year, respectively.

Recharge rates to the Intermediate aquifer system were evaluated by SWFWMD (1988). This publication indicates a very low to moderate recharge rate to the Intermediate aquifer for September 1986 and May 1987, ranging from 0 to 10 inches per year in the Hines Energy Complex site area.

2.3.2.2 Karst Hydrogeology

The Karst hydrogeology review and Hines Energy Complex site sinkhole evaluation was presented in the 1992 SCA. The review and evaluation included the following:

1) A study of topographic maps and aerial photographs (both pre-mining and post-mining) of the Hines Energy Complex site and vicinity;
2) A review of the available literature on the geology of the region of Polk County;
3) A review of USGS and Florida Geological Survey (FGS) documents related to sinkhole occurrences as reported by the Florida Sinkhole Research Institute (FSRI) and SWFWMD;
4) A review of available newspaper articles regarding reported sinkholes in the Polk County area;
5) A Surficial lineament analysis to evaluate the regional potential for sinkhole solution activity; and;
6) A field investigation program consisting of deep borings in three depressed areas identified on pre-mining aerial photographs.

The results of this study on sinkhole potential can be summarized as follows:

- The overall assessment of sinkhole potential at the Hines Energy Complex site is that the occurrence of a catastrophic sinkhole is highly unlikely. See Figure 2.3.2-10.

- No evidence of historic sinkholes at the Hines Energy Complex site exists, and there were no reported incidents of sinkhole problems during mining operations nor during Hines Energy Complex site development activities.

A sinkhole occurred approximately eight miles to the west of the Hines Energy Complex in 1996 beneath the IMC gypsum stack at the New Wales facility. The facility is located just south of County Road 640 near the Polk and Hillsborough County line. Due to the distance (approximately 8 miles) between the IMC sinkhole site and the Hines Energy Complex, this sinkhole activity does not impact the Hines Energy Complex site.

The Florida Geological Survey maintains records of sinkholes reported to the Florida Department of Community Affairs and the Florida Geological Survey. A review of the sinkhole files of the Florida Geological Survey reveals that no sinkholes in the vicinity of the Hines Energy Complex were reported since the submittal of the 1992 SCA.

2.3.2.3 References

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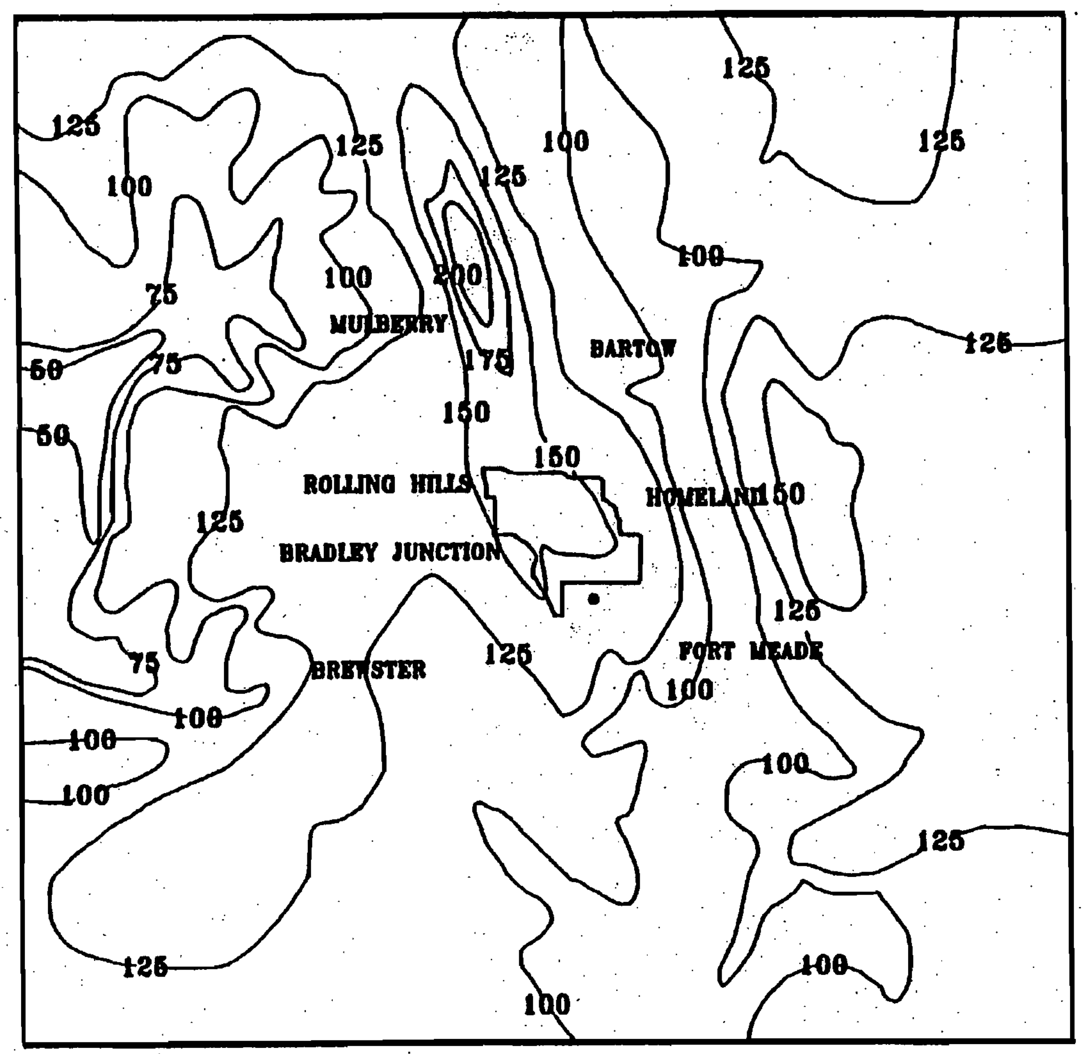

CONTOUR INTERVAL = 25 FEET (NGVD)

SOURCE: 1992 SCA

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FIGURE 2.3.2-1
GENERALIZED WATER TABLE CONTOUR MAP
SURFICIAL AQUIFER SEPTEMBER 1975

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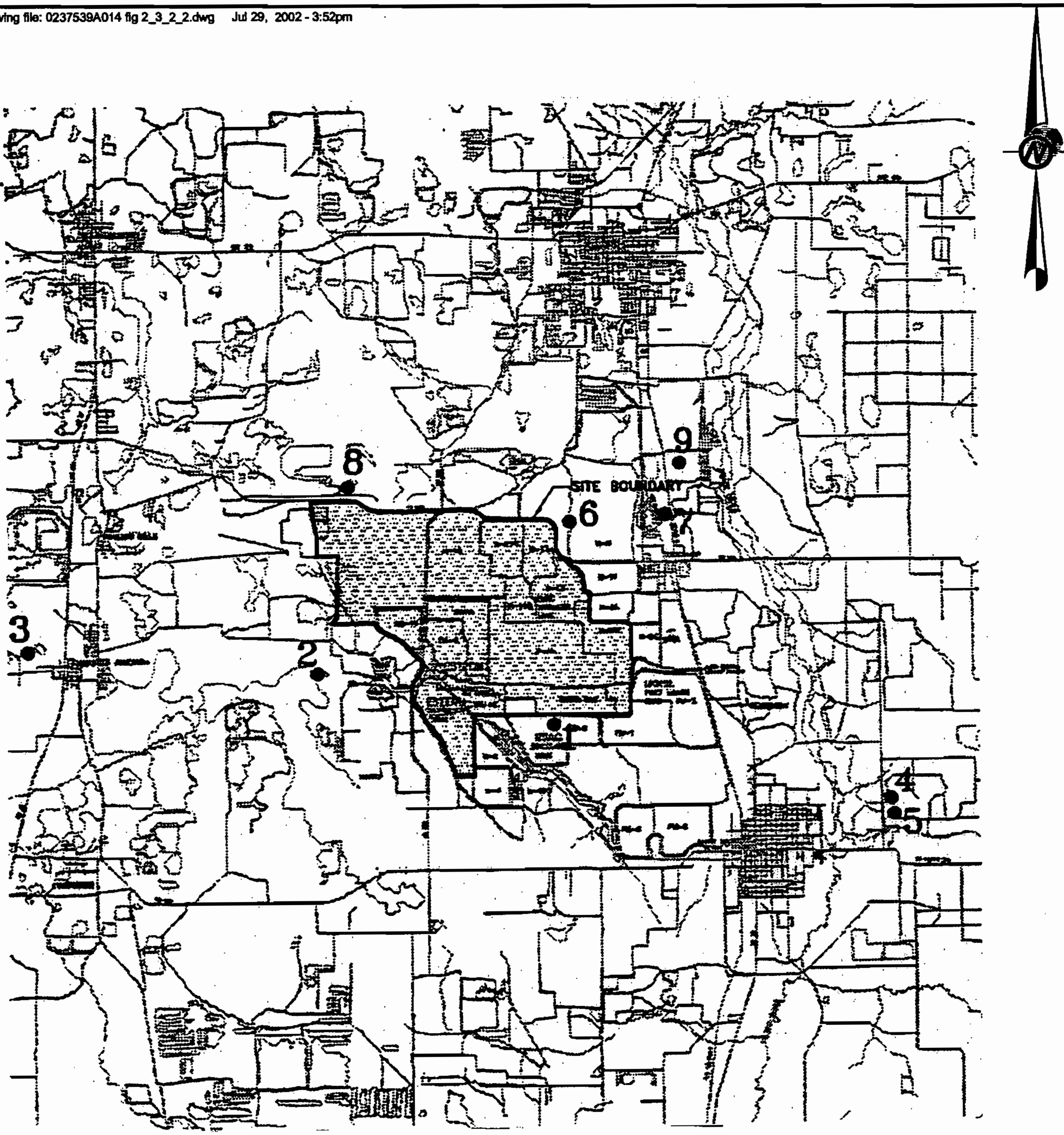

LEGEND

•1 SAMPLING POINT

SOURCE: 1992 SCA

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FIGURE 2.3.2-2
SURFICIAL AQUIFER BASELINE
WATER QUALITY DATA SAMPLING
LOCATION MAP

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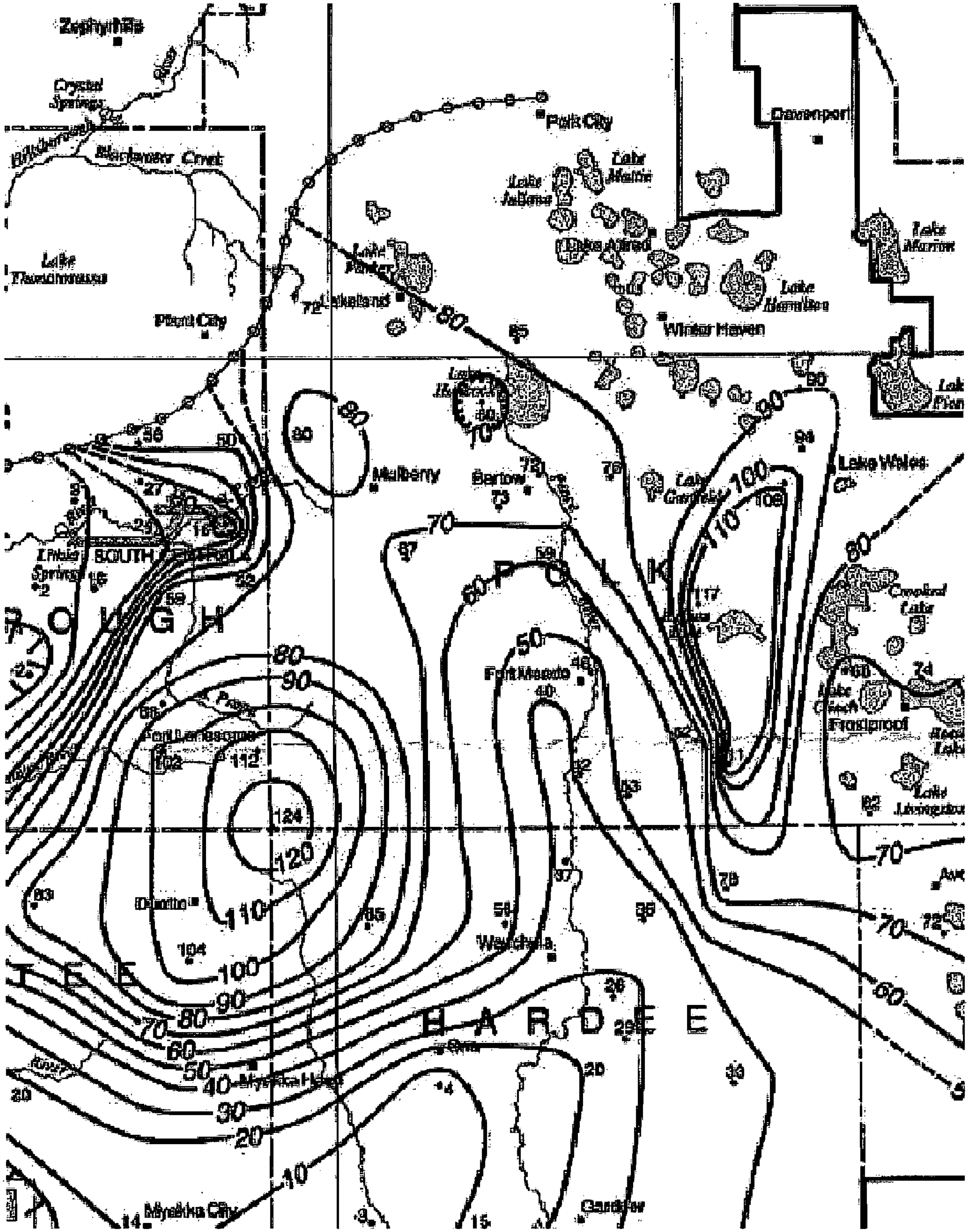

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FIGURE 2.3.2-3
POTENTIOMETRIC SURFACE INTERMEDIATE AQUIFER
MAY 2001

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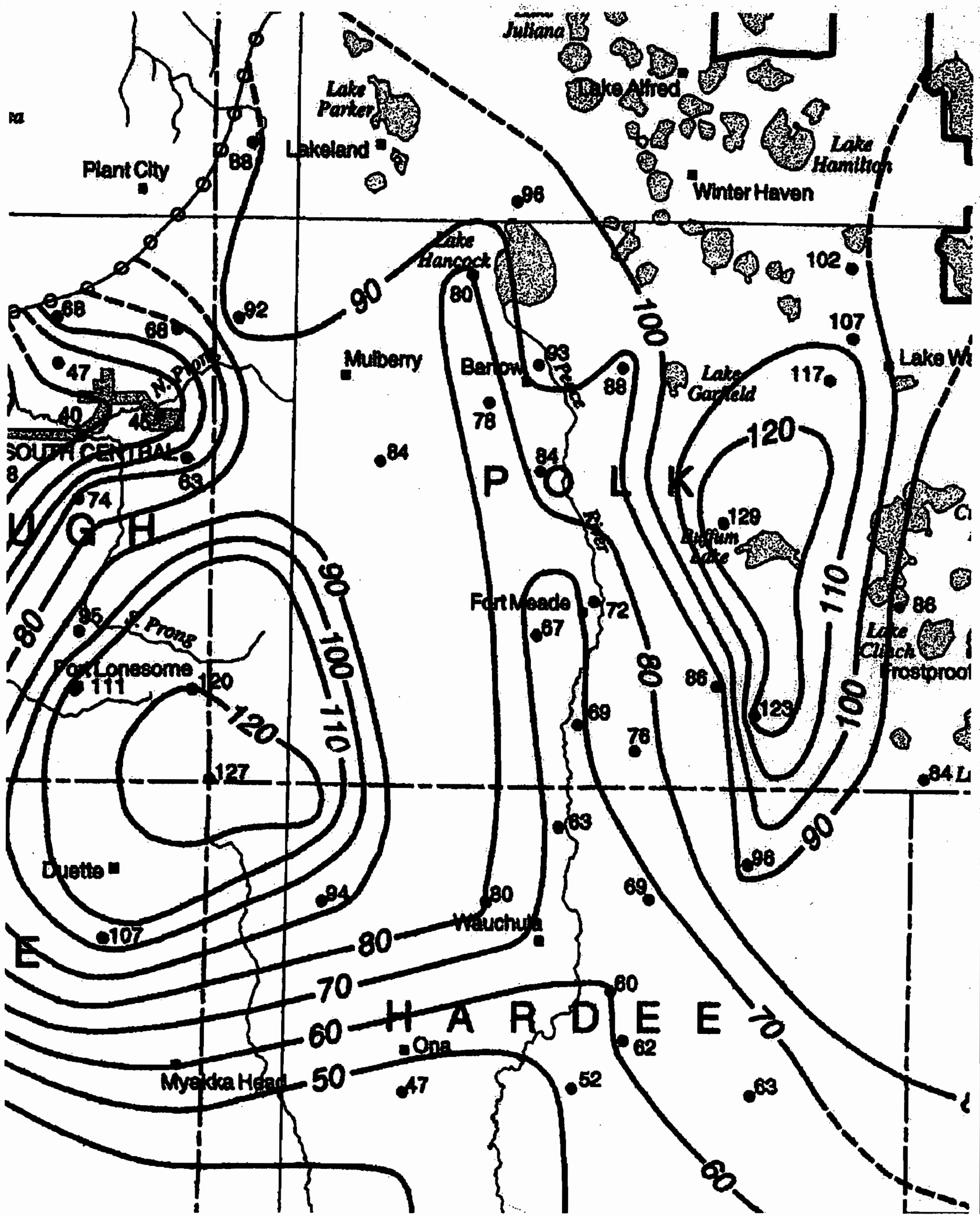

FIGURE 2.3.2-4
POTENTIOMETRIC SURFACE INTERMEDIATE AQUIFER
SEPTEMBER 2001

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Hines Energy Complex

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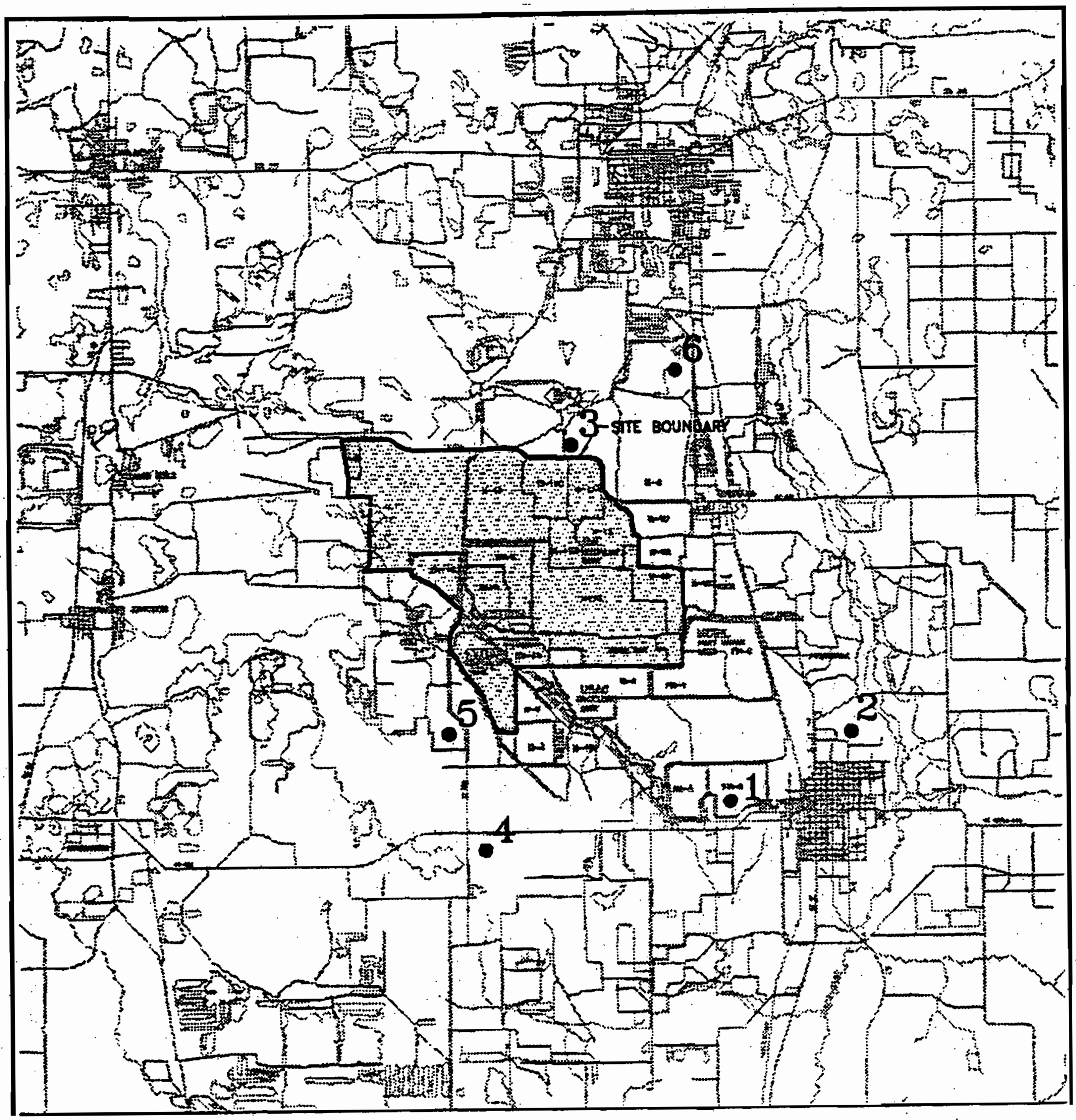

LEGEND

● 1 SAMPLING POINT

SOURCE: 1992 SCA

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FIGURE 2.3.2-5
INTERMEDIATE AQUIFER BASELINE
WATER QUALITY DATA SAMPLING
LOCATION MAP

Drawing file: 0237539A018 fig 2_3_2_6.dwg Aug 14, 2002 - 3:15pm

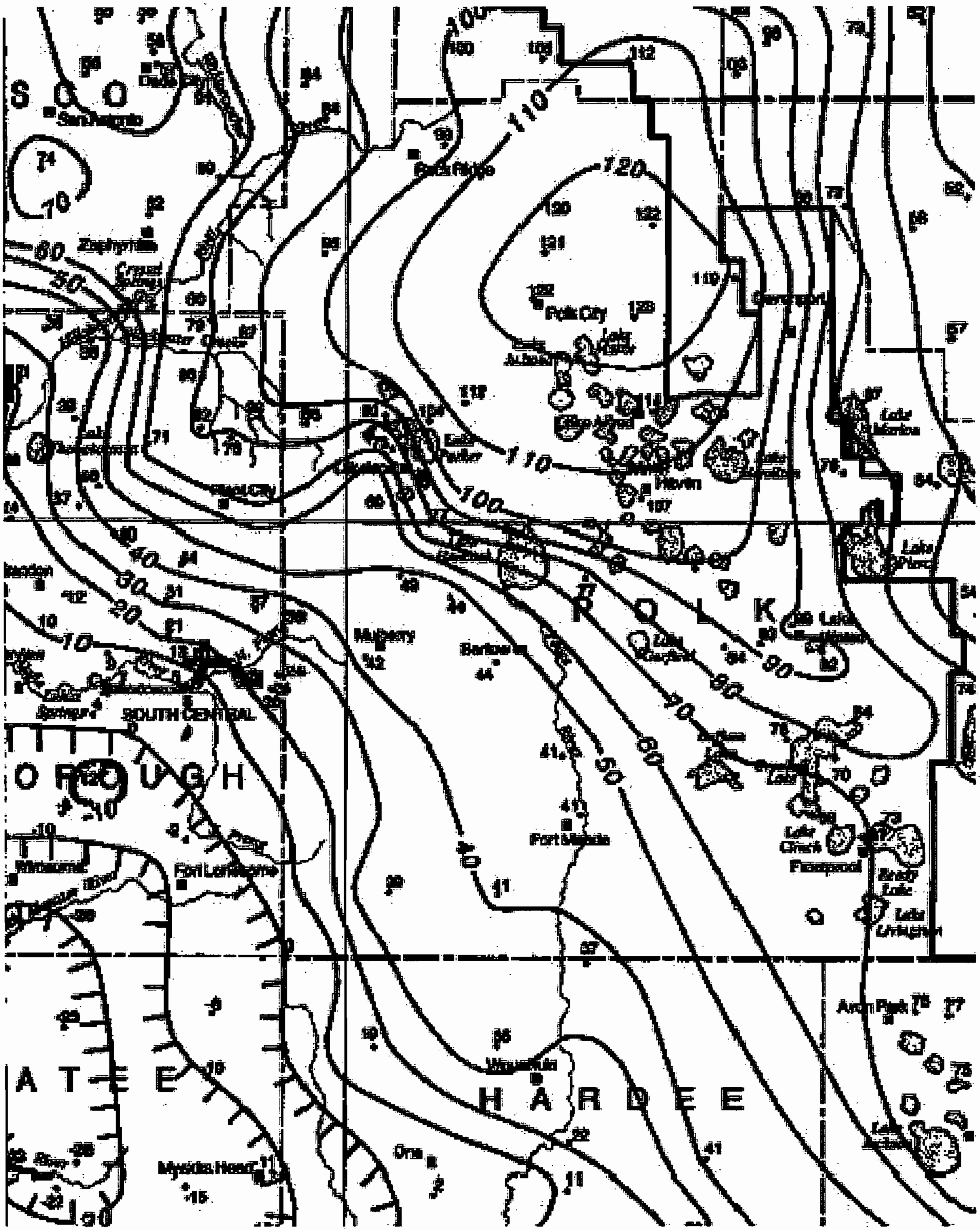

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FIGURE 2.3.2-6
POTENTIOMETRIC SURFACE FLORIDAN AQUIFER
MAY 2001

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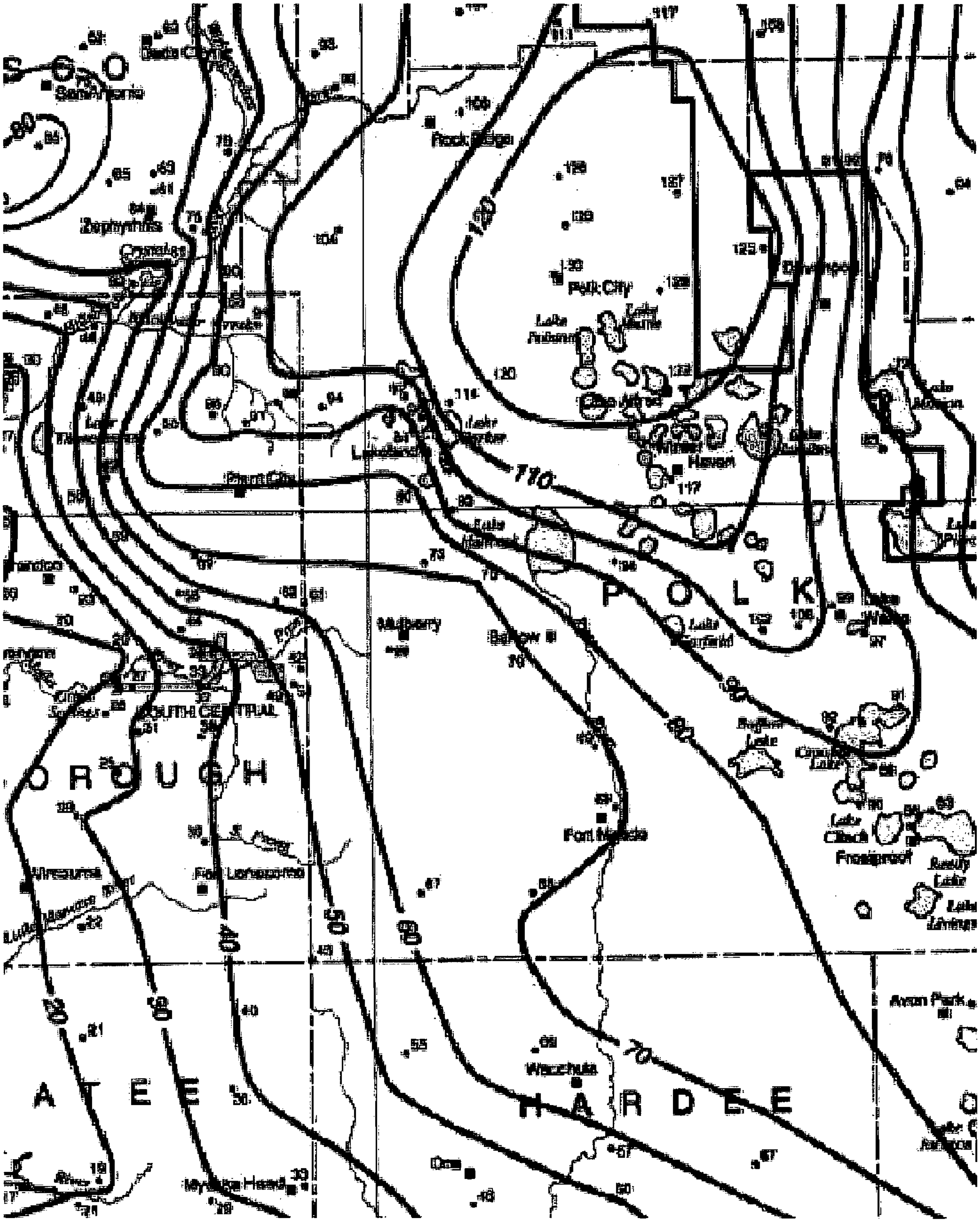

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FIGURE 2.3.2-7
POTENTIOMETRIC SURFACE FLORIDAN AQUIFER
SEPTEMBER 2001

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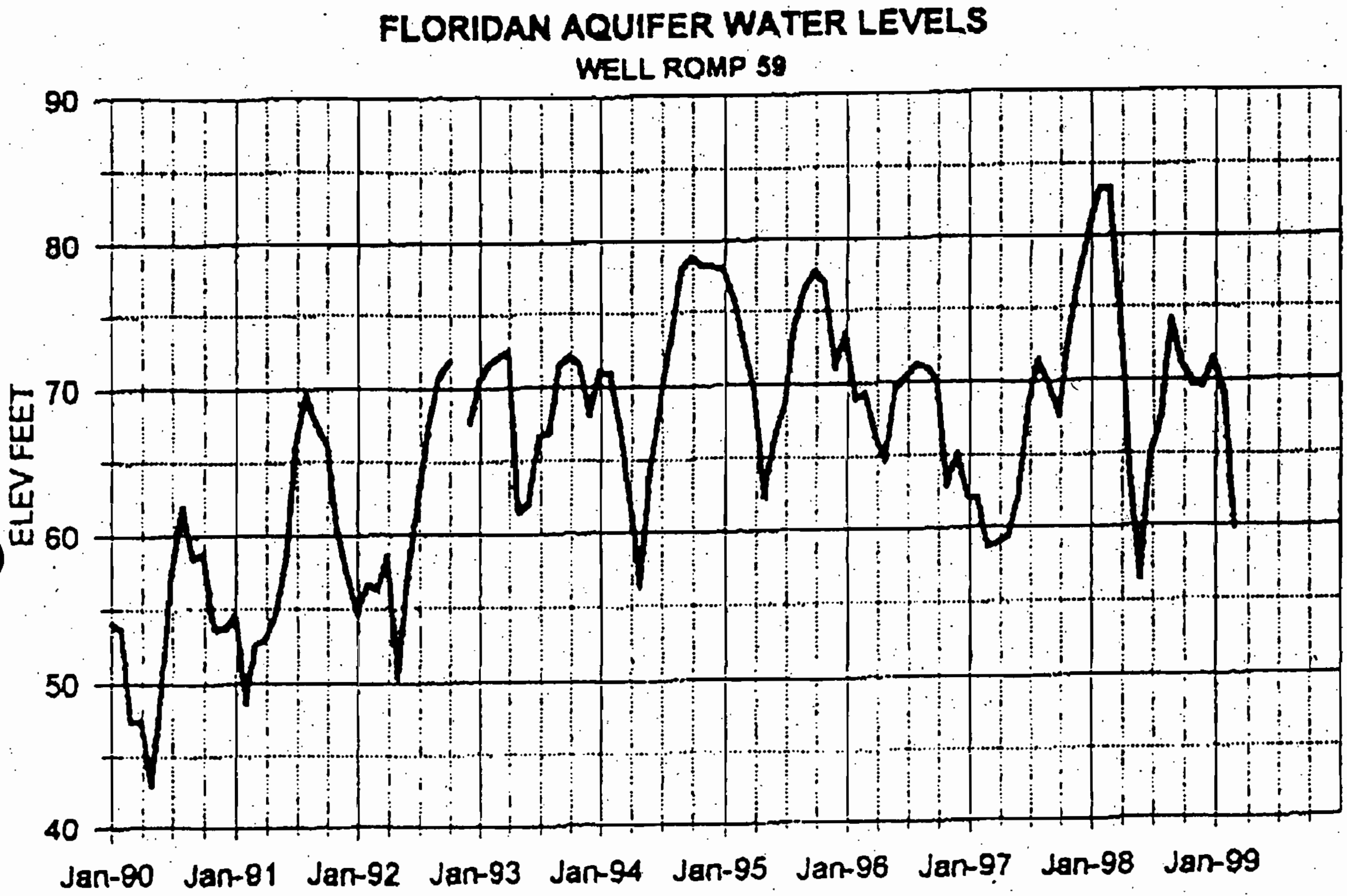

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FIGURE 2.3.2-8
FLORIDAN AQUIFER WATER LEVELS
AT WELL ROMP 59
1990 TO 1999

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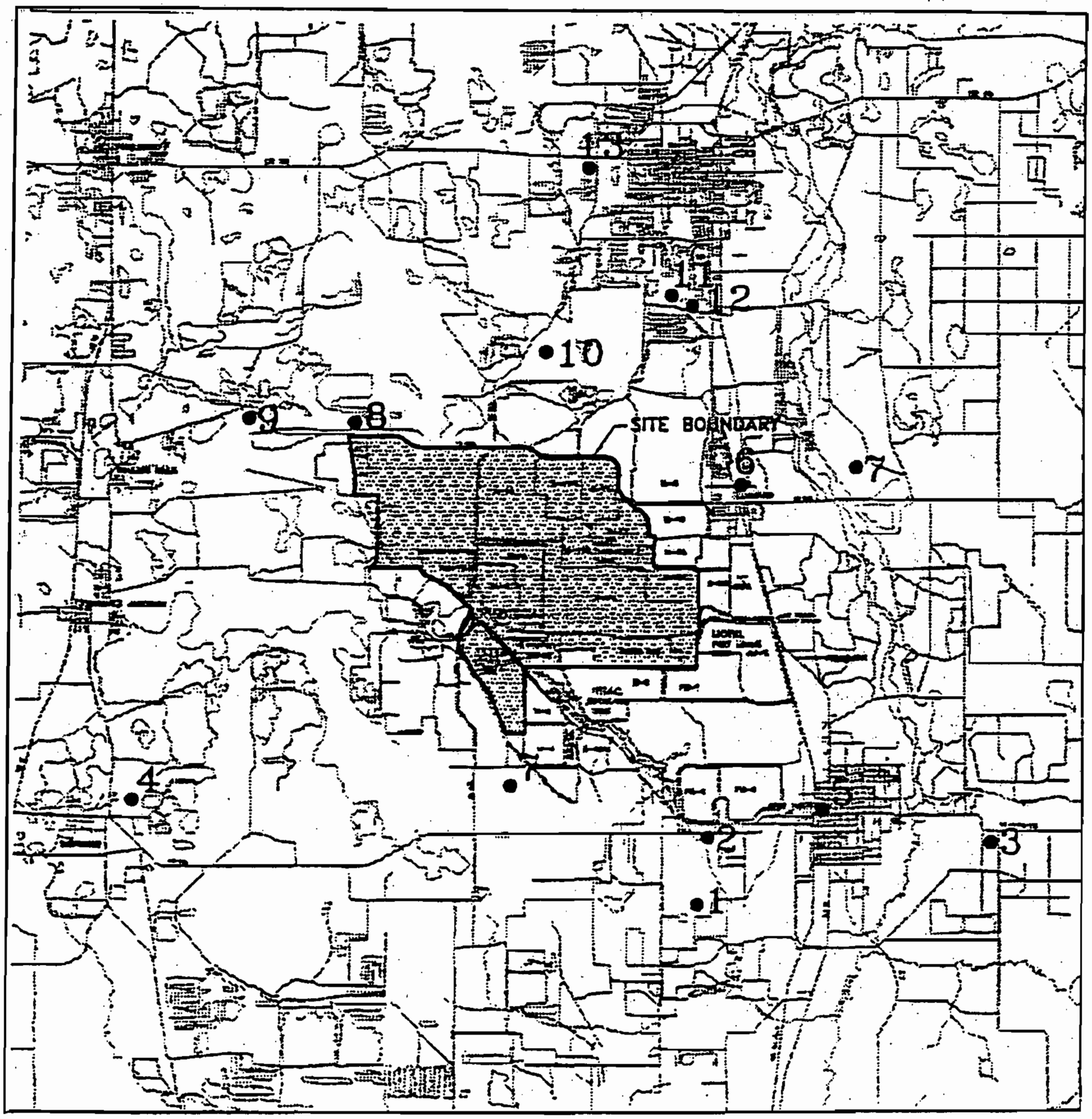

LEGEND

•1 SAMPLING POINT

SOURCE: 1992 SCA

Florida Power
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Hines Energy Complex

FIGURE 2.3.2-9
UPPER FLORIDAN AQUIFER
BASELINE WATER QUALITY DATA
SAMPLING LOCATION MAP

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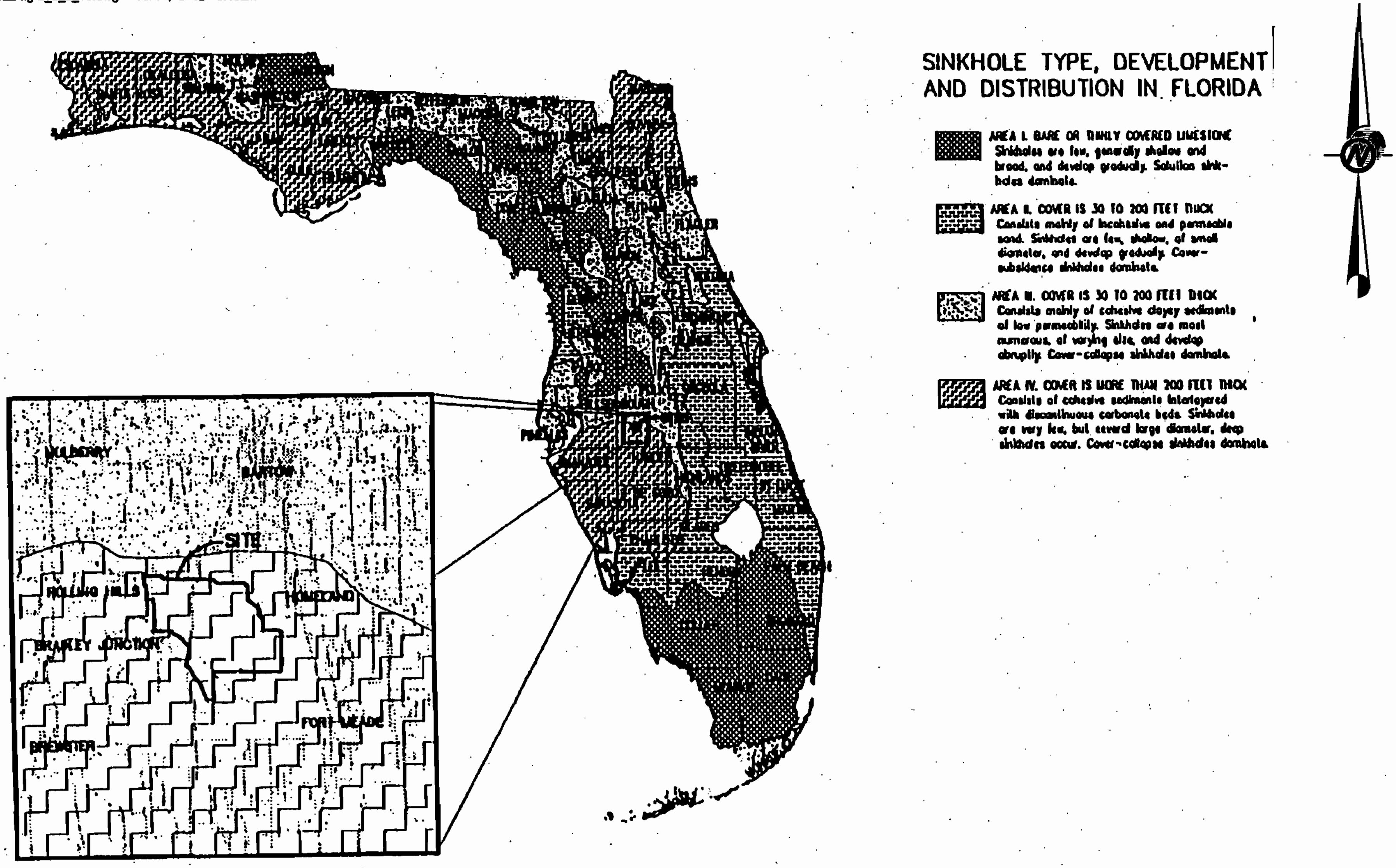

SOURCE: 1992 SCA

Florida Power
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Hines Energy Complex

FIGURE 2.3.2-10
AREAS OF SINKHOLE OCCURENCE
IN FLORIDA

2.3.3 Site Water Budget and Area Uses

This section presents a general site water budget based on regional information. In addition, area uses of water are presented in the following discussion.

2.3.3.1 General Site Water Budget

CLIMATOLOGY AND METEOROLOGY

The Hines Energy Complex is located in the south central Florida peninsula, which has a climate characterized as subtropical. The two National Weather Service stations nearest the Hines Energy Complex with long-term (30-year) periods of record are located at Bartow and Wauchula, Florida. Bartow lies approximately 3.5 miles north-northeast of the Hines Energy Complex site and Wauchula is approximately 19 miles south-southeast of the site. As shown in the 1992 SCA, temperatures in the vicinity of the Hines Energy Complex, as measured at Bartow and Wauchula, range from a combined average low of 61.2° F in January to a combined average high of 82.0° F in August, with a combined average of approximately 72.4° F. The highest temperature recorded nearby was 103° F and the lowest was 18° F, both recorded at the Bartow location.

Average total annual rainfall measured at Bartow and Wauchula, as shown in the 1992 SCA, is 53.43 inches. Normal monthly averages range from 2.00 inches in December to 8.42 inches in July. Generally, the wet season, when the majority of the rainfall occurs, is May through September.

Figure 2.3.3-1 shows the monthly rainfall pattern at the Noralyn Mine site, just to the north of the Hines site. The Southwest Florida Water Management District (SWFWMD) maintains this database.

No direct measurements of evaporation and evapotranspiration near the Hines Energy Complex site are available. Pan evaporation has been recorded monthly by National Oceanic and Atmospheric Administration (NOAA) since 1965 at Lake Alfred, which is approximately 23.5 miles north-northeast of the Hines Energy Complex site. SWFWMD analyzed NOAA's monthly measurements of pan evaporation data from Lake Alfred and presented a rationale for the method used to convert pan evaporation to estimated evapotranspiration rates (Keller, 1988). The 1992 SCA presented a summary of the measured precipitation and pan evaporation data along with calculated evapotranspiration, runoff, and recharge rates for the southwest Polk County area. Average yearly precipitation is approximately 53.43 inches and the average pan evaporation is 71.29 inches. Pan evaporation is converted to estimated evapotranspiration, using SWFWMD's formula, by multiplying the pan evaporation by 0.6 to obtain an estimated annual total evapotranspiration of 42.78 inches (Keller, 1988).

The Hines Energy Complex is located within the Peace River Basin. Based upon U.S.G.S. streamflow data for the Peace River Station at Zolfo Springs, Florida, Gauge No. 02295637, the average annual runoff for this area of west-central Florida is 10.25 inches.

GROUND WATER RESOURCES

Generally, the Hines Energy Complex site area is underlain by three hydrostratigraphic units: the Surficial aquifer (removed/altered at the Hines Energy Complex site); the Intermediate aquifer that includes upper and lower confining units; and the Floridan aquifer. Most of the materials that comprise the Surficial aquifer at the Hines Energy Complex site have been altered, or removed, due to mining activities by prior property owners. Where it occurs naturally and before being removed by mining at the Hines Energy Complex site, the Surficial aquifer system typically consists of clastic deposits of sands, silty sands, and clays of eolian and marine origins. In Polk County, the Surficial aquifer is used primarily for domestic and low volume irrigation uses. The bulk of recharge to the Surficial aquifer occurs directly by infiltration of rainfall. The Intermediate aquifer system includes all water bearing units and confining units between the overlying Surficial aquifer system and the underlying Upper Floridan aquifer system. Water withdrawals from the middle units of the Intermediate aquifer system are used primarily for domestic supply in Polk County. Recharge to the Intermediate aquifer system occurs through leakance from the Surficial aquifer through the overlying confining unit. The Upper Floridan aquifer of the Floridan aquifer system underlies the Intermediate aquifer. Primarily vertical hydraulic conductivity and thickness of overlying confining units control the recharge to the Upper Floridan aquifer in Polk County. Recharge occurs from the Intermediate aquifer through confining units separating the Intermediate aquifer from the Upper Floridan aquifer. The Floridan aquifer underlies the Upper Floridan aquifer and receives recharge principally from leakance through semi-confining units separating the Upper Floridan aquifer from the Floridan aquifer. More detailed information concerning ground water resources is presented in Section 2.3.2 of this SSCA.

SURFACE WATER RESOURCES

The Hines Energy Complex site is located completely within areas that were formerly mined for the severance of phosphate ore. This area was comprised principally of waste clay settling areas, with some mined-out areas also present. These mine land forms possess a significant quantity of storage volume which has altered the rate and volume of surface water discharging from the site compared to natural (pre-mining) condition.

As authorized in the 1994 and 2001 Certifications, the Hines Energy Complex site has been developed to support power plant operations. Surface waters within the site are being managed in accordance with the approved plans. Areas within the site which are being managed as closed basin systems include the Cooling

Pond and the Brine Pond. These areas are designed to retain all runoff that is generated within them. The Plant Island is served by a stormwater management system that presently drains to the Cooling Pond.

Areas of the Hines Energy Complex site that are being managed as externally drained watershed areas include the McCullough Creek and Camp Branch drainage enhancement project, composed of SA-10 and SA-12S, N-11A, N-13, N-9B and Tiger Bay. These systems are designed to collect, and convey runoff to McCullough Creek and Camp Branch respectively.

Surface waters within the remaining areas of the site drain are collected and incorporated into the on-site water cropping system.

2.3.3.2 Area Water Uses

The Southwest Florida Water Management District (SWFWMD) through the issuance of water use permits and well construction permits regulates surface and ground water use in the vicinity of the Hines Energy Complex site. Information gathered primarily from SWFWMD permit records was used to develop a summary of water uses near the Hines Energy Complex site. Polk County does not maintain any separate records of surface and ground water usage or well construction.

The unincorporated community of Homeland lies approximately one mile northeast of the Hines Energy Complex site. Homeland residents use ground water from individual wells for drinking water. Water use permits are not required for these individual, domestic ground water users.

Ground water is withdrawn regionally from the Surficial, Intermediate, and Upper Floridan aquifers for four principal purposes: phosphate mining operations, chemical manufacturing and processing, citrus and agricultural irrigation, and public supply. Essentially, all of the large water users withdraw ground water from the Floridan aquifer system. Some public supplies and citrus irrigation water is supplied from the Intermediate and Upper Floridan aquifers. Surface water withdrawal from a mining pit is the only surface water withdrawal permit listed.

Table 2.3.3-1 provides details concerning each water use permit within a five-mile radius of the Plant Island. The table lists ownership, location of property, number of permitted wells, source (aquifer or surface water), use, and permitted capacity.

Table 2.3.3-2 lists all the known wells identified in SWFWMD permit files within one mile of the Hines Energy Complex site. Additionally, the table lists the ownership, location, well depth, diameter, and permitted use of each well. Of the 70 known wells within one mile of the Hines Energy Complex site, 35 are listed as domestic use, 14 industrial use, 5 public supply, and 16 miscellaneous industrial categories. Few, if any, of these wells produce from the Surficial aquifer and many produce completely or partially from the Intermediate aquifer system. The majority produces from the Upper Floridan aquifer. Since most of these well owners are not required to obtain a water use permit, it is assumed that the overall usage is relatively low.

The above information has been provided fro reference purposes. The 1994 Site Certification authorized up to 17.5 mgd of groundwater withdrawal as not impacting existing legal users. FP is a superior user as it relates to wells installed after 1994.

2.3.3.3 References

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Keller, Kevin K. Distribution of Evapotranspiration within the Southwest Florida Water Management District. January 1988. SWFWMD. Brooksville, Florida.

SWFWMD. Well Construction and Permitting Section. SWFWMD. Brooksville, Florida. 2000. Computer Records.

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TABLE 2.3.3-1

CONSUMPTIVE USE PERMITS WITHIN A FIVE MILE RADIUS OF THE HINES ENERGY COMPLEX PLANT ISLAND

Consumptive Use Permit No.	OWNER	Location*			# Wells	Gallons Per Day (GPD)	
		SECTION	TOWNSHIP	RANGE		Permit Peak	Permit Average
20. 341.04	CITY OF BARTOW	35,36	29	24	17	5,130,000	4,100,000
		12,13,23,24	30	24			
		14,23,31,32,35	29	25			
		2,4,5,6,7,8,9,16,17,18	30	25			
20. 610.05	CF INDUSTRIES, INC.	24	30	23	27	3,821,800	3,302,300
		8,9,13,17,18,19,20,24,25,30	30	24			
20. 2224.06	CARGILL FERTILIZER	26,27,28,29,32,33,34,35	29	24	8	6,420,000	5,200,000
		3,4,5,9,10,11,14,15,16,21,22	30	24			
20. 8751.01	IMC-AGRICO CO/IMC- FERTILIZER	32,33	30	24	1	33,000	5,000
20. 10035.00	UNC RECLAMATION	30	30	24	1	90,000	30,000
20. 10700.00	POLK POWER PARTNERS LTD	23,25,26	30	24	2	1,010,000	761,000
20.3841.07	C & G CITRUS LIMITED PARTNER	2,9,10,11,13,14,15,16,21,22,23	31	24	44	576,000	132,000
20. 11436.00	CARPENTER, INC. D/B/A VADCON	29	30	25	2	8,400	4,200
20. 11600.01	POLK COUNTY BOCC DEPT. OF PARKS	33,34	30	25	2	3,100	1,700
20. 29.07	CARGILL FERTILIZER INC.	13,23,24,36	31	23	35	13,527,000	11,491,000
20. 438.04	U.S. AGRI-CHEMICALS CO.	13,24,25,26,35,36	31	24	56	18,913,300	9,673,400
		2,11	32	24			
		1,2,3,11,12	33	24			
		18,19,29,30,31,32,33	31	25			
		5,6,7,8	32	25			
20. 2297.06	CARGILL FERTILIZER INC.	1,2,11,12,13,14,23,24,36	32	24	30	20,800,000	15,300,000
		1,9,10,11,12,13,15,16,21,23,24	33	24			
		6,7,9,10,15,16,17,18,19,20,21,22,27	32	25			
		28,29,30,31,32,33,34					
		5,7,8,17,18,19	33	25			
20. 10638.00	CARGILL FERTILIZER INC.	12	32	24	1	1,000,000	186,000
20. 1255.03	MARY SNELL	5	31	25	1	26,800	13,400

TABLE 2.3.3-1
CONSUMPTIVE USE PERMITS WITHIN A FIVE MILE RADIUS OF THE HINES ENERGY COMPLEX PLANT ISLAND

Consumptive Use Permit No	OWNER	Location*			# Wells	Gallons Per Day (GPD)	
		SECTION	TOWNSHIP	RANGE		Permit Peak	Permit Average
20.11400.04	IMC-AGRICO CO.	32,33	30	25			
		33	30	25	228	66,500,000	52,000,000
		32	30	25			
		28,29	30	25			
		32,33	30	25			
		33	30	25			
		33	30	25			
		20	30	25			
		25,26,27,28,33,34,35,36	31	21			
		26,27,28,32,33,34,35	29	22			
		2,3,4,9,13,24,25,26,35	30	22			
		1,2,3,4,9,10,11,12,13,14,19,22,23 24,25,27,28,29,31,32,33,34,36,	31	22			
		3,4,5,6,7,11,27,34,35	32	22			
		2,8,12,17,23,24,25,26,27,29,30,31 32,33,34,35,36	30	23			
		1,2,3,4,5,6,7,8,9,10,11,12,14,15,16 17,18,20,21,22,26,27,28,29,36	31	23			
		1,9,10,11,12,13,14,17,20,21,24,27 28,29,30,32,33,34	32	23			
		2,3,5,6,7,19,30,31	33	23			
		3,6,20	34	23			
		7,12,13,14,15,16,17,20,21,22,23,24 25,26,27,28,29,30,31,32,33,34,35,36	30	24			
		1,2,3,4,5,6,7,8,9,12,13,17,20,21,28,29 30,31	31	24			

TABLE 2.3.3-1
CONSUMPTIVE USE PERMITS WITHIN A FIVE MILE RADIUS OF THE HINES ENERGY COMPLEX PLANT ISLAND

Consumptive Use Permit No.	OWNER	Location*			# Wells	Gallons Per Day (GPD)	
		SECTION	TOWNSHIP	RANGE		Permit Peak	Permit Average
20. 1467.02	GOOCHLAND NURSERIES INC.	15	31	25	5	216,000	166,600
20. 2318.03	MOBIL MINING & MINERALS COMPANY	1,2,3,4,8,9,10,11,12,13,14,15,16,17	31	25	88	1,620,000	1,360,000
		19,20,21,22,23,24,25,28,29,33,34					
		3,4	32	25			
		7,17,18,19,20,29,30	31	26			
20. 2596.02	WAYNE R. SNELL	4	31	25	1	19, ,000	5,000
20. 7226.01	PEMBROKE LABORATORIES INC	15	31	25	1		16,100
20. 8615.01	MARTHA L. SNELL	4	31	25	1	48,700	8,300
20. 10757.00	CENTRAL FLORIDA HUMAN SERVICES	2,3,11	31	25	2	6,000	2,000
20.11470.00	FLORIDA DEPT. OF ENV. PROTECTION	3,4,9,10	31	25	3	2,800	1,400
20. 261.02	ALUMINUM COMPANY OF AMERICA	30	31	25	2	340,000	200,000
20. 438.04	U.S. AGRI-CHEMICALS CORPORATION	13,24,25,26,35,36	31	24	56	7,878,300	9,673,400
		2,11	32	24			
		1,2,3,11,12	33	24			
		18,19,29,30,31,32,33	31	25			
		5,6,7,8	32	25			
		27	31	25			
20. 645.03	CITY OF FORT MEADE	1,2,3,4,8,9,10,11,12,13,14,15,16,17,19	31	25	3	1,534,000	1,264,000
		20,21,22,23,24,25,28,29,33,34	31	25			
20. 2318.03	MOBIL MINING & MINERALS COMPANY	7,17,18,19,20,29,30	31	26	88	1,620,000	1,360,000
		25,30,31,32,35,36	31	25			
20. 3842.11	C & G CITRUS	1,2,3,4,5,9,10,11,12	32	25			
		31,32	31	26	64	7,878,300	1,758,500
20. 8300.01	ANNIE B. WALKER	4,5,6,7,8,9	32	26			
		33	31	25	1	132,200	22,600
20. 8586.01	JOHN C. BARNETT	32	31	25	2	102,600	17,600

TABLE 2.3.3-1
CONSUMPTIVE USE PERMITS WITHIN A FIVE MILE RADIUS OF THE HINES ENERGY COMPLEX PLANT ISLAND

Consumptive Use Permit No.	OWNER	Location			# Wells	Gallons Per Day (GPD)	
		SECTION	TOWNSHIP	RANGE		Permit Peak	Permit Average
20. 8594.01	VIOLET SHEFFIELD TRUST	29	31	25	1	69,600	18,000
20. 9637.00	JOHN C. BARNETT, JR.	28	31	25	1		15,000
20. 10718.00	THE OAKS NURSERY	27	31	25	1	46,300	22,800
20. 10775.00	BARNETT-SUNBELT, INC.	27	31	25	1	56,200	27,700
20. 10840.00	U.S. AGRI-CHEMICALS CO	31	31	25	3	2,100,000	1,700,000
20. 438.04	U.S. AGRI-CHEMICALS CO	13,24,25,26,35,36	31	24	56	18,913,300	9,673,400
		2,11	32	24	30	20,800,000	15,300,000
		1,2,3,11,12	33	24			
		18,19,29,30,31,32,33	31	25			
		5,6,7,8	32	25			
20. 2297.06	CARGILL FERTILIZER INC.	1,2,11,12,13,14,23,24,36	32	24			
		1,9,10,11,12,13,15,16,21,23,24	33	24			
		6,7,9,10,15,16,17,18,19,20,21,	32	25			
		22,27,28,29,30,31,32,33,34					
		5,7,8,17,18,19	33	25			
20. 2318.03	MOBIL MINING & MINERALS CO	1,2,3,4,8,9,10,11,12,13,14,15,16			88	1,620,000	1,360,000
		17,19,20,21,22,23,24,25,28,29,33,34	31	25			
		3,4	32	25			
		7,17,18,19,20,29,30	31	26			
20. 3842.11	C & G CITRUS	25,30,31,32,35,36	31	25	64	7,878,300	7,758,500
		1,2,3,4,5,9,10,11,12	32	25			
		31,32	31	26			
		4,5,6,7,8,9	32	26			
20. 7948.01	JOHN C. & IRIS JEAN BARNETT	7	32	25	1	125,200	21,400
20. 29.07	CARGILL FERTILIZER INC.	13,23,24,36	31	23	35	13,527,000	11,491,000
		1,12	32	23			
		7,8,9,16,17,18,19,21,22,27,28,29	31	24			
		30,31,32,33,34					
		3,4,5,6,7,8,9,10,16,17,18	32	24			

Table 2.3.3-2

WELLS WITHIN ONE MILE OF THE HINES ENERGY COMPLEX					
Well Owner	**Location S T R**	**Well Diameter**	**Well Depth**	**Casing Depth**	**Well Usage**
A. Smith	11-31-24	4	200	83	Domestic
J. Haney	11-31-24	4	201	81	Domestic
Portable Dredging Corp.	11-31-24	4	160	84	Domestic
IMC	12-31-24	8	250	65	Industrial
Swift Agri Chemicals Corp.	14-31-24	4	220	40	Dewatering
Estech Inc	14-31-24	2	822	188	Public Supply
Swift & Company	15-31-24	8	795	325	Industrial
Estech Inc	15-31-24	4	822	333	Public Supply
IMC	25-30-24	0	125	43	Industrial
Intl. Min &	25-30-24	8	105	25	Mining
Intl. Min Ch	25-30-24	8	291	136	Irrigation
Farmland Industries, Inc	25-30-24	34	250	105	Industrial
Farmland Industries, Inc	25-30-24	24	460	105	Industrial
Intl Min Ch	26-30-24	8	291	85	Mining
L. Mason	26-30-24	3	18	7	Livestock
IMC	26-30-24	8	105	64	Monitoring
Polk Co Board of Co Comm Eng	26-30-24	6	375	98	Essential Services
IMC	26-30-24	8	340	72	Industrial
CSW Development One, Inc	26-30-24	12	800	260	Industrial
CSW Development One, Inc	26-30-24	12	800	261	Industrial
Polk Power Partners Limited	26-30-24	4	305	220	Public Supply
IMC - Agrico Company	27-30-24	4	150	84	Domestic
Maria Tenorio	27-30-24	4	140	65	Domestic
J. Douglas	34-30-24	3	170	91	Domestic
Carlton Whitaker	35-30-24	4	131	52	Domestic
W. R. Broderi	35-30-24	4	132	42	Domestic
W. Geohagan	35-30-24	4	145	50	Domestic
I. Stricklan	35-30-24	4	142	96	Domestic
IMC	35-30-24	8	186	66	Mining
IMC	35-30-24	8	256	67	Mining
D. G. Hagg	35-30-24	4	157	120	Domestic
R. M. Spivey	35-30-24	4	135	84	Domestic
IMC	35-30-24	8	205	126	Industrial
D. Gay	35-30-24	4	135	67	Domestic
B. Register	35-30-24	4	220	126	Domestic
IMC - Agrico Company	35-30-24	4			Domestic
John Desmidt	35-30-24	2	100	90	Domestic
Donald G. Haag	35-30-24	4	195	105	Domestic

WELLS WITHIN ONE MILE OF THE HINES ENERGY COMPLEX					
Well Owner	**Location S T R**	**Well Diameter**	**Well Depth**	**Casing Depth**	**Well Usage**
IMC	36-30-24	8	383	91	Mining
IMC	36-30-24	8	245	49	Mining
IMC	36-30-24	8	300	126	Domestic
R. Fountain	29-30-25	8	200	71	Mining
Kaplan Fd Y	29-30-25	12	885	82	Industrial
IMC	29-30-25	8	90	64	Mining
K. Planfeed	29-30-25	4	185	95	Livestock
Homeland Ind Complex	29-30-25	4	190	78	Public Supply
IMC	30-30-25	8	250	62	Industrial
International Mineral & Chemical	30-30-25	8	300	105	Industrial
Alcoa	32-30-25	10	823	397	Industrial
Alcoa	32-30-25	10	835	390	Industrial
P. Wilson	32-30-25	4	110	63	Domestic
R. Helms Sr.	32-30-25	4	--	--	Domestic
Paul Goss	32-30-25	4	155	63	Domestic
H. Gray	32-30-25	4	182	105	Domestic
IMC - Agrico Company	32-30-25	3	40	20	Recharge
Lloyd Leach	32-30-25	4	180	83	Domestic
Thomas Jarosek	32-30-25	4	--	--	Domestic
William Marvin Lanier	32-30-25	4	163	86	Domestic
Thomas Jarosek	32-30-25	4	120	60	Domestic
Lamar Sellers	32-30-25	4	180	84	Domestic
Ray Bodeen	32-30-25	4	125	50	Domestic
Hugh C. Davis Jr.	32-30-25	4	245	147	Public Supply
Earl Peterman	32-30-25	4	137	59	Domestic
Isabell Lawhorn	32-30-25	4	90	60	Domestic
Gas Kwick	32-30-25	6	35	10	Recovery Well
Dan Kauffman	32-30-25	4	185	54	Domestic
John Moon	32-30-25	4	98	54	Domestic
Edward Winberley	32-30-25	4	125	76	Domestic
Louise Helms	32-30-25	4	112	75	Domestic
Carlos A Salcedo	32-30-25	4	150	84	Domestic

Source: SWFWMD, 2002

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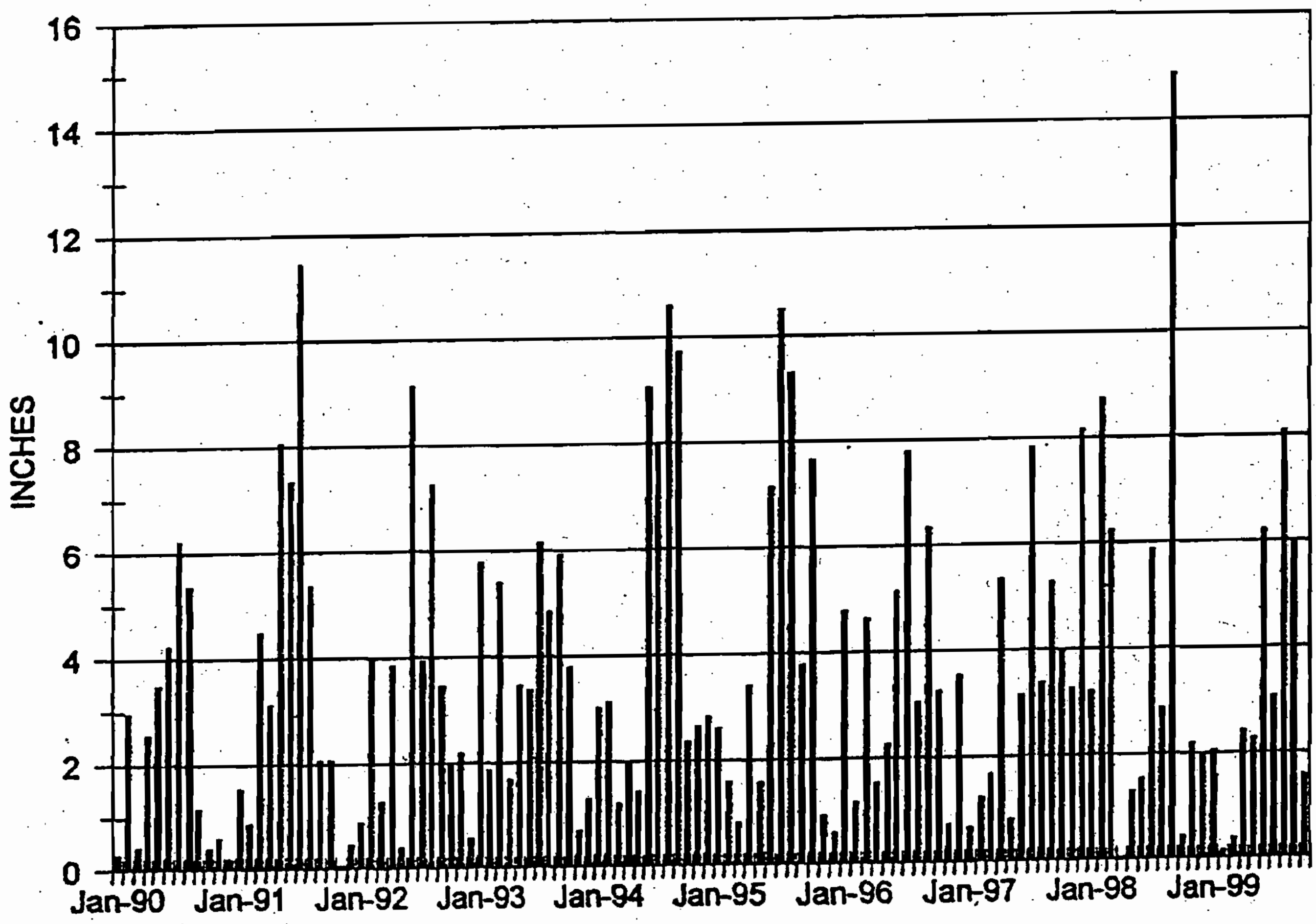

Florida Power
A Progress Energy Company

Hines Energy Complex

FIGURE 2.3.3-1
MONTHLY RAINFALL AT NORALYN MINE
1990-1999

2.3.4 Surficial Hydrology

2.3.4.1 Hydrologic Characterization

GENERAL DESCRIPTION

The Hines Energy Complex site is located within SWFWMD's boundaries, along the divide between the Peace River Basin and the Alafia River Basin (see Figure 2.3.4-1).

Polk County is on the topographic high elevation of peninsular Florida, from which water flows in all directions. Water from the eastern 35 percent of the County drains eastward and southward into the Kissimmee River and from the south-central 35 percent into the Peace River. Along the western boundary, water from 8 percent of the County drains into the Alafia River and water from 4 percent of the County drains into the Hillsborough River. On the north, water from about 15 percent of the County drains northwest into the Withlacoochee River, and drainage from about 3 percent of the County moves northward into the headwaters of the Oklawaha River, a tributary to the St. Johns River (USGS, 1961).

In the high, rolling, sandy lands of the Peace River basin, channels tend to be somewhat well defined, although many of the natural passages between lakes are more accurately described as long, narrow, wooded swamps than as well defined streams. In many places, these natural drains have been modified by channelization. In this part of Polk County, lakes are more numerous, although smaller, than in the Kissimmee Valley section. Many of the lakes have no surface outlet and discharge may take place through the ground. In several areas, lakes that had no surface connections or were imperfectly joined have been connected by canals and made into full-fledged drainage systems.

Along the western side of the county, in the Alafia River and Hillsborough River basins, the land is flat and of relatively high elevation. Lakes are few and small. Although the few streams in this area are small, most of them have well defined channels.

Streamflow in Polk County does not fluctuate as rapidly or as much as in many other counties in Florida because of the buffer effect of the many lakes in the County. The lakes store water in times of excess rainfall, thus reducing flood peaks. Conversely, they release water to streams in times of deficiency and thereby sustain streamflow. Each stream is stabilized by lakes to a greater or lesser extent, depending upon the size and number of lakes to which it may be connected. This factor, as well as climatic and geologic factors, causes flow characteristics to be different from stream to stream and even from place to place on the same stream.

PEACE RIVER BASIN. The drainage area of the Peace River is about 2,180 square miles. From its source in northern Polk County, the River flows southward through Hardee and DeSoto Counties into the tidewater of Charlotte Harbor in Charlotte County. The River has many tributary streams, some of them having large drainage areas.

The topography of the valley rises from tidewater near the estuary to about 200 feet above sea level on the upper western side of the valley and about 250 feet on the upper eastern side. The highlands and flatwoods areas of the valley were originally heavily timbered with pine but most of this has been cut and replaced with citrus groves and pastures. Cypress swamp extends generally throughout the River floodplain to tidewater.

The Peace River originally received more of the Green Swamp drainage than it has since the construction of the Atlantic Coast Line Railroad and Highway U.S. 17-92. The original natural divide was nearer the old Polk City-Haines City road.

The main stem of the Peace River is a narrow and shallow watercourse above tidewater in relation to the area it serves as a flood outlet. The floodplain is relatively narrow with a steep slope. This offers little opportunity for flood storage to reduce flood peaks. At the present time, floodwaters quickly spread beyond the banks of the natural stream, overflowing the densely wooded floodplain. As the River nears tidewater, extreme floods extend beyond the normal floodplain, inundating large areas of adjacent flat lands.

The River channel has headwaters in three lakes or lake systems: Lake Hancock, normally less than 98 feet above sea level; the Winter Haven chain of lakes, normally about 131 feet above sea level; and Lake Hamilton, normally about 121 feet above sea level. All of these lake outlets converge about 1 mile above Bartow. The distance from the point of convergence to the zone of tidewater influence is about 87 miles along the stream.

ALAFIA RIVER BASIN. The Alafia River drains approximately 460 square miles of Hillsborough and western Polk Counties. The USGS streamflow gauging station above Lithia Springs measures flow from approximately 72 percent of the drainage basin (SWFWMD, 1991).

The Alafia River is notable for the extensive phosphate mining and chemical processing in its basin. Water quality conditions in the river were at their worst during the 1950s and 1960s, but pollution abatement practices applied since the 1970s have resulted in improved water quality. Concentrations of several water quality parameters, such as phosphorus and nitrogen species, fluoride, specific conductance, sulfate, and coliform bacteria remain very high (SWFWMD, 1991). Water quality has consistently been impacted most in the North Prong of the river as a result of the high density of phosphate mines and chemical processing plants nearby. Water quality has typically been best in the South Prong of the river and is of intermediate quality in the main stem downstream of the confluence of the two prongs.

WATER BODIES NEAR THE SITE. Figure 2.3.4-2 shows the pre-mining drainage basin divides. All of the streams mentioned, except the South Prong Alafia River, are within the drainage basin of the Peace River. Table 2.3.4-1 indicates what percentage of the Hines Energy Complex was formerly within each of the sub-basins.

A portion of the Hines Energy Complex, as it existed prior to the start of mining activities, was within the drainage basin of the Alafia River. These areas, which are identified on Figure 2.3.4-2 represented approximately 0.14 percent of Alafia River's drainage basin. The three areas as they are presently identified include a small portion of land at the northwest corner of the Estech SA-12 parcel, the western portion of the IMC Phosphoria parcel and the western portion of the IMC P-3 parcel. These areas were altered by mining pre-1971, pre-1984, and during 1974 respectively. The P-2 and P-3 parcels, which were previously reclaimed, no longer drain to the Alafia River system. Reclamation plans for the Phosphoria parcel indicate that this area will drain to the Peace River system. Since none of these areas have contributed to the Alafia River basin since the start of mining and will not following reclamation, no further discussion of the Alafia River basin will be presented in this SSCA.

MORPHOMETRY, BATHYMETRY, AND STAGES

PEACE RIVER. Figure 2.3.4-3 shows the profile of the Peace River, from Punta Gorda to Lake Hancock. Figure 2.3.4-4 shows the USGS flow and water quality monitoring stations on the Peace River in the vicinity of the Hines Energy Complex. The Bartow station is located at the SR 60 Bridge in Bartow, 105 miles upstream from the mouth of the River (USGS, 1998). It is also shown at Milepost 101 on Figure 2.3.4-3. The Peace River station near Homeland is 97 miles upstream from the mouth, or at Milepost 93 as shown on Figure 2.3.4-3. The Peace River station at Fort Meade is 92 miles upstream of the mouth, or at Milepost 88 as shown on Figure 2.3.4-3.

Morphometry and bathymetry for the Peace River were not measured. However, data from the USGS gauging stations at Bartow, Homeland, and Fort Meade indicate that during the dry season, river widths are typically 20 to 50 feet at each of these stations, with maximum depths on the order of 1.5 to 4 feet. During the wet season, river widths are more typically 200 to 600 feet, and maximum depth ranges from 4 to 8 feet. The stage-discharge curve for the Bartow gauging station indicates a flow of 3,000 cfs would occur at a depth (gauge height) of about 7.5 feet. The same depth at the Fort Meade station would coincide with a flow of under 1,000 cfs. The maximum high water surface stages shown on Figure 2.3.4-3 were estimated for a design storm of 9.6 inches over a 5-day period (Johnson, 1960). This storm has a recurrence interval of about 15 years. Maximum stages, and the associated flows, are presented in Table 2.3.4-2 for the Peace

River USGS stations in the vicinity of the Hines Energy Complex. The peak stage at Fort Meade is 78.43 ft-NGVD and the peak stage at Bartow is 96.35 ft-NGVD. The coinciding peak flow rates are 2,020 cfs and 1,550 cfs, respectively. The 100-year flood stages at Bartow, Homeland, and Fort Meade are reported to be about 99.0, 90.6, and 85.1 ft-NGVD, respectively (FEMA, 1983).

McCULLOUGH CREEK. McCullough Creek presently arises from a small lake (approximately 10 acres) just south of the Hines Energy Complex property line. The Creek runs approximately south-southeast for about 5 miles and then empties into Whidden Creek. In the upper reaches, the Creek bank elevation is about 150 ft-NGVD. At the Whidden Creek confluence, the McCullough Creek bank elevations are on the order of 50 feet. The 100-year flood stage in the vicinity of the Hines Energy Complex site is expected to be within the channel banks due to the limited drainage area and the large detention storage volume within SA-12S. Presently, the only permitted discharge from the site to McCullough Creek is the weir outfall from SA-12S.

The pre-mining drainage basin for McCullough Creek was 14.5 square miles (Partney, et al., 1990), while in 1990 FDNR reported it contained 16.6 square miles at that time (see Figure 2.3.4-5). The increase in area is a result of phosphate mining changes to the topography. The area within the Hines Energy Complex, which was in the pre-mining drainage basin, is estimated at 1,526 acres, or about 2.4 square miles. As authorized by the 1994 Certification, approximately 500 acres of the site, known as the McCullough Creek drainage enhancement project, presently drains to McCullough Creek.

CAMP BRANCH. The source of Camp Branch is Tiger Bay. The Branch continues eastward about 3,500 feet and crosses under U.S. Highway 17. In 1971, the Branch traveled generally northward about a mile and then joined a ditch that entered the Peace River, as shown on Figure 2.3.4-6 (EPA, 1985). Since that time, the portion of the Branch east of U.S. Highway 17 has been mined. Its actual channel location is still more or less as described. A determination of total drainage area of the Branch has not been made. As indicated in the 1992 SCA, a portion of the Buffer/Mitigation Area (N-11A, N-13, and N-9B) has been reclaimed and reconnected to Camp Branch.

BARBER BRANCH. Barber Branch is a former stream that drained a portion of the Hines Energy Complex to the east and eventually discharged to the Peace River. Virtually no traces of this stream are left as a result of mining activities.

SIX-MILE CREEK. The former Six Mile Creek Basin is now part of the IMC Noralyn and Phosphoria mine areas. Much of the area is presently part of the mine water recirculation system for these mines. Portions of the area are presently being restored. After reclamation is complete, the Six Mile Creek Basin will be reconnected to the Peace River.

FLOWS

PEACE RIVER. Streamflow records in the vicinity of the Hines Energy Complex are available only for the Peace River. Figure 2.3.4-4 shows the three Peace River USGS monitoring locations at Bartow, Homeland, and Fort Meade. For the Bartow and Fort Meade stations, flows have been recorded daily since 1939 and 1974 respectively.

The Peace River Valley Water Conservation and Drainage District developed a unit hydrograph for the Peace River at Bartow in 1960 (Johnson, 1960). It is reproduced in this SCA as Figure 2.3.4-7, and it shows a peak of about 1,150 cfs at 3.5 hours with a duration of about 15 days. The maximum discharge recorded at the Bartow station was 4,100 cfs on September 24, 1947. The average discharge from 1939 to 2000 is 225 cfs. The maximum discharge recorded at Fort Meade since 1974 was 2,250 cfs on February 23, 1998. The minimum daily discharges recorded were 0 cfs at Bartow and 0.22 cfs at Fort Meade.

Heath and Wimberly (USGS, 1971) calculated the 7 consecutive day 10-year low flow (7Q10) from October 1939 through September 1964 for the Peace River at Bartow was 11.1 cfs, and the average flow was 308 cfs. Based on the period 1966 through 1991, the 7Q10 has dropped to about 3.0 cfs. Based on the period of record (water years 1940 to 1991), the 7Q10 is 4.6 cfs. Based on the period from 1974 to 1991, the 7Q10 is 3.3 cfs at Bartow, and only 0.9 cfs at Fort Meade. The average flow at Fort Meade is 181 cfs (water years 1974 to 1996); for the same period at Bartow, the average is 154 cfs.

TEMPERATURE

Heath (USGS, 1981) reports an average annual temperature range of streams in south central and southwestern Florida of 72 to 76° F. All of the USGS data for the Peace River at Bartow, near Homeland, and at Fort Meade have been plotted over the period of temperature record, and are shown on Figures 2.3.4-8 through 2.3.4-10. Based on the USGS data, water temperatures in the Peace River in the vicinity of the Hines Energy Complex range from a low of 50°F in the winter to a high of 94.1°F in the summer. There are no published temperature data for other water bodies in the site vicinity.

As part of the surface water hydrology studies in support of the 1992 SCA, water quality data were monitored at seven surface water locations during both the wet and dry season (see Figure 2.3.4-11). These monitoring results are tabulated in Table 2.3.4-3. They indicate that the temperatures in McCullough Creek and Camp Branch are, for all practical purposes, the same as in the Peace River. For SA-11, N-15, and N-16, water temperatures during the wet season (June to September) were 3 to 6° F higher than those in McCullough Creek, Camp Branch, and the Peace River, but were indistinguishable from them in the dry season (October to May). Water temperatures measured in Tiger Bay were similar to those measured in the other on-site areas.

WATER QUALITY

As was the case with temperature, historical water quality data are available for the Peace River at the three locations shown on Figure 2.3.4-4.

Water quality data have been taken continuously at the Bartow station since February 1963; and at the Fort Meade Station since January 1965. Water quality data are available for the Homeland station from January 1965 to August 1994, however these data are not continuous. These water quality data for the Bartow, Homeland, and Fort Meade stations are voluminous and will be made available upon request.

As part of baseline Surficial hydrology studies conducted in support of the 1992 SCA, water quality samples were taken during the wet (September 1991) and dry (February 1992) seasons at seven locations (see Figure 2.3.4-11). The complete results of that monitoring program are shown in Table 2.3.4-4 of the 1992 SCA. Table 2.3.4-5 presents the results of that monitoring program showing only those constituents that were detected.

Heath and Conover (USGS, 1981) indicate that streams in southwest Polk County are of the calcium and magnesium sulfate type (see Figures 2.3.4-12 and 2.3.4-13). This information indicates that the dominant cations for streams in the site vicinity are calcium, magnesium, and sodium, and the dominant anions are sulfate, bicarbonate, and chloride.

ON-SITE WATER BODIES

There is one existing on-site natural water body, Tiger Bay, which contains numerous surface water bodies and is not part of Plant operations. Tiger Bay is located east of the Plant Island area and consists of about 524 acres of reclaimed land and lakes mine area. Tiger Bay drains to the remnant Camp Branch system located on its east side. Tiger Bay receives water input from direct precipitation, groundwater seepage through the cooling pond southern dam and minimally from adjacent upland areas.

SITE DRAINAGE

Stormwater runoff is being managed for all areas within the Hines Energy Complex site. Areas that are in contact with plant process waters or industrial wastewater will be managed as closed basins. Several areas within the Hines Energy Complex are designed to drain freely, so as to enhance the flows in adjacent drainage systems. This has been done to intentionally provide flows to the McCullough Creek and Camp

Branch drainages. Those areas within the Hines Energy Complex that are not specified as closed systems or that are not designated as off-site drainage enhancement areas are used for water cropping purposes.

2.3.4.2 References

Florida Bureau of Geology, 1975. River Basin and Hydrologic Unit Map of Florida, Map Series 72.

Florida Power Corporation. 1992. Polk County Site. Site Certification Application.

Johnson, L. 1960. A Report on a Plan of Improvement for Peace River Valley. Peace River Valley Water Conservation and Drainage District.

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USGS (United States Geological Survey). 1961. Surface Water Resources of Polk County, Florida. Information Circular No. 15. Richard C. Heath. Tallahassee, Florida.

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USGS. 1996. Water Resources Data, Florida, Water Year 1996, Volume 3A Southwest Florida Surface Water. USGS Report FL-96- 3A. Tallahassee, Florida.

USGS. Website at www.USGS.gov/water.com 1998.

Table 2.3.4-1 Pre-Mining Drainage Basins	
Pre-mining Basin	% of Site Acreage
Peace River Basin	
McCullough Creek	18.5%
Six Mile Creek	52.5%
Barber Branch	11.5%
Camp Branch[1]	12.3%
Peace River Basins Subtotal	94.7%
Alafia River Basin	
In SA-12	0.6%
In Phosphoria	2.5%
In P-3	2.1%
Alafia River Basin Subtotal	5.2%

1. Also know as Camp Meeting Ground Branch.
Source: 1992 SCA.

Table 2.3.4-2 Maximum Stages - Peace River					
Station Location	At Bartow		Near Homeland	At Fort Meade	
Years of Complete Record	Flow 57	Stage 29	N/A	Flow 23	Stage 21
Peak Stage ft. NGVD	96.35		N/A	78.43	
Flow at Peak Stage, cfs	1,550		N/A	2,020	

N/A = Not Available

Source: USGS Website at www.USGS.gov/water. 1998.

Table 2.3.4-3 Measured Water Temperatures[1]		
Location	Wet Season	Dry Season
N-15	86.7	71.2
N-16	89.4	71.8
SA-11	86.0	72.1
Tiger Bay	87.1	72.5
Camp Branch[2]	82.4	71.6
McCullough Creek	83.7	69.6
Peace River	83.3	70.3

1. Temperature expressed in °F.
2. Also know as Camp Meeting Ground Branch.

Source: 1992 SCA

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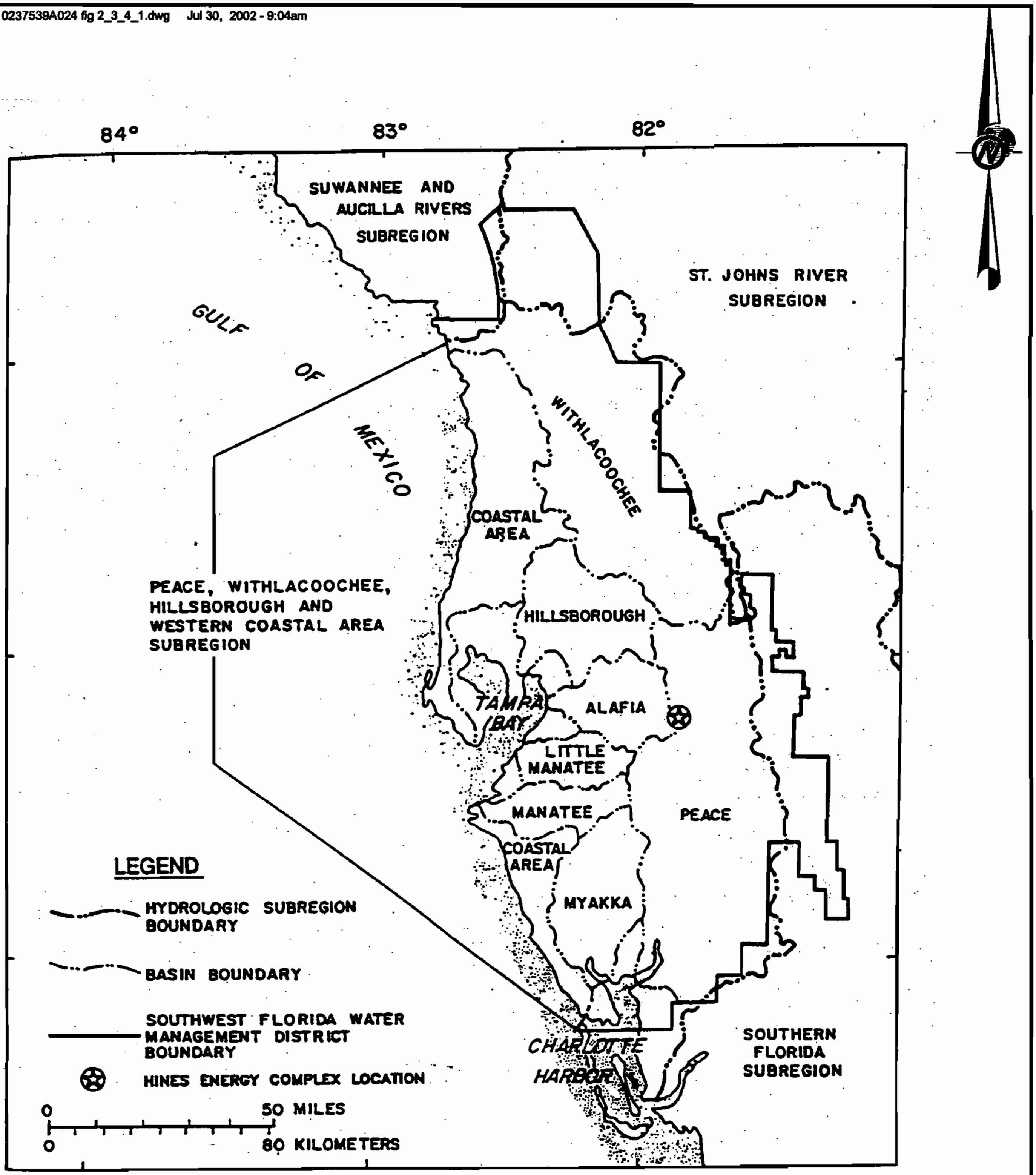

SOURCE: 1992 SCA

Florida Power
A Progress Energy Company
Hines Energy Complex

FIGURE 2.3.4-1
MAJOR RIVER BASINS IN VICINITY OF SITE

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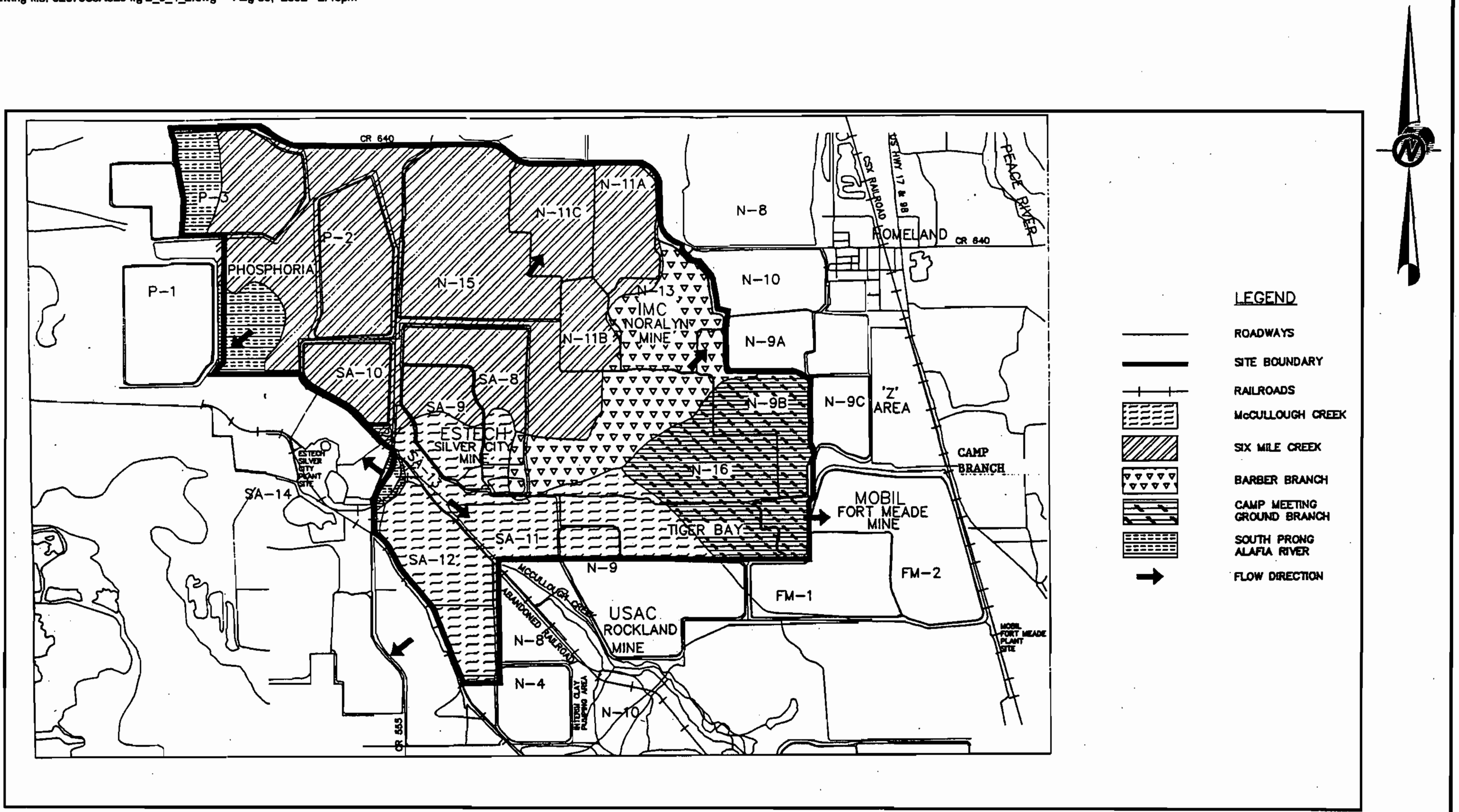

SOURCE: 1992 SCA

Florida Power
A Progress Energy Company

Hines Energy Complex

FIGURE 2.3.4-2
PRE-MINING DRAINAGE BASIN BOUNDARIES

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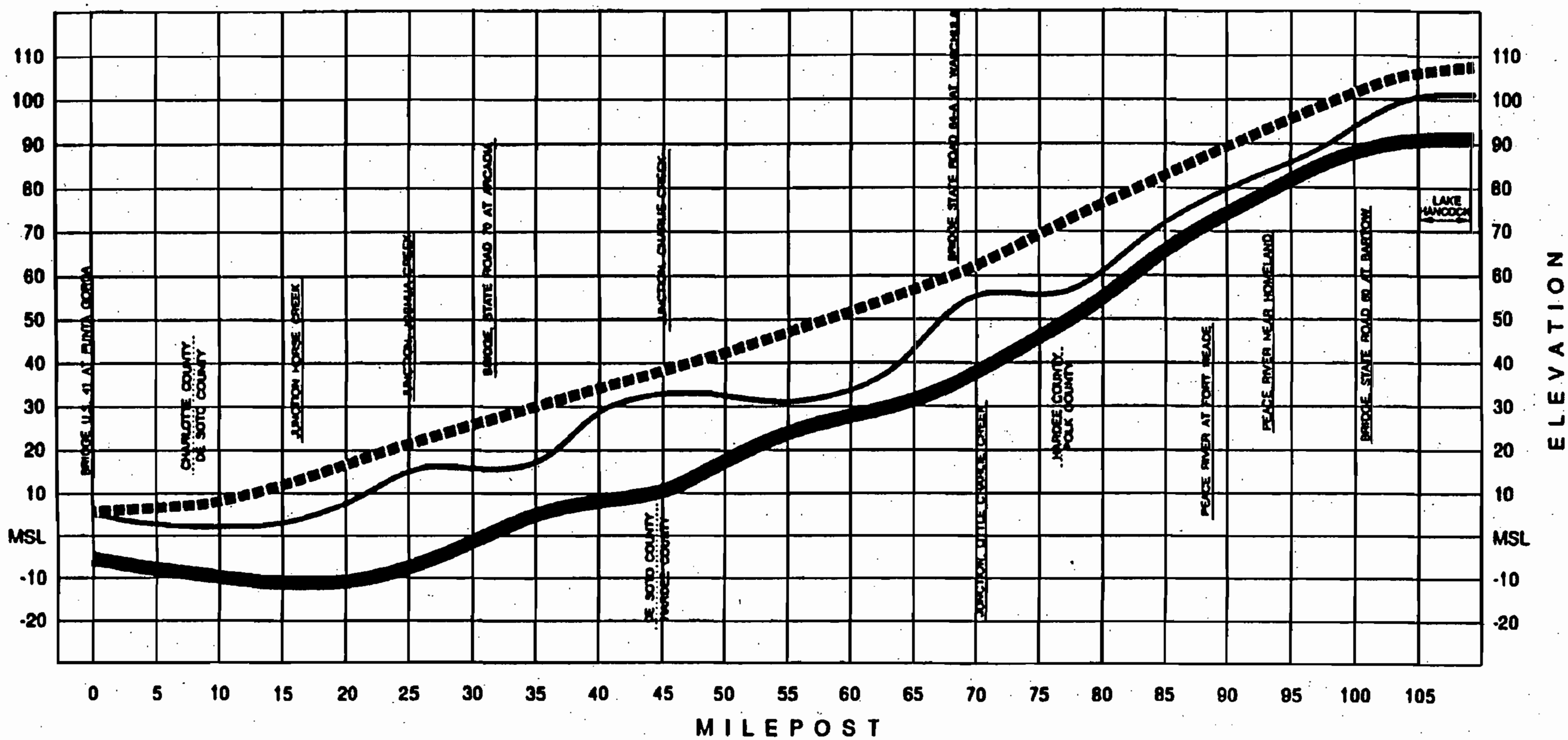

LEGEND

- MAXIMUM HIGH WATER SURFACE
- TOP OF CHANNEL BANK
- BOTTOM OF CHANNEL

NOTE: *(1)* MILEPOST MEASUREMENT IS TAKEN ALONG THE NATURAL WATERCOURSE OF THE RIVER, BEGINNING AT THE BRIDGE ON U.S. 41 IN PUNTA GORDA AND PROCEEDING NORTH TO LAKE HANCOCK IN POLK COUNTY.

(2) ELEVATIONS SHOWN ARE IN FEET ABOVE OR BELOW MEAN SEA LEVEL (MSL).

SOURCE: 1992 SCA

Florida Power
A Progress Energy Company

Hines Energy Complex

FIGURE 2.3.4-3
PROFILE OF PEACE RIVER

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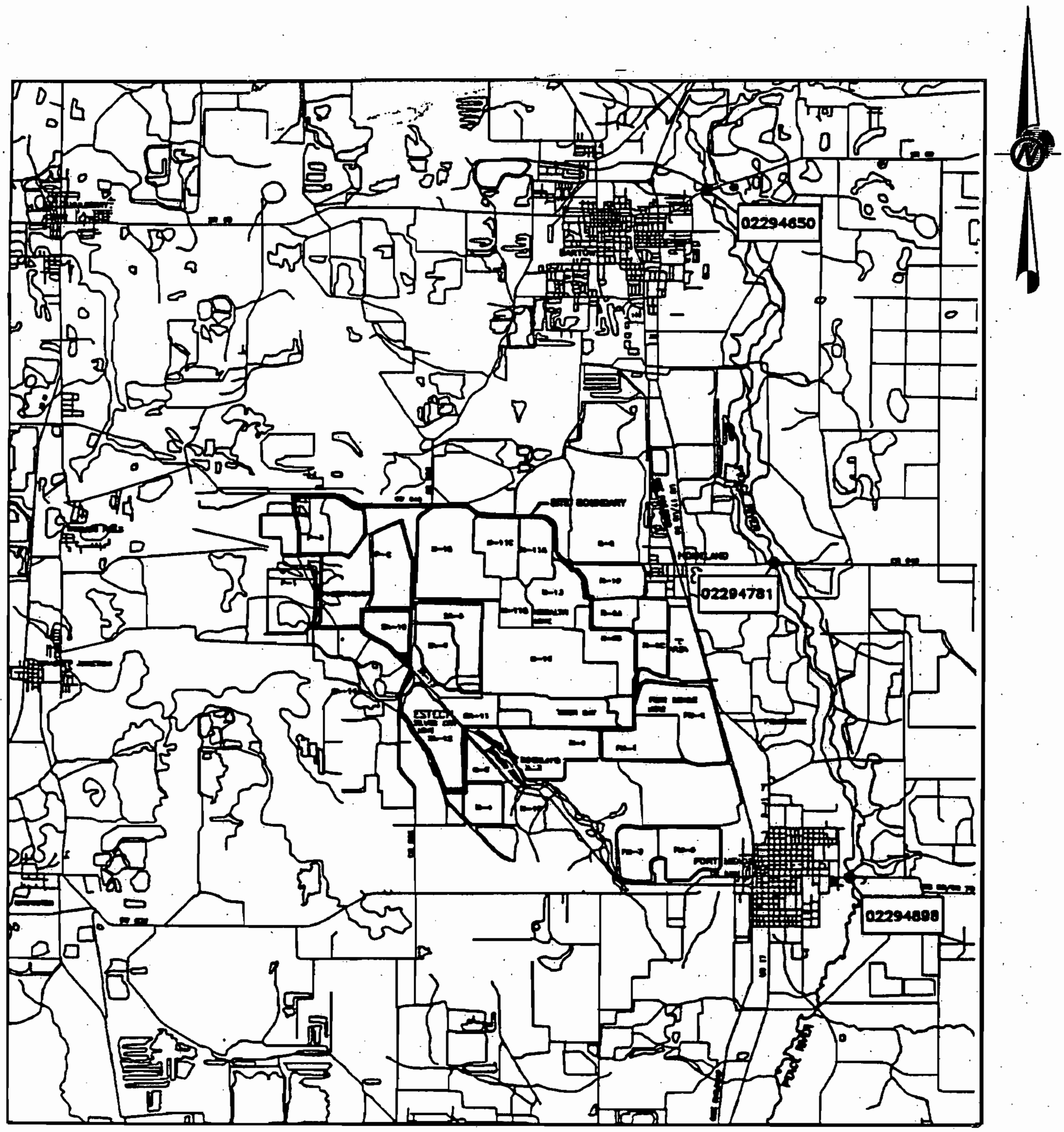

LEGEND

SITE BOUNDARY

02294898 USGS STREAM GAGING STATION

SOURCE: 1992 SCA

Florida Power
A Progress Energy Company
Hines Energy Complex

FIGURE 2.3.4-4
USGS STATION LOCATIONS

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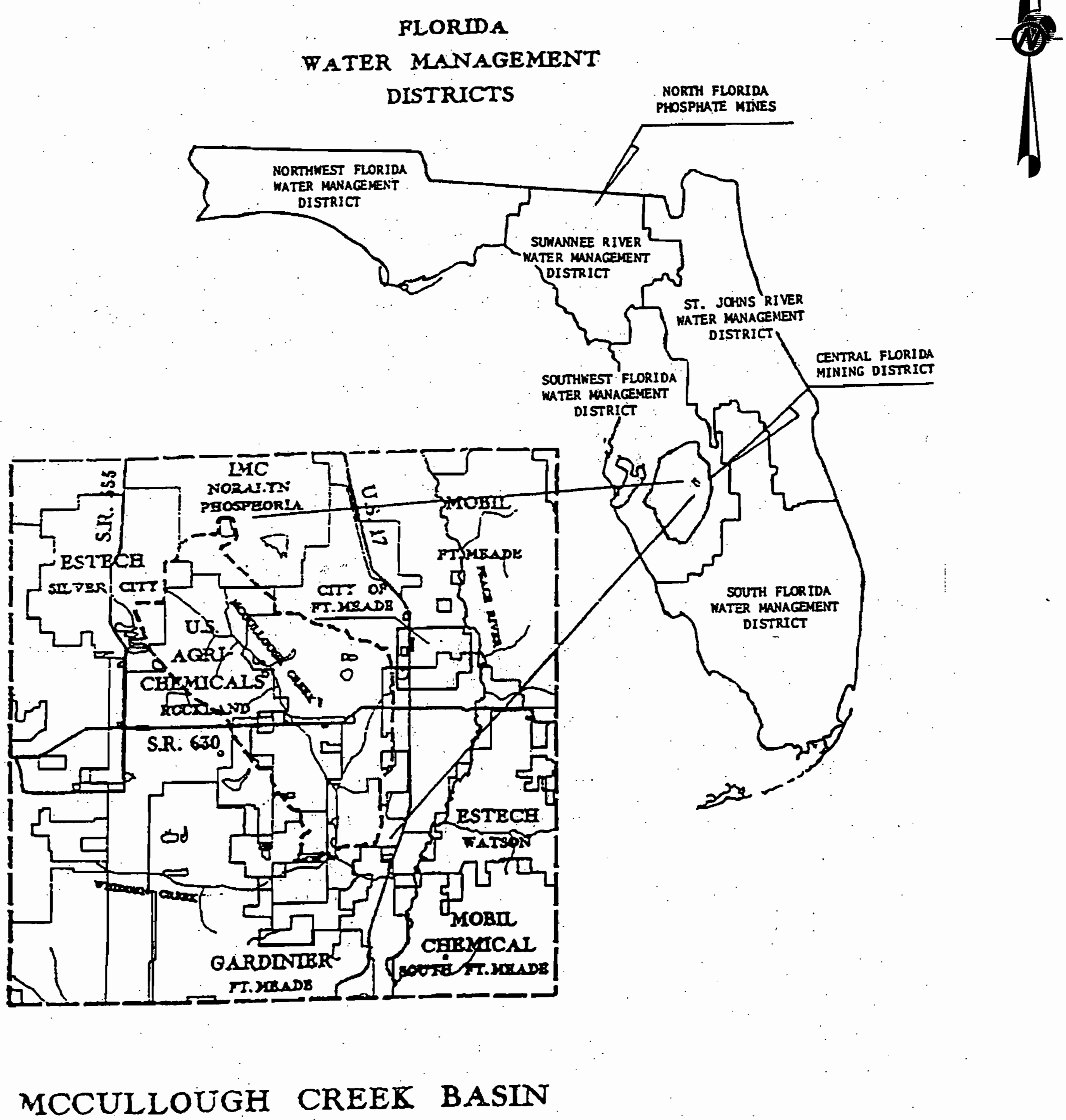

SOURCE: 1992 SCA

Florida Power
A Progress Energy Company
Hines Energy Complex

FIGURE 2.3.4-5
PRE-MINING DELINEATION OF
McCULLOUGH CREEK BASIN

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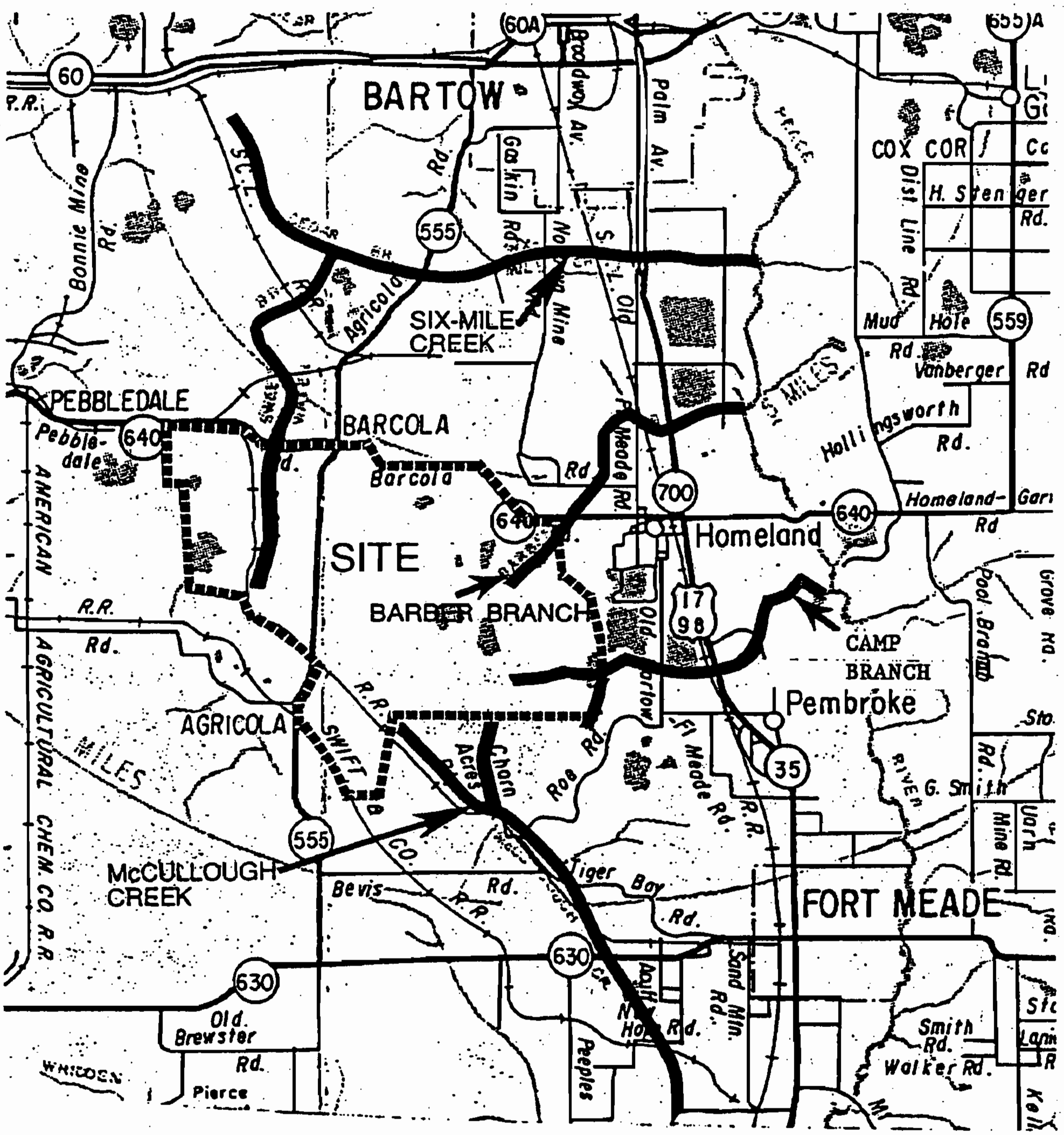

SOURCE: 1992 SCA

Florida Power

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FIGURE 2.3.4-6
PRE-MINING ON-SITE
WATER BODIES

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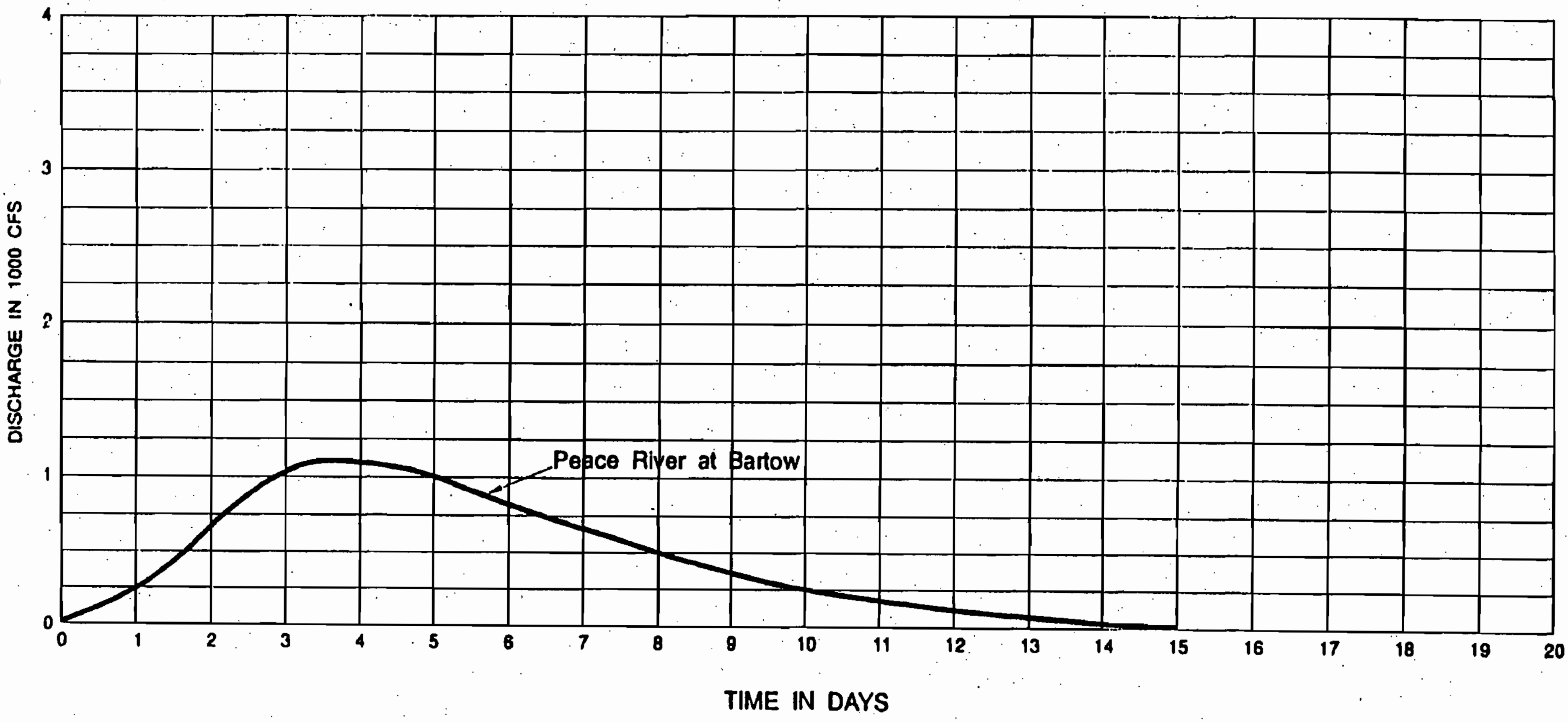

SOURCE: 1992 SCA

Florida Power
Hines Energy Complex

FIGURE 2.3.4-7
UNIT HYDROGRAPH
PEACE RIVER AT BARTOW, FLORIDA

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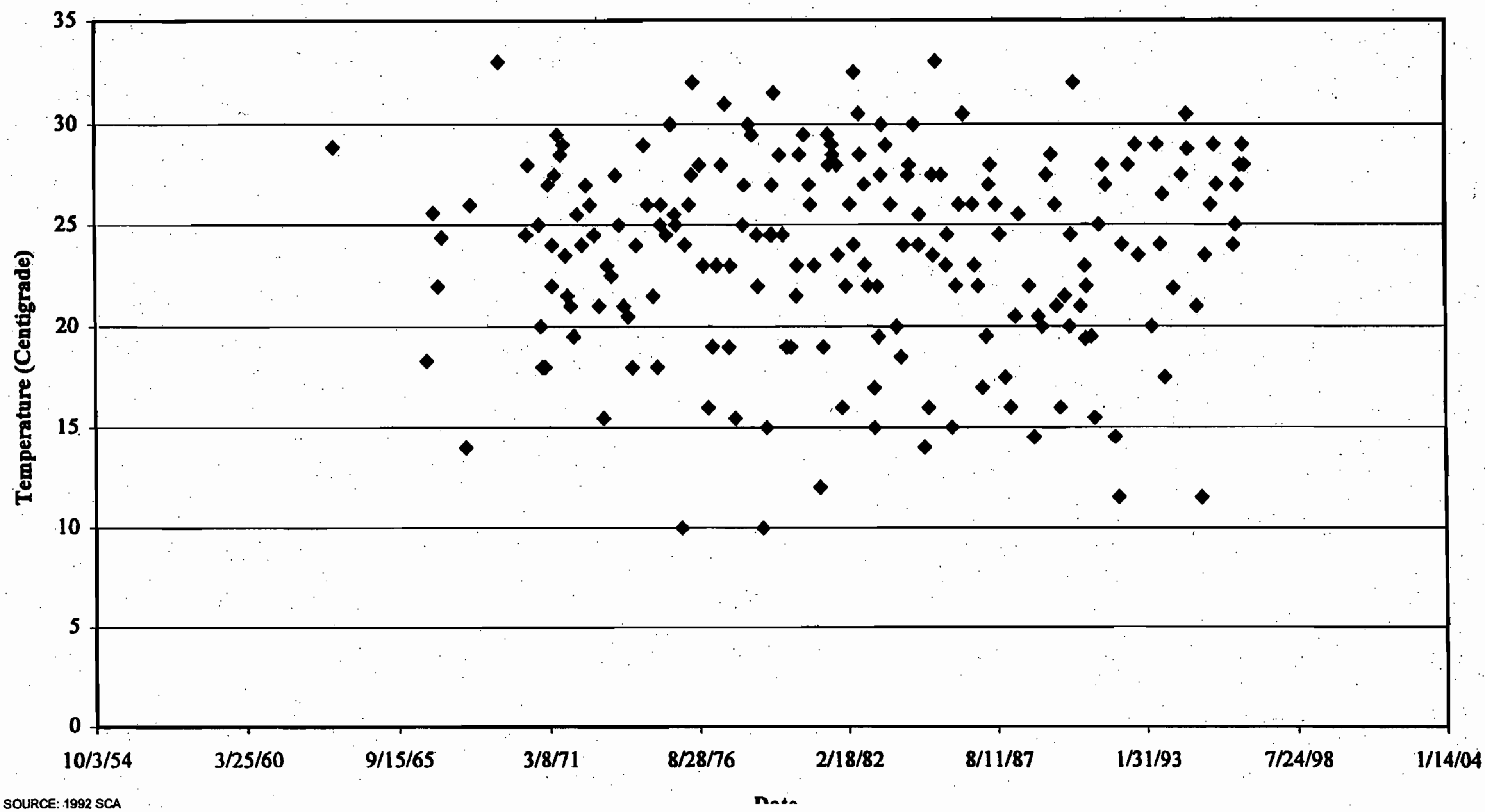
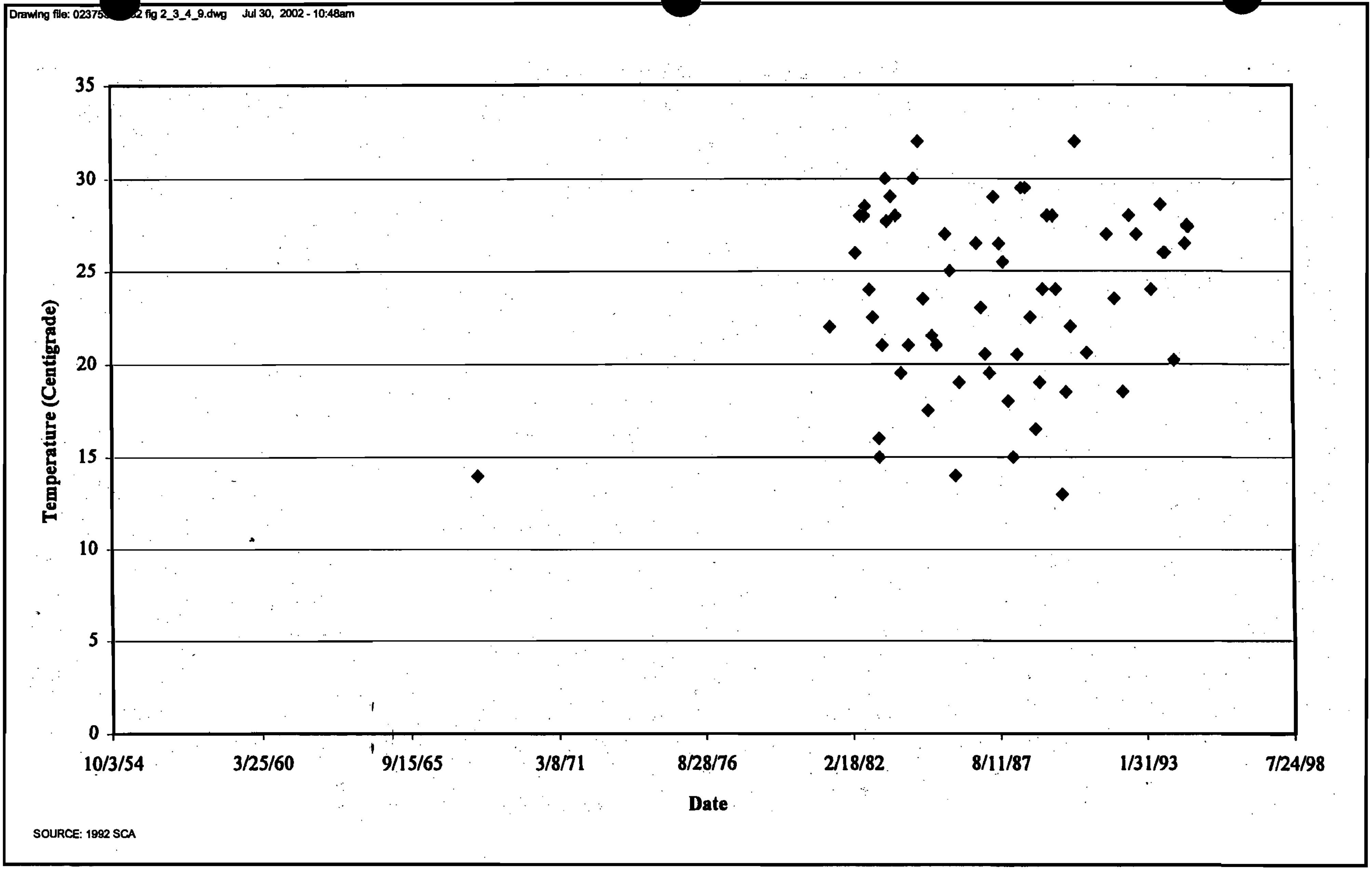


SOURCE: 1992 SCA

Florida Power
A Progress Energy Company
Hines Energy Complex

FIGURE 2.3.4-8
WATER TEMPERATURE
PEACE RIVER - BARTOW STATION No. 02294650



Florida Power

A Progress Energy Company

Hines Energy Complex

FIGURE 2.3.4-9
WATER TEMPERATURE
PEACE RIVER - HOMELAND STATION No. 02294781

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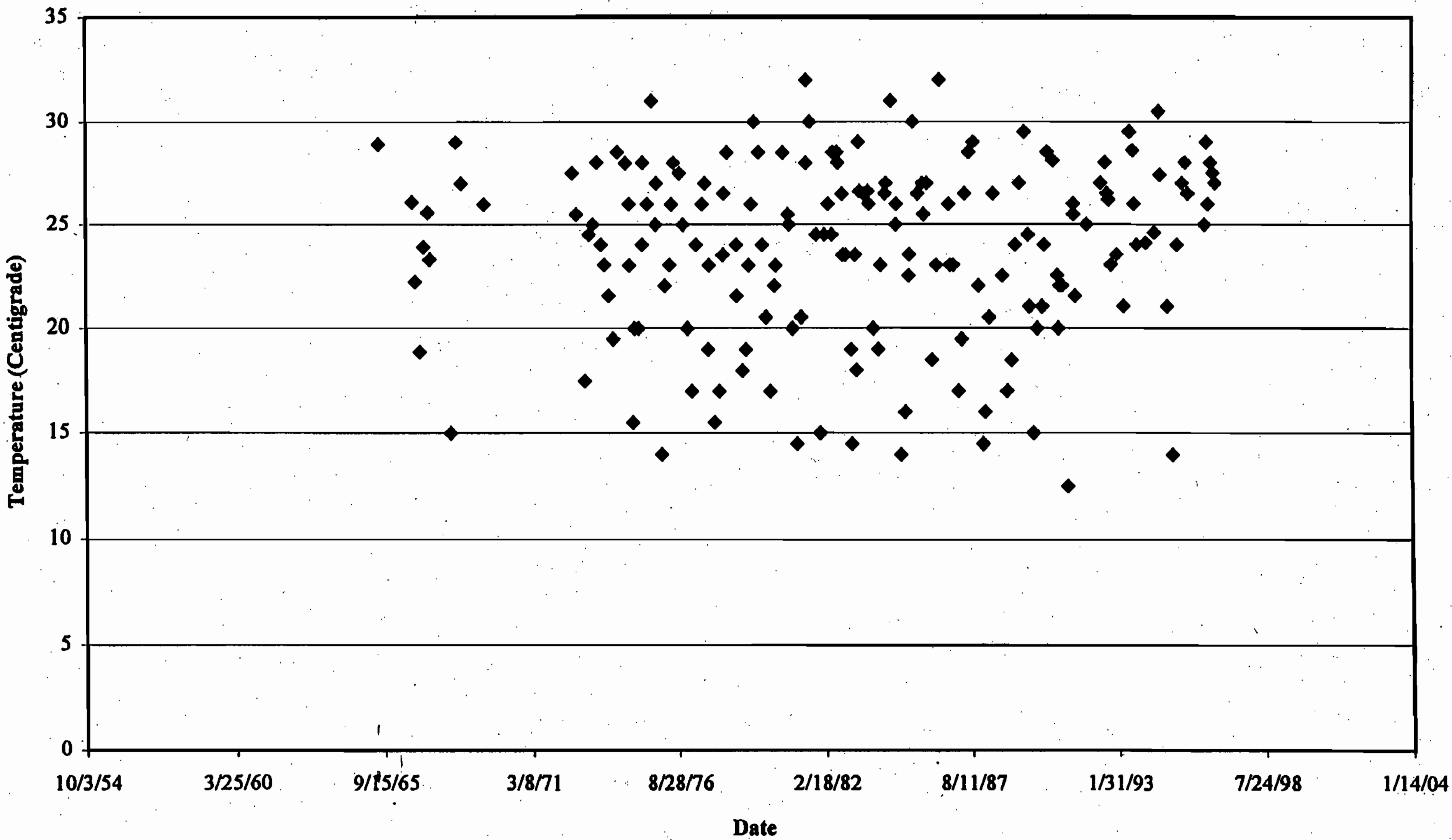

SOURCE: 1992 SCA

Florida Power
A Progress Energy Company
Hines Energy Complex

FIGURE 2.3.4-10
WATER TEMPERATURE
PEACE RIVER - FORT MEADE STATION No. 02294898

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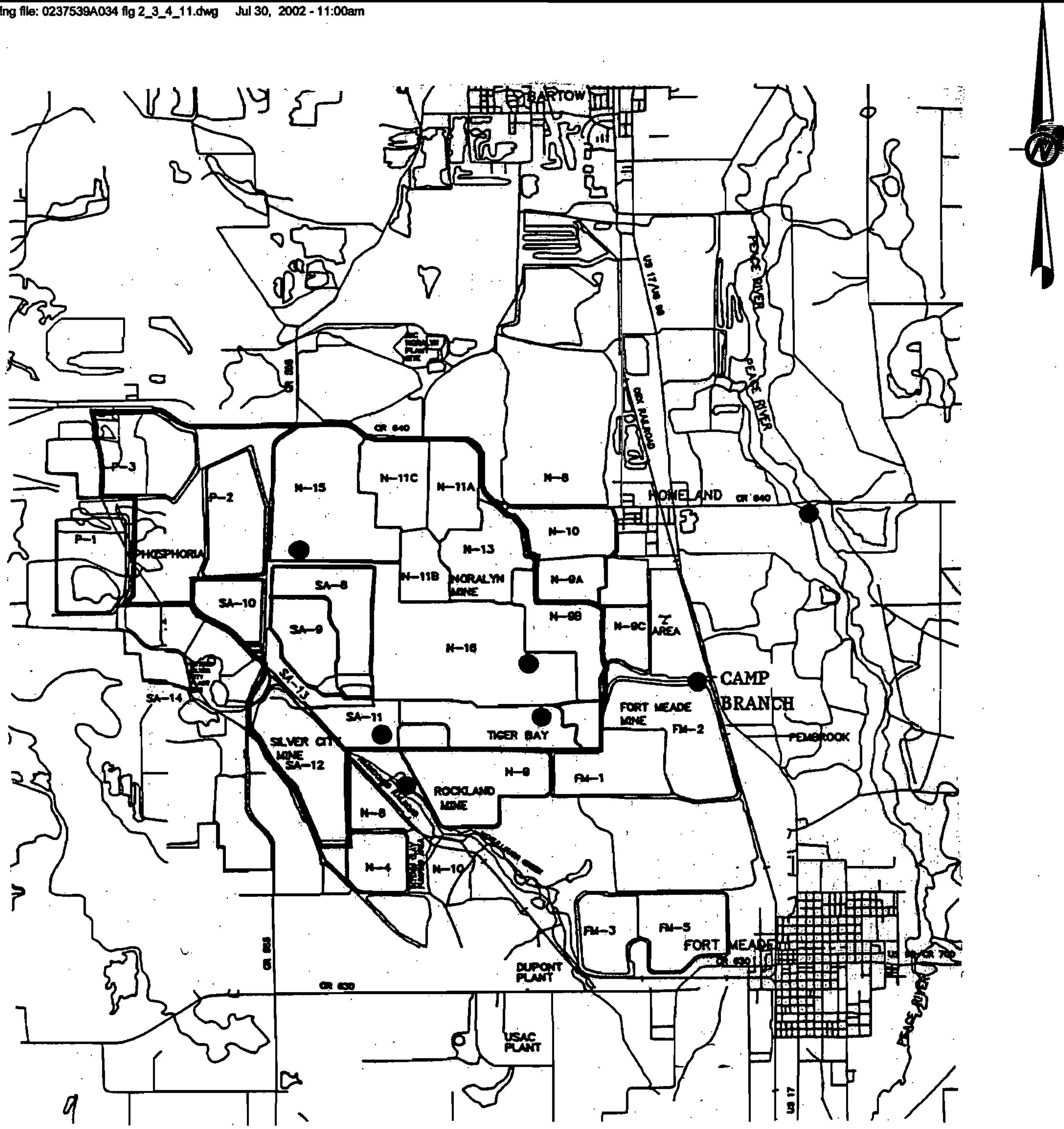

LEGEND

- ● SURFACE WATER SAMPLING LOCATIONS
- ROADWAYS
- SITE BOUNDARY
- RAILROAD

SOURCE: 1992 SCA

Florida Power
A Progress Energy Company

Hines Energy Complex

FIGURE 2.3.4-11
SURFACE WATER SAMPLING
SITE LOCATIONS

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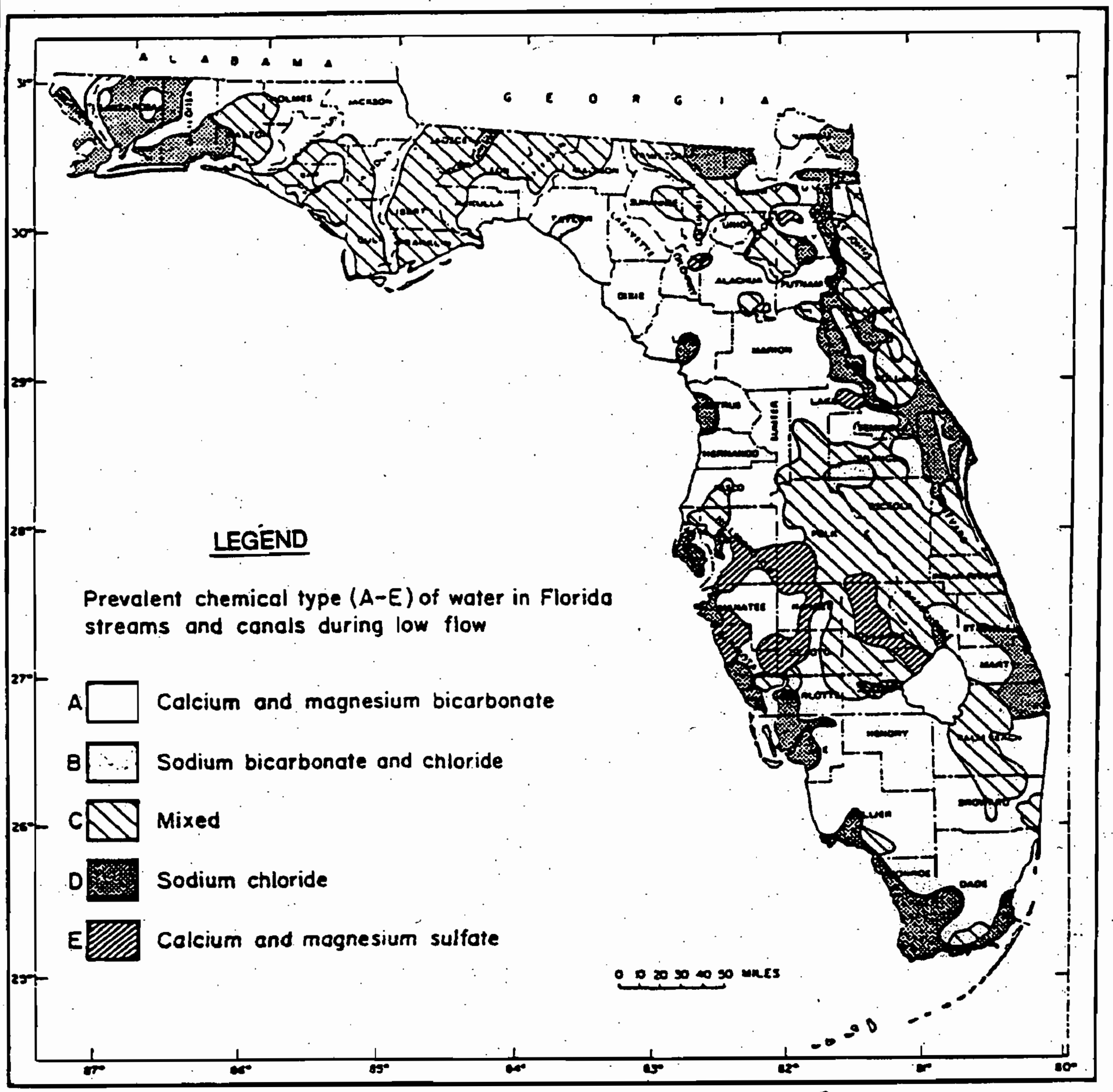
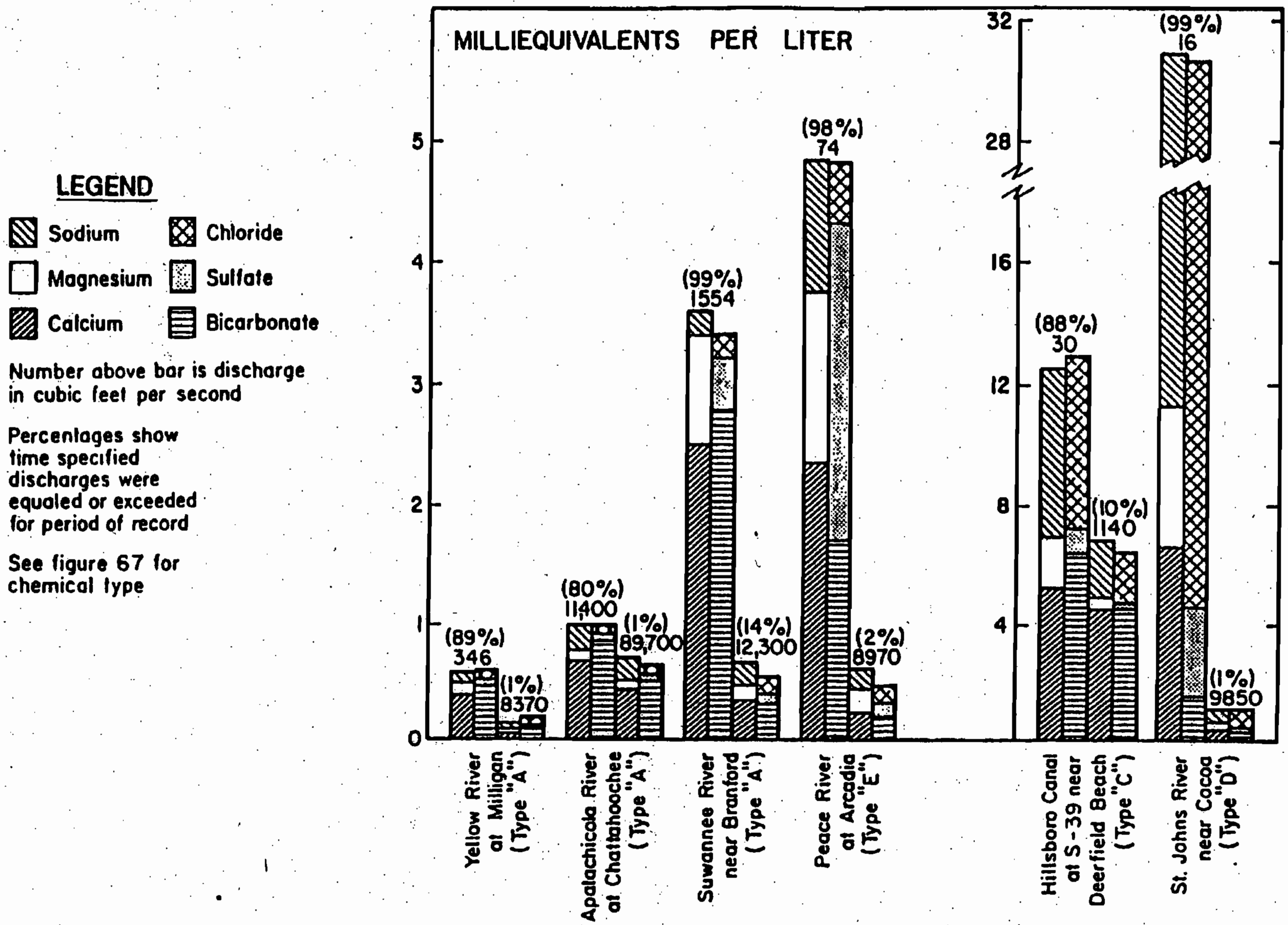


SOURCE: 1992 SCA

Florida Power
A Progress Energy Company
Hines Energy Complex

FIGURE 2.3.4-12
CHEMICAL TYPES OF WATER IN FLORIDA STREAMS



SOURCE: 1992 SCA

Florida Power
A Progress Energy Company
Hines Energy Complex

FIGURE 2.3.4-13
RELATIONS AMONG CHEMICAL COMPOSITION, CONSTITUENT CONCENTRATION AND DISCHARGE FOR SIX FLORIDA STREAMS AND CANALS DURING LOW VERSUS HIGH STREAM FLOW

2.3.5 Vegetation/Land Use

The Hines Energy Complex site consists of land developed for placement of electrical generation facilities and of mandatory mined lands (where mining began on or after July 1, 1975) and non-mandatory mined lands (where mining began prior to July 1, 1975). Mandatory lands on the site were subject to reclamation plans that were approved by the FDEP, prior to approval of the Site Certification. The 1994 Site Certification granted variances from certain reclamation requirements for mandatory areas which were to be developed as the Plant Island or as support facilities for power generation, such as the Cooling Pond and Brine Pond.

The baseline conditions used for impact assessment purposes in this document are those land conditions as authorized by the 1994 Certification and as permitted by the U. S. Army Corps of Engineers. For reference purposes only, a summary discussion of existing conditions is presented in this section along with the discussion of baseline conditions. These conditions are described in full in the original SCA.

2.3.5.1 Baseline Conditions

The baseline condition for SCA purposes is the projected condition of the site at the conclusion of site buildout and includes electrical generation facilities, buffer lands, including the wetland mitigation areas on the eastern and western portions of the site. Use of pre-certification conditions as the baseline is not appropriate for most of the site because of the significant alterations to the property that have occurred due to phosphate mining activities. Exceptions to this scenario are Tiger Bay, which is a reclaimed and released area, and Tiger Bay East, which was mined and revegetated naturally without reclamation and the P2 area that was previously reclaimed and released by the FDEP-BOMR. The Tiger Bay area currently makes up a portion of the site buffer area and conservation easements over these areas were conveyed to the State of Florida as a permanent conservation easement in 2002, pursuant to a non-mandatory funding contract between the State of Florida and FP.

SITE DESCRIPTION

Figures 2.3.5-1A and 2.3.5-1B are land cover maps of the Hines Energy Complex site. Land cover types shown on these maps are consistent with the site's stage of development as authorized in the 1994 Certification and subsequent modifications. The following vegetation/land use types would be present in the site area under the full site buildout condition. Classification is based on Levels I and II Florida Land Use, Cover and Forms Classification System.

- Electrical generation facilities

- Native uplands
- Wetlands
- Lakes

DOMINANT INDICATOR VEGETATION

Final site buildout, as authorized in the 1994 Certification, will include native upland and wetland vegetation communities created as part of the Buffer Area and SA-10 reclamation projects and the Tiger Bay area Enhancement Program. These programs have been initiated, plantings have occurred and progress toward ecological success is being monitored, as described in Section 2.3.5.2 below.

VEGETATION COMMUNITY QUALITY AND CONDITION

Tiger Bay is composed of 417 acres of uplands, wetlands, and open water lakes. It is currently a mix of forested wetlands, uplands and small lakes. Tiger Bay was considered to be low to medium in ecological quality at the time of Certification in 1994. The planting of over 30 wetland and transitional species during reclamation has increased the plant species diversity of Tiger Bay. Some of the planted tree and shrub species are well established and form narrow bands along lake margins. Cattail, Carolina willow, and hydrilla clearly dominated the majority of the wetlands as late as Year 2000 at the time of preparation of the SSCA for Hines Energy Complex Power Block No. 2. As a result of FP's nuisance plant eradication program in Tiger Bay, much of the dominance of these species has now given way to dominance of higher quality native vegetation such as cypress and with a decline in cattails, Brazilian pepper and aquatic pest species.

Tiger Bay East was also considered low to medium in ecological quality at the time of Site Certification in 1994. It is an unreclaimed mining area which has revegetated naturally and contains some relatively mature second growth upland forests in addition to some of the same invasive exotic and nuisance species found in Tiger Bay. In fact, the small (102 acres) area contains the majority of the upland forest community types on-site. Tiger Bay East has relatively high plant species diversity and exhibits some plant community types at intermediate stages of successional development. A non-mandatory reclamation program to enhance the ecological condition of Tiger Bay East is being proposed to the FDEP Bureau of Mine Reclamation. If approved for non-mandatory reclamation funding, this program is proposed to begin in 2003.

2.3.5.2 Reclamation Activities

GENERAL

The Hines Energy Complex Site is comprised entirely of lands which have been previously disturbed by phosphate mining and processing activities. Subsequent to these disturbances, some of the property has been reclaimed, either by the previous owners or by FP; in accordance with state reclamation standards. Additionally, FP has developed some of the site parcels as power plant facilities and some of the property still remains to be reclaimed. The site parcels can be further classified according to their status, under state reclamation law, as either Non-Mandatory Lands or Mandatory Lands. The Non-Mandatory Lands are those that were mined by the phosphate companies prior to July 1, 1975, which comprise approximately half of the Hines Energy Complex site. A trust fund was established by the State to encourage the voluntary reclamation of these lands. The Mandatory Lands are those that were mined on or after July 1, 1975 and must either be reclaimed in accordance with the standards of Chapter 62C-16 F.A.C. or must be granted variances from these standards by the FDEP. The Mandatory Lands that have been or will be developed as power plant facilities were granted the necessary variances from these standards through the approval of the 1994 Certification. Figure 2.3.5-1 is a map of the site illustrating the site parcels, which are discussed below.

PHOSPHORIA, P-2, P-3 AND TRIANGLE LAKES

These areas, which are west of CR 555, comprise approximately 1,700 acres. They are entirely Mandatory Lands, as defined above, and must be reclaimed by IMC-Agrico (IMC) in accordance with the standards of Chapter 62C-16 FAC. When purchased by FP from IMC, the P-2 clay settling area, had already been mined and reclaimed. Mining of Phosphoria concluded in late 1999, and IMC has initiated early stage reclamation activities on the area. Triangle Lakes continues to operate as a portion of the IMC mine water recirculation system. A modified Conceptual Reclamation Plan has been submitted for all of these areas and is under review by the FDEP Bureau of Mine Reclamation. In general, IMC's current reclamation plans call for re-establishment of the pre-mining habitat and drainage characteristics of the area. FP will utilize the final discharge of runoff from these areas for power plant water needs, as previously authorized in the 1994 Certification.

BUFFER AREA (N-11A, N-11C, N-13, N-9B AND TIGER BAY)

The Buffer Area of the site is located on its southern and eastern boundaries, encompassing approximately 1,800 acres. Subsequent to the Post-Certification Amendment filed April 17, 2000, N-11A, N-13 and N-9B were determined to be eligible for participation in the Non-Mandatory Lands Reclamation Program of the state. Upon execution of the contract between the State of Florida and FP, funding of the non-mandatory reclamation of these parcels has taken place, and a conservation easement over Tiger Bay has been conveyed to the State as additional support for the variances previously granted in the 1994 Certification. Following is a discussion of the current status of areas within the Buffer Area.

N-11A

N-11A is a non-mandatory clay settling area located in the northeastern corner of the site. Active consolidation of the clays in this area has been completed. In accordance with the non-mandatory reclamation requirements of Chapter 62C-17 FAC, and the approved reclamation design plans. Reclamation of this parcel was completed in October 2001. In general, this parcel was reclaimed as wildlife habitat consisting of various land use and cover classifications (FLUCCS). This area will also serve as watershed for the parcels to the south and ultimately to the Peace River.

N-11C

N-11C is a non-mandatory clay settling area that also contains large amounts of phosphatic sand tailings which were disposed of by IMC-Agrico. These sand tailings may be used by FP as backfill material to support site construction activities. The western portion of the parcel will be developed as part of the cooling pond. However, the remainder of the parcel will ultimately be reclaimed by FP in accordance with the standards of Chapter 62C-17 FAC. Specific design plans for this reclamation will be submitted to FDEP for review and approval prior to commencement of reclamation activities.

N-13

N-13 is a former IMC-Agrico non-mandatory waste clay settling area in which clay consolidation has also been completed. In accordance with the Post-Certification Amendment filed April 17, 2000, FP has reclaimed this area as primarily upland wildlife habitat, consisting of various land use and cover classifications. This area will also serve as watershed for the N-9B parcel to the south and ultimately to the Peace River.

N-9B AND SA-10 - CORPS OF ENGINEERS MITIGATION AREAS

In addition to meeting the requirements of applicable state reclamation rules, the N-9B and SA-10 Parcels have been reclaimed to contain wetland areas which will fulfill the requirements of U.S. Army Corps of Engineers Dredge and Fill Permit No. 199302169 (IP-MN). These wetlands are to serve as mitigation for impacts to spoil pile wetlands which existed in the N-16 Cooling Pond at the time the Hines Energy Complex site was acquired by FP. The habitat created in these areas consists of herbaceous and forested wetlands and their associated upland watersheds. The upland portions of the mitigation areas are shrub, brush, rangeland and forested habitat. SA-10 will serve as watershed for McCullough Creek and N-9B will serve as watershed for Camp Branch and ultimately to the Peace River. *Note:* Originally, the N-13 parcel was proposed as a mitigation area for the N-16 impacts. However, a modification of the Site Certification was approved in 1996 to allow FP to transfer the requirement for palmetto prairie reclamation from SA-10 into N-13 and to transfer the N-13 mitigation requirements to the SA-10 parcel. Concurrence from the U.S. Army Corps of Engineers is conditioned in the above permit upon meeting the review criteria and obtaining the final approval of the reclamation plan and schedule from the FDEP Bureau of Mine Reclamation.

TIGER BAY AND TIGER BAY EAST

These areas form the portion of the Buffer Area located south of the N-16 cooling pond. Tiger Bay is a previously reclaimed mandatory mining parcel, while Tiger Bay East is an unreclaimed non-mandatory area. These areas collectively form the headwaters of Camp Branch, to the east, which is a tributary to the Peace River. Additionally, these areas represent a link in the wildlife corridor connecting Hookers Prairie, in the Alafia River drainage basin, to the Peace River basin via Camp Branch. In accordance with the post-Certification Amendment filed April 17, 2000, a conservation easement over the Tiger Bay and Tiger Bay East parcels was donated to the State of Florida in 2000. This donation was completed following the signing of the non-mandatory funding contracts for the reclamation of Parcels N-11A, N-13 and N-9B, as alternative mitigation for the variances from mandatory reclamation requirements that were granted in the 1994 Certification.

SA-12 SOUTH – McCULLOUGH CREEK DRAINGAGE ENHANCEMENT PROJECT

This area was constructed by FP as the watershed detention area which discharges runoff from this project to the McCullough Creek headwaters located on the US Agri-Chemicals property to the east. As required by the 1994 Certification, this detention area was designed by FP to receive runoff from the offsite Silver City Drainage Area to the northwest and from the SA-10 reclamation area, also to the northwest, and then gradually discharge this water as an enhancement to the downstream McCullough Creek hydrology.

N-16 (Cooling Pond), SA-9 (Brine Pond), SA-12 North, SA-11 and SA-13

These areas were mandatory lands that have been developed by FP for their respective uses as power plant generation and support facilities. The construction and operation of these facilities is described in the 1992 SCA, the 1994 Certification and in subsequent modifications.

SA-8, N-15, N-11B, N-16E (Clay Storage and Reclaimed Water Storage Areas)

These areas, which are either clay settling areas or unreclaimed mined areas, are designated for construction and operation as future power plant support facilities. SA-8 was designated the Phase I Solid Waste Disposal Area for use when FP implements coal gasification as the fuel option for on-site generation. The remainder of the areas are proposed as future additions to the cooling pond. All of these areas, with the exception of the clay storage area of N-16E, are classified as non-mndatory Lands.

2.3.5.3 References

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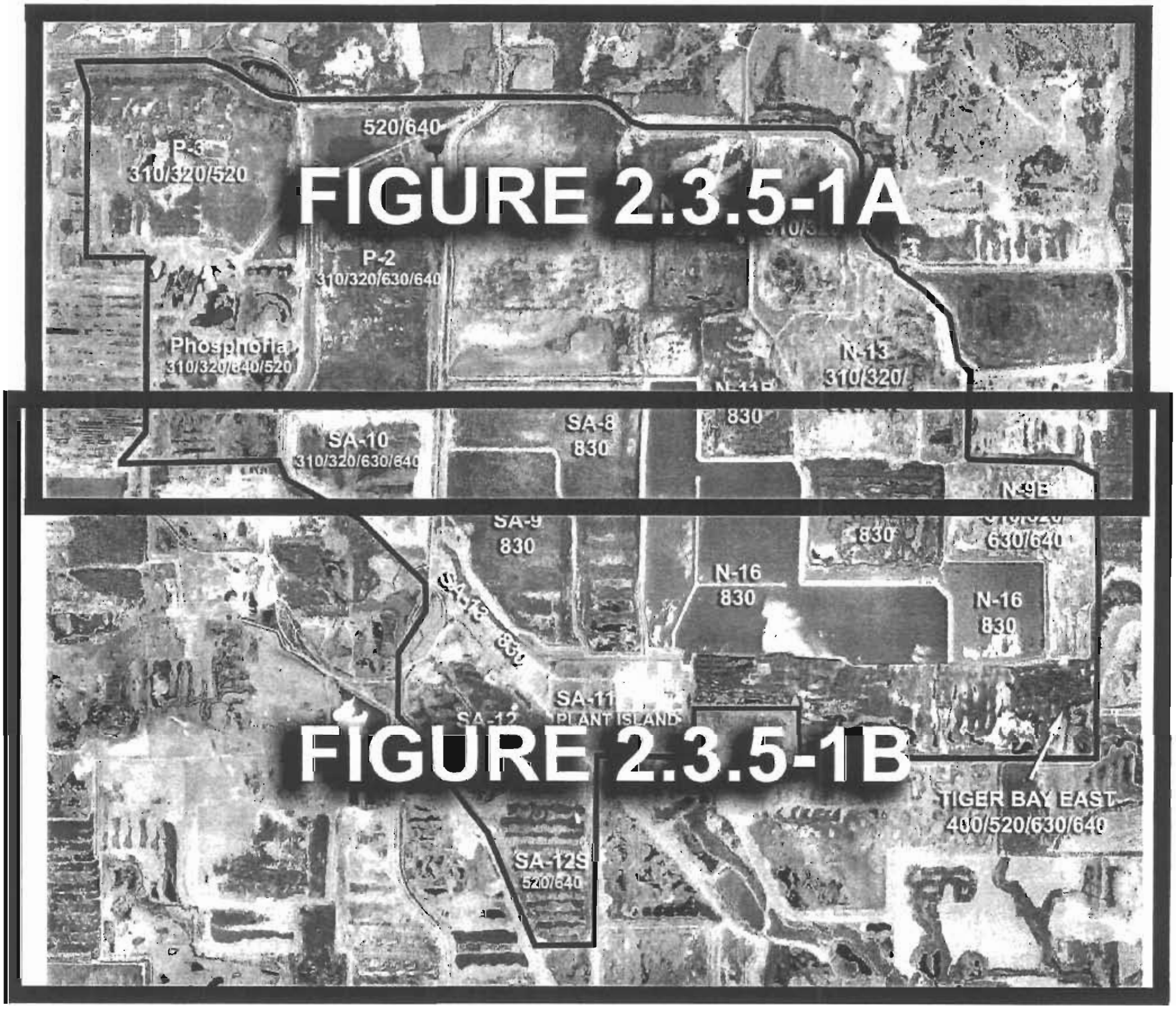

FLUCCS CODE LEGEND

210	CROPLAND AND PASTURELAND
310	UPLAND HERBACEOUS
320	UPLAND SHRUB AND BRUSHLAND
400	UPLAND FORESTS
520	LAKES
630	WETLAND FORESTS
640	VEGETATED NON-FORESTED WETLANDS
830	UTILITIES

Florida Power
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Hines Energy Complex

FIGURE 2.3.5-1
VEGETATION / LAND USE MAP KEY

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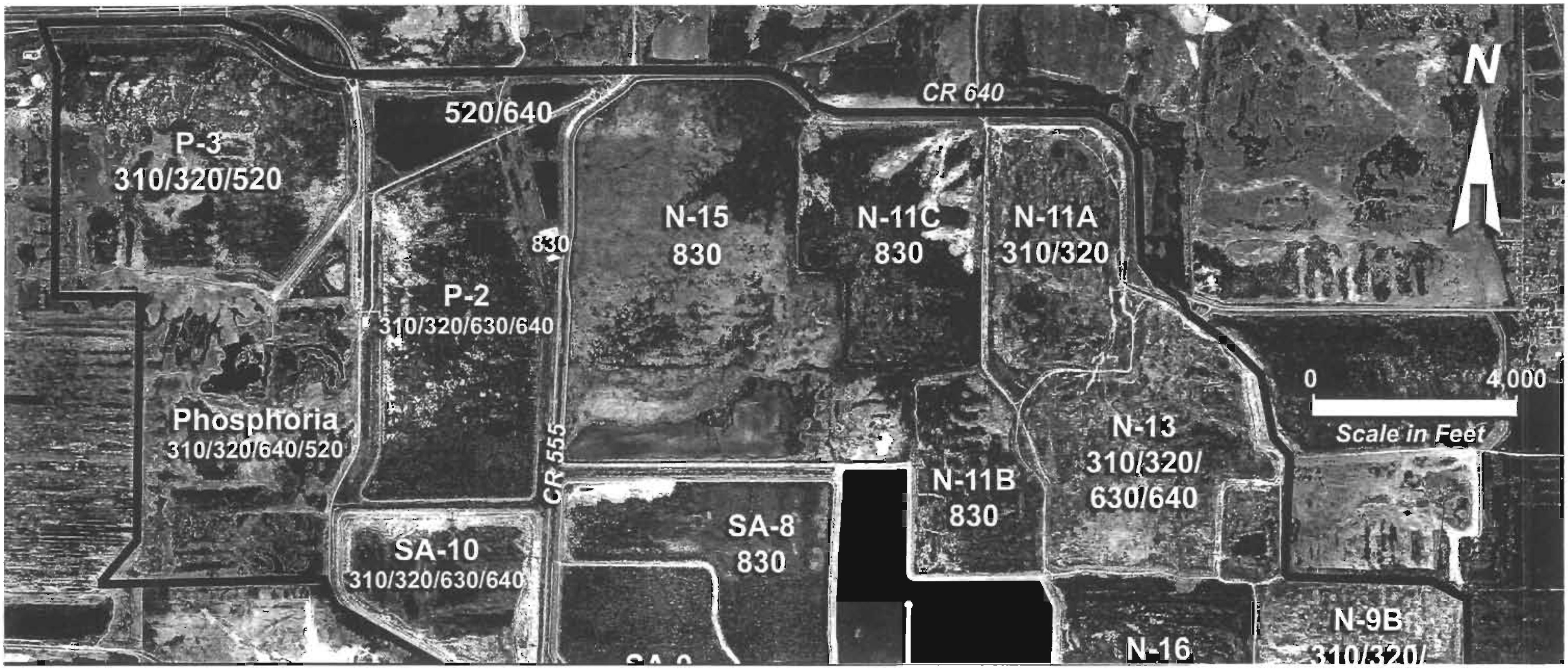

Florida Power
Hines Energy Complex

FIGURE 2.3.5-1A
VEGETATION / LAND USE MAP
EXISTING CONDITIONS

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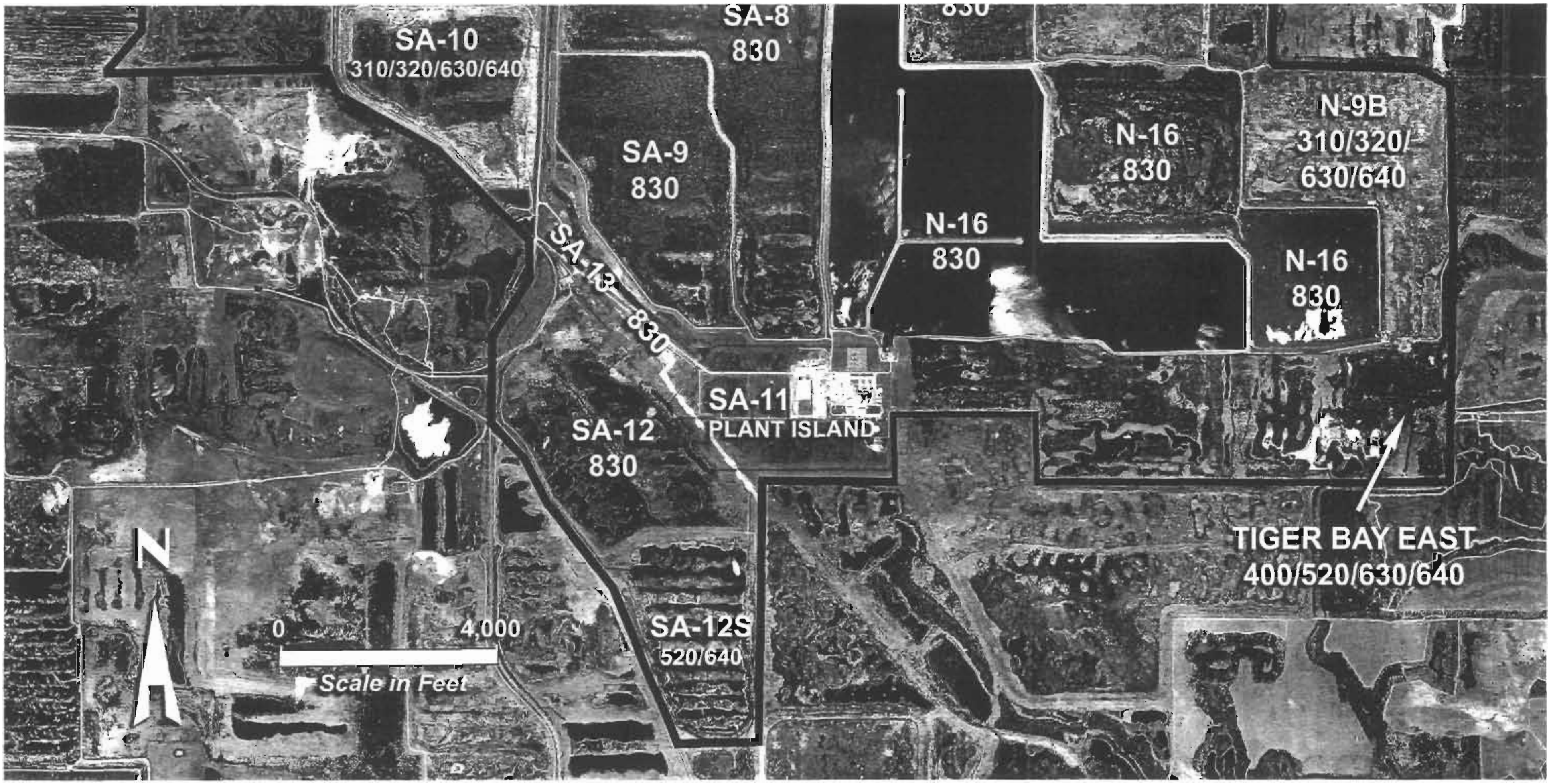

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FIGURE 2.3.5-1B
VEGETATION / LAND USE MAP
EXISTING CONDITIONS

2.3.6 Ecology

As part of the 1994 Certification, vegetation and land use impacts for full site buildout were reviewed and approved. The permitted reclamation plans for unreclaimed portions of the Hines, as well as the condition of areas which were already reclaimed and released at the time, were set forth as the pre-development baseline to which project impacts would be compared. The overall Hines site development plan was then reviewed and approved on the basis of this analysis.

The status of important flora and fauna is highlighted in this section. Importance status is based upon species or assemblages of species which are:

- Threatened or endangered species by the U.S. Fish and Wildlife Service (FWS)
- Threatened or endangered species or species of special concern by the Florida Fish and Wildlife Conservation Commission (FFWCC) and Department of Agriculture and Consumer Services (DACS)

Game, furbearers, or fishery resources by the FFWCC

- Indicators of species that are endemic or unique to specific plant communities or habitat types
- Functionally dominant species in their vegetation communities or habitat types

The potential status of important species at the full build out has not changed from that described in the 1992 SCA.

2.3.6.1 Species - Environmental Relationships

<u>*AQUATIC SYSTEMS*</u>

BASELINE CONDITIONS. At full build out, the aquatic systems on the site will include Tiger Bay and the Buffer/Mitigation Areas N-9B and SA-10 as developed for mitigation. The Tiger Bay aquatic system was not involved in construction of Power Blocks 1 or 2 and a conservation easement over the Tiger Bay parcel has been deeded to the State. The aquatic systems in N-9B and SA-10 have been created and are progressing toward ecological success as designed.

Threatened and Endangered Species and Species of Special Concern. No state or federally threatened or endangered species, or species of special concern, are known to occur in the aquatic habitats associated with the Hines Energy Complex (50 CFR 17).

Freshwater Game or Commercial Fish. Sport and commercial hunting and fishing are currently not allowed on the Hines Energy Complex site.

Indicator and Endemic Species. There are no indicator species existing on the Plant Island because of a lack of aquatic habitat in that area. Indicator species likely occur in other areas of the site where naturally occurring vegetation communities occur. No endemic species likely occur on the site.

Species Significant to Local Ecological Systems. As discussed in Section 2.3-5, various areas of the Hines Energy Complex site have been developed or reclaimed to have aquatic habitats. These areas contain wetlands and species that are typical of central Florida ecological systems.

BASELINE TERRESTRIAL AND WETLAND CONDITIONS

SPECIES IMPORTANCE CRITERIA. Descriptions of expected vegetation community structure are presented in Section 2.3.5. Within these communities is the potential for occurrence of faunal and floral species which are of special importance. This special importance arises from species status as being either:

- Threatened, endangered, or species of special concern
- Indicator and endemic species
- Vertebrate species significant to local ecological systems

Threatened or Endangered Plant Species. Endangered, or federally threatened plants, whose ranges include the Hines Energy Complex, are listed in Table 2.3.6-1. For conservative evaluation purposes, consideration was given to species whose known occurrence is within a one county radius of Polk County. None of the species described in Table 2.3.6-1 have been found at the Hines Energy Complex. When ecological succession has progressed in the Buffer/Mitigation Areas, habitat for many of these species will develop in those areas.

Protected species importance is based on species lists of the U.S. FWS (50 CFR 17.11-12), the FFWCC (Section 39-27.003-005 F.A.C.), and the Florida Department of Agriculture and Consumer Services (DACS) (Preservation of Native Flora Act, Section 581.185-187, F.S.).

The summary status of protected plant species potentially occurring in the Polk County area and, therefore, at the Hines Energy Complex, is presented in Table 2.3.6-1. Review of the literature resulted in a total of 107 species that could potentially be present. Florida Natural Areas Inventory has documented the presence of 38 protected species in Polk County. Suitable habitat as well as marginal habitat exists in the Hines Energy Complex site for 33 of the species listed.

Threatened, Endangered, or Species of Special Concern (Animals). Terrestrial vertebrate protected species status for the Hines Energy Complex based on habitats expected to exist following full buildout in the eastern Buffer/Mitigation Area is summarized in Table 2.3.6-2. Descriptions of habitat requirements, species range and other life history characteristics of protected vertebrate species potentially occurring at the Hines Energy Complex with existing certified baseline reclamation are given below. As the Buffer/Mitigation area fully develops and ecological succession progresses, habitat for many of these species is occurring. Habitats associated with the construction of Power Block 3 (i.e. cleared and graded land) are not suitable for occupation by protected species.

FLORIDA GOPHER FROG (*Rana capito*) has been recorded throughout most of Florida. Its most common habitat association is in and around gopher tortoise burrows. The preferred habitat is dry but near enough to grassy ponds for breeding. The gopher frog feeds upon insects and toads. Marginal habitat for the species currently exists on the Hines Energy Complex.

GOPHER TORTOISE (*Gopherus polyphemus*), a species of special concern in Florida, has large populations within the state. Species habitat includes dry, well-drained soils covered with a variety of upland pine and oak species, as well as old field vegetation communities. Vegetation cover is usually a habitat requirement. Gopher tortoises feed on grasses, leaves, and other herbaceous matter. This species excavates long burrows for its own use; however, a variety of other species also use these burrows for shelter such as the eastern indigo snake *(Drymarchon corais couperi*) and gopher frog. Some species use only tortoise burrows for life history needs (McDiarmid, 1978). Potential habitat for the gopher tortoise could develop in reclaimed upland areas of the Buffer/Mitigation Area of the Hines Energy Complex. Areas with flat topography and high wet season water table would limit burrowing habitat. Sandy soils versus soils with rock and solidified hard clays on the site will be preferred by the tortoise. The gopher tortoise was recorded on the site area prior to mining (FNAI files, Tallahassee, FL), but has not been observed during field inspections.

AMERICAN ALLIGATOR (*Alligator mississippiensis*), federally classified as threatened through its similarity in appearance to the American crocodile (*Crocodylus acutus*), and a species of special concern in Florida, has populations existing throughout the state and over much of the southeastern United States coastal plain. This species is found in nearly all wetland and aquatic habitat types in Florida. Food for the alligator includes aquatic and wetland vertebrates and larger invertebrates (McDiarmid, 1978). Potential habitat for this species following baseline reclamation in the area ranges from drainage canals to freshwater depression type wetlands, and ponds. Alligators were observed to be very common in former clay settling ponds on the site and should be expected in mitigation area aquatic and wetland systems.

SHORT-TAILED SNAKE (*Stilosoma extenuatum*) is found in Florida from the northeastern portion of the state south to Highlands County. This species is associated with xeric conditions of longleaf pine-turkey oak communities and in oak hammocks. Its natural history is poorly known (Ashton and Ashton, 1988). Habitat loss from timber operations and development are the primary reasons for its threatened status (McDiarmid, 1978). Habitat is not present on the Hines Energy Complex but will be of limited occurrence in the Buffer/Mitigation Area as ecological succession proceeds.

FLORIDA PINE SNAKE (*Pituophis melanoleucus mugitus*) is found throughout most of northern and eastern Florida. It occupies sandy habitats such as longleaf pine and turkey oak communities. The pine snake feeds upon small mammals, birds, and other small vertebrates (Ashton and Ashton, 1988). Habitat loss is the primary reason for its population decline and listing as a species of special concern. No habitat for this species is currently on the Hines Energy Complex. The Buffer/Mitigation Area will contain limited appropriate habitat as ecological succession proceeds.

EASTERN INDIGO SNAKE (*Drymarchon corais couperi*), classified as threatened by Florida and the federal government, is generally found in Florida and southeastern Georgia. Species habitat includes dry sandy areas, as well as moist vegetation communities. The indigo snake frequently uses gopher tortoise burrows as shelter in xeric habitats, in part to avoid desiccation. Food for this species includes a wide range of small upland vertebrates including other snakes (McDiarmid, 1978). Potential habitat for the indigo snake in the Hines Energy Complex area exists in pine flatwoods and pine and wet prairies and would be present following the Buffer/Mitigation Area reclamation. No indigo snakes were observed at the Hines Energy Complex. The indigo snake has been observed in several areas of Polk County prior to mining (FNAI, 1992). Habitat in the mitigation areas should be suitable for this species.

BLUE-TAILED MOLE SKINK (*Eumeces egregius lividus*) occurs on the Lake Wales Ridge in Polk and Highlands Counties. Its habitat is sand pine and scrub where it burrows in the St. Lucie Fine Sand. Occasionally, it is found in the turkey oak vegetation community. This species consumes small invertebrates such as roaches, spiders, and crickets. Habitat loss is reason for its threatened status (McDiarmid, 1978). The Hines Energy Complex currently lacks habitat for this species. The Buffer/Mitigation Areas include limited and marginal habitat that might be suitable for the species.

WOOD STORK (*Mycteria americana*) is considered endangered in Florida with nesting colonies occurring in South Carolina, southeastern Georgia and Florida. Nesting and feeding occur in freshwater wetlands and brackish mangrove swamps. Food for this species includes small fish usually obtained from shallow water. Inland nesting is frequently in large cypress trees while mangrove islands provide nesting habitat in estuarine and marine environments (Kale, 1978). Shallow open water and isolated marshlands represent potential feeding habitat for the wood stork in the Hines Energy Complex area, particularly under low water conditions when fish are concentrated. This habitat exists along ditches, in depressions and in shallow areas on clay settling ponds. Wood storks have been observed feeding in these habitats on the Hines Energy Complex. No suitable freshwater swamp-nesting habitat was found to occur at or near the Hines Energy Complex. Wood storks were observed feeding in off-site reclaimed wetlands and adjacent ponds. The Buffer/Mitigation Areas include limited feeding habitat that should be suitable for the species.

SOUTHERN BALD EAGLE (*Haliaeetus leucocephalus*), considered threatened by the State of Florida and endangered by the federal government, occurs throughout the state; however, nesting is concentrated in north central counties and along coastal portions of Charlotte, Lee, Collier, Monroe, and Dade Counties. Nesting usually occurs near feeding areas along shorelines and over shallow water bodies. Nests are solitary and are usually in tall pine or cypress trees often with good visibility over the surrounding countryside. Although fish are this species' primary food source, other vertebrate prey may be captured (Kale, 1978). Feeding habitat for this species includes clay settling ponds and marshlands that occur now and will occur following reclamation. The potential for nesting at the Hines Energy Complex is low now but increases ecological succession in of the Buffer/Mitigation Area reclamation.

SOUTHEASTERN AMERICAN KESTREL (*Falco sparverius paulus*), considered threatened by the State of Florida, is an open habitat bird preferring open pine forest and clearings with dead trees. However, it can also be found along the open edges of river bottoms, coastal regions, suburban areas, and even in large cities. Large insects are the primary food item with small rodents and reptiles also being important prey items. *Falco sparverius paulus* ranges from South Carolina south to southern Alabama and Florida with recent observations indicating that the Florida population is declining (Kale, 1978). Kestrels were observed occasionally at the Hines Energy Complex during the winter surveys, but not during the breeding season surveys. Habitat for this species will be present with Buffer/Mitigation Area as ecological succession occurs.

OSPREY (*Pandion haliaetus*) occurs at and near rivers, lakes and wetlands throughout the state. The population in the Keys is listed as a species of special concern. It has received consideration here because of its protected status elsewhere in the state, its previous decline due to chlorinated insecticides, and its high level position in the food chain. The osprey nests on tall structures near feeding areas or near the ground on islands with low predator populations (Kale, 1978). The species feeds upon fish. Osprey occupies the Hines Energy Complex during all seasons. Nesting pairs have occupied nest platforms in Tiger Bay regularly during the breeding season.

FLORIDA SANDHILL CRANE (*Grus canadensis pratensis*) is classified as threatened in Florida and ranges from extreme southeastern Georgia (Okefenokee Swamp) southward through peninsular Florida, becoming scarce in Monroe and Dade Counties. The preferred habitat includes wet prairies, marshy lake margins, and low-lying improved cattle pastures. Nesting activity is related to water level with eggs hatching normally in March and April. Sandhill cranes feed on a wide range of plants. Besides eating various grains, they consume herbaceous foliage, underground stems, tubers, and roots. Invertebrates such as grasshoppers, beetles, caterpillars and snails along with certain amphibians and mammals make up the bulk of the animal portion of its diet (Kale, 1978). Suitable feeding habitat exists in Tiger Bay and in the mitigation areas. No sandhill cranes were observed on the Hines Energy Complex.

LIMPKIN (*Aramus guarauna*), a species of special concern in Florida, can be found throughout peninsular Florida where they favor slow-moving freshwater rivers and streams, marshes and lakeshores. Nesting in Florida probably occurs year round and corresponds with the availability of foods. Various snails along with other freshwater mussels are the limpkin's primary foods. Lizards, insects, frogs and worms are eaten in lesser amounts (Kale, 1978). Suitable limpkin habitat was present at the Hines Energy Complex, however, this species was not observed. The lack of slow moving open watercourses now and within Buffer/Mitigation Area reclamation limits the opportunity for limpkin usage.

LITTLE BLUE HERON (*Egretta caerulea*), a Florida species of special concern, breeds along much of the Atlantic and Gulf coasts. In Florida, they range from the panhandle south to the Florida Keys. Cypress (*Taxodium distichum*), southern willow (*Salix caroliniana*), red mangrove, black mangrove, cabbage palm (*Sabal palmetto*), and Brazilian pepper are among the more common trees used during the breeding season which, in Florida, spans the months of February to September. These tree species occur in habitats ranging from fresh to saltwater. Little blue herons prefer to forage in freshwater habitats for the crustaceans, insects, small fish, frogs and lizards, which form the major portion of their diet (Kale, 1978). Suitable nesting and feeding habitat occurs in the Buffer/Mitigation Area.

SNOWY EGRET (*Egretta thula*), a Florida species of special concern, is typically restricted to coastal areas. It is found from Maine to Florida along the Atlantic Coast and to Texas along the Gulf. This small white egret nests in both inland and coastal colonies throughout peninsular Florida, but only rarely in western Florida. The largest nesting colonies occur in coastal estuarine habitats often in association with tricolor heron. Woody species typically chosen for nest sites include mangroves, willow, buttonbush, and wax myrtle stands. Small fish and various invertebrates are among the more common food items. Feeding habitat and nesting for the snowy egret exists in the Hines Energy Complex Buffer/Mitigation Area.

TRICOLORED HERON (*Egretta tricolor*) is classified as a species of special concern in Florida. In peninsular Florida, this large wader is most commonly found in estuarine colonies and only occasionally in freshwater habitats. Mangroves, willow, buttonbush, marsh elder, and wax myrtle are among the more common woody species used for nesting. Small fish are the primary food source while a variety of invertebrates are also consumed to a lesser extent. Nesting habitat for the tricolored heron occurs within the Hines Energy Complex as noted for the little blue heron above. Suitable feeding habitat is present in the Buffer/Mitigation Area.

LEAST TERN (*Sterna albifrons*) occurs in coastal areas throughout the state. Nesting colonies have occurred at widely scattered inland locations. The tern has nested near Polk County in both Lake and Highlands Counties. Nesting generally occurs on open flat sandy areas. Feeding habitat includes aquatic areas where they feed upon small fish (Kale, 1978). The Hines Energy Complex may be sparingly used by this species for feeding. It could be used in a similar fashion in the Buffer/Mitigation Area until sand deposits and open water habitats revegetate. Habitat loss and human disturbance are the reasons for its listing as a threatened species. Habitat for this species is limited on the site.

WHITE IBIS (*Eudocimus albus*), is a species of special concern as listed by the FFWCC. It nests along with other medium-sized wading birds in forest and shrub areas standing in water or in the same vegetation structure on small islands surrounded by relatively large distances of open water. The species feeds in wetlands and on moist grasslands. The white ibis feeds in the Hines Complex mitigation wetlands.

FLORIDA PANTHER (*Felis concolor coryi*), is a species considered endangered by both the State of Florida and the FWS. In Florida, this species is generally found in large undeveloped lands in the central parts of the state southward. It feeds primarily on large mammals, such as deer, rabbits, raccoons, etc. It may be diurnally active. The Florida panther has a large home range and may travel extensively up to 25 miles in a given night (Whitaker, 1980). Unofficial observations of the species were historically reported at the Hines Energy Complex in the area between N-15 and SA-8. No tracks of the species could be found in either instance. Several subsequent trips to the Hines Energy Complex, to locate tracks and scat of this species, did not result in any panther evidence. The FNAI files show no records of the panther in the region.

SHERMAN'S FOX SQUIRREL (*Sciurus niger shermani*), a Florida species of special concern, prefers the longleaf pine-turkey oak vegetation association of the sandhills. However, smaller numbers are known to occupy certain ecotonol situations. Among these transition areas are areas where range includes much of peninsular Florida east of the Suwannee River and north of Lake Okeechobee. Pine seeds and acorns along with a few insects are the primary food items (Layne, 1978). Suitable habitat does not exist on the Hines Energy Complex. However, it could possibly exist in the Buffer/Mitigation Area as mature forestlands develop.

<u>Indicator and Endemic Vertebrate Species</u>. No animal species endemic to Florida are likely to require habitats associated with the electrical generation facilities on the Hines Energy Complex. With ecological succession in the Buffer/Mitigation Area, indicator species are likely to be in the reclaimed native

vegetation communities. The following indicator species characteristic of a given habitat type may use this are in the future:

- Eastern Meadowlark - Pasture and Rangeland
- Marsh Rice Rat – Herbaceous/Shrub Wetlands
- Bullfrog - Open Water, Herbaceous Wetlands
- Pig Frog - Open Water, Herbaceous Wetlands
- Southern Leopard Frog - Open Water, Herbaceous Wetlands
- Southern Cricket Frog - Ponds, Herbaceous Wetlands
- American Alligator - Ponds, Herbaceous Wetlands, and Forested Wetlands

Vertebrate Species Important to Local Ecological Systems. The importance of vertebrate species to ecological systems on the Hines Energy Complex will be based upon roles species play in the local food chains and their ability to impact this energy flow by virtue of their numbers present.

Seasonal shifts in faunal ecosystem roles can complicate site food chain characteristics. For example, breeding, migratory and wintering birds differ seasonally in their food requirements and use of site habitats. Additionally, during the dry season, when many site wetland areas dry out for several months, these areas take on terrestrial characteristics. Consequently, habitat availability for species changes during the course of a year.

Reptilian species that may be most prominent at the Hines Energy Complex could include the following: black racer, skinks (Genus *Eumeces*), common garter snake and eastern diamondback rattlesnake in upland areas. In site wetlands, the American alligator, cooters, and water snakes (*Nerodia* spp.) are expected to be most abundant.

The following discussion of avian species important to local ecological systems focuses on winter and breeding season populations. During these periods of time, species populations are, at least in part, directly dependent on site habitats for food, cover and other life history requirements. During migratory seasons avian populations have less of a dependence upon site resources. The ecological effects of all species of migratory birds likely influence populations of most site biota.

Birds significant to local ecological systems are generally those with larger population densities or those considered being upper and top carnivore species. Upper and top carnivore species include raptors, shrikes, and large wading birds. For most of the smaller migratory bird species, dietary shifts occur in preparation for migration and winter occupation (when high energy content foods such as grains are required) and for nesting (when higher protein content foods are required for egg production and nestling growth). During the breeding season, therefore, many of these migratory species, position in the food chain will rise with more carnivorous diets and in the other seasons fall at times when more herbivorous or graniverous diets are required.

Large wading bird use of the Hines Energy Complex with baseline reclamation conditions would be restricted generally to shallow ditches and open isolated wetlands with standing water. Red-tailed and red-shouldered hawks would be observed throughout the open and forested portions of the Hines Energy Complex respectively. Red-shouldered hawks would be observed more often in and near forested habitats. Red-tailed hawks would be more often observed foraging in open pine flatwoods and pastureland and rangelands. The northern harrier would occur, foraging over open low vegetation in large dry wet prairies, rangelands and pasturelands, as they are present. Loggerhead shrikes would most frequently be observed in pastures and pine flatwoods. In the larger open water habitats in the Buffer/Mitigation Area, waterfowl including ducks, coots, common moorhens, double-crested cormorants, white and brown pelicans and anhingas would dominate the food chain systems at the upper trophic levels.

Confirmed indications of top or upper carnivore species presence at the Hines Energy Complex have been that of the bobcat and fox. These species are likely to be present at the Hines Energy Complex with future ecological succession in the Buffer/Mitigation Area. The occurrence and food chain status of mammals at the site are presented in the 1992 SCA.

In wetlands, streams, and open water habitats, river otters would likely be the most prominent mammals. Elsewhere, where there is adequate cover, an assortment of medium-sized mammals occurs at the Hines Energy Complex and is likely to occur in the Buffer/Mitigation Area with ecological succession. These include raccoons, opossum, armadillos, and bobcats. The white-tailed deer should also be present. In addition to the bobcat as a top carnivore, the gray and red fox could be present in adequate numbers to significantly influence the food chain. Other species that could be present include the eastern cottontail and marsh rabbits, and striped skunks. Small mammals that could be present include several rodents and shrews.

2.3.6.2 Pre-existing Stresses

Pre-existing stresses for this discussion consist of environmental disturbances that would occur under full build out conditions as approved in the 1994 Certification. Generally, stresses that would be expected at the Hines Energy Complex result from the effects of human activity associated with certified electrical generation.

Effects of human activity will result from certified electrical generation and will be generally restricted to site areas outside of the Buffer/Mitigation Area. These activities will include noise generated from the facility and the movement of vehicles and machinery used in the operation of the facility. The primary area on the Hines Energy Complex where human activity will occur is in the Plant Island.

2.3.6.3 Measurement Program

Methods associated with the 1992 SCA aquatic ecology studies and terrestrial and wetlands ecological studies are described in Section 2.3.6.3 of the 1992 SCA. Two types of data are addressed in these studies: a general characterization of existing conditions and a more detailed evaluation of site conditions proposed with conclusion of mining operations and implementation of existing approved (pre-1992) reclamation plans. Because the Buffer/Mitigation Area reclamation process is on schedule and land to be used for development of Power Block 3 has already been cleared, no special ecological surveys were needed for this SSCA.

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Table 2.3.6-1

PROTECTED PLANT SPECIES POTENTIALLY OCCURRING IN THE HINES ENERGY COMPLEX

Scientific Name	Common Name	Designated Status FDAC	USFWS	Habitat	Hines Energy Complex
Adiantum tenerum	Brittle maidenhair fern	E		Sinkholes, grottos, limestone ledges	Habitat not present
Andropogon arctatus	Pinewood bluestem	T		Flatwoods	Habitat not present
Aristida simpliciflora	Southern three-awn	E		Moist pine woods and fields	Habitat marginal, species not found
Asclepias curtissii *	Curtiss milkweed	E		Dry hammocks, scrub, flatwoods	Habitat not present
Asplenium auritum	Auricled spleenwort	E		Trunks of large trees in hammocks and strand swamps	Habitat marginal, species not found
Asplenium verecundum	Delicate spleenwort	E		Limestone in grottos and boulders in shaded woods	Habitat not present
Blechnum occidentale	Sinkhole fern	E		Sinkholes in forests	Habitat not present
Bonamia grandiflora *	Florida bonamia	E	T	Sandy soil and scrub	Habitat not present
*Calamintha ashei**	Ashe's calaminth	T		Dry pinelands and sand pine scrub	
Calopogon mutliflorus	Many-flowered grass pink	E	T	Pine flatwoods	Habitat not present
Carex chapmanii	Chapman's sedge	E		Hammocks and woodlands	Habitat marginal, species not found
*Centrosema arenicola**	Sand butterfly pea	E		Mixed woodlands, pine or oak palmetto thickets	Habitat marginal, species not found
Chionanthus pygmaeus *	Pigmy fringetree	E	E	Scrub	Habitat not present
Chrysopsis floridana	Florida golden aster	E	E	Sand pine scrub on bare sand	Habitat not present
Cladonia perforata	Florida perforate	E		Rosemary sandhills	Habitat not present
*Clitoria fragrans**	Pigeon wings	E	T	Sandhills, scrub, scrubby flatwoods, roadsides	Habitat marginal, species not found
Coelorachis tuberculosa	Florida jointtail	T		Marshes and margins of ponds	Habitat present, species not found
*Conradina brevifolia**	Short-leaved rosemary	E	E	Sand pine scrub of the Lake Wales Ridge	Habitat not present
*Crotalaria avonensis**	Avon Park harebells	E	E	Bare white sand of the Lake Wales Ridge	Habitat not present
Ctenitis sloanei syn. Dryopteris ampla	Red-hair comb fern	E		Limestone ledges and rockland hammocks, cypress swamps	Habitat not present
Ctenitis submarginalis syn. Thelypteris submarginalis	Brown-hair comb fern	E		Cypress swamps, rockland hammocks, spoil banks	Habitat marginal, species not found
Dicerandra christmanii	Christmas mint	E	E	Yellow sand and oak scrub	Habitat not present
*Dicerandra frutescens**	Scrub mint	E	E	Yellow sand in sand pine scrub	Habitat not present
*Drosera intermedia**	Water sundew	T		Wet flatwoods and depression marshes	Habitat marginal, species not found
Eltroplectris calcarata syn. Centrogenium setaceum	Spurred neottia	E		Dense hammocks	Habitat not present
Epidendrum difforme syn. Neolehmannia difformis	Umbelled epidendrum	E		Hammocks	Habitat not present
Eriogonum floridanum	Scrub buckwheat	E		Sandhills, scrub, long leaf pine, Lake Wales Ridge	Habitat not present
*Eryngium cuneifolium**	Scrub celery	E	E	Sand pine scrub	Habitat not present
Eulophia ecristata syn. Pteroglossaspis ecristata*	Non-crested eulophia	T		Sand pine scrub, sandhills	Habitat not present
Garberia heterophylla	Garberia	T		Scrub and prairies	Habitat marginal, species not found
Gossypium hirsutum	Wild cotton	E		Coastal hammocks, shell mounds,	Habitat not present

Table 2.3.6-1

PROTECTED PLANT SPECIES POTENTIALLY OCCURRING IN THE HINES ENERGY COMPLEX

Scientific Name	Common Name	Designated Status FDAC	Designated Status USFWS	Habitat	Hines Energy Complex
Habenaria distans	Distans habenaria	E		Hydric hammocks, strand swamps	Habitat marginal, species not found
Harrisella filiformis	Threadroot orchid	T		Orange groves, strand swamp, hardwood swamps, hammocks	Habitat present, species not found
*Hartwrightia floridana**	Hartwrightia	T		Wet flatwoods, bogs, pine woods	Habitat not present
*Hypericum cumulicola**	Highland's scrub	E	E	Sand pine scrub	Habitat not present
*Hypericum edisonianum**	Edison ascyrum	E		Marsh, wet prairie, wet flatwoods	Habitat present, species not found
Hexalectris spicata	Crested coralroot (orchid)	E		Hammock	Habitat marginal, species not found
*Illicium parviflorum**	Star anise	E		Bottomland forest, wet hammocks	Habitat not present
Justicia cooleyi	Cooley's water willow	E	E	Moist hammock, rocky woods	Habitat marginal, species not found
Lantana depressa	Pineland lantana	E		Pine rockland, coastal strand, marl prairies	Habitat not present
*Lechea cernua **	Nodding pinweed	T		Scrub	Habitat not present
*L. divaricata**	Pine pinweed	E		Pinelands	Habitat marginal, species not found
*Liatris ohlingerae **	Scrub blazing star	E	E	Sand pine scrub, Lake Wales Ridge	Habitat not present
Lilium catesbaei	Catesby lily	T		Wet flatwoods	Habitat not present
Liparis nervosa	Tall twayblade orchid	E		Cypress swamps, hammocks	Habitat not present
Listera australis	Southern twayblade	T		Moist woods, stream banks	Habitat present, species not found
Litsea aestivalis	Pond-spice	E		Margins of ponds, bayheads, hammocks in cypress swamps	Habitat present, species not found
Lobelia cardinalis	Cardinal flower	T		Springs, coastal hammocks	Habitat not present
*Lupinus aridorum **	Scrub lupine	E	E	Sand pine scrub	Habitat not present
Matelea floridana syn. Odontostephana floridana*	Florida spiny pod	E		Bluffs, pine-oak-hickory woods	Habitat not present
Matelea gonocarpus	Angle-pod	T		Floodplains	Habitat not present
Matelea pubiflora	Sandhill spiny pod	E		Sandhills, scrub	Habitat not present
Maytenus phyllanthoides	Mayten	T		Hammocks	Habitat not present
Monotropa hypopitys syn. Hypopitys monotropa	Pine-sap	E		Upland woods	Habitat marginal, species not found
Monotropa reynoldsiae	Pygmy-pipes	E		Grows on *Cornus florida* roots	Habitat not present
Najas filifolia	Slender naiad	T		Submerged in water	Habitat present, species not found
*Nemastylis floridana**	Celestial lily	E		Marshes, wet pine flatwoods	Habitat present, species not found
*Nolina brittoniana **	Scrub beargrass	E	E	Sand pine scrub, dry pine	Habitat not present
*Ophioglossum palmatum * syn. Cheiroglossa palmatum*	Hand fern	E		Epiphyte on Sabal palm in hydric hammocks and strand swamps	Habitat not present
*Panicum abscissum**	Cut throat grass	E		Wet pinelands	Habitat not present
*Paronychia chartacea **	Paper nailwort	E	T	Scrub	Habitat not present
Peperomia humilis	Peperomia	E		Maritime hammocks, upland hardwood, swamp	Habitat present, species not found
Pharus glaber	Creeping leafstalk grass	E		Dry woods and rocky hammocks	Habitat marginal, species not found
Pinguicula caerulea	Blue butterwort	T		Pine flatwoods, roadsides	Habitat marginal, species not found
Pinguicula lutea	Yellow butterwort	T		Pine flatwoods, roadsides	Habitat marginal, species not found
Platanthera integra syn. Habenaria integra*	Orange rein orchid	E		Boggy depressions in wet woods	Habitat not present
Platanthera blephariglottis, P. ciliaris, P. cristata, P. flava, P. nivea	Orchids	T		Marshes, meadows, pine savannahs, wet prairies	Habitat present, species not found

Table 2.3.6-1

PROTECTED PLANT SPECIES POTENTIALLY OCCURRING IN THE HINES ENERGY COMPLEX

Scientific Name	Common Name	Designated Status FDAC	Designated Status USFWS	Habitat	Hines Energy Complex
Pogonia ophioglossoides	Rose pogonia	T		Meadows, swamps, flatwoods	Habitat present, species not found
Polygala lewtonii *	Scrub milkwort	E		Dry oak, sand pine scrub	Habitat not present
*Polygonella. basiramia * syn. P. ciliata*	Wireweed	E	E	Sand pine and rosemary scrub	Habitat not present
*Polygonella myriophylla**	Sand lace	E	E	Scrub	Habitat not present
Polypodium dispersum, P. plumula, P. ptilodon	Polypodies	E		Hammocks	Habitat not present
Polystachya concreta syn. P. flavescens	Pale-flowered polystachya	E		Strand swamps	Habitat marginal, species not found
Prunus geniculata *	Scrub plum	E	E	Sand pine scrub	Habitat not present
Sarracenia minor	Hooded pitcher plant	T		Flatwoods, bogs, ditches	Habitat marginal, species not found
*Salix floridana**	Florida willow	E		Wet hammocks, dense bottomland forest, swamps	Habitat present, species not found
*Schizachyrium niveum**	Scrub bluestem	E		Rosemary scrub	Habitat not present
Schwalbaca americana	Chaffseed	E	E	Pinelands, savannahs	Habitat marginal, species not found
Spigelia loganioides syn. Coelostylis loganioides	Levy pinkroot	E		Swamps, wet woods	Habitat present, species not found
Spiranthes brevilabris syn. S. gracilis	Small ladies' tresses	E		Pine flatwoods	Habitat not present
Spiranthes laciniata, S. longilabris, S. tuberosa	Ladies' tresses	T		Swamp, marshes, flatwoods	Habitat present, species not found
Spiranthes ovalis syn. Ibidium ovale	Lesser ladies' tresses	E		Moist shady wood thickets, swamp margins	Habitat present, species not found
Stenorrhynchos lanceolatus	Leafless beaked orchid	T		Pastures, pine flatwoods	Habitat not present
*Stylisma abdita**	Hidden stylisma	E		Dry pinelands, scrub	Habitat not present
Thelypteris serrata	Dentate lattice fern	E		Pond apple and popash hammocks, guava groves, cypress swamps	Habitat not present
Tillandsia balbisiana, T. flexuosa	Wild pine (airplants)	T		Hammocks, cypress swamps, scrub	Habitat not present
Tillandsia utriculata	Giant wild pine	E		Hammocks, cypress swamps, pinelands	Habitat not present
Triphora craigheadii, T. latifolia	Orchids	E		Hammocks	Habitat not present
Triphora trianthophora	Three-birds orchid	T		Hammocks	Habitat not present
Verbena tampensis	Tampa vervain	E		Flatwoods, hammocks	Habitat not present
Vicia ocalensis	Ocala vetch	E		Banks of thickets and marshes	Habitat present, species not found
Warea amplexifolia *	Clasping warea	E	E	Dry pine, sandhills	Habitat not present
Warea carteri *	Carter's mustard	E	E	Scrub, sandhills, pinelands	Habitat not present
Zephynanthes atamasco, Z. simpsonii, Z. treatiae*	Zephyr lilies	T		Moist woods, pastures, meadows	Habitat marginal, species not found
*Ziziphus celata**	Scrub ziziphus	E	E	Sand pine scrub, long leaf pine	Habitat not present

FDAC = Florida Department of Agriculture and Consumer Services
USFWS = U.S. Fish and Wildlife Service
E = Endangered
T = Threatened
* = Recorded as present in Polk County by Florida Natural Areas Inventory. December 1997.

Table 2.3.6-2

PROTECTED ANIMAL SPECIES POTENTIALLY OCCURRING IN THE HINES ENERGY COMPLEX

Common Name	Scientific Name	Designated Status FDAC	USFWS	Habitat	Hines Energy Complex
GOPHER FROG	*Rana capito*	SSC		Dry areas near grassy ponds	Habitat present, species not found
GOPHER TORTOISE	*Gopherus polyphemus*	SSC		Dry well-drained soils suitable for burrow construction	Habitat present, species not found
AMERICAN ALLIGATOR	*Alligator mississippiensis*	SSC	T(S/A)	Aquatic and wetland habitats	Habitat present in Complex including mitigation area
SHORT-TAILED SNAKE	*Stilosoma extenuatum*	T		Xeric hammocks	Habitat marginal, species not found
EASTERN INDIGO SNAKE	*Drymarchon corais couperi*	T	T	Dry to wetland conditions	Habitat present, species not found
SAND SKINK	*Neoseps reynoldsi*	T	T		
BLUE-TAILED MOLE SKINK	*Eumeces egregius lividus*	T	T	Sand pine scrub	Habitat marginal, species not found
WOOD STORK	*Mycteria americana*	E	E	Fresh-water wetlands	Habitat present onsite including mitigation area; species present in Complex
FLORIDA GRASSHOPPER SPARROW	*Ammodramus savannarum*	E	E	Palmetto prairie	Habitat not present
SOUTHERN BALD EAGLE	*Haliaeetus leucocephalus*	T		Open water bodies and wetlands	Habitat present onsite including mitigation area; species present in Complex
SOUTHEASTERN AMERICAN KESTREL	*Falco sparverius paulus*	T		Open upland habitats with perches	Habitat marginal, species not found
PEREGRINE FALCON	*Falco peregrinus*	T		Open water bodies and wetlands	Habitat present, species not found
OSPREY	*Pandion haliaetus*	SSC		Open water bodies and wetlands	Habitat present onsite including mitigation area; species present in Complex
FLORIDA SANDHILL CRANE	*Grus canadensis pratensis*	T		Wetlands, open habitats	Habitat present, species not found.
LIMPKIN	*Aramus guarauna*	SSC		Wetlands and riverine systems	Habitat present, species not found
WHITE IBIS	*Eudocimus albus*	SSC		Wetlands, open moist habitats	Habitat present onsite including mitigation area; species present in Complex
LITTLE BLUE HERON	*Egretta caerulea*	SSC		Wetlands	Habitat present onsite including mitigation area; species present in Complex
SNOWY EGRET	*Egretta thula*	SSC		Wetlands	Habitat present onsite including mitigation area; species present in Complex
TRICOLORED HERON	*Egretta tricolor*	SSC		Wetlands	Habitat present onsite including mitigation area; species present in Complex
LEAST TERN	*Sterna albifrons*	SSC		Open calm waters, protected sandy areas with little vegetation	Nesting habitat not present, species not observed
SNAIL KITE	*Rhynchops niger*	E	E	Open wetlands with apple snail	Habitat not present

Table 2.3.6-2

PROTECTED ANIMAL SPECIES POTENTIALLY OCCURRING IN THE HINES ENERGY COMPLEX

Common Name	Scientific Name	Designated Status FDAC	USFWS	Habitat	Hines Energy Complex
				population present	
RED-COCKADED WOODPECKER	*Picoides borealis*	T	E	Mature pine forests	Habitat not present
SHERMAN'S FOX SQUIRREL	*Sciurus niger shermani*	SSC		Well-drained mixed forests	Habitat not present
FLORIDA BLACK BEAR	*Ursus americanus floridanus*	T		Uplands and wetlands with ample cover	Habitat not present
FLORIDA MOUSE	*Podomys floridanus*	SSC		Flatwoods and forests	Habitat marginal, species not found
FLORIDA PANTHER	*Felis concolor coryi*	E	E	Large undeveloped lands	Habitat present onsite including mitigation area; species possibly present in Complex in early 1990's

FFWCC = Florida Fish and Wildlife Conservation Commission
USFWS = U.S. Fish and Wildlife Service
E = Endangered
T = Threatened
T = Threatened due to similarity in appearance to crocodile
SSC = Species of Special Concern
Sources: 1992 SCA; Florida Fish and Wildlife Conservation Commission, 1997; Florida Natural Areas Inventory, 1997

2.3.7 Meteorological and Ambient Air Quality

2.3.7.1 Meteorology

Meteorological data collected at existing monitoring stations were used to describe the local and regional climatology in the vicinity of the Hines Energy Complex (Hines). The closest existing meteorological station to the facility with complete data is the National Weather Service (NWS) station located at the Tampa International Airport, situated approximately 68 kilometers (km) (42 miles) northwest of the Hines Energy Center. The NWS has recorded weather observations for more than 50 years at this site. These data are the most complete for, and representative of, the region surrounding the Project. FDEP has approved the use of these meteorological data in previous air permit applications for this area and recommended that these data be used for this Project.

The climate in the Hines area is subtropical with a marine influence from the Gulf of Mexico. The monthly and annual average temperatures for this area are presented in Table 2.3.7-1. The annual average temperature is approximately 72°F with monthly average temperatures varying from a maximum of 90°F to a minimum of 50°F. Record extreme temperatures range from a low of 18°F to a record high of 99°F. During the summertime, temperatures rarely exceed 99°F due to the high relative humidities with subsequent cloud cover formation and the abundant convective-type (e.g., thunderstorms) precipitation.

The monthly and annual average precipitation data are presented in Table 2.3.7-2. Approximately 70 percent of the annual precipitation falls during the six warmest months, May through October. The average annual precipitation is approximately 44 inches, but this has varied from as little as 30 inches to 68 inches in the past 30 years. The majority of rain is in the form of short-lived convection showers (e.g., thunderstorms). Large amounts of rain are also produced during the late summer or fall when tropical storms or hurricanes may pass near the Tampa region. These events may result in heavy downpours that reach torrential proportions; 24-hour amounts of about 12 inches have been associated with hurricanes.

Monthly and annual average relative humidities, which indicate the amount of moisture in the air at a given temperature, are also presented in Table 2.3.7-2 for the morning hours of 1:00 A.M. and 7:00 A.M. and early afternoon and evening hours of 1:00 P.M. and 7:00 P.M. The highest humidities are coincident with the coolest ambient temperatures, which generally occur at 7:00 A.M., or near dawn. The lowest humidities coincide with the highest ambient temperatures.

The project area lies entirely within the trade wind belt (i.e., below 30°N latitude), resulting in predominant winds from the east. Because of the location of the Gulf of Mexico, moderate to strong late afternoon sea breezes occur on days with strong land heating and produce localized onshore winds to reinforce the westerly winds. A wind rose for the 5-year period from 1991 through 1995 is given in Figure 2.3.7-1. A summary of the seasonal and annual average wind direction and wind speed, including calm conditions, is presented in Table 2.3.7-3. The data for this period were also used in the air quality impact analyses for the project.

Except during the passage of tropical storms or hurricanes, wind speeds greater than 25 mph in the area are not common.

Atmospheric stability is a measure of the atmosphere's capability to disperse pollutants and potentially reduce ground-level concentrations. During the daytime with strong solar heating, the atmosphere can disperse pollutants very quickly for a relatively short period. This condition is considered unstable and generally occurs more frequently during the summer. During the nighttime under clear skies and light wind speeds, the atmosphere is considered stable with minimal potential to disperse pollutants. During the day or night when wind speeds are moderate to high, pollutants are dispersed at moderate rates (i.e., dispersion rates that are lesser than those during unstable conditions but greater than those during stable conditions). This condition is considered neutral and occurs frequently throughout the year. The seasonal and annual average occurrences of atmospheric stability classes for this area for 1991 to 1995 are shown in Table 2.3.7-4.

During the summer months, unstable conditions occur about 35 percent of the time due to strong solar heating, whereas unstable conditions occurs only 16 percent of the time in the winter months. Neutral stability occurs most frequently during the winter months due to the higher wind speeds that occur in this season. The occurrence of stable conditions is nearly uniform throughout the year.

The mixing height is a parameter used to define the vertical height to which pollutants can disperse and, therefore, is used in estimating the volume of air in which pollutants are emitted and can be dispersed. In general, the higher the mixing height, the greater the potential for pollutants to be dispersed and for ground-level concentrations to be reduced.

The seasonal and annual average morning and afternoon mixing heights for the Hines area for 1991 to 1995 determined using the Holzworth method are listed in Table 2.3.7-5. The highest afternoon mixing heights occur in the spring and the lowest morning mixing heights occur in winter.

Thunderstorms are the most frequent of severe storms, occurring an average of 83 days per year as reported by the NWS at Tampa International Airport. These storms occur throughout the year, but about 73 percent occur from May through October.

Hurricanes and tornadoes are other types of severe weather that can occur in the project area, but the probability of a hurricane or tornado passing over the Hines Energy Complex is low.

In the 80-km (50-mile) coastal strip from Pinellas County to Tampa Bay, there is about a 10 percent chance that a tropical storm will pass over the Bay area during any given year (Gale Research Co., 1980). For storms of hurricane strength [i.e., wind speeds exceeding 73 miles per hour (mph)], the chance decreases to about 6 percent with a 1-percent chance that the winds will be greater than 124 mph (i.e., wind speeds of a great hurricane).

Statistics compiled by the severe local storms branch of the national severe storms forecast center (Pautz, 1969) show that 42 tornadoes were spotted within the 1 degree latitude by 1 degree longitude square centered just south of the Tampa area from 1955 to 1967. This averages about two tornadoes per year. The tornado recurrence interval for any specific point location within the 1 degree square was estimated by the Methodology of Thom (1963). The recurrence interval, r, is equal to 1/p where p is the probability of a tornado striking within the 1 degree square area and is estimated as follows:

$$p = (2.8209 \times t)/A$$

where: t = mean annual frequency of tornadoes occurring
A = of the 1 square (mi^2)

In this analysis, t was assumed to be 1.4 based on data collected from 1953 to 1962 and A was estimated to be 4,200 mi^2. Therefore, the mean recurrence interval for a tornado striking a point within this square is about 1,000 years.

2.3.7.2 Ambient Air Quality

AMBIENT STANDARDS

The National and Florida Ambient Air Quality Standards (AAQS) are presented in Table 2.3.7-6. Primary National AAQS were promulgated to protect the public health, and secondary National AAQS were promulgated to protect the public welfare from any known or anticipated adverse effects associated with the presence of pollutants in the ambient air. Areas of the country in violation of AAQS are designated as nonattainment areas, and new sources to be located in or near these areas may be subject to more stringent air permitting requirements. Pollutants for which AAQS have been established are referred to as criteria pollutants. These pollutants include particulate matter (PM) with an aerodynamic particle size of 10 micrometers (μm) or less (PM_{10}), sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), and lead (Pb).

Polk County is classified as an attainment area for all criteria pollutants (Rule 62-204.340, F.A.C.).

In promulgating the 1977 Clean Air Act (CAA) Amendments, Congress specified that certain increases above an air quality *baseline concentration* level of SO_2 and PM concentrations would constitute *significant deterioration* for sources located in attainment areas. The magnitudes of the allowable increases, or prevention of significant deterioration (PSD) increments, depend on the classification of the area in which a new source (or modification) will be located or have an impact. Three PSD increment classifications were designated based on criteria established in the 1977 CAA amendments. Initially, Congress promulgated areas as either Class I (national parks, national wilderness areas, and memorial parks larger than 5,000 acres, and national parks larger than 6,000 acres) or as Class II (all areas not designated as Class I). No Class III areas, which would be allowed greater deterioration than Class II areas, were designated. EPA then promulgated as regulations the requirements for classifications and area designations.

On October 17, 1988, EPA promulgated regulations to prevent significant deterioration due to nitrogen oxide (NO_x) emissions and established PSD increments for NO_2 concentrations. The EPA class designations and allowable PSD increments are presented in Table 2.3.7-6. Florida has adopted the EPA allowable increments for PM_{10}, SO_2, and NO_2.

Polk County is classified as a Class II area (Rule 62-204.340, F.A.C.) since it is an attainment area for all pollutants. The nearest Class I area to the Hines Energy Complex is the Chassahowitzka National Wilderness Area located about 118 km (73 miles) to the north-northwest.

AMBIENT AIR QUALITY DATA

The Hines Energy Center is located in a rural area of Polk County, which has a minimal number of air pollution sources. Air monitoring data are collected in the county for SO_2, PM_{10}, O_3, and NO_2.

A summary of the maximum pollutant concentrations measured in Polk County from 1998 through 2001 is presented in Table 2.3.7-7. These data indicate that the maximum air quality concentrations measured in the region are well below applicable standards.

Given the lack of industrial development in the vicinity of the plant, existing concentrations of other criteria pollutants, i.e., CO and Pb, which are usually associated with an urban environment, are expected to be well below the AAQS.

2.3.7.3 Measurement Programs

All information (i.e., meteorology and air quality data) was compiled from offsite monitoring stations maintained and operated by FDEP, Polk County, or cooperating governmental agencies (i.e., NWS). No significant changes in these programs are anticipated after the construction and operation of the Project.

Meteorological data were obtained from the NWS surface and upper-air station at the Tampa International Airport. These data were obtained for a 5-year period from 1991 through 1995 from which the joint frequency of wind direction, wind speed, and atmospheric stability and a 5-year average of mixing heights were developed. The wind sensors at the Tampa International Airport have been located 22 ft above grade. Regular surface observations are taken just before each hour, 7 days per week. Upper-air soundings are conducted twice per day at 0700 and 1900 Eastern Standard Time.

A PSD preconstruction ambient air monitoring analysis was developed as part of the licensing planning to satisfy PSD requirements. For all pollutants, an exemption from monitoring is provided by FDEP rules since the impacts of these pollutants are less than *de minimis* impact levels [Rule 62-212.400(3)(e), F.A.C.].

Table 2.3.7-1
Monthly and Annual Average Temperatures Measured at Tampa International Airport

	Daily Temperatures (°F)[a]			Extremes (°F)[b]	
Month	Average	Maximum	Minimum	Maximu m	Minimum
January	59.9	69.8	50.0	86	21
February	61.5	71.4	51.6	88	24
March	66.4	76.6	56.5	91	29
April	71.2	81.7	60.8	93	40
May	77.2	87.2	67.5	98	49
June	81.0	89.5	72.9	99	53
July	82.1	90.2	74.5	97	63
August	82.1	90.2	74.5	98	67
September	81.0	89.0	72.8	96	57
October	74.9	84.3	65.2	94	40
November	67.6	77.7	57.2	90	23
December	62.2	72.1	52.3	86	18
Annual	72.3	81.6	63.0	99	18

[a] 30-year period of record, climatological normal, 1961 to 1990.
[b] 54-year period of record, 1947 to 2000.

Source: National Oceanic and Atmospheric Administration (NOAA), 2000.

Table 2.3.7-2
Monthly and Annual Average Precipitation and Relative Humidity Measured at Tampa International Airport

Month	Precipitation (inches)			Humidity (%) hour (LT) [a]			
	Average[a]	Maximum[b]	Minimum[b]	1 a.m.	7 a.m.	1 p.m.	7 p.m.
January	1.99	8.02	< 0.01	84	86	58	73
February	3.08	10.82	0.21	83	86	56	69
March	3.01	12.64	0.06	82	87	54	67
April	1.15	10.71	<0.01	82	86	50	62
May	3.10	17.64	0.02	82	86	52	62
June	5.48	13.75	1.46	84	87	60	69
July	6.58	20.59	1.65	85	88	63	73
August	7.61	18.59	2.35	87	90	64	75
September	5.98	13.98	1.28	86	91	62	75
October	2.02	7.36	0.06	85	89	56	71
November	1.77	6.12	<0.01	86	88	57	74
December	2.15	15.57	0.07	84	87	58	74
Annual	43.92	20.59	<0.01	84	88	58	70

[a] 30-year period of record, climatological normal, 1961 to 1990.
[b] 54-year period of record, 1947 to 2000.

Note: LT = local time.

Source: NOAA, 2000.

Table 2.3.7-3
Seasonal and Annual Average Wind Direction and Wind Speed Measured at Tampa International Airport

Season	Average Wind Speed (mph)	Calm (Percent)	Prevailing Wind Direction	Prevailing Wind Average Wind Speed (mph)
Winter	7.8	6.4	Northeast	7.8
Spring	8.3	6.1	East-northeast	7.5
Summer	6.1	14.2	Southeast	6.8
Fall	6.8	10.6	Northeast	7.6
Annual	7.2	9.3	East-northeast	6.9

[a]5-year period of record, 1991 to 1995. The data for this period were also used in the air quality impact analyses for the project.
Source: NOAA, 1995.

Table 2.3.7-4
Seasonal and Annual Average Atmospheric Stability Classes Determined at Tampa Int'l Airport

Occurrence (Percent) of Stability Class

Moderately Season	Very Unstable	Moderately Unstable	Unstable	Slightly Neutral	Stable	Slightly Stable
Winter	0.0	3.5	12.2	41.7	18.4	24.2
Spring	0.5	8.6	17.1	33.1	18.0	22.8
Summer	2.6	13.4	19.0	20.8	14.7	29.6
Fall	0.6	7.5	15.4	30.3	17.5	28.8
Annual	0.9	8.3	15.9	31.4	17.1	26.3

[a] 5-year period of record, 1991 to 1995. The data for this period were also used in the air quality impact analyses for the project.

Source: NOAA, 1995.

Table 2.3.7-5
Seasonal and Annual Average Morning and Afternoon Mixing Heights Determined at Tampa International Airport [a]

	Mixing Height (m)	
Season	Morning	Afternoon
Winter	475	1,032
Spring	691	1,531
Summer	657	1,398
Fall	481	1,132
Annual	577	1,275

[a]5-year period of record, 1991 to 1995. The data for this period were also used in the air quality impact analyses for the project. Mixing heights based on surface temperatures and upper-air data from the NWS stations at Tampa International Airport and Ruskin, respectively.

Source: NOAA, 1995.

Table 2.3.7.6
National and State AAQS, Allowable PSD Increments, and Significant Impact Levels

Pollutant	Averaging Time	National AAQS ($\mu g/m^3$) Primary Standard	National AAQS ($\mu g/m^3$) Secondary Standard	Florida AAQS [a] ($\mu g/m^3$)	PSD Increments ($\mu g/m^3$) [a] Class I	PSD Increments ($\mu g/m^3$) [a] Class II	Significant Impact Levels[b] ($\mu g/m^3$)
Particulate Matter [c] (PM_{10})	Annual Arithmetic Mean	50	50	50	4	17	1
	24-Hour Maximum	150	150	150	8	30	5
Sulfur Dioxide	Annual Arithmetic Mean	80	NA	60	2	20	1
	24-Hour Maximum	365	NA	260	5	91	5
	3-Hour Maximum	NA	1,300	1,300	25	512	25
Carbon Monoxide	8-Hour Maximum	10,000	10,000	10,000	NA	NA	500
	1-Hour Maximum	40,000	40,000	40,000	NA	NA	2,000
Nitrogen Dioxide	Annual Arithmetic Mean	100	100	100	2.5	25	1
Ozone [c]	1-Hour Maximum [d]	235	235	235	NA	NA	NA
Lead	Calendar Quarter Arithmetic Mean	1.5	1.5	15	NA	NA	NA

Note: Particulate matter (PM_{10}) = particulate matter with aerodynamic diameter less than or equal to 10 micrometers.
NA = Not applicable, i.e., no standard exists.
[a] Short-term maximum concentrations are not to be exceeded more than once per year, except for PM_{10} and O_3 AAQS which are based on expected exceedances.
[b] Maximum concentrations are not to be exceeded.
[c] On July 18, 1997, EPA promulgated revised AAQS for particulate matter and ozone. For particulate matter, $PM_{2.5}$ standards were introduced with a 24-hour average standard of 65 $\mu g/m^3$ (based on the 3-year averages of the 98th percentile values) and an annual standard of 15 $\mu g/m^3$ (3-year averages at community monitors). The form of the 24-hour PM_{10} standard was changed; compliance is based on 3-year average of 99th percentile concentrations that is 150$\mu g/m^3$ or less. The O_3 standard was modified to be 0.08 ppm for the 8-hour average; achieved when the 3-year average of 99th percentile values is 0.08 ppm or less. Florida DEP has not yet adopted the revised standards.

[d] 0.12 ppm; achieved when the expected number of days per year with concentrations above the standard is fewer than 1.

Sources: Federal Register, Vol. 43, No. 118, June 19, 1978, 40 Code of Federal Regulations (CFR) 50; 40 CFR 52.21, Florida Chapter 62.204, A.C.

Table 2.3.7-7. Summary of Maximum Measured SO_2, PM_{10}, O_3, and NO_2 Concentrations Representative of the Hines Energy Complex, 1998 to 2001

AIRS/ Saroad Site No.	Operator	Location	Measurement Period Year	Measurement Period Months	Concentration 1-Hour Highest	Concentration 1-Hour 2nd Highest	Concentration 3-Hour Highest	Concentration 3-Hour 2nd Highest	Concentration 8-Hour 3-year Average 4th Highest	Concentration 24-Hour Highest	Concentration 24-Hour 2nd Highest	Concentration Annual Average
Sulfur dioxide		**Florida AAQS**			**NA**	**NA**	**NA**	**0.5 ppm**	**NA**	**NA**	**0.1 ppm**	**0.02 ppm**
2860006F02	Polk County	Mulberry	1998	Jan-Dec	NA	NA	0.078	0.069	NA	0.029	0.027	0.006
			1999	Jan-Dec	NA	NA	0.070	0.052	NA	0.019	0.019	0.006
			2000	Jan-Dec	NA	NA	0.074	0.062	NA	0.022	0.018	0.005
			2001	Jan-Dec	NA	NA	0.059	0.048	NA	0.018	0.017	0.005
PM_{10} [a]		**Florida AAQS**			**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**150 µg/m³**	**50 µg/m³**
121052006-1	Polk County	Mulberry	1998	Jan-Dec	NA	NA	NA	NA	NA	108	91	22.2
			1999	Jan-Dec	NA	NA	NA	NA	NA	50	50	20.8
			2000	Jan-Dec	NA	NA	NA	NA	NA	46	45	25.4
			2001	Jan-Dec	NA	NA	NA	NA	NA	74	59	22.6
Ozone [a]		**Florida AAQS**			**NA**	**0.12 ppm**	**NA**	**NA**	**0.08 ppm**	**NA**	**NA**	**NA**
121056006-1	Polk County	Lakeland	1998	Jan-Dec	0.119	0.106	NA	NA	NA	NA	NA	NA
			1999	Jan-Dec	0.103	0.101	NA	NA	NA	NA	NA	NA
			2000	Jan-Dec	0.106	0.102	NA	NA	NA	NA	NA	NA
			2001	Jan-Dec	0.113	0.106	NA	NA	NA	NA	NA	NA
Nitrogen dioxide		**Florida AAQS**			**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**0.053 ppm**
120570081-1	Hillsborough	Tampa	1998	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	0.006
			1999	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	0.007
			2000	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	0.008
			2001	Jan-Dec	NA	NA	NA	NA	NA	NA	NA	0.007

Note: NA = not applicable.
AAQS = ambient air quality standard.

[a] On July 18, 1997, EPA promulgated revised AAQS for particulate matter and ozone. For particulate matter, $PM_{2.5}$ standards were introduced with a 24-hour average standard of 65 µg/m³ (based on the 3-year averages of the 98th percentile values) and an annual standard of 15 µg/m³ (3-year averages at community monitors).
The form of the 24-hour PM_{10} standard was changed; compliance is based on 3-year average of 99th percentile concentrations that is 150 µg/m³ or less. The O_3 standard was modified to be 0.08 ppm for the 8-hour average; achieved when the 3-year average of 99th percentile values is 0.08 ppm or less. The courts have stayed these standards. Florida DEP has not yet adopted the revised standards.

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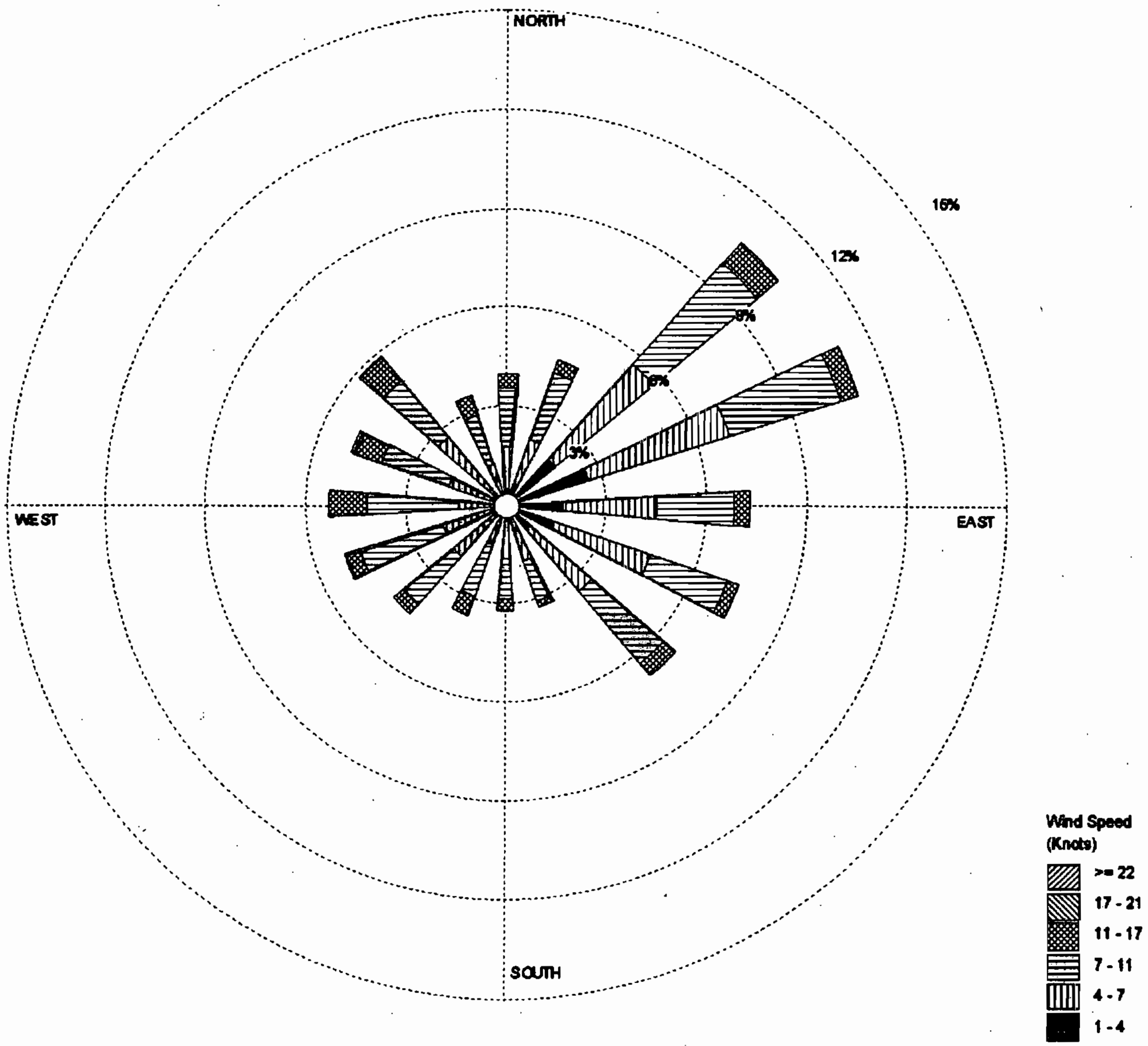

Florida Power
A Progress Energy Company

Hines Energy Complex

FIGURE 2.3.7-1
1991 - 1995 TAMPA WIND ROSE

2.3.8 Noise

2.3.8.1 Introduction

A comprehensive noise monitoring program was conducted in January 1992 and presented in the 1992 SCA. The monitoring program characterized the existing noise levels at the nearest noise-sensitive receptor locations, as well as the Plant Island. On May 8, 2000, an additional survey was conducted by Golder Associates, Inc. at the same sites that were used in the noise survey conducted in 1992. The purpose of the second survey was to determine the noise levels associated with Power Block 1 in operation. The Noise Survey performed in 2000 included the operation of Power Block 1 and representative of 2002, since Power Block 2 is under construction and not yet operational. The results of these surveys are summarized in this Section and are used to evaluate the noise impacts for construction and operation of Power Block 3.

2.3.8.2 Study Area Description

Noise levels were monitored in 1992 at five locations in the vicinity of the Hines Energy Complex (see Figure 2.3.8-1). Four of the monitoring locations (Locations 1-4) were near areas considered to be noise-sensitive receptors; the fifth (Location 5) was in the approximate location of the Plant Island.

The highly industrialized nature of this mining region has limited residential development, primarily to existing nearby communities of Homeland and Fort Meade. Thus, there are only a few isolated rural residences in the land areas surrounding the Hines Energy Complex. No residences exist within about 2.5 miles of the Plant Island where all of the plant generating equipment, which is the primary source of noise, will be located. Three or four isolated residences are located on the south side of CR 630 near the intersection of CR 555 about 2.9 miles south (Location 1), and one residence is located at the intersection of CR 640 and CR 555 about 3 miles to the north-northwest (Location 2). The communities of Homeland (Location 3) and Fort Meade (Location 4) are located about 3.5 miles northeast and 4.5 miles southeast from Plant Island, respectively.

Other potential noise-sensitive receptors in the area include one cemetery located on CR 555 south-southwest of the site (referred to as the Trinity Cemetery after the previous church at this location) (Location 7) and a church adjacent to Watson Cemetery at the intersection of CR 555 and CR 630 (Location 6). These receptors are about 1.5 miles and 2.5 miles from Plant Island, respectively.

Existing sources of noise in the area include heavy truck traffic on all the roads, mining activities and several large agri-chemical processing plants. The agri-chemical processing plants were only audible at Locations 1, 2 and 5 late at night during brief lulls in truck traffic. Truck traffic, even late at night, was a significant source of noise at monitoring locations.

2.3.8.3 Noise Standards or Guidelines

Noise resulting from power plant activities can impact the health and welfare of both workers and the general public. The level of impact is related to the magnitude of noise, which is referred to as sound pressure level (SPL) with units in decibels (dB). Decibels are calculated as a logarithmic function of SPL in air to a reference effective pressure, which is considered the hearing threshold, or:

$$SPL = 20 \log_{10} (Pe/Po)$$

where: Pe = measured effective pressure of sound wave in micropascals (μPa),
and
Po = reference effective pressure of 20 μPa.

To account for the effect of how the human ear perceives sound pressure, sound pressure level is adjusted for frequency. This is referred to as A-weighting (dBA), which adjusts measurements for the approximated response of the human ear to low-frequency SPLs [i.e., below 1,000 hertz (Hz)] and high-frequency SPLs (i.e., above 1,000 Hz).

There are no federal, state, or local noise standards applicable to the Hines Energy Complex site. The city of Fort Meade has a nuisance ordinance that prohibits unnecessary noise, but it is not applicable to the project site, which is about four miles outside Fort Meade. The EPA has developed guidelines for noise levels to protect the public health and welfare with an adequate margin of safety (EPA, 1974). These criteria relate to short-term and day-night average SPLs. The L_{eq} is the equivalent constant SPL that would be equal in sound energy to the varying SPL over the same time period. The L_{dn} is the 24-hour average SPL calculated for two daily time periods, i.e., day and night, but has 10 dBA added to nighttime SPL. The equation for L_{dn} is:

Where:

- $L_{dn} = 10 \log 1/24 (15x10^{(Ld/10)} + 9 x10^{(Ln+10/10)})$
- Ld = daytime l_{eq} for the period 0701 to 2200 hours
- Ln = nighttime L_{eq} for the period 2201 to 0700 hours.

For residential and farming areas, an outdoor L_{dn} of 55 dBA is recommended. For industrial areas, an L_{eq} of 70 is recommended.

2.3.8.4 Noise Monitoring Methodology

During the 1992 noise survey, both A-weighted and octave band sound levels were obtained at the five monitoring locations. The A-weighted scale was designed to account for the manner in which the human auditory system responds to sounds of different frequencies. Very low and very high frequency sounds are attenuated electronically by the meter to produce an instrument response proportional to the subjective response of an average person. Octave band sound level measurements are taken at different frequencies to show the tonal characteristics of the overall sound.

The A-weighted sound level was measured continuously and simultaneously at the five locations over a complete 24-hour period using five Larson-Davis Laboratories Model LDL 700 precision sound level analyzers (LDL 700) with integral data loggers. The microphones were equipped with 3.5-inch diameter foam windscreens to reduce wind effects and they were mounted at a height of 5 feet above the ground.

The analyzer was set to the A-weighted scale such that the level measured in each band already contained the A-weighting adjustment. Use of this technique generally ensures that the most audible frequencies will also be those with the highest peaks on the plotted graph. This is seldom the case with non-weighted octave band data where low frequency sounds are generally high in level but low in audibility.

During the May 2000 noise survey, both A-weighted and octave band sound pressure levels were collected at the four off-site locations (Sites 1-4) evaluated during 1992 using measurement techniques set forth by American National Standard Institute (ANSI) S12.9-1993/Part 3.

The noise monitoring equipment used during the 2000 noise study included:

1. Continuous Noise Monitoring Equipment
    a. Larson Davis Model 824 Precision Integrating Sound Level Meter with Real Time Frequency Analyzer
    b. Larson Davis Model PRM902 Microphone Preamplifier
    c. Larson Davis Model 2560 Prepolarized 1/2" Condenser Microphone
    d. Windscreen, tripod, and various cables

2. Sound Level Meter Calibration Unit
    a. Larson Davis Model CAL200 Sound Level Calibrator, 94/114 dB at 1,000 Hz.

The Larson Davis sound level meter complies with Type I--Precision requirements set forth by ANSI S1.4-1983 for sound level meters.

The equipment used to monitor the noise levels operated in the slow response mode to obtain accurate, integrated, A-weighted sound pressure levels. A windscreen was used because all measurements were taken outdoors. The microphone was positioned so that a random incidence response, as specified by the ANSI, was achieved. The sound level meter and octave band analyzer were calibrated immediately prior to and just after the sampling period to provide a quality control check of the sound level meter's operation during monitoring. Integrated sound pressure level (SPL) data consisting of the following noise parameters were collected at each location:

L_{eq} The sound pressure level averaged over the measurement period; this parameter is the continuous steady sound pressure level that would have the same total acoustic energy as the real fluctuating noise over the same time period;

Max The maximum sound pressure level for the sampling period, and;
Min The minimum sound pressure level for the sampling period.

Monitoring was conducted using the sound level meter mounted on a tripod at a height of 1.2 m (4 ft) above grade. Local meteorological conditions (wind speed, wind direction and temperature) were measured during the monitoring periods. The operator recorded detailed field notes during monitoring and including major noise sources in the area. Daytime and nighttime SPLs were measured at each of the four sites, for a minimum of 30 consecutive minutes. During the May 2000 noise survey, Power Block 1 was in operation, which would provide information on the potential noise contribution at each monitoring location from the existing plant. Since Power Blocks 2 and 3 are principally identical to Power Block 1, their noise potential impacts can be assessed.

2.3.8.5 Data Analysis

During the 1992 noise survey, the LDL 700 continuous analyzers were programmed to start automatically at 1600 on January 20, 1992, and to stop 24 hours later at 1600 on January 21, 1992. The analyzers were further programmed to compute and store the equivalent sound level (L_{eq}) occurring during each minute and each hour of the 24-hour period. The equivalent sound level is the energy averaged sound level occurring during the specified averaging period. Other hourly parameters computed and stored were the statistical sound levels exceeding 10, 50 and 90 percent of each 1-hour sample period (L_{10}, L_{50} and L_{90}, respectively). The L_{10} represents the sound level where only 10 percent of the time the observed noise level is greater than or equal to that sound level. This sound level would closely correspond to the noise levels where truck traffic is occurring on nearby roads. The L_{90} represents the sound level where 90 percent of the time the observed noise level is greater than or equal to that sound level. This sound level would closely correspond to the noise levels in absence of truck traffic and would be the "background" or "baseline" noise level. Any noise impacts from a power plant would be most noticeable during "baseline" noise levels. The baseline noise level at each monitoring location was calculated using the L_{90} data provided in the 1992 SCA.

At the end of the sample period in 1992, the analyzers were connected to a computer to which the data were downloaded, stored and computations performed. The day/night sound levels (L_{dn}) and the 24-hour L_{eq} levels were computed from the hourly L_{eq} data. The L_{dn} computation, as noted in Section 2.3.8.3, requires the addition of a 10 dBA penalty to hourly L_{eq} levels occurring between the hours of 10 p.m. and 7 a.m. to account for the increased noise sensitivity during normal sleep hours. Adjusted nighttime levels were then energy averaged with unadjusted daytime hourly levels to compute resulting L_{dn} levels. The 24-hour L_{eq} level was computed by energy averaging actual hourly L_{eq} levels.

For the May 2000 noise survey, the L_{eq} (equivalent sound pressure level averaged for the sampling period) as well as the maximum and minimum SPLs during each monitoring episode were recorded. The minimum, maximum, and L_{eq} SPLs for each site were calculated using 15 hours to represent the daytime conditions and 9 hours to represent nighttime conditions. This provided calculated 24-hour L_{eq} levels. The L_{dn} was also calculated using the same daytime and nighttime hours, but adding 10 dBA to the nighttime readings. Since the monitoring conducted in May 2000 was for a shorter duration, the minimum SPLs represent baseline noise levels at the sites. The minimum SPLs do not include transient noise, such as traffic, but include continuous noise sources such as Power Block 1.

2.3.8.6 Survey Results

For the 1992 noise survey, the 24-hour L_{eq} and L_{dn} levels and the L_{90} levels for each of the five monitored locations were:

Monitoring Location	24 Hour L_{eq} (dBA)	24 Hour L_{dn} (dBA)	Baseline L_{eq} (dBA)	Baseline L_{dn} (dBA)
1	56.6	62.7	43.4	46.4
2	58.3	64.5	46.4	48.9
3	50.0	53.2	46.2	48.0
4	53.7	57.5	48.2	50.0
5	49.9	51.2	38.7	42.6

A comparison of the 24-hour L_{dn} levels with the EPA guideline level of 55 dBA indicates that Locations 1, 2 and 4 already exceed the recommended EPA criteria. In the three cases, the noise levels are due to heavy truck traffic. Location 2, about 150 feet from the intersection of CR 555 and CR 640, had the highest L_{dn} level at 64.5 dBA. The lowest measured levels were at Location 5, which was on-site and well away from any roads. When the effect of trucks are removed from the observed noise levels, as represented by the L_{90} or what has been referred to as "Baseline" in the above table, all noise levels are within the EPA criteria.

During the May 2000 noise survey, the minimum, maximum, and L_{eq} SPLs for each site observed were:

Monitoring Location	Time of Monitoring	Minimum (dBA)	Maximum (dBA)	L_{eq} (dBA)
1	Day	41.0	58.5	49.2
1	Night	40.3	48.5	43.2
2	Day	44.5	61.6	52.9
2	Night	45.6	63.9	55.2
3	Day	45.4	58.8	50.7
3	Night	44.2	56.5	48.0
4	Day	43.5	54.4	48.9
4	Night	54.8	62.2	57.9

The results at monitoring location 1 and 3 observed lower nighttime noise levels than daytime levels, which would be expected given the rural nature of the site. Noise levels at monitoring location 2 were similar during both the daytime and nighttime periods. This was due to the truck traffic near this monitoring location. This observation was similar to that observed during the 1992 noise survey. The nighttime noise levels observed at the monitoring location 4 were considerably higher than the daytime observations. This was primarily due to a nearby thunderstorm that traversed the area.

Based on the results of the May 2000 noise survey, the calculated 24-hour L_{eq} and L_{dn} levels and baseline levels for each of the four off-site monitoring locations are:

Monitoring Location	24 Hour L_{eq} (dBA)	24 Hour L_{dn} (dBA)	Baseline L_{eq} (dBA)	Baseline L_{dn} (dBA)
1	47.8	51.2	40.8	46.8
2	53.9	61.4	45.0	51.9
3	49.9	54.9	45.0	50.8
4	54.5	63.7	51.1	60.6

A comparison of the calculated 24-hour L_{dn} levels with the EPA guideline level of 55 dBA indicates that locations 2 and 4 exceed the recommended EPA criteria. For monitoring location 2, the calculated L_{dn} noise level was due to the localized traffic, which was observed during the 1992 noise survey. The calculated L_{dn} noise levels observed at monitoring location 4 during the 2000 noise survey were due to the localized thunderstorm. The calculated baseline L_{dn} at monitoring locations were either less than or about equal to the results observed in 1992. This strongly suggests that the operation of Power Block 1 does not have a significant noise level impact on the noise levels observed at the sites.

2.3.8.7 Summary

Noise levels at existing noise-sensitive receptors around the site are dominated by heavy trucks on the state and county roads. The truck traffic is associated with the industrial plants in the area that operates 24 hours a day. Thus, the truck traffic also exists throughout the day and night. The noise environment at all of the land uses normally considered to be noise-sensitive (residences and churches) that exist adjacent to these roads around the site, while higher than the EPA guideline level, are dominated by traffic noise. During times when traffic is not occurring or at locations that are removed from the heavily traveled roads, noise levels would be within the EPA criteria. During the 1992 survey, existing industries were not audible in Homeland and Fort Meade but were audible at night at a very low level at the other three locations when there was a lull in truck traffic. During the May 2000 noise survey, these industries were not noted as a source of the noise and noise from the operation of Power Block 1 was not observed at the offsite monitoring locations.

2.3.8.8 References

EPA (U.S. Environmental Protection Agency). 1974. Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.
550/9-74-004. Washington, D.C.

Florida Power Corporation. 1992. Polk County Site. Site Certification Application.

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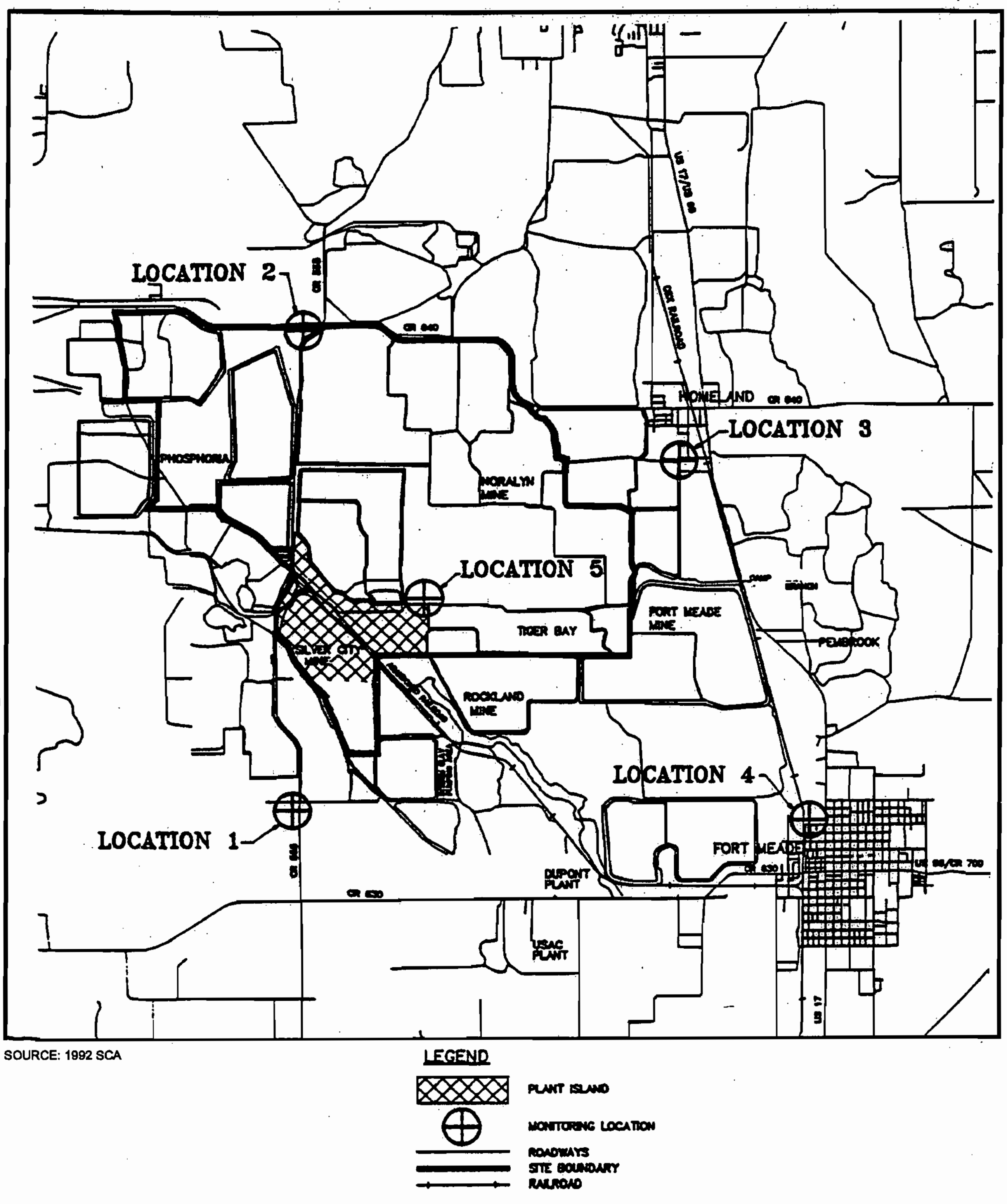

SOURCE: 1992 SCA

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FIGURE 2.3.8-1
NOISE MONITORING LOCATIONS

2.3.9 Other Environmental Features

Several regulatory agencies, including the DEP Bureau of Mine Reclamation, and environmental organizations promote the concept of regional wildlife corridors to form an integrated habitat network (IHN). During the preparation of the 1992 SCA, FP agreed to participate in this effort by assisting with the establishment of a wildlife corridor system in Polk County (FGFWFC, 1992). FP followed through on this commitment in December 1994 by funding the acquisition of a 442-acre offsite Conservation Easement on behalf of the State of Florida (See Figure 2.3.9-1). Additionally, pursuant to the post-Certification Amendment filed April 17, 2000, FP has donated a Conservation Easement on the reclaimed Buffer Area parcels (N-11A, N-13, and N-9B) and the Tiger Bay parcel to the State of Florida. These donations, together with the Conservation Easement described above, constitute a major portion of the IHN for the region.

2.3.9.1 References

FGFWFC (Florida Game and Fresh Water Fish Commission). 1992. Letter from T. King, FGFWFC, to K. Small, Florida Power Corporation, St. Petersburg, Florida. February 18, 1992.

Florida Power Corporation. 1992. Polk County Site. Site Certification Application.

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FIGURE 2.3.9-1
ENVIRONMENTAL FEATURES

TABLE OF CONTENTS
SECTION 3

LIST OF TABLES
SECTION 3

LIST OF FIGURES
SECTION 3

3.1 BACKGROUND

FP proposes to install and operate multiple generating units at the Hines Energy Complex over a twenty-year period. The units will be brought on-line sequentially, with the scheduling of units to match the estimated growth of demand through the ultimate site capacity. The Siting Board granted ultimate site capacity certification in 1994 for the Hines Energy Complex based on the assumption that the ultimate installation could include 12 CTs with associated HRSGs, STs, and coal gasification units for a total site capacity of 3,000 MW. The filing of this SCA is consistent with FP's original schedule proposed for the Hines Energy Complex. The actual sequence and timing of future units may vary somewhat, depending on need, as determined by the PSC.

The addition of Power Block 3 at the Hines Energy Complex as a 530 MW (nominal) natural gas-fired combined cycle (CC) unit with distillate oil as back-up fuel is consistent with the expected development of the total site capacity.

By this application, FP is seeking approval for the construction and operation of Power Block 3. All construction activities will occur within an approximate 5-acre portion of the Plant Island adjacent to Power Block 2.

Associated facilities that have been certified and constructed to support the Hines Energy Complex include transmission lines, a gas pipeline within the site's boundaries and a reclaimed water pipeline from the Bartow city limits to the Cooling Pond on site. These facilities, already authorized by the 1994 Certification, are sufficient to support the addition of Power Block 3.

The existing on-site Cooling Pond provides circulating water for cooling of the plant auxiliary systems and steam turbine condensers. The addition of Power Block 3 will not require any expansion of the Cooling Pond. The 722-acre portion of the ultimate 2250-acre Cooling Pond has been constructed and is sufficient to support Power Blocks 1, 2 and 3.

The existing site stormwater management system located within the Plant Island area is adequate for Power Blocks 1, 2 and 3 and provides overflow to the on-site Cooling Pond.

Air emission control will be achieved using the best available control technology. In addition to dry low NO_x burners in the CTs, selective catalytic reduction (SCR) technology will be used to further control nitrogen oxide (NO_x) emission levels while firing natural gas. While firing fuel oil as a back-up, water injection will be used to limit NO_x levels, along with the SCR technology. The combustion of clean fuels to minmize sulfur dioxide (SO_2) and particulate mater emissions is accomplished by burning fuels low in ash and sulfur content in conjunction with good combustion practices to ensure complete combustion. These technologies will ensure compliance with applicable air quality standards.

Noise impacts from the full 3000 MW site were assessed for several residential receptors around the Hines Energy Complex site as part of the 1994 Certification. Fractional noise increases observed at any nearby residential receptor will not be noticeable or significant. (See Section 2.3.8.) The isolated location and buffer area around the Hines Energy Complex site results in the lack of a significant noise impact.

Vehicular access is provided by County Road 555 (CR 555), with rail access provided by existing CSX rail lines, including an on-site rail spur. A traffic impact analysis was completed to assess traffic impacts for the construction and operation of the full build out of the site (3000 MW) on Polk County roadways. Conditions of Certification addressing those impacts were included in the 1994 Certification. Area roadways have capacity to accommodate traffic from construction and operation of Power Block 3 as previously demonstrated.

All on-site fuel oil delivery, storage and handling facilities, including unloading areas, piping, storage tank systems and containment structures are in place and adequate for Power Blocks 1, 2 and 3.

3.2 SITE LAYOUT

The Hines Energy Complex site contains a Plant Island and several ancillary areas that make up the balance of the site. The arrangement consists of two existing combined cycle units with a third combined cycle unit being proposed adjacent to the second. This section provides a description of existing and future plant arrangements of the power generating facilities and associated facilities on-site.

3.2.1 Plant Island

The overall plant arrangement, shown on Figure 3.2.1-1, utilizes a Plant Island that is located in the southern portion of the site, east of CR 555. The Plant Island consists of areas that were previously part of the phosphate mining company parcels designated as SA-11, SA-12N and SA-13, for a total of 704-acres. These parcels were selected for the Plant Island because, although originally intended to be waste clay settling areas, they were never so utilized. Thus, there are no waste clays in these areas that could complicate the structural foundation design. Figure 3.2.1-1 shows the location of Power Blocks 1 and 2, as well as indicating the space reserved for Power Block 3.

Figure 3.2.1-2 shows the general arrangement of the power block area, including Power Block 3.

Figure 3.2.1-3 is a schematic of a typical combined cycle unit illustrating the type of equipment associated with Power Block 3.

3.2.2 Balance of Site

The additional areas of the Hines Energy Complex site that may be minimally impacted by the addition of Power Block 3 are described below.

<u>*COOLING POND*</u>

One of the requirements for combined cycle power plants is a reliable supply of process water and cooling water to allow condensation of the steam. A cost-effective device to achieve that supply, while minimizing the consumptive use of water, is a cooling pond. The existing 722-acre Cooling Pond, which was constructed within mine area N-16W as shown on Figure 3.2.2-1, is a varying level Cooling Pond capable of supporting Power Blocks 1, 2 and 3. Other than new intake/discharge structures, no changes to the Cooling Pond will be needed to accommodate Power Block 3.

BRINE POND

Two unique features of the Hines Energy Complex site are the availability of waste clays, and the presence of structurally sound dams remaining from the previous phosphate mining activities. These features accommodate the use of an evaporative Brine Pond to receive concentrated wastewaters from the reverse osmosis treatment process. The area designated as SA-9, comprising about 311 acres of the site area, is utilized as the Brine Pond. Waste clays serve as an impermeable liner along the bottom of this area. The Brine Pond location is shown on Figure 3.2.2-1. This pond will not need to be altered for Power Block 3.

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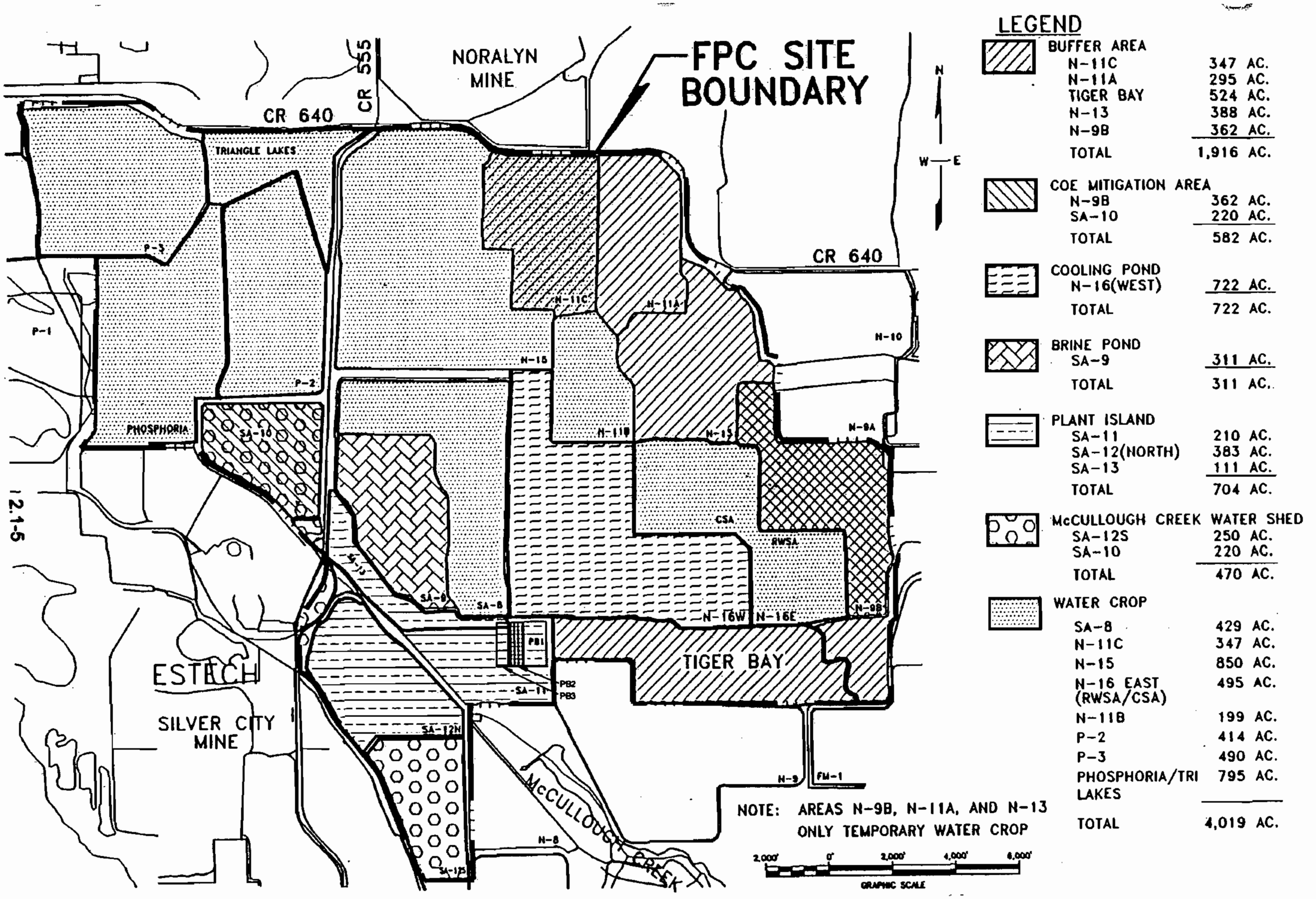

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FIGURE 3.2.1-1
HINES ENERGY COMPLEX POWER BLOCK 3 SITE PLAN

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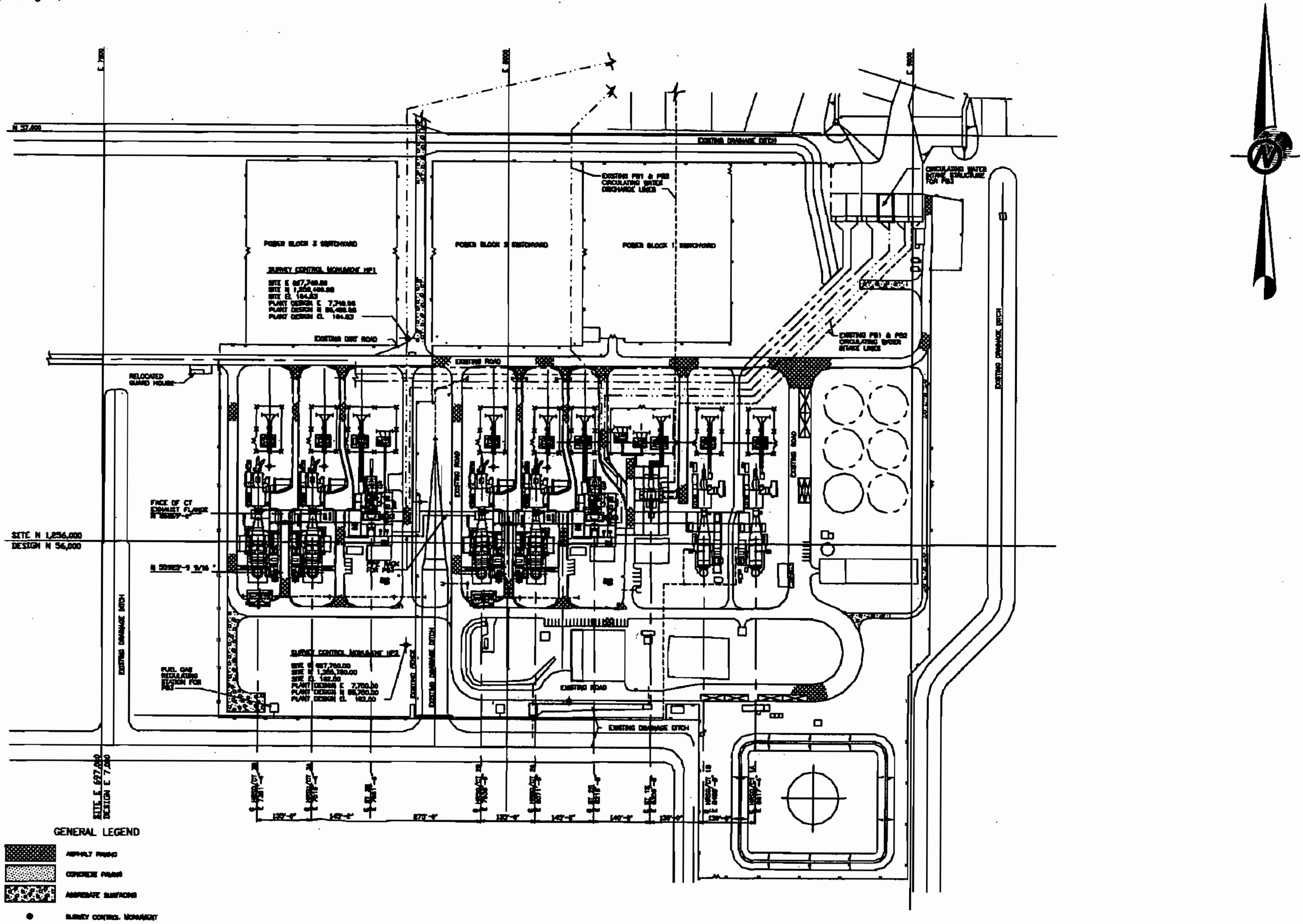

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FIGURE 3.2.1-2
SITE ARRANGEMENT MAP

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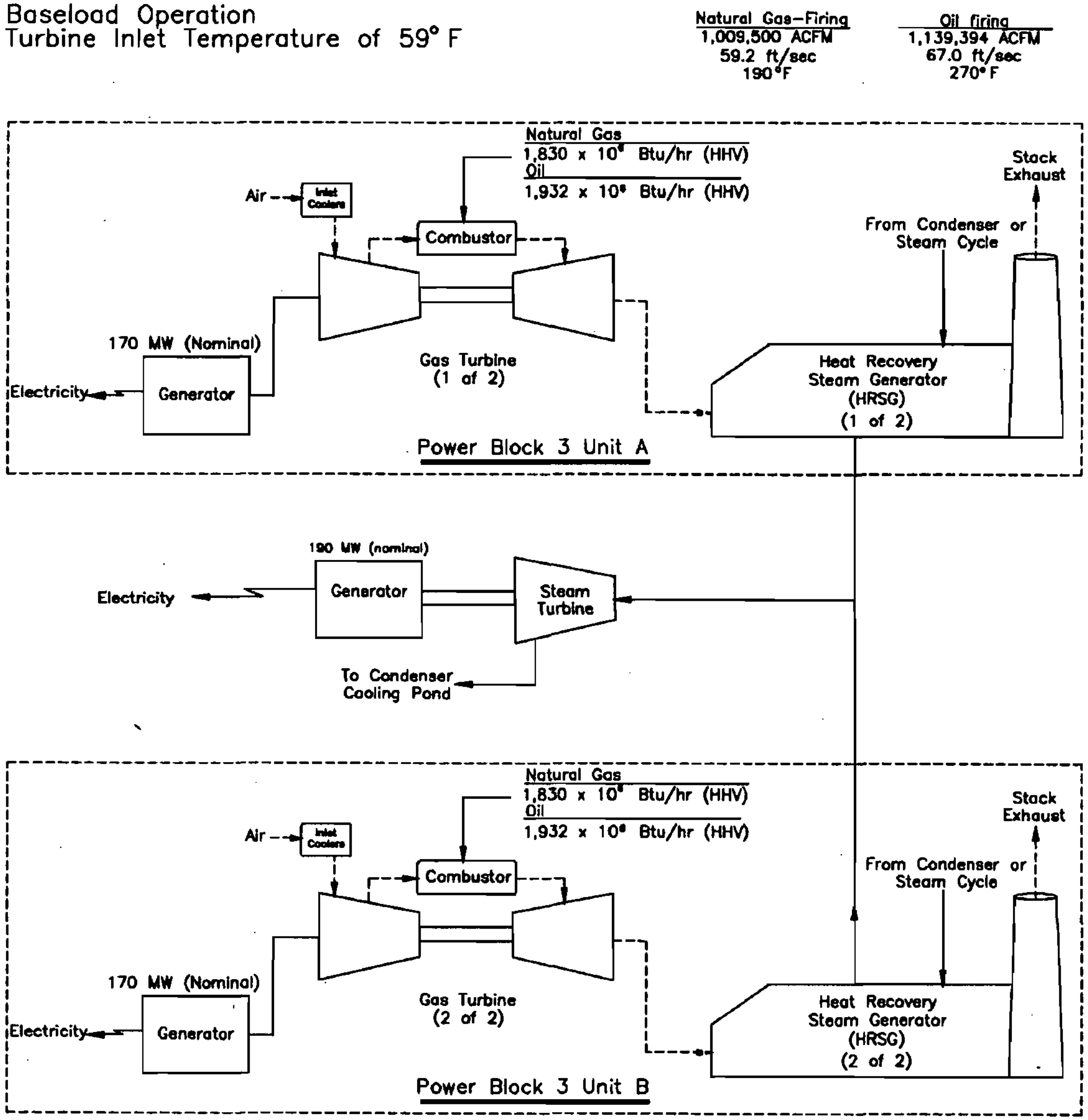

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FIGURE 3.2.1-3
PROCESS FLOW DIAGRAM

3.3 FUEL AND FUEL HANDLING CHARACTERISTICS

Power Block 3 will utilize natural gas as the primary fuel and low sulfur distillate fuel oil as backup fuel.

Following is a description of the fuel characteristics, supply considerations, and storage concepts associated with each of the fuels.

3.3.1 Natural Gas

Natural gas will be supplied via two separate existing pipelines to the Hines Energy Complex. Both the Florida Gas Transmission (FGT) and Gulf Stream pipelines currently supply natural gas to the site.

FP constructed the on-site pipeline from the FGT and Gulf Stream metering stations to the Plant Island area. This line was sized for three Power Blocks and ranges in size from 16" at the on-site metering station to 8" at the combustion turbines.

3.3.2 Fuel Oil

Low sulfur (0.05 % by weight) distillate fuel oil will be used as a backup fuel for the Power Block 3 at the Hines Energy Complex.

The fuel oil unloading system and storage tank existing at the site is adequate to serve the requirements of Power Block 3. This system consists of four truck unloading stations and one 3.7 million-gallon storage tank.

3.4 AIR EMISSIONS AND CONTROLS

Power Block 3 will consist of a natural gas-fired CC unit capable of producing approximately 530 MW (nominal). Specific information about this unit is presented in the Prevention of Significant Deterioration (PSD) application included as Appendix 10.1.5.

The remainder of this section will address the air emissions and controls for the proposed development.

3.4.1 Air Emission Types and Sources

Following is a description of the sources and types of air emissions at the Hines Energy Complex.

3.4.1.1 Sources

The primary sources of air emissions for this proposed development are the two Siemens Westinghouse combustion turbine (CT) units. The best available control technology (BACT) for these sources is presented in Section 3.4.3.

3.4.1.2 Emissions

Estimated maximum emissions from each of the air emission point sources noted in Section 3.4.1.1 are tabulated in Table 3.4.1-1. The estimated emissions represent full load operating conditions and are not inclusive of background ambient concentrations introduced into the particular processes. It is anticipated that higher emission rates will occur for short periods of time when a unit is started from a cold start or possibly during a malfunction. A comparison of the significant emission rate thresholds given in the table demonstrates that the project is subject to PSD BACT review for nitrogen oxides (NO_x), sulfur dioxide (SO_2), sulfuric acid mist (SAM), carbon monoxide (CO), particulate matter (TSP and PM_{10}) and volatile organic compounds (VOCs).

3.4.1.3 Emissions Inventory

For source specific emissions, DEP Form 62-210.900(1), "Application For Air Permit - Long Form", has been completed for Power Block 3, a copy of which is included in Appendix 10.1.5. These emissions are based on a 100 percent capacity factor at full load.

3.4.2 Air Emission Controls

The proposed control technologies and associated emission rates for the regulated pollutants emitted from each of the primary sources on the site are tabulated in Table 3.4.2-1. A detailed BACT analysis, including an economic evaluation, was performed and is presented in Appendix 10.1.5, Section 4.0.

3.4.3 Best Available Control Technology (BACT)

This BACT discussion provides a preliminary "worst case" scenario of generation alternatives and the corresponding analysis of the air quality control alternatives for controlling pollutant emissions from the Hines Energy Complex.

Under the federal Clean Air Act (CAA), BACT represents an emission limitation based on the maximum degree of pollutant reduction determined on a case-by-case basis considering technical, economic, energy, and environmental considerations. However, BACT cannot be less stringent than the emission limits established by the applicable New Source Performance Standards (NSPS) for stationary sources.

This BACT analysis follows the general requirements of the EPA's draft "top down" BACT guidance document, which requires that the BACT analysis start by assuming the use of the most stringent control alternative. Other less efficient emission control technologies are evaluated if this most stringent alternative is determined to be technologically infeasible or unreasonable considering economic, energy, and environmental factors.

As discussed in Section 3.4.1, the following regulated pollutants exceed the PSD significant emission rate thresholds and are, therefore, subject to PSD review:

- Carbon Monoxide (CO)
- Nitrogen oxides (NO_x)
- Sulfur dioxide (SO_2)
- Particulate (TSP and PM_{10})
- Volatile organic compounds (VOC)
- Sulfuric acid mist (SAM)

Consequently, the BACT analysis for Power Block 3 presented in Appendix 10.1.5, Section 4.0, addresses the control of emissions of these pollutants. Also included are discussions of the effects of the BACT systems selected on the emissions of other regulated pollutants.

3.4.4 Design Data for Control Equipment

Control equipment design information is included as part of the BACT analyses discussed in Section 3.4.3. Pollutant emission rates and specific control technologies are summarized in Table 3.4.2-1.

The CC units will be designed to minimize NO_x formation by the use of combustion controls, low NO_x burners and selective catalytic reduction (SCR). Water will be injected into the combustion zones to lower combustion temperatures and limit NO_x formation during oil firing. The annual emissions of other regulated pollutants which might be emitted from the CC units in quantities subject to PSD review (SO_2, CO, particulate matter [TSP/PM_{10}], VOCs and SAM) will be controlled by limiting the amount of fuel oil burned annually, limiting the sulfur content of the fuel, efficient operation of the CC facility, and utilizing good combustion control of the units.

3.4.5 Design Philosophy

Air quality control system designs are determined based on conservative design parameters. The parameters are developed to ensure that the air quality control system performance meets or exceeds the requirements specified by state and federal regulatory NSPS. Critical equipment that may affect the overall system reliability will have spare units in place to assure continuous operation. In addition, the application of top-down BACT (i.e., the evaluation of technical/engineering, economic, and environmental considerations) is used to determine appropriate air emission control technologies. The BACT analysis, discussed in Section 3.4.3, results in the selection of the best air quality control system for the particular site.

Table 3.4.1-1.

Maximum Potential Annual Emissions (530 MW) and PSD Significant Values

Pollutant	Emissions (TPY) *	PSD Significant Emission Rate (TPY)	PSD Review Required (Yes/No)
Carbon Monoxide	744	100	Yes
Nitrogen Oxides	267	40	Yes
Sulfur Dioxide	137	40	Yes
Particulate Matter (PM_{10})	121	15	Yes
Total Suspended Particulates (TSP)	121	25	Yes
Volatile Organic Compounds	57	40	Yes
Lead	0.02	0.6	No
Sulfuric Acid Mist (SAM)	21	7	Yes

* TPY = Tons per year for the proposed Power Block 3 project.

Basis:

			Annual Hours of Operation / CT	
	Load	Ambient Temp.	Gas	Oil
NO_x	100%	59° F	7,760	1,000
SO_2	100%	59° F	7,760	1,000
TSP/PM_{10}	100%	59° F	7,760	1,000
Lead	100%	59° F	7,760	1,000
SAM	100%	59° F	7,760	1,000
CO	100%	59° F	4,760	1,000
	60%	59° F	3,000	--
VOC	100%	59° F	4,760	1,000
	60%	59° F	3,000	--

Source: Golder Associates, 2002.

Table 3.4.2-1.
Summary of Proposed BACT Control Technologies and Emission Limits

Hines Energy Complex Power Block 3

(Siemens Westinghouse 501FD CTs)

Pollutant	Fuel	Load (%)	Control Technology	Proposed BACT Emission Limits[a] Concentration (ppm)	Mass (lb/hr)
TSP/PM_{10}	Gas	All	Natural gas and limited use of low-sulfur fuel oil	10%[b]	NA
	Oil	All	Efficient and complete combustion	20%[b]	NA
CO	Gas	100-65	Efficient and complete combustion	10	42
	Oil	100-65	Efficient and complete combustion	30	106
	Gas	60	Efficient and complete combustion	50	146
VOC	Gas	100	Efficient and complete combustion	1.8	4.4
	Oil	100-65	Efficient and complete combustion	10	21
	Gas	80-60	Efficient and complete combustion	3.0	7.5
NO_x	Gas	100-60	Use of dry low-NO_x burners and SCR	3.5[c]	23
	Oil	100-60	Water injection and SCR	12	87.5
SO_2/SAM	Gas/Oil	All	Natural gas and limited use of low-sulfur fuel oil	NA	NA

[a] NO_x is ppmvd at 15% O_2 gas and oil; CO is ppmvd at 15% O_2 for gas and ppmvd for oil; VOC is ppmvd at 15% O_2 for gas and ppmvw for oil. Max emissions at 59°F compressor inlet.

[b] Percent opacity, a surrogate for TSP/PM_{10} limits.

[c] Based on a 24-hr block (midnight. to midnight) average

Source: Golder Associates, 2002.

3.5 PROJECT WATER USE

The 1994 Site Certification authorized an ultimate site buildout (3000 MW) for the Hines Energy Complex site that will require a total of 32 MGD of water from a combination of sources, including reclaimed water, internal reuse of wastewater, water cropping, offsite non-potable water sources and ground water. Water will be needed for makeup requirements of the Cooling Pond, personal and sanitary needs of employees and visitors, and various plant processes associated with 3000 MW of power generation and ancillary facilities. With the exception of quantities needed to support potable and sanitary needs of the proposed facility, the 1994 Certification disallows use of ground water in support of the first 940 MW of generation capacity, except as approved by SWFWMD under circumstances constituting an emergency. Beyond the first 940 MW, the 1994 Site Certification authorizes the withdrawal of up to 17.5 MGD Annual Average Daily of Upper Floridan aquifer water. Power Block 3 represents the first major phase of development in excess of 940 MW and requires the first use of ground water as a source of cooling and process water makeup.

The HEC site is designed as a zero surface water discharge facility for industrial wastewaters. The key feature of this design is the Cooling Pond, which serves not only as the heat dissipation sink but also as a water storage impoundment. The existing 722-acre Cooling Pond in place is adequate to support Power Blocks 1, 2 and 3.

The following summarizes FP's efforts to minimize the use of ground water through the use of water conservation practices consistent with those outlined in Condition XXVI.A.14.b.ii.1) of the 1994 Site Certification.

- Power Block 3's combined-cycle combustion turbine design uses water-conserving electric generation and pollution control technologies;
- Any dewatering that may take place as part of the construction of Power Block 3 will be maintained on site;
- On-site rainwater and stormwater are captured and managed in the on-site water cropping system as cooling pond makeup;
- Internal wastewater streams are returned to the cooling pond for reuse;
- Reuse of treated wastewater from sewage treatment facilities is currently used to the maximum amount available (see addition information below); and,
- There are no other sources of non-potable water currently available for use.

As noted above, and as required by Conditions XXVI.A.15 and XXX.21 of the 1994 Site Certification, FP evaluated the availability of alternative water resources (e.g., reclaimed water) for this SSCA. A summary of potential reclaimed water sources located in Polk County is provided in Table 3.5-1. The locations of these potential sources are shown on Figure 3.5-1.

An evaluation of those facilities which might potentially provide reclaimed water of sufficient quantity and quality for the Cooling Pond follows:

> The City of Bartow Wastewater Treatment Facility has a permitted design capacity of 4.0 MGD. An agreement between FP and the City of Bartow allows FP to receive up to 3.5 MGD of reclaimed water, with a provision which allows the City of Bartow to use up to .6 MGD for irrigation of its own facilities, if needed. Presently, measured average daily flows to the Hines Energy Complex from Bartow are approximately 1.77 MGD. Monthly Operating Reports (MORs) filed by Bartow with DEP indicate that average daily flows from its Wastewater Treatment Facility are approximately 2.0 MGD. This level of total flows indicates that additional reclaimed water is not available for use at this time.
>
> The City of Lakeland W. Carl Dicks Wastewater Treatment Facility, located approximately 15 miles from the Hines Energy Complex, currently has a permitted design capacity of 10.8 MGD. DEP MOR data indicate that average daily flows of 9.8 MGD are currently reused by Lakeland Electric. Flows of sufficient quantity are therefore not available at this time.
>
> The City of Lakeland Northside reclaimed effluent outfall, which is located approximately 8 miles from the Hines Energy Complex, has a permitted design capacity of 6.25 MGD. DEP MOR data indicate that average daily flows are 2.9 MGD, with reuse by Lakeland Electric. Flows of sufficient quantity are therefore not available at this time.
>
> The City of Winter Haven #3 Wastewater Treatment Facility, located approximately 20 miles from the Hines Energy Complex, has a permitted design capacity of 5.0 MGD with discharge via overland flow. DEP MOR data indicate that average daily flows are approximately 2.9 MGD. Although quantities of reclaimed effluent are potentially available, this water is currently committed to another proposed power generation facility.

No other domestic wastewater treatment facilities in the vicinity of the Hines Energy Complex have adequate capacity to generate reclaimed effluent of sufficient quantity and quality to be feasible.

Currently anticipated total actual water-needs for the operation of Power Blocks 1, 2 and 3 will be approximately 10.6 MGD. An agreement with the City of Bartow allows FP to receive up to 3.5 MGD of reclaimed water, although measured average daily flows are only approximately 1.77 MGD. Additional sources of makeup to the Cooling Pond currently include direct precipitation (2.87 MGD), runoff from the

Plant Island stormwater retention pond SA-12N (0.67 MGD), reuse of process water (0.13 MGD), and the on-site water cropping system (2.77 MGD). In addition, the 1994 Site Certification authorized up to 17.5 MGD of Floridan Aquifer groundwater to support generation capacity in excess of the initial 940 MW of generating capacity. For reference, the current water budget for Power Blocks 1 and 2 is included on Figure 3.5-2. Figure 3.5-3 indicates the detailed water budget that illustrates the annual average flows for water uses for Power Blocks 1, 2 and 3. Figure 3.5-4 addresses the annual average flows expected during a one-in-ten year drought condition. In such a drought condition, up to 5.14 MGD of groundwater may be required to maintain the Cooling Pond at an adequate level necessary to ensure continued reliable operation of the facility.

3.5.1 Heat Dissipation System

As described above, the key feature of the plant water and wastewater systems is the Cooling Pond system. Following is a description of that system.

3.5.1.1 System Design

HEAT DISSIPATED

Based on data from Power Block 1, the estimated heat rejection rate for Power Blocks 1 and 2 is 2,550 mmBtu/hr. Power Block 3 will add an additional 1275 mmBtu/hr. The existing Cooling Pond will provide sufficient heat sink capacity for Power Blocks 1, 2 and 3 at the Hines Energy Complex.

SIZE AND LOCATION

The existing 722-acre Cooling Pond was approved in the 1994 Site Certification to provide a heat sink for heat rejection at the HEC and was constructed within mine area N-16W as shown on Figure 3.5.1-1. The existing Cooling Pond is capable of supporting the generating capacities of Power Blocks 1, 2 and 3. The Cooling Pond was constructed during initial site development and the As-Built drawings, dated November 1, 1996, were submitted to the appropriate agencies following completion of construction. The perimeter impoundment dam crest elevations are constructed to elevation 172 ft NGVD and the interior Cooling Pond phasing and dividing dams are constructed to a crest elevation of 167 feet NGVD. The interior phasing dams were constructed to create the initial phase 722-acre Cooling Pond, which falls entirely within the larger 1200-acre N-16 mine area.

RATE OF EVAPORATION OF WATER

Total evaporation from the Cooling Pond includes both natural and forced evaporation. Forced evaporation is that extra evaporation above and beyond natural evaporation that is caused by the heat rejected from the plant. The total annual average evaporation rate from the Cooling Pond is estimated to be 9,300,000 gallons per day for Power Blocks 1, 2 and 3. This evaporation rate is included in Figures 3.5-3 and 3.5-4, which illustrate the water budget for three power blocks under average and drought conditions.

DESIGN OF DAMS

Design of the Cooling Pond dams was addressed in the 1992 SCA. As-Built drawings of completed and accepted designs are currently on file with DEP. No new Cooling Pond dam construction is proposed for the Power Block 3 construction.

CONCEPTUAL DESIGN/LOCATION OF INTAKE STRUCTURES

The Hines Energy Complex will have no intake structures within any waters of the state or U.S. A new cooling water intake structure for Power Block 3 will be installed adjacent to the existing Power Block 1 and 2 cooling water intake structure within the Cooling Pond bank. Each of the three Power Blocks will have two vertical circulating water pumps. Design intake velocity will be a maximum of 2 feet per second at a design circulating water flow of approximately 120,000 gallons per minute.

MAXIMUM PREDICTED DISCHARGE TEMPERATURE AT POD

The project does not have a Point of Discharge (POD) to the waters of the state or U.S.

TRAVEL TIME FROM CONDENSER INLET TO POD

The project does not have a POD to the waters of the state or U.S.

3.5.1.2 Source of Cooling Water

The source of plant cooling water for Power Blocks 1, 2 and 3 will be the existing Cooling Pond. The Cooling Pond level will be maintained by using makeup from the following sources:

- Direct precipitation
- Reclaimed treated municipal effluent
- Plant Islant stormwater runoff
- Recycle of blowdown
- Treated low volume wastewaters
- Water cropping

- Groundwater

3.5.1.3 Dilution System

Power Blocks 1, 2 and 3 have no dilution systems.

3.5.1.4 Blowdown, Screened Organisms, and Trash Disposal

The project does not have a blowdown system with an off-site discharge. Disposal of debris and trash from coarse bar screens at the circulating water intake is described in Section 3.7. There are no off-site makeup water pumps.

3.5.1.5 Injection Wells

Like Power Blocks 1 and 2, Power Block 3 does not have any injection wells for waste disposal.

3.5.2 Domestic/Sanitary Wastewater

Showers, lavatories, sinks, toilets, urinals, and drinking fountains generate plant domestic/sanitary wastewater. These wastewaters are collected and treated in on-site domestic/sanitary waste treatment facilities. The effluent from the sanitary waste treatment system is used as makeup water for the Cooling Pond.

As authorized by the 1994 Certification, FP currently operates a 0.010 MGD Type III domestic wastewater treatment plant consisting of aeration, secondary clarification and chlorination at the Hines Energy Complex. Chlorinated effluent is directed to the 722-acre Cooling Pond.

3.5.3 Potable Water Systems

Potable water uses at the plant will include water for drinking, washing, showers, urinals, and toilets. Potable water for the plant is provided from the on-site service water system, supplied by well water. The well water is being treated using the lime softening pretreatment and filtration in the service water pretreatment system, and chlorination.

Condition No. XVI of the 1994 Site Certification authorizes potable water for the Hines Energy Complex. The system is a non-transient non-community water system. The permitted capacity of the plant (0.005 MGD) is adequate for Power Blocks 1,2 and 3.

3.5.4 Process Water Systems

The major process water uses for Power Blocks 1, 2 and 3 are as follows:

DEMINERALIZED WATER. Demineralized water is required for use as makeup to the steam-condensate-feedwater cycle associated with the heat recovery steam generators in Power Blocks 1, 2 and 3. The makeup is required to replace steam cycle losses and boiler blowdown. In addition, demineralized water will be used when firing the combustion turbines on fuel oil to control NO_x emissions, as well as for demineralizer regeneration.

Demineralized water treatment consists of reverse osmosis (RO) equipment and mobile ion exchange demineralizer units that are regenerated off-site. The source of demineralized water is the Cooling Pond water that is filtered and pumped as needed through the RO unit. RO permeate is transferred to the demineralizer inlet. As the water passes through the RO and demineralizer exchangers, it will be progressively demineralized until the effluent contains essentially no dissolved solids. RO brine reject is routed to the existing on-site Brine Pond. The mobile demineralizer vessels are regenerated off-site; therefore no regeneration wastes require on-site neutralization and disposal.

SERVICE WATER. Service water is provided throughout the plant for washdown purposes and for pump and equipment seal water and flushing as necessary. Service water may also be used to supplement the fire water supply described below. Service water is obtained from the Cooling Pond and is filtered and chlorinated before storage.

FIRE WATER. A dedicated supply of water from the existing Cooling Pond is treated by filtration and provided to the existing service/fire water storage tank. Backup fire water is supplied from the Cooling Pond via diesel-driven fire pumps located at the cooling water intake structure.

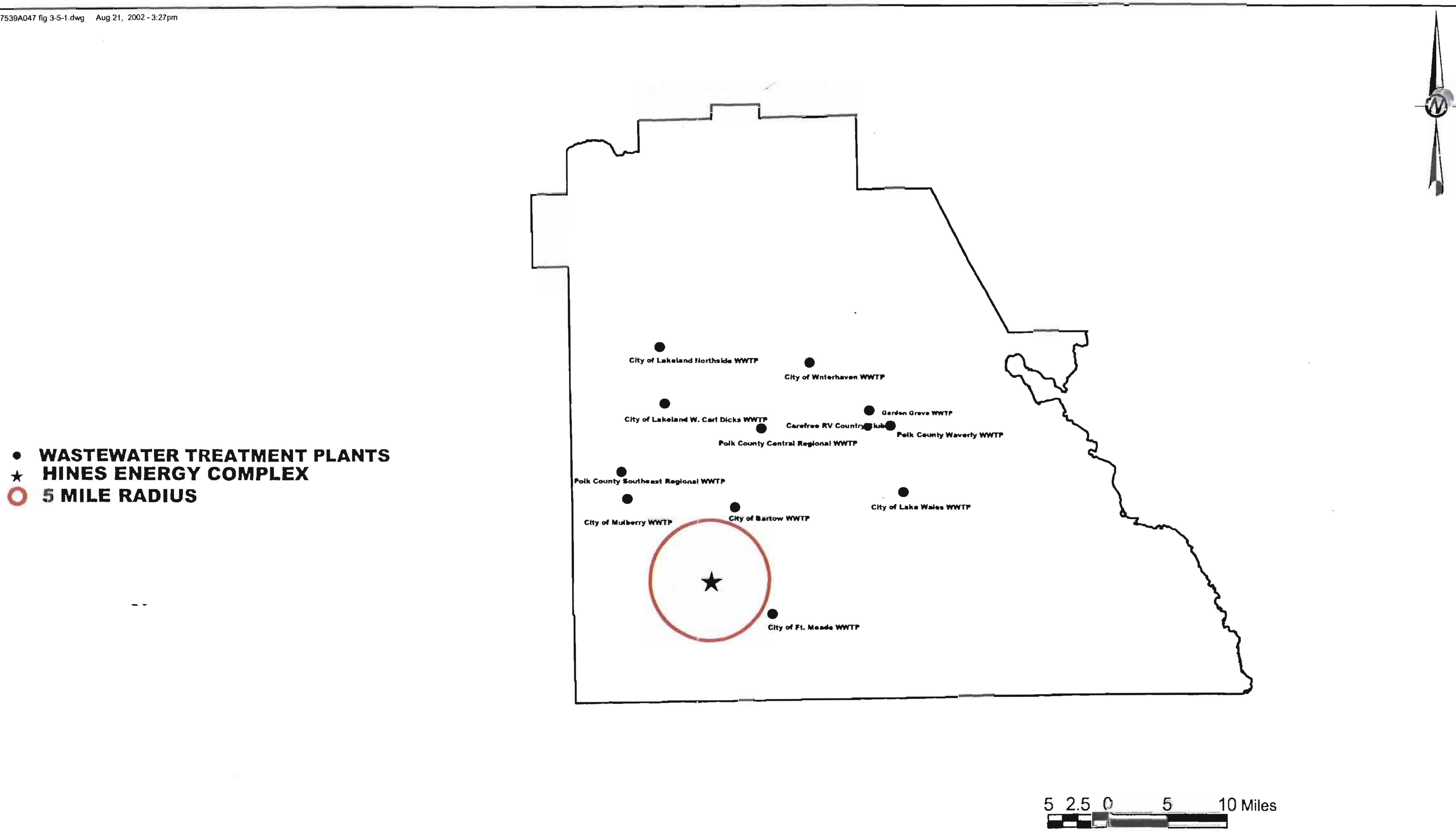
PROCESS WASTEWATER. Process wastewater potentially contaminated with oil is treated by the existing oil/water separator prior to being recycled to the Cooling Pond.

3.5.5 References

Florida Power Corporation. 1992. Polk County Site. Site Certification Application.

1994. Power Block 2 Site Certification Application

Drawing file: 0237539A047 fig 3-5-1.dwg Aug 21, 2002 - 3:27pm



SOURCE: 1992 SCA

Florida Power
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Hines Energy Complex

FIGURE 3.5-1
POLK COUNTY WASTE WATER
TREATMENT PLANT LOCATIONS

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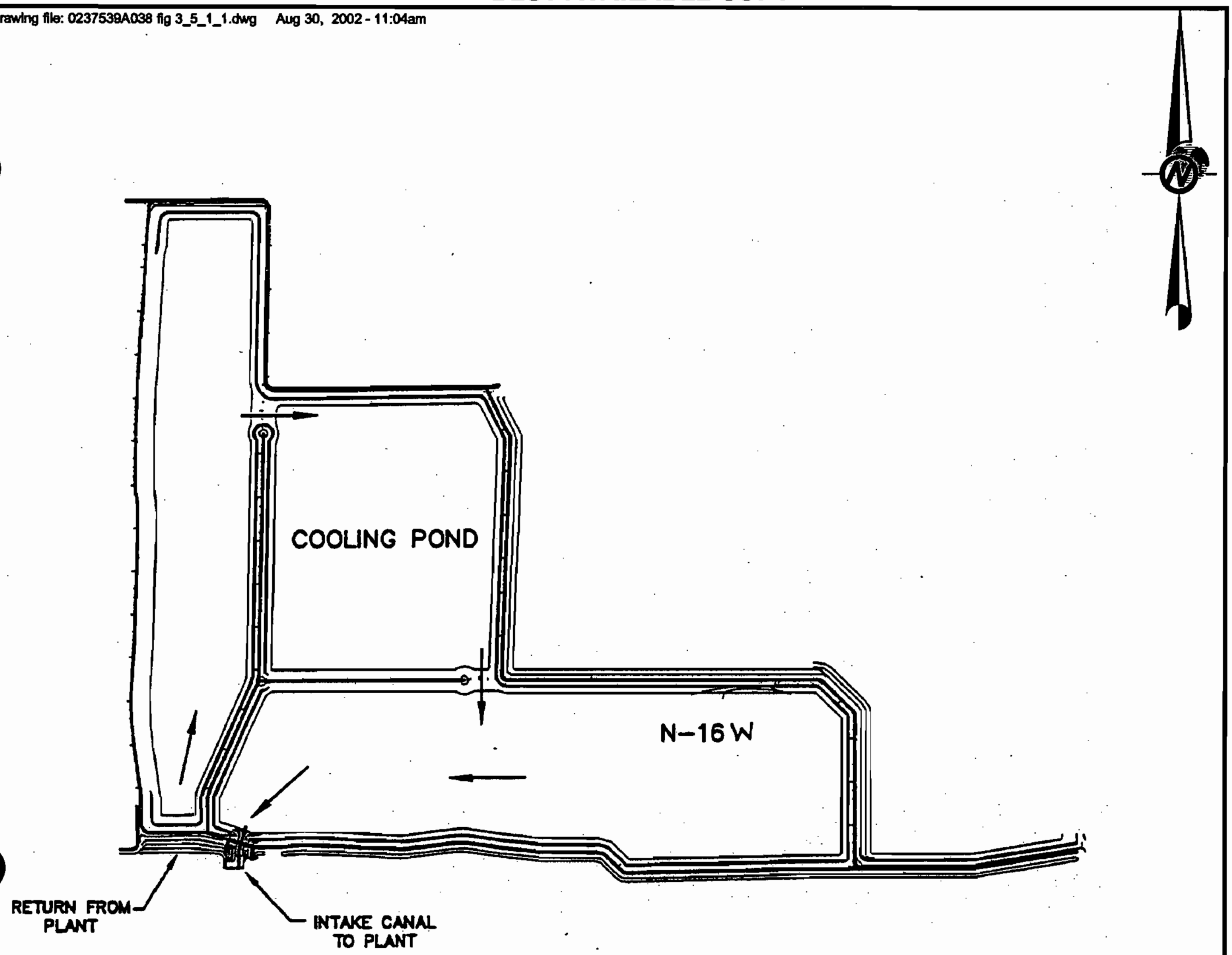

LEGEND

COOLING POND BOUNDARY

DIRECTION OF WATER FLOW

SOURCE: 1992 SCA

Florida Power
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Hines Energy Complex

FIGURE 3.5.1-1
COOLING POND CONFIGURATION

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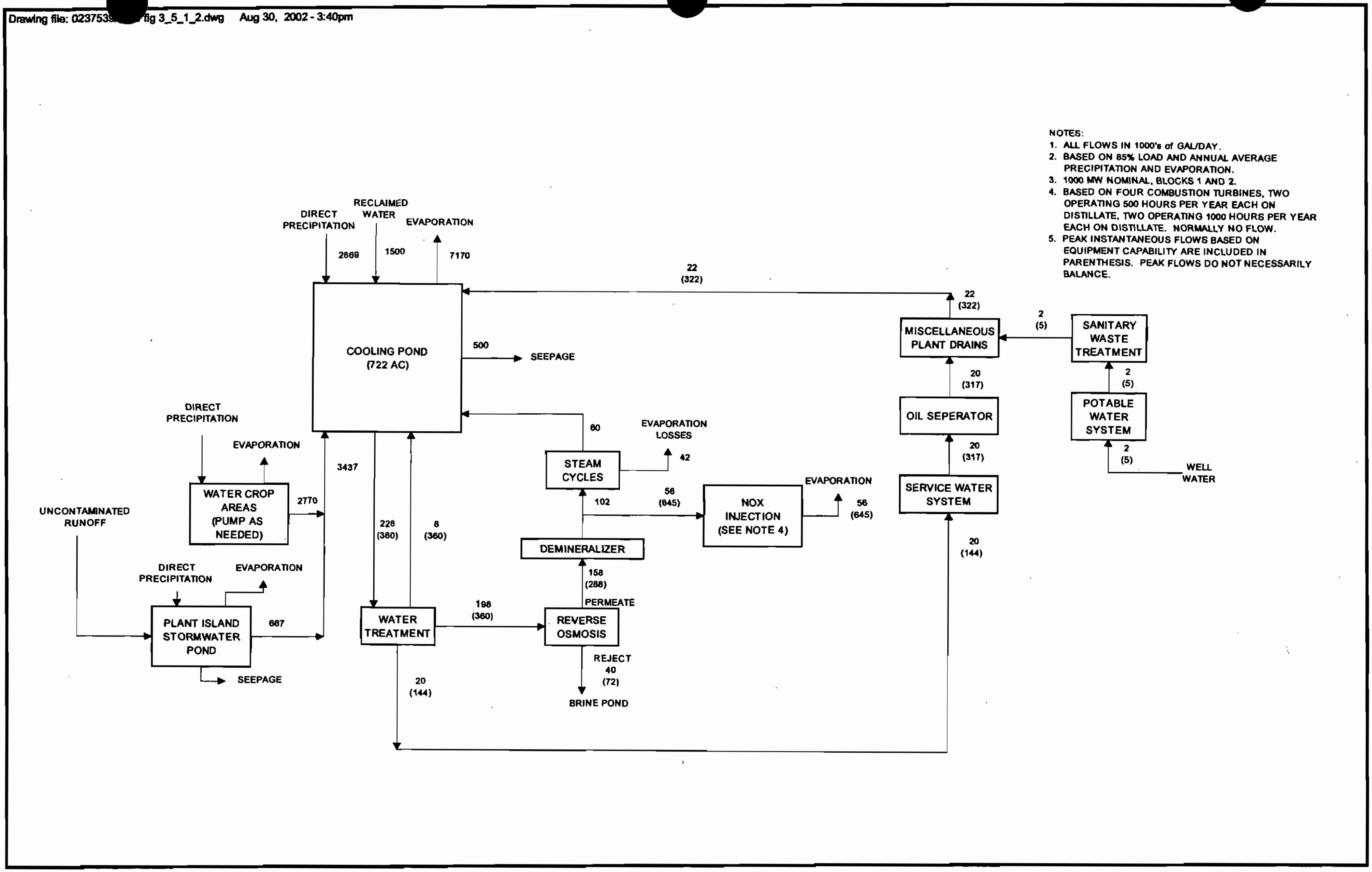

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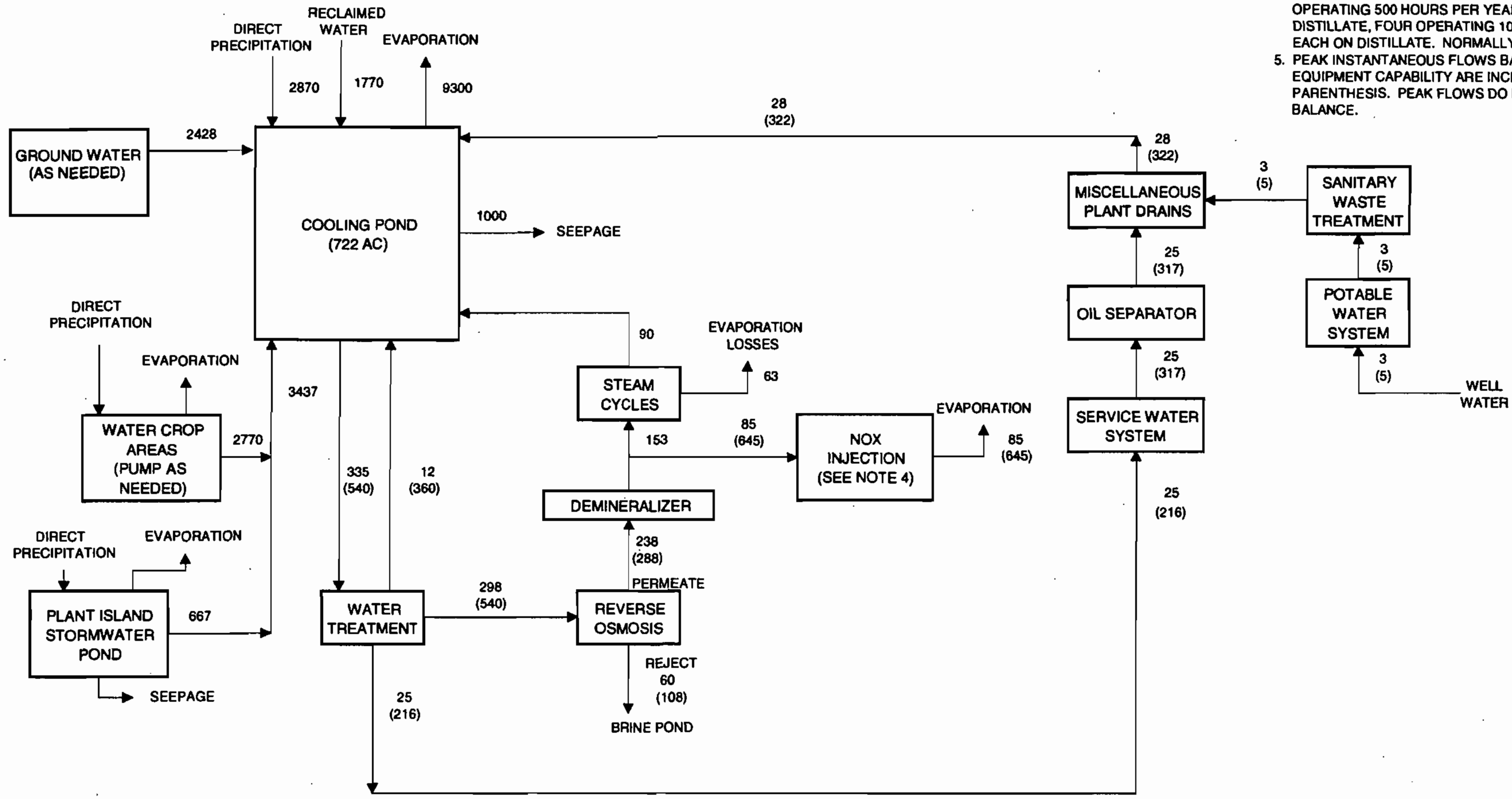
FIGURE 3.5.1-2
WATER BALANCE DIAGRAM - POWER BLOCKS 1 AND 2

Drawing file: 0237539A fig 3_5_1_3.dwg Aug 30, 2002 - 11:22am

NOTES:
1. ALL FLOWS IN 1000's of GAL/DAY.
2. BASED ON 85% LOAD AND ANNUAL AVERAGE PRECIPITATION AND EVAPORATION.
3. 1530 MW NOMINAL, BLOCKS 1, 2 AND 3.
4. BASED ON SIX COMBUSTION TURBINES, TWO OPERATING 500 HOURS PER YEAR EACH ON DISTILLATE, FOUR OPERATING 1000 HOURS PER YEAR EACH ON DISTILLATE. NORMALLY NO FLOW.
5. PEAK INSTANTANEOUS FLOWS BASED ON EQUIPMENT CAPABILITY ARE INCLUDED IN PARENTHESIS. PEAK FLOWS DO NOT NECESSARILY BALANCE.



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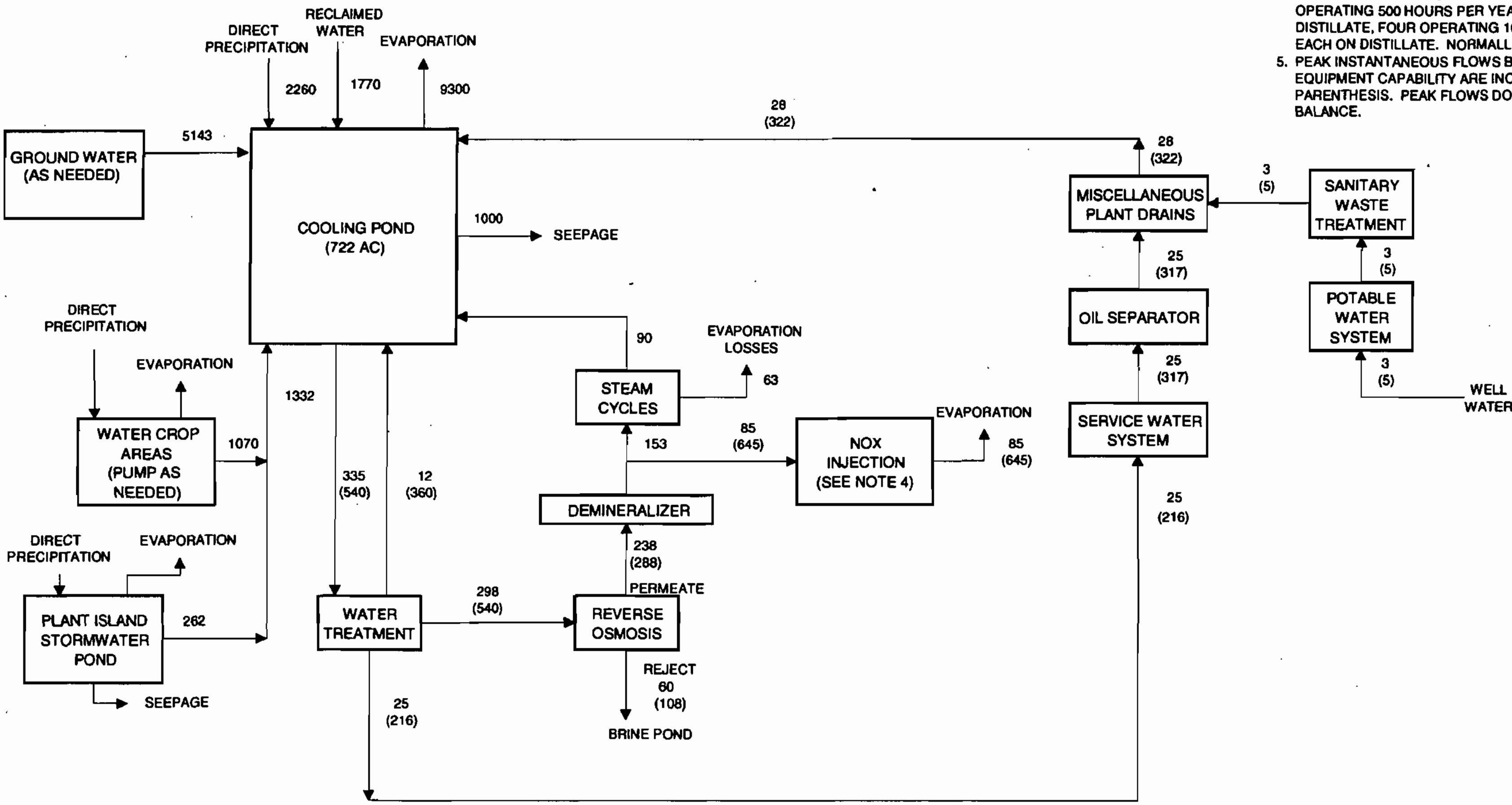
Hines Energy Complex

FIGURE 3.5.1-3
WATER BUDGET DIAGRAM - (AVERAGE YEAR)
POWER BLOCKS 1, 2, AND 3

Drawing file: 023753 fig 3_5_1_4.dwg Aug 30, 2002 - 11:27am

NOTES:
1. ALL FLOWS IN 1000's of GAL/DAY.
2. BASED ON 85% LOAD AND ONE IN 10 YEARS PRECIPITATION AND EVAPORATION.
3. 1530 MW NOMINAL, BLOCKS 1, 2 AND 3.
4. BASED ON SIX COMBUSTION TURBINES, TWO OPERATING 500 HOURS PER YEAR EACH ON DISTILLATE, FOUR OPERATING 1000 HOURS PER YEAR EACH ON DISTILLATE. NORMALLY NO FLOW.
5. PEAK INSTANTANEOUS FLOWS BASED ON EQUIPMENT CAPABILITY ARE INCLUDED IN PARENTHESIS. PEAK FLOWS DO NOT NECESSARILY BALANCE.



Florida Power
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Hines Energy Complex

FIGURE 3.5.1-4
WATER BUDGET DIAGRAM - (DROUUGHT YEAR)
POWER BLOCKS 1, 2, AND 3

TABLE 3.5-1

POLK COUNTY RECLAIMED WATER SOURCES

Reclaimed Water Source WWTP	Treatment Level	Permitted Design Capacity (MGD)	Main Effluent Disposal Method	Average Monthly Flow (MGD)	BOD (mg/l)	TSS (mg/l)	Nitrate (mg/l)	Total Phosphorous (mg/l)
City of Bartow	Secondary	4.00	Reuse by Florida Power Corporation	1.92	1.7	2.7	1.9	**
Carefree RV Country Club	Modified AWT	0.75	Irrigation	0.03	3.1	1.5	3.6	**
City of Ft. Meade	Secondary	1.00	Reuse by Cargill Mine	0.43	1.3	11.8	5.9*	3.2
Garden Grove	AWT	2.00	Irrigation	0.79	2.5	2.1	8.4	**
City of Lakeland W. Carl Dicks	Secondary	10.80	Reuse by Power Plant	6.30	1.8	2.3	1.2*	3.3
City of Lakeland Northside	Secondary	6.25	Wetland App. & Reuse by Power Plant	2.90	6.0	1.2	7.8	2.7
City of Lake Wales	Modified AWT	1.90	Discharge to Peace Creek	1.02	5.0	0.9	4.0	**
City of Mulberry	AWT	0.75	Discharge to Alafia River	0.35	3.0	2.9	3.1	**
Polk County CRWWTF	Secondary	1.10	P/E Ponds	0.62	1.7	4.1	5.0	**
Polk County SWRWWTF	Modified AWT	2.00	Irrigation	1.14	2.0	1.8	1.0	**
Polk County Waverly	Secondary	0.13	P/E Ponds	0.04	3.5	6.7	2.2	**
City of Winterhaven #3	Secondary	5.00	Overland Flow	2.90	6.0	17.0	4.9	4.0

*Reported as Total Nitrogen.
** Data not reported.

Source: Florida Department of Environmental Protection, 2000

3.6 CHEMICAL AND BIOCIDE WASTE

The Hines Energy Complex is a zero surface water discharge facility with respect to the National Pollutant Discharge Elimination System (NPDES) program for industrial wastewaters. The key feature of this design is the Cooling Pond, which will serve not only as the heat dissipation device but also as a treated wastewater collection and reuse storage device.

The following subsections address the potential sources for chemical and biocide wastewaters.

3.6.1 Cooling Pond Circulating Water Treatment and Other Biocide Treatment

Intermittent shock biocide treatment will be used to prevent biofouling of the circulating water system. An oxidizing biocide will be fed within the intake structure to the circulating water pump suctions. The feed rate will be based on obtaining a total residual oxidant at the condenser outlets of 0.5 mg/l. The frequency and duration of each treatment cycle will be adjusted seasonally to provide the necessary biofouling control to keep the condensers clean. Total residual oxidant levels in the Cooling Pond are expected to be, on average, below the limits of detectability because of the large volume of water in the Cooling Pond, the biocide demand, and the short duration of treatment.

3.6.2 Process Water Treatment

The Cooling Pond supplies all process water. This water is filtered before use or storage. The filter backwash is returned to the Cooling Pond.

Demineralized water is produced by treatment through reverse osmosis and an ion-exchange process as described in Section 3.5.4. The reverse osmosis system treats process water to produce a low dissolved solids permeate suitable for treatment by an ion-exchange process. Between 70 and 80 percent of the Cooling Pond water entering the reverse osmosis system will be recovered as permeate. The remaining 20 to 30 percent (reject) will leave the system with roughly three to four times the inlet dissolved solids concentration and will be routed to the Brine Pond for evaporation. Mobile ion-exchange vessels, which are regenerated off-site, perform final demineralization, therefore no demineralizer regeneration wastes are disposed on-site.

3.6.3 Potable Water Treatment

Well water will be chlorinated for potable uses as described in Section 3.5.3.

3.6.4 Sanitary Waste Treatment

The on-site sanitary waste treatment system is described in Section 3.5.2. The collected treatment system solids will be periodically removed from the sludge holding tank and disposed as described in Section 3.7.

3.6.5 Steam Cycle Chemical Feed

The steam cycle will be treated with an oxygen scavenger, such as a dilute hydrazine solution, for dissolved oxygen control and with an amine, such as ammonia solution, for pH control. Hydrazine will break down to ammonia at the system operating temperature. Di- and tri-sodium phosphate solutions will be fed to control scaling and corrosion in the boiler drums. The phosphate will react with calcium hardness in the steam generators to form a non-adherent precipitate, which is removed with boiler blowdown. Boiler blowdown will be high purity water with small amounts of suspended solids and sodium phosphate, and will be routed to the Cooling Pond for reuse.

3.6.6 Chemical Cleaning Wastes

Steam generators and boiler steam cycle components will be chemically cleaned initially during commissioning, and periodically during the life of the plant. Chemicals used for these cleanings will not be permanently stored on-site and will be administered utilizing a temporary system. Typical cleaning chemicals include the following:

- Di- and tri-sodium phosphate
- Chelates, such as ammoniated EDTA and citric acid
- Nonfoaming wetting agents

As authorized by Condition of Certification XVII.L, (modified August 1997), chemical cleaning wastes resulting from the acid cleaning wash and successive rinses may either be collected and characterized individually to determine if they are hazardous wastes or commingled prior to characterization to determine if the mixture is a hazardous waste. Based on the analytical results, the wastes will be handled in accordance with applicable state and federal rules and Conditions of Certification, either on-site in the Brine Pond, on-site in the Cooling Pond, or off-site, as appropriate. Chemical boiler cleaning wastes will be routed to the neutralization basin or to neutralization tanks for hazardous waste characterization. The mixture will then be neutralized and the resulting wastes disposed of appropriately. Any non-hazardous wastewater residual resulting from on-site treatment may either be recycled to the Cooling Pond, disposed of in the Brine Pond or shipped off-site for disposal. Any hazardous waste residues will be transported off-site by a licensed hazardous waste disposal contractor for appropriate treatment and disposal at a licensed hazardous waste facility.

If hazardous wastes regulated under 40 CFR 262-34, are treated on-site in tanks or containers as defined in 40 CFR 260.10, FP will comply with applicable waste analysis plan and notification requirements under 40 CFR 264.13 and 268.9(d). Boiler cleaning wastes treated in an Elementary Neutralization Unit or in a wastewater treatment unit as defined in 40 CFR 260.10 are not subject to these requirements.

3.6.7 Oil Spill Prevention

Oil separators will be provided for separation of oil and grease from contaminated wastewater. Treated wastewater effluent is discharged to the Cooling Pond. Any accumulated oil will be removed from the separator and recycled or disposed off-site by a licensed waste management contractor. Oil separators will be sized to contain the volume of oil produced by the total failure of the single largest source serviced by that separator.

Secondary containment is provided for site facilities containing significant amounts of oil. In the event of a spill, oil will be contained within the secondary containment area and removed for recycling or disposal by a licensed contractor. Drains within the containment area may be directed to the central oil/water separator and will normally be closed. After visual inspection of runoff within the containment area to ensure that no significant release of oil has occurred, the valves are opened to drain collected runoff to the oil/water separator.

3.6.8 Reference

Florida Power 1992. Polk County Site. Site Certification Application.

Siting Board. Final Order Modifying Conditions of Certification. In Re: Application for Plant Certification of Florida Power Polk County Site. DEP Case No. PA 92-33B.

3.7 SOLID AND HAZARDOUS WASTES AND BY-PRODUCTS

The solid and hazardous wastes to be generated at the Hines Energy Complex, including Power Block 3, and their associated methods of treatment, handling, storage and disposal are discussed in the following sections.

3.7.1. Solid Wastes

General solid wastes such as grass clippings, other yard wastes, and circulating water system screenings, will be recycled to the extent possible. Sanitary waste solids are disposed offsite at a licensed facility. Remaining wastes will be transported off-site to a licensed facility for disposal.

Filter backwash solids from service water pretreatment will be returned to the Cooling Pond.

The use of on-site clay settling areas for solid waste disposal as authorized by the 1994 Certification represents a major advantage for this particular power plant site. After ordinary mining reclamation, clays within the settling areas will form an effectively impermeable liner. No additional developments of onsite solid waste disposal facilities are proposed for Power Block 3.

FP has a corporate-wide commitment to waste minimization. This commitment includes extensive recycling of waste products, reduction at the source, and elimination of most hazardous product usage. This corporate commitment will be implemented on a continuing basis at the site.

3.7.2 Hazardous Wastes

Hazardous wastes will be managed in accordance with applicable state and federal regulations.

3.7.3 By-Products

As authorized by the 1994 Certification, FP currently utilizes the existing clay settling area (SA-9) for brine disposal. No additional brine disposal area is needed to support Power Block 3.

3.7.4 References

Florida Power. 1992. Polk County Site. Site Certification Application.

Siting Board. 1994. Final Order Approving Certification. In Re: Application for Power Plant Certification of Florida Power. Polk County Site PA 92-33. DOAH Case No. 92-5308 EPP.

3.8 ON-SITE DRAINAGE SYSTEM

Stormwater runoff associated with Power Block 3 will be managed consistent with the concept approved in the 1994 Site Certification, and explained in the Power Block 2 Supplemental Site Certification Application for all areas within the Hines Energy Complex site.

3.9 MATERIALS HANDLING

3.9.1 Construction Materials

Major components to be constructed at the Hines Energy Complex for Power Block 3 include the following:

- Two combustion turbines
- Two combustion turbine electrical generators
- Two heat recovery steam generators
- One steam turbine electrical generator
- One steam turbine
- Transformers

These components will be delivered to the site by rail or truck. No off-site or on-site upgrading of either rail or road facilities is expected to be necessary to facilitate delivery of construction materials. All oversized deliveries will receive necessary DOT approvals.

Once on site, materials will be unloaded and transported using mobile cranes and trucks. Some of the heaviest items will require rail delivery, multi-axle transport haul trailers, and special rigging for on-site handling.

Fuels for construction vehicles will be stored in fuel storage drums within a contained area in accordance with regulations. Gasoline and diesel fuel for cars and trucks used during construction and operation will be stored in tanks with appropriate secondary containment. Spent lubricants, paints, and solvents will be removed from the site for recycling or for disposal.

The construction sanitary wastewater system will consist of portable, self-contained chemical toilets. Wastes from these chemical toilets will be removed periodically by an off-site service, as needed. The existing site sewage treatment may also be used during the construction period.

Fugitive dust, surface water runoff, and waste disposal associated with material handling during construction will be controlled using the following techniques:

- Dust suppression will be accomplished by watering the unpaved roads, parking lots, and laydown areas, as needed.

- The Plant Island stormwater retention pond will be used to settle suspended sediment from rainfall runoff.

- Construction trash and other non-hazardous debris will be recycled, or will be collected for off-site disposal by a licensed disposal contractor in a permitted disposal facility.

- Commercial salvage of metal wastes will be implemented. If salvage is not feasible, these wastes will be removed from the site by a licensed contractor for recycling or disposal in a permitted disposal facility.

3.9.2 Operational Materials

The handling and storage of fuels for Power Block 3 (natural gas, fuel oil) are discussed in Section 3.3. Handling and storage of wastewater treatment sludge and other lesser-volume wastes are discussed in Section 3.7.

Other operational materials include water and wastewater treatment chemicals, lubrication oils, combustion and ST coolant and HRSG blanketing gas.

Water and wastewater treatment chemicals (e.g., sulfuric acid and sodium hypochlorite) will be stored in tanks adjacent to the water treatment systems. The chemical tanks will be located within containment areas.

Lubrication oil and greases will be stored in lube oil storage drums. The drums will be located within an enclosed curbed area designed to detain 110 percent of the stored material. An (normally closed) emergency drain system will route any spills within the curbed area to the plant oil/water separator.

Lubricating oil also will be stored in equipment-associated lube oil tanks and system piping. This equipment and piping will either be enclosed in a containment area or will be within an area protected by a drain system to the oil/water separator.

Nitrogen and carbon dioxide gases may be stored in bottles adjacent to the gas distribution system that serves the units.

TABLE OF CONTENTS
SECTION 4

TABLE OF CONTENTS
SECTION 4
(Continued)

4.1 LAND IMPACT

For reference, the Hines Energy Complex site has been divided into six general areas as listed below:

- Plant Island Area
- Cooling Pond Area
- Water Crop Areas
- Brine Pond Area
- Buffer/Mitigation Areas
- McCullough Creek Watershed

4.1.1 General Construction Impacts

4.1.1.1 Plant Island Area

The Plant Island area is described in Section 3.2.1. There are no impacts to land except for minor grading in the 5-acre parcel that will contain Power Block 3. Mass earthwork activities necessary for construction of the Power Block 3 area were performed during initial site development activities that were completed in August 1996. The resultant topography was presented in the As-Built Drawings for Earthwork Construction dated November 1996 that are on file with the DEP. Only localized impacts are expected from installation of foundation systems and infrastructure piping systems to support Power Block 3.

The discussion of the impacts to surface water bodies by the topographical changes is presented in Section 4.2, and a discussion of impacts to biota is presented in Section 4.4.

4.1.1.2 Cooling Pond Area

The existing 722-acre Cooling Pond construction was completed in August 1996 and is capable of supporting Power Blocks 1, 2 and 3. Expansion of the existing Cooling Pond, therefore, is not required for Power Block 3. The description of the Cooling Pond area is provided in Section 3.2.2. There will be no land impacts associated with the Cooling Pond during the construction of Power Block 3 other than the construction of a new cooling water intake/discharge structure.

4.1.1.3 Water Crop Areas

Runoff from all of the Hines Energy Complex site areas, with the exception of SA-9, SA-10, SA-12 South, N-9B, N-11A, N-13 and Tiger Bay, will be used as an alternative water supply to provide Cooling Pond makeup water in support of Power Blocks 1 and 2. There will be no land impacts associated to Water Crop Areas during the construction of Power Block 3.

4.1.1.4 Brine Pond Area

The Brine Pond was constructed during the summer/fall of 1997 within former clay settling area SA-9. Brine enters the pond near the southwestern corner of the area. The Brine Pond utilizes the existing waste phosphatic clays as its liner system. No additional construction is anticipated in the Brine Pond during Power Block 3 construction.

4.1.1.5 Buffer/Mitigation Areas

Construction of the Buffer/Mitigation Area (N-9B, N-11A, N-11C, N-13, and Tiger Bay) was authorized by the 1994 Certification and is complete. No new construction authorization in the Buffer/Mitigation Area is being sought to support Power Block 3.

4.1.1.6 McCullough Creek Watershed

SA-10 and SA-12 South are considered headwater areas for McCullough Creek. Runoff from these areas is released slowly into the McCullough Creek system with a control weir at the northeast corner of SA-12 South. No new impacts associated with Power Block 3 are anticipated for these areas.

4.1.2 Roads

There will be no new roads constructed to support Power Block 3. The existing plant access road which will service Power Blocks 1, 2 and 3, presently connects to CR 555 and is paved and striped. There will be no land impact due to construction of roads.

4.1.3 Flood Zones

No impacts beyond those addressed as part of the 1992 SCA will occur during the construction phase of Power Block 3.

4.1.4 Topography and Soils

Impacts to soils and topography by power plant construction have been addressed in Section 4.1.1.1.

4.1.5 References

Florida Power. 1992. Polk County Site. Site Certification Application.

4.2 IMPACT ON SURFACE WATER BODIES AND USES

4.2.1 Impact Assessment

4.2.1.1 Off-Site Water Bodies

The off-site water bodies in the vicinity of the Hines Energy Complex include the Peace River, Camp Branch and McCullough Creek. Barber Branch, formerly located within and adjacent to the northeast corner of the site, has been mined and no longer exists in the site vicinity. The Six Mile Creek drainage has also been mined in the vicinity of the site. However, a substantial portion of the Six Mile Creek drainage will be proposed to be reestablished through off-site mine reclamation activities.

Site development activities associated with Power Block 3 include construction of the power generating units, the cooling and process water systems, the Unit 3 stormwater drainage facilities, and the associated on-site transmission and substation facilities.

Only minimal (if any) localized dewatering for foundation and infrastructure installation will be utilized for the construction activities for Power Block 3. As a result, no construction impacts to off-site water bodies are anticipated from dewatering. Section 4.3 provides details of construction dewatering impacts.

4.2.1.2 On-Site Water Bodies

Because only minimal, if any, localized dewatering in and around Power Block 3 will be required during Power Block 3 construction activities, no impacts are anticipated to Tiger Bay, the only onsite water body over which DEP, SWFWMD, and Polk County have claimed jurisdiction.

4.2.2 Measuring and Monitoring Programs

Since the potential for any impacts to surface water bodies from the construction of Power Block 3 is minimal, no new measuring or monitoring programs are proposed.

4.2.3 References

Florida Power Corporation. 1992. Polk County Site. Site Certification Application.

4.3 GROUND WATER IMPACTS

4.3.1 Construction Dewatering Impact Assessment

Temporary dewatering activities may be required during the construction of Power Block 3 and associated facilities. The following is a list of structures and/or equipment that may require dewatering activities due to the depth of the installation:

- Circulating Water Intake Structure (27 feet deep)
- Circulating Water Pipe Lines (15 feet deep)
- Circulating Water Discharge Structure (10 feet)
- Oil Water Separator & Waste Water Lift Station (20 feet deep)
- Two Boiler Blowdown Sumps (10 feet deep)

Dewatering for these structures and equipment will be performed using well points or open pit sump pumps. This type of dewatering will only affect the ground water in a very localized area, thereby, minimizing the impact on the ground water table.

The areas where dewatering may be required are all within the Plant Island. The soils at the Plant Island consist of engineered, compacted fill soil. The hydraulic conductivity of the engineered fill material in the Power Block area typically will be lower than found in the natural, undisturbed Surficial aquifer. As reported by Hutchinson (1978) the transmissivity of the Surficial aquifer averaged 1,900 ft^2/day. Using an aquifer thickness of 35 feet, the hydraulic conductivity of the Surficial aquifer in an undisturbed condition will typically be on the order of 50 ft/d (feet per day) or less. Where compacted, engineered fill material is located in the Plant Island, the hydraulic conductivity of the backfilled soil is expected to be much lower. Based on grain size analyses and compaction data, the hydraulic conductivity of the engineered fill is expected to be less than 50 ft/d.

Two temporary piezometers were installed in the engineered fill material near the proposed excavation locations. Piezometer 1 was installed in the Plant Island south of the Cooling Pond and piezometer 2 was installed near the northwest corner of Power Block 2. The piezometers were installed to measure the depth to the water table near the locations proposed for subsurface placement of the equipment and structures. Ground water levels were measured on November 19, 1998. The depth to ground water in piezometer 1 was 19.2 feet below grade while the water level in piezometer 2 was 25.6 feet below grade.

The proposed excavation depths will range up to approximately 30 feet. Because of the depth to the water table, as measured in the piezometers, lowering of the water table for excavation and construction will be minimal and localized.

The dewatering will be accomplished using standard construction dewatering techniques. Either well points will be installed surrounding the area to be excavated; or the excavation will be dewatered by pumping from the excavation. Discharge from dewatering systems will be localized and remain on-site.

SWFWMD Rule 40D-2.051(1)(f) states that no permit is required for temporary dewatering for construction of buildings or other foundations and roadways or for installation of utility pipeline, cables, culverts, and catch basins. The dewatering for the structures and equipment listed above would not require a dewatering permit from SWFWMD.

4.3.2 Ground Water Supply Wells

Two wells will be drilled to tap the Floridan Aquifer to provide make-up water to the Cooling Pond for Power Block. Seventeen and one-half MGD of ground water was permitted to support generating capacity beyond the first 940 MW in the 1994 Site Certification. The ground water supply wells will have 20-inch diameter casing and a total well depth of about 880 feet. Each well is expected to be equipped with a 2000 gpm pump. The wells will be located on the south side of the Cooling Pond, near the cooling water intake structure.

4.3.2 References

Hutchinson, C.B. 1978. Appraisal of Shallow Ground-Water Resources and Management Alternatives in the Upper Peace and Eastern Alafya River Basins,

Florida. U.S. Geological Survey, Water Resources Investigation 77-124.

SWFWMD, 1998. Consumptive Use of Water, Rule 40D-2.051(1)(f). July 1998.

Florida Power Corporation. 1992. Polk County Site. Site Certification Application.

4.4 ECOLOGICAL IMPACTS

4.4.1 Impact Assessment

The 1992 SCA addressed impacts associated with full site buildout. Impact assessment in this Supplemental SCA is based on whether the addition of Power Block 3 results in any additional ecological impacts not already reviewed and approved by the 1994 Certification.

4.4.1.1 Site Construction

The construction of Power Block 3 will be limited to land already cleared and prepared for this project. Construction will be limited to land that has been previously cleared during the site preparation phase of the project. No ecological impacts beyond those approved by the 1994 Certification are anticipated.

4.4.1.2 Environmental Management and Protection Plans for Construction

The FP Construction Compliance Manual will be used to maintain compliance during construction activities. This manual contains all necessary permits and procedures that must be followed.

Because construction of Power Block 3 will occur within the Plant Island area, and all runoff will be contained onsite, no further protective measures are necessary.

4.4.1.3 Aquatic Ecology

Negative impacts to aquatic habitats are not expected because the site preparation work has already taken place and because native aquatic habitats are separated from construction areas on the site.

4.4.1.4 Vegetation Communities

No adverse impacts to important native vegetation communities are expected with development of Power Block 3 because all construction will take place on lands previously cleared and prepared for this and additional units.

4.4.1.5 Enhancement Plan

As a part of the 1994 Certification, an environmental enhancement plan was proposed for development of the Hines Energy Complex site. The plan consisted of three major features: the acquisition of a portion of the Hooker's Prairie/Peace River Wildlife Corridor, the planting of native vegetation communities in the Buffer/Mitigation area, and the construction of the McCullough Creek drainage enhancement project.

The wildlife corridor component was acquired and a conservation easement was granted to the State in 1994.

Non-mandatory parcels N-11A, N-13, and N-9B have been reclaimed and provide a Buffer/Mitigation area of approximately 1,115 acres. These areas were reclaimed and revegetated to provide upland and wetland assemblages, in accordance with reclamation plans approved by the FDEP Bureau of Mine Reclamation. The post-reclamation vegetative cover in these Buffer/Mitigation areas will consist of a combination of various upland and wetland communities designed to represent naturally occurring systems and provide a wide variety of wildlife habitat. Emphasis has been put on the creation of habitat for native species of plants and animals.

4.4.1.6 Threatened or Endangered Animal and Plant Species

Only land previously developed to accommodate the Hines generating facilities will be affected by construction activities associated with Power Block 3. Therefore, the project is not expected to affect threatened or endangered species populations.

4.4.2 Monitoring Programs

Because construction will occur in limited areas and mostly on land recently cleared and graded, no significant impacts are expected to occur to important ecological resources and no monitoring program is needed.

4.4.3 References

Florida Power Corporation. 1994. Construction Compliance Manual.

Florida Power Corporation. 1992. Polk County Site. - Site Certification Application.

4.5 AIR IMPACT

4.5.1 Air Quality Impacts

During the construction period, unavoidable air pollutant emissions are likely to occur from various construction-related activities. The most prevalent construction emissions are fugitive dust. However, minor emissions of nitrogen oxides (NO_x), sulfur dioxide (SO_2), carbon monoxide (CO), particulate matter, and volatile organic compounds (VOCs) are also likely during construction. Emissions of these pollutants generally are minimized through standard control measures.

4.5.1.1 Fugitive Dust

Fugitive dust is generally defined as natural and/or man-associated dusts that become airborne due to the forces of wind or human activity. Construction-phase fugitive dust emissions may be generated during site grading, excavation, vehicular activity, and other construction activities.

The quantities of fugitive dust emitted by the site construction vehicular traffic will be dependent on a number of factors, including the frequency of operations, specific operations being conducted, weather, and soil conditions. During construction, dust control measures will be used and will typically require moisture conditioning of the construction areas and along the defined roadways between these areas.

4.5.1.2 Other Air Pollutant Emissions

It is anticipated that total gaseous emissions during construction will be extremely small. Potential sources of VOC emissions include evaporative losses associated with on-site painting, refueling of construction equipment, and the application of adhesives and waterproofing chemicals. The frequency and extent of these activities are limited and they will have minimal impact on air quality.

Exhaust emissions from construction equipment will also contain small amounts of NO_x, SO_2, CO, particulate matter, and VOCs resulting from incomplete combustion of fuel. However, due to the nature of heavy-duty diesel-powered construction vehicles, which allow for more complete combustion and less volatile fuels than spark-ignited engines, these emissions are relatively low.

Open burning will emit particulate matter, CO, hydrocarbons, sulfur oxides, and NO_x. Open burning of construction debris may occur if the composition of that debris consists of wood products and other relatively clean-burning components. Pollutant emissions from debris burning will depend upon the amount and moisture content of the debris.

4.5.2 Air Quality Control Methods

The impact of heavy construction activities and site preparation on air quality will be short term and confined to the immediate vicinity of the construction activity. This is primarily because most of the fugitive dust created by construction traffic and earth-moving operations consists of relatively large particles. These large particles tend to settle quickly rather than remain suspended for transport over long distances.

Job site guidelines for minimizing emissions of fugitive dust from identifiable construction sources will include a combination of the following techniques (if applicable):

- Contractors will be instructed to comply with any applicable state and local regulations governing open-bodied trucks hauling sand, gravel, or soil between on-site and off-site areas. This could include providing covers or moistening the load with water and wheel washing to reduce dusting.
- Areas disturbed during construction will be stabilized by mulching or seeding as soon as practical.
- When construction occurs on bare ground, water (possibly together with wetting agents) will be used as necessary to suppress dust.
- Temporary vehicular surfaces of crushed rock may be used in high traffic areas. Areas not subject to heavy traffic or continual disturbance will be wetted down using nontoxic substances to suppress dust.
- On-site concrete batch plants will be equipped with dust control systems that effectively mitigate off-site impacts.

Sandblasting operations will be located in isolated areas to minimize effects on adjacent work areas. Protective covers will also be utilized where practicable.

Only minor short-term air quality impacts are expected to result from open burning since these operations will be conducted in compliance with FDEP air pollution control regulations (Chapter 62-256 F.A.C.) that are applicable in rural areas.

Because of the mitigative measures that will be employed, it is not expected that vehicular emissions, fugitive dust, or smoke from open-burning operations will present any significant air quality problems during the construction period.

4.5.3 Ambient Air Quality Monitoring Program

Air quality monitoring for construction-related fugitive dust or other air pollutants is not being proposed. Periodic visual inspections of the job site will be conducted to ensure compliance with guidelines for minimizing emissions of fugitive dust during construction of the proposed facility.

4.6 IMPACT ON HUMAN POPULATIONS

The construction site is located in southwestern Polk County. The city of Fort Meade, which is located approximately 5 miles southeast of the Plant Island, is the largest population center in the vicinity. The unincorporated community of Homeland is approximately 1 mile northeast of the site boundary. Since the entire area around the site has historically been dominated by phosphate mining, operation of heavy machinery and large volumes of truck traffic in the area are common. Construction activities on-site are not expected to have a significant impact on these communities.

4.6.1 Construction Traffic Impacts

The employment of construction workers will create traffic impacts on the external roadway network. The magnitude of the traffic impact will be directly related to the number of construction workers. Traffic generated during the construction of Power Block 3 will not exceed the traffic levels generated by the construction of the Hines Energy Complex Power Block 1.

A traffic impact analysis was completed and submitted with the 1992 SCA. That traffic analysis addresses anticipated peak construction employment and full buildout.

The traffic impact analysis was reviewed by Polk County and the Florida Department of Transportation. As a result, a series of improvements became the subject of conditions of the Polk County CUP and the 1994 Conditions of Certification. The conditions relate to the need for roadways or intersection improvements to a level of employment and provide for monitoring of employment and traffic conditions to determine the timing of improvements.

Traffic monitoring was conducted during the construction of Power Block 1. All necessary roadway/traffic control improvements required by the 1994 Conditions of Certification (XXIX and XXX.8) and the Polk County CUP have been completed. No increased construction traffic impacts are anticipated for the construction of Power Block 3, and therefore, additional improvements are not required.

4.6.2 Socioeconomic Impacts

Construction of Power Block 3 is scheduled to begin in early 2004 and end by late 2005. Over the approximate two-year construction period, the construction workforce is expected to peak at 350 and average 145 employees. Annual payroll over the two-year construction period is estimated at $15 million. Actual experience during construction of Power Block 1 and Power Block 2 show that most construction workers were drawn from Polk County and the Central Florida area, and they commuted daily to the job site. Consequently, construction of Power Block 3 is not expected to have a significant impact on Polk County's public services or housing market.

4.6.3 Construction Noise Impacts

Construction noise impacts from construction of all phases up to 3000 MW of ultimate site capacity were analyzed and shown to comply with applicable noise criteria as part of the 1992 SCA. The 1994 Certification finds these noise criteria will be met during construction of each future phase, including the proposed Power Block 3. This noise impact analysis is presented to reaffirm that earlier analysis and demonstration of no adverse impacts.

The construction of a power plant can be divided into five distinct phases for purposes of assessing potential noise impacts (Barnes et al., 1976). These include:

- Site preparation, including grading and excavation
- Concrete pouring
- Steel erection
- Machinery installation
- Site cleanup and plant start-up.

During the initial site preparation and foundation excavation phase, heavy diesel-powered earth moving equipment is the major source of noise. This equipment includes bulldozers, graders, roller compactors, dump trucks, backhoes, and front-end loaders. With the completion of Power Block 1 and the associated Cooling Pond, much of the site preparation activities have been completed. For Power Block 3, these activities will be minimal and primarily associated with the foundations for Power Block 3.

Equipment used during the concrete pouring stage includes concrete trucks, cranes, and some earth moving equipment for backfilling foundations. The steel erection phase requires the use of cranes in varying sizes, air compressors, welders, material delivery trucks, concrete trucks, and front-end loaders. The machinery installation phase requires the same types of equipment as the steel erection phase.

The final phase, consisting generally of site cleanup and plant start-up activities, is typically about 10 decibels quieter than the other phases (Barnes et al., 1976), except during the short periods of time when the steam lines are being cleaned. High-pressure steam is blown through the lines to remove scale or welding debris to prevent such material from passing through the turbines, where they could damage the turbine blades. The steam is vented directly to the atmosphere through a temporary bypass line constructed specifically for that purpose. During the construction of Power Block 1, continuous low pressure "wet" steam was used. This procedure, which is expected to be used for Power Block 3, produced much lower noise levels than conventional steam venting and resulted in noise levels of 90 dBA at about 50 feet. In contrast, conventional steam venting results in a peak sound pressure level at 50 feet of approximately 129 dBA. In setting the steam safety valves, steam will be released for about 6 minutes with a corresponding sound pressure level at 50 feet of approximately 121 dBA.

The temporary steam line blow out activity will produce noise levels less than 42 dBA at the nearest residences for a short duration. This impact is not considered significant because the duration is very short, the frequency of occurrence is low and the sound level produced is about the same as noise from a truck passing by on the highway.

Noise impacts have been assessed for Power Block 3 construction activities combined with the operation of Power Block 1 and Power Block 2. Because of the large separation between the plant site and the nearest residences (about 2.9 miles), the construction noise levels will be reduced to less than 40 dBA at the residences. This level is significantly below the existing 24-hr equivalent noise level of about 57 dBA measured at Location 1 near the residences closest to the Plant Island (see Section 2.3.8). Noise from construction activities and the operation of Power Block 1 and Power Block 2 would raise the noise levels by less than 1 dBA from the 24-hour leq at Location 1, an increase in the existing noise level that would not be noticeable. Consequently, normal construction activities associated with the construction of Power Block 3 will have an insignificant effect on the noise levels at residences in the vicinity of the Hines Energy Complex.

The construction work force, material delivery vehicular traffic levels and, consequently, the traffic noise impact levels will vary in relation to the size of the work force. The peak work force stage of the maximum impact scenario is expected to occur when the peak amount of construction workers will be on-site. The increase in traffic volume is expected to result in a temporary increase in traffic noise levels from 3 to 5 dBA on CR 555 between CR 630 and CR 640. Increases on other area roads will be significantly lower. Generally, increases of this low level are only slightly noticeable and they are particularly insignificant in this case since there are no noise receptors on this portion of the road. Consequently, no significant noise impact is anticipated from the construction of Power Block 3.

4.6.4 References

Barnes, J.D., L. N. Miller and E. W. Wood. 1976. Prediction of Noise from Power Plant Construction. Bolt Beranek and Newman, Inc. Report No. 3321.

Submittal to Empire State Electric Energy Research Corporation. Schenectady, New York.

Florida Power Corporation. 1992. Polk County Site - Site Certification Application.

4.7 IMPACT ON LANDMARKS AND SENSITIVE AREAS

The proposed site is located in an area that has been dominated by phosphate mining operations for the past several decades. There are no regional scenic, cultural, or natural landmarks within five miles of the site. Therefore, there will be no impact on landmarks or sensitive areas.

4.8 IMPACT ON ARCHAEOLOGICAL AND HISTORIC SITES

The Florida Department of State, Division of Historical Resources (DHR) has stated that because of the project location and/or nature, it is unlikely that any significant archaeological or historical sites will be affected.

4.9 SPECIAL FEATURES

No special features such as described in the SCA guidelines are expected to be associated with the construction of Power Block 3.

4.10 BENEFITS FROM CONSTRUCTION

The Hines Energy Complex site is located on lands that have been previously disturbed by phosphate mining activities. The project site contains both mandatory and non-mandatory lands.

Construction of plant facilities will result in a higher assessed value on the property than would otherwise be expected for reclaimed or unreclaimed phosphate lands. The reclamation of the mined phosphate lands for use as a power plant and associated facilities results in an increase in Polk County's property tax base and property tax revenues.

Construction at the Hines Energy Complex site will also result in increased employment and wages in Polk County, both through direct jobs and indirect jobs created as a result of the project. In addition to the direct construction jobs, construction of the project will result in the creation of indirect jobs in associated industries and support (retail and service) industries throughout Polk County.

4.11 VARIANCES

No construction related variances are expected to be required. Construction of the site will meet all applicable local, regional, state, and federal guidelines.

TABLE OF CONTENTS
SECTION 5

LIST OF TABLES
SECTION 5

5.1 EFFECTS OF THE OPERATION OF THE HEAT DISSIPATION SYSTEM

5.1.1 Temperature Effect on Receiving Body of Water

There will be no discharge of heated effluent to surface water from the Power Block 3 Cooling Pond. This section is not applicable.

5.1.2 Effects on Aquatic Life

There will be no discharge of heated effluent to marine or fresh waters from the Power Block 3 Cooling Pond. Additionally, there will be no intake or discharge structures located in off-site surface waters. This section is not applicable.

5.1.3 Biological Effects of Modified Circulation

There will be no discharge of heated effluent to marine or fresh waters from the Power Block 3 Cooling Pond. Additionally, there will be no intake or discharge structures located in off-site surface waters. This section is not applicable.

5.1.4 Effects of Offstream Cooling

The Cooling Pond is expected to operate at temperatures not significantly higher than ambient air and water temperatures, therefore, the Cooling Pond is not expected to produce fog in greater than normal amounts.

5.1.5 Measurement Program

Since no additional adverse effects are anticipated from operation of the heat dissipation system, FP does not propose any new measurement or monitoring programs.

5.2 EFFECTS OF CHEMICAL AND BIOCIDE DISCHARGES

5.2.1 Industrial Wastewater Discharges

There will be no industrial wastewater discharge from the Hines Energy Complex. Consequently, this section is not applicable.

5.2.2 Cooling Tower Blowdown

There will be no cooling tower blowdown from the Hines Energy Complex. Consequently, this section is not applicable.

5.2.3 Measurement Program

Since there is no potential for any industrial wastewater discharge from the Hines Energy Complex, no new measuring or monitoring programs are proposed.

5.3 IMPACTS ON WATER SUPPLIES

5.3.1 Surface Water

The off-site surface water bodies in the vicinity of the Hines Energy Complex include the Peace River, Camp Branch and McCullough Creek. Barber Branch, formerly located within and adjacent to the northeast corner of the site, has been mined through and no longer exists in the site vicinity. The Six Mile Creek drainage has also been mined through in the vicinity of the site. However, a portion of this drainage has been, or will be, reestablished through off-site mine reclamation activities. No impacts to off-site surface water bodies due to the operation of Power Block 3 are expected.

5.3.2 Ground Water

FP's water use plans for the Hines Energy Complex, as authorized in the 1994 Certification, incorporate all of the aspects of the District's long term and overall strategy. The Hines Energy Complex has refined and continues to refine its understanding of the water resources available to the plant through extensive ground water investigations and ongoing surface water studies. Water use plans for the facility incorporate alternative water supply sources including use of reclaimed water, water cropping, and water conservation in order to minimize groundwater withdrawals. In addition, to fully support the water use needs associated with Power Block 3, up to 17.5 MGD of groundwater withdrawals, as authorized in the 1994 Site Certification, are available.

5.3.2.1 Cooling Pond

The operational impacts of Power Block 3 on the Cooling Pond will not cause any additional ground water impacts beyond those already addressed.

5.3.2.2 Brine Pond

No additional impacts to the Brine Pond area are expected from the addition of Power Block 3.

5.3.2.3 Impacts of On-Site Solid Waste Disposal

The impacts associated with on-site solid waste disposal for the plant were presented in the 1992 SCA. No changes in those impacts are anticipated because of operation of Power Block 3, since there will be no on-site disposal of solid waste.

5.3.3 Drinking Water

5.3.3.1 Impacts of Withdrawal from a Drinking Water Source

Up to 5,000 GPD of ground water withdrawals for drinking and sanitary water are authorized in the 1994 Certification. This amount continues to be sufficient to support the addition of Power Block 3. Impacts to drinking water sources due to the groundwater withdrawals proposed in this application were reviewed and approved in the 1994 Site Certification.

5.3.3.2 Impacts of Discharge to a Drinking Water Source

A zone of discharge was authorized for the future solid waste disposal area, the Brine Pond, and the Cooling Pond at the Hines Energy Complex under the 1994 Certification (See Condition of Certification No. XVIII.A.1). The zone of discharge extends horizontally 100 feet out from the outside toe of the earthen dam along a consolidated boundary surrounding these facilities. The vertical extent of the zone of discharge is to the top of the Tampa member of the Hawthorn Group.

Discharges to groundwater from the Cooling Pond, Brine Pond, and solid waste disposal area for full site buildout (3000 MW) were addressed in the 1992 SCA. No impacts of ground water discharge are expected to a drinking water source due to the operation of Power Block 3.

5.3.4 Leachate and Runoff

Impacts to groundwater due to runoff or leachate are not anticipated.

5.3.5 Measurement Program

As required by Condition XVIII.A.9 of the 1994 Certification, FP has established a ground water monitoring program at the Hines Energy Complex. FP has implemented a ground water monitoring program which consists of the collection and analysis of ground water samples from six (6) Intermediate aquifer monitor wells and one (1) Upper Floridan aquifer monitor well.

5.3.6 References

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FDER (Florida Department of Environmental Regulation). 1990. Florida Solid Waste Disposal Facilities Regulations. Florida Administrative Code, Title 17. The Bureau of National Affairs Inc. Washington, D.C.

FIPR (Florida Institute of Phosphate Research). 1991. Volume 1. Documentation on FIPR hydrologic model. FIPR Project No. 88-03-085. Bartow, Florida.

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McDonald, M.G., and Harbaugh, A.W. 1988. A Modular Three-Dimensional Finite- Difference Ground Water Flow Model.

National Oceanic and Atmospheric Administration (NOAA). 1980-1990. Climatological Data, Florida; Annual Summary. U.S. Department of Commerce. Asheville, North Carolina.

Neuman, S. P. and P. A. Witherspoon. 1970. Finite Element Method of Analyzing Steady Seepage with a Free Surface. Water Resources Research. June 1970.

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Ryder, P. D. 1982. Digital Model of Predevelopment Flow in the Tertiary Limestone (Floridan) Aquifer System in West-Central Florida. U.S. Geological Survey Water-Resources Investigations 81-54.

Schroeder, P. R., B. M. McEnroe, and J. Sjostrum. 1988. Hydrologic Evaluation of Landfill Performance Model. U. S. Army Engineering Waterways Experiment Station.

Stewart, H. G. 1966. Ground Water Resources of Polk County. Florida Geological Survey. Report of Investigation No. 44.

SWFWMD (Southwest Florida Water Management District). 1987. Aquifer Characteristics Within The Southwest Florida Water Management District. SWFWMD Resource Management Department. Brooksville, Florida.

SWFWMD. 1989. Water Use Permit Information Manual. October 1989. Brooksville, Florida.

SWFWMD. 1991. Water Supply Needs and Sources, 1990-2020. Draft 4/29/91. Brooksville, Florida.

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USGS. 1990. Water Resources Data, Florida, Water Year 1990, Volume 3A, Southwest Florida Surface Water, USGS Water Data Report FL-90-3A. Tallahassee, Florida.

5.4 SOLID / HAZARDOUS WASTE DISPOSAL IMPACTS

5.4.1 Solid Waste

Solid wastes to be generated during plant operations are discussed in Section 3.7. General solid wastes, such as grass clippings, yard wastes and circulating water system screenings, will be recycled to the extent possible. Waste paper will be recycled where practical. Remaining solid wastes, such as office waste, will be transported off-site for disposal at a licensed waste disposal facility. No disposal of solid waste will occur on-site due to the operation of Power Block 3.

FP has a corporate-wide commitment to waste minimization. This commitment includes extensive recycling of waste, source reduction, and elimination of most hazardous waste product usage. The corporate commitment will be implemented on a continuing basis at the site.

Due to FP's significant recycling efforts and the minimal amount of solid waste to be generated by operation of Power Block 3, impacts related to off-site landfill operations and landfill space are negligible.

5.4.2 Hazardous Waste

No hazardous waste will be disposed on the Hines Energy Complex site.

Management of hazardous waste during plant operations will be in accordance with state and Federal regulations, specifically 40 CFR Part 262: Standards Applicable to Generators of Hazardous Wastes. If hazardous wastes are generated during the cleaning of steam generators and boiler steam cycle components, the wastes will be handled as discussed in Section 3.6.6.

The Hines Energy Complex uses mercury containing lamps and batteries that are regulated as Universal Wastes under federal (40CFR 273 and State Regulation (62-737, FAC)). FP complies with handling and disposal requirements for all Universal Wastes.

5.5 SANITARY AND OTHER WASTE DISCHARGES

Treatment of sanitary wastes generated during operation of Power Block 3 is discussed in Section 3.5.2. After treatment in the permitted on-site treatment plant, wastewater is routed to the Cooling Pond. Biodegradable solids collected in the treatment system are collected in a holding tank and disposed off-site at a licensed facility. No other related waste discharges will occur.

Wastewater reuse results in a slight reduction of water demand from other sources. No significant impacts are expected from the off-site disposal of the biodegradable solids.

5.6 AIR QUALITY IMPACTS

5.6.1 Impact Assessment

The air quality impacts of Power Block 3 are fully discussed in Sections 6, 7, and 8 of the PSD permit application provided as Appendix 10.1.5. Therefore, the analyses that address these air quality impacts are not repeated in their entirety in this section. A summary of the results of these analyses is presented in this section.

Air quality dispersion modeling analyses of the potential impacts of air emissions from the proposed Power Block 3 were performed for those pollutants which had proposed emissions greater than the PSD significant emission rates: Particulate Matter, SO_2, NO_x, and CO. These analyses were performed to address compliance with AAQS and PSD Class I and II increments.

For both natural gas-firing and oil-firing conditions, the ISCST3 air dispersion model was used to determine the maximum ambient air quality impacts for nine modeling scenarios that covered the range of operating loads and air inlet temperatures that the combustion turbines for Power Block 3 would likely experience. For each fuel, the nine modeling scenarios were as follows:

- Baseload operations for air inlet temperatures of 20°F, 59°F, and 90°F (natural gas-firing)/105°F (oil firing);
- 80% load for 20°F, 59°F, 90°F (natural gas-firing)/105°F (oil firing); and
- 60% load (for natural gas-firing)/65% load (oil-firing) for 20°F, 59°F, and 90°F (natural gas-firing)/105°F (oil firing).

Pollutant concentrations were predicted in a receptor grid containing more than 700 receptors that covered an area out to 50 kilometers from the site. Concentrations were predicted using five years of surface and upper air meteorological data for the years 1991 through 1995 from the National Weather Service (NWS) stations in Tampa and Ruskin, respectively. These data have been recommended and approved for use by the DEP in previous air permit applications to address air quality impacts for proposed sources locating in Polk County and adjacent counties.

In addition, pollutant concentrations were predicted at receptor locations placed at the boundary of the Chassahowitzka National Wilderness Area (NWA), which is located 118 kilometers from the plant site and is the nearest PSD Class I area. At distances beyond 50 km from a source, the EPA and FDEP currently recommend the CALPUFF model for predicting impacts. The CALPUFF model is a long-range transport model that was specifically developed for estimating the air quality impacts in areas that are more than 50 km from a source. As a result, the CALPUFF model was used to address impacts from Power Block 3 at the Chassahowitzka NWA.

The results of the ISCST3 and CALPUFF modeling analyses are summarized in Tables 5.6-1 and 5.6-2. In Table 5.6-1, the highest concentrations predicted for Power Block 3 for each pollutant are compared to the corresponding PSD Class II significance levels, PSD Class II increments, and ambient air quality standards. In Table 5.6-2, the highest concentrations predicted for Power Block 3 at the Chassahowitzka NWA are compared to the PSD Class I significance levels. As shown in these tables, the maximum concentrations for all pollutants are predicted to be less than the EPA PSD significance levels. Therefore, Power Block 3 will not have a significant impact on the ambient air quality of central Florida. In addition, these modeling results demonstrate that the maximum impacts predicted for Power Block 3 will not cause or contribute to an exceedance of any PSD increments or ambient air quality standards. Finally, since the impact of Power Block 3 on the Chassahowitzka NWA is less than significant and based on a regional haze analysis performed, there will not be a significant impact to the visibility in the NWA.

Table 5.6.1-1

SUMMARY OF MAXIMUM CONCENTRATIONS PREDICTED FOR POWER BLOCK 3 COMPARED TO THE PSD CLASS II SIGNIFICANT IMPACT LEVELS

Pollutant	Averaging Period	Maximum Predicted Concentration [a] ($\mu g/m^3$)	Polar Location [b]		Year	Significant Impact Level ($\mu g/m^3$)	Distance to Significant Impact Level (km)	Predicted Impact Greater than the Significant Impact Level? (Yes/No)
			Dir. (deg.)	Dist. (m)				
Carbon Monoxide	1-Hour	80	76	412	1993	2,000	None	No
	8-Hour	25.6	117	447	1993	500	None	No
Nitrogen Dioxide	Annual	0.094	90	1500	1992	1	None	No
Sulfur Dioxide	3-Hour	17.1	130	500	1993	25	None	No
	24-Hour	4.1	117	447	1993	5	None	No
	Annual	0.037	90	1500	1992	1	None	No
Particulate Matter (PM_{10}) [c]	24-Hour	2.5	117	447	1993	5	None	No
	Annual	0.039	90	1500	1992	1	None	No

(a) Concentrations are highest values for this analysis; annual average concentrations based on firing natural gas and fuel oil for 7,760 and 1,000 hours, respectively.

(b) With respect to zero point of 414.30 km E; 3,073.88 km N.

(c) As a conservative approach, all project emissions of particulate matter were assumed to be in the form of PM_{10}.

N/A = Not applicable

Golder, 2002.

Table 5.1.6.2

SUMMARY OF MAXIMUM CONCENTRATIONS PREDICTED FOR POWER BLOCK 3 COMPARED TO THE PSD CLASS I SIGNIFICANT IMPACT LEVELS				
Pollutant	**Averaging Period**	**Maximum Concentration Predicted for Power Block 2 [(a)] (μg/m^3)**	**PSD Class I Significant Impact Level (μg/m3)**	**Predicted Impact Greater than the PSD Significant Impact Level? (Yes/No)**
Sulfur Dioxide (SO_2)	3-Hour	0.39	1.0	NO
	24-Hour	0.15	0.2	NO
	Annual	0.0012	0.1	NO
Particulate Matter (PM_{10})	24-Hour	0.11	0.3	NO
	Annual	0.0014	0.2	NO
Nitrogen Dioxide (NO_2)	Annual	0.0014	0.1	NO

[(a] Concentrations are highest values for this analysis; annual average concentrations based on firing natural gas and fuel oil for 7,760 and 1,000 hours, respectively.

Source: Golder, 2002

5.7 NOISE

5.7.1 Impact Assessment

Noise impacts from operation of all phases up to 3000 MW of ultimate site capacity were analyzed and shown to comply with applicable noise criteria as part of the 1992 SCA. The 1994 Certification finds these noise criteria will be met during operation of each future phase, including the proposed Power Block 3. The 2000 supplemental certification application noise impact analysis reaffirmed the earlier analysis and demonstrated that no adverse impacts will occur because of the addition of Power Block 2. This noise impact analysis is presented to demonstrate that no adverse impacts will occur as a result of the addition of Power Block 3.

The potential noise impacts for the addition of Power Block 3 were determined based on the equipment manufacturers' far-field noise guarantee of 70 dBA at 400 feet for Power Block 1. Measurements taken during May 2000 as part of an ambient noise survey for Power Block 2 found actual noise levels of less than 70 dBA while Power Block 1 was operating. However, using the far-field noise guarantee of 70 dBA at 400 feet provides conservative estimates of noise impacts. Since the equipment will be substantially similar for Power Blocks 1,2, and 3, the operational noise levels for Power Block 3 were assumed the same as Power Blocks 1 and 2. This would produce a worst-case far-field noise level of 74.8 dBA at 400 ft from Power Blocks 1, 2, and 3, which is within the Hines Site boundary.

The offsite noise impacts were determined by decreasing the far-field noise level for Power Blocks 1, 2, and 3 by 6 dBA for each doubling of distance from the Plant Island. This noise reduction accounts for hemispheric spreading, but does not account for molecular absorption, terrain, vegetation, and barriers (including portions of the Power Block such as the HRSG). Therefore, the estimated noise impacts for Power Blocks 1, 2, and 3 are very conservative.

The noise contribution of Power Blocks 1, 2, and 3 were determined for 6 off-site locations. These off-site locations corresponded to the 4 noise monitoring locations where noise levels were determined in 1992 and 2000 (Locations 1 through 4) and 2 additional locations considered to be sensitive receptors in the 1992 SCA. These two locations included a church at the intersection of County Road 630 (CR 630) and CR 555 (Location 6), and the Trinity Cemetery located on CR 555 south of the Hines Energy Complex entrance road (Location 7). The six locations considered for noise impacts are:

- Location 1 CR 555 & CR 630
- Location 2 CR 555 & CR 640
- Location 3 Homeland
- Location 4 Fort Meade
- Location 6 Church at CR 630 and East CR 555
- Location 7 Trinity Cemetery

A survey of the area performed for Power Block 2 found no additional noise-sensitive receptors from those reported in the 1992 SCA. The estimated project noise impacts were appropriately added to the observed, baseline noise levels at the nearest noise-sensitive receptor locations. The noise conditions at each receptor were an average of the noise survey results observed in 1992 and 2000. The exception is monitoring location 4 where the nighttime noise levels due to a localized thunderstorm during the 2000 survey were excluded in the determination of the L_{dn} and, baseline L_{eq} and L_{dn} noise levels.

The results of the noise impacts analyses are summarized in Table 5.7.1-1 through 5.7.1-4. Tables 5.7.1-1 and -2 present the predicted impacts of Power Blocks 1, 2, and 3 together with the observed L_{eq} and L_{dn} noise levels, respectively. As shown in Table 5.7-2 for the column titled "Combined Impacts", the additional noise from Power Blocks 1, 2, and 3 together with the existing L_{dn} that result from noise from offsite passing trucks is, for most of the receptors, above the EPA recommended criteria of 55 dBA for residential and agricultural areas. However, the noise increase at these receptors due to Power Blocks 1, 2, and 3 is generally less than 0.5 dBA for all locations.

An increase in noise levels of 3 dBA or less is not noticeable. Further, ambient noise levels at these locations are already above the EPA criteria without the Hines Energy Complex operations.

The predicted impacts of Power Blocks 1, 2, and 3 together with the calculated existing baseline L_{eq} and L_{dn} noise levels are presented in Tables 5.7.1-3 and -4, respectively. As shown on Table 5.7.1-4, the additional noise from Power Blocks 1, 2, and 3 together with the baseline L_{dn}, is well below the EPA noise criteria for all locations. The additional noise from Power Blocks 1, 2, and 3, even during time when truck traffic is not present, will be less than 3 dBA and not be noticeable at any of the sensitive receptors. Moreover, the noise survey conducted in May 2000 supports this conclusion, since noise levels from Power Block 1 while it was in operation were low.

5.7.2 References

Adams, T.S. 1989. Noise Measurements at Shell Oil Company's Coal Gasification Demonstration Project in Deer Park, Texas. Unpublished. July. Norcross, Georgia.

Adams, T.S. and M.A. Bilello. 1991. Measurements of Noise from Rotary Coal Unloading Operations. Technical paper presented at NOISE-CON 91 in Tarrytown, New York. Sponsored by the Institute of Noise Control Engineering, Poughkeepsie, New York.

API (American Petroleum Institute). 1982. Manual 512, September, 1982.

Bolt, Beranek and Newman, Inc. (BBN). 1978. Electric Power Plant Environmental Noise Guide - Volume I. Prepared for Edison Electric Institute. Cambridge, Massachusetts.

Driscoll, D.A. 1984. NOISECALC (A Computer Program for Sound Propagation Calculations). State of New York Department of Public Service. Albany, New York.

EPA (U.S. Environmental Protection Agency). 1971. Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances. NTID300.1. Office of Noise Abatement and Control. Washington, D.C.

EPA (U.S. Environmental Protection Agency). 1974. Levels of Environmental Noise Requisite to Protect the Public Health and Welfare with an Adequate Margin of Safety. EPA 550/9-74-004. Office of Noise Abatement and Control. Washington, D.C.

Table 5.7.1-1
Predicted Noise Impacts
Power Blocks 1, 2, and 3
Based on 1992 and 2000 L_{eq} Monitoring Data

Location	Description	Distance (Miles)[1]	Predicted Noise Levels from PB1, PB2 & PB3 (dBA)	Observed Noise Levels L_{eq}[2] (dBA)	Predicted Combined Impacts[3] (dBA)
1	CR 555 & CR 630	2.9	43.6	54.1	54.5
2	CR 555 & CR 640	3.1	43.1	56.6	56.8
3	Homeland	3.4	42.4	50.0	50.7
4	Fort Meade	4.7	39.2	54.1	54.3
6	CR 630; East CR 555	2.8	43.9	54.1	54.5
7	Trinity Cemetery	1.9	46.1	56.6	57.0

Notes:
1. Distance (Miles) from Plant Island.
2. Includes all noise sources, including transient sources such as trucks. Based on 1992 and 2000 monitoring data.
3. Includes all noise sources and predicted noise from PB1, PB2, and PB3.

Source: Golder Associates, 2002.

Table 5.7.1-2
Noise Impacts
Power Blocks 1, 2, and 3
Based on 1992 and 2000 L_{dn} Monitoring Data

Location	Description	Distance (Miles)[1]	Predicted Noise Levels from PB1,PB2 & PB3 (dBA)	Observed Noise Levels L_{eq}[2] (dBA)	Predicted Combined Impacts[3] (dBA)
1	CR 555 & CR 630	2.9	43.6	60.0	60.1
2	CR 555 & CR 640	3.1	43.1	63.2	63.3
3	Homeland	3.4	42.4	54.1	54.4
4	Fort Meade	4.7	39.2	57.5	57.6
6	CR 630; East CR 555	2.8	43.9	60.0	60.1
7	Trinity Cemetery	1.9	46.1	63.2	63.3

Notes:
1. Distance (Miles) from Plant Island.
2. Includes all noise sources, including transient sources such as trucks. Based on 1992 and 2000 monitoring data.
3. Includes all noise sources and predicted noise from PB1, PB2, and PB3.

Source: Golder Associates, 2002.

Table 5.7.1-3
Noise Impacts
Power Blocks 1, 2, and 3
Calculated Baseline L_{eq}

Location	Description	Distance (Miles)[1]	Predicted Noise Levels from PB1, PB2 & PB3 (dBA)	Baseline Noise Levels L_{eq}[2] (dBA)	Predicted Combined Impacts[3] (dBA)
1	CR 555 & CR 630	2.9	43.6	42.3	46.0
2	CR 555 & CR 640	3.1	43.1	45.7	47.6
3	Homeland	3.4	42.4	45.6	47.3
4	Fort Meade	4.7	39.2	48.2	48.7
6	CR 630; East CR 555	2.8	43.9	42.3	46.2
7	Trinity Cemetery	1.9	46.1	45.7	48.9

Notes:
1. Distance (Miles) from Plant Island.
2. Baseline excludes loud, transient noise sources, such as truck traffic. Calculated from 1992 and 2000 monitoring data.
3. Includes baseline and predicted noise impacts from PB1, PB2, and PB3.

Source: Golder Associates, 2002.

Table 5.7.1-4
Noise Impacts
Power Blocks 1, 2, and 3
Calculated Baseline L_{dn}

Location	Description	Distance (Miles)[1]	Predicted Noise Levels from PB1, PB2, & PB3 (dBA)	Baseline Noise Levels L_{eq}[2] (dBA)	Predicted Combined Impacts[3] (dBA)
1	CR 555 & CR 630	2.9	43.6	46.6	48.4
2	CR 555 & CR 640	3.1	43.1	50.6	51.3
3	Homeland	3.4	42.4	49.1	50.0
4	Fort Meade	4.7	39.2	50.0	50.3
6	CR 630; East CR 555	2.8	43.9	46.6	48.5
7	Trinity Cemetery	1.9	46.1	50.6	51.9

Notes:
1. Distance (Miles) from Plant Island.
2. Baseline excludes loud, transient noise sources, such as truck traffic. Calculated from 1992 and 2000 monitoring data.
3. Includes baseline and predicted noise impacts from PB1, PB2, and PB3.

Source: Golder Associates, 2002.

5.8 CHANGES IN NONAQUATIC SPECIES POPULATIONS

5.8.1 Impacts

Emissions from Power Block 3 will comply with all state and federal ambient air quality standards. Those standards have been established to protect public health and welfare, with an adequate margin of safety. Compliance with these standards will be protective of the environment.

5.8.2 Monitoring

Monitoring of off-site non-aquatic species is not proposed because of the minimal opportunity for impacts to occur.

5.9 OTHER PLANT OPERATION EFFECTS

5.9.1 Highway Traffic

Traffic associated with operation of the Hines Energy Complex represents a long-term impact to Polk County roadways, since they will be recurring into the future. Traffic impacts are directly related to the number of employees, since materials for plant operations will arrive primarily by rail and/or pipeline. An estimated total of 55 operations workers will be needed for ultimate site development. This employment projection was considered in the traffic impact analysis that was conducted by Kimley-Horn in 1992 and submitted with the 1992 SCA.

Both Polk County and the Florida Department of Transportation (FDOT) reviewed the traffic impact analysis. Recommendations for roadway and intersection improvements were developed with input from both agencies. These improvements became the subject of conditions of the Polk County CUP, and were completed in conjunction with construction of Power Block 1. The CUP condition related the need for roadway or intersection improvements to a level of employment rather than a specific year and provided for monitoring of employment and traffic conditions to determine the appropriate timing of the improvements. Since peak employment on-site already occurred during site development and construction of Power Block 1, no further monitoring or roadway/intersection improvements are required.

5.9.2 Roadway Improvements

The improvements necessary to accommodate operations traffic were also recommended as a part of the construction traffic analysis (Section 4.6.1). No other improvements are required to accommodate the traffic impacts from the construction or operation of Power Block 3.

Using the number of employees rather than a specific year is the most appropriate measure of the need for improvement. A summary of the improvements and monitoring conditions that have been completed is presented below.

- Traffic monitoring program at the intersection of CR 555 and SR 640 to determine the need to install a traffic signal or make geometric improvements. As a result, minor geometric improvements were completed;

- Construction of a Case III intersection at the main driveway connection to CR 555 including left turn storage and acceleration/deceleration lanes;

- Construction of a Case II intersection at the secondary or southern-most driveway connection to CR 555;

- Traffic monitoring has been completed at the intersection of SR 37 and CR 640 to determine the need to install a traffic signal or make geometric improvements. Based on the occurrence of the peak numbers of employees, a traffic signal was installed by the County; and

- The addition of a signal phase for westbound left-turns that operates as protected/permissive at the intersection of CR 555 and SR 60.

The transportation improvements listed above conform to FDOT and Polk County requirements.

5.9.3. References

Florida Power Corporation. 1992. Polk County Site. Site Certification Application.

5.10 ARCHAEOLOGICAL SITES

As a result of the highly disturbed nature of the site, no significant archaeological sites are expected to be encountered. The State of Florida Division of Historical Resources provided this determination in a letter dated January 30, 1992.

5.11 RESOURCES COMMITTED

5.11.1 Physical Resources

The physical state resources committed to plant operation for Power Block 3 includes water and air.

The consumptive use of ground water related to the operation of Power Block 3 at the Hines Energy Complex is described in Section 3.5.

No irreversible or irretrievable commitment of air resources is anticipated as a result of project operation. Analysis of likely air quality impacts of the project (Section 5.6) indicates that applicable ambient air quality standards would not be exceeded by operation of Power Block 3. The site is located 118 km (73 mi) from the nearest Class I PSD area. As demonstrated in Section 5.6, the plant should have no significant impact on that Class I area.

5.11.2 Biological Resources

As discussed in Section 5.1.2, aquatic communities near the proposed plant will not experience adverse effects from operation of Power Block 3. Construction and operation of the plant will have no measurable effect on wildlife species populations, or on the growth and productivity of surrounding vegetation, including agricultural crops.

5.11.3 Economic and Cultural Resources

Economic resources committed to the project will include human labor, financial commitments, and the displacement of other potential economic uses of the site. Because the plant will require no expansion of government-supplied services, no commitment of state or local government financial resources is anticipated.

Any effects on schools, utilities, highways, and other public facilities will be more than offset by taxes paid in Polk County.

No cultural resources are known to exist on-site, therefore no commitment of cultural resources is anticipated.

5.12 VARIANCES

No variances from applicable federal or state standards are required.

TABLE OF CONTENTS
SECTION 6

6.1 TRANSMISSION LINES

The previously approved and existing 230 kv transmission system from the Barcola Substation to the Hines Energy Complex and from the Hines Energy Complex to the Fort Meade substation with double circuit structures is currently adequate to support electric transmission related to Power Block 3. No new off-site electrical transmission facilities or other associated linear facilities are required for operation of Power Block 3.

TABLE OF CONTENTS
SECTION 7

7.1 SOCIOECONOMIC BENEFITS AND COSTS

The Hines Energy Complex will continue to provide a substantial net benefit to Polk County, both in terms of the large increase in property tax base that will occur, and the project's employment and payroll. The level of permanent employment will continue to increase with the addition of generating units. Current employment at the Hines Energy Complex for operation of Power Block 1 is 29 employees, generating an annual payroll of $2.7 million. The expected increase in staff for the operation of Power Block 3 is 5 employees, for an expected increase in annual payroll of $500,000. Personnel for the Hines Energy Complex are recruited nationally. Local individuals are hired if their qualifications equal or exceed those of other applicants. Spending for parts, materials and parts rebuilding amounts to about $4.6 million per year. Actual experience in 2000 suggests that about 10 to 15 percent of this spending will be done with local vendors.

In addition to the increase in direct employment at the site, the increased economic activity in the county will have a multiplier effect, resulting in the creation of jobs in related industries such as construction, retail trade, business services, and health services. Estimates of the indirect jobs created are based on multipliers developed specifically for Polk County by the U.S. Department of Commerce, Bureau of Economic Analysis. The Regional Input-Output Modeling System (RIMS II) multipliers that were used reflect input-output data for the 1997 annual input-output table for the nation and 1999 regional data. RIMS II multipliers based on these sources were first released in June 2002. Using the direct effect multipliers, the estimated number of additional jobs expected as a result of the five new permanent jobs for operation of Power Block 3 is 10, generating earnings of $457,700.

In 2001, FP paid $6.7 million in property taxes to Polk County for the Hines Energy Complex and the Tiger Bay electric generating facility. The estimated increase in property taxes associated with Power Block 2, which is now under construction and will come on-line in 2004, is about $3.1 million. The estimated increase in property taxes for Power Block 3, projected for completion in 2005, is $3.4 million. These estimates are based on the 2001 Polk County millage rate. Over half of this revenue goes to support the Polk County school system. Since the County is required to provide very few services to the Hines Energy Complex, the net benefit of these revenues to the County and the school system is substantial.

TABLE OF CONTENTS
SECTION 8

8.1 SITE AND DESIGN ALTERNATIVES

This optional chapter is not being submitted as part of this SCA because an Environmental Impact Statement required by the National Environmental Policy Act is not required for the development of Power Block 3.

TABLE OF CONTENTS
SECTION 9

9.1 COORDINATION

The following individuals have been contacted regarding this SSCA:

Name	Agency	Telephone Number
Hamilton Oven	DEP	(850) 487-0472
Paul Darst	DCA	(850) 488-4925