

Florida Electrical Power Plant Siting Act Site Certification Application

Volume 1 of 3

Treasure Coast Energy Center



**Submitted by:
Florida Municipal Power Agency
April 2005**





Florida Municipal Power Agency

Jim Hay
Power Contracts Administrator

Via E-mail

May 5, 2005

Mr. Hamilton S. Oven, Administrator
Siting Coordination Office
Department of Environmental Protection
2600 Blair Stone Road
Suite 649, MS-48
Tallahassee, FL 32399-2400

Re: Florida Municipal Power Agency
Site Certification Application
Treasure Coast Energy Center
PA No. 05-48
DOAH Case No. 05-1492EPP

Dear Mr. Oven:

In accordance with the Florida Electrical Power Plant Siting Act, Section 403.566, Florida Statutes, the Site Certification Application for the Treasure Coast Energy Center was determined complete on April 29, 2005. Thus, in accordance with Subsection 403.5064(1) F.S., copies of the Site Certification Application have been distributed today to all affected agencies, previously identified by the Department and as listed on the attached Distribution List.

Additionally, enclosed please find revised pages for insertion into existing copies of the Site Certification Application delivered to the Department on April 14, 2005. These revised pages are included in the copies of the Site Certification Application that are being distributed today. If you have any questions concerning this submittal, please feel free to call me at (407) 355-7767.

Sincerely,

Jim Hay
Project Manager, FMPPA

Enclosures

cc: Tim Gray, FDEP-SE District, w/enc

Distribution List

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Florida Municipal Power Agency

Roger A. Fontes
General Manager and CEO

April 14, 2005

Mr. Hamilton S. Oven, Administrator
Siting Coordination Office
Department of Environmental Protection
2600 Blair Stone Road
Suite 649, MS-48
Tallahassee, FL 32399-2400

Re: Florida Municipal Power Agency
Site Certification Application
Treasure Coast Energy Center

Dear Mr. Oven:

On behalf of the Florida Municipal Power Agency (FMPA), I am pleased to submit this Site Certification Application for the Treasure Coast Energy Center located near Fort Pierce in St. Lucie County. FMPA is requesting ultimate site certification of 1200 MWs, with Unit 1 proposed at this time as a 300 MW (nominal) combined cycle combustion turbine unit firing natural gas as the primary fuel. In addition to Unit 1, two new 230 kV transmission corridors and a new 3,700 foot natural gas pipeline corridor are requested for certification as associated facilities. Certification is sought under the procedures of the Florida Electrical Power Plant Siting Act, Chapter 62-17.051 Florida Administrative Code.

One original and nine (9) copies of the application and a check in the amount of \$103,050 for the filing fee are enclosed to initiate the Department's completeness review. As requested, four (4) copies have been sent to Tim Gray at the FDEP-Southeast District office. Additional copies will be submitted to you and distributed to the other agencies at your direction after the application is determined complete.

In addition, four (4) copies of the Prevention of Significant Deterioration (PSD) permit application are included for the Department's Bureau of Air Regulation. The PSD application is identified as Volume 3 of the Site Certification Application. FMPA understands that the PSD permit application fee is to be covered by the site certification application fee included herein.

A petition to determine the need for the combined cycle unit was filed with the Public Service Commission on April 13, 2005.

Mr. Hamilton S. Oven

April 14, 2005

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We look forward to working with you and your staff as this application progresses through the certification process. If you have any questions concerning the project or this application, please do not hesitate to call me at (407) 355-7767.

Sincerely,

A handwritten signature in black ink, appearing to read "Roger Fontes".

Roger Fontes
GM and CEO, FMPA

Enclosures

cc: Tim Gray, FDEP-SE, w/4

Site Certification Application
Engineering Certification Statement
Treasure Coast Energy Center

I, the undersigned, hereby certify that:

The engineering features of Treasure Coast Energy Center Project – Unit 1 described in this application have been prepared, designed, or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles; and,

To the best of my knowledge, the information submitted in support of the application is true, accurate, and complete based on reasonable techniques, estimates, materials, and information gathered and evaluated by qualified personnel; and,

To the best of my knowledge, there is reasonable assurance that the Unit 1 project described in this application, when properly operated and maintained, will comply with all applicable pollution control standards found in the Florida Statutes, and rules of the Department of Environmental Protection and the South Florida Water Management District, which have been adopted by St. Lucie County for stormwater management.

Name: Stanley A. Armbruster Date: April 14, 2005
Florida License No. 30562
Black & Veatch
11401 Lamar
Overland Park, Kansas

Applicant Information

Applicants' Official Name

Florida Municipal Power Agency (FMPA)

Address

8553 Commodity Circle
Orlando, FL 32819-9002

Address of Official Headquarters

Same as address

Business Entity

Joint Action Agency

Names, Owners, etc.

Not applicable

Name and Title of Chief Executive Officers

Roger Fontes, General Manager and CEO

Name, Address, and Telephone Number of Official Representative Responsible for Obtaining Certification

Jim Hay, Treasure Coast Energy Center Project Manager
8553 Commodity Circle
Orlando, FL 32819-9002
407-355-7767

Site Location

Lot 8 - Phase III (North), Midway Industrial Park
4585 Selvitz Road
St. Lucie County

Nearest Incorporated City

Fort Pierce

Latitude and Longitude (center of site)Lat: 27⁰, 23min, 02sec NLong: 80⁰, 22min, 39sec W**UTM 27 Coordinates (center of site; km)**

North 3028.995

East 561.518

Section, Township, and Range

Section 31, Township 35 South, Range 40 East

Location of Any Directly Associated Transmission Facilities

St. Lucie County

Nameplate Generating Capacity

Unit 1: Nominal 300 MW Combined Cycle Combustion Turbine Unit
(150 MW CTG, 150 MW STG)

Capacity of Proposed Additions and Ultimate Site Capacity

300 MW Unit 1

1,200 MW Ultimate Site Capacity

Remarks:

FMPA is a nonprofit, joint action agency formed by 29 municipal electric utilities serving approximately 1.8 million Floridians. FMPA is a public agency whose primary purpose is to develop competitive power supply and related services for its members.

Associated Facilities Requested for Certification:

Treasure Coast Energy Center Project Transmission Lines

Treasure Coast Energy Center Project Natural Gas Pipeline

Preface

This Site Certification Application (SCA) is submitted by the Florida Municipal Power Agency (FMPA) for Unit 1 (300 MW) and ultimate site certification of the Treasure Coast Energy Center Project site (1,200 MW). In addition, this document is intended to serve as the SCA for certification of the Treasure Coast Energy Center transmission lines and the natural gas supply pipeline as associated facilities. This application addresses all state, regional, and local permitting requirements under review of the provisions of the Florida Electrical Power Plant Siting Act, Sections 403.501 – 403.518, Florida Statutes, as amended. The application includes the following major section headings:

- 1.0, Need for Power and proposed facilities.
- 2.0, Site and Vicinity Characterization.
- 3.0, Plant and Directly Associated Facilities.
- 4.0, Effects of Site Preparation, and Plant and Associated Facility Construction.
- 5.0, Effects of Plant Operation.
- 6.0, Transmission Lines and Other Linear Facilities.
- 7.0, Economic and Social Effects of Plant Construction and Operation.
- 8.0, Site and Design Alternatives.
- 9.0, Coordination.
- 10.0, Appendices.

Section 1.0 briefly describes the Need for Power request. The Need for Power request is a separate document that includes information such as the characterization and information specific to FMPA's need for Unit 1.

Project Information

The Treasure Coast Energy Center (TCEC) site is a greenfield site currently used as pasture located in Phase III-North of the Midway Industrial Park, 4585 Selvitz Road, near Ft. Pierce, St. Lucie County, Florida. TCEC Unit 1 (Unit 1) is proposed as a nominal 300 MW combined cycle generating unit with the capability to also operate in steam bypass mode. Unit 1 is scheduled for commercial operation in June 2008. Unit 1 will be interconnected to FPL's transmission system for transmission access by FMPA's members. FMPA is the owner and project manager for permitting, certification, construction, and operation of Unit 1.

The site and the adjoining industrial park to the east were previously permitted by Duke Energy Ft. Pierce, LLC, for a power plant consisting of eight simple cycle General Electric 7EA combustion turbines with a total capacity of 640 MW. Since the units were simple cycle, the facility was not permitted under the Florida Electrical Power Plant Siting Act.

Unit 1 and future units will have the capability to fire natural gas and ultra-low sulfur No. 2 fuel oil. All required equipment will be installed with modern pollution control devices.

Project Impacts

Air

Unit 1 as proposed qualifies as a major source under the New Source Review - Prevention of Significant Deterioration (NSR-PSD) program, as it will emit more than 100 tons per year (tpy) of at least one regulated pollutant. The TCEC site is located in an attainment area for all criteria pollutants, except PM₁₀ and lead, which are unclassifiable.

A comprehensive analysis of the Unit 1 potential to emit demonstrates that it will emit significant amounts of nitrogen oxides (NO_x), sulfur dioxide (SO₂), carbon monoxide (CO), and particulate matter (PM/PM₁₀) with respect to the PSD program. A full PSD analysis was performed for those pollutants emitted above the PSD thresholds, including the following:

- Best Available Control Technology (BACT) Analysis.
- Ambient Air Quality Impact Analysis.
- Additional Impact Analysis.

The technology proposed to control emissions from Unit 1 includes dry low-NO_x burners and selective catalytic reduction (SCR) for the control of NO_x during natural gas firing, water injection and SCR to control NO_x during fuel oil firing, the use of natural gas and, ultra-low sulfur (0.0015 percent S) fuel oil, and advanced combustion control technology to reduce CO, PM/PM₁₀, SO₂, and Volatile Organic Compound (VOC) emissions.

An air dispersion modeling analysis was performed to determine the Unit 1 maximum SO_x, NO_x, CO, and PM/PM₁₀ air quality impacts. The maximum air quality impacts at all modeled receptors were less than the applicable PSD significant impact levels, and consequently below the less stringent de minimis ambient background monitoring levels. As such, multi-source modeling of nearby existing sources for PSD increment consumption and ambient air quality standards (AAQS) comparison was not required.

The Unit 1 predicted pollutant impact concentrations are well below the threshold levels above which the air quality may be significantly affected. Moreover, an additional

impact assessment determined that the Unit 1 visual impacts, PSD Class I regional haze impacts, air quality impacts on vegetation and soils, and air quality impacts due to growth, are inconsequential as the predicted levels are well below threshold levels.

Water Use

The Unit 1 cooling tower will use a maximum of approximately 2.9 million gallons of treated sewage effluent per day when firing natural gas. This effluent will be supplied from the proposed Ft. Pierce Utilities Authority (FPUA) Mainland Wastewater Treatment Plant (WWTP) that will be constructed adjacent to the TCEC site. At full load operation on natural gas, approximately 806,000 gallons per day of process wastewaters will be returned to the FPUA treatment plant for disposal.

Service and fire water will be supplied by onsite groundwater wells. Under natural gas operation, Unit 1 will require 154,000 gallons of service water per day; under fuel oil operation, the unit will require 597,000 gallons per day. The majority of this amount is required for power cycle demineralized makeup water supply, evaporative cooler makeup supply, and water injection for NO_x control when burning low-sulfur No. 2 fuel oil. Upper Floridan Aquifer groundwater is requested as makeup to the service/fire water system.

In addition to the normal service water demand, FMPA also requests the use of 3.275 million gallons per day of groundwater for short-term supply to the cooling tower, if needed, until the FPUA Mainland WWTP is fully operational in late 2009. Also, in the event of pipeline catastrophe or supply disruptions regarding the FPUA effluent supplies, FMPA requests that same groundwater allocation on an emergency (30 days/year) basis to continue operations until effluent supply is restored.

Potable water will be supplied to the TCEC from an extension to the FPUA water main located 850 feet southwest of the TCEC property boundary by agreement between FMPA and FPUA. This water main will also provide backup to the service/fire water and cooling tower makeup systems.

Land

The 68 acre TCEC site has been zoned Utility by the St. Lucie County Board of Commissioners. Use of the property in an industrial/utility capacity is consistent with the current zoning and future land use elements of the *St. Lucie County Comprehensive Plan*. The site is currently used as pasture.

A biophysical assessment of the property concluded that the property is not inhabited by any federal or state-listed protected species. There are 11.96 acres of low quality herbaceous DEP regulated wetlands onsite; 11.25 acres will be unavoidably lost due to TCEC development; mitigation is proposed. There are no archaeological, historic,

or cultural sites present on the property or in the immediate vicinity that are considered eligible for listing on the *National Register of Historic Places*.

Wastewater and Solid Waste

Process and sanitary wastewaters will be separately collected and returned to the FPUA Mainland WWTP to be constructed adjacent to the TCEC site. Uncontaminated stormwaters will be directed to an onsite stormwater detention pond. No adverse impacts are anticipated from the disposal of these wastewaters or stormwaters.

Trash and other low-volume solid wastes will be collected and managed onsite for disposal at an approved facility by a licensed contractor.

Socioeconomics

Operation of facility should have positive socioeconomic impacts in St. Lucie County through employment and associated tax revenues. Construction and operation of Unit 1 will incrementally increase these benefits. During the peak period of Unit 1 construction, approximately 230 craft jobs will be created by the construction project. The net direct employment effect from Unit 1 will be the creation of approximately 16 additional full-time operations positions. The development of the TCEC is not anticipated to negatively impact the local or regional services or infrastructure.

Need for Power

FMPA has filed a Need for Power petition and application with the Florida Public Service Commission for the development of Unit 1 at the TCEC site in accordance with the Florida Electrical Power Plant Siting Act. The determination of need for the proposed Unit 1 is being sought under Section 403.519, Florida Statutes.

The basic power generation cycle for Unit 1 will consist of an F-class combustion turbine, a heat recovery steam generator (HRSG), a condensing steam turbine, and a mechanical draft cooling tower. Duct burners will be installed in the HRSG inlet to provide increased steam turbine generator output for peaking capacity. Unit 1 will have the capability to operate in steam bypass mode.

Natural gas will be the primary fuel for the combustion turbine and the only fuel for the HRSG duct burners. Ultra-low sulfur No. 2 fuel oil is also planned as an additional fuel for the combustion turbine. Onsite fuel oil storage capacity of approximately 1 million gallons will be provided in an aboveground storage tank.

Schedule

The anticipated Unit 1 and ultimate site certification major milestone schedule is as follows:

- Need for Power Submittal--April 2005.
- Site Certification Application Submittal--April 2005.
- Land Use Hearing--August 2005.
- Need for Power Hearing – July 2005.
- Certification Hearing--February 2006.
- Siting Board Hearing-- May 2006.
- Site Certification Order Issued-- June 2006.
- Air Permit Issued-- July 2006.
- Start of Construction--August 2006.
- Commercial Operation--June 2008.

Acronyms and Abbreviations

AADT	Average Annual Daily Traffic
AAQS	Ambient Air Quality Standards
AQCS	Air Quality Control System
ARP	All-Requirements Project
BACT	Best Available Control Technology
BEA	Bureau of Economic Analysis
bgs	Below ground surface
BOD	Biochemical oxygen demand
BTU	British thermal unit
Btu/h	British thermal units per hour
cfs	Cubic feet per second
CO	Carbon monoxide
COD	Chemical oxygen demand
CTG	Combustion Turbine Generator
dBA	Decibels (A-weighted)
dB(C)	Decibels (C-weighted)
DHR	Division of Historical Resources, Florida Department of State
EPA	US Environmental Protection Agency
EPRI	Electric Power Research Institute
F	Degrees Fahrenheit
FAC	Florida Administrative Code
FCREPA	Florida Committee on Rare and Endangered Plants and Animals
FDA	Florida Department of Agriculture
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FEC	Florida East Coast Railroad
FFWCC	Florida Fish and Wildlife Conservation Commission
FMPA	Florida Municipal Power Agency
FNAI	Florida Natural Areas Inventory
FPL	Florida Power & Light
FPUA	Ft. Pierce Utilities Authority
FS	Florida Statutes
FTA	Florida Turnpike Authority
GEP	Good Engineering Practice
gpd	Gallons per day

gpm	Gallons per minute
gr/dscf	Grains per dry standard cubic foot
HgA	Mercury, absolute
HRSG	Heat recovery steam generator
IPP	Independent Power Producers
IRP	Integrated Resource Plan
ISCST	Industrial Source Complex Short-Term
kg	Kilogram(s)
km	Kilometer(s)
LAER	Lowest achievable emission rate
lb/h	Pounds per hour
lb/MBtu	Pounds per million British thermal units
LNG	Liquefied natural gas
m	Meters
MBtu	Million British thermal units
mgd	Million gallons per day
mg/l	Milligrams per liter
mg/m ³	Milligrams per cubic meter
mm	Millimeters
MSA	Metropolitan State Area
msl	Mean sea level
MW	Megawatt(s)
MWh	Megawatt-hour
NEMA	National Electrical Manufacturers Association
NGVD	National Geodetic Vertical Datum
NML	Noise monitoring location
NO _x	Nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NSLRWCD	North St. Lucie River Water Control District
NSPS	New Source Performance Standards
NWS	National Weather Service
O&M	Operations and Maintenance
PM ₁₀	Particulate matter less than 10 microns
ppm	Parts per million
ppmvd	Parts per million by volume dry
PSC	Florida Public Service Commission

PSD	Prevention of Significant Deterioration
psig	Pounds per square inch, gauge
PTPLU-2	Screening level point source dispersion model
RO	Reverse Osmosis
SACTI	Seasonal/annual cooling tower impact
SCA	Site Certification Application
scfm	Standard cubic feet per minute
SCR	Selective catalytic reduction
SFWMD	South Florida Water Management District
SIP	State Implementation Plan
SLCFD	St. Lucie County Fire District
SO ₂	Sulfur dioxide
TCEC	Treasure Coast Energy Center
TDS	Total dissolved solids
TOC	Total organic carbon
tpy	Tons per year
TRS	Total reduced sulfur
TSP	Total suspended particulate
TSS	Total suspended solids
µg/m ³	Micrograms per cubic meter
ULSD	Ultra-low sulfur diesel
UNAMAP	User's Network for the Applied Modeling of Air Pollution
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator
VOC	Volatile organic compounds
WWTP	Wastewater treatment plant
ZLD	Zero liquid discharge

Site Certification Application
Engineering Certification Statement
Treasure Coast Energy Center

I, the undersigned, hereby certify that:

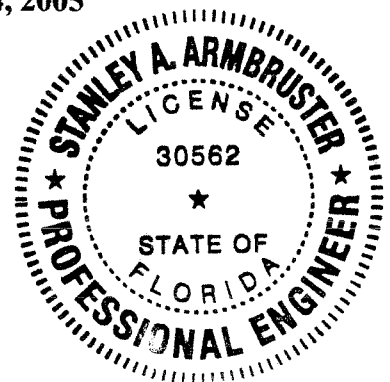
The engineering features of Treasure Coast Energy Center Project – Unit 1 described in this application have been prepared, designed, or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles; and,

To the best of my knowledge, the information submitted in support of the application is true, accurate, and complete based on reasonable techniques, estimates, materials, and information gathered and evaluated by qualified personnel; and,

To the best of my knowledge, there is reasonable assurance that the Unit 1 project described in this application, when properly operated and maintained, will comply with all applicable pollution control standards found in the Florida Statutes, and rules of the Department of Environmental Protection and the South Florida Water Management District, which have been adopted by St. Lucie County for stormwater management.



Name: Stanley A. Armbruster Date: April 14, 2005
Florida License No. 30562
Black & Veatch
11401 Lamar
Overland Park, Kansas



BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Petition of Florida Municipal Power
Agency for Determination of Need for
Proposed Treasure Coast Energy Center
Unit 1.

DOCKET NO. _____

FILED: April 13, 2005

**PETITION OF FLORIDA MUNICIPAL POWER AGENCY
FOR DETERMINATION OF NEED FOR
PROPOSED ELECTRICAL POWER PLANT**

FLORIDA MUNICIPAL POWER AGENCY ("FMPA"), by and through its undersigned attorneys, hereby petitions the Florida Public Service Commission ("Commission") pursuant to Section 403.519, Florida Statutes, and Rule 25-22.081, Florida Administrative Code, to determine the need for the proposed electrical power plant called the Treasure Coast Energy Center Unit 1, and to file its order making that determination with the Department of Environmental Protection pursuant to Section 403.507(2)(a)2., Florida Statutes. In support of this petition, FMPA states:

1. Petitioner's full name and address are:

Florida Municipal Power Agency
8553 Commodity Circle
Orlando, Florida 32819-9002

2. All notices, pleadings and other communications required to be served on the petitioner should be directed to:

Gary V. Perko
Gary P. Sams
Hopping Green & Sams, P.A.
123 S. Calhoun Street (32301)
Post Office Box 6526
Tallahassee, FL 32314

with copy to:

Frederick M. Bryant, General Counsel
Jody Lamar Finklea, Associate General Counsel
Florida Municipal Power Agency
P.O. Box 3209
Tallahassee, Florida 32315-3209

3. FMPA is a joint action agency comprised of 29 municipal electric utilities.

FMPA was created on February 24, 1978, under the provisions of the Florida Interlocal Cooperation Act of 1969, Section 163.01, Florida Statutes, and exercising powers under the Joint Power Act, Chapter 361, part II, Florida Statutes. FMPA was formed to allow its members to cooperate with each other, on the basis of mutual advantage, to provide services and facilities in a manner and in a form of governmental organization relevant to geographic, economic, population, and other factors influencing the needs and development of local communities. Specifically, FMPA is involved in the joint financing, construction, acquisition, ownership, management, and operation of electric generation resources for its municipal members.

4. As a joint operating agency, engaged in the business of generating and transmitting electric energy, the FMPA is an "Electric Utility" under 403.503(13), Florida Statutes, and, therefore, is an "applicant" as defined by Section 403.503(4), Florida Statutes. The Commission previously has held that FMPA is a proper applicant for a determination of need pursuant to Section 403.519, Florida Statutes. Order No. PSC-01-1103-FOF-EM, issued in Docket No. 010143-EM, on May 14, 2001.

5. FMPA was created to provide a means by which its members could cooperatively gain mutual advantage and meet present and projected electric energy requirements. As part of this empowerment, FMPA developed an All-Requirements Project (ARP) to secure an adequate, economical and reliable supply of electric capacity and energy to meet the needs of the Project participants (ARP members) who include 15 municipal utilities who serve approximately

180,000 customers throughout Florida. ARP members without their own generating capacity (non-generating members) are required to purchase all their capacity and energy from the ARP. Generating members (members with their own generating capacity and purchases) are required to sell the electric capacity and energy of their generating resources to FMPA, and purchase all their capacity and energy from the ARP. In exchange for the sale of their electric capacity and energy, the generating members receive credits. The credits are developed using a market value methodology and average class-based performance. The ARP pays for all fuel, fuel transportation, and purchased power costs.

6. FMPA's ARP has been growing rapidly through load growth and the addition of new ARP members. FMPA's load and energy forecast for the ARP projects that the summer reserve margin will fall below accepted minimums in the 2008 time-frame. In addition, about 24% of the ARP's capacity comes from purchased power contracts. Many of the ARP's capacity and power purchase contracts are expiring, or nearing the end of their lifetime.

7. To address the future decline in resource capacity, and to help meet the need of future demand, FMPA employed a competitive request for proposal (RFP) process, in combination with an evaluation of FMPA generation options, to choose the most cost-effective alternative to the ARP's capacity needs. That process identified a new 300 MW combined cycle generating facility as the most cost-effective alternative. The new unit will be constructed at a new site located in St. Lucie County, Florida. The new unit, to be known as FMPA Treasure Coast Energy Center (TCEC) Unit 1, consists of a combustion turbine/generator and a heat recovery steam generator that will drive a steam turbine generator. All of the generation capacity from the unit will be committed to ARP members for retail sale to their customers.

8. Under base case planning assumptions, the TCEC Unit 1 project saves a minimum of \$14 million in cumulative present worth costs (CWPC) for a twenty year period (2005-2024) when compared to the lowest-cost project submitted in response to the RFP.

9. Pursuant to the Florida Electrical Power Plant Siting Act, Section 403.519, Florida Statutes, and Rules 25-22.080 to 25-22.081, Florida Administrative Code, the Commission has jurisdiction to determine the need for the proposed electrical power plant, applying the standards set forth in Section 403.519, Florida Statutes.

10. The information supporting this petition is contained in FMPA's Need For Power Application (the "Need Application") which is provided as Exhibit No. __ (FMPA-1) to this petition and incorporated herein by reference. The Need Application contains FMPA's analysis of the need for the proposed electrical power plant and includes the information required by Rule 25-22.081, Florida Administrative Code.

11. The accompanying information demonstrates the need for the proposed electrical power plant in the proposed time frame as the most cost-effective alternative available, taking into account the need for electric system reliability and integrity, the need for adequate electricity at a reasonable cost, and other relevant matters.

(a) By providing sufficient resources for FMPA to meet the ARP's capacity needs, the proposed plant will contribute to the reliability of the FMPA ARP system. Additionally, because TCEC Unit 1 will be more efficient than much of the natural gas fired generation in the state, the project will reduce costs and increase reliability in Peninsular Florida.

(b) The proposed unit will ensure that the ARP has an adequate supply of power to serve its customers' needs at a reasonable cost.

(c) The proposed unit is the most cost-effective alternative available for meeting the ARP's capacity needs. As noted above, TCEC Unit 1 will save a minimum of \$14

million over a 20-year period (2005-2024) compared to the least cost alternative identified through the FMPA's competitive RFP process.

(d) ARP members have implemented demand-side management programs. Even with the demand and energy reductions from those programs, TCEC Unit 1 is required to enable FMPA to reliably meet the ARP's power supply needs.

(e) FMPA has evaluated additional conservation measures and have not found any that can mitigate the need for TCEC Unit 1.

12. As set forth in more detail in the Need for Power Application, the TCEC Unit 1 has a number of advantageous features, including the following:

(a) The TCEC Unit 1 will be directly connected to FPL's transmission system. This direct connection will allow FMPA to better serve its members on the FPL transmission grid, and help the State to mitigate flow problems from the north to the south.

(b) TCEC Unit 1 will incorporate several design features which will increase the value of the unit to ARP members by helping to efficiently meet daily load swings.

(c) TCEC will have will have dual fuel capability, as well as the ability to operate in simple cycle mode. These attributes will contribute to the overall reliability of FMPA's generation system if problems arise that limit the availability of natural gas or the availability of the steam turbine.

(d) The project will minimize environmental impacts by locating at an existing industrial park, utilizing clean burning natural gas as the primary fuel and ultra-low sulfur diesel for back-up, utilizing low NO_x combustors and Selective Catalytic Reduction technology to achieve extremely low NO_x emission rates, utilizing reclaimed wastewater for cooling water, and utilizing a zero water discharge design.

(e) Delaying TCEC Unit 1 would result in reduced reliability and higher costs. If TCEC Unit 1 is delayed, FMPA's summer reserve margin will fall to 12 percent in 2008 which is well below FMPA's 18 percent requirement. If other capacity would be installed to retain FMPA's 18 percent summer reserve margin, costs would increase by more than \$23 million in CPWC.

13. FMPA is not aware of any dispute regarding any of the material facts contained in this petition.

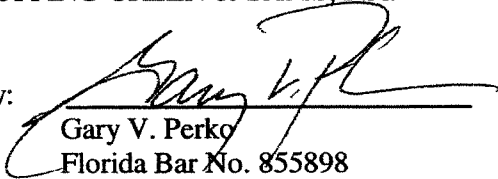
WHEREFORE, FMPA respectfully requests that:

(1) the Commission give notice of the commencement of the proceeding as required by Rule 25-22.080(3), Florida Administrative Code; and

(2) the Commission determine that there is a need for the proposed electrical power plant described in this petition, and file its order making such determination with the Florida Department of Environmental Protection pursuant to Section 403.507(2)(a)2., Florida Statutes.

RESPECTFULLY SUBMITTED this 15th day of April, 2005.

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1.0 Need for Power and the Proposed Facilities

A Petition to Determine Need for Electrical Power Plant will be submitted to the Florida Public Service Commission (PSC) by the Florida Municipal Power Agency (FMPA) on April 11, 2005, for Treasure Coast Energy Center Unit 1 Project. A copy of the Petition is included herein for information purposes only. The Need for Power includes information such as the characterization of Unit 1 and information specific to FMPA's need for Unit 1.

The proposed Unit 1 is a nominal 300 MW combined cycle combustion turbine unit firing natural gas as the primary fuel. The electricity generated is stepped up in voltage for distribution to the power grid and FMPA members. Unit 1 is scheduled for commercial operation in June 2008.

1.1 FMPA Corporate Summary

FMPA is a nonprofit, public, joint action agency formed by a group of municipal electric utilities with the primary purpose of developing competitive power supply and related services.

The mission of FMPA is to develop economical and competitive power supply projects, to be proactive in providing member services, and to promote the image of public power, enabling its member utilities to succeed in a rapidly changing environment. Each member appoints one representative to FMPA's Board of Directors, which governs the Agency's activities.

FMPA's membership includes the following municipal electric utilities: City of Alachua, City of Bartow, City of Bushnell, City of Chattahoochee, City of Clewiston, City of Fort Meade, Fort Pierce Utilities Authority, Gainesville Regional Utilities, City of Green Cove Springs, City of Havana, City of Homestead, City of Jacksonville Beach, Keys Energy Services, Kissimmee Utility Authority, City of Lake Worth, Lakeland Electric, City of Leesburg, City of Mount Dora, New Smyrna Beach Utilities Commission, City of Newberry, Ocala Electric Utility, Orlando Utilities Commission, City of Quincy, City of St. Cloud, City of Vero Beach, City of Wauchula, and City of Williston.

FMPA is specifically authorized under the Joint Power Act to undertake joint projects for its members and to issue tax-exempt bonds and other obligations to finance the costs of such projects.

Each member utility is locally owned and operated; however, municipal utilities share common concerns that can best be solved by working together. This helps reduce the cost of power, as municipal utilities can obtain power from several power plants

rather than depending on a few. Through FMPA, municipalities have been successful in reducing power costs, diversifying power supply resources, and providing a measure of competition in the wholesale market.

2.0 Site and Vicinity Characterization

To assess the potential impacts a project may have on the social and biological environment, it is necessary to establish a set of baseline or existing conditions for the project area. This chapter provides that characterization for the Treasure Coast Energy Center Project (TCEC) site. This chapter describes the TCEC site and St. Lucie County sociopolitical and biophysical environment.

2.1 Site and Associated Facilities Delineation

This section provides information concerning the physical, biological, and sociological characteristics of the existing site and project area that might be affected by construction and operation of TCEC.

2.1.1 Site Location

The TCEC is located within Phase III-North of the Midway Industrial Park in St. Lucie County, Florida. Figure 2.1-1 shows the general location of the TCEC site which is 5 miles southwest of Ft. Pierce, and 8 miles northwest of Port St. Lucie. Figure 2.1-2 illustrates the site vicinity.

The proposed TCEC site occupies 68.1 acres in Section 31, Township 35 South, Range 40 East. Photographs of the project site are shown on Figures 2.1-3 through 2.1-6. Figure 2.1-7 is a photograph location key that indicates the position of the photograph. Figure 2.1-8 shows the TCEC boundaries and identifies adjacent property owners. Unit 1 and ultimate site arrangement are shown on Figure 2.1-9. Table 2.1-1 provides the names and address of the adjacent property owners.

2.1.2 Site Modification

The site is currently a greenfield site used for cattle pasture that was approved for industrial use in January 1993 by the St. Lucie Board County Board of Commissioners to develop as an industrial park. The site is zoned Utility. The TCEC Project will initially consist of construction and operation of one 300 MW (nominal) combined cycle combustion turbine generating unit. Additional units of similar configuration will be added to the site as a “need” is identified and approved. The development of TCEC will occupy approximately 55 acres of the 68.1 acre property.

New major equipment associated with Unit 1 will include a combustion turbine generator, heat recovery steam generator, a steam turbine generator, and cooling tower. Section 6.0 presents information concerning this substation, transmission lines, and proposed corridors. There will also be water and wastewater treatment facilities, fuel oil

Figure 2.1-1
Site Location

Figure 2.1-2
Site Vicinity



Figure 2.1-3

TCEC1: View to the west; photograph taken from the west central portion of the property



Figure 2.1-4

TCEC2: View to the north; photograph taken from the west central portion of the property



Figure 2.1-5

TCEC3: View to the south; photograph taken from the central portion of the property



Figure 2.1-6

TCEC4: View to the northeast; photograph taken from central portion of property

Figure 2.1-7
Photograph Location Key

Figure 2.1-8
Adjacent Property Owners

Figure 2.1-9
Ultimate Site Arrangement

Table 2.1-1 Adjacent Property Owners Treasure Coast Energy Center	
Parcel No.	Property Owner
1	Florida East Coast Railroad Company 1 Malaga St. P.O. Drawer 1048 Saint Augustine, FL 32085
2	St. Lucie County 2300 Virginia Avenue Ft. Pierce, Florida 34982
3	Midway Properties of St. Lucie 161 N Causeway New Smyrna, FL 32169-5300
4	Ft. Pierce Utilities Authority 206 S 6 th Street Ft. Pierce, FL 34950
5	Florida Power & Light Company P.O. Box 025576 Miami, FL 33102
6	North St. Lucie River Water Control District Ft. Pierce, Florida 34982
Note: Figure 2.1-8 illustrates the adjacent property ownership.	

and water storage tanks, a stormwater detention area, and an electrical substation that will serve Unit 1 and future units. No portions of the site are within a 100-year flood zone.

A Landscaping and Screening Plan conforming to Section 7.09.00, Landscaping and Screening, of the *St. Lucie County Land Development Code* will be implemented during construction.

2.1.3 Existing and Proposed Uses

The existing site includes 68.1 acres of pasture land with 11.96 acres of wetlands. St. Lucie County Resolution Number 01-138 granted a Major Site Plan Approval for Midway Industrial Park Phase III to Midway Properties zoning it for utility use.

The final buildout of the site will include 34.5 acres for the power generation equipment. A stormwater detention area will cover 11 acres of the site. Figure 3.2-2 in Section 3.0 illustrates the ultimate site arrangement.

2.1.4 Flood Zones

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), the site is located in an area determined to be outside the 500-year flood plain. The stormwater collection system is designed such that the equipment foundations and site roads will be above the stormwater backup of the 100 year, 72 hour storm event.

2.2 Sociopolitical Environment

The FDEP rules for site certification require an analysis of various land use and socioeconomic baseline conditions and projected impacts in accordance with local government comprehensive plans and land development code ordinances. Various planning issues relevant to the site fall within the generalized categories: existing land use; comprehensive plans and land development code ordinances; infrastructure and growth management; cultural resources; aesthetics; and socioeconomics. This section addresses these issues.

The sociopolitical environments of St. Lucie County and Ft. Pierce are discussed in this section. As a general overview, St. Lucie County is currently the third fastest-growing county in Florida, with much of the growth occurring in the cities of Ft. Pierce and Port St. Lucie. The county and its two major cities provide the amenities of larger metropolitan centers in areas such as health care, education, employment opportunities, and recreation; yet the current county population of only 214,100 (2005 projected) allows these areas to retain a spirit of community and a small town atmosphere.

St. Lucie County and Ft. Pierce have successfully balanced economic development and the preservation of unique environmental and recreational areas, and have anticipated and planned for additional growth that will continue to preserve the amenities now offered to the county population and its visitors. The proposed TCEC facility is consistent with this balance, and will provide positive socioeconomic benefits to St. Lucie County, Ft. Pierce, and the region.

2.2.1 Governmental Jurisdictions

The TCEC site is located in an unincorporated area of St. Lucie County as previously shown on Figure 2.1-2.

The nearest incorporated areas to the site within St. Lucie County are Ft. Pierce and Port St. Lucie. Presently, the southern boundary of Ft. Pierce is approximately 5 miles northeast of the site. The northwest boundary of Port St. Lucie is approximately 3 miles south of the site. The nearest unincorporated area is White City, which is approximately 3 miles east of the site. Governmental jurisdiction over the associated linear facilities is addressed in Section 6.0 of this SCA.

2.2.2 Zoning and Land Use Plans

As required by the Florida Electric Power Plant Siting Act, the proposed TCEC site must be consistent and in compliance with existing land use plans and zoning ordinances. The land use plans and zoning ordinances applicable to the TCEC site include the St. Lucie County Comprehensive Plan and Future Land Use Map, as well as the *St. Lucie County Land Development Code*. These documents were reviewed to determine the specific goals, objectives, policies, and codes applicable to the proposed power plant project. As required by Chapter 163, F.S., the *St. Lucie County Land Development Code* is consistent and in compliance with the *St. Lucie County Comprehensive Plan*, which by law is also consistent and in compliance with the regional and state comprehensive plans.

St. Lucie County future land use maps indicate no change in the anticipated zoning pattern for the TCEC site or the adjacent land area in the future, confirming that the TCEC site will continue to be compatible with the predominant land uses in the immediate project vicinity.

The St. Lucie County future land use map dated August 2004 confirms that the property for the TCEC is designated for Transportation/Utility (T/U) purposes. Adjacent properties are designated for industrial, transportation, utility, and road/canal future land use development. Therefore, the TCEC project is consistent with the St. Lucie County future land use plan for the site. Figure 2.2-1 is the St. Lucie County Future Land Use that illustrates the TCEC site and corresponding future land use designation. A copy of applicable land use portions of the St. Lucie County Comprehensive Plan are included in Section 10.3 of this SCA.

The site is located in the Midway Industrial Park, Phase III North. The site is currently zoned Utilities (U Zoning District) by St. Lucie County as shown on Figure 2.2-2. Utility, transportation, and communications facilities are permitted and compatible within this district. Electric generating plants must be approved as a Conditional Use in this district as required by Section 3.01.03 of the *St. Lucie County Land Development Code*. Conditional use requests require individual review of location, design, intensity, configuration, and public impact to determine the appropriateness of the proposed use. The St. Lucie County Board of County Commissioners has the authority to grant conditional use permits and impose conditions on such permits. Applicants requesting a Conditional Use Permit must demonstrate consistency with the local code and comprehensive plan, effects on adjacent properties, adequacy of public facilities and fire protection, and assess environmental impacts. A copy of the applicable County Codes is included in Section 10.2 of this SCA.

Figure 2.2-1
St. Lucie County Future Land Use

Figure 2.2-2
St. Lucie County Zoning Map

Prior to filing the SCA, FMPA attended a pre-application meeting with County planning and engineering department personnel to present the project and obtain the views and concerns of the County regarding the proposed project. The proposed project will be an approved use within the Utilities designation, and consistent and in compliance with the county, regional, and state comprehensive plans, following successful completion of the Conditional Use process.

2.2.3 Demography and Ongoing Land Use

2.2.3.1 Land Use. St. Lucie County, located approximately 115 miles north of Miami and 100 miles southeast of Orlando, lies along Florida's eastern seaboard and is part of the Treasure Coast region. The county land area in 2000 consisted of 572 square miles, or 1.1 percent of the state land area of 53,927 square miles.

St. Lucie County has 21 miles of beach front, including 6 miles of public shoreline that, together with the Indian River Lagoon and St. Lucie River, provide many opportunities for recreation and wildlife. The county also has a strong industrial basis concentrated in citrus processing facilities, as St. Lucie County leads the state in citrus production. The economy continues to diversify, however, and there remains ample land available for residential and commercial development.

The two major cities in St. Lucie County are Ft. Pierce and Port St. Lucie. Port St. Lucie was established in 1961 as a bedroom community of 300 residents. It has since grown into the largest city in St. Lucie county, and its current population of 105,000 ranks it as the 15th largest city in Florida. A factor that will contribute to further population growth is that approximately half of the more than 94 square miles of the available buildout area is currently undeveloped.

Ft. Pierce is a waterfront city of more than 20 square miles offering access to the Atlantic Ocean via Ft. Pierce Inlet. The city is accessed via the Florida Turnpike, Interstate 95, Florida Highway 1, and Florida Highway 70. The downtown area continues to undergo restoration and development, and provides many shopping, dining, and entertainment opportunities.

The 68.1 acre TCEC site is located southwest of Ft. Pierce on the east side of Glades Cutoff Road (Highway 709) at a location approximately 0.5 mile due east of Florida's Turnpike and 0.5 mile due north of Midway Road. The site is located in the Midway Industrial Park developed by Midway Properties of St. Lucie County. The site is approximately 4.5 miles west from the nearest point of the Indian River Lagoon, and approximately 5 miles southwest of Ft. Pierce downtown business area.

As seen on Figure 2.2-3, much of the site's northwestern border is determined by a Florida East Coast Railroad line that parallels Glades Cutoff Road. To the south, the site is bordered by a transmission line right-of-way owned by FPL. The parcel north of the TCEC site is the property owned by FPUA and proposed for the FPUA Mainland WWTP. The land directly east of the site is largely undeveloped industrial park.

Figure 2.2-2 shows the zoning currently in effect at the TCEC site and immediate vicinity. As part of the Midway Industrial Park, the site is currently zoned for utility use and lies in the midst of an area predominantly zoned for heavy industrial use. The undeveloped land east of the site is currently zoned for heavy industrial use, as are the parcels lying across from the site at Glades Cutoff Road and north of the site. South of the transmission right-of-way, bordering the site, are areas currently zoned for heavy industry (adjacent to approximately the western most 40 percent of the southern site boundary) and residential use (adjacent to approximately the eastern most 60 percent of the southern site boundary). No houses in this residential zone are within direct eyesight of the plant area. FMPA anticipates that these local residents will only be within sight of the upper sections of the stack.

St. Lucie County future land use maps indicate no change in the anticipated zoning pattern for the TCEC site or the adjacent land area in the future, confirming that the TCEC site will continue to be compatible with the predominant land use in the immediate project vicinity.

2.2.3.2 Population Statistics. The population of St. Lucie County was estimated to be 213,447 in 2003 by the U.S. Census Bureau, and this constituted 1.25 percent of the estimated state population of 17,019,068. The St. Lucie County population increased by 10.8 percent between 2000 and 2003, compared to a 6.5 percent growth for Florida. The respective 1990 to 2000 growth rate was 28.3 percent for St. Lucie County compared to 23.5 percent for Florida. Table 2.2-1 lists the projected population levels for Florida and the Treasure Coast counties. The St. Lucie County population is expected to increase from 214,100 in 2005 to 276,700 in 2020, an average annual growth rate of 1.72 percent. This is above the 1.50 percent average annual growth rate projected for the state.

Figure 2.2-3
Site Border Features

Table 2.2-1 State of Florida and Treasure Coast County Population Projections (in thousands)					
Location	2005	2010	2015	2020	Annual Average Growth Rate, 2005-2020
St. Lucie County	214.1	234.7	255.5	276.7	1.72 percent
Martin County	138.7	150.8	163.0	175.5	1.58 percent
Indian River County	124.2	135.2	146.2	157.5	1.60 percent
Okeechobee County	38.0	40.1	42.3	44.5	1.06 percent
Florida Population	17,436.4	18,866.7	20,314.5	21,792.6	1.50 percent
Source: St. Lucie County Chamber of Commerce, "2004 Relocation & Visitors Guide," p. 13.					

Table 2.2-2 indicates that the age distribution of the St. Lucie County population is comparable to that of the entire state, with the largest difference occurring in the 65 years old and over category where 22.7 percent of the St. Lucie County population was classified in 2000 versus 17.6 percent at the state level.

Table 2.2-2 Age Distribution in St. Lucie County and Florida in 2000		
Category	St. Lucie County	Florida
Population under 5 years, percent	5.6	5.9
Population under 18 years old, percent	22.6	22.8
Population 65 years or older, percent	22.7	17.6
Source: http://www.fedstats.gov/qf/state/12/12111.htmls .		

Table 2.2-3 presents population information for Ft. Pierce and Port St. Lucie for selected years. Ft. Pierce had an estimated 2004 population of 38,642, and this is expected to grow to 41,000 by 2006. The median age of Ft. Pierce population is 35.4. The 2004 population of Port St. Lucie was 105,000. The population is expected to increase rapidly over the next few years, reaching 150,000 in 2006. The residents of Port St. Lucie have a median age of 29.9.

Table 2.2-3 Population Statistics for Ft. Pierce and Port St. Lucie, 2004 and 2006		
Year	Ft. Pierce	Port St. Lucie
2004	38,642	105,000
2006 (projected)	41,000	150,000
Source: St. Lucie County Chamber of Commerce, "2004 Relocation & Visitors Guide," p. 13.		

2.2.4 Easements, Title, Agency Works

No new easements or titles will be required from any governmental agency for the TCEC Unit 1 facilities. However, right-of-way use authorizations will be required from the Florida Turnpike Authority, the Florida Department of Transportation, NSLRWCD Canal 102, and St. Lucie County to install the two 3 mile transmission lines and natural gas pipeline as discussed in Section 6.0 of this SCA.

2.2.5 Regional Scenic, Cultural, and Natural Landmarks

St. Lucie County offers many water-related scenic and natural attractions. Fishing is a major attraction in St. Lucie County. There are several marinas, boat rental businesses, and sports fishing guides based in St. Lucie County. Additionally, beaches including Pepper Park offer snorkel and scuba divers with an opportunity to dive several shipwreck sites.

As described later in Subsection 2.2.7.18, the only regional, state, or federal environmentally protected area within 5 miles of the site is the Savannas Recreation Area and State Preserve, which is approximately 4.5 miles east of the site.

There are no recorded historic, scenic, cultural, or natural landmarks located on the TCEC site. The nearest recorded national natural landmark is the Reed Wilderness Seashore Sanctuary located more than 5 miles south of St. Lucie County in Martin County. There are several aquatic preserves located along the east shoreline of St. Lucie County. These include the Jensen Beach to Jupiter Inlet Aquatic Preserve; the Indian River Aquatic Preserve; the Savannas State Preserve; and the North Fork of the St. Lucie River Aquatic Preserve.

2.2.6 Archaeological and Historic Sites

In March 2000, the Duke Energy Ft. Pierce, LLC Project requested a historical resource review for the same site that is now TCEC. The Florida Department of State-

Division of Historical Resources (DHR) reviewed the Florida Master Site File and their records and determined that no historic properties are known to exist in the area of potential effect. The DHR concluded that no historic properties would be affected by the Duke Energy Project. FMPA contacted the DHR to advise of the revised project and site owner. The DHR responded with a similar determination of “no effect.” These letters are included in Section 10.4 of this SCA.

There are 15 sites in St. Lucie County that are recorded on the *National Register of Historic Places* as listed in Table 2.2-4. Six of these 15 sites are also registered with the Florida *Office of Cultural and Historical Programs*.

Table 2.2-4 Historic Sites in St. Lucie County, Florida			
Site Name	National Register of Historic Places (Yes/No)	State of Florida Office of Cultural and Historical Programs (Yes/No)	City
Moore's Creek Bridge	Yes	No	Ft. Pierce
Casa Caprona	Yes	Yes	Ft. Pierce
Cresthaven	Yes	Yes	Ft. Pierce
Ft. Pierce Old City Hall	Yes	No	Ft. Pierce
Ft. Pierce Old Post Office	Yes	No	Ft. Pierce
Ft. Pierce Site	Yes	Yes	Ft. Pierce
Jules Frere House	Yes	No	Ft. Pierce
Captain Hammond House	Yes	Yes	White City
Zora Neale Hurston House	Yes	Yes	Ft. Pierce
Immokalee	Yes	No	Ft. Pierce
St. Anastasia Old Catholic School	Yes	No	Ft. Pierce
St. Lucie High School	Yes	Yes	Ft. Pierce
St. Lucie Village Historic District	Yes	Yes	St. Lucie Village
Sunrise Theatre	Yes	No	Ft. Pierce
Urca de Lima Shipwreck	Yes	No	Off Shore Ft. Pierce

2.2.7 Socioeconomics and Public Services

2.2.7.1 Labor Force. Labor force statistics for Florida, St. Lucie County, and the other Treasure Coast counties are shown in Table 2.2-5. St. Lucie County had a total civilian labor force in October 2004 of 94,204; of which 9.6 percent were unemployed.

Table 2.2-5 Labor Force Statistics for the Treasure Coast Counties, Florida, and the US				
Area	Civilian Labor Force	Employment	Unemployment	Unemployment Rate
October 2004 Labor Force Statistics				
St. Lucie County	94,204	85,176	9,028	9.6
Martin County	58,032	54,893	3,139	5.4
Indian River County	56,160	50,221	5,939	10.6
Okeechobee County	17,178	15,848	1,330	7.7
Florida	8,467,000	8,087,000	380,000	4.5
U.S.	147,978,000	140,447,000	7,531,000	5.1
Annual 2003 Labor Force Statistics				
St. Lucie County	89,474	82,783	6,691	7.5
Martin County	56,271	53,350	2,921	5.2
Indian River County	52,931	48,950	3,981	7.5
Okeechobee County	16,432	15,274	1,158	7.0
Florida	8,164,000	7,744,000	420,000	5.1
U.S.	146,510,000	137,736,000	8,774,000	6.0
Source: Florida Research & Economic Database, Labor Market Analysis, http://fred.labormarketinfo.com/analyzer/mappages/map.asp?mapcode=04 .				

Among Treasure Coast counties, only Indian River (10.6 percent) had a higher unemployment rate. By way of comparison, the overall state unemployment rate was 4.5 percent in October 2004; this was below the 5.1 percent unemployment rate nationally. Annual figures for 2003 show a similar pattern, with the St. Lucie County unemployment rate at 7.5 percent versus a 5.1 percent rate for Florida, and a 6.0 percent rate nationwide.

2.2.7.2 Employment by Occupation. Employment figures for Ft. Pierce-Port St. Lucie Metropolitan Statistical Area (MSA) for November 2003 are shown in Table 2.2-6. Among all occupations, there were 111,190 employed in the MSA, and the largest occupation category was in the office and administrative support occupation (20,920 or 18.8 percent). This category was followed by sales and related occupation (14,050 or 12.6 percent), and the food preparation and serving occupation (10,560 or 9.5 percent).

Table 2.2-6 Employment by Occupation for Ft. Pierce-Port St. Lucie, Metropolitan Statistical Area, November 2003		
Occupation	Employment Level	Percent of Total
All Occupations	111,190	100
Management	3,830	3.4
Business and Financial Operations	2,820	2.5
Computer and Mathematical Science	830	0.7
Architecture and Engineering Occupations	1,190	1.1
Life, Physical, and Social Science	650	0.6
Community and Social Services	1,630	1.5
Legal	850	0.8
Education, Training, and Library	5,890	5.3
Arts, Design, Entertainment, Sport, and Media	780	0.7
Healthcare Practitioner and Technical Occupations	5,870	5.3
Healthcare Support Occupations	3,650	3.3
Protective Service	3,270	2.9
Food Preparation and Serving	10,560	9.5
Building and Grounds Cleaning and Maintenance	5,640	5.1
Personal Care and Service	2,640	2.4
Sales and Related	14,050	12.6
Office and Administrative Support	20,920	18.8
Farming, Fishing, and Forestry	2,040	1.8
Construction and Extraction	6,960	6.3
Installation, Maintenance, and Repair	4,820	4.3
Production Occupations	4,480	4.0
Transportation and Material Moving	7,820	7.0
Source: US Department of Labor, Bureau of Labor Statistics, November 2003 Metropolitan Area Occupational Employment and Wage Estimates, http://stats.bls.gov/oes/current/oes_2710.htm .		

Top employers in the county in 2004 include the St. Lucie County Schools (3,700), St. Lucie County (1,561), the State of Florida (1,375), Lawnwood Regional Medical Center (1,300), Indian River Community College (1,080), Publix Super Markets (995), QVC (970), Florida Power & Light (962), Wal-Mart (850), and Liberty Medical Supply (750). FPUA employ 247 and Ft. Pierce has 346 employees.

2.2.7.3 Employment by Industrial Sector. Table 2.2-7 lists the employment by industrial sector for St. Lucie County and Florida in 2002. Major employment sectors in the county included the education services sector (9.2 percent), the healthcare and social services sector (13.3 percent), and 28.1 percent were in the other services classification. Construction and real estate (9.2 percent) and professional and business services (8.5 percent) also made up a significant portion of the St. Lucie County employment by industry in 2002.

Table 2.2-7 Employment by Industry by Percent in St. Lucie County and Florida, 2002				
Industry	St. Lucie County		Florida	
	Percent	Number	Percent	Number
Agriculture, Natural Resources, Mining	6.0	3,302	1.5	107,452
Construction & Real Estate	8.9	4,897	8.2	587,404
Education Services	9.2	5,063	7.2	515,769
Finance & Insurance	3.7	2,036	4.5	322,356
Government (Including Military)	8.3	4,567	6.1	436,971
Healthcare and Social Assistance	13.3	7,319	11.3	809,471
Information	1.4	770	2.5	179,086
Manufacturing	4.7	2,586	5.7	408,317
Other Services	28.1	15,463	28.1	2,012,932
Professional and Business Services	8.5	4,677	17.0	1,217,788
Transportation/Warehousing/Wholesale Trade	7.8	4,292	7.9	56,591
Source: Enterprise Florida, http://www.eflorida.com/profiles/CountyReport.asp?CountyID=36&Display=all).				

Compared to the state, St. Lucie County had a relatively higher concentration of employment in the agriculture, natural resources, and mining sector (6.0 percent versus 1.5 percent), the education sector (9.2 percent versus 7.2 percent), and in the government sector (8.3 percent versus 6.1 percent). The county was well below the state percentage in the professional and business services sector (8.5 percent versus 17.0 percent respectively).

2.2.7.4 Baseline Employment Projections. Employment projections are available by sector for the Treasure Coast employment region and for Florida through the Florida Research & Economic Database. Projections covering 2003 and 2011 are shown in Table 2.2-8. For this period, the health services sector in the Treasure Coast region is

Table 2.2-8 Baseline Employment Projections, 2003-2011						
Industry	Treasure Coast Employment Region			Florida		
	2003 Estimate	2011	Annual Avg. Growth Rate	2003 Estimate	2011	Annual Avg. Growth Rate
Agri, Forestry, Fishing	18,754	20,267	0.98	222,565	244,851	1.22
Construction	12,126	13,975	1.82	421,490	488,881	1.91
Finance, Insurance, Real Estate	7,397	8,079	1.12	480,036	547,530	1.69
Government	12,272	13,500	1.21	493,432	526,704	0.83
Manufacturing	9,613	9,773	0.21	468,565	481,668	0.32
Retail Trade	38,055	42,660	1.46	1,457,174	1,644,973	1.55
Wholesale Trade	5,219	6,264	2.37	385,544	446,057	1.88
Services	65,889	81,140	2.71	3,280,193	4,031,776	2.69
Health	18,920	24,259	3.27	689,064	849,698	2.73
Education	12,427	14,919	2.37	562,161	660,670	2.08
Trans., Public Utilities	7,653	8,567	1.44	421,963	470,493	1.39
Not Elsewhere Classified	15,875	16,814	0.72	621,473	660,702	0.77
Total	192,853	221,039	1.75	8,252,435	9,543,635	1.87
Source: Florida Research & Economic Database, http://fred.labormarketinfo.com/analyzer/saintro.asp?cat=IND&session=indproj&time=&geo=						

expected to experience the largest annual average growth rate (3.27 percent per year), and the education sector (2.37 percent) and wholesale trade sector (2.37 percent) also are expected to increase at an annual average rate of more than 2 percent.

Compared to the state of Florida in general, the Treasure Coast region is expected to realize higher growth rates in the government sector (1.21 percent versus 0.83 percent), the wholesale trade sector (2.37 percent versus 1.88 percent), and in the health services sector (3.27 percent versus 2.73 percent). The state is projected to have an advantage in the annual average growth rate in a number of categories, including the agriculture, forestry and fishing sector (1.22 percent versus 0.98 percent), and in the finance, insurance, and real estate sector (1.69 percent versus 1.12 percent).

Ft. Pierce is also realizing noticeable economic and employment growth. The 2003 *Comprehensive Annual Financial Report* for FPUA listed a number of new investments that will add jobs and demand for power to the area. This included 1,200 new jobs associated with a new Wal-Mart Distribution Center that is now operational

(and located across from Glades Cutoff Road from the TCEC site), the Harbour Isle project that was projected to add in excess of 800 electric, water, and wastewater accounts during the subsequent 3 years, and several new or revitalized commercial buildings.

2.2.7.5 General Income Characteristics. Total and per capita income information for St. Lucie County and for Florida is listed in Table 2.2-9. In St. Lucie County, the total personal income in 2002 was \$4.813 billion, or less than 1 percent of the state figure. The per capita income level was \$23,458 per person in 2002, and compares to a per capita income of \$22,830 the previous year, and \$22,420 in 2000. The 2002 per capita income in the county was significantly below that at the state level, which was \$29,758. According to the 2000 US Census, 24,404 persons or 12.5 percent of the population in St. Lucie County lived in poverty. The corresponding figure for the state was 11.7 percent or 1.88 million in 2000.

Table 2.2-9 Total and Per Capita Personal Income, 2000-2002				
Year	St. Lucie County		Florida	
	Per Capita Income	Total Personal Income (\$000s)	Per Capita Income	Total Personal Income (\$000s)
2000	\$22,420	4,302,495	\$28,511	\$457,539,355
2001	\$22,830	4,522,591	\$29,247	\$478,341,768
2002	\$23,458	4,813,388	\$29,758	\$496,706,399
Source: Enterprise Florida, St. Lucie County Profile, http://www.eflorida.com/profiles/CountyReport.asp?CountyID=36&Display=all				

2.2.7.6 Source of Income. Table 2.2-10 indicates the sources of income for St. Lucie County in 2001 and 2002 according to the US Bureau of Economic Analysis. In 2002, net earnings were the largest source of income (\$2.36 billion); retirement benefits and dividends, interest and rent also generated more than \$1 billion in income.

Table 2.2-10 Source of Income for St. Lucie County, Florida, 2001 and 2002		
Category	2001	2002
Place of Residence Profile (\$000s)		
Personal Income ¹	4,522,591	4,813,388
Net Earnings	2,185,881	2,358,179
Personal Current Transfer Receipts	1,100,674	1,205,075
Income maintenance	71,786	82,079
Unemployment insurance benefit payments	19,427	27,412
Retirement and other	1,009,461	1,095,584
Dividends, Interest, and Rent	1,236,036	1,250,134
1. Net earning by place of residence is earnings by place of work less contributions for government social insurance, plus an adjustment to convert earnings by place of work to a place of residence basis. Earnings by place of work is the sum of wage and salary disbursements, supplements to wages and salaries, and proprietors' income. 2. Income Maintenance Payments consists largely of supplemental security income payments, family assistance, food stamp payments, and other assistance payments, including general assistance. 3. Source: CA30 Regional economic profiles –St. Lucie, FL, 4. http://www.bea.doc.gov/bea/regional/definitions/nextpage.cfm?key=Net%20earnings		

2.2.7.7 Average Wage and Salary Income, by Sector. Table 2.2-11 lists the average annual wage by industry in St. Lucie County in 2002. The industry having the highest average annual wage was the government sector (\$36,489) followed by the healthcare and social assistance sector (\$35,009) and the manufacturing sector (\$34,642). The construction and real estate sector (\$20,372) and the professional and business sector (\$20,900) had the lowest average annual wage in 2002.

Table 2.2-12 lists the income by occupation for Ft. Pierce-Port St. Lucie MSA in November 2003. For all occupations, the average income was \$30,460 in the MSA, though there was significant variation among individual occupations. The highest income category was in the management occupation (\$74,900) followed by the legal (\$59,960), and the healthcare practitioner and technical occupation (\$52,570).

Table 2.2-11 Average Annual Wage by Industry, St. Lucie County, 2002 (\$)	
Industry	St. Lucie County
Agriculture, Natural Resources, Mining	27,762
Construction & Real Estate	20,372
Education Services	27,087
Finance and Insurance	32,138
Government (Incl. Military)	36,489
Healthcare and Social Assistance	35,009
Information	33,013
Manufacturing	34,642
Other Services	29,759
Professional and Business Services	20,900
Transportation/Warehousing/Wholesale Trade	31,518
Source: Enterprise Florida, St. Lucie County profile, http://www.eflorida.com/profiles/CountyReport.asp?CountyID=36&Display=all	

Table 2.2-12 Income by Occupation for Ft. Pierce-Port St. Lucie, Metropolitan Statistical Area, November 2003	
Occupation	Mean Annual Wages, \$
All Occupations	30,460
Management	74,900
Business and financial Operations	53,150
Computer and Mathematical Science	48,330
Architecture and Engineering Occupations	45,890
Life, Physical, and Social Science	44,800
Community and Social Services	33,130
Legal	59,960
Education, Training, and Library	38,130
Arts, Design, Entertainment, Sport, and Media	39,260
Healthcare Practitioner and Technical Occupations	52,570
Healthcare Support Occupations	22,160
Protective Service	33,290
Food Preparation and Serving	16,790
Building and Grounds Cleaning and Maintenance	20,930
Personal Care and Service	19,660
Sales and Related	28,770
Office and Administrative Support	25,060
Farming, Fishing, and Forestry	16,870
Construction and Extraction	28,150
Installation, Maintenance, and Repair	31,600
Production Occupations	26,930
Transportation and Material Moving	23,310
Source: US Department of Labor, Bureau of Labor Statistics, November 2003 Metropolitan Area Occupational Employment and Wage Estimates, http://stats.bls.gov/oes/current/oes_2710.htm	

2.2.7.8 Baseline Income Projections. Table 2.2-13 contains baseline income projections through 2011 for St. Lucie County and Florida. The categories projected include per capita income and total personal income, and the projections assume that the 2000 through 2002 average annual growth rate for these categories continues to apply through 2011 at the county and state level. Projections indicate that under the assumptions made, the per capita income in St. Lucie County would increase to \$23,995 in 2005 and to \$27,484 in 2011. This compares to respective figures of \$29,128 and \$34,568 for Florida. The total personal income in St. Lucie County increases to \$5.09 billion in 2005 and to \$7.13 billion in 2011 under the forecast, while the state income would increase from \$517.53 billion in 2005 to \$662.14 billion in 2011.

Table 2.2-13 Projection of Baseline Income Figures for St. Lucie County and Florida				
Year	St. Lucie County		Florida	
	Per Capita Income	Total Personal Income (\$000s)	Per Capita Income	Total Personal Income (\$000s)
2003	22,933	4,550,779	20,128	476,720,777
2004	23,458	4,813,391	29,758	496,706,343
2005	23,995	5,091,157	30,402	517,529,763
2006	24,544	5,384,953	31,060	539,226,163
2007	25,106	5,695,702	31,732	561,832,141
2008	25,680	6,024,384	32,418	585,385,830
2009	26,268	6,372,033	33,119	609,926,960
2010	26,869	6,739,744	33,836	635,496,928
2011	27,484	7,128,674	34,568	662,138,866
Source: Projections made by Black & Veatch.				

2.2.7.9 Housing. According to the US Census Bureau, there were 96,123 housing units in St. Lucie County in 2002. This was 1.3 percent of the 7,624,378 units in the state. The number of housing units in 2002 compared to a figure of 91,262 reported in the 2000 US Census, which also reported 17,170 housing units in Ft. Pierce, and 36,785 housing units in Port St. Lucie. Home ownership rate in the county was high at 78 percent versus a 70 percent ownership rate for Florida.

Additional statistics shown in Table 2.2-14 indicate that single unit homes made up two-thirds of the county housing stock in 2000, with 12.7 percent classified as mobile homes and 23 percent as multi-unit homes. The housing stock in St. Lucie County is

Table 2.2-14 Profile of Selected Housing Characteristics for St. Lucie County in 2000		
Category	Number (out of 91,262 housing units)	Percent
Units in Structure		
1 unit, detached	57,441	62.9
1 unit, attached	3,402	3.7
2 units	3,188	3.5
3 or 4 units	3,583	3.9
5 to 9 units	2,851	3.1
10 to 19 units	2,544	2.8
20 or more units	6,381	7.0
Mobile home	11,595	12.7
Boat, RV, van, etc.	277	0.3
Year Structure Built		
1999 to March 2000	2,520	2.8
1995-1998	9,053	9.9
1990-1994	13,633	14.9
1980-1989	33,259	36.4
1970-1979	18,722	20.5
1960-1969	7,208	7.9
1940-1959	5,631	6.2
1939 or earlier	1,236	1.4
Rooms		
1 room	550	0.6
2 rooms	3,097	3.4
3 rooms	6,858	7.5
4 rooms	17,843	19.6
5 rooms	25,263	27.7
6 rooms	20,933	22.9
7 rooms	10,638	11.7
8 rooms	3,727	4.1
9 or more rooms	2,353	2.6
Median	5.2	NA

Table 2.2-14 (Continued) Profile of Selected Housing Characteristics for St. Lucie County in 2000		
Category	Number (out of 91,262 housing units)	Percent
Year Householder Moved into Unit		
1999 to March 2000	14,637	19.0
1995 to 1998	23,423	30.4
1990 to 1994	15,777	20.5
1980-1989	16,525	21.5
1970 to 1979	4,783	6.2
1969 or earlier	1,788	2.3
Source: US Census Bureau, 2000 Census data, DP-4 Profile of Selected Housing Characteristics: 2000, SF 3.		

relatively young, reflecting the recent population growth. Approximately 64 percent of the housing stock in 2000 was built in 1980 or later, and only 7.6 percent of the housing stock was built before 1960. Approximately 50 percent of the 2000 population moved into their housing unit in 1995 or later, and approximately 70 percent moved into the unit in 1990 or later. The median number of rooms for the St. Lucie County housing stock was 5.2 in 2000, and 94.3 percent of the homeowners had at least one vehicle.

2.2.7.10 Existing Housing Stock. Table 2.2-15 lists additional detail about the St. Lucie County housing stock. All data is from the 2000 U.S. Census. Of the total 91,262 housing units in the county, only 0.5 percent of the housing units were classified as lacking complete plumbing facilities, and 0.3 percent were lacking complete kitchen facilities. In 2000, only 2.2 percent of the housing units lacked telephone service. The vast majority of homes (92.3 percent) in St. Lucie County were heated by electricity in 2000, while only 4 percent were heated by natural gas.

The number of persons per household was essentially the same at the county (2.47 per household) and state levels (2.46) according to U.S. Census data. Of the occupied housing units in St. Lucie County, 95.5 percent contained 1.00 or fewer occupants per room. The median value of owner-occupied housing units in 2000 was \$86,100 for St. Lucie County versus \$105,500 at the state level.

Table 2.2-15 Selected Housing Characteristics for St. Lucie County from the 2000 Census		
Category	Number	Percent
Lacking Complete Plumbing Facilities	382	0.5
Lacking Complete Kitchen Facilities	214	0.3
No Telephone Service	1,673	2.2
Occupants Per Room (out of 76,933 occupied units)		
1.00 or less	73,456	95.5
1.01 to 1.50	2,165	2.8
1.51 or more	1,312	1.7
House Heating Fuel		
Natural Gas	3,110	4.0
LP or Other Tank Gas	1,468	1.9
Electricity	71,041	92.3
Fuel Oil, Kerosene, etc.	285	0.4
Coal or Coke	0	0
Wood	98	0.1
Solar Energy	26	0.0
Other Fuel	43	0.1
No Fuel Used	862	1.1
Source: US Census Bureau, 2000 Census, DP-4 Profile of Selected Housing Characteristics: 2000 (SF 3), St. Lucie County, Florida.		

Of the total housing units in St. Lucie County, 84.3 percent are occupied, 15.7 percent are vacant, and 9.9 of vacant houses are for seasonal, recreational, or occasional use. The homeowner vacancy rate was 2.3 percent in 2000 and the rental vacancy rate was 11.8 percent. Of the 76,933 occupied housing units, 78 percent were owner-occupied housing units and 22 percent were renter occupied.

2.2.7.11 Building Activity. Table 2.2-16 indicates that the building activity for St. Lucie County has continued at a rapid pace during the recent past, as reflected in the number of housing unit building permits issued. In 2003, a total of 7,684 permits were issued for the county, and this was equal to nearly 8 percent of the 2002 existing housing stock. During the past five years, the type of housing unit for which a building permit

Table 2.2-16 Housing Unit Building Permits for St. Lucie County, FL, 1999-2003					
Units	1999	2000	2001	2002	2003
Single-Family Structures	1,644	1,719	2,146	3,304	6,805
Multi-Family Structures	589	374	624	1,251	879
2 Unit Multi-Family Structures	18	16	34	12	36
3 and 4 Unit Multi-Family Structures	3	12	25	68	105
5+ Unit Multi-Family Structures	568	346	565	1,171	738
Total	2,233	2,093	2,770	4,555	7,684
Source: US Dept. of Housing and Urban Development, State of the Cities Data Systems (SOCDS), http://socds.huduser.org/permits/index.html?					

was issued has been primarily for single family structures, though multi-family structures also comprised a significant percentage in 2002 (38 percent) and in other years.

2.2.7.12 Housing Costs. St. Lucie County has a diversity of residential areas and offers a wide range of housing prices. The average home prices for St. Lucie County in 2004 are shown in Table 2.2-17, based on information from the St. Lucie County Board of Realtors and its Multiple Listing Services. The cost of housing was relatively affordable in 2004; a three bedroom, 2 bath housing unit averaged \$80,000 in the county, with price ranges from \$55,000 to \$175,000. A two bedroom, two bath rental unit had a monthly rent of between \$500 and \$600 dollars, on average. As is typical of coastal areas, homes and rentals on the waterfront were priced at a premium.

Additional housing cost information is available from the 2000 US Census. Table 2.2-18 shows that in 2000, 57.5 percent of the housing in St. Lucie County had a value of between \$50,000 and \$99,999. The second highest percentage of owner-occupied housing units was in the \$100,000 to \$149,000 range (22.0 percent of the units). The 2000 US Census also reported that 28.6 percent of the housing units were not mortgaged and, of those units mortgaged, 28.5 percent had monthly owner costs between \$700 and \$999 per month; 16.7 percent had a monthly mortgage between \$1,000 and \$1,499 per month; and 15.7 percent had a monthly mortgage between \$500 and \$699 per month. According to US Census data, 50.8 percent of the St. Lucie county population spent less than 20 percent of household income on monthly owner costs.

For rental units, the 2000 US Census reported that 44.6 percent of the renter-occupied units in St. Lucie County had a gross rent between \$500 and \$749 per month, 19.7 percent were between \$750 and \$999 per month, and 19.1 percent were between

Table 2.2-17 Average Home and Rental Prices in St. Lucie County, 2004		
Average Home Prices (\$)		
Description	Averages	Range
2 bedroom – 1 bath	40,500	35,000-80,000
3 bedroom – 2 bath	80,000	55,000 - 175,000
4 bedroom – 2 bath	113,000	75,000 - 250,000
Oceanfront Condo	125,000	75,000 - 400,000
Waterfront	193,000	140,000 - 600,000
Average Price of Rentals (\$)		
2 bedroom, 1 bath , 1 car garage.		485-500
2 bedroom, 2 bath, 1 car garage		500-600
3 bedroom, 2 bath, 1 car garage		550-700
3 bedroom, 2 bath, 2 car garage		575-950
Large 3 bedroom, 2 bath, 2 car garage		800-1200
Large pool, 3 bedroom, 2 bath, 2 car garage		850-1200
Source: St. Lucie County Chamber of Commerce, “2004 Relocation & Visitors Guide” p. 43.		

\$500 and \$749 per month. According to the 2000 Census, 28.6 percent of renters spent less than 20 percent of their income on rent and 34 percent spent 35 percent or more on rent.

Table 2.2-18 Selected Housing Cost Characteristics for St. Lucie County, 2000		
Category	Number (out of 45,029)	Percent
Value of Specified Owner-Occupied Units		
Less than \$50,000	3,541	7.9
\$50,000 to \$99,999	25,912	57.5
\$100,000 to \$149,999	9,892	22.0
\$150,000 to \$199,000	2,992	6.6
\$200,000 to \$299,999	1,617	3.6
\$300,000 to \$499,000	824	1.8
\$500,000 to \$999,999	175	0.4
\$1,000,000 plus	76	0.2
Median	\$86,100	NA
Selected Monthly Owner Costs as a Percent of Household Income		
Less than 15 percent	15,110	33.6
15 to 19 percent	7,767	17.2
20 to 24 percent	6,235	13.8
25 to 29 percent	4,137	9.2
30 to 34 percent	2,620	5.8
35 percent or more	8,678	19.3
Not computed	482	1.1
Gross Rent of Specified Renter-Occupied Units		
Less than \$200	650	3.9
\$200 to \$299	409	2.4
\$300 to \$499	3,202	19.1
\$500 to \$749	7,476	44.6
\$750 to \$999	3,294	19.7
\$1,000 to \$1,499	702	4.2
\$1,500 or more	185	1.1
No cash rent	836	5.0
Median	621	NA

Table 2.2-18 (Continued) Selected Housing Cost Characteristics for St. Lucie County, 2000		
Category	Number (out of 45,029)	Percent
Gross Rent as a Percent of Household Income		
Less than 15 percent	2,539	15.2
15 to 19 percent	2,245	13.4
20 to 24 percent	1,843	11.0
25 to 29 percent	1,747	10.4
30 to 34 percent	1,217	7.3
35 percent or more	5,702	34.0
Not computed	1,461	8.7
Source: US Census Bureau, 2000 Census, DP-4 Profile of Selected Housing Characteristics: 2000 (SF 3), St. Lucie County, Florida.		

In addition to the housing and rental stock, St. Lucie County and Ft. Pierce offer a wide array of temporary lodging, reflecting the area's status as a destination for recreation seekers. The St. Lucie County website lists 46 motels, inns, hotels, RV parks, and short-term apartments in the vicinity.

2.2.7.13 Education. According to the St. Lucie County Chamber of Commerce, there were thirty-six public schools, nine private schools, and branches of three top universities and research facilities located in the county in 2004. More than 29,000 students attend the public schools, which are all accredited by and meet the Southern Association of Colleges and Schools requirements for class size. Parents have the option of choosing their child's school in accordance with certain rules and limits.

There are several options for higher education in the county and region. Indian River Community College (IRCC) is a two-year college providing an education to more than 45,000 students each year. IRCC has campuses located in Ft. Pierce, St. Lucie West, Stuart, Vero Beach, and Okeechobee.

A major university available to area students is Florida Atlantic University (FAU), based in Boca Raton. Established in 1961 as the fifth university in the state system, it services the South Florida region with seven campus locations, including Port St. Lucie. FAU fosters a partnership with IRCC to coordinate academic programs. Students can obtain their associated degree from IRCC and their bachelor's, master's, and doctoral degrees in selected disciplines from FAU. A new joint-use facility opened in January 2002 and houses classrooms, students services and a library for FAU and IRCC students.

Another higher educational choice is Barry University. This is a co-educational Catholic institution that has a Port St. Lucie location.

In 2000, 15.1 percent of the St. Lucie County population had a bachelor's degree or higher, according to the US Census Bureau, and this compares to a 22.3 percent rate at the state level.

2.2.7.14 Transportation.

Airport. The St Lucie County International Airport is located 3 miles northwest of Ft. Pierce. The airport includes a control tower, a beacon, and dusk to dawn lights. The airport's longest runway is 6,492 feet long by 150 feet wide with 25 foot paved shoulders; a second runway is 4,756 by 100 feet and has 50 foot paved shoulder. Both runways are asphalt and in good condition. The longest runway has a single wheel weight limit of 30,000 pounds and the second has a single wheel weight limit of 15,000 pounds. Standard services include jet fuel availability, hangars and tie downs for aircraft. The airport also offers charter flights, flight instruction, aircraft rental, and aircraft sales.

The airport has 185 aircraft based on the field, of which 125 are single engine airplanes, 50 are multiengine planes, five are jet airplanes and five are helicopters. The airport has an average of 537 aircraft operations per day, of which 53 percent are local aviation and 47 percent are transient aviation, on average. The airport is considered to be in a noise sensitive area and has restrictions on touch and go operations.

The Port of Ft. Pierce. The Port of Ft. Pierce is one of Florida's 14 deep water ports. The Port was created in 1920 when a 300 foot wide opening, Ft. Pierce Inlet, was cut through the land barrier between the Atlantic Ocean and the Indian River Lagoon. The Port is a choice location to export citrus and is nearby the Florida East Coast Railway, US-1, Highway I-95, and the Florida Turnpike.

Although the Port lies physically within Ft. Pierce limits, it is the responsibility of St. Lucie County. Management of the Port falls under the jurisdiction of St. Lucie County Commission.

The Port has historically specialized in handling perishable products such as fruit and vegetables. Roll on, roll off cargo, heavy lift and containerized cargo have all been handled at the Port. The Port has also serviced day cruises for large passenger and luxury intracoastal waterway vessels. Two tugs provide around-the-clock service to the terminal, and additional assistance is provided by the Harbor master pilot boat if necessary. Ft. Pierce Harbor Master, the US Coast Guard, and the Indian River Terminal all maintain VHF channels for ship to shore communications.

The Port turning basin within the Inlet is up to 900 feet wide and allows large vessels maneuvering room for docking and undocking at the Port's Indian River Terminal. Existing Port facilities include the Indian River Terminal with berths of 454 feet, 330 feet, and 150 feet for vessels with a 28 foot draft or less, and the municipal pier with marginal wharfs of 330 feet and 195 feet for vessels up to 20 feet in draft on the

seaward end. The municipal pier, primarily suitable for small cargo vessels servicing the island trades, also has a roll on, roll off cargo ramp. The Indian River Terminal, with a pier-side refrigerated terminal, can also accommodate ships with roll on, roll off equipment.

According to the *Port of Ft. Pierce Master Plan*, since 1996, the intended general use of the Port has shifted from exclusively cargo use to a mix of recreational, commercial, and industrial uses. A major goal of the Port is to strengthen and maintain the quality of life for St. Lucie County residents by enhancing the economic viability, attractiveness, environmental quality, and social benefits associated with activities at the Port of Ft. Pierce. Other goals stated in the *Port of Ft. Pierce Master Plan* include the support of expansion of water-dependent recreational and ecotourism in the Port Planning Area, to ensure that Port facilities are compatible with the use of the surrounding area in Ft. Pierce downtown waterfront development, to enhance public access to the Port Planning Area, and to protect and correct any detrimental effects on the Indian River Lagoon caused by operations.

Highway Transportation. Ft. Pierce transportation network includes a number of high capacity volume highways. The major north-south highways are Interstate 95, Florida's Turnpike, and US Highway 1. Highway 70 and Highway 68 are predominately east-west highways that link Ft. Pierce with Okeechobee County and beyond. Figure 2.2-4 shows the transportation network within the region. There are six exits off of Interstate 95 in St. Lucie County, located at Gatlin Boulevard, St. Lucie West Boulevard, Midway Road/CR712, Okeechobee Road/SR70, Orange Avenue, and Indrio Road. The Midway Road exit (Exit 126) is the nearest to the TCEC site. The Florida Turnpike has two exits in St. Lucie County. These are the SR 716 exit and the SR 70/ I-95 exit north of the TCEC site.

The TCEC site will be located southwest of Ft. Pierce on the east side of Glades Cutoff Road, approximately 1.8 miles east of Interstate 95 and a half-mile north of Midway Road. Access to the site from outside Ft. Pierce area can be gained by taking the Interstate 95 to the Midway Road exit, heading east, then turning north on Selvitz Road. As part of the Midway Industrial Park project, an entrance to the site from Selvitz Road will be developed. This will serve as the site entrance during construction and operation. An alternative approach for traffic traveling to the site from Highway 1 will be to turn west on Midway Road for approximately 2 miles, and to then turn right on Selvitz Road.

Traffic flow in the immediate vicinity of the TCEC site can generally be described as moderate. The Florida Department of Transportation reported a 2003 annual average daily traffic (AADT) volume of 11,400 for County Road 712/Midway Road east of

Regional

Figure 2.2-4
Transportation

Network

Interstate 95, with the flow split evenly between east and west flow (5,700 each). Truck traffic comprised 21.9 percent of this traffic flow. The 2003 AADT for Highway 1 at County Road 712 was heavy, totaling 37,000. This figure was evenly divided between east and west bound traffic, and truck traffic comprised 5.2 percent of the traffic flow.

2.2.7.15 Medical Facilities. St. Lucie County and Ft. Pierce benefit from a number of modern health care facilities offering a wide diversity of care.

St. Lucie Medical Center, located in Port St. Lucie, is a 194 bed acute care hospital providing a full range of medical and surgical services for inpatient and outpatient procedures, including cardiology services, endoscopy, and emergency services. The center is open 24 hours a day, 7 days a week.

Lawnwood Regional Medical Center & Heart Institute, located in Ft. Pierce, is a 345 bed acute care hospital offering a full range of services, and is the only full-service cardiac center on the Treasure Coast. It offers diagnostic, interventional and therapeutic care, including open heart surgery. It also provides emergency care around the clock, offers a Level II neonatal intensive care unit, labor/delivery and birthing rooms, pediatrics, orthopedics, oncology, nuclear medicine, ultrasound and radiation therapy, and a full range of inpatient and outpatient general surgical services.

Lawnwood Pavilion, located on Lawnwood Regional Medical Center's campus in Ft. Pierce, houses a 36 bed inpatient rehabilitation center. Mental health services include assessment and referral, outpatient psychiatric and mental health services, and intensive outpatient chemical dependency program, and inpatient psychiatric services, physical and occupational therapies, speech/language pathology, and 24 hour rehabilitation nursing. Martin Memorial Health Service, with two locations in St. Lucie County, includes an Outpatient Surgery Center, a Diagnostic Center including MRI and Mammography units, a Rehabilitation Center and Wellness Center. The MediCenter provides walk-in treatment by a physician with no appointment necessary.

New Horizons of the Treasure Coast is a 130 bed, not-for-profit mental health and substance abuse agency located in Ft. Pierce. Services include crisis evaluation and stabilization, substance abuse detoxification and residential treatment, adult residential services, day treatment programs, outpatient counseling and the only children's services unit in the area.

Savannas Hospital, located in Port St. Lucie, is a private 70 bed short-term psychiatric hospital with programs in general psychiatry for adults and adolescents, including substance abuse treatment facilities and dual diagnosis.

2.2.7.16 Fire Fighting Facilities. The St. Lucie County Fire District (SLCFD) operates 15 stations and also serves the cities of Ft. Pierce and Port St. Lucie. The fire department is a career department with a total of 367 employees. The county fire department jointly owns an air ambulance helicopter with the St. Lucie County Police

Department. The SLCFD also owns 15 fire engines, 14 brush units, 18 rescue units, and four tanker trucks. The SLCFD provide command units and special operations (hazmat response) services. The primary emergency responder to the TCEC will be the SLCFD Station #6 located at 350 East Midway Road, which is less than 4 miles from the TCEC. The backup emergency responders to the TCEC will be the SLCFD Station #1 or Station #14. Station #1 is located approximately 4.24 miles from the TCEC and Station #14 is located approximately 9 miles from the TCEC in Port St. Lucie.

2.2.7.17 Police Protection. Police protection for St. Lucie County is provided by the St. Lucie County Sheriff's Department, which has a professional staff of approximately 500, including 200 patrolmen. The department works through a number of cooperative agreements with other governmental and law enforcement agencies to pool resources. Equipment includes an Agusta A-119 Koala air ambulance helicopter jointly owned with the county fire department, a fully equipped marine unit servicing the county waterways, and a mobile command center developed with Ft. Pierce police department, the county fire department, and the Board of County Commissioners. The St. Lucie Sheriff's Department has been accredited since 1996 and has received recognition from the Commission on Accreditation for Law Enforcement Agencies. The county jail is accredited by the Florida Correctional Accreditation Commission and, in 2003, the Board of County Commissioners approved the expansion of the jail by 560 permanent beds.

Ft. Pierce police force has a total of 144 personnel, including 106 police officers. The city also has a reserve police force of 23. The City of Port St. Lucie, which has the lowest crime rate in Florida, has a staff of 120 of which 110 are uniformed officers. Ft. Pierce Police Department is located approximately 8 miles north of the TCEC.

2.2.7.18 Recreation Facilities. St. Lucie County has abundant recreational facilities and attractions, many of which are water-related activities. Fishing is a major attraction in St. Lucie County, with channel bass, snook, ladyfish, jack crevalle, and trout in the backwaters of the St. Lucie River. Black bass are abundant in the canals, and largemouth bass are common in a chain of lakes known as the Savannas. Surf and offshore ocean fishing are popular, as is lobstering which is facilitated by the good breeding environment provided by Ft. Pierce Inlet. There are also in-shore reefs with depths ranging from 12 to 25 feet that provide lobster diving and trapping opportunities.

There are a number of marinas, sport fishing, and boat rental opportunities in the county. Facilities located in Ft. Pierce include the Marina at Ft. Pierce, Riverside Marina, Ft. Pierce City Marina, Ft. Pierce Inlet Marina, Harbortown Marina & Restaurant, and Taylor Creek Marina.

The beaches of Pepper Park on North Hutchinson Island offer snorkelers and scuba divers a chance to dive several of the ship wreck sites that are located just off the beach. Thousands of threatened loggerhead and endangered green leatherback sea turtles

nest along the beaches of Hutchinson Island during June and July of each year. Organized nighttime turtle walks are available. Horseback riding along the shore of South Hutchinson Island is also available, with basic riding lessons offered.

The barrier islands off of St. Lucie County include 21 miles of bleached white beaches. Public beaches lie along 7 miles of this coastal stretch. Ft. Pierce Inlet Recreation Area is a 340 acre state owned plot located on the southern tip of North Hutchinson Island with 1,500 feet of frontage on Ft. Pierce Inlet and a wide sandy ocean beach. Jack Island lies off the east shore of the Indian River where only foot traffic is allowed, and where an abundance of bird life can be observed.

The nearby Savannas State Preserve provides the opportunity to experience the largest remaining fresh water marsh on the east coast of Florida. It offers opportunities for hiking, bicycling, and horseback riding. The Savannas is the only local, state or federal environmentally protected area within 5 miles of the TCEC and is illustrated on Figure 2.2-5.

North Jetty Park has a protected beach that is popular, as is South Jetty Park, with its 237 feet of ocean front located on the south side of Ft. Pierce inlet. The park offers restrooms, boardwalk, a 1,200 foot fishing jetty, and picnic shelters with grills.

Ecotourism is a developing niche market for St. Lucie County. Ecotours of the Indian River Lagoon, including Ft. Pierce State Inlet Park, Jack Island Wildlife Preserve Indian River Lagoon are available from Ft. Pierce City Marina. Trips allow views of dolphins and other marine life, plus birds, and wildlife among the mangroves along the Indian River. Tours of the North Fork of the St. Lucie River are also available from Port St. Lucie.

The Florida Manatee can be viewed at the Manatee Observation & Education Center at Moore's Creek on the Indian River in Ft. Pierce. The center, operated by FPUA, reported sighting 354 manatees in the 2002-2003 season. The center is also the county's premier nature education facility and includes a butterfly garden, educational videos, and has a gift shop.

Heathcote Botanical Gardens in Ft. Pierce is a living museum of tropical flowers and foliage, both native and exotic, including a Japanese garden. Educational programs are offered year round. The Harbor Branch Oceanographic Institution, Inc. located in Ft. Pierce is a non-profit organization involved in research and education in the marine sciences and engineering. Harbor Branch is a world-class research organization that welcomes interested visitors. Throughout the year, Harbor Branch offers college courses, lecture series, trips, and tours. Both educational and fun marine research tours and cruises on the Indian River Lagoon are available daily.

Figure 2.2-5
Local Recreational Facilities

The Smithsonian Marine Ecosystems Exhibit located on South Hutchinson Island in Ft. Pierce allows visitors to learn about marine ecosystems and the role humans can play in preservation. The exhibit includes a 3,300 gallon living Caribbean Coral Reef and exhibits of mangrove and seagrass communities in the Indian River Lagoon.

St. Lucie County and Ft. Pierce also offer many historical attractions. The St. Lucie County Historical Museum in Ft. Pierce features exhibits on Seminole Indian encampments, and items from the wrecked ships of the 1715 Spanish Treasure Fleet, a settler's home, general store, and other collections and displays. Downtown Main Street of Ft. Pierce features a mix of restored turn-of-the-century buildings, and patrons can enjoy the waterfront and Ft. Pierce City Marina. The visitor's information center is a refurbished 1910 seven-gable house located in downtown Ft. Pierce, and is on the list of historical structures.

The UDT/Seal Museum is located on North Hutchinson Island in Ft. Pierce where the first Navy Frogmen trained in 1943. The museum features weapons, diving gear, rafts, and other equipment used by the Navy Frogmen.

Other area attractions include the 4,000 square foot A.E. Bean Backus Gallery in Ft. Pierce, FPL's Energy Encounter museum on South Hutchinson Island, the IRCC planetarium, and the St. Lucie County Thomas J. White Stadium, which is the spring training home of the New York Mets, and the summer home of the Florida State League St. Lucie Mets. The St. Lucie County web site lists 14 golf courses and three driving ranges. St. Lucie County also has 47 parks and six public tennis courts.

2.2.7.19 Electricity and Gas. Electric service in St. Lucie County is provided by Florida Power & Light (FPL) and Ft. Pierce Utilities Authority (FPUA). Retail gas service is provided by Florida City Gas, FPUA, and Florida Gas Transmission (FGT). provides gas transmission services.

Because the project is located near Ft. Pierce and will help meet the power requirements of FPUA, the focus of this section will be on FPUA, a locally owned and governed, not-for-profit municipal utility formed in 1972. The utility is headquartered at 206 South Sixth Street in Ft. Pierce and employs approximately 247 people. In addition to electric and gas service, FPUA's primary services provided also include water and wastewater services to customers in Ft. Pierce and the surrounding area. The FPUA's mission statement is "To provide our customers with economical and friendly service in a continuous effort to enhance the quality of life in our community." The FPUA Board includes five members, four of whom are appointed by the City Commission, plus the Mayor-Commissioner of Ft. Pierce.

The FPUA electric system encompasses roughly 35 square miles and included approximately 26,000 metered customers at the end of fiscal year 2003. The system includes 21 miles of 69 kV lines, eight miles of 138 kV lines, 200 miles of 13.2 kV

distribution lines, six distribution substations, and two transmission substations. The system was heavily damaged by Hurricane Frances, a Category II hurricane, which pounded the area for nearly 30 hours. Restoration efforts progressed quickly and were completed ahead of schedule as staff worked 16 hour days and some 160 additional electric workers from area and out-of-state utilities helped reconnect customers and repair damage.

FPUA's power generation assets consist of 123 MW of natural gas fired capacity at the Henry L. King Generating Station and, through its participation in FMPA, a 20 MW share of the Stanton Power Plant and 10 MW share of the St. Lucie Nuclear Plant. FPUA began participation in the FMPA's All-Requirements Power Supply Project (ARP) on January 1, 1998. Participation involved the assignment of FPUA's resources and supply contracts, such that all of FPUA's power requirements are now purchased from the ARP. As a result, the ARP schedules the capacity at the King Generating Station, which is essentially used only for peaking purposes.

The FPUA gas system serves approximately 27 square miles in Ft. Pierce and the surrounding area. During fiscal year 2003, an average of 4,630 customers were on the gas system. The FPUA gas supply is from the Florida City Gas and is transported by FGT to Ft. Pierce. FGT has a gas pumping station located approximately 3,700 feet from the TCEC site and will provide gas to the project.

FPUA has experienced consistent and steady overall growth as indicated by the average number of bills issued per month to its customers. This figure has increased from less than 56,500 per month in 1998 to more than 58,000 in fiscal 2002. The average residential monthly charges by system for September 30, 2002 and February 1, 2003 are shown in Table 2.2-19. The average electric bill in early 2003 was \$86.78 per month and the average natural gas bill was \$31.38 per month.

Table 2.2-19 Average Residential Monthly Charges by System, Fiscal Year 2002		
System	September 30, 2002	February 1, 2003
Electric	88.40	86.78
Water	25.88	25.88
Wastewater	33.30	35.95
Gas	22.51	31.38
Source: FPUA Annual Report To Customers, 2002, page 11.		

Table 2.2-20 lists the FPUA Statement of Revenues, Expenses, and Changes in Net Assets for fiscal years 2002 and 2003. In 2003, the utility realized \$80.4 million in operating revenues, compared to operating expenses of nearly \$78.2 million, resulting in income before capital contributions and extraordinary items of \$2.2 million. The FPUA electric system accounted for nearly \$56 million in Fiscal 2003, while water revenues were next highest but generated only approximately \$11 million in revenues.

The largest operating expense category was Purchases for Resale (\$34.3 million) followed by General and Administrative expenses (\$10.9 million). FPUA transferred \$4.5 million to the General Fund of Ft. Pierce in fiscal year 2003. After accounting for Capital Contributions, and Extraordinary Income, the utility experienced a Net Change in Assets of \$3.7 million in 2003, ending the year with Net Assets of \$106.5 million. This compares to Net Assets of \$102.8 million at the end of the 2002 fiscal year.

2.2.7.20 Water Supply. FPUA provides water service to Ft. Pierce, including the TCEC site. The FPUA water system encompasses approximately 30 square miles, with just over 16,000 customers at the start of fiscal year 2004. The water system includes 327 miles of transmission and distribution pipelines, ranging in diameter from 2 to 36 inches. FPUA's source for drinking water consists of 42 shallow wells located in the Surficial Aquifer and at a depth of about 100 feet, and from nine wells in the Floridan Aquifer at a depth of between 500 and 1,250 feet. FPUA has a consumptive use permit from the South Florida Water Management District for a daily withdrawal of up to 14.6 MGD of ground water. The water obtained from the wells is treated to meet all applicable standards through a 20 MGD conventional lime softening water treatment plant, and a 5.3 MGD reverse osmosis treatment plant that went into operation in December of 2002. The plant can potentially provide an additional 3 million gallons per day to meet future demands. Other facilities added in recent years include a 3 million gallon storage tank (bringing its total storage capability to 9 MG), a new raw water pipeline, and eight Floridan (brackish water) supply wells.

2.2.7.21 Wastewater Treatment Facilities. Wastewater treatment for Ft. Pierce and the TCEC site is provided by FPUA. The wastewater system encompasses approximately 30 square miles and serves about 13,000 customers. The wastewater collection system consisted of 99 pumping and lift stations at the start of fiscal year 2004, 150 miles of gravity sewer lines ranging from 8 to 48 inches in diameter, and approximately 65 miles of force mains that range from 2.5 to 18 inches in diameter. The Water Reclamation Facility has a permitted capacity of 10 MGD. FPUA has a deep injection well at the plant site, where a pumping station injects treated effluent into the permitted 3,300 foot deep injection well.

Table 2.2-20 FPUA Statement of Revenues, Expenses, and Changes in Net Assets for Fiscal Years 2003 and 2002 (\$000s)		
Category	FY2003	FY2002
Operating Revenues		
Electric	55,665	51,365
Water	11,056	10,924
Natural Gas	3,906	3,121
Wastewater	8,678	7,957
MOEC	307	257
Nonoperating Revenues	811	917
Total Revenues	80,423	74,541
Expenses		
Generation	2,555	3,447
Purchases for Resale	34,281	29,961
Plant Operations	3,912	4,063
Field Operations	6,335	6,216
Administrative and General	10,944	11,046
Depreciation	10,475	9,263
Distribution to Ft. Pierce	4,477	4,410
Interest and Amortization	5,231	5,037
Total Expenses	78,210	73,443
Income before Capital Contributions and Extraordinary Items	2,213	1,098
Capital Contributions	1,505	1,909
Income Before Extraordinary Items	3,718	3,007
Extraordinary Income	--	122
Change in Net Assets	3,718	3,129
Beginning Net Assets	102,820	99,691
Ending Net Assets	106,538	102,820
Source: "Comprehensive Annual Financial Report, Fiscal year Ended September 30, 2003," p. 25.		

FPUA has committed to a new sewage treatment plant to be located adjacent to the TCEC site. FPUA has committed to an on-line date in the late 2009 time frame, and will provide the cooling water needs for the TCEC facility (2.9 million gallons per day, on natural gas, or 95 percent of the total facility water needs), and will also dispose of the wastewater generated by the plant (806,000 gallons per day, on natural gas).

2.2.7.22 Solid Waste Disposal. In Ft. Pierce, the Department of Solid Waste is responsible for the storage, collection, and transportation of all refuse generated by residential, commercial, and institutional entities. It is a requirement of the Code of the City that all solid waste, excluding recyclable commodities, must be collected and disposed of exclusively by the City. Collection is provided Monday through Saturday between 4:00 a.m. and noon. The Department offers a variety of dumpster sizes and service frequencies, with waste collected one time per week at a minimum. All Class 1 solid waste collected is taken to the Okeechobee WMI Landfill, which charges the city a disposal fee of \$31.31 per ton.

The Department includes a Commercial Collection Division that consists of 11 employees and has an annual operating budget of approximately \$2 million which is funded through service fees collected through monthly bills. The division provides garbage dumpsters to approximately 1,350 customers in the City, including apartments, commercial and industrial businesses. The division collects more than 17,000 tons of solid waste annually. Container rates for larger needs range from \$115.03 and \$138.53, respectively for 6 and 8 cubic yard containers emptied once per week, to \$629.37 and \$759.03, respectively, for containers emptied six times per week. Special commercial pickup service can also be arranged at a rate of \$6.41 per cubic yard.

2.3 Biophysical Environment

2.3.1 Geohydrology

Current geological and soil information for the site is based on information obtained from the *Draft Report, Geotechnical Investigation, St. Lucie Generating Station, Ft. Pierce, Florida*, prepared by Tolunay-Wong Engineers in September 2000 for Duke Energy. The work performed during this investigation included nine test borings, 13 cone penetrometer soundings, 12 test pits, two piezometers, and other tests including a seismic piezocone survey, electrical resistivity tests, infiltration and percolation tests. The maximum depth of soil investigated at the site was 80 feet below ground surface.

An additional detailed subsurface investigation will be completed to support the final design of the proposed facility. This investigation will include the following:

- Advancing geotechnical borings or cone penetrometer soundings to be positioned beneath the proposed major structures. The additional boring

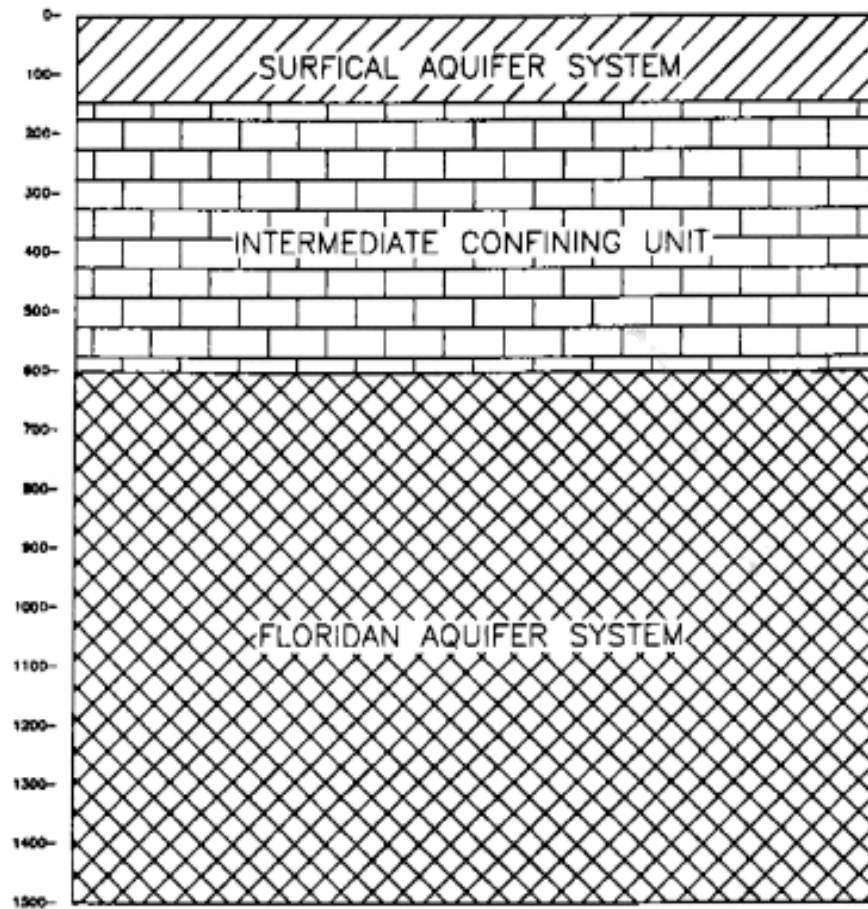
or sounding locations will be placed to supplement any locations not investigated during the 2000 geotechnical investigation.

- Analyzing in situ subsurface conditions using standard penetration, cone penetrometer, and geophysical test.
- Analyzing soil properties using laboratory tests such as moisture contents, grain size distributions, Atterberg limits, carbonate concentration analysis, and strength and chemical properties.

2.3.1.1 Geologic Description of Site Area. The site is located in the southern Florida peninsula, within the Atlantic Coastal Plain Physiographic Province. The Peninsula is generally composed of a thick section of mostly undeformed, southerly dipping, carbonate rocks forming a carbonate platform that has been developing since the late Triassic opening of the North Atlantic Ocean (about 180 million years ago). The predominant rock types in the platform are limestone and dolomite. These sedimentary rocks are collectively referred to as the Floridan confined aquifer (Figure 2.3-1). The thickness of these sedimentary rock strata is generally greater than 10,000 feet, reaching 25,000 feet in the southern tip of the peninsula. The carbonate platform is underlain by older crystalline igneous and metamorphic rocks at depth.

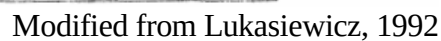
Overlying the carbonate rocks of the platform are Miocene (about 24 million years ago) and younger sediments consisting of mostly sand, silt and clay, with varying amounts of shells. Surficial deposits exposed at the surface are of Pleistocene age (less than about 2 million years ago) and consist mostly of clastic (non-marine) sediments. Geologic maps of the area indicate that the surface deposits at the site belong to the Anastasia Formation. This formation generally consists of uncemented, fossiliferous sands. A geologic cross section of St. Lucie County showing detail of underlying geologic units is presented in Figure 2.3-2. Note that the site is roughly located on the NE portion of the cross section.

2.3.1.2 Detailed Site Lithologic Description. Based on the information provided in the 2000 geotechnical report, the soil conditions at the site generally consist of interbedded layers of loose to medium dense sands with varying amounts of silt, clay and shells mixed throughout. At depths greater than 30 feet, the soils generally become denser with slight cementation. The maximum depth of the investigation was 80 feet below the ground surface. Consolidated rock was not encountered within the depths of investigation. The 2000 geotechnical report included in Section 10.6, noted no knowledge of sinkhole occurrence (karst features) near the site (Tolunay-Wong, 2000). Review of Lane (1986) also suggests that St. Lucie County has a limited risk of karst feature development.



Modified from Butler D.E and Padgett, 1995

Figure 2.3-1
Generalized Cross Section of Floridan Aquifer System



2-50

According to the 1980 USDA soil survey for St Lucie County, Florida, the majority of the surface soils at the site belong to the Akona series. The series is generally described as poorly drained soil derived from marine sandy and loamy sediments.

2.3.1.3 Geologic Maps. Currently, detailed subsurface geologic information sufficient to map the site in detail has not been generated. This task will be completed during the supplemental subsurface investigation and provided post-certification.

2.3.1.4 Bearing Strength. The subsurface bearing capacity will be determined in future after the subsurface stratigraphy is determined with the engineering proprieties. However, bearing capacity for future structures with the subsurface sandy soils is not considered a significant issue.

2.3.2 Subsurface Hydrology

This section describes the groundwater aquifers beneath the site. The description is based on published data, data from borings, piezometers, and tests performed at the site. In south Florida, groundwater occurs in two separate aquifer systems. These are the surficial aquifer system and the Floridan Aquifer system. The surficial aquifer system consists of moderately productive zones of sand, shell, limestone, and sandstone. The surficial aquifer system is separated from the Floridan Aquifer system by the thick sequence of low permeability fine clastic and carbonate sediments of the intermediate confining unit. The Floridan Aquifer system is comprised of the Ocala group, Avon Park, Lake City, and Oldsmar limestone formations.

2.3.2.1 Surficial Aquifer System. The shallow aquifer system is a surficial aquifer consisting of sand, shell, limestone, and sandstone. The Surficial Aquifer System is the source of most of the potable water used in St. Lucie County (Lukansiewicz, 1992). The aquifer is unconfined in some areas and semi-confined in others (Tolunay-Wong, 2000). The subsurface at the site generally consist of interbedded layers of loose to medium dense sands with varying amounts of silt, clay and shells mixed throughout. At depths greater than 30 feet, the soils generally become denser with slight cementation.

The shallow zone of the surficial aquifer, generally to a depth of 50 feet, is unconfined. This zone is seldom used as a groundwater source. The deeper aquifer zone is usually semi-confined production zone composed of an interbedded mixture of sand, silt, clay, shells, and limestone (Butler and Padgett, 1995).

The surficial aquifer is recharged by precipitation, canals, ditches, small reservoirs, and irrigation water. The average precipitation in St. Lucie County is estimated to be 51 inches per year. The net precipitation recharge to groundwater is approximately 24 inches per year (Butler and Padgett). Groundwater depths at the site varied from about 0.4 to 3.8 feet below grade, with an average depth of about 2 feet below ground surface (bgs). The regional flow of groundwater is toward the east.

Hydraulic conductivity of the soil estimated from infiltration tests is approximately 0.0003 foot/sec.

The top of the Hawthorn Group marks the top of the confining unit below the surficial aquifer. The contact is marked by the change from gray-green silty sand to dark green fairly dens clay. The Hawthorn Group consists of a sequence of low permeability, phosphatic, silty, and clayey sediments and lower carbonate zone (Arcadia Formation). The confining unit, which is approximately 300 feet thick in St. Lucie County, effectively confines the Floridan Aquifer System and separates it from the surficial aquifer system.

2.3.2.2 Floridan Aquifer System. The Floridan Aquifer underlies all of Florida and consists of a sequence of carbonates with multiple permeable intervals sandwiched between confining materials. The Floridan Aquifer is approximately 2,000 feet thick in St. Lucie County (Butler and Padgett). Flow zones in the Floridan Aquifer System are associated with solution cavities and formational unconformities. The aquifer system is divided into two flow zones; the “Upper Floridan,” and the “Lower Floridan” aquifers. The two aquifer zones are separated by the middle semi-confining unit.

The Upper Floridan Aquifer is approximately 400 feet thick and composed of two continuous flow zones. The aquifer consists of the Suwanee and the Ocala limestone and some of the dolomite and dolomitic limestones of the upper portion of the Avon Park Formation. The approximate average transmissivity of the Upper Floridan Aquifer is calibrated in the 1992 SFWMD model as 257,000 ft²/day (Lukasiewicz). Lukasiewicz (1992 estimated the top of the Upper Floridan Aquifer in the vicinity of St. Lucie County wells to be at 1,200 feet National Geodetic Vertical Datum (NGVD). A list of SFWMD permitted pumping wells located within 1 mile of the TCEC, with pumping rates in the aquifer is included in Table 2.3-1. Figure 2.3-3 illustrates the location of these wells. Well number 2, on Figure 2.3-3 was never constructed.

The aquifer is recharged primarily from infiltration of precipitation in its outcrop area. The principal recharge area in southern Florida is in Polk County. Within the recharge area water enters the Floridan aquifer at its outcrop areas, through breaches in the Hawthorn Formation caused by sinkholes, and downward leakage where the Hawthorn Formation is thin or absent. Discharge of groundwater from the Floridan Aquifer in the region occurs primarily by pumping. Outflow to other areas and to the Atlantic Ocean also contributes to the discharge from this aquifer.

The Floridan Aquifer is artesian. The artesian pressure is created by the presence of the confining layer above the Floridan aquifer at the project site. The SFWMD model simulated potentiometric surface of the Upper Floridan Aquifer at the project site is approximately 35 feet elevation, which is approximately 20 feet above existing grade.

The middle semi-confining unit consists of relatively less permeable, soft limestone and dense dolomitic limestone in the middle portion of the Avon Park Formation. The lower Floridan Aquifer includes the bottom portion of the Avon Park Formation.

Table 2.3-1 Existing Permitted Wells Located Within 1 Mile from the TCEC								
Well Number	Well Depth in Feet	Well Casing Depth in Feet	Groundwater Source	Water Use	Million Gallons Annual Allocation	Million Gallons Maximum Month	Million Gallons Maximum Day	Million Gallons Average Day
1	1,250	500	Floridan Aquifer System	Industrial	75.6	48.64	1.6	0.27
2*	1,250	500	Floridan Aquifer System	Industrial	75.6	48.64	1.6	0.27
3	300	300	Floridan Aquifer System	Industrial	4.38	0.365	0	0
4	300	300	Floridan Aquifer System	Industrial	4.38	0.365	0	0
5	650	100	Floridan Aquifer System	Freeze Protection	21.87	2.822	0	0
*Not constructed Source: South Florida Water Management District, 2004.								

Figure 2.3-3
Permitted Wells within 1 mile of the TCEC

2.3.3 Site Water Budget

The regional temperature variation from season to season is slight, with warm, humid summers and mild winters. Table 2.3-7 presents a summary of the means and extremes of monthly and daily dry-bulb temperatures. The average annual rainfall in the TCEC region is approximately 50 inches. Normal monthly and annual precipitation (rain) totals are shown in Table 2.3-11. A portion of this rainfall is intercepted by vegetation or stored in small depressions on the surface, a portion infiltrates into the soil, and the remainder directly runs off during storm events. Evaporation occurs from shallow lakes and reservoirs, and also, to a lesser degree, from soil surfaces and as transpiration from vegetation. The total evaporation and transpiration is known as evapotranspiration, which varies with surface conditions. Evapotranspiration in the region is estimated at 48 inches per year (Abtew, et al). Peak runoff for the design storm event is 72 cubic feet per second (cfs). The average annual estimated peak runoff is 0.148 cfs. The net precipitation groundwater recharge is 24 inches per year (Butler and Padgett).

A list of SFWMD permitted wells within five miles of the TCEC shows that the major water uses are for agricultural irrigation. Port St. Lucie is identified as having five permitted groundwater wells that are used as raw water for the public water supply (PWS). Two of these PWS wells are located approximately one mile from the TCEC. The well detailed information is the same for both wells and is as follows: diameter is 17 inches; well depth is 1,350 feet; casing depth is 650 feet; and each have a maximum daily allocation of 19.77 million gallons. All of the permitted groundwater wells that were provided by the SFWMD are located in the Upper Floridan Aquifer.

2.3.4 Surficial Hydrology

There are no naturally occurring water bodies on the TCEC site. Surface runoff onsite is generally toward the west, east, and south into ditches that ultimately discharge into the North St. Lucie River Water Control District's Canal No. 101 or 102 via the drainage ditch between the site and the FEC Railroad. Canal No. 102 is located south of the property boundary; Canal No. 101 is located north of the FPUA WWTP site.

2.3.5 Vegetation/Land Use

Land use and vegetation types at the TCEC site consist primarily of pastureland. Within the pastureland are areas of wet prairie, freshwater marsh, and thickets of Brazilian pepper. The site is currently used to graze cattle. The FEC Railroad is adjacent on the northwest side of the site, and an FP&L transmission corridor is located parallel to the south edge of the property.

Table 2.3-2 lists the vegetation types that occur on the site following the Florida Land Use Cover and Classification System (FLUCCS). The distribution of these vegetation types on the project site is illustrated on Figure 2.3-4. Figure 2.3-5 illustrates the FLUCCS land use within 5 miles of the TCEC. The site was historically most likely pine flatwoods and/or savannah, based on the characteristics of the surrounding vicinity. However, due to past clearing and agricultural activities, the site has been significantly altered from its natural state. The vegetation and wildlife present today reflect the disturbed condition of the site in that the species present are largely those with the ability to tolerate such disturbances.

Table 2.3-2 FLUCCS Land Use Types at the Treasure Coast Energy Center Site	
FLUCCS Code	Vegetation Type
211	Improved pasture
643	Wet Prairie
422	Brazilian Pepper
641	Emergent/Freshwater Marsh
832/643	Electrical Power Transmission Lines/Wet Prairie
511	Ditch

The vegetation types listed in Table 2.3-2 are described as follows.

Figure 2.3-4
Existing Vegetation Communities on TCEC Site

Figure 2.3-5
FLUCCS Land Use

Improved Pasture (211) Improved pasture accounts for about 31.2 acres, or 46 percent, of the project site. Furrows from row crops planted in the past can be observed throughout the area. Reportedly, tomatoes were most recently planted. Grasses dominate the vegetation, especially India dropseed (*Sporobolus indicus*), Bermuda grass (*Cynodon dactylon*), and knotgrasses (*Paspalum* spp.).

Wet Prairie (643) Wet prairie accounts for about 12.5 acres, or 18 percent, of the project site. The areas are dominated by grasses, sedges, and flowering forbs. Trees and shrubs are absent except for occasional Brazilian pepper (*Schinus terebinthifolius*), an exotic shrub. Dominant species include Bermuda grass, knotgrasses, carpet grasses (*Axonopus* spp.), smartweed (*Polygonum* spp.), water pennywort (*Hydrocotyle bonariensis*), and red ludwigia (*Ludwigia repens*). The deepest and wettest portions are dominated by pickerelweed (*Pontederia cordata*), while soft rush (*Juncus effusus*) and beakrushes (*Rhynchospora* spp.) are common in areas less inundated.

Brazilian Pepper (422) Brazilian pepper thickets account for about 17.9 acres, or 26 percent, of the project site. The Brazilian pepper is an undesirable non-native species that rapidly colonizes disturbed sites, but is equally aggressive in undisturbed natural areas. The thickets shade out existing vegetation to form nearly monospecific stands. Florida considers the plant a nuisance species. Ground cover in these areas is usually absent.

Emergent/Freshwater Marsh (641) One small area of freshwater marsh is found in the southern portion of the site and accounts for about 0.5 acre. The circular depression is surrounded by a berm. Pickerelweed dominates the deeper portions of the area. St. John's wort (*Hypericum* spp) and maidencane (*Panicum hemitomon*) are common in the shallower areas of the marsh.

Electrical Transmission Lines/Wet Prairie (832/643) A FP&L electrical transmission line corridor passes through the southern edge of the property. The maintained utility easement is 170 feet wide and occupies about 5.5 acres. This area of the corridor is dominated by the wet prairie community (643).

Ditch (511) One intermittent ditch parallels the north side of the electrical transmission corridor on the south side of the project site. The ditch occupies less than 0.5 acre. The ditches are occupied by pickerelweed, water pennywort, smartweed, and maidencane. Brazilian pepper is also common on the upper banks.

2.3.5.1 Wetlands. Wetland located on the TCEC site are regulated by the FDEP and St. Lucie County, which recognizes that actions of the FDEP and SFWMD are sufficient to implement the County Compliance Plan goals, objectives, and policies related to wetlands. Wetlands are defined by the State of Florida using the Florida Wetland

Delineation Manual (FDEP, 1995) to determine wetland boundaries pursuant Florida Administrative Code 62-343.0040.

Wetlands on the project site were originally delineated for the previous Duke Energy Project. DEP issued an Environmental Resources Permit (ERP) to Duke for work in wetlands. Since the Duke project was never constructed, site conditions remain unchanged.

The Duke delineation is illustrated on Figure 2.3-6. Five of the nine wetlands areas identified in the figure occur on the TCEC site: A, B, C, E (east portion), and F. Table 2.3-3 lists the five wetlands and provides a brief characterization of each. The total extent of DEP regulated wetlands on the site is 11.96 acres.

Table 2.3-3 Wetlands at the Treasure Coast Energy Center Project Site		
Wetland Area	Size (acres)	Description
A	10.26	Wet prairie; dominated by water pennywort, red ludwigia, and wetland grasses
B	0.51	Freshwater marsh; excavated depression dominated by pickerel weed and surrounded by Brazilian pepper
C	0.48	Wet prairie; dominated by water pennywort, red ludwigia, and wetland grasses
E	0.53	Wet prairie or marsh dominated by pickerel weed, knotweeds, flat sedges, and beak rushes
F	0.18	Drainage ditch
Total Wetland Acres = 11.96		

Figure 2.3-6
Duke Energy Wetland Delineation

2.3.6 Ecology

Ecology was examined within a 5-mile radius of the project site. Brief summaries of the vegetation, wildlife, and important species known in the area are provided and a discussion of pre-existing stresses. Observations of vegetation and wildlife were evaluated on the basis of studies by CH2MHill (October 3, 2000, ERP Permit Application) and a pedestrian survey of the project site by Black & Veatch biologists in October 2004 and February 2005. Additionally, data belonging to the USFWS, the Florida Natural Areas Inventory (FNAI), and the Florida Fish and Wildlife Conservation Commission (FFWCC) were assessed.

2.3.6.1 Species and Environmental Relationships.

Vegetation. Table 2.3-4 presents a list of the vascular plant species that have been observed on the project site. The composition of the plant communities present is discussed in Subsection 2.3.5. Overall, the site is occupied by communities that have been subjected to high levels of disturbance over time. It appears that most of the site was cleared at one time and has since been replanted or is in very early stages of natural succession. Much of the area adjacent to or in the general vicinity of the project has been developed for industrial or low-density residential use. The overall result is that species diversity on the project site and in much of the surrounding vicinity is low compared to what would be expected in a high quality natural condition.

Wildlife. Table 2.3-5 presents a list of the wildlife species observed or reported as observed on the site or in the vicinity. Although some wildlife is present, the poor quality of the plant communities present and the commercial and residential development in the surrounding areas no doubt contributes to the low number of species apparently present.

The only amphibians or reptiles observed on the site were one box turtle (*Terrapene carolina*) and cricket frogs (*Acris* sp.). Several snakes are known in the area, such as the black racer (*Coluber constrictor*), Florida cottonmouth (*Agkistrodon piscivorous conanti*), and coachwhip (*Masticophis flagellum*), but none were observed. Other frogs common to the area include species of *Acris*, *Pseudacris*, and *Limnaoedus*.

Birds were occasionally observed on the project site, mostly in the pasture and wet prairie areas. Most frequent were eastern meadowlark (*Sturnella magna*), sparrows (*Ammodramus* sp.), robins (*Turdus migratorius*), and yellow-rumped warblers (*Dendroica coronata*). Most spent time moving between grassed areas and the Brazilian pepper.

Table 2.3-4
Vascular Plants Observed at the Treasure Coast Energy Center Site

Species ¹	Wetland Status ²	Growth Form ³	Wetland		Upland	
			Shrub Zone	Open	Shrub Zone	Open
<i>Andropogon virginicus</i> Broomsedge	FAC-	H				x
<i>Aster subulatus</i> Annual Salt Marsh Aster	OBL	H		x		
<i>Axonopus</i> sp. Carpet Grass	OBL	H		x		
<i>Baccharis halimifolia</i> Eastern False-willow	FAC	S	x			
<i>Bidens</i> sp. Beggars-tick	FACW-	H		x		
<i>Carex</i> sp. Sedge	FAC	H		x		
<i>Cenchrus insertus</i> Coast Sandspur	NL	H				x
<i>Cirsium horridulum</i> Yellow Thistle	FAC+	H				x
<i>Commelina erecta</i> Day-flower	NL	H		x	x	x
<i>Cynodon dactylon</i> Bermudagrass	FACU	H				x
<i>Cyperus ligularis</i> Pond Nutsedge	FACW	H		x		x
<i>Cyperus polystachyos</i> Many-spike Nutsedge	FACW	H		x		
<i>Cyperus surinamensis</i> Nutsedge	FACW	H		x		x
<i>Cyperus virens</i> Green Nutsedge	FACW	H		x		
<i>Dactyloctenium aegyptium</i> Crowfoot	NL	H				x
<i>Digitaria ciliaris</i> Southern Crabgrass	NL	H				x
<i>Echinochola crusgalli</i> Barnyardgrass	FACW-	H		x		x
<i>Eleusine indica</i> India Goosegrass	FACU	H				x

Table 2.3-4 (Continued) Vascular Plants Observed at the Treasure Coast Energy Center Site						
Species ¹	Wetland Status ²	Growth Form ³	Wetland		Upland	
			Shrub Zone	Open	Shrub Zone	Open
<i>Eupatorium capillifolium</i> Small Dog-fennel Thoroughwort	FACU	H		x		x
<i>Euthamia minor</i> Slender Fragrant Goldenrod	FAC	H				x
<i>Hydrocotyle bonariensis</i> Water Pennywort	FACW	H		x		x
<i>Hypericum</i> sp. St. Johns-wort	FAC	H		x		x
<i>Hypericum fasciculatum</i> St. Johns-wort	FACW+	S		x		
<i>Juncus effusus</i> Soft Rush	FACW+	H		x		
<i>Lemna</i> sp. Duckweed	OBL	H	x	x		
<i>Ludwigia palustris</i> Marsh Seedbox	OBL	H		x		
<i>Ludwigia peruviana</i> Peruvian Seedbox	OBL	H		x	x	
<i>Ludwigia repens</i> Red Seedbox	OBL	H			x	
<i>Panicum hemitomon</i> Maiden-cane	OBL	H			x	
<i>Panicum rigidulum</i> Red-top Panicgrass	FACW	H		x		x
<i>Phyla nodiflora</i> Common Frog-fruit	FACW	H		x		x
<i>Polygonum hydropiperoides</i> Swamp Smartweed	OBL	H		x		
<i>Pontederia cordata</i> Pickerelweed	OBL	H		x		
<i>Rhynchospora</i> sp. Beaksedge	>FAC	H		x		
<i>Sabal palmetto</i> Palmetto	FACU+	H		x		x
<i>Sagittaria lancifolia</i> Lance-leaf Arrowhead		H		x		

Table 2.3-4 (Continued) Vascular Plants Observed at the Treasure Coast Energy Center Site						
Species ¹	Wetland Status ²	Growth Form ³	Wetland		Upland	
			Shrub Zone	Open	Shrub Zone	Open
<i>Schinus terebinthifolius</i> Brazilian Pepper	FACU	S	x		x	
<i>Serenoa repens</i> Saw Palmetto	FACU	S	x		x	
<i>Setaria geniculata</i> Knotroot Bristlegrass	FAC	H				x
<i>Solidago canadensis</i> Canada Goldenrod	FACU	H				x
<i>Sporobolus indicus</i> West Indian Dropseed	FACU+	H		x		x
<i>Thelypteris cf. kunthii</i> Widespread Maiden Fern	FAC	H	x			
<i>Toxicodendron radicans</i> Poison Ivy	FAC	V	x		x	
Species listed are based on October 2004 and February 2005 field observations by Black & Veatch and listing by CH2M Hill in FDEP Environmental Resource Permit for Duke Energy Ft. Pierce Generating Station, October 3, 1995. ¹Reed, P.B., Jr. 1988. <i>National List of Plant Species that Occur in Wetlands: Southeast (Region 2)</i>. U.S. Fish Wildl. Serv. Biol. Rep. 88 (26.2). 124 pp. ²From Reed (1988): OBL = Obligate; FACW = Facultative Wetland Plant; FAC = Facultative Wetland Plant; FACU = Facultative Upland Plant; UPL = Upland Plant; NL = Not Listed (and considered upland). ³T = tree; S = shrub; V = Vine; H = Herb.						

Two species of vultures occur in the area, black and turkey (*Coragyps atratus* and *Cathartes aura*). The only birds noted in the wetlands were occasional cattle egret (*Bubulcus ibis*) and red-winged blackbird (*Agelaius phoeniceus*).

Mammals are not common at the site. One eastern cottontail rabbit (*Sylvilagus floridanus*) has been observed, but there have been no other sightings or signs (scat, tracks, etc.) observed. Mammals expected to occur in the vicinity of the project that are common to similar mixed urban/rural residential and industrial areas include eastern spotted skunk (*Spilogale putorius*), various mice (*Peromyscus* sp. and *Reithrodontomys* sp.) and nine-banded armadillo (*Dasypus novemcinctus*).

Table 2.3-5 Wildlife Observed at the Treasure Coast Energy Center Site ¹	
Common Name	Scientific Name
Reptiles and Amphibians	
Box Turtle	<i>Terrapene carolina</i>
Black Racer	<i>Coluber constrictor</i>
Coachwhip	<i>Masticophis flagellum</i>
Racerunner	<i>Cnemidophorus sexlineatus</i>
Yellow Rat Snake	<i>Elaphe obsoleta</i>
Cricket Frog	<i>Acris gryllus</i>
Little Grass Frog	<i>Limnaoedus ocularis</i>
Southern Chorus Frog	<i>Pseudacris nigrita</i>
Birds	
Blackbird, Red-winged	<i>Agelaius phoeniceus</i>
Bluejay	<i>Cyanocitta cristata</i>
Crane, Sandhill	<i>Grus Canadensis</i>
Dove, Morning	<i>Zenaida macroura</i>
Egret, Cattle	<i>Bubulcus ibis</i>
Harrier, Northern	<i>Circus cyaneus</i>
Hawk, Red-tailed	<i>Buteo jamaicensis</i>
Killdeer	<i>Charadrius vociferous</i>
Meadowlark, Eastern	<i>Sturnella magna</i>
Robin	<i>Turdus migratorius</i>
Vulture, Black	<i>Coragyps atratus</i>
Vulture, Turkey	<i>Cathartes aura</i>
Warbler, Yellow-rumped	<i>Dendroica petchia</i>
Mammals	
Eastern Cottontail	<i>Sylvilagus floridanus</i>
Species listed are based on October 2004 and February 2005 field observations by Black & Veatch and listing by CH2M Hill in FDEP Environmental Resource Permit for Duke Energy Ft. Pierce Generating Station, October 3, 1995.	

Threatened and Endangered Species. The potential for threatened and endangered species to occur within the TCEC project area is based on information from FNAI and the FFWCC. A list of state and federal protected species that have been observed in the 5 mile radius around the TCEC site area is provided in Table 2.3-6.

Table 2.3-6 Federal and State Listed Protected Species Within 5 miles of the TCEC ¹	
Common Name	Scientific Name
Birds	
Bald Eagle	<i>Haliaeetus leucocephalus</i>
Crested Caracara	<i>Caracara cheriway</i>
Florida Sandhill Crane	<i>Grus canadensis pratensis</i>
Florida Scrub-Jay	<i>Aphelocoma coerulescens</i>
Snail Kite	<i>Rostrhamus sociabilis plumbeus</i>
White Ibis	<i>Eudocimus albus</i>
Wood Stork	<i>Mycteria americana</i>
Mammals	
Manatee	<i>Trichechus manatus</i>
Sherman's Fox Squirrel	<i>Sciurus niger shermani</i>
Plants	
Fragrant Prickly Apple	<i>Harrisia fragrans</i>
Giant Orchid	<i>Pteroglossaspis ecristata</i>
Large-Flowered Rosemary	<i>Conradina grandiflora</i>
Reptiles	
Eastern Indigo Snake	<i>Drymarchon couperi</i>
¹ Note that two endangered species (federal and state) and one state threatened species have been observed in the 5 mile area around TCEC, but are not listed here due to sensitivity considerations in accordance with FNAI request.	

According to the FNAI database, one Sherman's fox squirrel (*Sciurus niger shermani*) was observed approximately 1 mile northwest of the TCEC site in June 1980. The preferred habitat of Sherman's fox squirrel in Florida is longleaf pine and turkey oak sandhills. Such habitat does not occur on the TCEC site, making it unlikely that this species occurs onsite.

The Florida sandhill crane (*Grus canadensis pratensis*), a state-listed threatened species, was observed feeding in the wetland prairie in June 1999. It is possible that during wet periods the ditches and wetland prairies could provide foraging habitat for this as well as other listed wading birds. These could include, for instance, the little blue heron (*Egretta caerulea*) or wood stork (*Mycteria americana*). However, the degraded nature of the site environment provides only marginal conditions. During an October 2004 site visit when much of the site was wet, only a single red-winged blackbird and single cattle egret were observed using these areas. Birds of prey may also use the site on

occasion, but wildlife studies suggest that little prey is available at the site to attract such species.

There is one bald eagle nest in close proximity to the TCEC, located northwest of the site, west of Glades Cutoff Road.

The federally threatened bald eagle is protected in accordance with the Endangered Species Act, Bald and Golden Eagle Protection Act, and the guidance document titled *Habitat Management Guidelines for the Bald Eagle in the Southeast Region*, issued by the U.S. Fish and Wildlife Service. This guidance document suggests primary and secondary impact zones and accompanying distances that any human activity or development should be set back from eagle nests. For the primary impact zone, defined as a 750 foot radius ring around the tree supporting the eagle nest, the guidelines state that all activity is prohibited to ensure minimal disturbance of eagle nesting activities. The secondary impact zone allows low impact activities such as low-density residential development, and is defined as the area within a 1,500 foot radius around the tree supporting the eagle nest. Another guideline in this document is that disturbance of eagle nests should be avoided during the nesting season, from October 1 to May 15 each year. These impact zones and accompanying restrictions, although not codified as law, apply to all eagle nests whether they are active or inactive unless the U.S. Fish and Wildlife Service declassifies an inactive nest by request.

The exact location of the bald eagle nest near the TCEC is uncertain. The TCEC site may be within the secondary impact zone for the nearby eagle nest, and FMPA will consult with the U.S. Fish and Wildlife Service and implement best practices to avoid disturbing nesting eagles during site development and operation, and also during construction of associated linear facilities.

No protected plant species have been observed at the site and, due to the disturbed condition of the site and ongoing grazing, none are expected.

2.3.6.2 Pre-existing Stresses. The major pre-existing stresses to the onsite and vicinity environment include the following:

- Cattle grazing.
- Land clearing.
- Cultivation of row crops.
- Historic alterations to site and regional drainage.
- Infestation of invasive plant species, such as Brazilian pepper.
- Residential, commercial, and industrial development.

The removal of native vegetation in order to use the area for growing row crops and eventual replanting of the area as pasture for cattle has dramatically changed the natural characteristics of the plant communities and associated wildlife onsite. In

addition, ongoing commercial and industrial development in all directions of the project site continues to stress natural communities.

2.3.7 Meteorology and Ambient Air Quality

2.3.7.1 Regional Climatology/Meteorology. The prevailing subtropical marine climate of the Florida southeastern coastal region results from the influence of the warm waters of the Atlantic Ocean. Long, warm, humid summers and short, mild winters prevail. Because of the southerly location and marine influences, this area has a climate characterized by small annual and diurnal temperature variations. Rainfall is moderate to heavy during the summer and light during the winter.

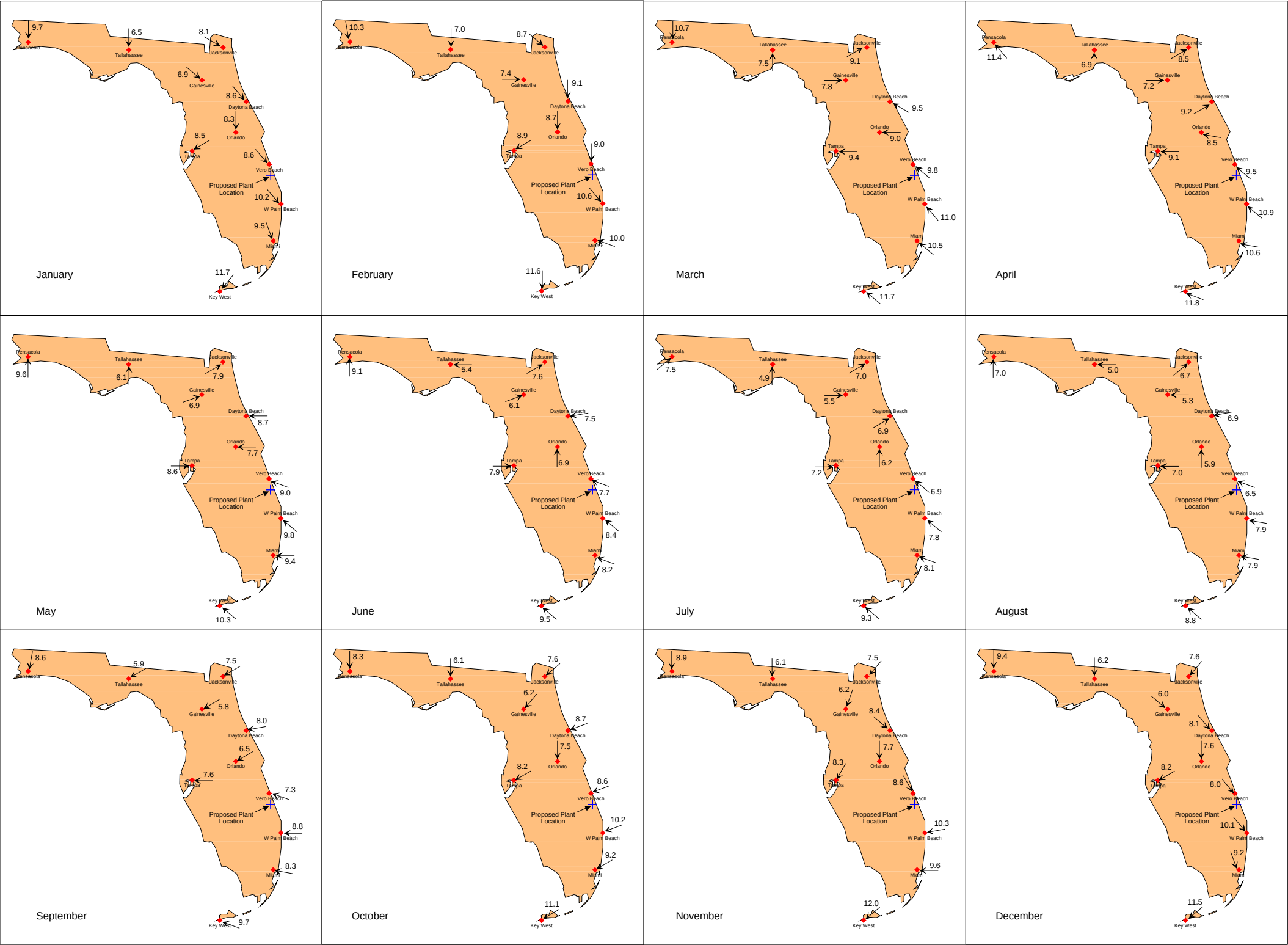
Winds are of moderate speed and blow predominantly from the east to southeast during the spring, summer, and fall months. During the winter months, the predominant direction is from the northwest. Monthly and annual wind speed and prevailing direction for selected Florida locations are given on Figures 2.3-7 and 2.3-8, respectively. Of the hurricanes that pass the Project area, many move northward offshore and some enter the coastal area from the Atlantic Ocean, with a frequency of the latter group of about 5 in 114 years. There are also some occurrences of hurricanes coming from the west being weakened by their passage over land.

The average annual rainfall in this region is approximately 50 inches. Summer precipitation due to frequent afternoon thundershowers exceeds winter precipitation due to frontal systems, pre-frontal squall lines, and wave disturbances along fronts stalled over the Florida peninsula. Thunderstorms are present approximately 70 to 80 days a year. The Project region lies at the northern boundary of a tropical rainy region. Within that region, there may be hurricane activity during the summer and fall months. Tropical disturbances periodically cause significant precipitation during the summer and fall seasons.

Extremely hot weather is rare because of the ocean influence; maximum temperatures over a summer average near 90° F in the TCEC region. Winter temperatures are mild, slightly above 50° F, interrupted only a few times each season by northerly or northwesterly advection of polar air. The record lows for the region are near 20° F. Only rarely do temperatures fall below freezing; when they do, it is often in January.

The dispersion characteristics of the region are generally good because of land-sea and lake breeze circulations, good ventilation, mixing due to convective instability, and flat terrain.

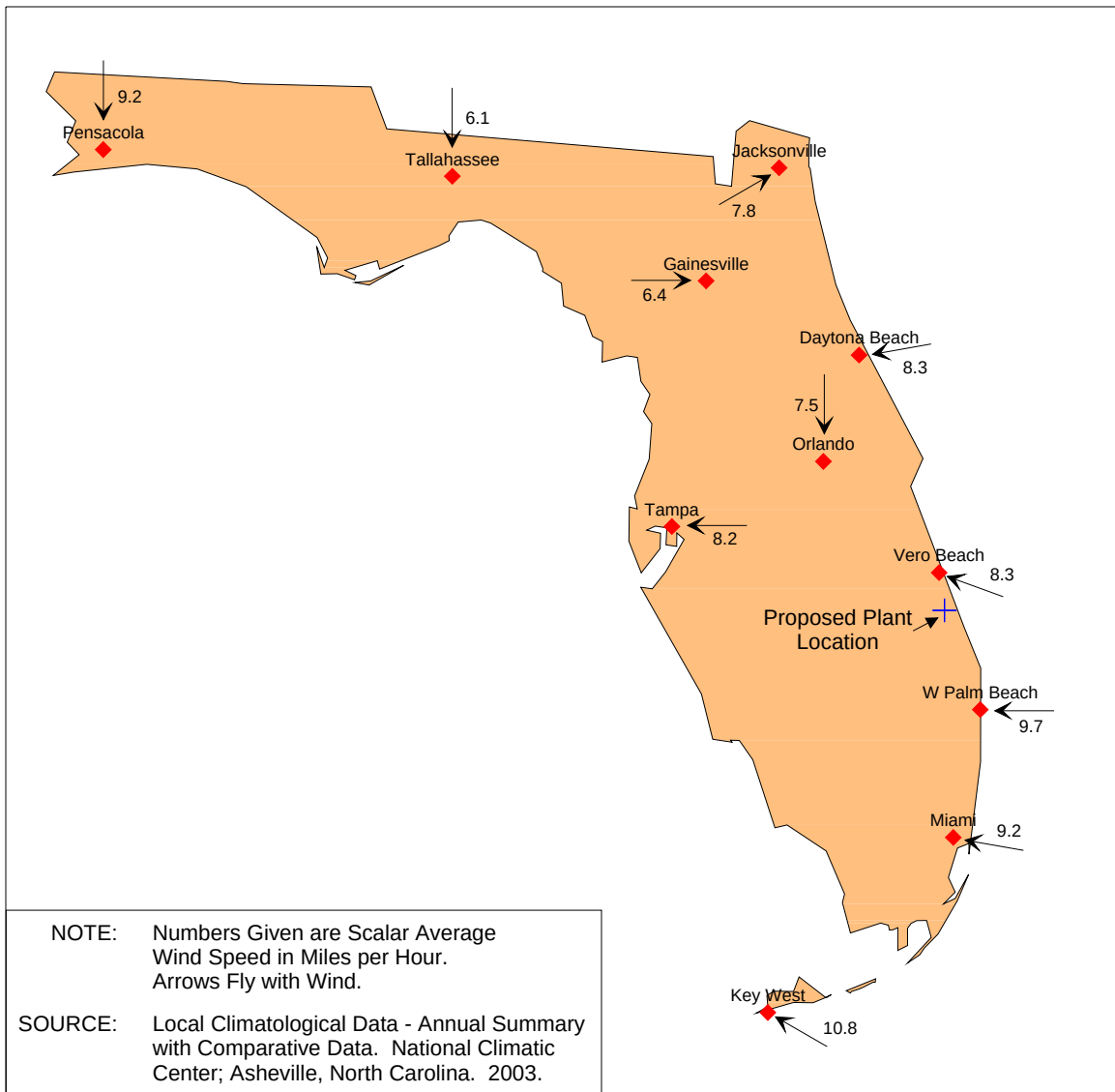
2.3.7.2 Site Climatology. The TCEC is located near the southeast coast of Florida about 5 miles inland from the Atlantic Ocean. This region is strongly influenced by this maritime location. A detailed discussion of the site climatology follows.



NOTE: Numbers Given are Scalar Average Wind Speed in Miles per Hour. Arrows Fly with Wind.

SOURCE: Local Climatological Data – Annual Summary with Comparative Data. National Climatic Center; Asheville, North Carolina. 2003.

Monthly Average Wind Speed and Prevailing Direction for Selected Florida Cities
Figure 2.3-7



Annual Average Wind Speed and Prevailing
Direction for Selected Florida Cities
Figure 2.3-8

Temperatures and Humidity. The temperature variation from season to season is slight, with warm, humid summers and mild winters. Table 2.3-7 presents a summary of the means and extremes of monthly and daily dry-bulb temperatures. Temperatures around 80° F occur during the summer months. The hottest month is July, with a mean monthly temperature of 81.7° F. The daily minimum and maximum temperature averages are 73.0° F and 90.4° F, respectively, for this month. Subfreezing temperatures rarely occur (i.e., about 1 day per year) and subzero temperatures have never been recorded. In some years, no freezing temperatures occur.

January is the coldest month, with a mean monthly temperature of 63.0° F. Average January daily minimum and maximum temperatures are 52.7° F and 73.3° F, respectively. The absolute temperature range is from 100° F (June) to 26° F (December).

Table 2.3-8 presents a summary of the wet-bulb and dry-bulb design temperatures. The 1 and 2 percent wet-bulb temperatures for June through September are 80° F and 79° F, respectively. The 1 and 2 percent dry-bulb temperatures, based on historical data from June through September, are 91°F and 90°F, respectively. The 1 percent temperatures are exceeded only 1 percent of the time and the 2 percent temperatures are exceeded 2 percent of the time. Table 2.3-5 also includes other design temperatures for percentages of 0.4, 97.5, 99.0, and 99.6.

Average relative humidities are presented in Table 2.3-9. The table shows that the average annual relative humidity is approximately 75 percent. Hourly average minimum and maximum values are 52 percent and 92 percent and occur at 1300 in April and 0700 in August, respectively. The relative humidity does not vary significantly from season to season, with spring days being slightly drier.

Heating and Cooling Degree-Days. Units of degree-days can be used as an indicator of heating or cooling requirements. One heating degree-day is accumulated for each degree that the daily mean temperature drops below the base temperature of 65 F. Cooling degree-days are accumulated when the daily mean temperature is above 65 F. Table 2.3-10 gives mean monthly and annual degree-day totals considered representative of the Project area.

Precipitation. Normal monthly and annual precipitation (rain) totals are shown in Table 2.3-11. As shown in the table, precipitation is highest during the summer and into the fall months. During the period 1931-2004, the annual precipitation has ranged from 32.66 inches to 80.24 inches. Only a trace of snowfall was recorded during the period

Table 2.3-7 Dry-Bulb Temperature Data					
Month	Normal Temperature ^(a)			Extreme Temperature ^(b)	
	Monthly (°F)	Daily Minimum (°F)	Daily Maximum (°F)	Lowest (°F)	Highest (°F)
January	63.0	52.7	73.3	29	88
February	63.9	53.6	74.1	30	89
March	67.7	57.8	77.6	34	91
April	71.5	61.6	81.4	44	95
May	76.2	67.2	85.2	52	98
June	80.4	71.8	89.0	63	100
July	81.7	73.0	90.4	67	98
August	81.6	72.9	90.2	66	98
September	80.7	72.7	88.7	64	97
October	76.4	68.5	84.3	48	92
November	70.5	61.9	79.1	33	88
December	64.7	54.7	74.7	26	86
Annual	73.2	64.0	82.3	26	100
<u>Season</u>					
Summer	81.2	72.6	89.9	63	100
Fall	75.9	67.7	84.0	33	97
Winter	63.9	53.7	74.0	26	89
Spring	71.8	62.2	81.4	34	98
NOTES: ^(a)Source: United States Department of Commerce. Local Climatological Data – Annual Summary with Comparative Data – Vero Beach, Florida (VRB, WBAN: 12843). National Climatic Center; Asheville, North Carolina. 2003. (Period of record: 1974 – 2003). ^(b)Source: International Station Meteorological Climate Summary. Version 3.0. St. Lucie County, FL (73575). March 1995.					

Table 2.3-8 Wet-Bulb and Dry-Bulb Design Temperatures for Vero Beach, Florida		
Percent of Time	Temperatures (°F)	
	Wet-Bulb	Dry-Bulb
0.4	80	92
1.0	80	91
2.0	79	90
97.5	--	47
99.0	--	42
99.6	--	38
NOTES: Source: "Engineering Weather Data." AFCCC/DOC1. Published by NCDC. Version 1.0. December 23, 1999. (Period of record: 1973 – 1996).		

Table 2.3-9 Normal Relative Humidity Data					
Month	Hour (Local Standard Time)				
	0100 (percent)	0700 (percent)	1300 (percent)	1900 (percent)	Normal (percent)
January	85	87	59	75	76
February	83	87	56	72	73
March	82	86	56	69	72
April	80	84	52	65	68
May	81	84	57	70	72
June	86	86	63	76	77
July	89	89	65	78	79
August	89	92	64	78	79
September	87	90	64	79	78
October	83	87	62	77	76
November	85	87	62	78	77
December	83	86	59	78	75
Annual	84	87	60	75	75
<u>Season</u>					
Summer	88	89	64	77	78
Fall	85	88	63	78	77
Winter	84	87	58	75	75
Spring	81	85	55	68	71
NOTES: Source: United States Department of Commerce. Local Climatological Data – Annual Summary with Comparative Data – Vero Beach, Florida (VRB, WBAN: 12843). National Climatic Center; Asheville, North Carolina. 2003. (Period of record: 1974 – 2003).					

Table 2.3-10 Heating and Cooling Degree-Day Data		
Month	Normal Degree-Day	
	Heating	Cooling
January	129	75
February	92	83
March	50	146
April	9	221
May	0	359
June	0	449
July	0	511
August	0	516
September	0	468
October	2	356
November	30	185
December	95	102
Annual	407	3,470
NOTES: Source: Southeast Regional Climate Center. Historical Climate Summaries – General Climate Summary Tables. Ft. Pierce, Florida (83207). Base 65 F. http://www.dnr.state.sc.us/climate/sercc/index.html (Period of record: 1931 – 2004).		

Table 2.3-11 Total Precipitation Data	
Month	Normal Precipitation (inches)
January	2.89
February	2.45
March	4.20
April	2.88
May	3.80
June	6.03
July	6.53
August	6.04
September	6.84
October	5.04
November	3.04
December	2.19
Annual	51.93
NOTES: Source: United States Department of Commerce. Local Climatological Data – Annual Summary with Comparative Data – Vero Beach, Florida (VRB, WBAN: 12843). National Climatic Center; Asheville, North Carolina. 2003. (Period of record: 1974 – 2003).	

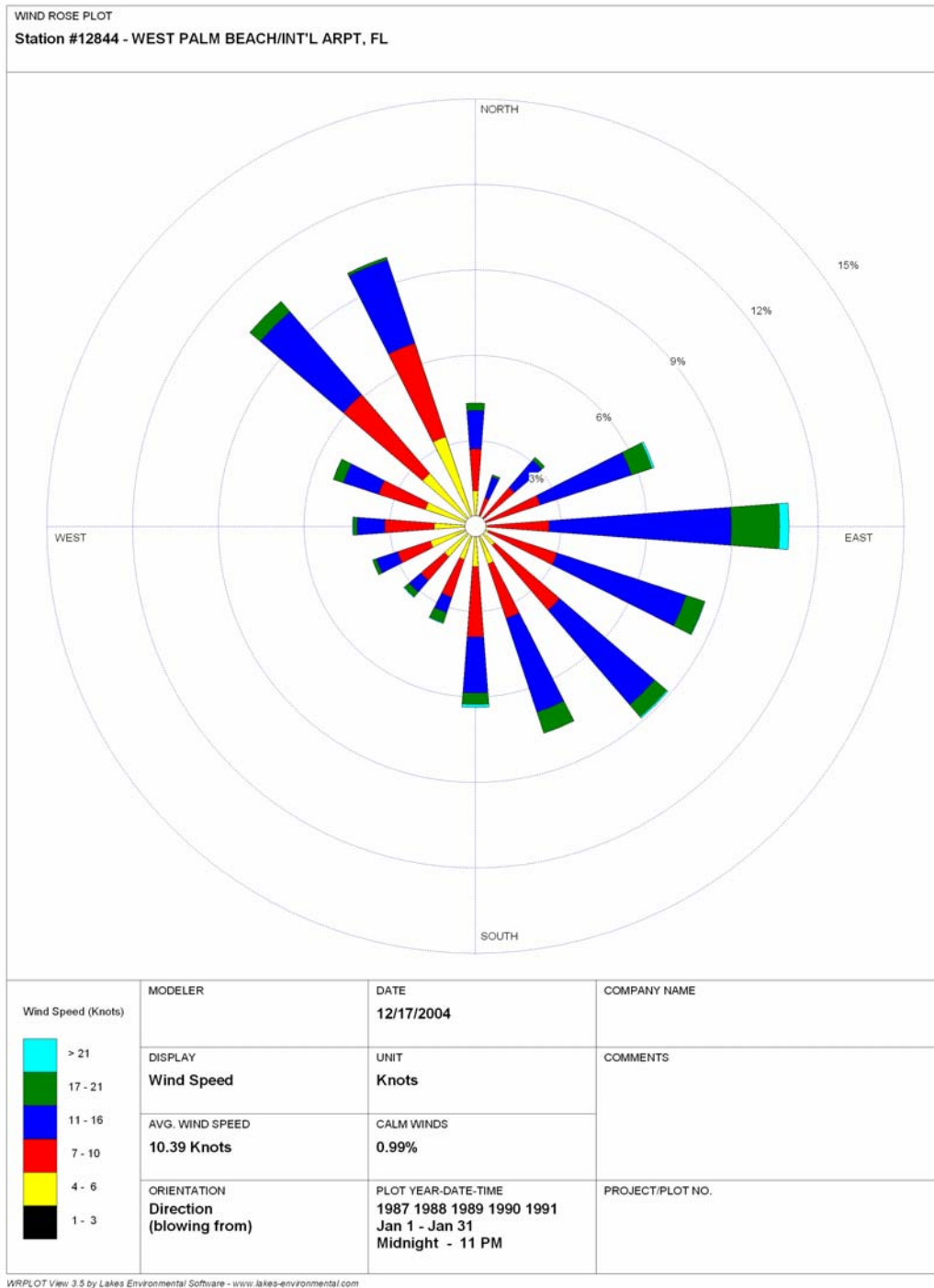
1986 through 2003. Extreme monthly precipitation totals are listed in Table 2.3-12. The highest recorded 24 hour rainfall total in Ft. Pierce was 10.00 inches (October 1936). Maximum recorded rainfall totals for various time periods are presented in Table 2.3-13. Precipitation maximums and intensities for various return periods and durations are shown in Table 2.3-14.

Table 2.3-12 Extreme Precipitation Data					
Month	Extreme Precipitation ^(a)			Extreme Snowfall ^(b)	
	Maximum 24 Hour (inches)	Maximum Monthly (inches)	Minimum Monthly (inches)	Maximum 24 Hour (inches)	Maximum Monthly (inches)
January	2.66	9.46	0.19	0	0
February	3.34	9.70	0.06	0	0
March	6.58	12.46	0.10	Trace	Trace
April	5.92	11.16	0.17	Trace	Trace
May	6.89	12.97	0.36	Trace	Trace
June	3.96	15.84	0.78	Trace	Trace
July	3.74	13.17	0.82	Trace	Trace
August	5.94	17.66	1.31	0	0
September	6.62	19.90	1.46	0	0
October	10.00	16.41	0.66	0	0
November	5.40	9.33	0.09	0	0
December	4.53	8.21	0.13	0	0
Annual	10.00	80.24	32.66	Trace	Trace
NOTES: ^(a)Source: Southeast Regional Climate Center. Historical Climate Summaries – General Climate Summary Tables. Ft. Pierce, Florida (83207). http://www.dnr.state.sc.us/climate/sercc/index.html (Period of record: 1931 – 2004) ^(b)Source: United States Department of Commerce. Local Climatological Data – Annual Summary with Comparative Data – Vero Beach, Florida (VRB, WBAN: 12843). National Climatic Center; Asheville, North Carolina. 2003. (Period of record: 1986 – 2003).					

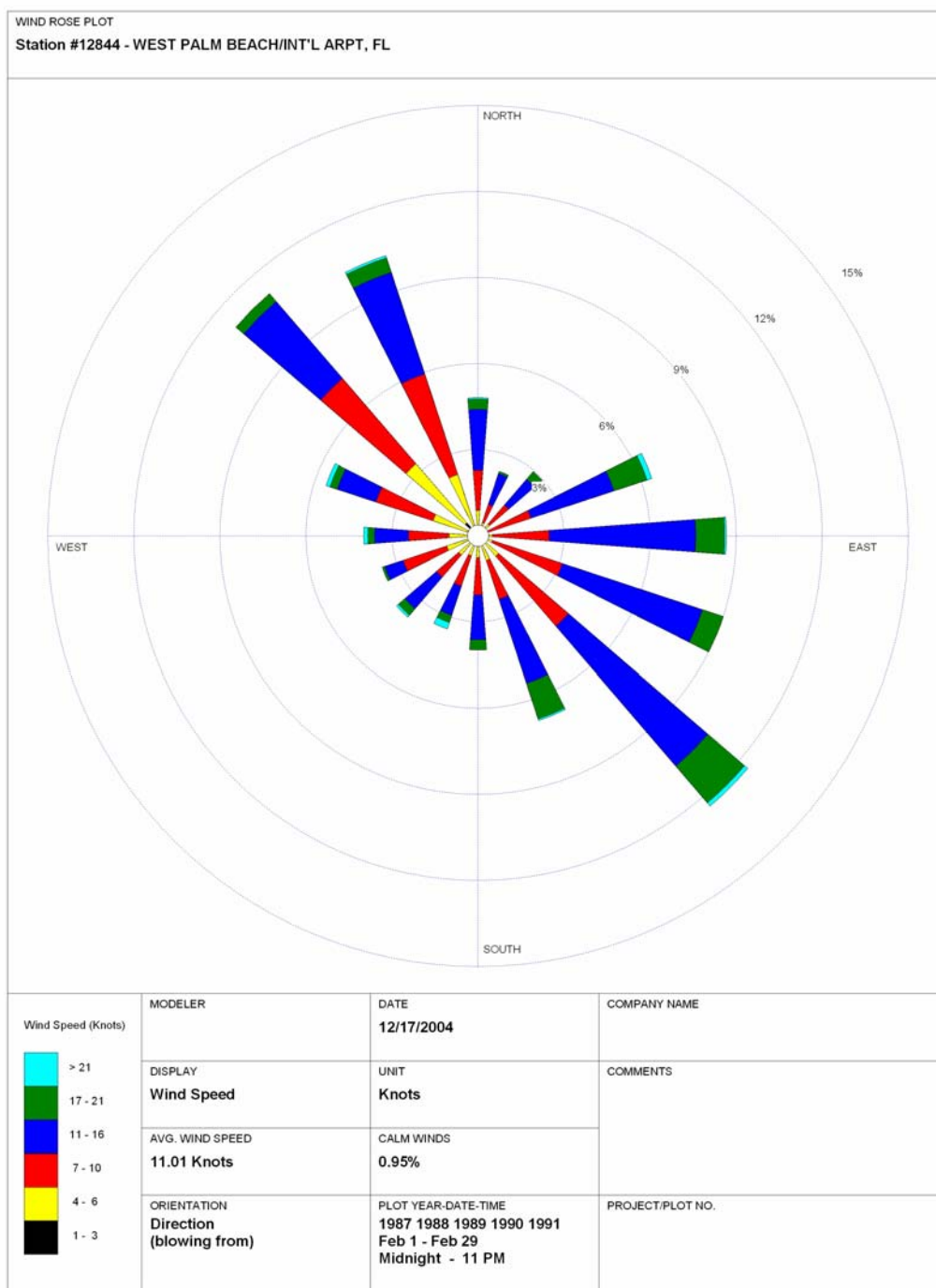
Table 2.3-13 Maximum Recorded Rainfall Data for West Palm Beach, Florida		
Duration	Rainfall (inches)	Date
5 minutes ^(a)	0.74	July 19, 1933
10 minutes ^(a)	0.90	September 16, 1959
15 minutes ^(a)	1.17	May 11, 1958
30 minutes ^(a)	--	--
60 minutes ^(b)	4.40	April 17, 1942
2 hours ^(b)	8.35	April 17, 1942
3 hours ^(b)	8.77	April 17, 1942
6 hours ^(b)	9.90	April 17, 1942
12 hours ^(b)	15.16	April 17, 1942
24 hours ^(c)	15.23	April 17, 1942
NOTES: Source: United States Weather Bureau, <u>Maximum Recorded United States Point Rainfall for 5 Minutes to 24 Hours at 296 First-Order Stations</u>, Technical Paper No. 2, Washington, D.C., 1963. ^(a)Period of record: 1953-1961. ^(b)Period of record: 1941-1961 ^(c)Period of record: 1939-1961.		

Table 2.3-14 Precipitation Amounts and Intensities for Selected Durations and Return Periods Expected in the Power Park Area							
PRECIPITATION AMOUNTS							
Duration (hours)	Return Period						
	1 Year (inches)	2 Year (inches)	5 Year (inches)	10 Year (inches)	25 Year (inches)	50 Year (inches)	100 Year (inches)
1/2	1.50	1.75	2.11	2.40	2.80	3.07	3.25
1	1.90	2.21	2.74	3.08	3.85	3.85	4.20
2	2.30	2.79	3.30	4.12	4.50	5.20	5.63
3	2.52	3.03	3.85	4.60	5.20	5.90	6.48
6	3.15	3.80	4.75	5.57	6.50	7.35	8.10
12	3.60	4.48	5.80	6.60	7.90	9.20	10.05
24	4.20	5.20	6.95	8.15	9.50	10.90	12.15
PRECIPITATION INTENSITIES							
Duration (hours)	Return Period						
	1 Year (inches)	2 Year (inches)	5 Year (inches)	10 Year (inches)	25 Year (inches)	50 Year (inches)	100 Year (inches)
1/2	3.00	3.50	4.22	4.80	5.60	6.14	6.50
1	1.90	2.21	2.74	3.08	3.85	3.85	4.20
2	1.15	1.40	1.65	2.06	2.25	2.60	2.82
3	0.84	1.01	1.28	1.53	1.73	1.97	2.16
6	0.53	0.63	0.79	0.93	1.08	1.23	1.35
12	0.30	0.37	0.48	0.55	0.66	0.77	0.84
24	0.18	0.22	0.29	0.34	0.40	0.45	0.51
NOTES: Source: United States Weather Bureau, <u>Rainfall Frequency Atlas of the United States for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years</u>, Technical Paper No. 40, Washington, D.C., May 1961.							

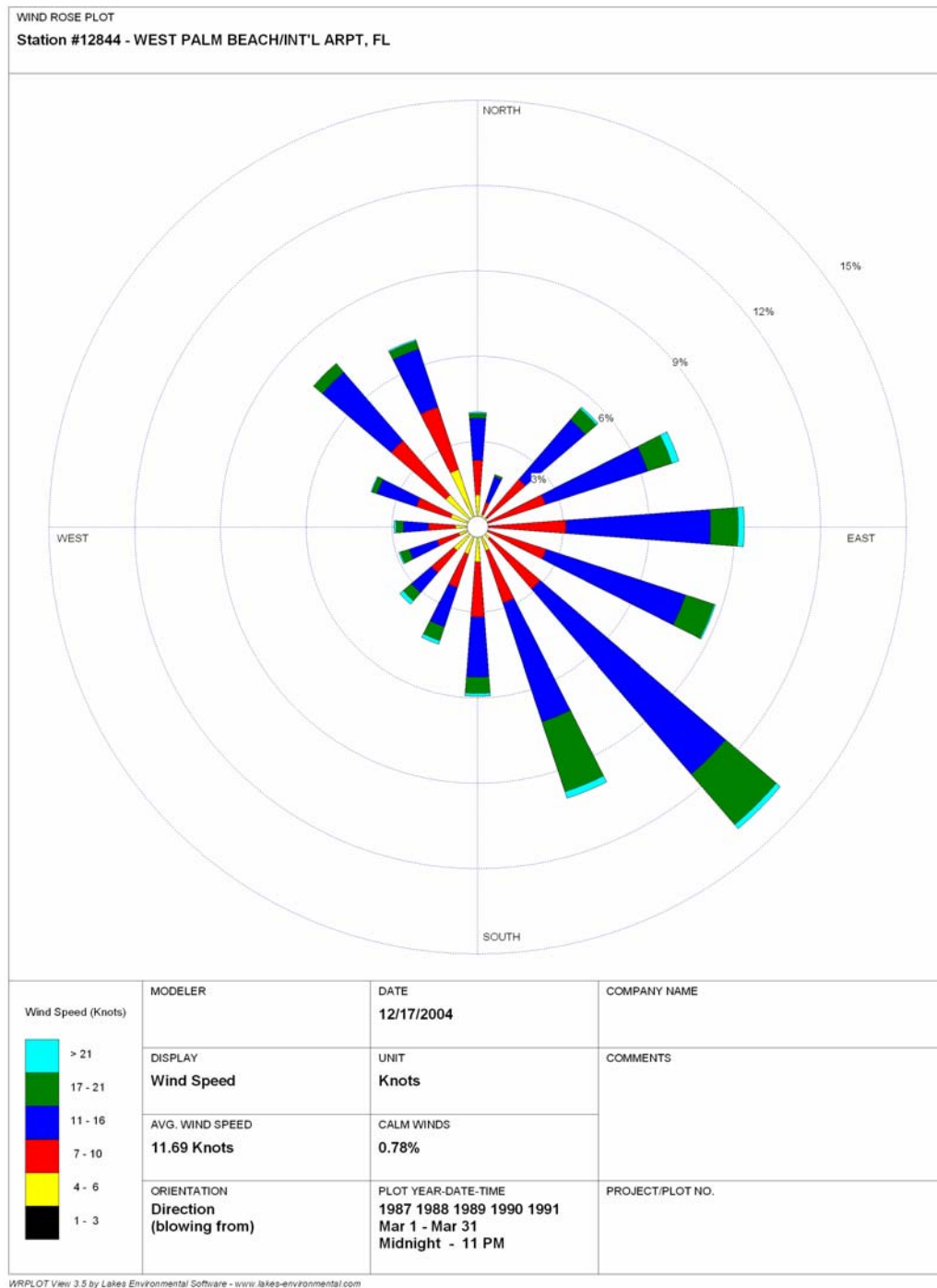
Wind Characteristics. Five years of wind data (1987-1991) were used to generate the monthly, annual, and seasonal wind roses from West Palm Beach, Florida, as shown on Figures 2.3-9 through 2.3-25. These wind roses are considered appropriate in describing the general wind flow at the Project. Table 2.3-15 includes the annual percent frequency of occurrence of the wind speed categories for each of the 16 wind directions. The annual wind rose shows a predominance of southeast wind. The winter months show a predominance of winds from the northwest at a maximum speed of 17 to 21 knots. The



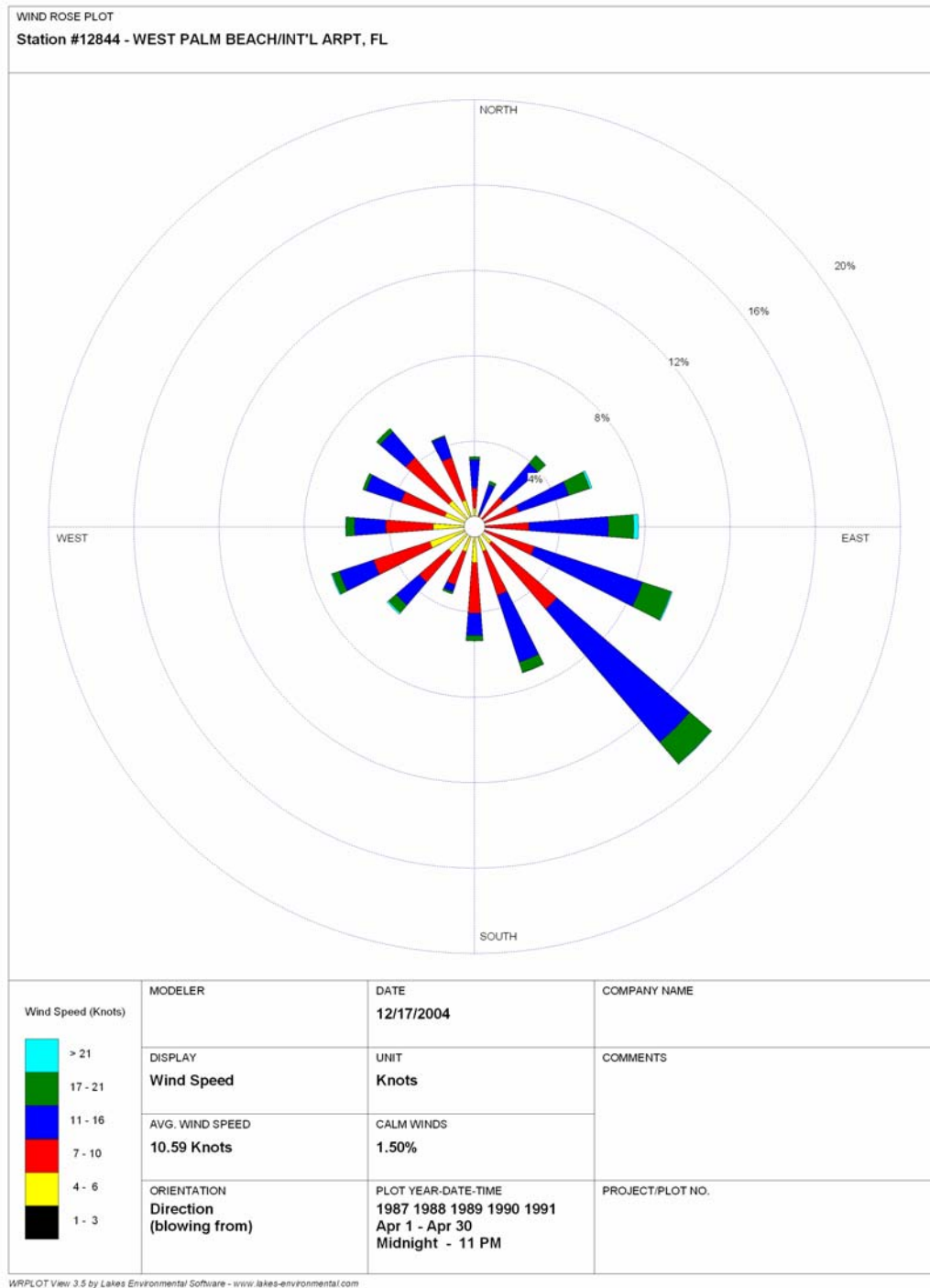
January Wind Rose for West Palm Beach, Florida
Period: 1987-1991
Figure 2.3-9



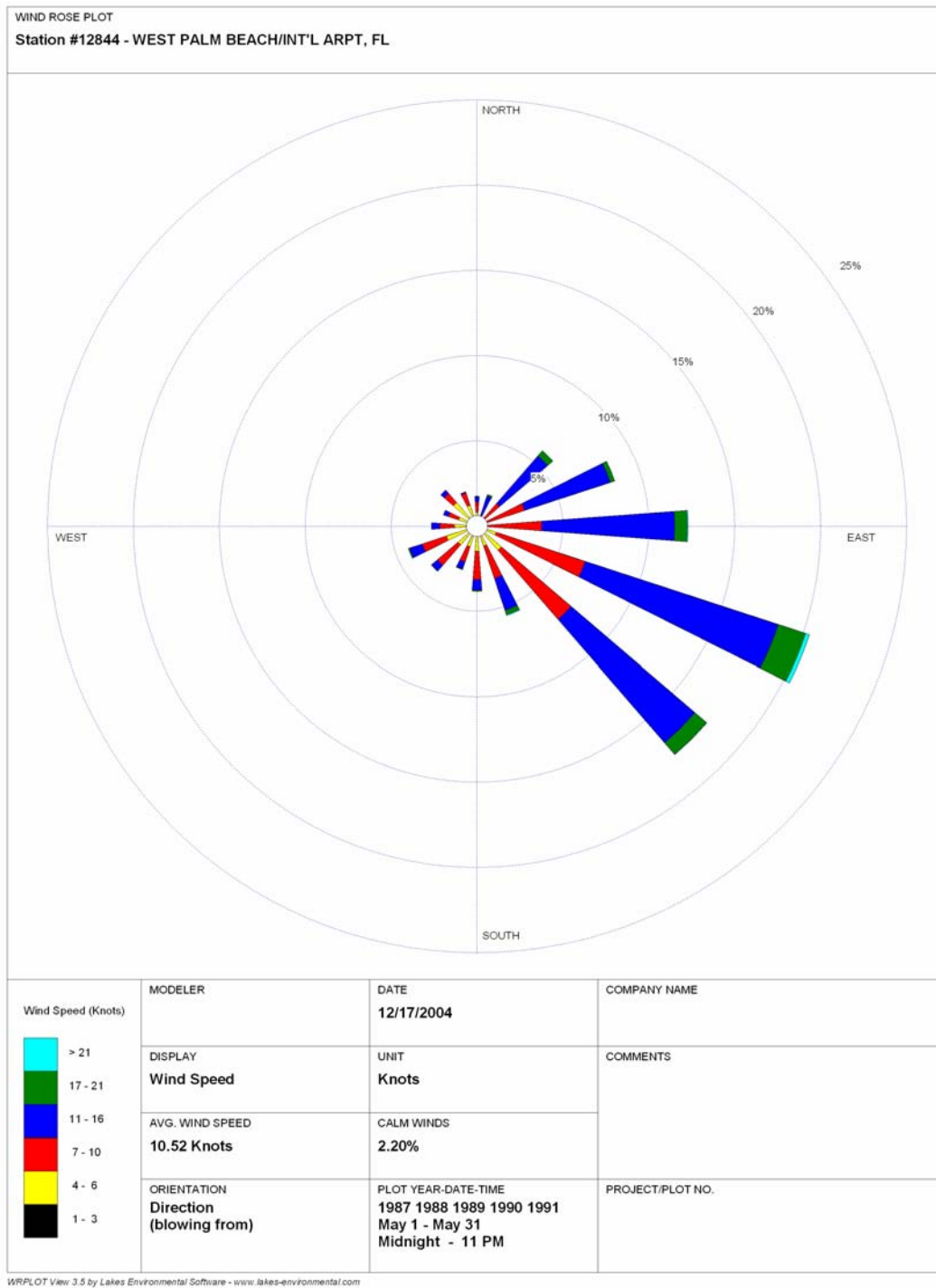
February Wind Rose for West Palm Beach, Florida
Period: 1987-1991
Figure 2.3-10



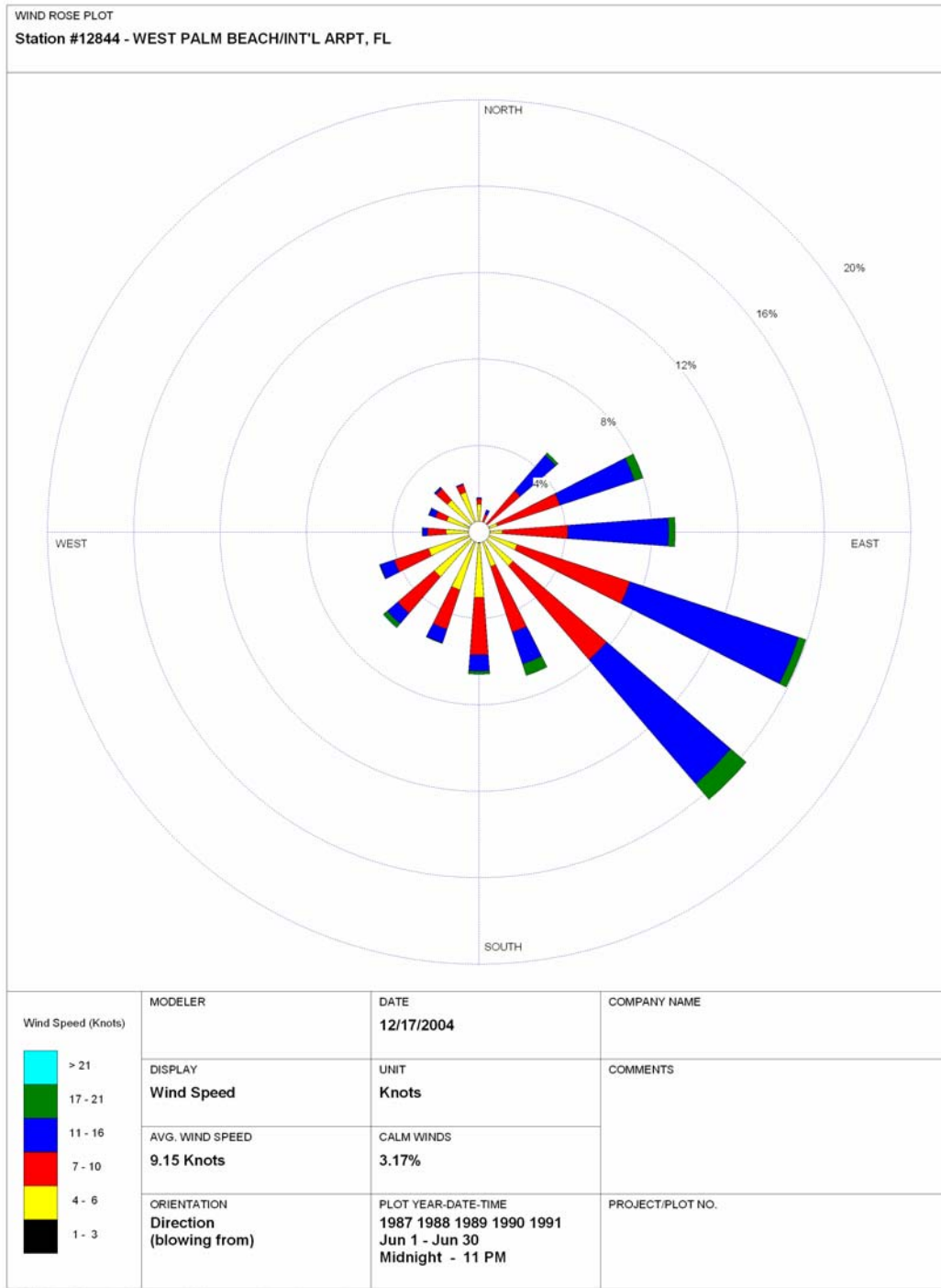
March Wind Rose for West Palm Beach, Florida
Period: 1987-1991
Figure 2.3-11



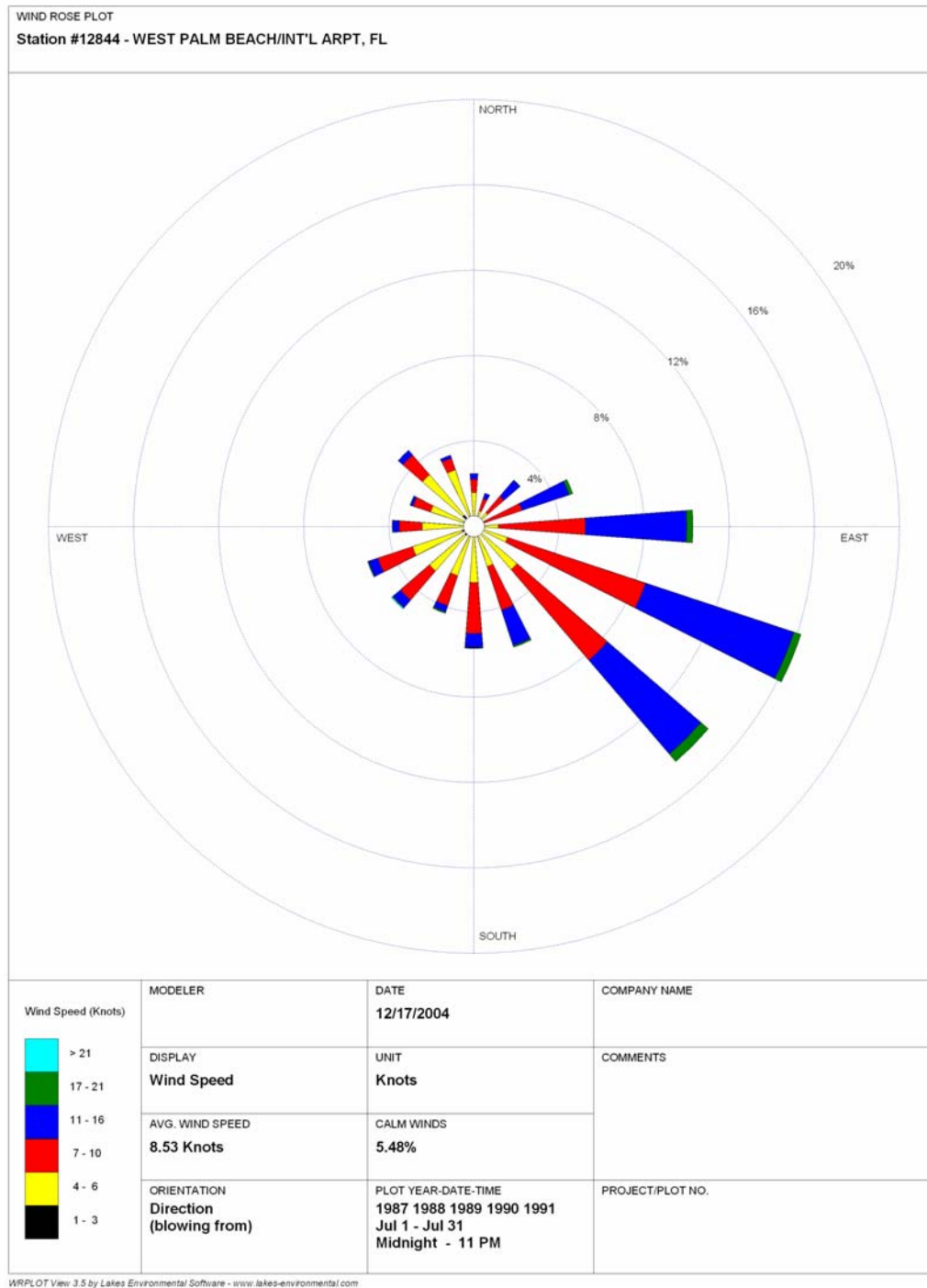
April Wind Rose for West Palm Beach, Florida
Period: 1987-1991
Figure 2.3-12



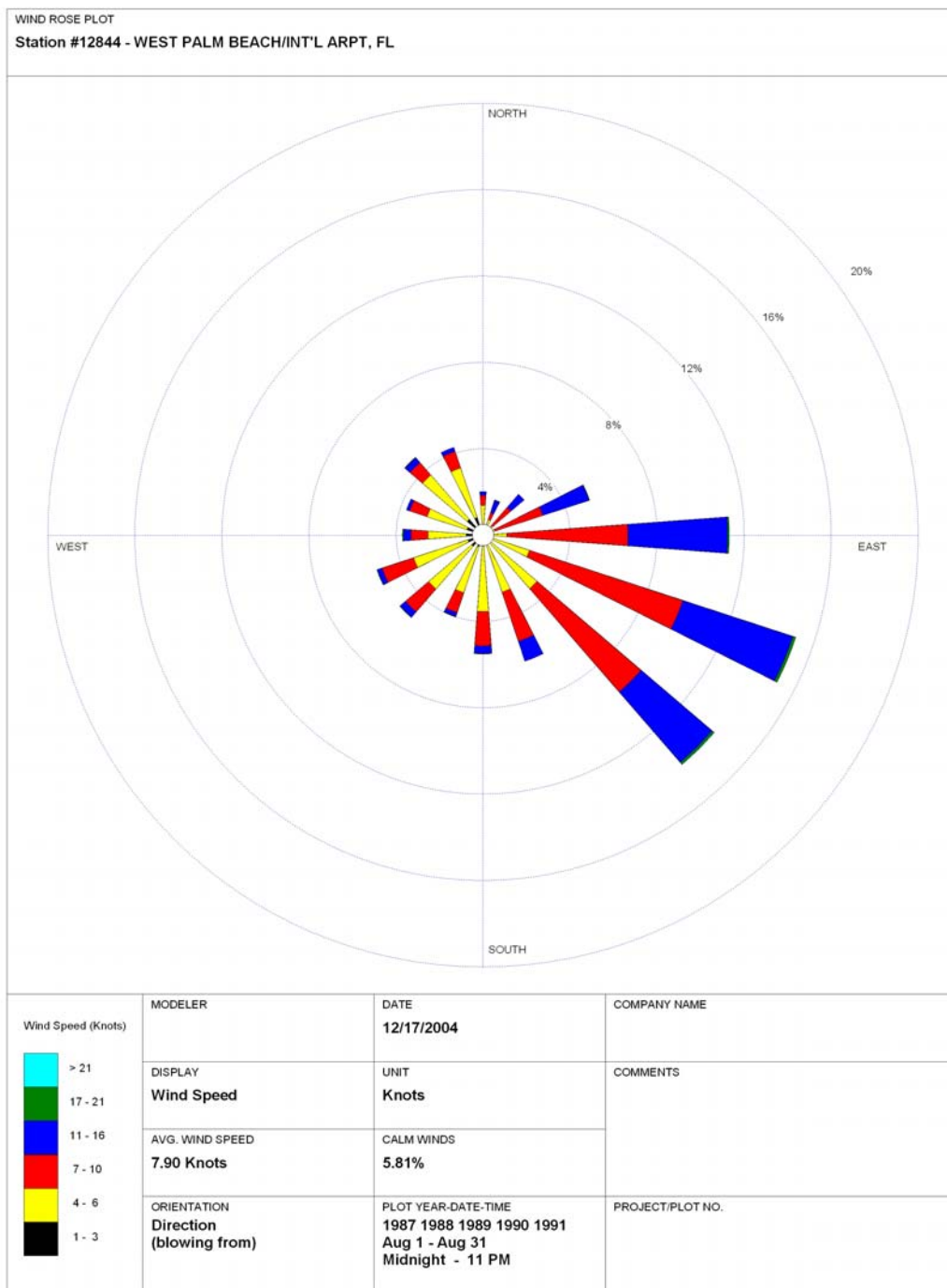
May Wind Rose for West Palm Beach, Florida
Period: 1987-1991
Figure 2.3-13



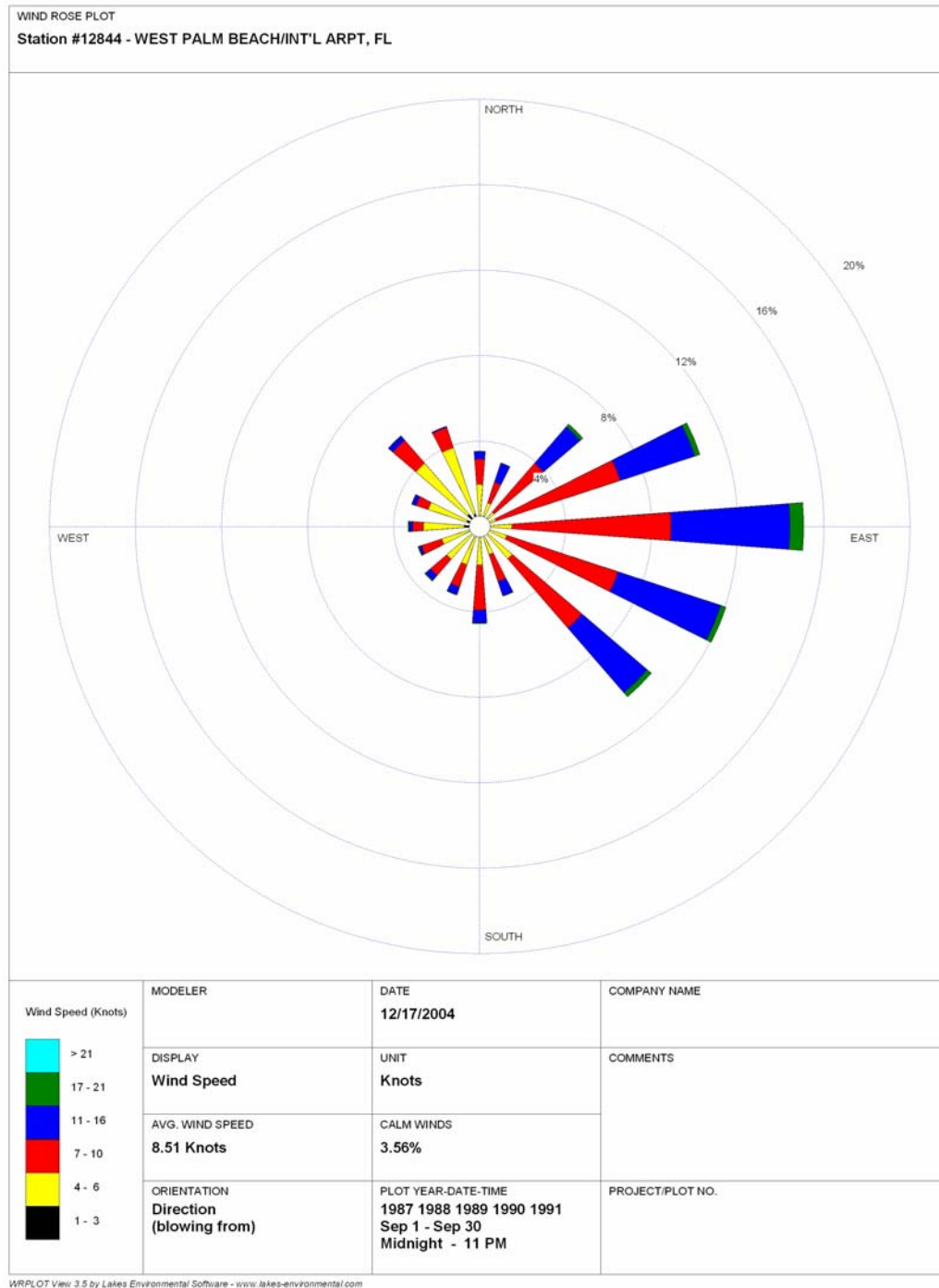
June Wind Rose for West Palm Beach, Florida
Period: 1987-1991
Figure 2.3-14



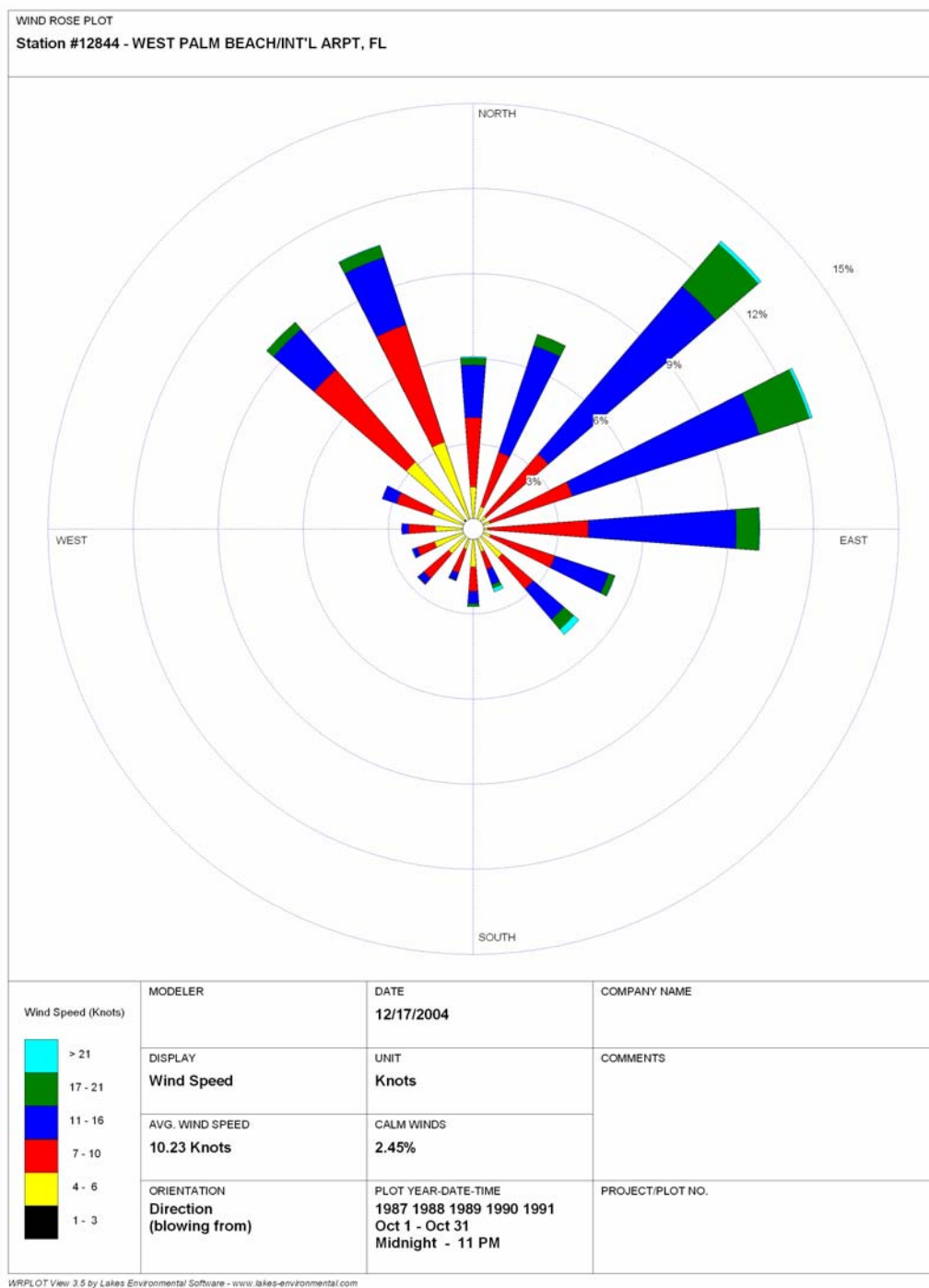
July Wind Rose for West Palm Beach, Florida
Period: 1987-1991
Figure 2.3-15



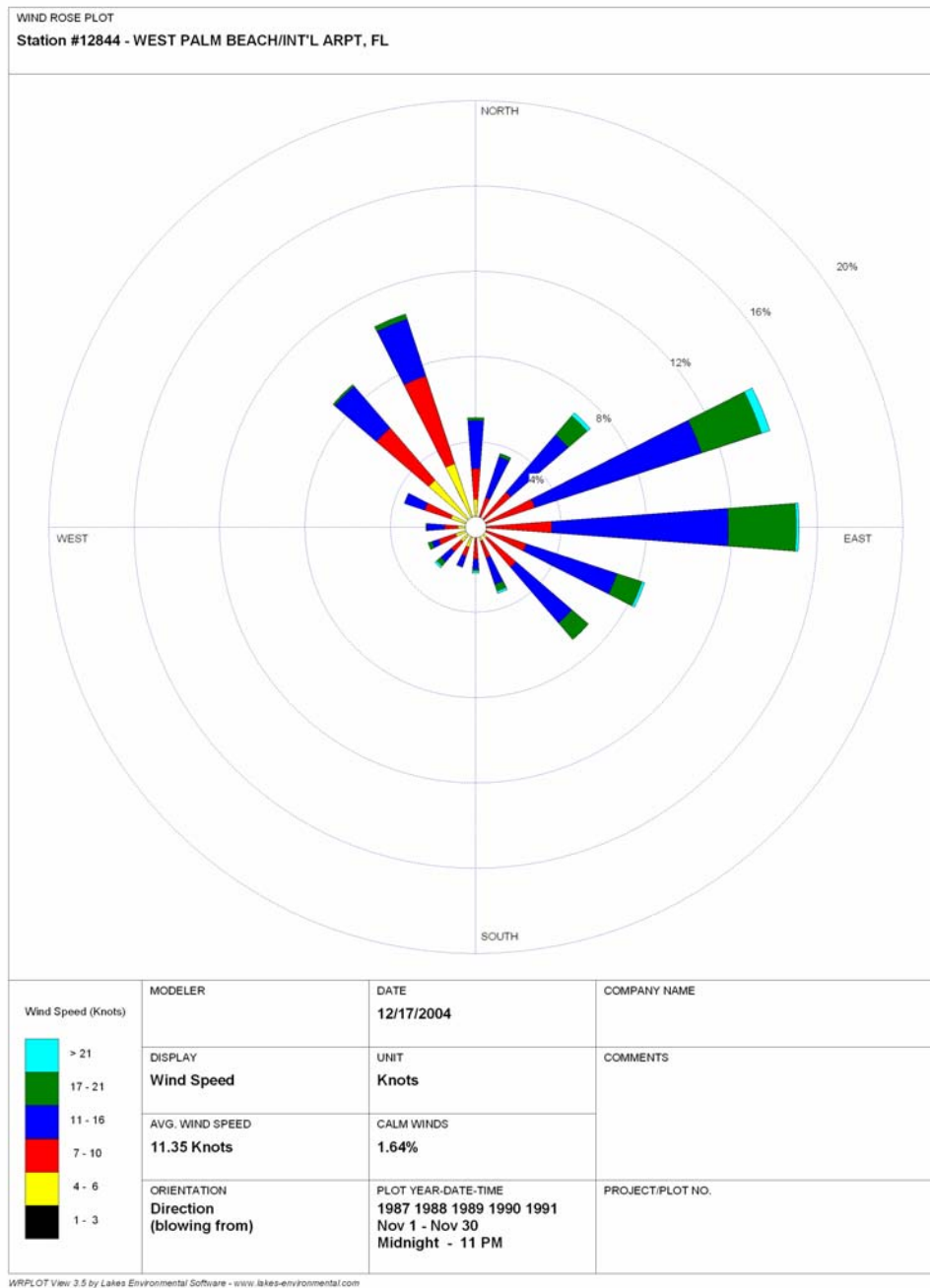
August Wind Rose for West Palm Beach, Florida
Period: 1987-1991
Figure 2.3-16



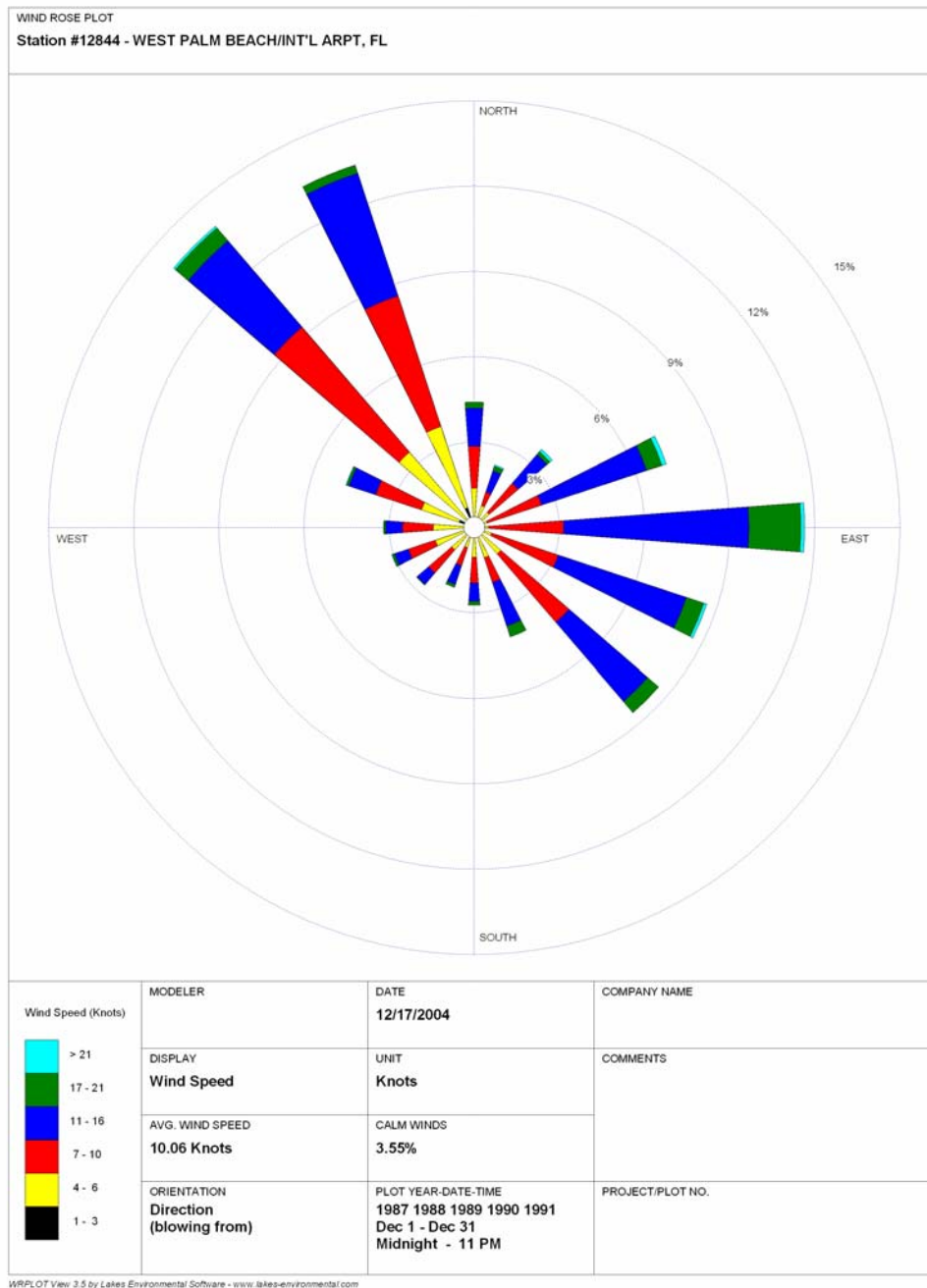
September Wind Rose for West Palm Beach, Florida
Period: 1987-1991
Figure 2.3-17



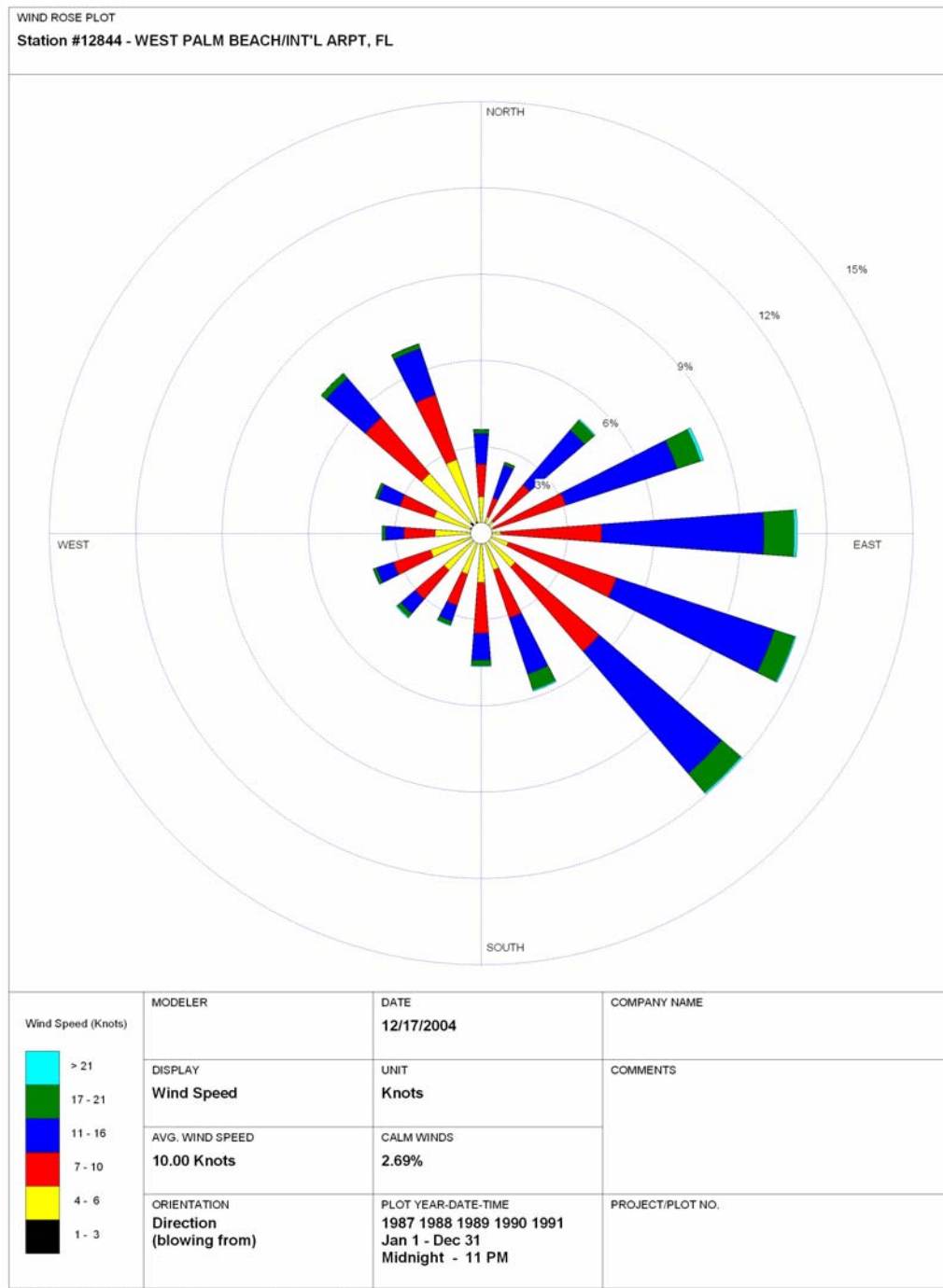
October Wind Rose for West Palm Beach, Florida
Period: 1987-1991
Figure 2.3-18



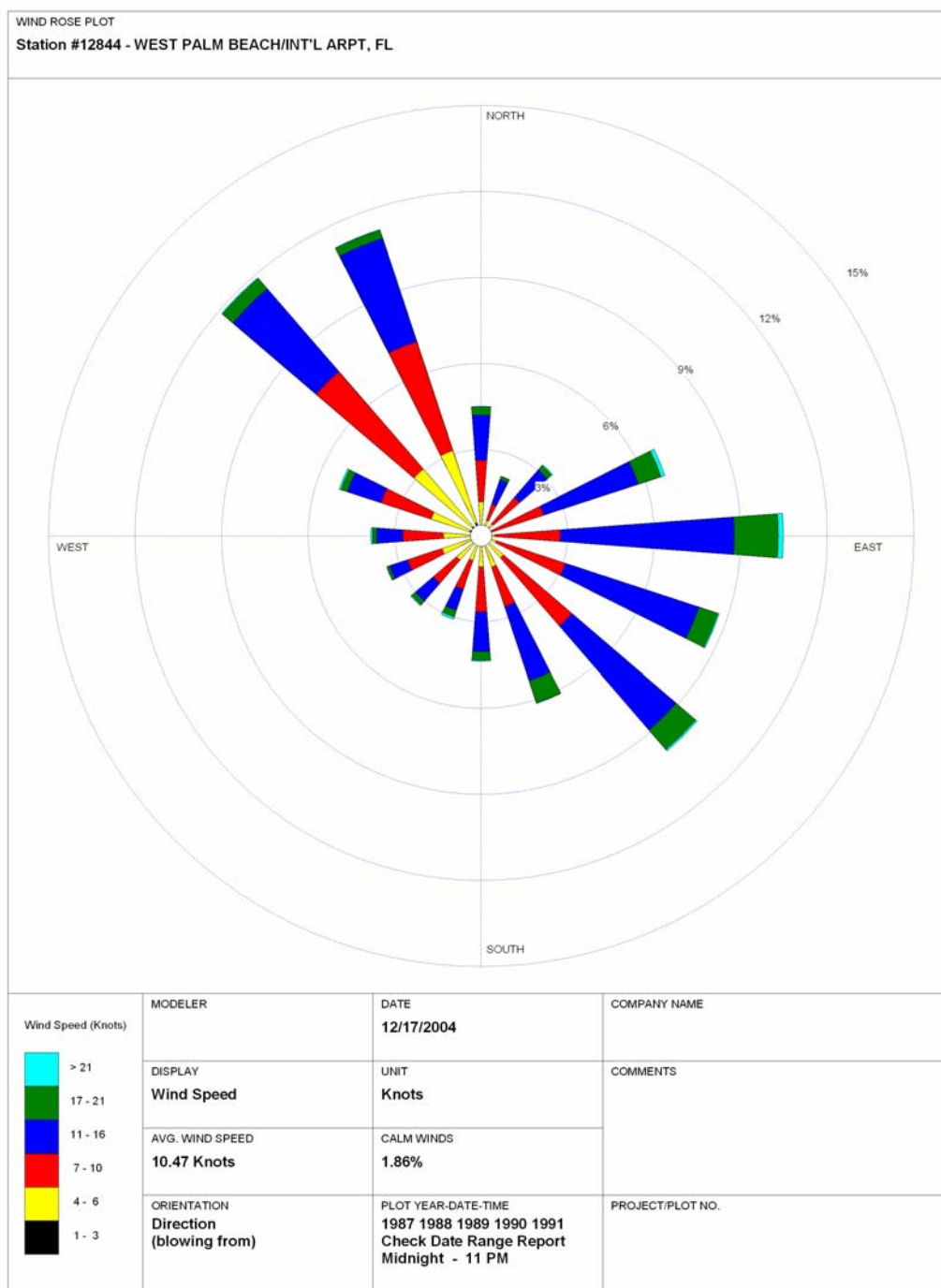
November Wind Rose for West Palm Beach, Florida
Period: 1987-1991
Figure 2.3-19



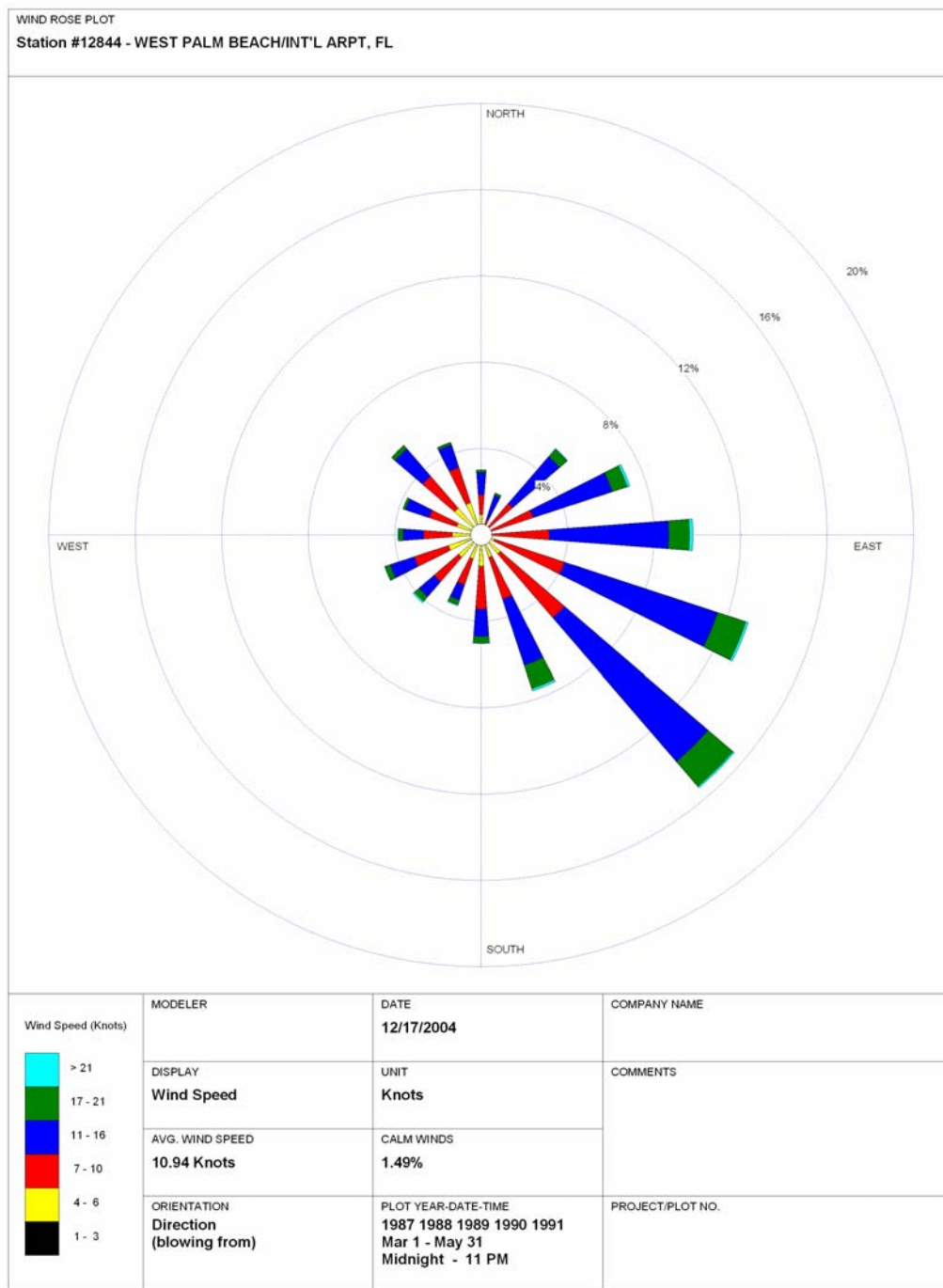
December Wind Rose for West Palm Beach, Florida
Period: 1987-1991
Figure 2.3-20



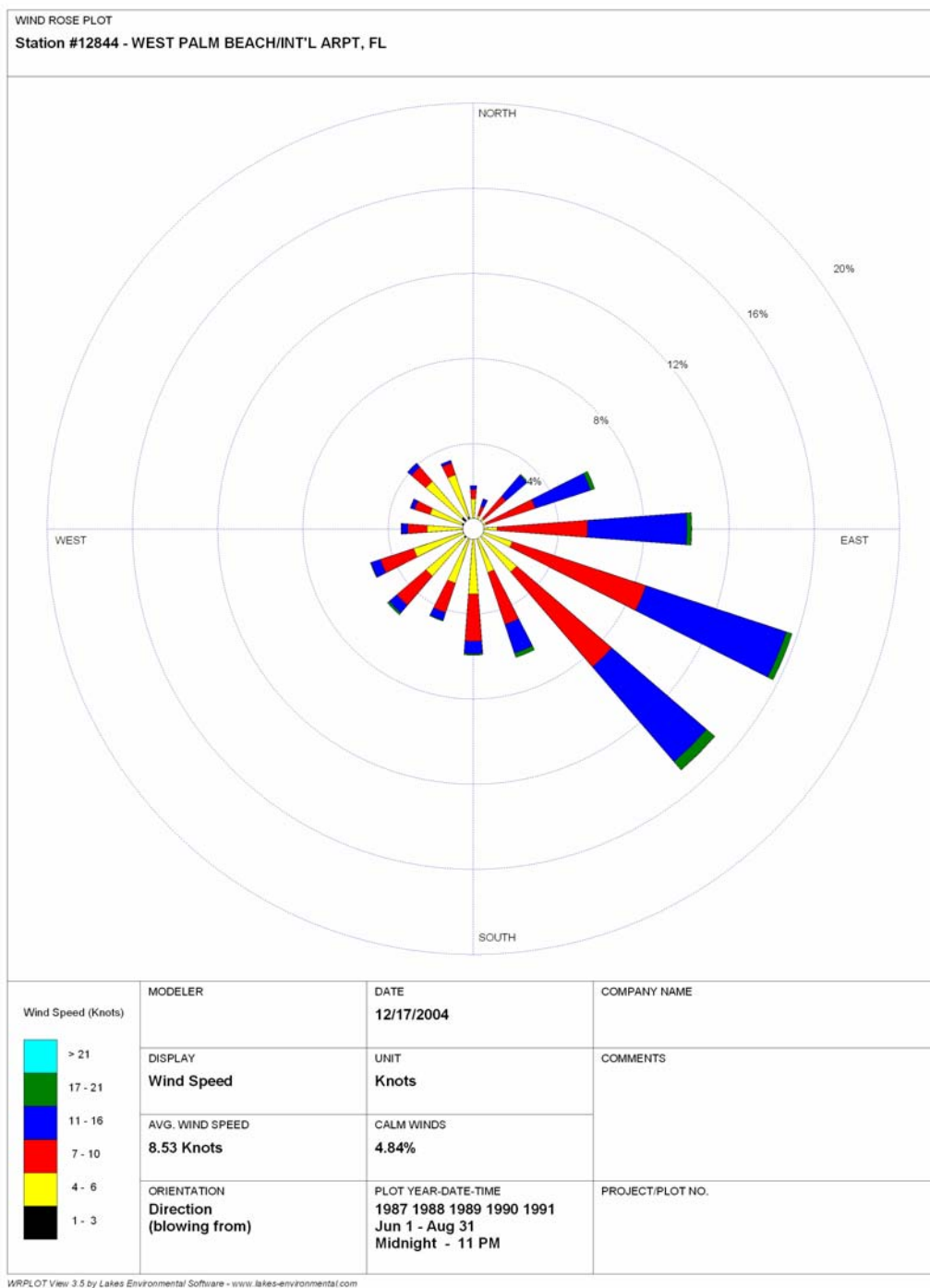
Annual Wind Rose for West Palm Beach, Florida
Period: 1987-1991
Figure 2.3-21



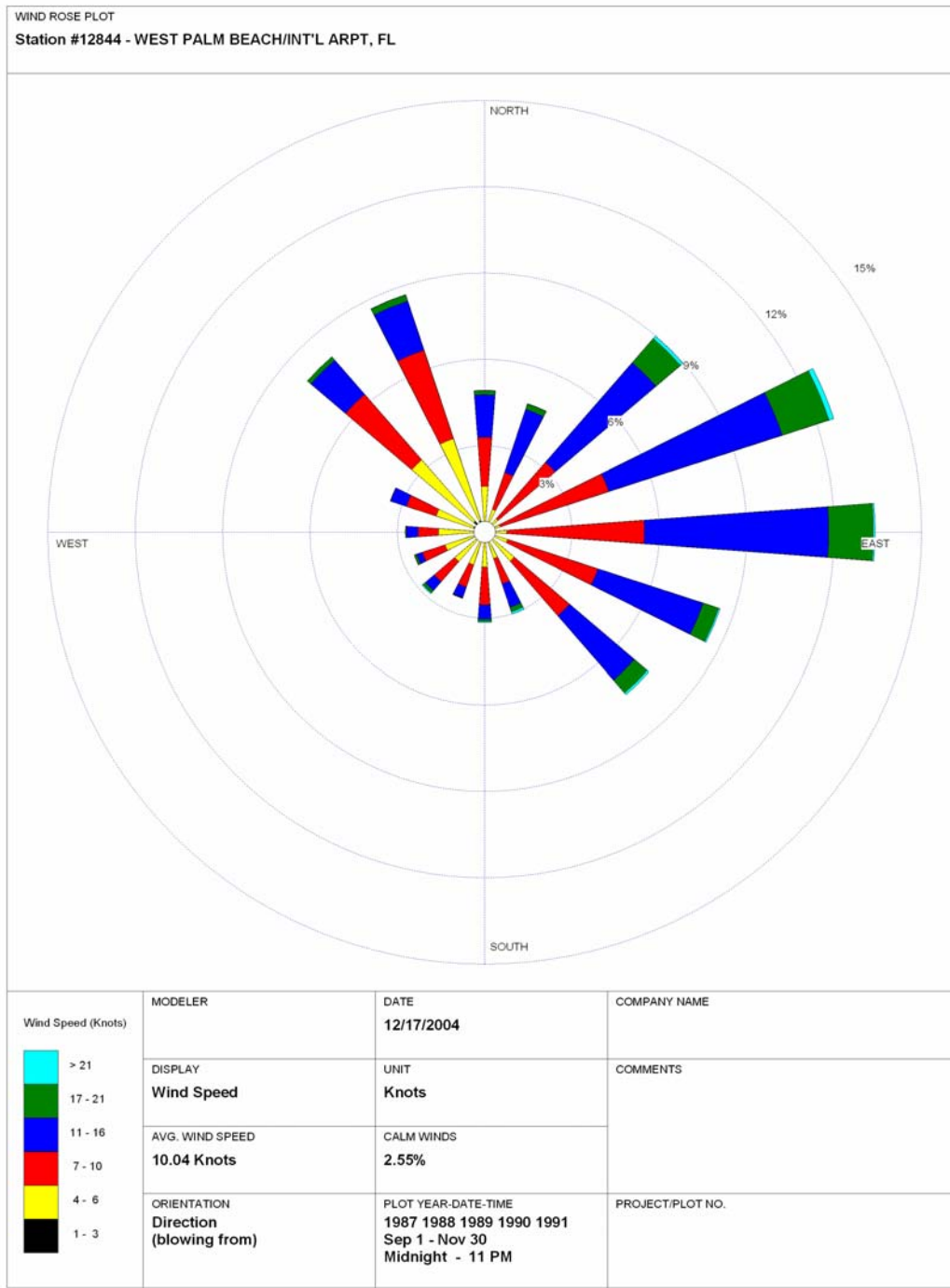
Winter Wind Rose for West Palm Beach, Florida
Period: 1987-1991 (December, January, February)
Figure 2.3-22



Spring Wind Rose for West Palm Beach, Florida
Period: 1987-1991 (March, April, May)
Figure 2.3-23



Summer Wind Rose for West Palm Beach, Florida
Period: 1987-1991 (June, July, August)
Figure 2.3-24



Fall Wind Rose for West Palm Beach, Florida
Period: 1987-1991 (September, October, November)
Figure 2.3-25

Table 2.3-15 Annual Wind Rose Percent Frequency Distribution							
Direction Sector	Wind Speed Categories (knots) ^(a)						Total (percent)
	0-3	4-6	7-10	11-16	17-21	>21	
N	0.340	1.045	1.127	1.068	0.130	0.014	3.724
NNE	0.151	0.486	0.694	1.182	0.110	0.007	2.629
NE	0.114	0.470	1.673	2.501	0.456	0.046	5.260
ENE	0.094	0.404	2.642	4.066	0.860	0.110	8.176
E	0.144	0.614	3.507	5.634	1.054	0.100	11.053
ESE	0.205	0.910	3.954	5.782	0.728	0.055	11.635
SE	0.390	1.381	3.863	5.600	0.874	0.059	12.167
SSE	0.379	1.155	1.752	2.049	0.577	0.052	5.965
S	0.450	1.460	1.771	0.929	0.185	0.030	4.824
SSW	0.372	1.296	1.150	0.568	0.135	0.034	3.555
SW	0.534	1.394	1.326	0.653	0.167	0.046	4.119
WSW	0.646	1.513	1.351	0.618	0.114	0.016	4.258
W	0.541	1.266	1.084	0.637	0.103	0.025	3.656
WNW	0.580	1.333	1.248	0.787	0.094	0.018	4.059
NW	0.803	2.243	2.569	1.812	0.214	0.007	7.649
NNW	0.764	2.266	2.378	1.689	0.162	0.014	7.272
Total	6.506	19.236	32.090	35.574	5.962	0.632	100.000
NOTES: Source: Derived from hourly West Palm Beach (Station No. 12844), Florida, SCRAM meteorological data (1987-1991). ^(a) 1 knot = 1.15 mph.							

spring and summer months show abundance of southeasterly winds. Fall months show a predominance of winds from the east at a maximum speed of greater than 21 knots.

The design wind speed for wind loadings is 140 miles per hour for the Project area. The Vero Beach fastest observed 2 minute and 5 second wind speeds on record are 48 and 63 miles per hour, respectively. The periods of record for the fastest 2 minute and 5 second wind speeds are both 10 years.

2.3.7.3 Atmospheric Dispersion. Atmospheric dispersion depends primarily on four meteorological parameters:

- Height of the mixing layer (mixing height).
- Wind speed within the mixing layer.

- Frequency of low level temperature inversions.
- Atmospheric stability.

Holzworth has estimated mean mixing depths and average wind speed within the mixing layer for 62 National Weather Service radiosonde stations within the 48 contiguous states. The morning and afternoon mixing depths are calculated from the twice daily vertical temperature profiles and the morning and afternoon surface temperatures. Within the mixing depth, relatively vigorous mixing occurs. Diffusion within layers above this height is inhibited because of thermal buoyancy considerations (that is, neutral or slightly stable conditions). The worst dispersion conditions occur when both the mixing depth and wind speed are low. In general, Holzworth's data show that Florida has the best combinations of greater mixing depths and higher wind speeds than other areas. Table 2.3-16 presents values of seasonal and annual morning and afternoon mixing depths and wind speed representative of the TCEC area.

Table 2.3-16 Estimated Average Mixing Heights and Average Wind Speeds Through the Mixed Layer Representative of the TCEC Area				
Season	Morning		Afternoon	
	Mixing Height (m)	Wind Speed (m/s)	Mixing Height (m)	Wind Speed (m/s)
Winter	707	5.7	1,221	6.5
Spring	980	5.9	1,459	6.9
Summer	1,071	4.5	1,383	5.5
Fall	933	5.3	1,341	6.9
Annual	923	5.3	1,351	6.5
NOTES: Source: Holzworth, G.C. "Mixing Heights, Wind Speeds, and Potential for Urban Air Pollution throughout the Contiguous United States." Washington D.C., USEPA. January 1972. Table B-1; Miami, Florida.				

Atmospheric stability, in conjunction with general wind patterns, indicates the potential of the atmosphere to disperse airborne pollutants. Atmospheric conditions are typically categorized as unstable, neutral, or stable. An unstable atmosphere is one in which relatively rapid dispersion takes place in both the horizontal and vertical direction. Viewed in terms of changes in temperature with height, an unstable atmosphere is characterized by a sharp decrease in temperature with height. Neutral conditions are

common in the atmosphere and are associated with moderate diffusion rates. Temperatures also decrease with height in a neutral atmosphere but not as rapidly as under unstable conditions (neutral conditions are associated with the adiabatic lapse rate). A stable atmosphere is characterized by slight decreases, or even increases of temperature with height, and greatly reduced dispersion rates in comparison with unstable or neutral atmospheres.

The stability classifications presented in this section are based on the well-known Pasquill, Gifford, Turner method, which assigns a stability on the basis of surface wind speed, cloud cover, and solar altitude (Turner). Stability classes range from Class A (most unstable) to Class F (most stable). Class D represents a neutral stability condition. The joint frequency distribution of wind speed, wind direction, and stability at West Palm Beach, Florida, is summarized in Tables 2.3-17 through 2.3-22.

2.3.7.4 Ambient Air Quality. One requirement in obtaining site certification and applicable air quality permits is to demonstrate that the operation of the proposed facility will not cause or contribute to a violation of any federal or state ambient air quality standard or allowable air quality increment. This demonstration is included in Section 5.6, which also addresses many of the requirements of the Prevention of Significant Deterioration (PSD) permit application. One necessary part of the application is to establish representative values for background air quality for applicable pollutants. The existing air quality in the vicinity of the Project is described in this section including applicable standards and allowable incremental effects. The impact predictions resulting from the consideration of the proposed source emissions are also described in Volume 3 of this SCA.

Air Quality Standards. Ambient air quality standards (AAQS) have been set to protect public health (primary standards) and public welfare (secondary standards). In addition, the State of Florida has adopted ambient air quality standards. The federal and state AAQS are given in Table 2.3-23.

In addition to ambient standards, the operation of the units must not cause air quality incremental impacts beyond those specified by Prevention of Significant Deterioration (PSD) criteria. The TCEC area is classified as PSD Class II. Class II PSD increments will be applicable for this analysis in all areas surrounding the TCEC.

Existing Air Quality. The state of Florida has been conducting air quality monitoring for criteria pollutants at locations throughout the state for many years. The US EPA AIRS Data, accessed on the Internet, provides the most recent monitoring data for use in establishing background concentrations for applicable criteria pollutants. FDEP and EPA

Table 2.3-17 Distribution of Hours of Occurrence of Wind Speed and Wind Direction for Stability Class A							
Direction	Speed Categories (mph)						Total Hours
	1-3	4-7	8-12	13-18	19-24	> 24	
N	1	1	0	0	0	0	2
NNE	0	4	0	0	0	0	4
NE	1	3	0	0	0	0	4
ENE	0	3	0	0	0	0	3
E	0	5	0	0	0	0	5
ESE	0	1	0	0	0	0	1
SE	1	5	0	0	0	0	6
SSE	1	1	0	0	0	0	2
S	1	5	0	0	0	0	6
SSW	1	5	0	0	0	0	6
SW	1	3	0	0	0	0	4
WSW	1	8	0	0	0	0	9
W	0	4	0	0	0	0	4
WNW	0	1	0	0	0	0	1
NW	0	2	0	0	0	0	2
NNW	0	1	0	0	0	0	1
Totals	8	52	0	0	0	0	60
NOTES: Source: Derived from hourly West Palm Beach (Station No. 12844), Florida, SCRAM meteorological data (1987-1991). Number of Occurrences of A Stability = 69 hours Number of Calms with A Stability = 9 hours							

Table 2.3-18 Distribution of Hours of Occurrence of Wind Speed and Wind Direction for Stability Class B							
Direction	Speed Categories (mph)						Total Hours
	1-3	4-7	8-12	13-18	19-24	> 24	
N	5	44	6	0	0	0	55
NNE	6	39	16	0	0	0	61
NE	6	55	28	0	0	0	89
ENE	1	47	36	0	0	0	84
E	2	56	77	0	0	0	135
ESE	0	56	88	2	0	0	146
SE	2	62	42	1	0	0	107
SSE	4	41	19	0	0	0	64
S	4	36	14	0	0	0	54
SSW	3	44	8	0	0	0	55
SW	5	65	9	1	0	0	80
WSW	2	38	15	0	0	0	55
W	3	54	9	0	0	0	66
WNW	7	54	10	0	0	0	71
NW	5	57	8	0	0	0	70
NNW	4	54	5	0	0	0	63
Totals	59	802	390	4	0	0	1,255
NOTES: Source: Derived from hourly West Palm Beach (Station No. 12844), Florida, SCRAM meteorological data (1987-1991). Number of Occurrences of B Stability = 1,271 hours Number of Calms with B Stability = 16 hours							

Table 2.3-19 Distribution of Hours of Occurrence of Wind Speed and Wind Direction for Stability Class C							
Direction	Speed Categories (mph)						Total Hours
	1-3	4-7	8-12	13-18	19-24	> 24	
N	10	73	125	11	0	0	219
NNE	7	27	110	32	1	0	177
NE	5	35	242	55	6	0	343
ENE	2	43	329	86	1	0	461
E	5	45	489	165	5	0	709
ESE	5	47	556	256	8	0	872
SE	7	50	446	294	18	0	815
SSE	5	44	152	83	6	0	290
S	5	84	106	21	3	0	219
SSW	11	32	88	9	3	0	143
SW	7	47	136	29	6	1	226
WSW	7	44	126	16	0	0	193
W	8	45	109	18	1	1	182
WNW	10	67	117	14	1	0	209
NW	13	85	188	12	2	0	300
NNW	11	93	156	7	0	0	267
Totals	118	861	3,475	1,108	61	2	5,625
NOTES: Source: Derived from hourly West Palm Beach (Station No. 12844), Florida, SCRAM meteorological data (1987-1991). Number of Occurrences of C Stability = 5,695 hours Number of Calms with C Stability = 70 hours							

Table 2.3-20 Distribution of Hours of Occurrence of Wind Speed and Wind Direction for Stability Class D							
Direction	Speed Categories (mph)						Total Hours
	1-3	4-7	8-12	13-18	19-24	> 24	
N	17	138	365	282	20	0	822
NNE	5	65	290	291	16	1	668
NE	6	77	622	735	81	0	1,521
ENE	1	84	965	1,218	171	7	2,446
E	4	105	1,346	1,561	186	6	3,208
ESE	3	144	1,250	1,461	113	3	2,974
SE	7	188	1,206	1,517	114	8	3,040
SSE	10	143	524	656	104	1	1,438
S	9	167	381	271	29	4	861
SSW	8	157	254	165	33	5	622
SW	9	181	248	162	32	8	640
WSW	10	135	252	152	21	3	573
W	8	120	219	163	22	3	535
WNW	11	165	282	182	14	5	659
NW	19	252	650	454	31	0	1,406
NNW	12	234	681	400	26	1	1,354
Totals	139	2,355	9,535	9,670	1,013	55	22,767
NOTES: Source: Derived from hourly West Palm Beach (Station No. 12844), Florida, SCRAM meteorological data (1987-1991). Number of Occurrences of D Stability = 22,845 hours Number of Calms with D Stability = 78 hours							

Table 2.3-21 Distribution of Hours of Occurrence of Wind Speed and Wind Direction for Stability Class E							
Direction	Speed Categories (mph)						Total Hours
	1-3	4-7	8-12	13-18	19-24	> 24	
N	19	178	84	1	0	0	282
NNE	8	74	57	0	0	0	139
NE	3	98	148	0	0	0	249
ENE	2	126	372	1	0	0	501
E	3	160	464	1	0	0	628
ESE	4	284	553	2	0	0	843
SE	9	365	531	4	0	0	909
SSE	11	222	194	0	0	0	427
S	16	308	192	2	0	0	518
SSW	8	218	94	2	0	0	322
SW	14	245	105	0	0	0	364
WSW	8	264	142	0	0	0	414
W	18	214	115	0	0	0	347
WNW	17	219	134	0	0	0	370
NW	30	410	346	2	0	0	788
NNW	19	402	291	1	0	0	713
Totals	189	3,787	3,822	16	0	0	7,814
NOTES: Source: Derived from hourly West Palm Beach (Station No. 12844), Florida, SCRAM meteorological data (1987-1991). Number of Occurrences of E Stability = 7,951 hours Number of Calms with E Stability = 137 hours							

Table 2.3-22 Distribution of Hours of Occurrence of Wind Speed and Wind Direction for Stability Class F							
Direction	Speed Categories (mph)						Total Hours
	1-3	4-7	8-12	13-18	19-24	> 24	
N	48	154	1	0	0	0	203
NNE	28	63	0	0	0	0	91
NE	16	70	0	0	0	0	86
ENE	17	53	0	0	0	0	70
E	14	108	2	0	0	0	124
ESE	25	184	1	0	0	0	210
SE	53	307	3	0	0	0	363
SSE	57	258	0	0	0	0	315
S	78	293	1	0	0	0	372
SSW	61	277	1	0	0	0	339
SW	102	291	2	0	0	0	395
WSW	124	366	1	0	0	0	491
W	112	268	0	0	0	0	380
WNW	131	260	0	0	0	0	391
NW	152	496	4	1	0	0	653
NNW	142	499	1	0	0	0	642
Totals	1,160	3,947	17	1	0	0	5,125
NOTES: Source: Derived from hourly West Palm Beach (Station No. 12844), Florida, SCRAM meteorological data (1987-1991). Number of Occurrences of F Stability = 5,993 hours Number of Calms with F Stability = 868 hours							

Table 2.3-23 Ambient Air Quality Standards			
Pollutant	Less Than 24 Hour Average	24 Hour Average	Annual Average
Carbon Monoxide ($\mu\text{g}/\text{m}^3$)			
Federal primary and secondary	10,000 (8 hour) ^(a)	--	--
Federal primary and secondary	40,000 (1 hour) ^(a)	--	--
Florida	Same as Federal	--	--
Lead (Pb) ($\mu\text{g}/\text{m}^3$)			
Federal primary and secondary	--	--	1.5 (3 mo) ^(b)
Florida	--	--	1.5 (3 mo) ^(b)
Nitrogen Dioxide ($\mu\text{g}/\text{m}^3$)			
Federal primary and secondary	--	--	100 ^(b)
Florida	--	--	100 ^(b)
Particulate Matter (PM ₁₀) ($\mu\text{g}/\text{m}^3$)			
Federal primary and secondary	--	150 ^(c)	50 ^(b)
Florida	--	150 ^(c)	50 ^(b)
Particulate Matter (PM _{2.5}) ($\mu\text{g}/\text{m}^3$)			
Federal primary and secondary	--	65 ^(d)	15 ^(e)
Ozone ($\mu\text{g}/\text{m}^3$)			
Federal primary and secondary	157 (8-hour) ^(g)	--	--
Federal primary and secondary	235 (1-hour) ^(c,f)	--	--
Florida	235 (1-hour) ^(c)	--	--
Sulfur Dioxide ($\mu\text{g}/\text{m}^3$)			
Federal primary	--	365 ^(a)	80 ^(b)
Federal secondary	1,300 (3-hour) ^(a)	--	--
Florida	1,300 (3-hour) ^(a)	260 ^(a)	60 ^(b)
NOTES: ^(a)Not to be exceeded more than once per year. ^(b)Arithmetic mean. ^(c)Not to be exceeded an average of more than 1 day per year over a 3 year period. ^(d)Not to be exceeded by the 3 year average of the 98th percentile of 24 hour concentrations. ^(e)Not to be exceeded by the 3 year average of the annual arithmetic mean. ^(f)Will not longer apply one year after the effective date of the designation of that area for the 8 hour ozone NAAQS. (Effective date for all Florida counties is June 15, 2004). ^(g)Not to be exceeded by the 3 year average of 4th highest daily maximum 8 hour concentration. $\mu\text{g}/\text{m}^3$ -- micrograms per cubic meter (at 25 EC and 760 mm Hg)			

guidance would generally require the use of the highest or second-highest monitored concentrations to establish conservative background concentrations for the TCEC area. The most recent data (2004 data) along with the maximum recorded value during the period of record from the nearest monitoring location are presented in Table 2.3-24. The 2004 data represents the background air quality levels at the TCEC site, while the maximum recorded values are presented for a historical perspective. Pursuant to a pre-application meeting with FDEP-BAR, site-specific ambient air monitoring and data collection was not required.

2.3.8 Existing Acoustical Environment

In order to characterize the existing acoustical environment surrounding the TCEC site, an ambient sound level survey was conducted. This section describes the results of the survey and the nature of the existing acoustical environment surrounding the site.

2.3.8.1 General Community Noise. The existing acoustical environment around the proposed TCEC site is characterized by mixed use areas and major traffic arterials. The primary sources of noise include traffic on local roadways, Florida Turnpike traffic, and natural sounds. Natural sounds experienced during the survey included insects, birds, and dogs. Secondary noise sources include occasional aircraft, small tractor operation, light residential construction/repair, and residential mechanical equipment (e.g., air conditioning unit).

2.3.8.2 Survey Procedure and Conditions. The ambient sound level survey was conducted between October 28 and 29, 2004 to characterize the existing acoustical environment at nearby noise sensitive receptors. The ambient sound level survey procedure was based on general industry test standards including ANSI S12.9, ANSI S12.18, and ANSI S1.13. In order to effectively quantify and qualify the existing daily sound levels, the ambient survey included both continuous monitoring and short-term measurements.

The sound level survey was conducted at four locations surrounding the project site. These locations were selected to capture acoustical environments representative of the nearby noise-sensitive receptors (i.e., residences). Each measurement location is identified on Figure 2.3-26 and described in Table 2.3-25.

Weather conditions during the October 28 - 29, 2004 survey were favorable for sound level measurements. Temperatures ranged from approximately 75 to 85° F and the relative humidity ranged from approximately 53 to 69 percent. Winds were calm, ranging from 0 to 3 mph, and skies were mostly clear.

Table 2.3-24 Background Ambient Air Quality					
Standard	Background Concentration ^(a) ($\mu\text{g}/\text{m}^3$)			Location	AIRS Site ID
	2004	Maximum	Year		
Carbon Monoxide					
8 hour	1,831	4,806	1995 ^(b)	West Palm Beach	(f)
1 hour	4,806	8,926	1995 ^(b)	West Palm Beach	(f)
Lead					
Calendar quarter	0	0	mult. ^(e)	--	120990018
Nitrogen Dioxide					
Annual	17	19	mult. ^(c)	Ft. Pierce	121111002
PM ₁₀					
Annual	17	21	2001 ^(b)	Ft. Pierce	(g)
24 hour	49	82	1998 ^(b)	Ft. Pierce	(g)
PM _{2.5}					
Annual	9	10	2000 ^(c)	Ft. Pierce	121111002
24 hour	20	31	2001 ^(c)	Ft. Pierce	121111002
Ozone					
8 hour	153	178	2001 ^(d)	Ft. Pierce	121111002
1 hour	165	196	2001 ^(d)	Ft. Pierce	121111002
Sulfur Dioxide					
Annual	3	8	1994 ^(b)	Riviera Beach	120993004
24 hour	3	68	1995 ^(b)	Riviera Beach	120993004
3 hour	5	270	1995 ^(b)	Riviera Beach	120993004
NOTES: ^(a)Source: US EPA AIRS Data. Data is conservative and represents the 1st highest concentration. http://www.epa.gov/air/data/. ^(b)Represents maximum reported values for the period 1994 – 2004. ^(c)Represents maximum reported values for the period 1999 – 2004. ^(d)Represents maximum reported values for the period 1995 – 2004. ^(e)Represents maximum reported values for the period 1994 – 1999. ^(f)The monitor for CO changed locations in 1997 and 2003, site ID (from oldest to most recent) 120991005, 120991006, and 120991008. ^(g)The monitor for PM₁₀ changed locations in 2002, original site had ID 121110012 and new site has ID 121111002.					

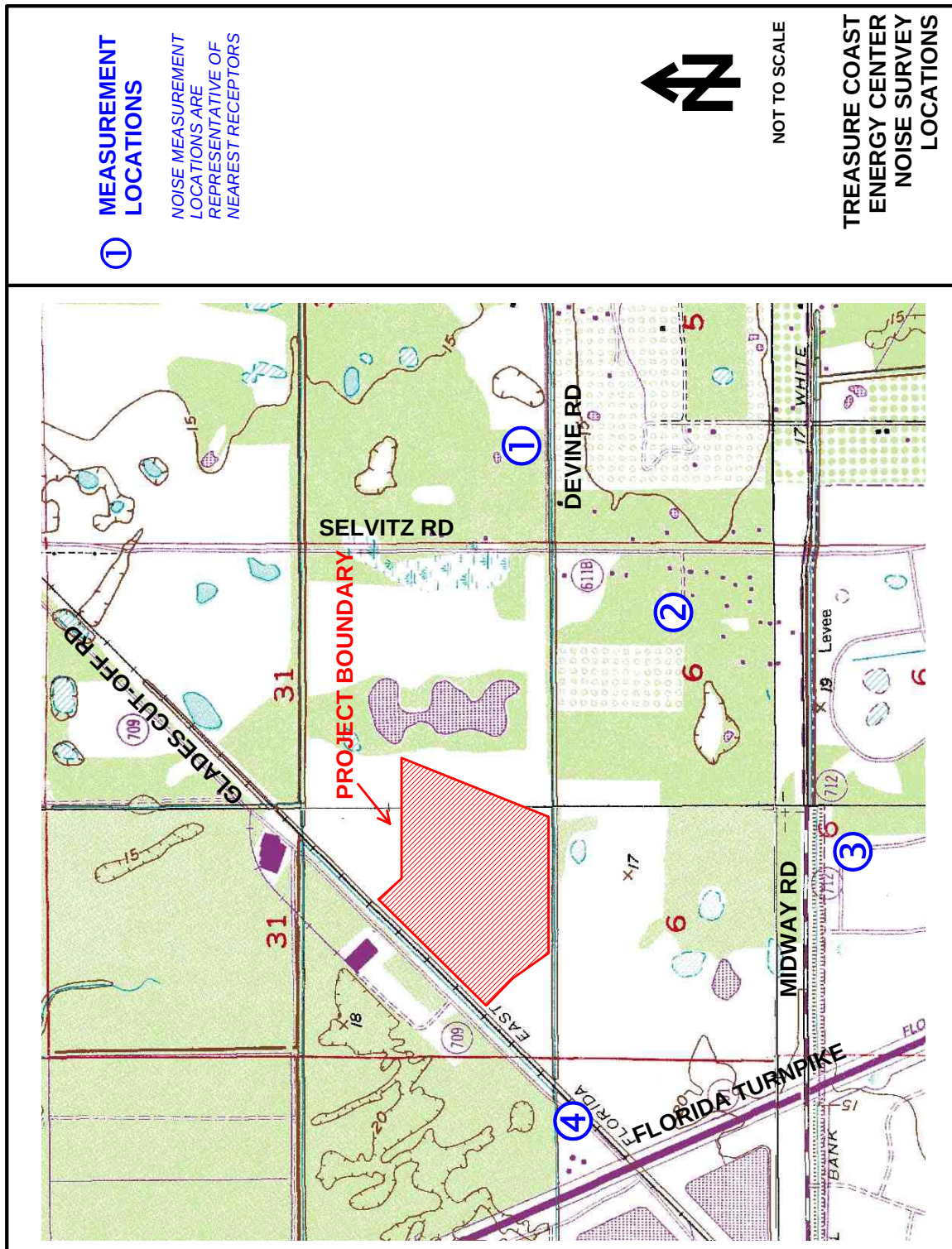


Figure 2.3-26
Noise Survey Locations

Table 2.3-25 Noise Measurement Locations				
Location	Approximate Distance from Proposed TCEC Boundary (feet)	Description	Continuous Monitoring	Short-term Measurements
NML-1	3,200	Nearest resident east of the project site, east of the intersection of Selvitz Road and Devine Road.	Yes	Yes
NML-2	2,500	Nearest resident southeast of the project site, west of the intersection of Selvitz Road and Favorite Road.	Yes	Yes
NML-3	2,950	Nearest resident south of the project site on Omega Road, on the south side of Midway Road.	Yes	Yes
NML-4	1,650	Nearest resident west-southwest of the project site, immediately north of the crossing of Glades Cutoff Road and the Florida Turnpike.	No	Yes
¹ As a conservative measure and in light of a lack of definition within the ordinance, existing ambient sound levels were based on the L ₉₀ statistical parameter. ² Measurements at NML 4 were limited to manned measurements due to limited access (private property) and because the property is bordered by two main arterials (Florida's Turnpike and Glades Cutoff Road). The sound level presented is based on the L ₉₀ statistical parameter measured during the manned measurements.				

All sound level measurements were conducted using either a Type 1 or 2 sound level meter that met the requirements of ANSI S1.4. The sound level meters had integrating capabilities to determine the average and statistical sound levels over the measurement duration. The microphones were equipped with windscreens provided by the manufacturer. The equipment used for the survey is listed in Table 2.3-26.

Table 2.3-26 Noise Survey Test Equipment		
Model	Serial Number	Last Calibration Date
Rion Model NA-27	01191119	10/21/2004
Rion Type UC-53 Microphone	99858	10/21/2004
Norsonic Type 1251 Acoustic Calibrator	25762	10/21/2004
Rion Model NL-22	01110135	10/20/2004
Rion Model NL-22	01110133	10/20/2004
Rion Model NL-22	01110122	10/20/2004
Rion Model NC-73 Acoustic Calibrator	10527795	10/21/2004

2.3.8.3 Continuous Monitoring. Continuous noise monitoring was conducted at residential locations NML-1, NML-2, and NML-3 for 24 hours to capture typical ambient daytime and nighttime sound levels. Several sound level metrics were used to quantify the fluctuating noise levels. The measurements included the L_{eq} , L_1 , L_{10} , L_{50} , and L_{90} sound pressure levels, which provided an indication of the daily trends in the ambient sound level.

The equivalent-continuous sound level, L_{eq} , is the level of a hypothetical steady sound that has the equivalent sound energy as the actual fluctuating sound over a given time duration. For example, $L_{eq}(1h)$ is the equivalent-continuous sound level measured over a 1 hour period and provides an indication of the average sound energy over the 1 hour period.

The exceedance sound level, L_x , is the sound level exceeded “x” percent of the sampling period and is referred to as a statistical sound level. The most common L_x values are L_{90} , L_{50} , and L_{10} . L_{90} is the sound level exceeded 90 percent of the sampling period. L_{90} is often referred to as the background sound level because it measures the residual sound level without the influence of loud, transient noise sources. L_{50} is the sound level exceeded 50 percent of the sampling period or the median sound level. L_{10} is the sound level exceeded 10 percent of the sampling period. L_{10} is often referred to as the intrusive sound level because it measures the occasional louder noises.

The variation between the L_{90} , L_{50} , and L_{10} sound levels can provide an indication of the variability and distribution of the noise environment. If the noise environment were perfectly steady, all values would be identical. A large variation between the values would indicate a large range of sound levels within the environment. For instance, measurements near a roadway with frequent passing vehicles would cause a large variation in the statistical sound levels.

The continuous noise monitoring results are detailed in Table 2.3-27 and Figure 2.3-27, which depict the L_{10} , L_{50} , and L_{90} hourly sound levels during the 24 hour period at each residential location. As previously discussed, the L_{90} sound level is generally considered representative of the residual or background sound level (i.e., absent of discrete noise events such as occasional traffic, aircraft, dogs, etc.), the L_{50} sound level is considered the median sound level, and the L_{10} sound level is generally considered the intrusive sound level (i.e., due to the occasional discrete events such as traffic, aircraft, etc.).

The continuous monitoring results indicated that the quietest times of the day occur during very early morning hours when predominant noise sources are at a minimum (e.g. traffic), as expected. At the three monitoring locations, the average hourly *background* sound levels (L_{90}) ranged from 41 dBA to 46 dBA. Each location was

Table 2.3-27 Continuous (24-hour) Monitoring Results				
Location	Hourly Exceedance Sound Levels, dBA			
		L ₉₀ (Background)	L ₅₀ (Median)	L ₁₀ (Intrusive)
NML-1	Average (Median)	41	44	48
NML-2	Average (Median)	43	46	50
NML-3	Average (Median)	46	50	54

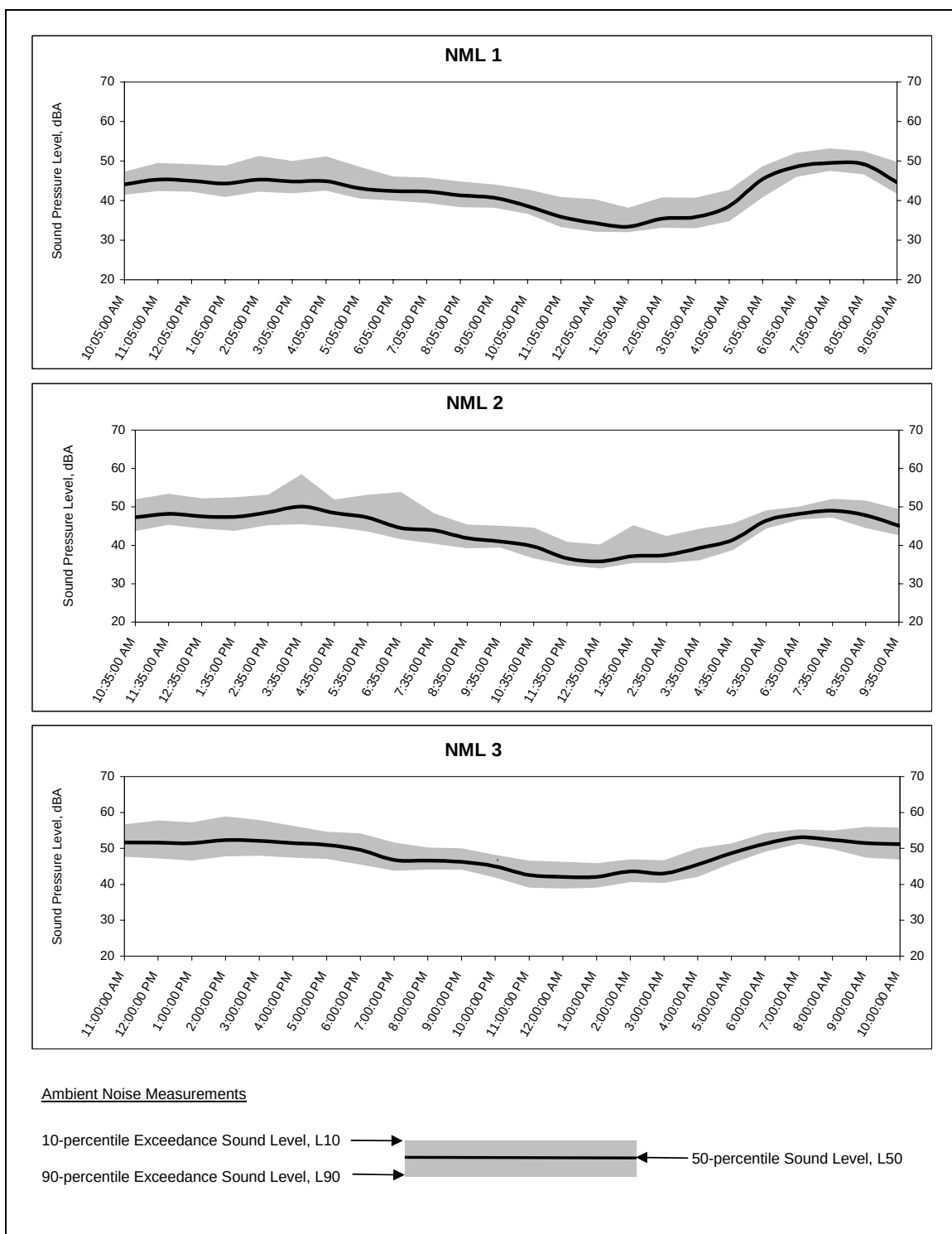


Figure 2.3-27
Results of 24 Hour Continuous Noise Monitoring

primarily influenced by traffic noise and insect noise. As would be expected, sound levels increased during daytime hours and decreased during nighttime hours. In general, the *background* sound levels are consistent with mixed use areas that are located near highways and main arterials.

Location 1 (NML-1) Location 1 is representative of the nearest residential neighbors located approximately 3,200 feet east of the project site boundary in an area east of the intersection of Selvitz Road and Devine Road. The quietest background periods occurred during the early morning hours from about 12:00 AM to 2:00 AM. The acoustical environment at this location is primarily influenced by traffic on Selvitz Road and natural sounds (i.e., insects). It should be noted that Selvitz Road includes heavy commercial truck traffic.

Location 2 (NML-2) Location 2 is representative of the nearest residences located approximately 2,500 feet southeast of the project site boundary. The quietest background periods occurred from about 11:30 PM to 2:30 AM. This location was primarily influenced by noise from traffic along Selvitz Road and natural sounds (i.e., insects, dogs).

Location 3 (NML-3) Location 3 is representative of the nearest residences located approximately 2,950 feet south of the project site along Omega Road, on the south side of Midway Road. The quietest background periods occurred between 11:00 PM and 3:00 AM. This location was primarily influenced by traffic on Midway Road, distant traffic on the Florida Turnpike, and insects.

2.3.8.4 Short-Term Measurements. In addition to the continuous monitoring, manned, short-term noise measurements were conducted at each of the three monitoring locations and one additional location (NML-4) west of the project site. The short-term measurements were conducted to supplement the monitoring results and provide additional information. Specifically, these measurements helped to qualify the surrounding noise sources and provide an indication of the spectral content of the existing acoustical environment. Each measurement period lasted 10 to 20 minutes in order to capture sound levels representative of each location during different time periods throughout the day.

The short-term measurement results for each location are listed in Table 2.3-28 and are detailed on Figures 2.3-28 through 2.3-31. The results listed in Table 2.3-27 are consistent with the continuous monitoring results previously discussed. The figures show the background (L_{90}) octave band sound pressure levels for each location at varying times throughout the day.

Table 2.3-28 Short-Term Measurement Results						
Location	Measured Sound Levels, dBA					
	Time	Duration (min)	L ₉₀	L ₅₀	L ₁₀	Audible Sources
NML-1	9:53 am	20	42	46	49	Traffic, insects, distant tractor, birds.
	1:39 pm	20	40	44	48	Traffic, insects, distant train with whistle.
	12:11 am	20	32	34	42	Traffic, dogs, insects.
NML-2	10:21 am	20	44	47	52	Light residential construction noise, insects, roosters, traffic, small aircraft.
	2:03 pm	20	44	47	53	Light residential construction, traffic, roosters, neighborhood traffic.
	12:36 am	20	36	37	40	Traffic, insects, dogs, mechanical equipment (e.g., residential A/C unit).
NML-3	10:48 am	20	49	53	56	Traffic, neighborhood traffic, insects.
	1:11 pm	20	48	53	57	Traffic, insects.
	1:03 am	20	38	41	47	Traffic, insects.
NML-4	1:30 am	10	45	50	57	Florida Turnpike traffic, local traffic, insects.
	10:20 am	20	50	59	74	Traffic, insects, birds.

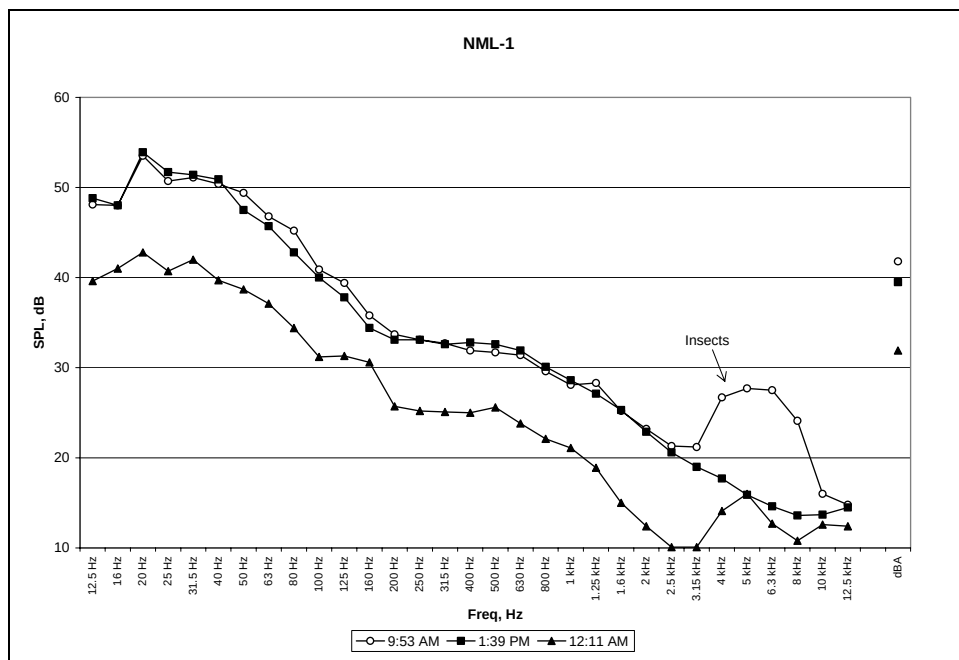


Figure 2.3-28
NML-1: Measured Background One-Third Octave Band Sound Pressure Levels (L_{90})

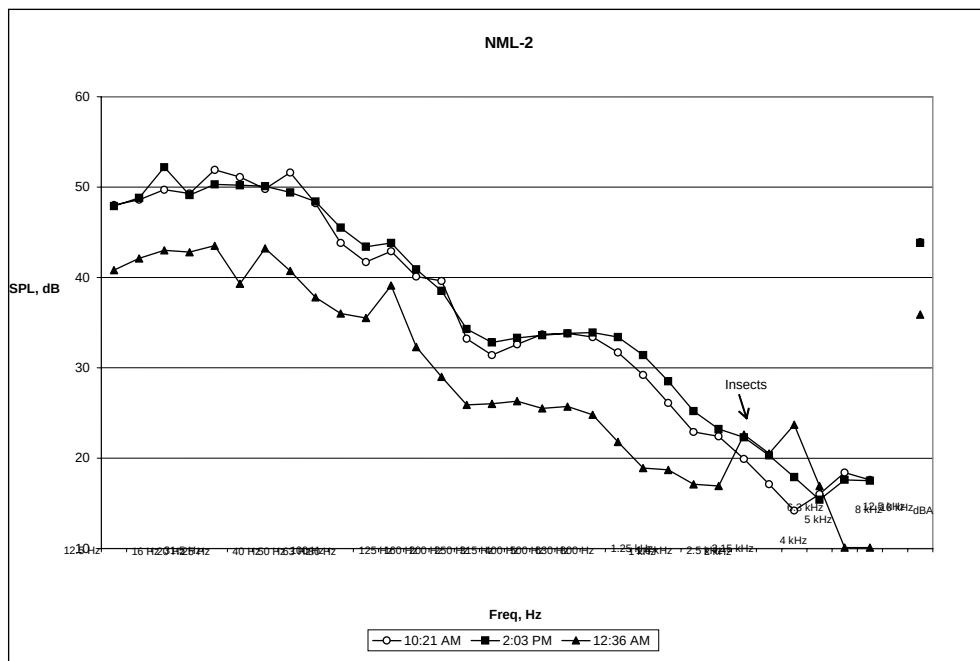
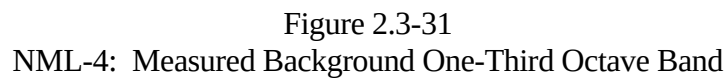
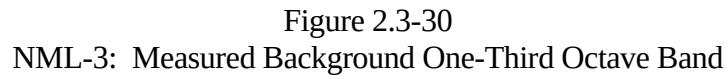


Figure 2.3-29
NML-2: Measured Background One-Third Octave Band Sound Pressure Levels (L_{90})



2.3.9 Other Environmental Features

The previous sections have provided detailed descriptions of the environmental features of the TCEC site and surrounding area. FMPA proposes that there are no other special or significant environmental features exist or in the surrounding area that require additional information.

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3.0 The Plant and Directly Associated Facilities

3.1 General Plant Description

The FMPA TCEC initial installation will be a 1-on-1 F-Class Combined Cycle Unit (Unit 1) with a nominal rating of 300 MW at average temperature conditions. Up to three additional units of similar configuration will be added to the site as a “need” is identified and approved for a total of 1,200 MW.

Unit 1 will be dual fueled with natural gas as the primary fuel and ultra-low sulfur No. 2 fuel oil as an alternate fuel. The combustion turbine generator will have an evaporative cooler to increase warm weather power generation and a steam turbine bypass to the condenser to allow for simple cycle operation. Table 3-1 presents the conceptual site design conditions for the TCEC site.

Table 3-1 Conceptual Design Conditions for the TCEC Site		
Condition	Value or Range	Reference
Maximum Temperature Coincident Relative Humidity	100° F 48.4%	National Climatic Data Center
Minimum Temperature Coincident Relative Humidity	26° F 100%	National Climatic Data Center
Average Temperature Coincident Relative Humidity	73° F 81.5%	National Climatic Data Center
Wind Loading	Basic Wind Speed: 140 mph, Wind-borne Debris Region, Importance Factor (Iw): 1.15, Exposure C	Florida Building Code (FBC) 2001, Section 1606
Seismic Zone	Seismic Use Group/Seismic Design Category III A, Site Classification (stiff soil): D, $S_{ds}=0.089g$, $S_{d1}=0.056g$:	FBC does not consider seismic loads for building codes. Seismic design criteria per ASCE 7-98.
Site Elevation	Average 21.0 feet above MSL	Site Arrangement Drawing
Location	Outdoors, Corrosive Environment	Site Arrangement Drawing

3.1.1 Mode of Operation

For combined cycle operating mode, Unit 1 will be designed and permitted, subject to FDEP PSD permit approval, for unlimited operation on natural gas and 500 hours per year of operation on ultra-low sulfur No. 2 fuel oil, including an unlimited number of starts annually. The new unit will be designed for cycling load operation. The steam turbine generator will be selected in combination with the HRSG to provide a reasonable design throttle pressure to assure satisfactory cycling operation. The HRSG will be designed with duct burners for natural gas firing only. The CTG will have an evaporative cooler to increase warm weather power generation by increasing the CTG inlet air density. Power augmentation systems for the CTG are not included. The CTG will be designed to operate in a pseudo simple cycle mode where the steam from the HRSG bypasses the steam turbine and is dumped to the condenser.

3.1.2 Combustion Turbine Generator

A number of manufacturers produce F-class combustion turbines. For purposes of this SCA, it is assumed that the combustion turbine generator (CTG) will be a General Electric PG7241FA enhanced combustion turbine with modulating inlet guide vanes for an outdoor installation; however, several manufacturers provide similar combustion turbines and the actual combustion turbine will be selected through a competitive bid process. The actual F-class combustion turbine will be selected by competitive bidding. The use of the General Electric combustion turbine for output and performance assumptions is not intended to represent any preference of combustion turbine manufacturer by FMPA. The CTG will have enclosures for installation outdoors and will include the following major features:

- Dual fuel firing system using natural gas or ultra-low sulfur No. 2 fuel oil.
- Dry low NO_x combustion system.
- Direct connected generator with static excitation.
- Acoustic enclosure for turbine.
- Self cleaning inlet air filter system with silencers and evaporative coolers.
- Lube oil systems.
- Static starting system.
- Water injection system for NO_x reduction when firing fuel oil.
- Fire detection/carbon dioxide fire protection systems.
- Mark VI control system with remote work station.
- Off-line/on-line water wash system.
- Package electrical and electronics control compartment.

3.1.3 Heat Recovery Steam Generator (HRSG)

The HRSG will be installed outdoors and will convert waste heat from the combustion turbine exhaust to steam for use in driving the steam turbine generator. The HRSG is expected to be a natural circulation, three pressure, reheat unit with supplemental duct firing by natural gas only to maximize unit output. Cycle operating pressure will be a nominal 1,800 psig. Selective catalytic reduction for NO_x control is included within the HRSG. The HRSG will discharge to a metal exhaust stack. A stack damper will be included to minimize heat loss during shutdowns. Two 100 percent capacity condensate pumps and boiler feedwater pumps will be included. The design includes natural gas heating, utilizing HRSG intermediate pressure feedwater as the heating source during normal operation and an electric heater for startup.

3.1.4 Steam Turbine Generator

The steam turbine will be a tandem-compound single reheat condensing turbine operating at 3,600 rpm. The steam turbine will have one high-pressure section with a nominal 1,800 psig throttle pressure, one intermediate-pressure section, and one low-pressure section. Turbine suppliers' standard auxiliary equipment, lubricating oil system, hydraulic oil system, and supervisory, monitoring and control systems will be utilized. A surface condenser will be provided for condensing steam from the turbine exhaust and will utilize a recirculating cooling tower system for cooling. The condenser will be designed for full steam flow bypass around the steam turbine. A blanking plate will be provided to allow isolation of the steam turbine from the condenser to allow operation of the combustion turbine during an extended steam turbine outage. A single synchronous generator will be direct coupled to the steam turbine. Generator suppliers' standard auxiliary equipment, supervisory, monitoring, and control systems, and static excitation system will be utilized. The steam turbine will be provided with enclosures as required for outdoor installation.

A 5,000 pound per hour natural gas fired auxiliary boiler will provide steam for the STG steam seal system during startups. The boiler will not have post combustion emission controls (SCR and CO catalyst).

3.1.5 Cooling Tower

A multiple cell, mechanical draft, counterflow cooling tower will be used for plant cooling. The cooling tower will be of fiberglass construction and installed on a reinforced concrete basin which will include a pump intake structure housing two 50 percent capacity circulating water pumps and one 100 percent capacity auxiliary cooling water pump. Circulating water chemical feed system will be included. Makeup water to the cooling tower will be highly disinfected treated sewage plant effluent

(reclaimed water). Provisions will be included to utilize groundwater as emergency sources of cooling tower makeup. The cooling tower will be equipped with drift eliminators with a design drift rate of 0.0005 percent.

3.1.6 Control System

The unit will be designed for control through a plant distributed control and information system (DCIS). A Mark VI control system for control of the turbine will also be included. The DCIS control CRTs will be located in the main plant control room that will be in a new onsite administration/control building.

3.1.7 Transmission Interconnection

Unit 1 will be interconnected to the FPL 230 kV transmission system. The combustion turbine generator and steam turbine generator will each connect to separate 18 kV/230 kV generator step-up transformers. The combustion turbine generator and the steam turbine generator will each have generator breakers. Auxiliary power will be provided by auxiliary transformers connected to each unit's 18 kV power. A new 230 kV breaker and one half switching station will be constructed to interconnect the combustion turbine and steam turbine to the transmission system.

3.2 Site Layout

The Ultimate Site Arrangement depicts the proposed layout of Unit 1 and the future Units 2, 3, and 4 for the Energy Center (Figure 2.1-9). The profile, shown on Figure 3.2-1, is based on preliminary elevations and dimensions and may change during detailed design and equipment selection. Figures 3.2-2 and 3.2-3 present computer generated renderings of the TCEC one unit facility and four unit facility. Figure 3.2-4 depicts the proposed locations and elevations for the gaseous and liquid release points.

The site is a new greenfield site, and will have the capability for the future installation of combined cycle and simple-cycle units. The ultimate site arrangement shows the site with the installation of three future similar-sized combined cycle units for an ultimate certification capacity of approximately 1,200 MW.

FMPA proposes to clear and develop the entire 68 acre site, including the stormwater detention basin, for ultimate build out of four 1-on-1 units during the construction for Unit 1.

Figure 3.2-1
Profile



Figure 3.2-2
Computer Generated Rendering of the TCEC One Unit Facility



Figure 3.2-3
Computer Generated Rendering of the TCEC Four Unit Facility

Figure 3.2-4
Release Points

3.3 Fuel

3.3.1 Fuel Types and Qualities

The primary fuel for Unit 1 will be natural gas from an existing Florida Gas Transmission Company (FGT) pipeline. Table 3.3-1 presents typical properties for the primary fuel.

Table 3.3-1 Natural Gas Properties	
Parameter	Mole, %
C 6 +	0.054
Propane	0.506
I-Butane	0.110
N-Butane	0.100
I-Pentane	0.036
N-Pentane	0.022
Nitrogen	0.356
Methane	95.513
CO ₂	0.853
Ethane	2.450
Totals	100.0
Note: Heating Value, Btu/cubic foot (HHV) is 1,037.	

The backup fuel will be ultra-low sulfur (0.0015 percent) No. 2 fuel oil. Approximately 1 million gallons will be stored onsite. Operation on oil is limited to an equivalent of 500 hours at full load operation per year per unit. Table 3.3-2 presents typical properties for the backup fuel.

Table 3.3-2 Ultra-Low Sulfur No. 2 Fuel Oil Properties	
Parameter	Value
Sulfur Content, wt, %	0.0015
Density, kg/L at 15° C	0.8469
Gravity, API at 60° F	35.5
Gross Heat Value, Btu/gal	140,068
Sodium, ppm	0.51
Vanadium, ppm	<0.10
Lead, ppm	<0.10

3.3.2 Fuel Quantities

Hourly fuel consumption rates will depend on plant load, ambient conditions, and whether supplemental firing is being used. Table 3.3-3 provides indicative estimates of average fuel consumption rates.

Table 3.3-3 Indicative Hourly Fuel Consumption Rates	
Description of Operating Mode	MMBtu/h
Average ambient, natural gas fuel, supplemental firing off, full load.	1,722.5
Average ambient, natural gas fuel, supplemental firing on, full load.	2,267.90
Minimum ambient, fuel oil fuel, supplemental firing off, full load.	2,044.4

3.3.3 Fuel Transportation, Delivery, and Metering

Natural gas will be delivered to the site by new and existing pipelines from FGT and will be regulated, metered, and conditioned onsite. Existing FGT pipelines are located approximately 3,700 feet from the site. The existing gas mains parallel the Florida Turnpike. The lateral to the site will be sized for ultimate site capacity. Details of this pipeline will be determined during detailed design. Carbon steel pipe with cathodic protection will be installed underground from the gas main to the site. A new meter run and natural gas conditioning equipment is included onsite. The natural gas conditioning equipment includes a fuel gas scrubber, two coalescing gas filters, and a performance fuel gas heater. Further detail provided in Section 6.2 of this SCA.

A complete fuel oil unloading, storage, and supply system will be installed. A foam fire suppression system for the tank will be included. Fuel oil delivery will be by

truck. A truck unloading system will be installed including truck connections. The fuel oil unloading station will be designed for spill containment and double-walled piping will be used for any underground piping running from the unloading station to the tank, from the tank to the forwarding station and from the forwarding station to the combustion turbine. A new fuel oil forwarding skid is included to transfer fuel oil from the storage tank to the combustion turbine generator. Two 100 percent capacity electric motor driven pumps will be included and the skid will be installed outdoors on a concrete pad near the new fuel oil storage tank. All fuel oil piping will be installed above grade on beams to hold them at the correct elevation. The locations of the tank, unloading station, and forwarding station are shown on the site arrangement drawing.

An approximately 1 million gallon aboveground storage tank will be installed which will provide approximately 3 days of full load operation for Unit 1. The tank will be a single wall tank fabricated from carbon steel and will be installed inside a dike containment area. The fuel oil storage tank will be installed within an earthen berm to provide containment. The containment area will be large enough for both Unit 1 and Unit 2 fuel oil storage tanks and will be provided with a synthetic liner sufficiently impermeable to ensure no oil can escape by infiltrating through the liner and soil into surface or groundwaters. The berm area will be designed to provide containment for both 110 percent of the storage capacity of the largest tank within the berm and a sufficient allowance for the design (10 year, 24 hour) rainfall event. Future units will be similar to Unit 1 and will also require similar fuel oil quantities.

3.3.4 Alternate Fuel Types

FMPA has determined that combustion turbines firing primarily natural gas will be the most efficient technology for power generation at the Treasure Coast Energy Center. Natural gas does not require delivery vehicles, storage facilities, secondary containment structures, or large dedicated acreages. Natural gas is also the cleanest burning fossil fuel available and its use results in minimal air quality impacts. Incremental additions of natural gas fired combustion turbine capacity are also more flexible than additions of oil or coal fired capacity. The plant site is not suitable to accommodate coal fired generating units with coal storage and handling systems.

Liquefied natural gas (LNG) is essentially no different from natural gas except that it has been refrigerated to minus 259° F. At this temperature, natural gas becomes a clear, colorless, and odorless liquid. LNG occupies only a fraction of its gaseous volume and can be transported economically between regions in special tankers. As such, FMPA will consider liquefied natural gas (LNG) as an alternate fuel supply for Unit 1 and future units. At this time, LNG is not available in the region; however, FMPA proposes that

LNG will be one of the approved fuels for the TCEC. Delivery of LNG would be through the FGT system and connection to the site.

3.4 Air Emissions and Control

Unit 1 will be considered a major source by the DEP. Subject to regulatory approval, emission control for NO_x will be by use of combustion turbine dry low NO_x burners and SCR when firing natural gas or water injection and SCR when firing ultra-low sulfur (ULS) No. 2 fuel oil. Control of other pollutants will be by good combustion control and use of natural gas and ULS No. 2 fuel oil. The anticipated air emissions and proposed control technologies are fully described and presented in Volume 3 - PSD Application which is attached to this SCA under separate cover.

3.4.1 Air Emissions Types and Sources

Air pollutants will be emitted from the CT/HRSG when firing natural gas and ULS No. 2 fuel oil. Air emissions result from either the combustion process or impurities in the fuel. Fuel combustion generally results in the emissions of nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO₂), volatile organic compounds (VOC), particulate matter (PM/PM₁₀), sulfuric acid mist (SAM), and small amounts of hazardous air pollutants (HAPs). During combustion, two primary types of NO_x emissions are formed: fuel NO_x and thermal NO_x. Fuel NO_x emissions are formed through the oxidation of a portion of the nitrogen contained in the fuel. Thermal NO_x emissions are generated through the oxidation of a portion of the nitrogen contained in the combustion air. SO₂ and SAM emissions result from conversion of sulfur in the fuel and are minimized by the very low sulfur content in the fuels proposed for the Project.

Maximum potential annual emissions are based on emissions expected for baseload operation at the average annual site temperature of 73° F. The maximum annual emissions are based on the ability to fire either natural gas or No. 2 fuel oil in the combustion turbine, with unlimited operation with natural gas firing and up to 500 hours per year of ULS fuel oil firing. The maximum annual emissions include emissions from firing natural gas in the HRSG duct burner. For each pollutant the worst case operation relative to annual emissions of that pollutant was used to determine the annual emissions rate for that pollutant. Volume 3, the PSD Application, presents the basis for the emission rates and maximum annual emissions.

Particulate emissions from the mechanical draft cooling tower result from dissolved solids contained in water drift from the cooling tower. High efficiency mist eliminators will be used to minimize PM/PM₁₀ emissions from the mechanical draft cooling tower.

Table 3.4-1 presents the annual potential emissions for the Project compared to the PSD significant emission rates, which are thresholds for PSD review. If a project located at a proposed new source has emissions of at least one PSD pollutant that are great enough to cause the new source to be classified as a major source for PSD, then PSD review is required for any pollutant with emissions that are greater than the listed PSD significant emission rate for that pollutant. PSD review requires a determination of best available control technology (BACT) and an ambient air quality impact analysis (AAQIA).

3.4.2 Air Emission Controls

The use of clean fuel; i.e., natural gas and No. 2 fuel oil, and combustion controls will minimize air emissions and ensure compliance with applicable emission-limiting standards. Using clean fuels will minimize emissions of SO₂, PM/PM₁₀, and other fuel-bound contaminants. Combustion controls will minimize the formation of NO_x and the formation of CO and VOCs by combustor design. Further NO_x reduction will be achieved by use of a selective catalytic reduction (SCR) system. The combination of these techniques are proposed for Unit 1 and have been determined to represent BACT based on an evaluation of economic, energy, and environmental impacts. The following subsection summarizes of the Air Pollution Control Technology and BACT analysis, which is presented in the PSD permit application located in Volume 3.

3.4.3 Best Available Control Technology (BACT) Summary

BACT review is required under FDEP and EPA regulations pertaining to PSD. BACT is applicable to all pollutants for which PSD review is required and is pollutant specific. It is an emission limitation that is based on the maximum degree of reduction for each regulated pollutant, which is determined to be appropriate after taking into account energy, environmental, economic impacts, and other costs. BACT cannot be any less stringent than the federal New Source Performance Standards (NSPS) applicable to the source under evaluation. For the Unit 1, BACT is applicable for emissions of PM, PM₁₀, SO₂, NO_x, CO, and sulfuric acid mist (SAM).

3.4.3.1 Nitrogen Oxides. Dry low-NO_x combustor technology has been offered and installed by CT manufacturers to reduce NO_x emissions by inhibiting thermal NO_x formation through premixing fuel and air prior to combustion and providing pre-mix

Table 3.4-1
PSD Applicability

Pollutant	Project PTE ^a (tpy)	PSD Significant Emission Rate (tpy)	PSD Review Required
NO _x	90.0 ^(b)	40	Yes
SO ₂	56.6 ^(c)	40	Yes
CO	231.0 ^(b)	100	Yes
PM	176.1 ^(b, d, e)	25	Yes
PM ₁₀	171.4 ^(b, d, e)	15	Yes
VOC	23.4 ^(b, f)	40	No
Sulfuric Acid Mist	22.4 ^(c, g)	7	Yes
Total Reduced Sulfur	negl.	10	No
Hydrogen Sulfide	negl.	10	No
Vinyl Chloride	negl.	1	No
Total Fluorides	negl.	3	No
Mercury	0.001 ^(b, h)	0.1	No
Lead	0.007 ^(b, h)	0.6	No

^aRegardless of operating mode, emissions are based on operation of the combustion turbine at 100 percent load and at an average ambient temperature of 73° F and includes emissions from the duct burner. Includes emissions from the auxiliary boiler, the diesel engine fire pump, and the safe shutdown diesel engine generator.

^bBased on firing ULS fuel oil for 500 hours per year in the combustion turbine and firing natural gas for the remainder of the year.

^cBased on firing natural gas in the combustion turbine for the entire year. Based on a natural gas sulfur content of 2 grains/100 scf.

^dIncludes the effects of SO₂ oxidation and formation of ammonium sulfates.

^eIncludes front and back half PM/PM₁₀ emissions from Unit 1. Includes emissions from the cooling tower.

^fVOC PTE is based on potential emissions from the Unit 1 combustion sources and emissions from the fuel oil storage tank.

^gIncludes the effects of SO₂ oxidation and assumes 100 percent conversion of SO₃ to sulfuric acid mist (H₂SO₄).

^hBased on AP-42 emission factors.

Note: PTE calculations are provided in a spreadsheet included in Appendix A of Volume 3.

combustion to reduce flame temperatures. The GE PG7241FA DLN combustion turbine produces NO_x emissions of 9 parts per million by volume dry (ppmvd) corrected to 15 percent O₂ for new CTs firing natural gas and 42 ppmvd at 15 percent O₂ with water injection for No. 2 fuel oil firing.

NO_x emissions from Unit 1 will be controlled using state-of-the-art dry low-NO_x combustors in the CTs when firing natural gas and water injection when firing ULS fuel oil. To further reduce emissions of NO_x when firing either natural gas or No. 2 fuel oil, a SCR system will be installed within the HRSG. The SCR system is designed for reduction of flue gas NO_x emissions to 2.0 ppmvd at 15 percent O₂ when firing natural gas and 8 ppmvd at 15 percent O₂ when firing fuel oil.

Ammonia will be required for use in the SCR. Vaporized ammonia is injected into the combustion turbine exhaust gases prior to passage through the catalyst bed, which is installed in the HRSG. The onsite ammonia system will include unloading facilities, ammonia storage tank, forwarding system, and vaporizing facilities. Aqueous ammonia will be used, and delivered to site by tanker trucks which include integral unloading pumps. The aqueous ammonia will be stored as a liquid in a nominal 20,000-gallon tank large enough for two full tanker truck deliveries. The liquid ammonia will be forwarded to the HRSG, vaporized, and injected upstream of the catalyst.

3.4.3.2 Carbon Monoxide. The CT will utilize advanced combustion technology, and good combustion control to minimize CO emissions. Proposed CO emission rates are consistent with those established as BACT.

3.4.3.3 Sulfur Oxides (SO₂ and H₂SO₄ Mist). The only reasonable SO₂ and SAM control method for combined cycle facilities is the use of clean fuels, i.e., natural gas and No. 2 fuel oil. The No. 2 fuel oil proposed for the Project will be limited to 0.0015 percent sulfur.

3.4.3.4 Particulate Matter and Other Regulated Pollutants. Clean-burning fuels having low PM and trace contaminant contents are being proposed as BACT for Unit 1. PM emissions will be emitted from the mechanical draft cooling tower in the form of drift. Cooling tower drift will be controlled through the use of high efficiency mist eliminators designed to limit drift to 0.0005 percent of the circulating water flow rate of the cooling tower.

3.4.4 Design Data for Control Equipment

Design data for the air pollution control equipment is presented in Volume 3 (PSD Application). Emissions of other pollutants from Unit 1 are expected to be minimal and require no additional control technology. Therefore, analysis of alternative emission controls for these other pollutants is not necessary.

3.4.5 Design Philosophy

Unit 1 minimizes air pollutant emissions by using the most efficient and pollutant-preventing generating technology. This concept has been incorporated with the selection of a combined cycle process utilizing advanced CTs. Combined cycle plants can be expected to achieve fuel conversion rates on the order of 7,000 Btu/kilowatt hours (kWh), as opposed to values in the 9,000 to 10,000 Btu/kWh range for more conventional generating plants. This is an improvement of about 30 percent. Thus, by maximizing the megawatt output per unit of fuel consumed, the air pollutant emissions per megawatt output are minimized. Pollution prevention is incorporated in the design by the use of clean fuels, efficient combustion technology, and post-combustion control. Natural gas and ultra-low sulfur No. 2 fuel oil will be used at the facility. Moreover, advanced dry low-NO_x combustion technology will minimize NO_x emissions during the combustion process while ensuring that CO and VOC emissions are within accepted limits. SCR will be installed post-combustion to further reduce NO_x emissions when operating in combined cycle mode. Taken together, these design features will make Unit 1 one of the most efficient and least polluting power plants in the state of Florida.

3.5 Plant Water Use

In an effort to use Florida's water resources efficiently and minimize the quantity of groundwater withdrawals requested for the TCEC, FMPA proposes to use water from several sources. Highly disinfected treated sewage effluent (reclaimed water) will be used as the primary source for cooling tower makeup water, the largest single use of water for facility operations. FMPA and FPUA are developing an agreement for the delivery, use, and return of this reclaimed water. Potable water will be supplied from an extension of a nearby existing FPUA municipal water main. Service and fire protection water are proposed as withdrawals from the Upper Floridan Aquifer.

Highly disinfected treated sewage effluent (reclaimed water) will be used for cooling tower makeup water. The reclaimed water will be provided by the FPUA wastewater treatment plant proposed to be located north and adjacent to the TCEC site and on-line in late 2009. The reclaimed water supply pipeline will be located on both the TCEC project site and the property for the new FPUA wastewater treatment plant site.

The reclaimed water supply line will be 12 inches in diameter with 50 psi pressure and will be constructed up to the northern property boundary of the TCEC site. FPUA will construct the reclaimed water supply line on their property and bring the connection to the TCEC property boundary.

It will be necessary to utilize groundwater until the FPUA WWTP is online and to supply the plant. Groundwater is also requested for use when the WWTP is offline and

unable to supply treated effluent in the future. Although this latter scenario is highly unlikely, the groundwater withdrawals from the TCEC will be used efficiently.

Three new onsite wells will supply fire water, service water, supply water to the steam cycle and makeup treatment (demineralizer) system, evaporative cooling makeup, and temporary and later, emergency water supply for cooling tower makeup. Three 1,500 to 2,000 gpm well pumps are planned for Unit 1. The wells will be sized so that two of the wells will be able to provide the required water flow at full load conditions, with the third well as a backup. Process water demand for Unit 1, excluding cooling tower makeup, will be approximately 154,000 gpd when firing natural gas and 597,000 gpd when firing fuel oil. Process water demand for ultimate site development, excluding cooling tower makeup, will be approximately 614,000 gpd when firing natural gas and 2,389,000 gpd when firing fuel oil.

Maximum water demand for Unit 1 cooling tower makeup will be approximately 2,908,000 gpd. Highly disinfected reclaimed water from FPUA will be used to supply cooling tower makeup for the TCEC Unit 1. Estimated water quality of the treated effluent is provided in Table 3.5-1. The treated effluent will meet all of the requirements of Chapter 62.610, Part III, F.A.C. Floridan Aquifer groundwater is requested as a source of temporary cooling tower makeup in the interim between Unit 1 operation and operation of the FPUA WWTP. In addition, after the reclaimed water supply line from the new WWTP goes into service, groundwater is also requested to serve as a backup makeup water source for up to 30 days per year if there are disruptions in the water supply from the sewage treatment plant, such as water quality upsets or outages in the transfer pump and piping system.

Table 3.5-1 Typical Water Quality Reclaimed Water, Well Water and Potable Water Supplies			
Constituent	Reclaimed Water*	Well Water**	Potable Water***
Calcium, mg/L as CaCO ₃	73	130	100
Magnesium, mg/L as CaCO ₃	32	189	18
Sodium, mg/L as CaCO ₃	260	417	130
Potassium, mg/L as CaCO ₃	--	13	--
Alkalinity, mg/L as CaCO ₃	80	160	28
Sulfate, mg/L as CaCO ₃	62	156	62
Chloride, mg/L as CaCO ₃	212	465	113
Silica, mg/L as SiO ₂	12	20	8
Total dissolved solids, mg/L	480	1,000	330
* Ft. Pierce Wastewater Plant effluent, based on information supplied by FPUA ** Based on data from existing Floridan Aquifer well, WMD Site ID SLF-0021, 3-20-96 *** Ft. Pierce Municipal System, based on information supplied by FPUA			

For ultimate site development, maximum cooling tower makeup demand will be approximately 11.6 mgd. Assuming a moderate rate of population growth, FPUA has estimated treated wastewater flows of 9.8 mgd and 12.1 mgd will be available in 2014 and 2024, respectively. Therefore, adequate reclaimed water supplies should be available for the cooling water needs associated with ultimate site development.

In addition to the reclaimed water and well water sources, a tie-in will be made to a 12 inch main from the FPUA municipal potable water system near the TCEC site. The potable water supply for the TCEC will be obtained from this source. The municipal potable water system will also be used as a short-term emergency supply to the service water/fire water system, cooling water system, and cooling water makeup system.

For Unit 1, water mass balance diagrams depicting the natural gas case and fuel oil case that results in maximum water consumption are shown on Figures 3.5-1 and 3.5-2, respectively. Figure 3.5-3 shows annual average expected water use assuming a 90 percent capacity factor and 500 hours of operation on fuel oil per year. Figures 3.5-4, 3.5-5, and 3.5-6 are included to show the maximum on gas fuel, maximum on fuel oil and annual average water balances assuming use of well water as cooling tower makeup.

For ultimate site development of four units, Figures 3.5-7 and 3.5-8 show the maximum case water mass balances for natural gas firing and fuel oil firing. Figure 3.5-9 shows average expected water use for four units assuming a 90 percent capacity factor.

The water mass balances represent operation at 100 percent load conditions. Actual average annual flows will be less, dependent upon the electrical loading of the generators.

3.5.1 Heat Dissipation System (Cooling Towers)

Waste heat from the steam turbine condenser and auxiliary cooling system will be rejected to the atmosphere by a cooling cycle using linear mechanical draft cooling towers. The primary source of cooling water makeup will be reclaimed water from the FPUA WWTP. Initially, well water from the Floridan Aquifer will be required to be used for cooling tower makeup until completion of the new FPUA WWTP adjacent to the TCEC site. The estimated maximum cooling water makeup to Unit 1 is 2,908,000 gallons per day. Internal reuse of approximately 50,000 gallons per day of quenched blowdown water from the HRSGs will supplement the makeup supply.

Cooling tower blowdown will be conveyed to the FPUA WWTP Class I injection wells for disposal. The maximum wastewater return to the FPUA system from Unit 1 is estimated to be 889,000 gpd.

3.5.1.1 Dilution System. The TCEC Unit 1 project does not propose the use of a cooling water stream dilution system.

Figure 3.5-1
Water Mass Balance

Figure 3.5-2
Water Mass Balance

Figure 3.5-3
Water Mass Balance

Figure 3.5-4
Water Mass Balance

Figure 3.5-5
Water Mass Balance

Figure 3.5-6
Water Mass Balance

Figure 3.5-7
Water Mass Balance

Figure 3.5-8
Water Mass Balance

Figure 3.5-9
Water Mass Balance

3.5.1.2 Blowdown, Screened Organisms, and Trash Disposal. Cooling tower blowdown will be returned to the FPUA WWTP for disposal. No biological organisms or trash will be present in the blowdown.

3.5.1.3 Injection Wells. The TCEC Unit 1 project will not install any injection wells.

3.5.2 Domestic/Sanitary Wastewater

Domestic/sanitary wastewater is generated by showers, lavatories, sinks, toilets, urinals, and drinking fountains. It is estimated that there will be 16 permanent Unit 1 employees at the site who will generate approximately 1,000 gpd of sanitary wastewater. Sanitary wastes will be routed to the FPUA sanitary force main on the TCEC site. For ultimate site development, it is estimated that there will be 30 permanent employees who will generate approximately 2,000 gallons per day of sanitary wastewater.

3.5.3 Potable Water System

Potable water uses will include showers, lavatories, sinks, toilets, urinals, and drinking fountains. One new potable water supply pipeline will be interconnected with an existing FPUA potable water main. The existing 12 inch potable water main is located 850 feet south of the TCEC site. It is anticipated that the TCEC interconnection with the existing FPUA potable main will be at a location south of the TCEC property boundary and North St. Lucie River Water Control District (NSLRWCD) Canal No. 102.

The potable water pipeline construction will likely be within a 100 foot wide corridor that follows the existing FPUA wastewater pipeline. The proposed corridor will require the potable water supply interconnection to be constructed either aerial or under the NSLRWCD Canal No. 102, which is located parallel, adjacent to the potable water main in this area. FPUA will construct the potable water supply pipeline up to the TCEC property boundary, at which point FMPA will be responsible for extending the potable water supply pipeline to the necessary facilities. The pipeline must also cross the FPL transmission corridor. Onsite facilities will be in accordance with Chapter 62.555, F.A.C. The estimated potable water chemical analysis is indicated in Table 3.5-1.

3.5.4 Process Water Systems

Service/process water will be obtained from the service/fire water tank for use for washdown purposes, for pump and equipment seal water and flushing, evaporator cooler makeup, and cycle makeup treatment system water supply. The estimated well water analysis is also included in Table 3.5-1. The major systems are indicated on the water mass balances.

Demineralized water will be required for use as makeup to the steam-condensate-feedwater cycle associated with the HRSGs. The makeup is required to replace cycle

losses and boiler blowdown. In addition, demineralized water will be used when firing fuel oil to control combustion turbine NO_x emissions. Demineralized water will be supplied by treating service water by a process that includes filtration, reverse osmosis, and a “continuous electrodialysis” demineralization system. Wastewater will consist of filter backwash and a “reject” stream from the reverse osmosis process.

Fire water will be obtained from well water, with backup supply from the 12 inch main from the Ft. Pierce municipal potable water supply adjacent to the TCEC site. There will be two 400,000 fire/water storage tanks, with 340,000 gallons dedicated to firewater. Fire water pumps will provide water by means of an underground piping loop which serves fire hydrants, hose racks and reels, and automatic suppression systems.

3.5.5 Water Use Variations

All water requirements described in the preceding sections are based on operation of the facility at 100 percent load. When the units operate at less than 100 percent load, the evaporation rate from the cooling towers, and consequently the cooling tower makeup and blowdown rates, will vary proportionately. There are also smaller variations in cooling tower evaporation resulting from ambient conditions such as temperature and humidity. Cooling tower makeup (reclaimed water) is the major water use.

Demineralized water used as makeup to the steam cycle also generally varies proportionately to unit loading, while demineralized water used for NO_x control is dependant upon the fuel used. Evaporative cooler operation is dependent upon the ambient temperature and humidity conditions as well as unit load. The balance of water uses will be basically independent of the operating load.

In the event of temporary unit shutdown, no main cooling tower or steam cycle makeup will be required, but other systems may continue to operate.

3.6 Chemical and Biocide Waste

The TCEC startup and operations will require the use of different chemical and biocides. Chemicals are used in the steam cycle water treatment, the cycle makeup water treatment, and as cleaning agents. Biocides are used in the cooling tower to prevent bacterial growth. Chemicals or biocides will be present in the sanitary wastewater, the oil/water separator effluent, evaporative cooler blowdown, the reverse osmosis reject, and the cooling tower blowdown. These waste streams are shown on the water mass balances

3.6.1 Cooling Tower Blowdown

The cooling tower blowdown will be transferred via a separate pipeline to the FPUA WWTP. Chemicals used in cooling tower water treatment will include sulfuric acid for pH adjustment, a biocide control, and a commercial scale inhibitor.

3.6.2 Sanitary Wastes

Sanitary wastes will be collected in a separate wastewater piping system and routed to the FPUA municipal wastewater force main that is located on the TCEC site.

3.6.3 Steam Cycle Water Treatment

The steam cycle water will be treated with an oxygen scavenger for dissolved oxygen control and with an amine, such as ammonia solution, for pH control. The oxygen scavenger will break down to ammonia at the system operating temperature. A phosphate solution will be fed to control scaling, corrosion, and boiling water pH in the steam generators. The phosphate will react with any calcium hardness in the steam generators to form a non-adherent precipitate.

Boiler blowdown will be relatively high purity water with small amounts of suspended solids and phosphate. Boiler blowdown will be routed to a sump, where it will be quenched using cooling tower water, and then routed to the cooling tower basin for reuse.

3.6.4 Cycle Makeup Water Treatment

Makeup water to the steam cycle will be demineralized using a process that includes filtration, RO, electrodialysis, and polishing ion exchange. Wastewater will include filter backwash and RO reject wastewater, which will be routed to the plant wastewater sump for disposal to the FPUA WWTP. The polishing ion exchange demineralizer will be a mixed bed type. Since the polisher is lightly loaded, it will be portable and replaced as necessary using a commercial service.

3.6.5 Chemical Cleaning Wastes

The heat recovery steam generator (HRSG) and preboiler piping will be chemically cleaned during commissioning. The steam generators will also be cleaned infrequently during the life of the unit. Chemicals used for these cleanings will not be stored onsite and will be administered utilizing a temporary system. The chemical cleaning solutions to be used for cleaning of the HRSG will be dependent to a limited extent on the HRSG manufacturer. Chemicals typically used in HRSG and preboiler piping chemical cleaning include the following:

- Inhibited citric acid.
- Disodium phosphate.
- Trisodium phosphate.
- Nonfoaming wetting agents.

- Foam inhibitors.
- Chelates, such as EDTA.

Chemical cleaning wastewaters will consist of the cleaning solutions and material removed during the cleaning process. Since chemical cleaning is a maintenance operation, it will not contribute to the liquid wastes produced by the normal operation of the plant. Cleaning solutions will be neutralized onsite if required and transported offsite by a licensed waste disposal contractor.

3.6.6 *Miscellaneous Chemical Drains*

Chemical wastewater can result from draining a chemical storage tank, overflowing a chemical tank during filling, or from maintenance operations such as hosing down chemical storage areas. Miscellaneous chemical drains will be contained for neutralization, if necessary, and disposed to the plant wastewater system. Large chemical leaks will be scavenged and disposed offsite by a licensed commercial service. Flows from miscellaneous chemical drains will be intermittent and will not normally contribute to the wastewater flows.

3.7 Solid and Hazardous Waste

Unit 1 will not generate any solid waste, such as combustion ash or FGD scrubber waste, from the electric generation process. The firing of natural gas, or fuel oil, does not create significant combustion byproducts. TCEC operations will not require any onsite landfills or solid waste disposal areas. Commercial trash services will be contracted to haul off typical solid wastes that result from plant operations, such as office debris.

Waste oil is the only potentially hazardous substance generated by plant operation. Three processes generate waste oil: combustion turbine cleaning, false starts of the combustion turbines, and oil/water separator operation. The internal components of the combustion turbines are periodically cleaned using a solvent solution. This wash water may contain oily residues and metal particles. The wash water is collected in an underground combustion turbine drain tank and hauled offsite as needed by a licensed contractor for ultimate disposal. The combustion turbines are occasionally started to check operation during oil firing. The residual oil resulting from any false starts is also collected in the combustion turbine drain tank.

Waste oil that is generated will be conveyed to the oil/water separator. Waste oil collected in the oil/water separators will be hauled offsite as needed by a licensed contractor for ultimate disposal.

3.8 Onsite Drainage System

3.8.1 *Uncontaminated Areas*

The site is extremely level, with existing grade elevations ranging from 15.5 to 18 feet above sea level (msl). In general, the site topography drains from the center of the site radially to the west, east, and south, to bordering wetlands and Canal No. 102, respectively.

The onsite drainage facilities will be designed in accordance with the requirements of the SFWMD Basis of Review, Chapter 7.0 Water Management System Design and Construction Criteria and the FDEP regulations in Chapter 62-621, F.A.C. Figure 3.8-1 shows preliminary grading and drainage for the various facility areas. Open channels and drainage structures (culverts, piping systems) will be designed to collect and direct the runoff resulting from a 25 year, 72 hour storm event. Site runoff facilities (ditches, detention basin) will provide storage to satisfy criteria for maintenance of water quality and quantity, and to provide storage to attenuate peak discharge rates.

The requirements for quality treatment include retention of the first inch of runoff from the developed portions of the site. This volume will be provided in the onsite stormwater detention basin. A V-notch weir is used as a bleed-down mechanism, and is located at the discharge structure for the detention basin. The V-notch weir is sized to discharge less than one half inch of the detention volume in 24 hours.

The requirements for quantity treatment include the limitation that the post-development peak discharge does not exceed the predevelopment peak discharge. The detention basin will assist in attenuating the peak discharge flows from the developed site to meet this requirement.

Runoff from areas of the site not disturbed by construction activities or plant operations will be maintained in the existing state to the greatest extent possible. Runoff from areas of the site disturbed by construction activities or plant operations will be collected in a ditch system and directed to the onsite detention basin as described below. Drainage systems will be designed for gravity flow wherever site conditions allow. Generally, the drainage in the areas of the new facility will be directed away from the structures and routed to the onsite stormwater detention basin. Figure 3.8-1 indicates the general flow paths at the TCEC site once construction is completed.

Figure 3.8-1
Preliminary Grading and Drainage

3.8.2 Drainage Areas

Excluding the area within the FPL transmission line easement, the majority of the site will drain to the detention basin. Stormwater ditches will run on the north and south side of the power block. The substation area and the southern half of the power block will be graded to drain to the ditch on the south side of the power block. The area surrounding the cooling towers and the north half of the power block will drain to the north ditch. Each of these ditches will drain west-northwest, discharging into the detention basin on the west side of the property. The area north of the cooling towers may be used for construction laydown/staging. This stormwater will also be routed to the ditch on the north side of the power block. The combined area of the power block, substation, and construction lay-down/staging area, and stormwater facilities is approximately 52.8 acres.

The detention basin will serve as a dry detention basin to provide both quality and quantity treatment to the stormwater. The quality treatment will be accomplished by detention and reduction of suspended solids load. The detention basin will also provide quantity treatment by providing surge capacity to attenuate the maximum discharge rate offsite.

3.8.3 Design Criteria

The surface water management and storage of surface waters system will be designed in accordance with the regulations and requirements of Chapter 40E-4, F.A.C., the SFWMD's *Environmental Resource Permit Information Manual Volume IV*, and the FDEP's *The Florida Manual--A Guide to Sound Land and Water Management Land Development*. Areas subject to potential contamination of stormwater runoff will be designed for zero discharge.

The surface water management system at the site is designed to maintain the existing drainage patterns wherever possible. The existing drainage patterns generally flow to the northwest to the ditch located parallel to the FEC Railroad.

The surface water management system for the developed areas of the TCEC will be designed to ensure that the post-development peak discharge will not exceed that of the pre-development peak discharge at the project site boundary.

The following design criteria are specified in the SFWMD Permit Manual:

- Design Storm: 25 year, 72 hour.
- Rainfall frequencies obtained from the SFWMD Permit Manual are as follows:
 - 10 year, 24 hour--5.5 inches.
 - 10 year, 72 hour--8.2 inches.
 - 25 year, 24 hour--6.4 inches.

- 25 year, 72 hour--9.0 inches.
- 100 year, 72 hour--10.0 inches.
- Rainfall Distribution: SFWMD 72 Hour Synthetic Storm Distribution.
- Outlet structures:
 - Emergency spillways are designed to pass the 100 year recurrence interval storm event.

3.8.4 Runoff Analysis

The area associated with the power block and construction lay-down/staging consists of approximately 7.6 acres of impervious area, 36.1 acres of aggregate area, and 1.0 acre of grass. These areas will drain into a new stormwater detention basin designed for the 25 year, 72 hour rainfall event. The pre-development curve number (CN) was estimated to be 64.5, with a pre-development time of concentration of 1.474 hours, resulting in a time lag of 0.884 hour. The post-development CN and time of concentration were estimated to be 86.7 and 0.445 hour, respectively. The post-development time lag is estimated at 0.267 hour. The curve numbers and times of concentration were determined using the methods outlined in the Soil Conservation Service TR-55 manual.

The stormwater collection system will consist of ditches, drainage structures, and a site runoff detention basin. This system will function as a stormwater quality and quantity treatment facility. The quality treatment of runoff will be accomplished through detention in the site detention basin to reduce the total suspended solid concentrated in the water. Grading and drainage plans (stormwater management system) are shown on Figures 3.8-2 through 3.8-9.

The discharge structure of the detention basin is designed for the 25 year, 72 hour event peak flow. The discharge structure will also safely pass the 100 year, 72 hour storm event without overtopping the detention basin perimeter berms. The structure includes the V-notch bleeder weir at elevation 17.25 and a 20 foot long sharp-crested weir at elevation 17.6. The stormwater detention basin and discharge structure are sized to meet the design criteria outlined in Subsection 3.8.3. Stormwater enters the detention basin through direct precipitation and from ditches conveying runoff from the energy center and construction staging/lay-down areas.

The pre-development peak discharge in response to the 25 year, 72 hour storm event is estimated at 89 cfs. The post-development peak discharge in response to the 25 year, 72 hour storm event is estimated at 72 cfs. The detention basin discharges to the south, in the area of an existing wetland. A 20 foot wide concrete lined channel is provided downstream of the discharge structure to spread the discharge and prevent erosion.

HEC-1 and HEC-2 hydrologic analytic models were completed to predict runoff rates, stormwater detention basin size, and site stormwater drainage facilities. The predictive results from these analytic models are included at the end of this section.

3.8.5 Erosion and Sediment Control Measures

Erosion and sediment control measures will be installed as necessary during construction to control sediment disposition. The primary destination of construction runoff will be to the stormwater detention basin. The stormwater detention basin will provide reduction of suspended solids load through detention.

Before construction begins, a silt fence or other appropriate control measures will be installed around the perimeter of construction areas. Figures 3.8-10 and 3.8-11 show erosion control plans and details. Diversion ditches will be equipped with straw bale dikes to aid in minimizing the amount of sediments flowing into the onsite runoff basin and offsite. Construction accessways and parking areas will be surfaced with aggregate to provide a stabilized subgrade. Erosion control measures will also include minimizing fugitive dust through the periodic spraying of water.

3.8.5.1 Staging of Earthmoving Activities. Initial construction will remove all significant vegetation (trees and brush). If possible, some trees will be retained in the construction lay-down/staging area. The runoff basin and associated drainageways will be constructed concurrently with initial clearing activities. Topsoil will be removed and stockpiled for finished grading and site restoration after construction is completed. Once the topsoil has been removed, site preparation will be directly related to the construction of specific power plant facilities. Once the earthmoving and construction are completed, the stockpiled topsoil will be used for finished grading. Seeding and mulching activities will begin immediately upon completion of construction.

3.8.5.2 Construction Monitoring and Maintenance. In general, all erosion and sedimentation control measures will be checked weekly and after each significant rainfall event. Items including the following will be checked:

- Silt fences and straw bale dikes will be inspected after each significant rainfall and during prolonged periods of rainfall. Required repairs will be made within 24 hours.
- Sediment deposits at barriers will be removed when the deposit depth reaches approximately one half the height of the barrier.

An FDEP issued, but federally required, NPDES General Permit for construction stormwater discharges and accompanying Stormwater Pollution Prevention Plan will be required and are included in Section 10.1.10.

Figure 3.8-2
Preliminary Grading and Drainage Plan

Figure 3.8-3
Preliminary Grading and Drainage Plan

Figure 3.8-4
Preliminary Grading and Drainage Plan

Figure 3.8-5
Preliminary Grading and Drainage Plan

Figure 3.8-6
Preliminary Grading and Drainage Plan

Figure 3.8-7
Preliminary Grading and Drainage Plan

Figure 3.8-8
Preliminary Grading and Drainage Plan

Figure 3.8-9
Preliminary Grading and Drainage Plan

Figure 3.8-10
Preliminary Grading and Drainage Plan

Figure 3.8-11
Preliminary Grading and Drainage Plan

3.8.5.3 Permanent Control Measures. Permanent erosion and sedimentation control measures within the TCEC site will include the runoff collection system (ditches, culverts, trenches), surfaced traffic and work areas, nonworking areas with established vegetation, and the site runoff detention basin. These measures will minimize erosion and potential sedimentation.

The permanent erosion and sediment control system will be installed as early as possible during construction and will remain in service throughout the life of the TCEC. The primary components of this system will be established vegetation, surfacing, concrete ditches, culverts, and trenches which will collect the site runoff and direct it to the site runoff area. The system will be maintained and monitored during construction and operation. When the TCEC is constructed, uncontaminated stormwater will flow into the stormwater detention basin. In the event that the stormwater detention pond overflows, the overflow will be directed through a weir and the stormwater will then be allowed to sheet flow.

Surface water monitoring during construction and operation is described in the stormwater Notice of Intent and Stormwater Pollution Prevention Plan in Volume 2, and Subsection 5.3.5 of this volume, respectively.

The drainage system will require periodic inspection, maintenance, cleaning, and occasional repair work. Inspection will be completed on a seasonal basis and after any severe rainfall event. The condition of the ditches, culverts, and weirs will be noted. Cleaning or repair of the drainage structures will be completed as required.

3.8.6 Potentially Contaminated Areas

Flows originating from potentially contaminated areas, and any stormwater runoff generated in these areas, will not be collected in the surface water management system. These flows which include miscellaneous plant drains and drainage from oil containment areas will be routed through the oil/water separator for treatment.

The effluent from the oil/water separator will be conveyed to the wastewater sump for transfer to the FPUA WWTP.

The following potentially contaminated areas will be added with the construction of the TCEC:

- Steam Turbine Step-up Transformer.
- Combustion Turbine Step-up Transformer.
- Auxiliary Transformers.
- Fuel Oil Unloading and Storage Areas.
- Circulating Water Acid Storage Tank.

All of the transformers will be constructed with a curbed secondary containment area. The containment area will be sized to confine 110 percent of the volume of oil

stored within the equipment and a sufficient allowance for the design rainfall storm event. The discharge from the containment areas will be conveyed to the oil/water separator.

The secondary containment associated with the containment associated with the circulating water acid storage tank will be designed in accordance with Chapter 62-762, F.A.C., aboveground storage tank systems. The containment area will discharge all rainwater to the wastewater system. Refer to Subsection 3.6.6 for descriptions of the miscellaneous chemical drains.

The fuel oil storage tanks and transformer secondary containment areas are designed such that all of the rainwater is collected and conveyed to the oil/water separator for treatment. The containment areas are sloped to a drainage collection point (a gate valved discharge pipe). The discharge pipe from each containment area and the fuel oil unloading area are interconnected and routed to the oil/water separator by gravity.

Oil/water separators are provided for separation of any oil and grease from contaminated wastewaters and stormwaters. Treated separator effluent (water) will be conveyed to the FPUA WWTP. The oil phase will be periodically pumped from the separator and disposed offsite by a licensed waste management contractor. The effluent from the separator will be low in the structure to allow the water to underflow while the oil is retained for later removal. The separator is sized to contain the volume of oil produced by the total failure of the single largest source served by the separator, with the exception of the valved fuel oil storage tank and step-up transformer containment areas.

Secondary containment will be provided around site facilities containing significant amounts of oil like the ULS No. 2 fuel oil storage tanks and the step-up transformers. In the event of a spill from the largest vessel, oil will be contained within the bermed or curbed area. The berm or curbed areas will be equipped with a valve to prevent or allow drainage from the specific area. The valves will normally be in the closed position. After visual inspection of the stormwater runoff within the containment area, the valves will be opened to drain clean collected runoff to the stormwater detention basin.

3.9 Construction Materials and Equipment Handling

The major components associated with the Unit 1 installation include the following:

- Combustion Turbine.
- Heat Recovery Steam Generator.
- Generator Step-up Transformer.
- Cooling Tower.
- Steam Turbine.

- Control Building.
- Water Treatment Building and Associated Equipment.
- Warehouse.
- Water Storage Tanks.
- Fuel Oil Storage Tank.

The major components and all other required equipment and materials will be delivered to the TCEC site by truck or rail. All deliveries associated with construction and operation will utilize the industrial park access road that connects to Selvitz Road. All deliveries will be cleared through a temporary guardhouse located near the main gate. Once onsite, construction materials will be directed to the construction lay-down area or its permanent location for offloading and transport to the proper storage area by portable cranes, forklifts, and trucks.

3.10 References

United States Department of Agriculture; Soil Conservation Service, *Urban Hydrology for Small Watersheds*, Technical Release 55, Washington, D.C., June 1986.

U.S. Department of Commerce; Weather Bureau, *Rainfall Intensity-Duration-Frequency Curves*, Technical Paper No. 25, Washington D.C., December 1955.

United States Weather Bureau, *Rainfall Frequency Atlas of the United States for Durations from 30 Minutes to 24-Hour and Return Periods from 1 to 100 Years*, Technical Paper No. 40, Washington, D.C., May 1961.

South Florida Water Management District, *Environmental Resources Permit Information Manual Volume IV*, West Palm Beach, Florida, 2000.

4.0 Effects of Site Preparation, and Plant and Associated Facilities Construction

This chapter identifies and describes the potential impacts from construction of the proposed Treasure Coast Energy Center (TCEC) Unit 1 Project (Unit 1) and ultimate site development on the social, physical, and natural resources of the site and vicinity. The potential impacts of Unit 1 and ultimate site development are assessed based on the existing site and vicinity conditions described in Section 2.0, as well as in terms of compliance with applicable regulations and standards.

4.1 Land Impact

Approximately 59 acres of the 68 acre site will be impacted during construction of TCEC, with about 46 acres being permanently impacted. The effects of construction of the transmission lines and natural gas pipeline are described in Section 6.0.

4.1.1 General Construction Impacts

The power block will be located on 15.2 acres, which will include several buildings and equipment pads. Aggregate surfacing will be used around the units, with asphalt paved roads around the perimeter. A stormwater detention basin will be located on the west side of the site and will occupy 10.5 acres. The 7.8 acre substation south of the power block will be surfaced with aggregate. The cooling towers are within a 7.3 acre aggregate surfaced area. The area north of the cooling towers will be used for construction laydown and parking and will be seeded when construction is complete. The current FPL transmission line corridor on the site, which includes about 10 acres, will not be impacted by the TCEC construction.

Site landscaping will be completed in accordance with the requirements of the St. Lucie County Land Development Code.

4.1.2 Roads

Two entrances will be constructed for access to the site. An entrance in the northeast corner of the site will tie into the industrial park entrance road from Selvitz Road. An entrance on the southwest corner of the site will connect to the future South Jenkins Road. A new paved road will be constructed around the units and connect to each entrance as shown on Figure 2.1-9 (Drawing 138859-CSTA-S1001), which can be found in Section 2.0.

4.1.3 Flood Zones

The TCEC site is located in an area determined to be outside of the 500 year flood plain as shown on Figure 4.1-1.

Figure 4.1-1
Site Flood Elevation

4.1.4 Topography and Soils

The TCEC site is a relatively flat grassland with scattered trees. Site elevation ranges from 15.5 to 18 feet above msl. The site stormwater detention basin will be located in an existing low quality herbaceous wetland area and will be filled to more than 1 foot above the high groundwater elevation.

Construction will begin with the installation of erosion and sedimentation control structures at the perimeter of the construction areas. The construction areas will then be cleared, grubbed, and prepared for buildings and foundations. The stormwater detention basin will be built early to collect stormwater runoff from the construction area. Offsite fill will be required to facilitate drainage. Final paving, grading, and landscaping will complete construction. In addition to the erosion and sedimentation control measures, water sprays will be used to control fugitive dust.

4.1.5 Solid Wastes and Wastewater Disposal

Waste oils, greases, hydraulic fluids, construction wastes, and garbage will be collected, stored, and removed for disposal at a properly licensed landfill or resource recovery facility by the general services contractor or individual construction contractors. Such activities will be supervised and controlled by the Construction Supervisor. Table 4.1-1 indicates the treatment and disposal methods of these wastes.

Clearing existing vegetation will generate vegetation wastes that will be disposed of by the construction contractor in either a permitted solid waste landfill, a permitted composting facility, or burned in accordance with state and local requirements.

Wastewater will be generated from hydrostatic testing and cleaning of various equipment; such as the HRSG, piping and tanks. Most of these wastewaters are predicted to be non-hazardous and will be released to either the stormwater detention basin or conveyed to the FPUA force main onsite. Waste and wastewater stream information is presented in Table 4.1-1. Many of the processes that generate wastewater during construction are the same wastewater streams identified on Figure 3.5-4, Water Mass Balance sheet. However, construction will generate additional wastewater streams and solid wastes that are identified on Table 4.1-1. FMPA requests approval of these wastewaters and solid waste disposal methods during Unit 1 construction.

The plant service water system or potable water system will provide water for chemical cleaning of the HRSG and steam piping, as well as for the steam blow processes. Chemical cleaning involves cleaning the HRSG and piping systems prior to operation. The steam blow process involves cleaning steam piping systems to remove accumulated weld spatter, slag, filings, and other debris. If this material is not removed

Table 4.1-1 Waste Streams and Wastewater Streams Associated with Construction				
Potential Waste Streams	Quantity	Quality	Discharge Point	Treatment Prior to Discharge
HRSG Hydro	120,000 gallons	Ammoniated demin water (pH 9-10) 2 ppm ammonia	FPUA Wastewater System	pH adjustment
Condenser Hydro	200,000 gallons	Demin water (pH 6-8)	Stormwater Detention basin	Filter before Discharge
Misc. Hydro and Flush Water	400,000 gallons	Trace oil/grease	FPUA Wastewater System	Filter before discharge
Cooling Tower Drain and Clean	800,000 gallons	Service Water	FPUA Wastewater System	None
Cooling System Water Flush	50,000 gallons	Demin Water	Stormwater Detention basin	Filter before Discharge
Steam Blow Quench Water	300,000 gallons	Service Water	Stormwater Detention basin	Filter before Discharge
HRSG and Preboiler Piping Chem Cleaning	150,000 gallons	Expected to be non-hazardous	If non-hazardous, to FPUA Wastewater System. If hazardous, hauled off by licensed contractor	None
Service/Fire Water Tank Hydro	400,000 gallons	Service Water	Stormwater Detention basin	Filter before Discharge
Demin Storage Tank Hydro	1,000,000 gallons	Service Water	Stormwater Detention basin	Filter before Discharge
Fuel/Oil Storage Tank Hydro	1,000,000 gallons	Service Water	Stormwater Detention basin	Filter before Discharge

Table 4.1-1 (Continued) Waste Streams and Wastewater Streams Associated with Construction				
Potential Waste Streams	Quantity	Quality	Discharge Point	Treatment Prior to Discharge
Groundwater from Well Construction (3 wells)	9.0 million gallons	Groundwater	Stormwater Detention basin	Filter Prior to Discharge
Preservatives in Tubes	150,000 gallons	Water Soluble Corrosion Inhibitor	Contained and then disposed by an approved hazardous waste disposal contractor.	
Oily Solid Wastes	Conditionally Exempt SQG	Hazardous	Approved hazardous waste disposal contractor	
Oily Rags	Conditionally Exempt SQG	Hazardous	Recycled via laundered by FDEP approved vendor or disposed as hazardous waste.	
Non-oily Rags	Conditionally Exempt SQG	Hazardous	Recycled via laundered by FDEP approved vendor or disposed as hazardous waste.	
Punctured Aerosol Cans	Conditionally Exempt SQG	Hazardous	Approved scrap metal contractor or disposed as hazardous waste.	
Captured Paint Residues from Punctured Aerosol Cans	Conditionally Exempt SQG	Hazardous	As hazardous waste in accordance with 40 CFR Part 261	

Table 4.1-1 (Continued Waste Streams and Wastewater Streams Associated with Construction				
Potential Waste Streams	Quantity	Quality	Discharge Point	Treatment Prior to Discharge
Fluorescent Bulbs and Batteries	Conditionally Exempt SQG	Not Applicable	Contained onsite; Recycled as universal waste	None
Wood	Various	Not Applicable	Contained onsite; Recycled or disposed in landfill	None
Metals	Varies	Not Applicable	Contained onsite; Approved Scrap Metal Contractor	None
Plastics	Varies	Not Applicable	Contained onsite; Transported offsite by an FDEP approved recycled facility or disposal facility	None

prior to steam turbine operation, the steam turbine will be damaged by the metal particles, which would strike the blades and steam path at very high velocities. Blowing through the piping system with steam removes these materials, rust, grease, and other fabrication and construction residues prior to commencement of combined cycle operation. The steam blow process requires treated water and may require an additional portable reverse osmosis unit for a short period of time. Chemical cleaning residuals will be hauled offsite by a licensed transporter and disposed accordingly. Reverse osmosis reject will be conveyed to the FPUA WWTP for disposal.

4.2 Impact on Surface Water Bodies and Uses

There are no naturally occurring surface water bodies located on the TCEC site. There should be no adverse impact to Canal 102 (adjacent to site) because of erosion/sedimentation control facilities designed and maintained in accordance with US EPA, FDEP, and SFWMD stormwater management criteria. Therefore, there will be no impact to surface water bodies as a result of the construction of TCEC Unit 1. Wetland impacts are discussed in Section 4.4.

4.3 Groundwater Impacts

The current dewatering plan for the site is based on information obtained from the *Draft Report, Geotechnical Investigation, St. Lucie Generating Station, Fort Pierce, Florida*, prepared by Tolunay-Wong Engineers in September 2000. The work performed during this investigation included nine test borings, 13 cone penetrometer soundings, 12 test pits, two piezometers, and other tests including a seismic piezocone survey, electrical resistivity tests, infiltration and percolation tests. The maximum depth of soil investigated at the proposed site was 80 feet below ground surface.

The site currently includes pasture with some scattered trees and shrubs. Approximately 11.96 acres of wetlands were identified at the site. Site boring information shows that the site is covered with approximately 8 to 12 inches of topsoil underlain by dark gray and gray silty fine to medium sand. Groundwater depths at the site varied from about 0.4 to 3.8 feet below grade, with an average depth of about 2 feet below ground surface (bgs).

The site is extremely level with existing grade elevations ranging from 15.5 to 18 feet above sea level (msl). In general, the site topography drains from the center of the site radially to the west, east, and south, to bordering wetlands and Canal No. 102, respectively.

During the project construction period, excavation and dewatering will be necessary for placement of subsurface facilities such as piping, electrical trenches, sumps,

and foundations. Within an area of approximately 900 by 400 feet, the site will be cleared and grubbed to facilitate construction of the power generating facility. The existing vegetation, consisting of trees, brush, and grasses, will be removed from the majority of the site. Organic topsoil will be removed and stockpiled. Clean, suitable fill material will be imported to the site and will be spread and compacted to an elevation of approximately 22 feet msl.

The general site excavation depth is expected to be about 4 feet below ground surface. Limited areas could be excavated to 10 to 12 feet below the existing surface elevation to accommodate installation of specific structures such as the oil/water separator.

As mentioned above, average depth to groundwater at the site is estimated to be approximately 2 feet below existing grade. Groundwater depth changes are expected during the year due to precipitation changes, natural drainage, and regional man-made drainage systems.

4.3.1 Impact Assessment

During the Unit 1 construction period, excavation and dewatering will be necessary for placement of piping, electrical trenches, sumps, and foundations. Within the 900 foot by 400 foot area, the site will be cleared and grubbed to facilitate construction of the power generating facility. The native vegetation, consisting of trees, brush, and grasses, will be removed. Organic topsoil on the site will be removed and stockpiled. Suitable fill material will be imported to the site and will be spread and compacted in layers to an elevation of approximately 22 feet msl. Excavation and dewatering of the area may be required to install subgrade structures.

The general site excavation depth is expected to be about 4 feet below ground surface. Limited areas within the general site excavation could be excavated to 10 to 12 feet below the filled surface elevation to accommodate installation of specific structures.

In 1999, Duke Energy identified three leaking underground storage tanks (LUST) located within 0.5 mile from the project site (EDR, 1999). The three sites are located on Glades Cutoff Road and include Southern Eagle Distribution, Gold Coast Beverage Distributors, and William Thies & Son. Communications with the FDEP indicate only that there has been a “discharge” from each site. The discharges occurred in 1988, 1988, and 1991, respectively. Further, the FDEP has assigned these three sites very low scores. There is no FDEP contact person assigned to these sites. As such, these sites are a very low priority to the FDEP because they are located 0.5 mile from the nearest drinking water well (B&V, 2005).

The FDEP Site Investigation Section conducts environmental investigations across the state of Florida. The primary focus of this group is groundwater contamination. A review of the FDEP Site Investigation Section active and completed sites identified six sites in St. Lucie County. Based upon available information, it appears these sites are located generally north or east of the TCEC site.

Finally, a review of the Florida National Priorities List showed no sites in St. Lucie County.

Therefore, based upon available information, it is highly unlikely that there is existing groundwater contamination in the vicinity of the TCEC or that potential groundwater contamination could migrate to the TCEC site from construction or operations.

4.3.2 Groundwater

The site will be dewatered to lower the water table for excavation, backfill, and foundation construction. Hydraulic conductivity of the soil estimated from infiltration tests is approximately 0.0003 foot/sec. Dewatering flows for the site construction are estimated to be 1.5 to 2 million gallons per day (mgd). The dewatering flows are based upon a 900 foot by 400 foot construction area over a 30 day period to approximately 12 feet below ground surface. Construction in the 900 foot by 400 foot area may require up to six months; however, dewatering to a steady-state condition was estimated to require a 30 day period. Dewatering after the initial 30 day period should be minimal.

Dewatering effluent will be filtered using straw bales and/or silt fences prior to discharge to the stormwater detention basin. The detention basin should recover from the daily dewatering volumes.

4.4 Ecological Impacts Assessment

4.4.1 Wetlands Impacts.

Five wetlands regulated by the FDEP are delineated on the TCEC site and are described in Subsection 2.3.5.1. Table 4.4-1 lists the wetlands, indicating the size of each and area to be impacted by site development.

Table 4.4-1 Wetland Impacts at the Treasure Coast Energy Center Site		
Wetland Area	Size (acres)	Area Impacted (acres)
A	10.26	10.26
B	0.51	0.51
C	0.48	0.48
E	0.53	0.0
F1	0.08	0.0
F2	0.18	0.0
Totals	11.96	11.25

Wetlands A, B, and C (11.25 acres total) will be lost due to TCEC site development. Wetlands E and F are ditches at the periphery of the site and will not be impacted by the project. Since there is no available space on the project site for mitigation, it is the intent of FMPA to provide mitigation by purchasing wetland credits sufficient to offset the loss from a wetland mitigation bank accredited by the FDEP.

Since mitigation banking is the proposed alternative for wetlands mitigation, FMPA completed a Wetlands Rapid Assessment Procedure (WRAP) to evaluate the conditions of the existing wetlands. The WRAP study methods and results are attached to the ERP application in Section 10.4.1.

4.4.1.1 Vegetation Impacts. Site development is expected to result in a significant loss of existing vegetation, and therefore available wildlife habitat at the site. The extent of each habitat and area impacted is shown in Table 4.4-2. As noted in other portions of this document, historic natural vegetation on the site was eliminated by past agricultural or related activities. The vegetation present at this time has been planted or has naturally invaded the land. Because of this, species diversity and composition are poor, with nuisance species dominating in some instances. While the vegetation will be lost, the overall impact is considered minimal due to the quality of the resource.

Table 4.4-2 Habitat and Area Impacted			
FLUCCS Code	Vegetation Type	Acres	Acres Impacted
211	Improved Pasture	34.6	34.6
643	Wet Prairie	13.9	10.26
422	Brazilian Pepper	19.8	19.8
641	Emergent/Freshwater Marsh	0.51	0.51
832/643	Electrical Power Transmission Lines/ Wet Prairie	6.1	0
511	Ditch	0.53	0

4.4.2 Wildlife Impacts.

Wildlife does not appear to be common on the site, which is presumably a function of the low quality habitats available and the commercial, industrial, and residential development in the surrounding areas. As such, impacts to wildlife due to loss of habitat are expected to be minor and have minimal or no effect on wildlife populations in the surrounding vicinity.

4.4.3 Threatened and Endangered Species Impacts.

No federal or Florida listed threatened or endangered species are known to occur or suspected of occurring on the site or in close proximity. Therefore, no impacts are expected to these species. FMPA has requested the USFWS, FFWCC, and FNAI review the site and proposed project for important natural resources and protected species or habitats. These request letters are included in Section 10.1 and 10.2.

4.4.4 Measuring and Monitoring Programs

No measuring or monitoring programs are proposed since the loss of ecological resources is considered negligible and will be offset by purchasing wetland mitigation bank credits.

4.5 Air Impacts

During the Unit 1 construction phase, atmospheric dust (particulate matter) will be generated from the mechanical disturbance of granular material that becomes exposed to the wind at the construction site. The particulate matter dust is often referred to as

fugitive dust, as its source is particulate matter that cannot be reasonably discharged to the atmosphere in a confined flow stream.

4.5.1 Sources of Construction Fugitive Dust

Construction activities, including material moving activities, site preparation, and vehicle traffic, if not properly monitored and controlled, have the potential to generate large amounts of fugitive dust. The construction activities at TCEC Unit 1 may be generally broken down into the following three phases as related to generating fugitive dust:

- Phase 1 - Debris Removal--Debris removal consists of removing any manmade or natural obstructions from the site. Under extreme circumstances, this phase of construction may require blasting, explosion, or mechanical dismemberment of the obstructions in order to clear the site. However, this level of debris removal is not anticipated, and will likely be limited to material loading/unloading, small disturbed areas, and vehicular travel on unpaved surfaces.
- Phase 2 - Site Preparation--Site development includes the general site grading and soil stabilization techniques used to bring the site to a final or near final grade. These techniques will typically include cut and fill as well as aggregate surfacing operations. Typical fugitive dust emission sources of this phase include movement of large earth moving equipment (e.g., scrapers and dozers) over disturbed surfaces, material/aggregate loading and unloading, and vehicular travel on unpaved surfaces.
- Phase 3 - General Construction--The construction phase is the final, but generally the longest, phase of the construction activities. This phase includes everything from foundation work, structural and reinforcing steel erection, exterior/interior operations, to piping/electrical work and final landscaping. In contrast to Phases 1 and 2, fugitive dust emissions during Phase 3 are somewhat sporadic in nature, depending on the delivery schedule of parts and materials, with many simultaneous operations throughout the construction site.

Within each of the major construction phases described above, there may be one or more specific construction activities occurring during that phase that can be a source(s) of fugitive dust. The fugitive dust emission sources resulting from these construction activities are typically assigned into one of four categories, which include disturbed surface areas, open storage piles, earth moving, and vehicular traffic. The following sections describe each of these fugitive dust emission sources as applicable to the construction site.

4.5.1.1 Disturbed Surface Areas. Many of the construction activities will result in disturbed surface areas in the power block area, which may be subject to wind erosion. A disturbed surface refers to a portion of the earth's surface which has been physically moved, uncovered, destabilized, or otherwise modified from its undisturbed natural soil condition, thereby increasing the potential for emissions of fugitive dust. Disturbed surfaces do not include those areas which have been restored to a natural state such that the vegetative ground cover is similar to any adjacent natural conditions, or which have been paved or covered by a permanent structure.

4.5.1.2 Storage Piles. A storage pile is any accumulation of bulk material, generally with a 5 percent or greater silt content, that is not fully enclosed or otherwise covered or chemically stabilized. The storage pile may be composed of soil, stored temporarily during cut and fill operations, or may be composed of aggregate used in foundation work and construction materials. Storage piles of this nature are typically left uncovered because of the frequent need to transfer material into and out of storage.

Fugitive dust emissions may occur at several points in the storage pile cycle, including material loading or unloading (material handling), and dust entrainment in wind currents on the exposed slopes of the storage pile.

4.5.1.3 Earth Moving. Earth moving refers to a broad range of construction activities using heavy equipment to clear land, excavate, cut, and fill. The activities may directly expose material to wind erosion through excavation, scraping, hauling, loading, transferring, and other material moving activities.

4.5.1.4 Vehicular Traffic. Vehicular traffic associated with the construction activities will include worker vehicles, equipment deliveries, and heavy construction vehicle traffic over unpaved surfaces. When a vehicle travels on an unpaved surface, the force of the wheels on the surface causes the material on the road to become lifted, dropped, and then entrained into the turbulent air currents caused by the velocity of the vehicle. As such, the vehicle's speed and size, silt content of the road surface, and material moisture content all play a role in determining the magnitude of the fugitive dust emissions from unpaved roads.

4.5.2 Available Control Methods

Fugitive dust emissions may result from a variety of activities that may require a multitude of different emission control alternatives. Additionally, the relatively short-term nature of construction activities makes some fugitive dust control methods more cost effective and practical than others. Tables 4.5-1 through 4.5-4 describe several available fugitive dust control methods and practices associated with disturbed surfaces, storage piles, earth moving, and vehicular traffic that may be employed to control fugitive dust during construction. The available control methods identified in each table are

summarized in the following subsections. The control methods ultimately used will be agreed upon by the Contractor and Construction Manager.

Table 4.5-1 Available Fugitive Dust Control Methods for Disturbed Surface Areas	
Control Method	Description/Remarks
Work Practice Controls	Paving identified roads and access points early in the construction process, phasing of earth moving activities to reduce disturbed surface extent, compaction and/or stabilization of disturbed surfaces as quickly as practical. Onsite traffic control program to direct, control, and restrict unnecessary traffic.
Watering	Use of water or water plus a wetting agent to suppress fugitive dust over disturbed areas. Typically applied with spray nozzles attached to a special truck adapted for this purpose. Temporary in nature, but cost-effective even with frequent reapplication.
Graveling	Graveling of high volume traffic areas within the disturbed area of the construction site provides a physical stabilization of the exposed surface and covers the surface with a material having a lower silt content.
Wind Fencing	Wind fencing provides a sheltered region behind the fence line which reduces the mechanical turbulence generated by the ambient winds. The sheltered area of dust control is proportional to the physical height of the fence around the disturbed surface.
Physical Stabilization	Physical stabilization methods involve the application of materials such as rock, bark, wood chips, straw, or other suitable materials to cover the exposed surface, thus preventing the wind from disturbing the surface particles. Graveling is one example of physical stabilization.
Vegetative Stabilization	Vegetative cover provides a physical stabilization and wind shelter of the disturbed surface. However, it is effective only on inactive areas of the disturbed surfaces where frequent mechanical (i.e., earth moving) activities are not anticipated. As such, it is typically not implemented during short-term construction activities.
Chemical Stabilization	Chemical stabilization is a dust suppressant method that uses binding agents that, upon application, bind the surface particles to form a protective crust over the disturbed surface. Typically, the temporary nature of construction activities does not warrant their use as they are not cost-effective over such a small scale of application and reapplication.

Table 4.5-2 Available Fugitive Dust Control Methods for Storage Piles	
Control Method	Description/Remarks
Work Practice Controls	Minimize temporary material storage pile(s) size and number by utilizing phased earth moving activities. Minimize drop height when adding material to the pile(s), and perform loading and unloading operations on the leeward (down wind) side of the pile. Cleanup spillage and maintain material to the confines of the pile.
Watering	Use of water or water plus a wetting agent to suppress fugitive dust from the storage pile. Temporary in nature, but cost-effective even with frequent reapplication.
Wind Fencing/ Barriers	Wind fencing or partial temporary barriers or enclosures provides a sheltered region in the vicinity of the storage pile which reduces the mechanical turbulence generated by the ambient winds. The sheltered area of dust control is proportional to the physical height of the fence or barrier.
Chemical Stabilization	Chemical stabilization is a dust suppressant method that uses binding agents that, upon application, bind the surface particles to form a protective crust over the disturbed surface. Typically, the temporary nature of construction activities does not warrant their use as they are not cost-effective over such a small scale of application and reapplication.

Table 4.5-3 Available Fugitive Dust Control Methods for Earth Moving	
Control Method	Description/Remarks
Work Practice Control	Onsite traffic control program to direct, control speed, and restrict unnecessary traffic. Reduce offsite hauling with balanced cut and fill operations and construction management. Cover truck beds during material hauling operations.
Watering	Preapplication of water or water plus a wetting agent to suppress fugitive dust prior to, and to the extent possible, during earth moving operations. Temporary in nature, but cost-effective even with frequent reapplication.
Wheel Washing	Water washing of heavy construction equipment wheels and undercarriages at construction site egress points to prevent material trackout and deposition outside of the construction site. System may include automatic or manual sprayers, and/or drive-through wheel washing basins.
Wind Fencing/ Barriers	Wind fencing or partial temporary barriers or enclosures provides a sheltered region in the vicinity of the earth moving which reduces the mechanical turbulence generated by the ambient winds. The sheltered area of dust control is proportional to the physical height of the fence or barrier.
Chemical Stabilization	Chemical stabilization is a dust suppressant method that uses binding agents that, upon application, bind the surface particles to form a protective crust over the disturbed surface. Typically, the temporary nature of construction activities does not warrant their use as they are not cost-effective over such a small scale of application and reapplication.

Table 4.5-4 Available Fugitive Dust Control Methods for Vehicular Traffic	
Control Method	Description/Remarks
Work Practice Controls	Onsite traffic control program to direct, control speed, and restrict unnecessary traffic. Reduce offsite hauling with balanced cut and fill operations and construction management. Cover truck beds during material hauling operations.
UNPAVED ROADS	
Watering	Application of water or water plus a wetting agent to suppress fugitive dust prior to, and to the extent possible, during earth moving operations. Temporary in nature, but cost-effective even with frequent reapplication.
Graveling	Graveling of high volume unpaved traffic areas provides a physical stabilization of the exposed surface and covers the surface with a material having a lower silt content.
Chemical Stabilization	Chemical stabilization is a dust suppressant method that uses binding agents that, upon application, bind the surface particles to form a protective crust over the disturbed surface. Typically, the temporary nature of construction activities does not warrant their use as they are not cost-effective over such a small scale of application and reapplication.

4.5.2.1 Watering. Watering is an effective stabilizing tool that controls fugitive dust by using water (or water combined with a surfactant as a binder) by either maintaining soil moisture content or establishing a crust which prevents soil movement under windy conditions. The water can be applied by any suitable means such as trucks, hoses, and/or sprinklers appropriate for site characteristics and size. Watering is most effective when an area or road surface is pre-watered, with frequent reapplication as necessary.

4.5.2.2 Chemical Stabilizers. Chemical stabilizers are commercially available and contain approved chemical soil binding agents to artificially crust soil and prevent soil movement during windy conditions. Stabilizers are effective for temporary periods. Depending on the application rates and/or materials involved, stabilizer use may extend the durability and longevity of the artificial soil crust for longer periods. As such, stabilizers are best suited for areas not subject to daily disturbance.

4.5.2.3 Physical Barriers. Physical barriers provide a sheltered region behind the barrier to allow gravitational settling of larger fugitive dust particles, as well as a reduction in the wind's erosion potential. Physical barriers reduce the mechanical turbulence generated by the ambient winds for a downwind distance proportional to the height of the barrier and porosity. Physical barriers include portable wind screens and

fences, partial enclosures, straw bales, tree lines, and terraces for example. Wind screens and fences can be used to control a wide variety of fugitive dust sources at a construction site, including disturbed areas, storage piles, and providing shelter for material handling operations such as storage pile loading or unloading. Furthermore, fences and screens are portable and thus capable of being relocated around the construction site as necessary.

4.5.2.4 Vegetative Stabilization. Vegetative stabilization uses established cover or locally recommended varieties and seeding rates that approximate native cover to stabilize soil against wind erosion and emission of fugitive dust. Either temporary or permanent cover can be established using standard agricultural methods, hydroseeding, or hand seeding. Temporary cover for areas that will be disturbed again after a short period is best established by using rapidly emerging varieties of vegetation with rapid initial growth. Maintenance of the original vegetative cover and opportunistic vegetation such as weeds and native species are also options, but may require some watering to establish.

Vegetative stabilization as a fugitive dust control method is most effective only on inactive areas of the disturbed surfaces where frequent mechanical (i.e., earth moving) activities are not anticipated. As such, it is typically not implemented on a large scale for control of fugitive dust emissions during short-term construction activities.

4.5.2.5 Work Practice Controls. There are a number of work practice controls that can be applied to reduce the fugitive dust emissions during construction activities. These work practices include both active and preventive fugitive dust control methods which are typically integrated into a comprehensive construction management plan. The following list contains several common work practice activities that may be applied to reduce fugitive dust emissions during construction:

- Pave designated roads, construction parking areas, and site access points early on in the construction project.
- Compact or stabilize disturbed areas as quickly as practical.
- Phase earth moving activities to reduce disturbed surface extent.
- Maintain original vegetative ground cover as long as practical.
- Establish a traffic control plan to decrease disturbance of soil and fugitive dust generated from unnecessary vehicle traffic by posting speed limit signs (generally less than 10 mph), erecting fencing and/or placing barriers to direct traffic, designating specific haul and/or access roads, designating offsite or limited access onsite parking for construction workers, and limiting public vehicle access.
- Reduce offsite hauling via balanced cut and fill operations.

4.5.2.6 Physical Stabilization. Physical stabilization methods, which involve covering a disturbed surface with a material that prevents the wind from entraining the

surface particles, may be used during many phases of the construction project. Common physical stabilizing materials include rock, gravel, crushed or granulated slag, bark, wood chips, straw, or hay that are harrowed into the top few inches of the disturbed surface.

4.6 Impact on Human Populations

In this section, the impact on human populations arising from the construction of TCEC Unit 1 is evaluated. Potential areas of impact include those on land use, employment, traffic, housing, and public facilities and services. The analysis will address the impacts from the first unit at the TCEC site, a nominal 300 MW combined cycle unit having an in-service date of 2008, and will also address impacts from the anticipated ultimate site capacity of 1,200 MW (4 x 300 MW combined cycle units).

4.6.1 Land Use Impacts

The TCEC site is well suited for power generation consistent with the industrial land use in the immediate vicinity. As discussed in Subsection 2.2.3.1, the site is part of the Midway Industrial Park, southwest of the City of Fort Pierce and the surrounding land area is primarily zoned for heavy industrial use. This compatibility of land use will minimize potentially negative external impacts. Figure 4.6-1 illustrates St. Lucie County current zoning designations for the TCEC site and area. Figure 4.6-2 is an aerial photograph of the project area indicating general land use patterns.

This conclusion is bolstered by relatively few housing units in the immediate project vicinity. Residential areas near the TCEC site are limited primarily to several homes located along Favorite Road, south and east of the TCEC site at a straight line distance of approximately 0.5 mile. Importantly, these homes do not have a direct view of the TCEC site due to the intervening presence of an orange grove and woods. These homes and the TCEC site are also separated by an existing transmission line right-of-way owned by FPL.

The only other residence in close proximity to the site is a mobile home located south and west of the site, in a relatively small triangle of land formed by Florida's Turnpike, Glades Cutoff Road, and an FPL transmission line right-of-way. This housing unit is approximately 0.25 mile away from the nearest project boundary, on the opposite side of Glades Cutoff Road, and has limited view of the site due to existing foliage.

Figure 4.6-1
St. Lucie Local Zoning

Figure 4.6-2
Local Land Use

4.6.2 Construction Employment

The TCEC Unit 1 facility will require a substantial construction workforce, which will provide direct employment and wage benefits to the area. Figure 4.6-3 indicates the projected monthly workforce at the TCEC site during the 22 month construction period, scheduled to span the August 2006 to May 2008 time frame. Figure 4.6-4 indicates the number of direct craft expected at the site each month. During the 22 month construction period, an average of 119 direct craft construction workers and a total workforce (that also includes indirect craft workers, construction management, and local utility staff) average of 169 personnel are expected. The peak construction workforce is projected to occur during the eleventh month of construction, when 233 direct craft workers, and a total of 286 workers are expected on site. In terms of total man-months of construction, direct craft labor is projected at 2,628 man-months of construction employment, and a total of 3,714 man-months of employment is expected including all members of the project construction workforce.

As subsequent units are added, a similar manpower loading pattern would be expected, perhaps reduced slightly as the transmission line will be in place and certain site requirements, such as the access road, will have already been completed with Unit 1.

The wage benefits resulting from the construction of the TCEC Unit 1 are significant due to the 3,714 man-months of employment involved during construction and the high anticipated hourly wage rate of \$31.46 per hour for the total workforce. Wages of \$23.6 million are budgeted for the construction of Unit 1, and direct craft labor is expected to account for \$17 million of this total. Section 7.2 discusses the multiplier impacts expected to result from these employment and income benefits.

As subsequent units are added to the TCEC facility, an income pattern similar to that for TCEC Unit 1 will be repeated, providing substantial benefits to the local community. The total project income generated should increase due to inflationary impacts, though acting to reduce the income benefits slightly would perhaps be modest reduction in the workforce due to the existence of common facilities shared with Unit 1.

4.6.3 Construction Traffic

The TCEC site is located in close proximity to I-95, and will facilitate easy and quick access during the construction period. Florida's Turnpike, Highway 1, and Highway 70 will also facilitate the flow of construction traffic to the site. Figure 4.6-5 shows the projected number of round trips to the site anticipated during construction. The total round trips include those to be made by the construction workforce as well as those needed to deliver equipment and supplies to the lay-down area, which will be entirely onsite. It is anticipated that during the peak month of construction (month 11), a total of 6,263 round trips will be made to the site, an average of 285 per day assuming 22

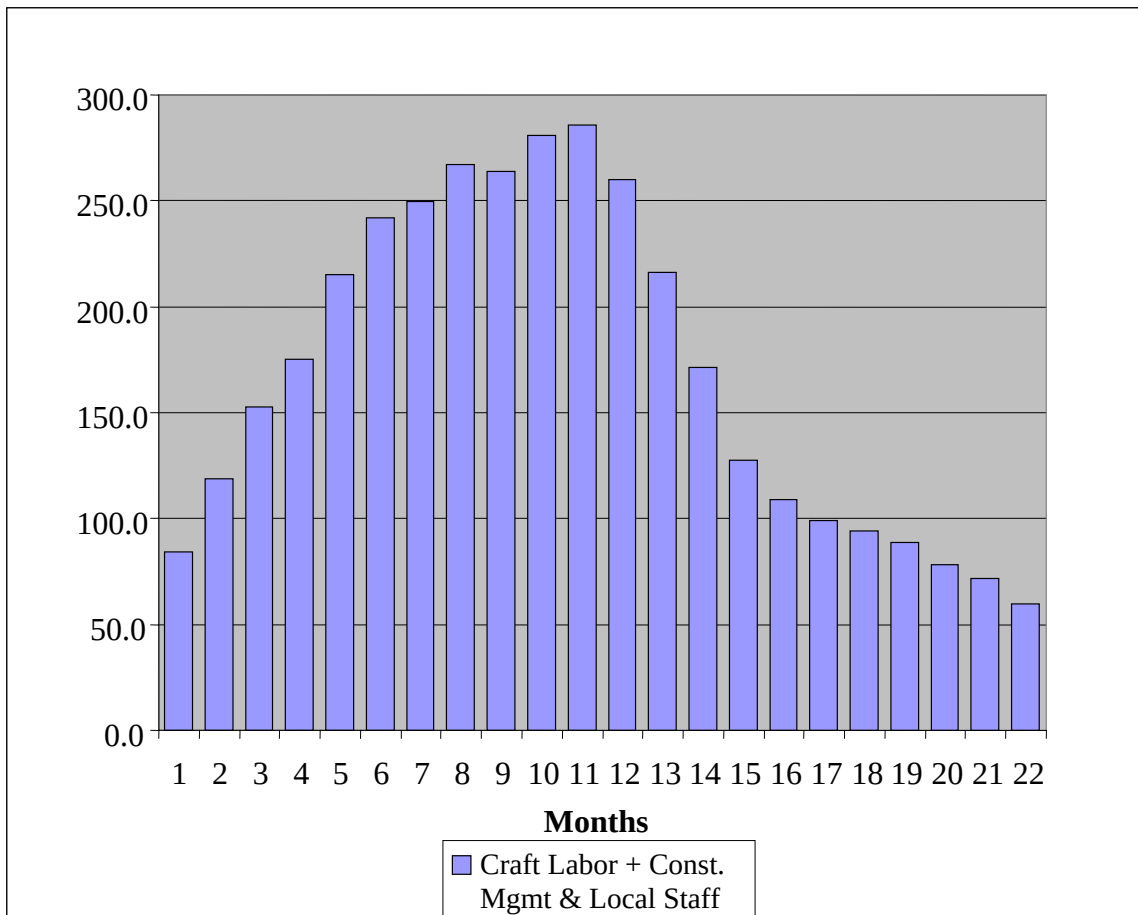


Figure 4.6-3
Total Site Manpower by Month

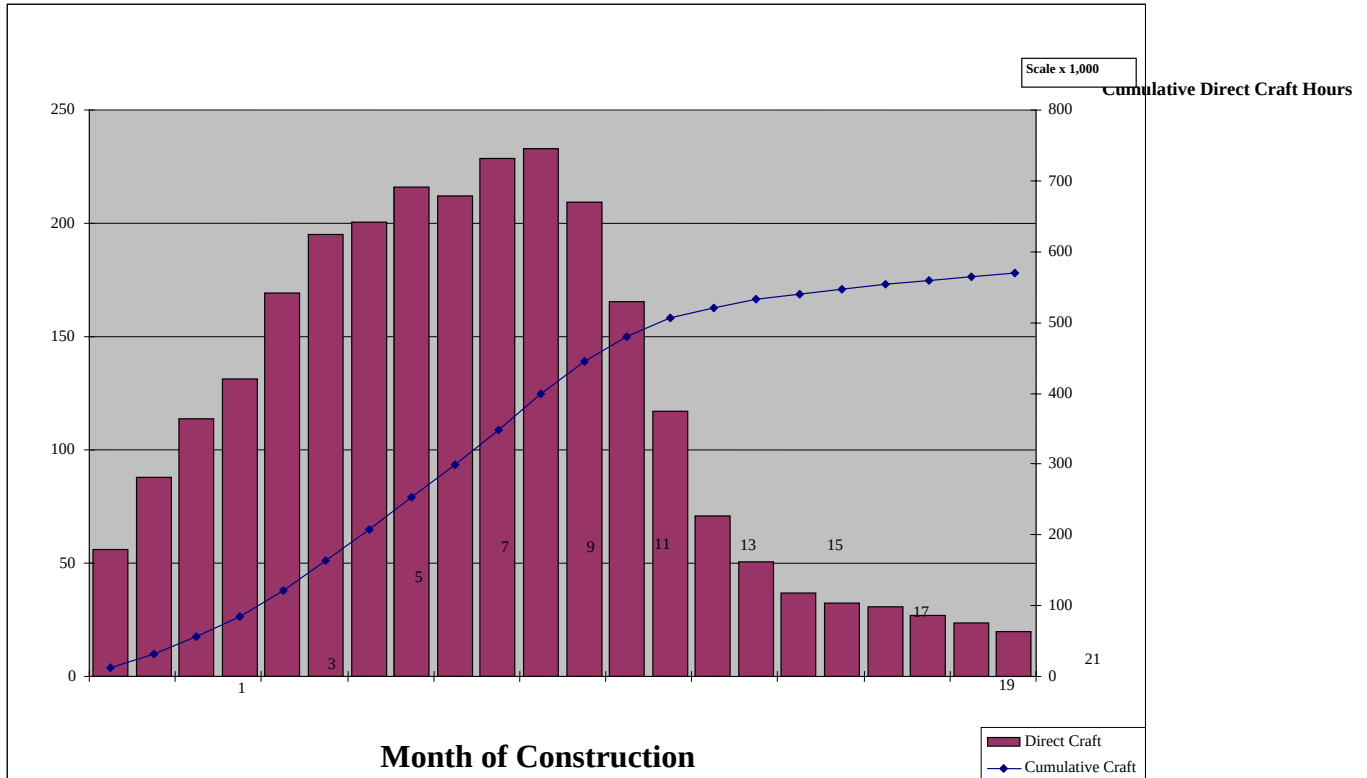


Figure 4.6-4
Direct Craft per Month

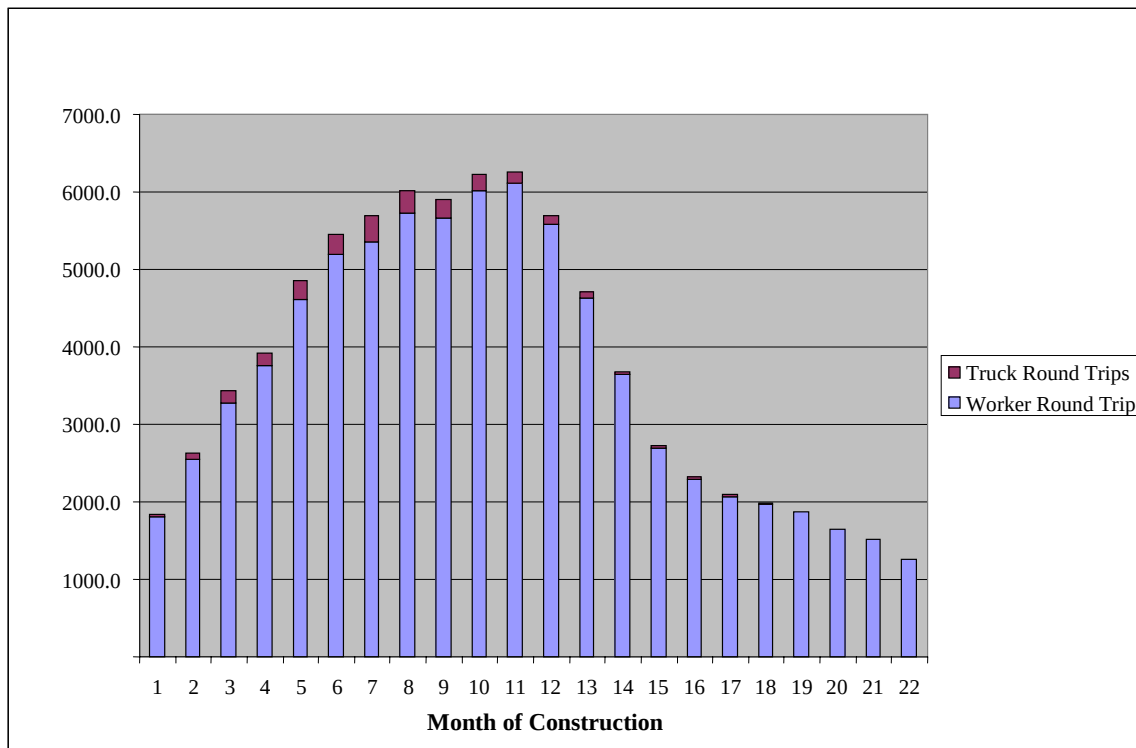


Figure 4.6-5
Projected Round Trips to the Site During Construction

work days in a month. On average during the construction period, there will be 3,602 round trips per month made to the site, or an average of 164 round trips each work day. As subsequent units are added to the site, similar construction patterns will be anticipated as those shown on Figure 4.6-5.

Assuming that 70 percent of the trips at construction peak are assumed to travel to the site via I-95 and Midway Road, then the average daily additional traffic will be 399, ($2 * 285 * .7$) or 3.5 percent, over the 2003 AADT count of 11,400 for Midway Road east of I-95. If 30 percent of the peak month trips are assumed to travel to the site via Highway 1 and Midway Road, then at the peak of construction in month 11, the AADT will increase by 171 ($285 * 2 * .3$) or less than half of one percent over the 2003 traffic count data for Midway Road at Highway 1 of 37,000. On average over the 22 month construction period, the increase over the 2003 traffic levels will be 2 percent at Midway Road east of I-95, and approximately three-tenths of one percent at Highway 1 and Midway Road.

In practice, the impacts during peak commuter periods should be slightly less than that implied by the percentage increase in AADT figures listed above. This is because 50 hour work weeks (5 x 10 hour days) are anticipated for the construction staff, meaning

that project traffic commuting patterns will not coincide exactly with other commuters working 8 hour days; and truck deliveries will be dispersed throughout the day.

4.6.4 Housing Impacts

Construction of a power facility has the potential to impact housing in a variety of ways. Impacts could include the direct removal of housing units; visual impacts due to the location of the project near residential areas, and a shortage of housing should there be an influx of workers requiring long-term lodging during construction.

The TCEC Unit 1 facility will not require the removal of any housing units at the TCEC site or along the transmission lines or gas pipeline routes. Further, as discussed in Subsection 4.6.1, because the site location is zoned for utility use and located in an industrial park, and because only one home, approximately a 0.25 mile away, has only a partial view of the site, no negative housing impacts are expected to occur, and no change in designated land use will be required.

The potential for housing shortages has been an issue historically for the construction of large coal plants in sparsely populated areas in the western United States. However, experience has also shown that smaller projects (non-coal plants) located in or near urban areas typically have no noticeable impacts on the housing market. The reason is that impacts are primarily a function of the size of the construction workforce and the need for the workforce to relocate during construction. The need to relocate is a function of the available workforce within a reasonable commuting distance of the work site. Research by the Electric Power Research Institute (EPRI) has indicated that the construction workforce for a power plant project can reasonably be expected to commute without relocating during construction from a distance of more than 70 miles, with instances of a commuting distance of more than 100 miles found in each of the construction projects studied. When a 70 mile radius around the TCEC site is considered, large metropolitan areas including Fort Lauderdale and Orlando are within commuting distance to the site, and a 100 mile radius includes all or part of the large cities of West Palm Beach, Coral Springs and Fort Lauderdale to the south, and Melbourne, Palm Bay, and even Orlando to the north. Based on the large population of these areas as well as the size of the construction work force in the Treasure Coast counties (the construction and real estate sector in these counties employed 15,235 workers in 2003), it is unlikely that a substantial number of the Unit 1 construction workforce would choose to relocate during the 22 month construction period.

This conclusion is further supported by the fact that during the 22 month period, most workers will be onsite for less than the total construction period, further reducing the likelihood that any sizable relocation would occur. Figure 4.6-6 indicates the limited duration of employment at the site by the major construction groups. To the degree that

short-term or occasional lodging is needed by some of the workforce, Subsection 2.2.7.11 explained that St. Lucie County has an abundance of hotel and other short-term lodging options because of its destination for vacationers and recreational enthusiasts. Census data in Subsection 2.2.7.9 also indicated that there was a rental vacancy rate of 11.8 percent. Assuming a continuation of the vacancy pattern, there would be no noticeable impact on rental unit availability even if a portion of the workforce should choose to relocate during construction.

4.6.5 Public Facilities and Services

Construction of TCEC Unit 1 has potential to negatively impact local community public facilities and services. Areas of potential impact include police and fire protection, hospital services, the demand for water, wastewater, electricity, and natural gas supplies, the demand for landfill and trash removal services, and impacts on school facilities. The potential for impacts in these areas is discussed below. Generally, construction practices will be designed to minimize or eliminate negative impacts on community facilities and services, and the cost for services likely to be required are included as part of the construction budget and will be paid for on a user fee basis.

A construction safety plan is to be developed for the site. This plan will facilitate a safe working environment for the construction workforce. The safety plan will comply with all OSHA requirements, all workers will undergo training to familiarize themselves with the safety plan, and every member of the construction work force will be required to adhere to the requirements. Examples of proven safety measures include the required use of hard hats in construction areas, and required use of tie lines for those working at elevated heights.

In addition, the site will include a high chain link fence around the perimeter that will encompass the plant footprint area and lay-down area for equipment and supplies. There will be limited access to the plant construction site, with a security guard posted on site and a badge system to control personnel access. The site will include security lighting and fire suppression equipment. First aid stations will be established and maintained throughout the TCEC site. First aid training will also be provided to selected individuals in the construction workforce. Standard procedures will be adopted for spill prevention and containment, injury response, and requests for assistance from local police, fire, and ambulance service.

The primary emergency responder to the TCEC will be the SLCFD Station #6 located at 350 East Midway Road, which is less than 4 miles from the TCEC. The backup emergency responders to the TCEC will be the SLCFD Station #1 or Station #14. Station #1 is located approximately 4.24 miles from the TCEC and Station #14 is located

approximately 9 miles from the TCEC in Port St. Lucie. Further, the Ft. Pierce Police Department is located approximately 8 miles north of the TCEC.

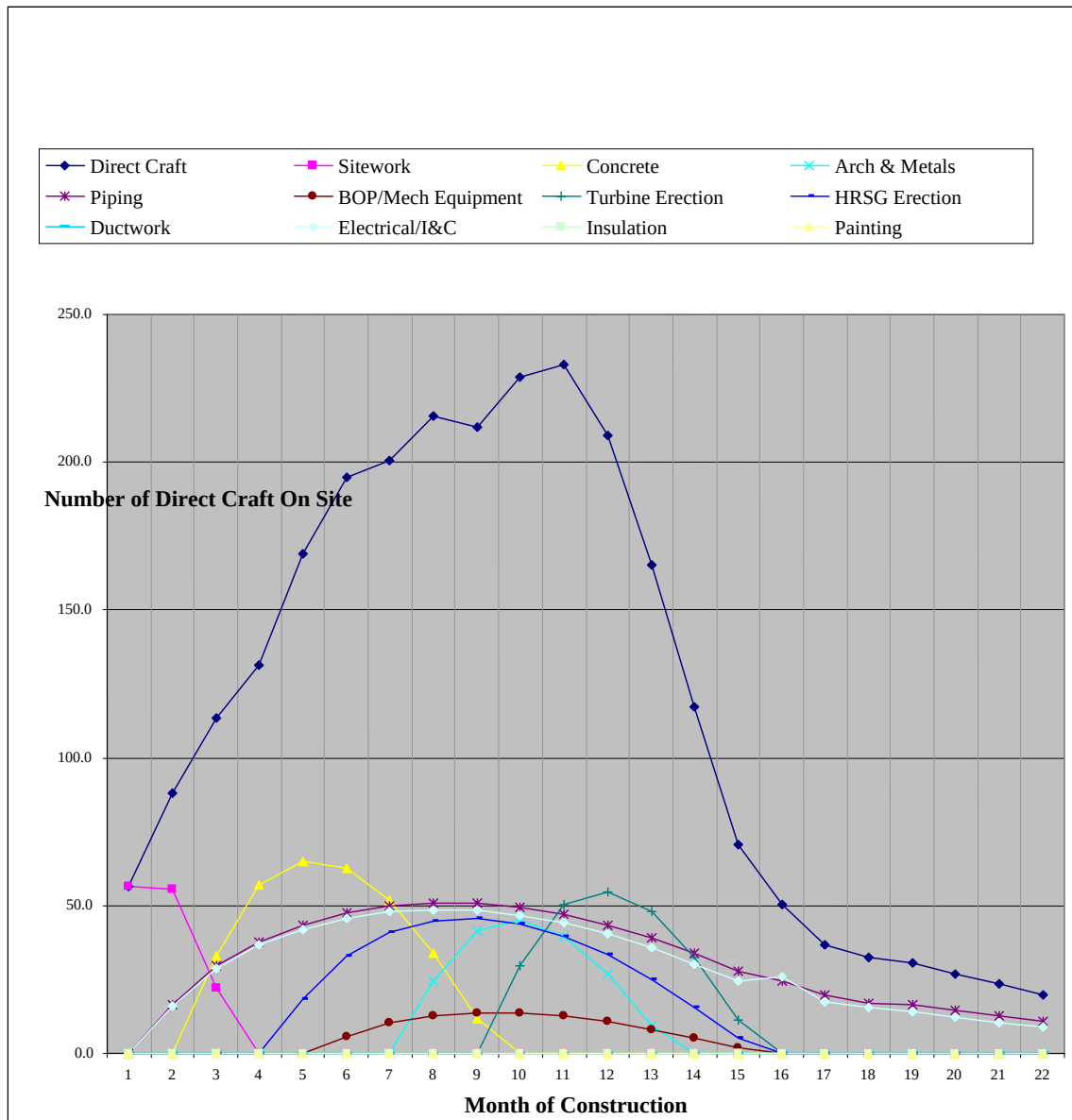


Figure 4.6-6
Direct Craft on Site by Discipline

With the safety plan in place, it is anticipated that the need for support services and facilities from police, fire, and hospital services will be minimal. Should hospitalization be required for a worker as the result of an onsite injury, the Ft. Pierce area, as discussed in Subsection 2.2.7.14, has complete care hospital facilities capable of handling virtually any type of medical need.

Water requirements during construction will be modest, and will be supplied by FPUA from the water force main until the onsite well becomes functional. The site will have portable restrooms for construction workers, thereby minimizing the need for an interconnected wastewater system until the system is in place.

Waste generated from construction of the TCEC will be placed in large industrial dumpsters that will be obtained from and serviced either by the City of Fort Pierce, or through an independent contractor. The dumpsters will be emptied on a schedule sufficient to avoid overfilling during the construction period, and fees will be paid to cover all disposal costs.

There are no impacts expected to the educational system as a result of the construction of the facility. Because construction workers are expected to commute from their existing residence rather than relocate to the area, enrollment in area schools should not increase to any significant degree due to Unit 1 construction.

As subsequent units are added to the TCEC site, similar levels of impacts would be expected to occur. That is, relatively minor, temporary, and manageable impacts would be expected on the local community facilities and services, and construction management practices will be employed to avoid significant negative impacts.

4.6.6 Impacts from Construction Noise

Noise emissions attributable to construction activities are highly variable, depending on the location and operating load of the construction equipment and the construction phase activities. The following sections discuss the methodology for estimating the construction activity noise emissions, the offsite noise levels associated with Unit 1 construction, and the evaluation of the noise levels and potential impacts to nearby receptors.

4.6.6.1 Construction Activities. Major construction phases will consist of site preparation, foundation construction, building and equipment erection, and site cleanup/facility startup. Noise emissions will vary with each phase of construction depending on the construction activity and the associated equipment required for each phase.

Site preparation will require the use of heavy diesel-powered earth moving equipment. Examples of this equipment include bulldozers, scrapers, dump trucks,

graders, and front end loaders. Noise emissions during site preparation will be dominated by the diesel engine noise.

Foundation construction primarily will involve concrete handling equipment such as concrete trucks, mixers, vibrators, pumps, and pile driving (if necessary) equipment. Some earth moving equipment will also be required to backfill the foundations. Foundation construction activities will primarily be centered at the power block and cooling tower equipment areas.

The equipment and building installation will involve diesel-powered earth moving equipment, mobile cranes, equipment delivery, impact wrenches, saws, drills, and air compressors. Again, these activities will primarily be centered at the power block and cooling tower equipment areas.

Site cleanup and facility startup will generally result in lower noise emissions than the preceding construction phases with the exception of steam blowout of the HRSG and steam lines. At the end of construction, low-pressure steam is passed through the HRSG to remove any debris within the steam lines prior to connecting to the steam turbine. Noise is produced when the steam is vented to the atmosphere. Typical steam blow schedules will involve several steam releases lasting several hours each, occurring within a 2 week period. While vent silencers are often employed, the steam blow noise is still easily discernable at offsite locations. Local residents will be notified through correspondence sent through the U.S. Postal Service by FMPA in advance of the steam blow period to minimize adverse impacts related to steam blows.

Project construction will occur throughout the day. Daily onsite construction is expected to commence at 7 a.m., although vehicles delivering construction materials may arrive at the site before 7 a.m. Depending upon the construction contractor's work schedule, either one or two work shifts per day may be utilized. Construction may occur during evening hours when needed to complete extended construction activities, such as cement pours, placement of pilings and cleaning of piping and equipment with steam. These activities must continue until completed to insure structural and operational integrity of the TCEC. These extended construction activities will be of temporary duration; reasonable alternatives are not available.

4.6.6.2 Equipment Noise Emissions. The variable nature of construction noise is best represented by an average noise level. The average noise levels account for the type and quantity of equipment, the typical usage of each piece of equipment, and typical noise levels of the equipment used during each phase of construction. The typical types of equipment, equipment usage, and equipment noise emissions for each phase of construction are listed in Table 4.6-1. Estimates of the construction equipment usage and noise levels are based on information provided in the EPA Document PB-250 430, Noise Emission Standards for Construction Equipment (EPA 1975) and the Power Plant

Construction Noise Guide, Report No. 3321, prepared by Bolt Beranek and Newman Inc. (1977).

4.6.6.3 Evaluation of Construction Noise Impacts. The variable nature of construction activity makes it difficult to predict construction noise emissions. While the average noise level is representative of construction activities, certain activities will produce temporary elevations in the noise level. By contrast, decreased noise emissions will occur during reduced construction activities. Estimated construction noise emissions at the nearby receptor locations are provided in Table 4.6-2. As shown, the foundation construction stage is anticipated to result in the highest noise level.

The St. Lucie County noise ordinance includes an exemption for noise resulting from construction activities occurring between 7:00 a.m. and sundown. Construction activities resulting in offsite noise emissions between sundown and 7:00 a.m. will require a special permit from St. Lucie County.

Table 4.6-2 also indicates the sound levels associated with Unit 1 construction activity that are estimated to range from 39 dBA to 54 dBA at the nearby receptors. Construction related noise is expected to be highest at NML 4 due to its proximity to the project site. However, because NML 4 is bordered by Florida's Turnpike and Glades Cutoff Road, it already experiences daytime sound levels of 50 dBA (L₉₀) and noise related to heavy traffic volumes. As such, noise associated with Unit 1 construction activity is not expected to have significant impacts. Table 4.6-3 provides a comparison between the measured background sound levels and the estimated average construction sound levels for each of the four receptor locations discussed in Subsection 2.3.8. In general, construction noise emissions associated with Unit 1 are consistent with existing daytime sound levels; therefore, significant impacts are not anticipated.

Table 4.6-1 Typical Construction Equipment Noise Emissions							
Phase	Equipment	Lp ¹ (50 ft) (dBA)	Qty	Usage ²	Usage Factor ²	Acoustic Max Factor ²	L _{av} ³ (50 ft) (dBA)
Road Construction / Site Preparation	Backhoe	86	1	0.04	-14	-4	68
	Concrete Vibrator	78	5	0.16	-8	-3	74
	Drill	87	1	0.16	-8	0	79
	Grader	86	1	0.30	-5	-6	75
	Diesel Generator	81	1	0.16	-8	-3	70
	Trencher	86	1	0.21	-7	-3	76
	Mobile Crane	83	1	0.16	-8	-8	67
	Dozer	85	2	0.60	-2	-5	81
	Front End Loader	86	2	0.33	-5	-5	79
	Compactor	82	2	0.50	-3	-3	79
	Truck, Large	84	4	0.16	-8	-8	74
	Water Truck	84	1	0.35	-5	-8	71
	Mobile Crane	83	1	0.16	-8	-8	67
Foundation	Front End Loader	86	2	0.33	-5	-5	79
	Concrete Vibrator	78	4	0.16	-8	-3	73
	Pile Driver	98	2	0.04	-14	-3	84
	Drill	87	1	0.16	-8	-3	76
	Saw	70	2	0.21	-7	-3	63
	Torque Wrench	85	2	0.05	-12	-3	73
	Concrete Delivery Truck	84	1	0.25	-6	-8	70
	Concrete Pump	78	1	0.08	-12	-3	63
	Concrete Saw	96	1	0.04	-14	-3	79
	Chop Saw	82	1	0.04	-14	-3	65
	Bush Hammer	85	1	0.25	-6	-3	76
	Dozer	85	1	0.50	-3	-5	77
	Stationary Crane	82	2	0.33	-5	-13	67
	Backhoe	86	2	0.40	-4	-4	81
	Truck, Large	84	4	0.16	-8	-8	74
	Diesel Generator	81	1	0.16	-8	-3	70
	Compactor	82	2	0.35	-5	-3	77
	Air Compressor	87	1	0.25	-6	-7	74

**Table 4.6-1 (Continued)
Typical Construction Equipment Noise Emissions**

Phase	Equipment	Lp ¹ (50 ft) (dBA)	Qty	Usage ²	Usage Factor ²	Acoustic Max Factor ²	L _{av} ³ (50 ft) (dBA)
Equipment Erection	Mobile Crane	83	1	0.50	-3	-8	72
	Backhoe	86	2	0.20	-7	-4	78
	Truck, Large	84	4	0.16	-8	-8	74
	Trencher	86	1	0.21	-7	-3	76
	Stationary Crane	82	5	0.50	-3	-13	73
	Diesel Generator	81	1	0.33	-5	-3	73
	Welder	81	1	0.65	-2	-3	76
	Grinder	80	1	0.25	-6	-3	71
	Chop Saw	82	1	1.00	0	-3	79
	Drill	87	1	0.16	-8	-3	76
	Torque Wrench	85	7	0.16	-8	-3	83
	Air Compressor	87	1	0.25	-6	-7	74
Startup	Grader	86	1	0.10	-10	-6	70
	Trencher	86	1	0.10	-10	-3	73
	Drill	87	1	0.16	-8	-3	76
	Torque Wrench	85	5	0.16	-8	-3	81
	Diesel Generator	81	1	0.16	-8	-3	70
	Truck, Large	84	4	0.05	-12	-8	70
	Mobile Crane	83	1	0.05	-12	-8	63
	Air Compressor	87	1	0.25	-6	-7	74

¹Average sound pressure level at 50 feet (15 m) horizontal distance from the equipment.

²Based on information provided in the Power Plant Construction Noise Guide prepared by Bolt Beranek and Newman Inc. and information available from previous similar projects.

³Energy average sound pressure level at 50 feet (15 m) horizontal distance from the equipment for work shift of 7 – 10 hours.

Sources: *Power Plant Construction Noise Guide*, 1977.

U.S. EPA Noise Emission Standards for Construction Equipment, 1975.

Table 4.6-2 Equivalent Noise Level of Construction Noise at Receptor Locations for each Construction Phase		
Construction Phase	Location Number	Equivalent Noise Level L_{av} , dBA
Site Preparation	NML 1	42
	NML 2	45
	NML 3	44
	NML 4	52
Foundation	NML 1	44
	NML 2	47
	NML 3	46
	NML 4	54
Equipment Erection	NML 1	42
	NML 2	45
	NML 3	44
	NML 4	52
Startup ¹	NML 1	39
	NML 2	42
	NML 3	41
	NML 4	49
¹ Sound level estimates do not include the influence of steam blows.		

Table 4.6-3 Equivalent Noise Level of Construction Noise at Receptor Locations for each Construction Phase		
Construction Phase	Measured Daytime Background Sound Level (L_{90}), dBA ¹	Construction Equivalent Noise Level L_{av} , dBA ²
NML 1	42	39 - 44
NML 2	44	42 - 47
NML 3	47	41 - 46
NML 4	50	49 - 54
¹ Based on the median sound level recorded between the hours of 7 a.m. and 7 p.m. ² Sound level estimates do not include the influence of steam blows.		

4.7 Impact on Landmarks and Sensitive Areas

Construction of Unit 1 or future units is not anticipated to impact the landmarks or non-residential sensitive areas identified in Subsection 2.2.5 or 2.2.7.17. There are no such resources onsite or in the immediate vicinity; the nearest such resource is the Reed Wilderness Seashore Sanctuary located south of St. Lucie County in Martin County. As described in Section 4.5, fugitive dust emissions will be controlled to minimize impacts on visibility. Construction noise and vibration are exempt from the St. Lucie County Code of Ordinances between 7:00 a.m. and sundown, in accordance with Section 1-13.8-19(n). However, construction noise and vibration are not expected to affect the quality of life in the area due to existing industrial activities in the area and distance attenuation.

4.8 Impact on Archaeological and Historic Sites

No archaeological or historic sites have been identified on the TCEC site or in the immediate vicinity, as previously described in Subsection 2.2.6. No impacts to such resources are anticipated as a result of Unit 1 or future unit construction. If any such resources are discovered during construction, work in that area will stop, and the DHR will be contacted within 24 hours for an appropriate plan of action.

4.9 Special Features

There will be no unusual products, raw materials, garbage disposal services, incinerator effluents, or residues produced during construction that will have an adverse effect on the environment and ecological systems of the plant site and the adjacent areas. Construction debris, trash, and garbage will be collected in appropriate containers and removed from the site by the contractor for disposal at an approved landfill or resource recovery facility.

4.10 Benefits from Construction

Previous sections have discussed a number of project benefits arising from the construction of Unit 1. In sum, these benefits consist of the following:

- Employment--The project will create a total of 3,714 man-months of employment at the site during the 22 month construction duration. This is an average of 169 workers at the site each month. Of this number, an average of 119 will be direct craft labor, and the remainder will be indirect craft labor, construction management, and local utility staff.

- Income--Total site wages for Unit 1 are anticipated to be \$23.6 million. Of this amount, \$17.0 million will be paid to direct craft labor, with the remainder paid to indirect craft labor, construction management, and local utility staff personnel.

In addition, the Unit 1 will generate significant indirect economic impacts during the construction period due to an economic multiplier effect. The multiplier impacts will benefit the City of Fort Pierce, St. Lucie County, and the entire state, particularly the other counties from which construction workers will commute. Section 7.2 provides a multiplier impact analysis that predicts the multiplier impacts on employment, income, and output in the primary project impact area that consists of the Treasure Coast counties.

As subsequent units are added at the TCEC site, the benefits anticipated for Unit 1 will again be generated, with only slight deviations expected in the employment and income benefit levels.

4.11 Variances

No variances from applicable standards are requested for Unit 1 construction.

4.12 References

Code of Ordinances, County of St. Lucie, Florida, St. Lucie County Board of County Commissioners, adopted April 6, 2004.

EPRI, "Impacts of Power Plants," EPRI EA-2228, February 1982, page IV-4.

Based on data from Enterprise Florida, <http://www.eflorida.com/profiles/>.

EDR, Inc., *EDR Radius Map with GeoCheck*, Duke Energy Proposed Power Plant site, Midway Industrial Park, Inquiry Number: 420166.3s, October 22, 1999.

http://www.dep.state.fl.us/waste/categories/wc/pages/npl_1199.htm, site accessed on April 12, 2005

http://www.dep.state.fl.us/waste/quick_topics/publications/wc/siteinv/SiteStatus/internet_southeast.pdf, site accessed on April 12, 2005.

Black & Veatch, Sarah Howard in personal communication with Grace Rivera, Florida Department of Environmental Protection, April 12, 2005.

5.0 Effects of Plant Operation

5.1 Effects of the Operation of the Heat Dissipation System

The Treasure Coast Energy Center – Unit 1 (Unit 1) will use a mechanical draft cooling tower as the major equipment heat dissipation/cooling method. In the long term, water for cooling tower makeup will be reclaimed water supplied from a new FPUA sewage treatment plant that is planned to be constructed on the property adjacent to and north of the TCEC site. Backup supply of cooling water will be provided by onsite groundwater wells. Well water will also initially be the cooling water source if the new FPUA wastewater treatment plant is not yet in service at the time of Unit 1 startup. Additional backup will be provided by the FPUA municipal water system, although this source has limited capability to supply water to the site and cannot meet long-term needs. Cooling tower blowdown and other process wastewaters will be pumped directly to the FPUA municipal wastewater treatment plant for disposal in injection wells.

5.1.1 Temperature Effect on Receiving Body of Water

Cooling towers are a common method used to dissipate heat produced during power generation. There will be no discharge of cooling waters from the heat dissipation system to surface waters or groundwater. Blowdown from the heat dissipation system will be combined routed to the FPUA municipal wastewater plant for disposal in the deep injection wells.

5.1.2 Effect on Aquatic Life

There will be no discharge of effluent from Unit 1 into surface waters; therefore, no impacts to aquatic life are expected.

5.1.3 Biological Effects of Modified Circulation

Unit 1 will use reclaimed water for cooling water supply. Modified circulation of a water body will not occur; therefore, there will be no biological effects.

5.1.4 Effects of Offstream Cooling

The purpose of this section is to assess the potential environmental impacts associated with the operation of cooling towers at the TCEC. Potential impacts from the cooling towers include plume induced fogging and icing, deposition from circulating water drift, and visible plume formation. The following subsections describe the cooling towers at the TCEC, explain the methodology and assumptions used to quantify the

magnitude and extent of the impacts, present the results of the modeling, and discuss the potential environmental effects.

5.1.4.1 Cooling Tower Description. Each of the four 300 MW combined cycle units proposed necessitates the construction and operation of a cooling tower. The proposed cooling towers will be mechanical draft, counterflow, wet design cooling towers incorporating plume abatement features. The preliminary design consists of four towers each consisting of eight cells arranged along a northwest-southeast axis. Since this SCA application is for the ultimate certification of all four combined cycle combustion turbines, the combined effects from all four cooling towers are considered in this analysis.

5.1.4.2 Technical Approach. A computer modeling analysis was performed to evaluate the magnitude and extent of the potential environmental impacts resulting from the operation of the cooling towers at the TCEC. The Electric Power Research Institute (EPRI)-sponsored Seasonal/Annual Cooling Tower Plume Impact (SACTI, Version 11-1-90) model was used to quantify the cooling tower impacts. This computer code is an outgrowth of an earlier model evaluation study carried out by A. J. Policastro of the Argonne National Laboratory (ANL). Improved plume and drift models in the code have been calibrated with existing field and laboratory data and then subsequently verified with new data not included in the calibration process. The SACTI model has been widely used by electric utilities and their consultants to assess cooling tower plume impacts for incorporation into various types of environmental impact studies.

The methodology used in the SACTI model is based on the assumption that up to 35 distinct plume categories, based on the local ambient meteorological conditions and cooling tower design characteristics, can be identified at any given site. For mechanical draft cooling tower designs, the SACTI code assumes that 10 additional distinct plume categories may exist which are characteristic of plume induced ground level fogging and icing. In other words, depending on the type of cooling tower and the specific site conditions, a cooling tower plume may exhibit up to 45 distinctly different sets of plume characteristics (e.g., plume height, plume spread, plume downwash, and plume dispersion). In the case of mechanical draft cooling tower arrangements, the effects of the orientation of the tower with respect to merging cell plumes and structure induced downwash are simulated through the use of representative wind directions and the specific tower configuration.

The cooling tower plume in each of the aforementioned categories is produced by a different set of ambient meteorological conditions. Hourly meteorological data are used by the SACTI model to compute frequency distributions of the meteorological conditions responsible for each plume type within the assumed plume category. The SACTI model

performs the following computational functions in a sequential manner to determine the representative plume categories and plume impacts:

- **Meteorological Data Preprocessor**--The meteorological data preprocessor performs three subtasks to delineate plume categories and calculate representative parameters for each category. In the first subtask, hourly surface meteorological data are read and invalid or missing parameters and hours are discarded. For each valid record, the model uses cooling tower parameters such as tower height, tower effective exit diameter, tower effective heat rejection, and tower effective air flow to calculate additional exit parameters including temperature and velocity, and some nondimensional parameters which characterize the buoyancy of the plume and the stability and saturation of the ambient air.

The second subtask generates frequency distribution tables for ranges of tower, meteorological, and nondimensional parameters as a function of the standard 16 wind directions. These meteorological variables represent the full range of atmospheric conditions affecting plume dispersion and drift deposition. For example, the SACTI model selects temperature ranges from -49° F to 113° F in 9° F intervals. The frequency of actual dry-bulb temperatures occurring in each of those ranges for each of the standard 16 wind directions is tabulated. Likewise, the model tabulates relative humidity values falling between 0 and 100 percent in intervals of 10 percent.

Subtask 3 uses the frequency distributions from Subtask 2 to delineate the distinctly different plume categories that could occur from cooling tower operation. Categories are selected so that all categories are roughly equally populated. A single set of representative tower and ambient conditions is then calculated from the range of conditions in each category, and then reassigned to each category.

- **Plume Calculations**--Using the preprocessor's representative conditions and cooling tower design data (e.g., tower orientation, number of cells, drift droplet spectrum, and salt concentrations), the plume code calculates fogging/icing and the plume's dimensions and depositional characteristics for each plume category and each representative wind direction. For example, assuming 45 total drift and fogging categories and four representative wind directions, a total of 225 plume cases are simulated.

As previously stated, the representative wind directions are used to simulate tower-induced downwash. Therefore, specific output showing

the nature and extent of the downwash is not generated by the program. Rather, output is generated for each representative wind direction, and the downwash effects can be inferred from the deposition/fogging/icing gradients.

- Impact Calculations--The various plume code prediction results are used in conjunction with the meteorological data preprocessor's frequency distribution of plume categories and actual wind directions to calculate impacts. The resulting cumulative impacts from all plume categories are tabulated and plotted in the SACTI model output as a function of wind direction and distance from the cooling tower.

5.1.4.2.1 Cooling tower plume model input. The SACTI cooling tower model requires certain site-specific, tower-specific, and circulating water-specific data as input. The input data used in this SACTI cooling tower modeling analysis are discussed below and summarized in Table 5.1-1 with the documented source of the data:

- Site-specific data includes the site's latitude and longitude, time zone, surface roughness height, monthly clearness indices, daily solar insolation values, representative hourly recorded surface meteorological data, and seasonal average morning and afternoon mixing heights.
- Tower-specific data includes information pertaining to the type of cooling tower, dimensions of the tower housing, cell exhaust diameter, heat load, drift rate, design air flow rate, and orientation of the cooling tower cells with respect to the 16 representative wind directions.
- Water-specific data includes the circulating water salt concentration, salt density, and the size distribution of the water droplets in the cooling tower drift.

The TCEC latitude, longitude, time zone, and surface roughness height were either directly measured or estimated. The monthly clearness indices and solar insolation values were obtained from Appendix B of the User's Manual for the SACTI Computer Code for a representative location at approximately the same latitude (EPRI 1984).

Table 5.1-1 SACTI Cooling Tower Modeling Input Parameters		
		Data Source/Notes
Site-Specific Data		
Site Latitude	27.384° N	Measured
Site Longitude	80.378° E	Measured
Time Zone	-5	Measured
Surface Roughness Height	10 cm	Estimated
Monthly Clearness Indices (K_T)	0.61, 0.62, 0.63, 0.61, 0.59, 0.55, 0.57, 0.56, 0.55, 0.56, 0.60, 0.60	SACTI User's Manual for Miami, FL
Monthly Average Daily Total Solar Flux (MJ/m^2)	14.34, 17.40, 20.53, 22.75, 23.08, 22.21, 22.46, 21.24, 18.69, 16.27, 14.80, 13.34	SACTI User's Manual for Miami, FL
Meteorological Data (hourly surface data)	West Palm Beach, FL (91-95)	NOAA CD-ROM
Seasonal Average Mixing Heights	707 m (Winter morning) 1,221 m (Winter afternoon) 980 m (Spring morning) 1,459 m (Spring afternoon) 1,071 m (Summer morning) 1,383 m (Summer afternoon) 933 m (Fall morning) 1,341 m (Fall afternoon)	SACTI User's Manual for Miami, FL
Wind Instrument Reference Height	10.1 m (anemometer height)	EPA SCRAM website
Tower-Specific Data		
Tower Type	Linear Mechanical Draft	Design Criteria
Number of Towers	4	Note 1
Total Number of Cells	32	Note 2
Effective Exhaust Diameter	55.49 m	Note 3
Tower Height	17.0 m	Note 4
Tower Width	29.26 m	Note 4
Tower Length	58.52 m	Note 4
Total Heat Dissipation Rate	1,040.4 MW	Note 5
Total Circulating Water	444,520 gpm	Note 5
Total Drift Loss Rate	140.12 g/s	Note 5, based on 0.0005% drift rate.
Total Airflow Rate	17,504 kg/s	Note 5
Water-Specific Data		
Cooling Tower Salt Concentration	0.005331 g Salt/g Soln	Preliminary Design
Salt Density	2.20 g/cm ³	Estimated
Drift Droplet Spectrum	Drop Size Mass (μm) Fraction	Estimated, based on EPRI Study <i>Calculating Realistic PM₁₀ from Cooling Towers</i> .
	0-10 0.0000	
	10-20 0.0020	
	20-30 0.0003	
	30-40 0.0029	
	40-50 0.0130	
	50-60 0.0389	
	60-70 0.1565	
	70-90 0.2846	
	90-110 0.2070	
	110-130 0.1151	

Table 5.1-1 (Continued)
SACTI Cooling Tower Modeling Input Parameters

Table 5.1-1 (Continued)																										
SACTI Cooling Tower Modeling Input Parameters																										
		Data Source/Notes																								
	<table><tr><th>Drop Size (μm)</th><th>Mass Fraction</th></tr><tr><td>130-150</td><td>0.0599</td></tr><tr><td>150-180</td><td>0.0302</td></tr><tr><td>180-210</td><td>0.0144</td></tr><tr><td>210-240</td><td>0.0162</td></tr><tr><td>240-270</td><td>0.0060</td></tr><tr><td>270-300</td><td>0.0160</td></tr><tr><td>300-350</td><td>0.0072</td></tr><tr><td>350-400</td><td>0.0133</td></tr><tr><td>400-450</td><td>0.0073</td></tr><tr><td>450-500</td><td>0.0000</td></tr><tr><td>500-600</td><td>0.0093</td></tr></table>	Drop Size (μm)	Mass Fraction	130-150	0.0599	150-180	0.0302	180-210	0.0144	210-240	0.0162	240-270	0.0060	270-300	0.0160	300-350	0.0072	350-400	0.0133	400-450	0.0073	450-500	0.0000	500-600	0.0093	
Drop Size (μm)	Mass Fraction																									
130-150	0.0599																									
150-180	0.0302																									
180-210	0.0144																									
210-240	0.0162																									
240-270	0.0060																									
270-300	0.0160																									
300-350	0.0072																									
350-400	0.0133																									
400-450	0.0073																									
450-500	0.0000																									
500-600	0.0093																									
Note 1: While there are four separate cooling towers proposed for the TCEC, the SACTI modeling analysis was performed with a representative single larger tower for modeling purposes. Note 2: The SACTI model used has a limit of 24 cells. Therefore, the actual number used in this analysis was 24. However, all tower characteristics were input as the total from 32 cells. This includes variables such as effective exhaust diameter, heat dissipation rate, circulating water, drift loss rate, and air flow. This effectively forces the model to exhaust the characteristics of a 32 cell tower through 24 cells. Note 3: Effective exhaust diameter is calculated using an equation from the SACTI user’s manual where the square-root of the total number of cells is multiplied by the actual diameter of a single cell. The total number of cells is 32 (4 towers x 8 cells each). The actual diameter of a single cell is 9.81 m. Note 4: These values represent the dimensions of a single tower. The value for tower length used in this SACTI analysis was multiplied by 3 since SACTI only accepts 24 cells (i.e., 24 cell SACTI limit divided by 8 cells per tower yields an effective tower length of 175.56 m for input to SACTI). Note 5: These values represent the total from all four towers.																										

Five years (1991-1995) of surface meteorological data from West Palm Beach, Florida, collected by the National Weather Service (NWS) and distributed on CD-ROM were used in the SACTI modeling analysis. These data contained the complete set of surface meteorological parameters (originally in HUSWO format; subsequently converted to TD-1440 format) necessary to conduct the cooling tower modeling analysis, and are considered representative of the TCEC site.

The type of cooling tower, dimensions of the tower housing, cell exhaust diameter, heat load, drift rate, design air flow rate, and orientation of the cooling tower cells for the TCEC were all based on data representative of a single larger simulated tower composed of the combined heat load and circulating water flow from all four proposed cooling towers.

The size distribution of drift droplets from the cooling tower is required as input to the SACTI model. The size distribution of drift droplets depends on the details of the interior construction, air and water flow through the fill, and the efficiency of the drift eliminators. The cooling tower drift droplet size spectrum data used in this study are based on representative data of other towers with similar drift eliminators. These drift droplet size data are representative of best available technology (BAT) currently utilized in cooling tower drift eliminator design. The concentration of total dissolved solids (TDS) in the cooling tower circulating water was based on using the Floridan aquifer as the water supply with the cooling tower operating at six cycles of concentration. The Floridan Aquifer water supply provided the highest TDS estimate of all investigated sources of makeup water.

5.1.4.3 Cooling Tower Impact Modeling Results. The SACTI cooling tower model was used to predict the magnitude of the cooling tower induced fogging and icing, deposition, and plume length frequency of occurrence while conservatively assuming the cooling towers are operating the entire year under peak conditions. The cooling tower systems will dissipate waste heat by evaporating water and releasing the water vapor into the atmosphere. If the ambient air is cold and/or moist, a portion of the emitted water vapor will condense to form small water droplets. This condition is seen as a visible white plume emanating from the cooling towers.

Potential environmental impacts such as fogging, icing, and deposition associated with the cooling tower plumes may arise depending on the meteorological conditions and the environmental setting.

5.1.4.3.1 Plume fogging modeling results. Ground level fogging occurs when the visible plume from a cooling tower contacts the ground. Meteorological conditions favorable for ground level fogging from a mechanical draft cooling tower are generally associated with strong winds (generally greater than 20 mph) which bend the plume to

intercept the ground, and high relative humidity (small dew point depression) for easy plume saturation. The cooling tower fogging results are calculated by the SACTI cooling tower model as the maximum number of hours plume induced fogging from a cooling tower could occur for each wind direction. Table 5.1-2 presents the total hours (based on the 5 year West Palm Beach meteorological database) of predicted plume fogging associated with the cooling towers. The 16 wind direction labels in the columns of the table represent the direction from the cooling towers that the plume is headed. The data represent the total hours (over the 5 year data base) that the cooling tower plume could induce fogging conditions for a particular direction and distance from the cooling tower.

Table 5.1-2 Total Hours of Predicted Plume Induced Fogging																	
Distance From Tower (m)	Fogging in the Direction Plume is Headed (Hours)*																
	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE	Total
100	6.8	15.2	16.6	17.9	0.0	0.0	0.0	5.4	8.2	6.7	3.0	1.7	0.0	0.0	0.0	0.8	82.3
200	5.6	21.3	25.3	36.1	28.1	0.0	7.3	9.4	11.0	9.6	3.5	3.2	0.5	0.0	0.0	1.2	162.1
300	1.7	2.1	12.8	27.8	27.0	0.0	8.0	4.5	7.7	0.9	1.7	2.1	0.0	0.0	0.0	0.1	96.4
400	0.2	0.0	1.7	19.8	16.5	0.0	4.9	2.9	1.0	0.0	0.2	1.5	0.0	0.0	0.0	0.0	48.7
500	0.0	0.0	0.0	13.5	13.5	0.0	4.0	2.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	34.0
600	0.0	0.0	0.0	3.1	3.1	0.0	0.9	0.5	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	7.9
700	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
800	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
900	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1400	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1600	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Total hours of fogging over 5 years. Average annual hours of cooling tower induced fogging is obtained by dividing the table value by 5.

Source: SACTI cooling tower model.

As the data in Table 5.1-2 indicate, the SACTI model predicts that, on average, 1.6 hours per year (considering all wind directions) of plume fogging would not extend past 600 m (1,969 ft) in any direction from the cooling towers.

5.1.4.3.2 Plume icing modeling results. Ground level plume icing (fog ice) is a semi-opaque coating of small granules of ice formed when small water droplets in the visible cooling tower fog freeze rapidly on the ground during conditions of high relative humidity and below freezing temperatures. The SACTI cooling tower model predicted no occurrences of cooling tower plume induced icing based on the 5 year West Palm Beach meteorological database. This is consistent with the climate of the area, as records indicate that freezing temperatures occur less than 1 percent of the year on average.

5.1.4.3.3 Water deposition modeling results. Water deposition from a cooling tower occurs when the airborne water droplets coalesce and precipitate downwind of the cooling tower. The pattern of water deposition and the distance of maximum water deposition from the cooling tower are a function of the physical size of the water droplets in the drift, prevailing wind direction, orientation of the cooling tower cells, and the airflow rate.

Table 5.1-3 presents the SACTI model predicted average monthly (based on the 5 year West Palm Beach meteorological database) water deposition rate in scientific notation in units of kg/km²/month associated with the proposed cooling towers at the Treasure Coast Energy Center. The 16 wind direction labels in the columns of the table represent the direction from the cooling towers that the water deposition is predicted to occur.

**Table 5.1-3
Average Monthly Predicted Cooling Tower Water Deposition**

Distance From Tower (m)	Water Deposition in the Direction Plume is Headed (kg/km ² -month)																
	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE	AVG
100	0.00E+00	1.40E+04	0.00E+00	0.00E+00	0.00E+00	1.20E+04	0.00E+00	0.00E+00	0.00E+00	7.10E+03	0.00E+00	0.00E+00	0.00E+00	1.20E+04	0.00E+00	0.00E+00	2.90E+03
200	1.10E+04	2.70E+04	1.60E+04	3.30E+02	2.20E+03	1.00E+04	2.60E+03	8.20E+02	9.10E+03	1.40E+04	5.40E+03	3.60E+02	5.40E+02	3.10E+03	4.10E+02	2.10E+02	6.40E+03
300	8.10E+03	7.10E+03	8.60E+03	5.30E+03	1.10E+04	8.80E+03	8.70E+03	4.50E+03	7.10E+03	5.60E+03	4.10E+03	1.50E+03	2.20E+03	3.20E+03	1.80E+03	1.20E+03	5.60E+03
400	6.30E+03	1.10E+03	5.40E+03	6.80E+03	1.10E+04	1.10E+04	8.10E+03	5.10E+03	6.80E+03	2.50E+03	3.80E+03	2.30E+03	3.50E+03	3.80E+03	3.70E+03	2.80E+03	5.30E+03
500	5.00E+03	9.40E+02	3.10E+03	3.60E+03	8.00E+03	8.60E+03	6.70E+03	3.70E+03	5.00E+03	2.20E+03	3.10E+03	2.30E+03	3.10E+03	3.20E+03	3.40E+03	3.00E+03	4.10E+03
600	3.00E+03	7.60E+02	1.90E+03	1.60E+03	3.30E+03	3.80E+03	3.20E+03	2.30E+03	2.60E+03	1.60E+03	1.80E+03	2.00E+03	2.50E+03	2.50E+03	3.10E+03	3.00E+03	2.40E+03
700	1.90E+03	4.40E+02	1.50E+03	6.10E+02	6.20E+02	2.20E+03	7.10E+02	8.70E+02	1.60E+03	1.20E+03	9.60E+02	1.00E+03	1.10E+03	2.00E+03	1.40E+03	1.70E+03	1.20E+03
800	1.40E+03	1.50E+02	1.40E+03	7.10E+02	1.40E+03	2.00E+03	1.10E+03	7.00E+02	1.20E+03	2.90E+02	6.90E+02	6.20E+02	8.50E+02	9.50E+02	9.50E+02	9.70E+02	9.60E+02
900	1.10E+03	1.60E+02	7.20E+02	7.70E+02	1.30E+03	1.40E+03	9.80E+02	7.10E+02	9.70E+02	3.40E+02	6.20E+02	5.10E+02	6.50E+02	8.00E+02	7.30E+02	7.20E+02	7.80E+02
1000	7.90E+02	1.50E+02	4.70E+02	7.30E+02	1.20E+03	1.20E+03	8.10E+02	5.00E+02	7.10E+02	2.90E+02	4.60E+02	2.30E+02	3.80E+02	9.00E+02	4.30E+02	3.30E+02	5.90E+02
1100	7.10E+02	1.50E+02	3.70E+02	7.00E+02	1.20E+03	1.20E+03	8.20E+02	5.00E+02	6.50E+02	2.90E+02	4.20E+02	2.50E+02	4.30E+02	7.20E+02	5.00E+02	3.60E+02	5.80E+02
1200	5.90E+02	1.60E+02	2.50E+02	4.60E+02	8.60E+02	1.10E+03	6.40E+02	3.90E+02	5.10E+02	3.10E+02	3.50E+02	2.60E+02	4.40E+02	6.90E+02	5.40E+02	4.10E+02	5.00E+02
1300	4.60E+02	1.50E+02	1.50E+02	3.90E+02	5.90E+02	1.00E+03	4.50E+02	3.40E+02	3.70E+02	2.80E+02	2.60E+02	2.40E+02	3.10E+02	7.30E+02	3.70E+02	3.70E+02	4.00E+02
1400	4.30E+02	1.20E+02	1.50E+02	3.70E+02	5.70E+02	7.10E+02	4.30E+02	3.00E+02	3.50E+02	2.60E+02	2.40E+02	1.80E+02	2.70E+02	5.30E+02	3.20E+02	3.00E+02	3.50E+02
1500	4.50E+02	8.50E+01	1.40E+02	3.60E+02	5.40E+02	6.90E+02	4.00E+02	2.90E+02	3.50E+02	2.30E+02	2.40E+02	1.80E+02	2.50E+02	4.70E+02	3.10E+02	2.80E+02	3.30E+02
1600	4.40E+02	6.30E+01	1.40E+02	3.60E+02	5.40E+02	6.80E+02	3.90E+02	2.80E+02	3.40E+02	2.30E+02	2.30E+02	1.80E+02	2.60E+02	4.40E+02	3.10E+02	2.80E+02	3.20E+02
1700	4.10E+02	5.70E+01	1.30E+02	3.50E+02	5.30E+02	6.80E+02	3.90E+02	2.80E+02	3.00E+02	2.10E+02	2.20E+02	1.80E+02	2.30E+02	4.30E+02	2.80E+02	2.80E+02	3.10E+02
1800	3.80E+02	5.50E+01	1.20E+02	3.50E+02	5.20E+02	6.70E+02	3.70E+02	2.70E+02	2.90E+02	2.00E+02	2.00E+02	1.70E+02	2.20E+02	4.40E+02	2.60E+02	2.50E+02	3.00E+02
1900	3.60E+02	5.00E+01	1.20E+02	2.60E+02	5.00E+02	6.70E+02	3.60E+02	2.20E+02	2.70E+02	1.90E+02	1.90E+02	1.50E+02	2.00E+02	4.40E+02	2.30E+02	2.30E+02	2.80E+02
2000	3.50E+02	4.90E+01	1.10E+02	2.10E+02	2.40E+02	6.50E+02	2.00E+02	1.90E+02	2.60E+02	1.80E+02	1.90E+02	1.40E+02	1.60E+02	4.30E+02	2.10E+02	2.10E+02	2.30E+02
2100	3.00E+02	4.40E+01	6.90E+01	1.20E+02	6.80E+01	1.90E+02	1.00E+02	1.40E+02	2.10E+02	1.70E+02	1.60E+02	1.30E+02	1.60E+02	1.50E+02	2.10E+02	2.00E+02	1.50E+02
2200	2.70E+02	4.30E+01	5.70E+01	5.50E+01	6.50E+01	6.80E+01	9.40E+01	1.10E+02	1.90E+02	1.60E+02	1.40E+02	1.20E+02	1.50E+02	1.00E+02	2.00E+02	1.70E+02	1.20E+02
2300	2.50E+02	4.30E+01	4.50E+01	5.20E+01	6.00E+01	6.80E+01	8.90E+01	1.00E+02	1.70E+02	1.60E+02	1.30E+02	1.10E+02	1.50E+02	1.10E+02	1.90E+02	1.60E+02	1.20E+02
2400	1.90E+02	4.00E+01	3.70E+01	4.70E+01	5.20E+01	6.80E+01	8.00E+01	9.60E+01	1.30E+02	1.60E+02	9.60E+01	1.10E+02	1.40E+02	1.10E+02	1.90E+02	1.60E+02	1.10E+02
2500	1.80E+02	2.80E+01	3.30E+01	4.30E+01	5.10E+01	6.80E+01	7.90E+01	8.90E+01	1.20E+02	1.30E+02	8.80E+01	1.00E+02	1.40E+02	1.10E+02	1.80E+02	1.50E+02	9.90E+01
2600	1.70E+02	2.00E+01	3.20E+01	3.80E+01	5.10E+01	6.60E+01	7.80E+01	8.40E+01	1.10E+02	9.50E+01	8.30E+01	1.00E+02	1.40E+02	1.10E+02	1.80E+02	1.40E+02	9.40E+01
2700	1.60E+02	1.70E+01	3.00E+01	3.80E+01	5.10E+01	6.40E+01	7.80E+01	8.40E+01	1.00E+02	8.40E+01	7.50E+01	1.00E+02	1.40E+02	1.00E+02	1.80E+02	1.40E+02	9.10E+01
2800	1.60E+02	1.50E+01	3.00E+01	3.80E+01	4.70E+01	6.20E+01	7.50E+01	8.40E+01	1.00E+02	7.80E+01	7.40E+01	1.00E+02	1.40E+02	1.00E+02	1.80E+02	1.40E+02	8.90E+01
2900	1.50E+02	1.40E+01	2.90E+01	3.80E+01	4.70E+01	5.70E+01	7.40E+01	8.40E+01	9.90E+01	7.30E+01	7.20E+01	1.00E+02	1.40E+02	9.90E+01	1.80E+02	1.40E+02	8.70E+01
3000	1.50E+02	1.40E+01	2.90E+01	3.70E+01	4.30E+01	5.60E+01	7.00E+01	8.10E+01	9.90E+01	7.20E+01	7.20E+01	9.80E+01	1.30E+02	9.80E+01	1.70E+02	1.40E+02	8.50E+01
3100	1.50E+02	1.40E+01	2.90E+01	3.60E+01	4.00E+01	5.60E+01	6.70E+01	8.00E+01	9.90E+01	7.20E+01	7.20E+01	9.70E+01	1.20E+02	9.80E+01	1.60E+02	1.40E+02	8.30E+01
3200	1.50E+02	1.40E+01	2.90E+01	3.40E+01	3.50E+01	4.50E+01	5.60E+01	6.50E+01	9.90E+01	7.20E+01	7.20E+01	7.70E+01	1.00E+02	9.60E+01	1.30E+02	1.10E+02	7.50E+01
3300	1.40E+02	1.40E+01	2.10E+01	3.30E+01	3.10E+01	2.90E+01	4.40E+01	5.80E+01	8.70E+01	7.20E+01	6.40E+01	6.90E+01	7.60E+01	9.20E+01	9.80E+01	1.00E+02	6.40E+01
3400	8.60E+01	1.40E+01	1.30E+01	3.00E+01	3.00E+01	2.90E+01	4.30E+01	5.30E+01	5.40E+01	7.20E+01	4.00E+01	5.90E+01	7.30E+01	9.20E+01	9.40E+01	8.30E+01	5.40E+01
3500	8.60E+01	1.10E+01	1.30E+01	2.00E+01	1.70E+01	2.90E+01	3.40E+01	4.40E+01	5.40E+01	5.80E+01	4.00E+01	5.10E+01	6.60E+01	9.20E+01	8.50E+01	6.90E+01	4.80E+01
3600	8.60E+01	7.60E+00	1.30E+01	1.10E+01	1.30E+01	2.50E+01	3.10E+01	3.90E+01	5.40E+01	3.80E+01	4.00E+01	5.00E+01	6.60E+01	7.90E+01	8.50E+01	6.80E+01	4.40E+01
3700	8.60E+01	7.60E+00	1.30E+01	9.50E+00	1.20E+01	1.70E+01	3.00E+01	3.70E+01	5.40E+01	3.80E+01	4.00E+01	4.80E+01	6.20E+01	5.50E+01	8.00E+01	6.30E+01	4.10E+01
3800	8.50E+01	7.50E+00	1.30E+01	9.40E+00	1.20E+01	1.60E+01	3.00E+01	3.70E+01	5.30E+01	3.80E+01	4.00E+01	4.70E+01	6.10E+01	5.30E+01	7.80E+01	6.20E+01	4.00E+01
3900	8.50E+01	7.40E+00	1.30E+01	9.40E+00	1.20E+01	1.60E+01	3.00E+01	3.70E+01	5.30E+01	3.80E+01	4.00E+01	4.70E+01	6.10E+01	5.20E+01	7.80E+01	6.20E+01	4.00E+01
4000	8.30E+01	7.30E+00	1.20E+01	9.30E+00	1.20E+01	1.40E+01	3.00E+01	3.70E+01	5.20E+01	3.70E+01	3.90E+01	4.70E+01	6.10E+01	5.10E+01	7.80E+01	6.20E+01	3.90E+01
4100	8.00E+01	7.20E+00	1.20E+01	9.10E+00	1.10E+01	1.40E+01	3.00E+01	3.60E+01	5.00E+01	3.70E+01	3.70E+01	4.70E+01	6.10E+01	5.00E+01	7.80E+01	6.10E+01	3.90E+01
4200	7.90E+01	7.20E+00	1.20E+01	9.10E+00	1.10E+01	1.40E+01	3.00E+01	3.60E+01	4.80E+01	3.70E+01	3.60E+01	4.70E+01	6.10E+01	4.90E+01	7.80E+01	6.10E+01	3.90E+01
4300	7.90E+01	7.20E+00	1.20E+01	8.90E+00	1.10E+01	1.30E+01	2.90E+01	3.60E+01	4.80E+01	3.70E+01	3.60E+01	4.60E+01	6.10E+01	4.70E+01	7.80E+01	5.90E+01	3.80E+01
4400	7.80E+01	7.20E+00	1.10E+01	8.60E+00	1.10E+01	1.30E+01	2.90E+01	3.50E+01	4.80E+01	3.70E+01	3.60E+01	4.50E+01	6.10E+01	4.50E+01	7.80E+01	5.70E+01	3.70E+01
4500	7.70E+01	7.20E+00	1.10E+01	8.50E+00	1.10E+01	1.30E+01	2.90E+01	3.50E+01	4.70E+01	3.70E+01	3.50E+01	4.50E+01	6.10E+01	4.50E+01	7.80E+01	5.60E+01	3.70E+01
4600	7.70E+01	7.20E+00	1.10E+01	7.70E+00	1.10E+01	1.30E+01	2.90E+01	3.00E+01	4.70E+01	3.70E+01	3.50E+01	3.80E+01	6.10E+01	4.50E+01	7.80E+01	4.90E+01	3.60E+01
4700	7.70E+01	7.20E+00	1.10E+01	5.90E+00	7.60E+00	1.20E+01	1.80E+01	1.90E+01	4.70E+01	3.70E+01	3.50E+01	2.40E+01	3.70E+01	4.50E+01	4.80E+01	3.00E+01	2.90E+01
4800	7.70E+01	7.20E+00	1.10E+01	5.90E+00	6.80E+00	1.20E+01	1.60E+01	1.90E+01	4.70E+01	3.70E+01	3.50E+01	2.40E+01	3.20E+01	4.50E+01	4.10E+01	3.00E+01	2.80E+01
4900	7.70E+01	7.20E+00	1.10E+01	5.90E+00	6.80E+00	1.20E+01	1.60E+01	1.90E+01	4.70E+01	3.70E+01	3.50E+01	2.40E+01	3.20E+01	4.50E+01	4.10E+01	3.00E+01	2.80E+01
5000	6.60E+01	7.20E+00	9.70E+00	5.90E+00	6.80E+00	1.20E+01	1.60E+01	1.90E+01	4.00								

The SACTI model predicted that the maximum cooling tower water deposition will occur approximately 200 m (656 ft) south-southwest of the cooling towers at a rate of 27,000 kg/km²/month. The average water deposition at a 200 m (656 ft) radius from the cooling tower (considering all directions of plume travel) is predicted to be 6,400 kg/km²/month.

5.1.4.3.4 Salt deposition modeling results. Salt deposition is primarily a function of the salt concentration in the circulating cooling water and the water deposition rate. Table 5.1-4 presents the SACTI model predicted average monthly (based on the 5 year West Palm Beach meteorological data base) salt deposition rate in units of kg/km²/month associated with the proposed cooling towers at the TCEC. The 16 wind direction labels in the columns of the table represent the direction from the proposed cooling towers that the salt deposition is predicted to occur.

Table 5.1-4
Average Monthly Predicted Cooling Tower Salt Deposition

Distance From Tower (m)	Salt Deposition in the Direction Plume is Headed (kg/km ² -month)																	
	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE	AVG	
100	0.00	76.38	0.00	0.00	0.00	65.21	0.00	0.00	0.00	38.14	0.00	0.00	0.00	65.21	0.00	0.00	15.31	
200	57.78	144.35	84.65	1.95	12.72	57.95	15.35	4.88	48.82	74.98	28.71	2.13	3.18	17.49	2.44	1.24	34.91	
300	43.58	38.58	46.27	29.09	61.95	49.19	48.85	25.09	38.38	30.87	22.32	8.44	12.55	17.66	10.21	6.46	30.59	
400	36.78	7.60	30.48	36.95	62.12	70.92	46.03	28.46	42.04	16.91	22.59	12.77	19.80	22.50	20.69	15.73	30.77	
500	30.14	6.13	18.23	21.67	50.00	62.53	44.51	24.84	33.54	14.12	19.23	14.63	18.70	20.13	20.16	17.62	26.01	
600	18.64	5.15	11.27	11.08	24.48	26.86	25.55	17.18	18.26	10.84	11.57	12.90	15.63	14.67	18.37	17.82	16.27	
700	12.08	3.36	9.15	4.16	6.17	15.53	7.32	6.61	12.09	8.41	6.78	6.64	7.14	11.37	8.50	10.27	8.47	
800	9.25	1.49	8.01	5.01	11.67	13.91	9.98	5.90	9.29	2.96	5.04	4.53	6.07	5.71	6.57	6.27	6.98	
900	7.76	1.30	4.39	5.36	10.18	9.96	8.55	5.69	7.61	2.81	4.49	3.84	4.48	4.88	4.82	4.80	5.68	
1000	5.66	0.99	3.04	4.94	9.15	8.39	7.22	4.12	6.09	1.99	3.53	1.98	2.95	5.43	3.17	2.36	4.44	
1100	4.97	1.04	2.38	4.73	9.18	8.46	7.28	4.08	5.30	2.05	3.11	2.04	3.33	4.25	3.74	2.72	4.29	
1200	3.81	1.06	1.55	3.56	7.41	7.85	6.19	3.60	3.48	2.14	2.30	2.15	3.27	4.17	3.89	3.05	3.72	
1300	3.01	1.00	1.01	3.28	6.24	7.71	5.34	3.34	2.67	1.92	1.76	2.00	2.45	4.56	2.87	2.86	3.25	
1400	2.90	0.85	1.01	3.10	5.85	6.01	5.03	3.06	2.59	1.80	1.67	1.70	2.23	3.49	2.60	2.35	2.89	
1500	3.01	0.63	0.98	3.02	5.54	5.91	4.60	2.97	2.61	1.64	1.69	1.66	2.12	3.09	2.48	2.26	2.76	
1600	2.95	0.51	0.94	2.79	4.85	5.82	3.53	2.34	2.54	1.63	1.65	1.45	2.00	2.86	2.37	2.14	2.52	
1700	2.75	0.48	0.88	2.72	4.78	5.79	3.47	2.17	2.31	1.52	1.55	1.40	1.73	2.84	2.00	2.12	2.41	
1800	2.62	0.47	0.87	2.69	4.69	5.20	3.38	2.08	2.22	1.48	1.49	1.22	1.68	2.76	1.93	1.80	2.29	
1900	2.51	0.42	0.84	1.96	4.60	5.03	3.30	1.68	2.13	1.37	1.43	1.09	1.56	2.76	1.76	1.66	2.13	
2000	2.42	0.42	0.78	1.47	2.67	4.91	2.14	1.43	2.04	1.33	1.39	0.99	1.31	2.72	1.57	1.50	1.82	
2100	2.15	0.39	0.58	0.97	0.98	2.36	1.12	1.17	1.80	1.25	1.23	0.95	1.22	1.13	1.55	1.43	1.27	
2200	1.98	0.38	0.57	0.62	0.95	1.12	1.08	0.95	1.66	1.23	1.11	0.87	1.15	0.82	1.46	1.30	1.08	
2300	1.90	0.38	0.60	0.59	0.92	1.12	1.04	0.91	1.61	1.23	1.07	0.83	1.13	0.83	1.42	1.23	1.05	
2400	1.60	0.35	0.56	0.56	0.85	1.12	0.97	0.87	1.41	1.16	0.90	0.82	1.07	0.84	1.36	1.20	0.98	
2500	1.50	0.27	0.53	0.52	0.84	1.12	0.96	0.82	1.31	0.99	0.84	0.78	1.06	0.84	1.34	1.13	0.93	
2600	1.44	0.22	0.51	0.49	0.85	1.09	0.96	0.77	1.24	0.78	0.80	0.76	1.06	0.83	1.33	1.08	0.89	
2700	1.37	0.19	0.50	0.49	0.85	1.09	0.96	0.78	1.18	0.70	0.74	0.76	1.05	0.80	1.33	1.08	0.87	
2800	1.35	0.18	0.49	0.49	0.82	1.06	0.94	0.78	1.16	0.66	0.73	0.76	1.01	0.78	1.27	1.08	0.85	
2900	1.33	0.14	0.48	0.49	0.80	1.01	0.91	0.78	1.13	0.56	0.71	0.76	0.99	0.74	1.26	1.08	0.82	
3000	1.33	0.14	0.48	0.47	0.76	1.00	0.86	0.75	1.12	0.55	0.71	0.73	0.94	0.74	1.19	1.02	0.80	
3100	1.33	0.14	0.48	0.47	0.74	1.00	0.84	0.75	1.12	0.55	0.71	0.72	0.89	0.74	1.12	1.02	0.79	
3200	1.33	0.14	0.48	0.46	0.70	0.82	0.77	0.68	1.12	0.55	0.71	0.63	0.78	0.70	0.98	0.91	0.74	
3300	1.13	0.14	0.29	0.45	0.68	0.49	0.71	0.64	0.93	0.55	0.59	0.59	0.64	0.64	0.79	0.86	0.63	
3400	0.74	0.14	0.16	0.43	0.66	0.49	0.70	0.60	0.59	0.55	0.39	0.51	0.61	0.64	0.75	0.71	0.54	
3500	0.73	0.12	0.15	0.32	0.45	0.49	0.56	0.51	0.56	0.47	0.38	0.44	0.52	0.64	0.65	0.59	0.48	
3600	0.73	0.10	0.15	0.24	0.36	0.47	0.50	0.46	0.56	0.36	0.38	0.43	0.51	0.58	0.64	0.58	0.44	
3700	0.73	0.10	0.15	0.22	0.35	0.40	0.49	0.45	0.56	0.36	0.38	0.40	0.48	0.44	0.60	0.52	0.41	
3800	0.72	0.10	0.15	0.22	0.35	0.39	0.49	0.44	0.55	0.36	0.37	0.39	0.47	0.42	0.59	0.50	0.41	
3900	0.72	0.10	0.15	0.22	0.35	0.39	0.49	0.44	0.55	0.35	0.37	0.39	0.47	0.42	0.59	0.50	0.41	
4000	0.71	0.10	0.15	0.22	0.35	0.37	0.48	0.44	0.54	0.35	0.37	0.39	0.47	0.40	0.59	0.50	0.40	
4100	0.69	0.10	0.14	0.21	0.35	0.36	0.48	0.43	0.53	0.35	0.36	0.38	0.47	0.39	0.59	0.49	0.39	
4200	0.67	0.10	0.14	0.21	0.34	0.36	0.48	0.43	0.51	0.35	0.34	0.38	0.47	0.38	0.58	0.49	0.39	
4300	0.65	0.10	0.13	0.19	0.26	0.35	0.35	0.37	0.50	0.35	0.34	0.36	0.45	0.36	0.57	0.46	0.36	
4400	0.62	0.10	0.13	0.17	0.24	0.34	0.33	0.33	0.47	0.35	0.32	0.34	0.45	0.34	0.56	0.44	0.35	
4500	0.61	0.10	0.13	0.17	0.24	0.34	0.33	0.33	0.46	0.35	0.31	0.34	0.45	0.34	0.56	0.44	0.34	
4600	0.61	0.10	0.12	0.17	0.24	0.34	0.33	0.30	0.46	0.33	0.31	0.30	0.45	0.34	0.56	0.39	0.33	
4700	0.61	0.10	0.12	0.16	0.22	0.34	0.28	0.24	0.46	0.33	0.31	0.23	0.33	0.33	0.41	0.30	0.30	
4800	0.61	0.09	0.12	0.16	0.22	0.34	0.26	0.24	0.46	0.32	0.31	0.23	0.30	0.33	0.37	0.30	0.29	
4900	0.61	0.09	0.12	0.16	0.22	0.34	0.26	0.24	0.46	0.32	0.31	0.23	0.30	0.33	0.37	0.30	0.29	
5000	0.54	0.09	0.12	0.16	0.22	0.34	0.26	0.24	0.42	0.32	0.28	0.23	0.30	0.33	0.37	0.30	0.28	

Source: SACTI cooling tower model.

The maximum salt deposition occurs approximately 200 m (656 ft) south-southwest of the cooling towers at a rate of 144 kg/km²/month. The average salt deposition at a radius of 200 m (656 ft) from the cooling towers (considering all directions of plume travel) is predicted to be 35 kg/km²/month. Beyond 600 m (1,968 ft) from the cooling towers, the salt deposition significantly decreases. In fact, the average salt deposition beyond 600 m (1,968 ft) from the cooling towers in all directions is less than 10 kg/km²/month.

5.1.4.3.5 Plume length modeling results. The cooling tower plume lengths are calculated by the SACTI model as the frequency of occurrence of a given plume length from the cooling tower for each wind direction. Table 5.1-5 presents the average annual (based on the 5 year West Palm Beach meteorological data base) predicted plume length frequency of occurrence associated with the cooling towers. The 16 wind direction labels in the columns of the table represent the direction from the cooling towers that the plume is headed. The data represent the probability (by percent of the year) that the cooling tower plume will be as long or longer than the length defined in the table for a particular direction and distance from the cooling tower.

As the data in Table 5.1-5 indicates, the SACTI model predicts the plume length to be less than 300 m (984 ft) 90 percent of the year considering all directions of plume travel. The median plume length, or that length which the plume is predicted to be longer or shorter than for 50 percent of the year considering all directions of plume travel, is approximately 161 m (528 ft).

As indicated in Table 5.1-5, the percent frequency of occurrence of long cooling tower plumes in any particular direction is very small. The highest probability of a visible plume over a particular location is approximately 14 percent of the year in an area 100 m (328 ft) west of the cooling towers.

5.1.4.4 Environmental Impact. The following sections discuss the potential environmental impacts associated with the operation of the cooling towers at the TCEC. The relative magnitudes of the impacts are based on the results of the numerical modeling studies presented in Subsection 5.1.4.3. The environmental impacts are assessed with respect to the transportation arteries, vegetation, aesthetics, and land use.

In addition to assessing the environmental impacts associated with each of the aforementioned categories, this section also discusses many naturally occurring meteorological and atmospheric phenomena such as fog, cloud cover, and precipitation that may tend to mitigate the actual or perceived environmental impacts resulting from the operation of the cooling towers.

5.1.4.4.1 Impact on transportation arteries. Cooling towers may at times produce plume induced fogging and icing in the vicinity of the cooling tower structures which may have an affect on nearby transportation arteries such as roads, highways, bridges,

Table 5.1-5
Average Annual Predicted Plume Length Frequency of Occurrence

Distance From Tower (m)	Probability the Plume is Longer in a Given Direction Than the Distance Indicated (percent)																	SUM
	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE		
100	6.30	2.76	4.44	7.46	13.89	10.72	10.44	6.31	6.22	3.63	3.84	3.98	5.11	4.15	5.28	5.48	100.00	
200	2.89	1.56	2.56	0.12	0.27	0.31	0.37	0.28	2.64	2.35	1.52	0.36	0.53	0.50	0.69	0.56	17.52	
300	1.53	0.46	0.33	0.12	0.27	0.10	0.37	0.28	1.26	1.68	0.82	0.36	0.53	0.43	0.69	0.56	9.81	
400	1.51	0.34	0.32	0.04	0.27	0.09	0.37	0.21	1.24	1.33	0.82	0.33	0.53	0.43	0.69	0.49	9.02	
500	1.15	0.27	0.17	0.04	0.12	0.09	0.23	0.21	0.91	1.09	0.67	0.33	0.49	0.43	0.64	0.49	7.33	
600	1.00	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.69	
700	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
800	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
900	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
1000	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
1100	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
1200	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
1300	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
1400	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
1500	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
1600	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
1700	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
1800	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
1900	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
2000	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
2100	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
2200	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
2300	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
2400	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
2500	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
2600	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
2700	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
2800	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
2900	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
3000	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
3100	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
3200	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
3300	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
3400	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
3500	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
3600	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
3700	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
3800	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
3900	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
4000	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
4100	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
4200	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
4300	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
4400	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
4500	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
4600	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
4700	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
4800	0.99	0.27	0.12	0.04	0.07	0.09	0.20	0.21	0.69	1.09	0.57	0.33	0.47	0.43	0.61	0.49	6.68	
4900	0.49	0.13	0.06	0.02	0.03	0.04	0.08	0.10	0.34	0.45	0.28	0.13	0.18	0.17	0.23	0.16	2.87	
5000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Source: SACTI cooling tower model.																		

Source: SACTI cooling tower model.

airports, or navigable waters. Several factors influence the cooling tower plume as it leaves the tower which, to varying degrees, determine the location and magnitude of these phenomena.

The cooling tower plume will have thermal buoyancy and momentum as it is exhausted from the cooling tower. Under calm conditions, the plume will ascend vertically due to these forces. However, prolonged periods of calm and stable conditions do not frequently occur in the atmosphere, and are somewhat infrequent along the central Florida peninsula. In fact, winds in the vicinity of the TCEC are calm only about 1 percent of the year, and the subtropical humid climate is frequently unstable. As such,

the cooling tower plume's trajectory becomes modified almost immediately as it leaves the cooling tower by persistent winds and atmospheric instability.

As the wind speed increases, the cooling tower plume begins to assume a trajectory that is sloped in the direction of the wind vector, bringing the plume closer to the ground. The plume will likely undergo further trajectory modification as the result of turbulent airflow over and around terrain features, buildings, or the cooling tower structure itself. This effect, known as structure or building induced downwash, occurs when the trajectory modification is such that the plume is forced to the ground in the vicinity of the cooling tower. If the plume becomes supersaturated during this process (i.e., becomes visible), then the result is a phenomenon known as cooling tower induced ground level fogging (Ovard and Reisman).

Cooling tower induced fogging can occur at any time during the year, but it is most commonplace during periods of moderate wind speeds (which bend the plume to intercept the ground), high relative humidity, and cool temperatures. These meteorological conditions frequently occur during the late evening and early morning periods of the day.

A topographic map of the area was reviewed to determine the major transportation arteries in the vicinity of the site. Apart from the TCEC entrance road, which is mostly restricted from public access, the nearest transportation arteries include portions of Glades Cut-off Road and the Florida East Coast rail line just west of the site. As discussed in Subsection 5.1.4.3.1, the maximum cooling tower plume induced fogging is predicted to occur less than 32 hours per year on average regardless of wind direction, and no amount of fogging is predicted to extend beyond a radius of 1,969 feet (600 m) from the cooling towers.

Figure 5.1-1 illustrates the minimal extent and duration of the predicted cooling tower induced fogging. The outermost contour represents 1 hour per year of possible plume fogging, with increasing contours of fogging at 1 hour per year intervals. Based on the results of the modeling, the cooling tower plume induced fogging is not predicted to extend significantly beyond the power block limits, and is not predicted to cause more than 7 hours per year of fogging conditions near the transportation corridors that lie to the west.

Many of the meteorological conditions that are favorable for the occurrence of cooling tower plume induced fogging are conducive to natural fog. As such, the two events may occur simultaneously and thereby mitigate the relative impact potentially caused by cooling tower plume induced events. Climatologically, natural fog (that which restricts visibility to less than 1/4 of a mile) occurs an average of 8 days a year based on meteorological data from West Palm Beach. This means that there are, at a minimum, 8 hours of naturally occurring fog in the vicinity of the TCEC (conservatively assuming

Figure 5.1-1
Minimal Extent and Duration of the Predicted Cooling Tower Induced Fogging

that reported fogging events last for only one hour per day). If of the 32 hours per year of fogging predicted by SACTI, 8 of those occur during a natural fog event, only 24 hours of cooling tower fogging per year would remain.

A secondary effect of cooling tower fogging is the formation of cooling tower induced ground level icing. However, as temperatures rarely fall below freezing in the area, no cooling tower plume induced icing is predicted to occur.

5.1.4.4.2 Impact on vegetation. The plume exhaust from cooling towers may affect the vegetation in the vicinity as the result of drift deposition. Drift deposition from a cooling tower occurs when airborne water droplets, caused by cooling tower drift, coalesce and precipitate in the vicinity of the cooling tower. The pattern of drift deposition and the distance from the cooling tower to the areas of maximum deposition concentrations are a function of many variables, which include: cooling tower type, prevailing wind direction and speed, orientation of the cooling tower, airflow rate, drift rate, water chemistry, and the physical size of the water droplets (drift droplet size spectrum) in the cooling tower drift. The potential effects associated with cooling tower drift deposition are primarily associated with water and salt deposition. The response of the vegetation to salt and water deposition will vary from year to year depending on the rate of deposit and precipitation patterns during the growing season.

An area map depicting the TCEC location overlaid with an isopleth analysis of the SACTI predicted average monthly water deposition rate is presented on Figure 5.1-2. The predicted location of the maximum water deposition rate occurs approximately 200 m (656 ft) south-southwest of the cooling tower at a deposition rate of 27,000 kg/km²/month.

A second predicted location of maximum of water deposition occurs just west of the site. Predicted water deposition rates in this area are on the order of 9,000 kg/km²/month

A potential effect of water deposition on vegetation species is the increased threat of plant fungal diseases associated with the increased precipitation. Based on historical meteorological data for West Palm Beach, the average monthly rainfalls for the driest month (February) and the wettest month (September) are 65 and 206 mm, respectively. If one conservatively assumes no evaporation of the falling cooling tower drift droplets, then the precipitation rate equivalent of the maximum SACTI model predicted water deposition rate (27,000 kg/km²/month) is approximately 0.027 mm per month. By comparison, this precipitation rate is less than 0.05 percent of the average monthly rainfall of the driest month.

Dr. Walter Stevenson, a crop pathologist at the University of Wisconsin has experience with plant disease prediction models that consider precipitation and leaf

Figure 5.1-2
SACTI Predicted Average Monthly Water Deposition Rate

wetness. Dr. Stevenson's research shows that a slight increase in disease occurrence is sometimes observed by US Midwestern potato growers when irrigation at a rate of approximately 50 mm per week is applied. A 50 mm per week irrigation rate is equivalent to a water deposition rate of approximately 2×10^8 kg/km²/month, which is more than 7,400 times greater than the maximum TCEC water deposition rate predicted by the SACTI model. This suggests that the water deposition from the cooling towers on vegetation and crops species is insignificant when compared to normal wetting associated with dew, precipitation, and irrigation. Furthermore, because water deposition will occur in conjunction with salt deposition, the additional deposition of salt may be toxic to any pathogenic microorganisms or fungi, and thus negate the effects of water deposition by itself.

An area map overlaid with an isopleth analysis of the SACTI predicted average monthly salt deposition rate is presented on Figure 5.1-3. The predicted location of the maximum salt deposition rate occurs south-southwest of the cooling tower at a deposition rate of 144 kg/km²/month.

A second predicted location of maximum of salt deposition occurs just west of the site. Predicted salt deposition rates in this area generally range from 25 to 55 kg/km²/month.

Research studies on salt deposition effects have been conducted in response to known or observed cases of vegetation damage. From these studies, it is known that the local climate plays a significant role in increasing or reducing the stress that such deposition can have on vegetation. For example, a species growing in an area with high rainfall during the growing season tends to be less stressed from salt deposition than the same species growing in an area with less rainfall due to the dilution of the deposited salt on the leaf surface. Additionally, vegetation species growing along coastal regions have a higher tolerance for salt deposition because of the relatively high ambient airborne concentration of sea salts in the marine environment.

As salinity levels increase, growth of intolerant plants declines, and yields are reduced. Some plant families tend to show either high or low limits of salt survival. The limit is low in legumes, (pea, beans), medium in cereal grasses (rye, oats, wheat barley), and high in some forage and other crop plants (alfalfa, sunflower, sugar beet, forage beet) (Maianu et al. 1965). Growth suppression is sometimes accompanied by leaf injury. Leaves become smaller and deeper blue-green than normal, and leaf tips or margins become bleached, tan, or brownish in proportion to the degree of salt deposition. Bronzing and early defoliation may also be prominent. Leaf injury may be the most prominent symptom of salt deposition, but is not nearly important to yield reductions as the growth suppression (Treshow 1970).

Figure 5.1-3
SACTI Predicted Average Salt Deposition Rate

Dr. Charles Mulchi of the University of Maryland at College Park has conducted extensive research on cooling tower salt deposition effects and toxicity levels in several vegetation species. According to Dr. Mulchi (1991), a salt deposition rate of $400 \text{ kg/km}^2/\text{month}$ or greater is sufficient to cause damage to vegetation. The amount and type of damage is dependent on the species involved. For example, one species of pine may show signs of damage while another species may show no signs of damage. The $400 \text{ kg/km}^2/\text{month}$ salt deposition rate is the threshold level for most vegetation species and has been used in many environmental assessments as a screening or trigger level of potentially significant salt deposition rates. Salt deposition rates less than $400 \text{ kg/km}^2/\text{month}$ are generally not considered to have a significant impact on vegetation. The maximum predicted salt deposition rate from the TCEC cooling towers is $144 \text{ kg/km}^2/\text{month}$. Therefore, salt deposition from the cooling tower is expected to have a negligible impact on vegetation.

5.1.4.4.3 Impact on aesthetics and land use. A cooling tower contributes to the impacts on the aesthetics of an area by forming a visible, at times completely opaque, vapor condensate plume emanating from the cooling tower exhaust. The presence of a visible plume and cooling tower are often perceived as a distraction or debasement to the otherwise scenic quality or functional use of an area. This is particularly true if the cooling tower plume and tower structure are in the background or foreground of a view with a particular scenic quality or land use type. The potential impacts on aesthetics and land use as the result of visible plume formation and the cooling tower structure are discussed below.

Perhaps the most obvious environmental impact from a cooling tower is the formation of a visible plume extending out from the cooling tower cell exhaust ports. The visible plume may extend several hundred yards downwind, potentially obstructing visibility on the site and at nearby locations. The factors that affect visible cooling tower plume formation are discussed in the following paragraphs.

Cooling towers are simple fluid heat exchange systems that dissipate waste heat to the atmosphere through mass and convective heat transfer of water vapor. The exhaust from a cooling tower is essentially a saturated air-water vapor mixture which is warmer than the ambient air as it leaves the tower. Depending on the ambient air temperature and the wet-bulb temperature, a portion of the saturated air-water vapor mixture will become supersaturated and begin to condense into small water droplets as heat transfer with the atmosphere begins to cool the plume. With time, more small water droplets continue to form and grow through condensation and coalescence until the cooling tower exhaust becomes visible as a white plume emanating from the tower. The cooling tower plume will continue to be visible until it is dispersed and evaporated, or until meteorological

conditions are no longer favorable for its formation. In the former case, the visible cooling tower plume is transported downwind until turbulent mixing in the atmosphere with the abundant and relatively dryer ambient air causes the small water droplets to disperse and evaporate. As the visible plume becomes thoroughly mixed with the ambient air, the small water droplets completely disperse and evaporate until the plume is no longer visible and becomes transparent.

The frequency, persistence, and size of the visible cooling tower plume depends primarily on the cooling tower type, heat load, orientation of the cooling tower, and the prevailing meteorological conditions. Mechanical draft towers typically present less of a visual distraction because of the relatively low plume exhaust height and profile.

Visible plume formation from cooling towers is more frequent during the cooler seasons when ambient air conditions are capable of rapidly condensing the cooling tower exhaust and allowing only minimal evaporation of the condensed water droplets. Similar conditions exist on a diurnal scale that are also more suitable for visible plume formation. These periods occur during the early morning hours, shortly before and after sunrise, when relatively low ambient air temperatures and high relative humidity make the environment particularly conducive to visible plume formation.

Figure 5.1-4 illustrates the site location overlaid with an isopleth analysis of the average annual predicted plume length frequency of occurrence. The highest probability of a visible plume is predicted to occur in the area just west of the cooling towers for approximately 14 percent of the year on average. Over the remaining portions of the TCEC site and the immediate vicinity, the frequency of occurrence of a visible plume for a particular location generally ranges from about 2 to 10 percent of the year. Based on these results, it is concluded that the presence of a visible plume from the cooling towers will only minimally contribute to the visible and aesthetic impacts in the area.

The visible plume from the cooling towers is also predicted to periodically extend offsite. However, as shown on Figure 5.1-4, this is predicted to occur only about 1 percent of the year on average, and therefore will have little or no impact on nearby businesses, residences, or transportation facilities.

It should be noted that the probability of visible plume lengths predicted by the SACTI model are conservative overestimates of actual plume lengths. This is primarily because the SACTI model does not distinguish prevailing meteorological conditions such as haze, overcast skies, fog, and precipitation, which may render the cooling tower plume indiscernible. In certain cases, especially as the distance from the cooling tower increases, the model may predict saturation (thus a visible plume by modeling standards), but due to spreading of the plume it may only be visible as a slight haze. If this is the

Figure 5.1-4
Annual Plume Length Frequency

case, then from an aesthetic perspective, the plume may not be discernible against the background haze that may already exist due to the high humidity, smog, or suspended particulate matter. In other cases, the plume may be dense, but it would not be discernable against the existing cloud deck.

5.1.5 Measurement Program

The Unit 1 cooling tower blowdown will be conveyed to the FPUA Municipal Wastewater Treatment Plant and will comply with categorical pretreatment standards and measurement programs established by agreement with FPUA. Since there will be no discharge to surface water, no monitoring of surface waters is proposed.

5.1.6 Ultimate Development and Impacts of the Operation of the Heat Dissipation System

There will be no discharge of cooling waters to a water body from operation of the TCEC heat dissipation system. The cooling tower blowdown will be conveyed to the FPUA wastewater treatment plant to be constructed north of and adjacent to the TCEC site. The cooling tower blowdown will be conveyed to the FPUA WWTP, where it will be disposed directly into a Class I injection well. Therefore, there will be no impacts to a water body or aquatic life from ultimate site development. Cooling tower impacts of the ultimate site development related to transportation arteries, vegetation, aesthetics, and land use were addressed in Section 5.1.4.4, with no significant impacts projected.

5.2 Effects of Chemical and Biocide Discharges

As shown on the water mass balances (Section 3.5, Figures 3.5-1 through 3.5-9) in Section 3.0, and as described below, process wastewaters will be returned to the FPUA wastewater treatment plant. There are no discharges to wetlands or surface waters under normal operating conditions. The Wastewater Facility or Activity Permit application form is included in Section 10.1.2. The water mass balances identify the wastewater streams anticipated during Unit 1 operations.

5.2.1 Industrial Wastewater Discharge

Wastewaters potentially contaminated with grease or oil from the plant floor drain system and oil containment areas will be directed to an oil/water separator for treatment prior to disposal. Effluent from the oil/water separator will contain no more than 15 ppm oil/grease (manufacturer's guarantee). The effluent from the oil/water separator will be combined with other plant process wastewaters and conveyed to the wastewater collection system for transfer to the FPUA WWTP Class I injection well.

Cooling tower blowdown will be the major source of wastewater and is described in Subsection 5.2.2.

5.2.2 Cooling Tower Blowdown

Cooling tower blowdown will be discharged with other process wastewaters to the FPUA WWTP for disposal in Class I injection wells. As previously discussed, the cooling tower blowdown will be held in a treatment basin at the TCEC site until disposal or will be directly disposed into a Class I deep injection well. Water quantity estimates are provided on the water mass balances (Figure 3.5-1 through Figure 3.5-9). The estimated quality of the blowdown return to FPUA is indicated in Table 5.2-1. No violation of water quality standards is expected as a result of water use by Unit 1 or future similar units.

Table 5.2-1 Estimated Treasure Coast Energy Center Unit 1 Cooling Tower Blowdown Analysis*		
Constituent	Using Reclaimed Water Makeup (mg/L)	Using Well Water Makeup (mg/L)
Calcium, as CaCO ₃	292	497
Magnesium, as CaCO ₃	157	723
Sodium, as CaCO ₃	1,036	1,729
Potassium, as CaCO ₃	3	50
M-Alk as CaCO ₃	125	125
Sulfate, as CaCO ₃	456	1,083
Chloride, as CaCO ₃	866	1,778
Silica, as SiO ₂	57	91
Total N	22	--
Total P	15	<5
TDS, calculated	1,992	3,756
BOD5	20 to 40	<5
*Based upon cooling tower operation at four cycles of concentration.		

Potential effluent delivery emergency situations include disruption of effluent delivery due to a pipeline problem, or low effluent supply. In addition, the new FPUA wastewater treatment plant north of and immediately adjacent to the TCEC site may not be operational in time to support Unit 1 startup. Therefore, FMPA requests approval to use Floridan Aquifer well water as cooling tower makeup until the FPUA wastewater

treatment plant is capable of supplying reclaimed water to the TCEC site, and under emergency conditions thereafter. The estimated quality of the blowdown return to FPUA when using well water as cooling tower makeup is also indicated in Table 5.2-1.

5.2.3 Measurement Program

An Industrial Wastewater Facility Activity Permit application for TCEC is included in Section 10.1.2. Monitoring will be in accordance with the requirements of the FPUA pretreatment program and is expected to include monitoring of inflow and discharge flows.

5.2.4 Ultimate Development Impacts from Chemical and Biocide Discharge

There will be no discharge to a water body of chemicals or biocides from four units operating at the TCEC site. Wastewaters potentially contaminated with grease or oil from the plant floor drain system and secondary containment areas will be treated by an oil/water separator. Effluent from the oil/water separator will contain no more than 15 ppm oil/grease and will be conveyed to a combined process wastewater and cooling tower blowdown sump for discharge to the FPUA wastewater treatment plant.

Additionally, since the cooling tower blowdown will be conveyed to the FPUA for disposal, there will be no impacts to a water body from the biocides used in the cooling tower water. The estimated water quality of the cooling tower blowdown is not anticipated to impact the FPUA system.

Therefore, there will be no adverse impacts to a water body or aquatic life from the use and disposal of chemicals or biocides at the TCEC.

5.3 Impacts on Water Supplies

5.3.1 Surface Water

There are no natural surface water bodies onsite. Project operations will not withdraw or discharge to any surface waters; therefore, no impacts to local surface waters are expected as a result of TCEC operations.

The site stormwater drainage system will be designed to comply with all applicable federal, state, and local regulations. The runoff from uncontaminated areas will be directed to the stormwater detention basin for reduction of the suspended solids load and equalization of peak flows. At the property boundary, the post-development peak flow rate will not exceed the pre-development peak discharge rate during the applicable design storm event. A detailed description of the onsite drainage system is provided in Section 3.8.

TCEC operations are not expected to affect surface water quality within the area. Runoff water quality should at least remain unchanged and is expected to be improved as a result of detention in the stormwater pond.

5.3.2 Groundwater

The following describes the effects of TCEC operations on the aquifers underlying the site.

5.3.2.1 Surficial Aquifer. The TCEC will not have an adverse effect on the surficial aquifer quality. No water will be withdrawn from or discharged to this water table zone, other than seepage from the stormwater pond.

5.3.2.2 Floridan Aquifer. Water for fire water, service water, evaporator cooler makeup, demineralizer makeup, and cooling tower makeup (initial and emergency operation) will be supplied by the Floridan Aquifer. The Floridan Aquifer, as defined for the TCEC, is a confined unit. The base of the confining unit is located at approximately 500 feet to 600 feet bgs. Hydrogeological and water quality data for the Floridan Aquifer are presented in Subsection 2.3.2.

Three wells will be initially installed into the Floridan Aquifer during the construction of Unit 1. Withdrawals requested are an annual allocation not to exceed 2.965 million gallons, and a maximum daily allocation not to exceed 3.654 million gallons. A SFWMD Water Use Permit application is presented in Section 10.4.2 to facilitate review.

Excluding cooling system makeup, the maximum Unit 1 daily well water requirement is estimated to be 597,000 gpd. Including cooling system makeup, the maximum Unit 1 daily well water requirement is expected to be 3.654 MGD. Three 1,200 gpm wells are proposed for Unit 1. Each well will be capable of producing a maximum of 2,000 gpm. One well is considered to be a spare, available during periodic maintenance of individual wells.

5.3.2.2.1 Description of Groundwater Model. Prior to the assessment of the drawdown impacts of Project pumping on the Upper Floridan Aquifer, Mr. John Lockwood, the SFWMD hydrogeologist, was contacted. Mr. Lockwood suggested the use of analytic solution to calculate distance-drawdown of the proposed pumping wells. The SFWMD 1992 Floridan Aquifer model documentation was acquired and reviewed to estimate aquifer parameters for the analytic model. A spreadsheet containing a list of the area permitted Floridan Aquifer pumping wells, pumping rates, and annual allocations was also acquired from SFWMD and reviewed. The locations of the Floridan Aquifer permitted pumping wells within 1 mile from the site are shown on Figure 5.3-1.

Figure 5.3-1
Permitted Wells Within 1 mile of the TCEC Site

5.3.2.2.2 Aquifer Characteristics. The aquifer system in the area is discussed in detail in Subsection 2.3.2. The SFWMD Floridan Aquifer model documentation, Technical Publication 92-03 includes a detailed discussion of a Three-Dimensional Finite Difference Groundwater Flow Model of the Floridan Aquifer System in Martin, St. Lucie and Eastern Okeechobee Counties, Florida (Lukasiewicz, 1992). The SFWMD calibrated model of the Upper Floridan aquifer transmissivity at the site was 257,322 ft²/day. The model used an average storage coefficient of 0.0004, and leakance of 0.04/day for the semi-confining layer between the upper and the Upper-lower Floridan aquifers.

5.3.2.2.3 Analytic Model. The impact of groundwater pumping from the Upper Floridan aquifer was determined using the Theis analytic model. Theis (1935) derived an equation that predicts groundwater level decline in a confined aquifer when the aquifer is pumped. The equation predicts drawdown as a function of distance from the pumping well as follows:

$$S = \frac{Q}{4\pi T} \int_u^{\infty} \frac{e^{-y}}{y} dy$$

Where:

$$u = \frac{r^2 S}{4Tt}$$

S = Aquifer drawdown

Q = Pumping rate

T = Aquifer transmissivity

R = Distance from the pumping well

T = Time since pumping started

The Theis equation is in most instances written follows:

$$S = \frac{Q}{4\pi T} W(U)$$

Where:

W(U) = Well function.

The Theis Solution assumes the following:

- The aquifer is confined.
- The aquifer is homogeneous, isotropic, and of uniform thickness.
- The pumping well is fully penetrating. Flow to the pumping well is horizontal.
- Flow is transient.
- Water is released instantaneously from the aquifer storage with decline of hydraulic head.

- The well diameter is small so that storage in the well bore can be neglected.

The equation is applicable to evaluate pumping drawdown at the site for the following reasons: the Upper Floridan aquifer is assumed as a high transmissivity confined aquifer; groundwater flow in the aquifer is considered horizontal; and there is a potential for limited leakage amount through the semi-confining layer between the upper and the Upper-lower Floridan aquifers. The aquifer parameters used in the Theis solution were transmissivity and storage coefficient. These parameters were taken from the SFWMD calibrated regional model. The SFWMD model used a leakance value of 0.04/day. In the calculation of distance-drawdown due to pumping at the site, the leakage is ignored to make conservative estimates of drawdown.

5.3.2.2.4 Predictive Results. Drawdown resulting from pumping at the maximum demands was calculated using a spreadsheet program for a one unit Project and a four unit Project. The distance drawdown calculation was completed using the Project maximum daily withdrawals with cooling tower makeup demands. A 90 day continuous pumping at a single equivalent pumping well was assumed. Table 5.3-1 includes calculated distance-drawdown from the TCEC pumping location. Figure 5.3-2 is a plot of the calculated distance-drawdown. The results for the four pumping scenarios indicated the following:

- One-unit including cooling system makeup (2,538 gpm): The drawdown in the Floridan Aquifer at 1,000 feet was only 1.76 feet. The drawdown at 1 mile distance from the well is estimated to be 1.3 feet. Therefore, the site pumping will have very little impact outside the TCEC site.
- Four-units including cooling system makeup (<10,150 gpm): The drawdown in the Floridan Aquifer at 1 mile distance from the well will be 5.17 feet. The pumping drawdown was estimated to be 4.3 and 3.8 feet at 2 and 3 mile distances from the pumping well, respectively.

The calculated results indicate the drawdown caused by 90 days of pumping at maximum daily flow at the site without considering recharge from the Lower Floridan Aquifer; therefore, calculated drawdowns indicate the worst case scenarios. Since the Floridan Aquifer is fully confined at its top, the pumping will not impact the surficial aquifer or any local surface water bodies. At the closest permitted user, approximately 1 mile from the site, the predicted results indicate that even the four unit maximum demand including cooling tower makeup will cause only 5.1 feet of drawdown in the Floridan Aquifer. Despite this change in head, the Floridan Aquifer, which is artesian, would still

Table 5.3-1 Distance Drawdown in the Floridan Aquifer Caused by Site Pumping Alternatives			
Theis Solution		1 - Unit	4 - Units
	Q in gpm =	2,538	10,150
	Q in ft ³ /day =	488,437	1,953,749
Distance, feet	U	Drawdown, feet	Drawdown, feet
2	1.72719E-11	3.66	14.62
50	1.07949E-08	2.68	10.73
100	4.31798E-08	2.47	9.90
200	1.72719E-07	2.26	9.06
300	3.88618E-07	2.14	8.57
400	6.90877E-07	2.06	8.22
500	1.07949E-06	1.99	7.95
600	1.55447E-06	1.93	7.73
700	2.11581E-06	1.89	7.55
800	2.76351E-06	1.85	7.38
900	3.49756E-06	1.81	7.24
1,000	4.31798E-06	1.78	7.11
1,100	5.22476E-06	1.75	7.00
1,200	6.21789E-06	1.72	6.89
1,300	7.29739E-06	1.70	6.80
1,400	8.46324E-06	1.68	6.71
1,500	9.71545E-06	1.66	6.62
1,600	1.1054E-05	1.64	6.55
1,700	1.2479E-05	1.62	6.47
1,800	1.39903E-05	1.60	6.40
1,900	1.55879E-05	1.58	6.34
2,000	1.72719E-05	1.57	6.28
2,100	1.90423E-05	1.55	6.22
2,200	2.0899E-05	1.54	6.16
2,300	2.28421E-05	1.53	6.11
2,400	2.48716E-05	1.51	6.06
2,500	2.69874E-05	1.50	6.01
2,600	2.91895E-05	1.49	5.96
2,700	3.14781E-05	1.48	5.91
2,800	3.3853E-05	1.47	5.87
2,900	3.63142E-05	1.46	5.83

Table 5.3-1 (Continued) Distance Drawdown in the Floridan Aquifer Caused by Site Pumping Alternatives			
Theis Solution		1 - Unit	4 - Units
	Q in gpm =	2,538	10,150
	Q in ft ³ /day =	488,437	1,953,749
Distance, feet	U	Drawdown, feet	Drawdown, feet
3,000	3.88618E-05	1.45	5.79
3,100	4.14958E-05	1.44	5.75
3,200	4.42161E-05	1.43	5.71
3,300	4.70228E-05	1.42	5.67
3,400	4.99158E-05	1.41	5.64
3,500	5.28952E-05	1.40	5.60
3,600	5.5961E-05	1.39	5.57
3,700	5.91131E-05	1.38	5.53
3,800	6.23516E-05	1.38	5.50
3,900	6.56765E-05	1.37	5.47
4,000	6.90877E-05	1.36	5.44
4,100	7.25852E-05	1.35	5.41
4,200	7.61692E-05	1.35	5.38
4,300	7.98394E-05	1.34	5.35
4,400	8.35961E-05	1.33	5.32
4,500	8.74391E-05	1.32	5.30
4,600	9.13684E-05	1.32	5.27
4,700	9.53842E-05	1.31	5.24
4,800	9.94862E-05	1.30	5.22
4,900	0.000103675	1.30	5.19
5,000	0.000107949	1.29	5.17
5,100	0.000112311	1.29	5.15
5,200	0.000116758	1.28	5.12
5,300	0.000121292	1.27	5.10
5,400	0.000125912	1.27	5.08
5,500	0.000130619	1.26	5.05
5,600	0.000135412	1.26	5.03
5,700	0.000140291	1.25	5.01
5,800	0.000145257	1.25	4.99
5,900	0.000150309	1.24	4.97
6,000	0.000155447	1.24	4.95
6,100	0.000160672	1.23	4.93

Table 5.3-1 (Continued) Distance Drawdown in the Floridan Aquifer Caused by Site Pumping Alternatives			
Theis Solution		1 - Unit	4 - Units
	Q in gpm =	2,538	10,150
	Q in ft ³ /day =	488,437	1,953,749
Distance, feet	U	Drawdown, feet	Drawdown, feet
6,200	0.000165983	1.23	4.91
6,300	0.000171381	1.22	4.89
6,400	0.000176864	1.22	4.87
6,500	0.000182435	1.22	4.85
6,600	0.000188091	1.21	4.83
6,700	0.000193834	1.21	4.82
6,800	0.000199663	1.20	4.80
6,900	0.000205579	1.20	4.78
7,000	0.000211581	1.19	4.76
7,100	0.000217669	1.19	4.75
7,200	0.000223844	1.18	4.73
7,300	0.000230105	1.18	4.71
7,400	0.000236453	1.17	4.70
7,500	0.000242886	1.17	4.68
7,600	0.000249406	1.17	4.66
7,700	0.000256013	1.16	4.65
7,800	0.000262706	1.16	4.63
7,900	0.000269485	1.15	4.62
8,000	0.000276351	1.15	4.60
8,100	0.000283303	1.15	4.59
8,200	0.000290341	1.14	4.57
8,300	0.000297466	1.14	4.56
8,400	0.000304677	1.14	4.54
8,500	0.000311974	1.14	4.53
8,600	0.000319358	1.13	4.51
8,700	0.000326828	1.13	4.50
8,800	0.000334384	1.13	4.49
8,900	0.000342027	1.12	4.47
9,000	0.000349756	1.12	4.46
9,100	0.000357572	1.60	4.45
9,200	0.000365474	1.60	4.43
9,300	0.000373462	1.59	4.42

Table 5.3-1 (Continued) Distance Drawdown in the Floridan Aquifer Caused by Site Pumping Alternatives			
Theis Solution		1 - Unit	4 - Units
	Q in gpm =	2,538	10,150
	Q in ft ³ /day =	488,437	1,953,749
Distance, feet	U	Drawdown, feet	Drawdown, feet
9,400	0.000381537	1.59	4.41
9,500	0.000389698	1.58	4.39
9,600	0.000397945	1.58	4.38
9,700	0.000406279	1.57	4.37
9,800	0.000414699	1.57	4.36
9,900	0.000423205	1.56	4.34
10,000	0.000431798	1.56	4.33
10,100	0.000440477	1.56	4.32
10,200	0.000449243	1.55	4.31
10,300	0.000458094	1.55	4.30
10,400	0.000467033	1.54	4.29
10,500	0.000476057	1.54	4.27
10,600	0.000485168	1.53	4.26
10,700	0.000494365	1.53	4.25
10,800	0.000503649	1.53	4.24
10,900	0.000513019	1.52	4.23
11,000	0.000522476	1.52	4.22
11,100	0.000532018	1.51	4.21
11,200	0.000541647	1.51	4.20
11,300	0.000551363	1.51	4.18
11,400	0.000561165	1.50	4.17
11,500	0.000571053	1.50	4.16
11,600	0.000581027	1.50	4.15
11,700	0.000591088	1.49	4.14
11,800	0.000601235	1.49	4.13
11,900	0.000611469	1.48	4.12
12,000	0.000621789	1.48	4.11
12,100	0.000632195	1.48	4.10
12,200	0.000642688	1.47	4.09
12,300	0.000653267	1.47	4.08
12,400	0.000663933	1.47	4.07
12,500	0.000674684	1.46	4.06

Table 5.3-1 (Continued) Distance Drawdown in the Floridan Aquifer Caused by Site Pumping Alternatives			
Theis Solution		1 - Unit	4 - Units
	Q in gpm =	2,538	10,150
	Q in ft ³ /day =	488,437	1,953,749
Distance, feet	U	Drawdown, feet	Drawdown, feet
12,600	0.000685522	1.46	4.05
12,700	0.000696447	1.46	4.04
12,800	0.000707458	1.45	4.03
12,900	0.000718555	1.45	4.03
13,000	0.000729739	1.45	4.02
13,100	0.000741008	1.44	4.01
13,200	0.000752365	1.44	4.00
13,300	0.000763807	1.44	3.99
13,400	0.000775336	1.43	3.98
13,500	0.000786952	1.43	3.97
13,600	0.000798653	1.43	3.96
13,700	0.000810442	1.42	3.95
13,800	0.000822316	1.42	3.94
13,900	0.000834277	1.42	3.93
14,000	0.000846324	1.41	3.93
14,100	0.000858457	1.41	3.92
14,200	0.000870677	1.41	3.91
14,300	0.000882984	1.40	3.90
14,400	0.000895376	1.40	3.89
14,500	0.000907855	1.40	3.88
14,600	0.000920421	1.40	3.88
14,700	0.000933072	1.39	3.87
14,800	0.00094581	1.39	3.86
14,900	0.000958635	1.39	3.85
15,000	0.000971545	1.38	3.84
15,100	0.000984542	1.38	3.83
15,200	0.000997626	1.38	3.83
15,300	0.001010796	1.37	3.82
15,400	0.001024052	1.37	3.81
15,500	0.001037395	1.37	3.80
15,600	0.001050823	1.37	3.80
15,700	0.001064339	1.36	3.79

Table 5.3-1 (Continued) Distance Drawdown in the Floridan Aquifer Caused by Site Pumping Alternatives			
Theis Solution		1 - Unit	4 - Units
	Q in gpm =	2,538	10,150
	Q in ft ³ /day =	488,437	1,953,749
Distance, feet	U	Drawdown, feet	Drawdown, feet
15,800	0.00107794	1.36	3.78
15,900	0.001091628	1.36	3.77
16,000	0.001105403	1.36	3.77
16,500	0.00117557	1.34	3.73
17,000	0.001247896	1.33	3.69
17,500	0.001322381	1.32	3.66
18,000	0.001399025	1.30	3.62
18,500	0.001477828	1.29	3.59
19,000	0.001558791	1.28	3.56
19,500	0.001641912	1.27	3.53
20,000	0.001727192	1.26	3.50
20,500	0.001814631	1.25	3.47
21,000	0.001904229	1.24	3.44
21,500	0.001995986	1.23	3.41
22,000	0.002089902	1.22	3.38
22,500	0.002185977	1.21	3.35
23,000	0.002284211	1.20	3.33
23,500	0.002384604	1.19	3.30
24,000	0.002487156	1.18	3.28
24,500	0.002591867	1.17	3.25
25,000	0.002698737	1.16	3.23
25,500	0.002807766	1.15	3.20
26,000	0.002918954	1.14	3.18
26,400	0.003009459	1.14	3.16

Distance-Drawdown Plot from Theis Solution

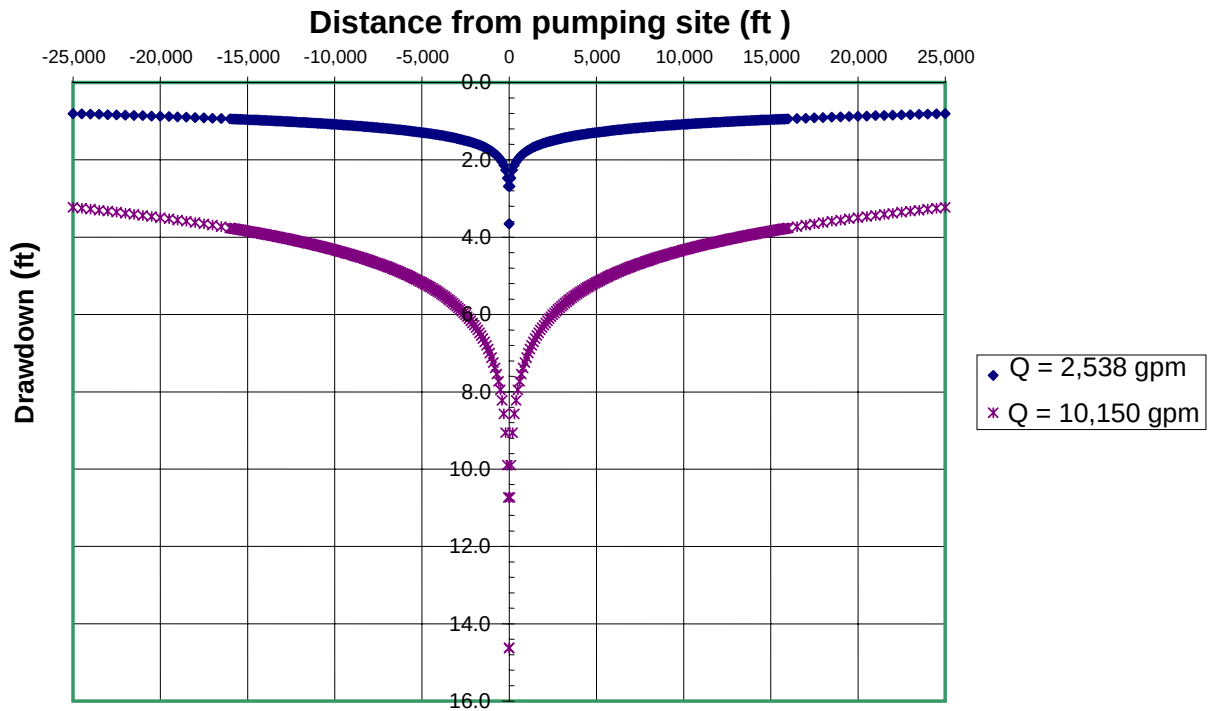


Figure 5.3-2
Distance-Drawdown Plot from Theis Solution

be over 20 feet NGVD (land surface is estimated between 15 and 20 NGVD). Therefore, the maximum water usage at the plant site is not considered to be sufficient to cause head changes required to induce vertical or lateral saltwater intrusion into the Upper Floridan Aquifer.

In summary, TCEC groundwater withdrawals from the Upper Floridan Aquifer will not affect the unconfined groundwater elevations, adversely impact other users, or result in saline water intrusion.

5.3.3 Drinking Water

The effects of groundwater withdrawals during Unit 1 operation on drinking water supplies are discussed in Subsection 5.3.2. Potable water will be supplied to the TCEC site by FPUA. The effects of leachate and runoff are discussed in Subsection 5.3.4. The locations and descriptions of existing wells pumping from the Floridan Aquifer are provided in Subsection 5.3.2. There will be no harm to any existing legal users or to the

groundwater drinking water resource by any of the activities associated with the TCEC operations.

5.3.4 Leachate and Runoff

There is no source of leachate runoff associated with the TCEC; therefore, there will be no impact on the underlying aquifers due to leachate.

5.3.5 Measurement Programs

Following installation of TCEC wells, the groundwater in the Floridan Aquifer will be monitored to measure water withdrawals. Water withdrawals will be made on a daily basis from each well using a flowmeter. Sampling of groundwater will be conducted in compliance with the Consumptive Use conditions included in the final Conditions of Certification. Water samples for chemical analyses will be collected and analyzed using standard methods required by the FDEP and SFWMD.

All of the wells will be placed within the fenced enclosure of the site for maximum security. The well locations will be protected by concrete pads and provided with lockable enclosures to limit access to authorized personnel only.

The general site runoff will be monitored during a rainfall event which causes discharge from the site runoff collection system at the site runoff detention overflow weir. A grab sample will be collected during the event in the vicinity of the basin overflow. The sample will be tested in accordance with the Generic Permit for Stormwater Discharge from Industrial Facilities (this application/NOI included in Section 10.1.10).

5.3.6 Ultimate Development and Impacts on Water Supplies

There are no natural surface water bodies onsite. The TCEC will not discharge or withdraw from any surface water body. The TCEC will convey all sanitary and industrial wastewaters to the FPUA wastewater system for treatment and/or disposal.

The TCEC will have no adverse effect on the surficial groundwater aquifer quality because no water will be withdrawn from this water table zone. The TCEC will draw process water for plant operations, excluding potable water, from the Upper Floridan Aquifer.

Model results of the analytical model used to calculate distance-drawdown indicates that with ultimate site development of four units, the drawdown at 1 mile from the site will be 4.71 feet. Despite this change in head, the Floridan Aquifer, which is artesian, would still be over 30 feet NGVD. As such, the maximum water usage at the

site is not considered to be sufficient to cause head changes to induce vertical or lateral saltwater intrusion into the Upper Floridan Aquifer.

Additionally, potable water will be provided by the FPUA water system from a water main located immediately south of the TCEC site. The number of personnel required to operate the four-unit TCEC is anticipated to be 60, which will result in a negligible impact on the FPUA potable water system. FPUA will provide treated effluent for the cooling towers. FPUA ensures that the capacity of the wastewater treatment plant that will be constructed adjacent to the TCEC site will be capable of providing the treated effluent demand required for operating four units at full capacity.

Finally, there is no source of leachate associated with plant operations. Therefore, there will be no impact on the underlying aquifers from leachate. The impacts from plant operations on surface runoff will be minimized using appropriate stormwater management protocols.

For these reasons, there will be no adverse impacts to water supplies from the operation of the TCEC.

5.4 Solid/Hazardous Waste Disposal Impacts

5.4.1 Solid Waste

Solid waste such as office wastes and grass clippings resulting from normal site operations will be recycled to the maximum extent possible. Remaining wastes will be hauled and disposed using a commercial disposal service. Spent catalysts from the NO_x reduction system will be returned to the supplier for regeneration of the catalyst material.

5.4.2 Hazardous Waste

Potentially hazardous waste materials such as paint, thinners, solvents, laboratory reagents, and similar products will be stored in appropriate containers and stored in segregated storage areas for less than 90 days. These wastes will be disposed of offsite by a licensed hazardous waste contractor.

Chemical and oil spills will be confined by berms and containments. These spills will be collected and recycled or disposed of by an approved contractor.

Preoperational chemical cleaning solutions will be collected, neutralized, and tested to determine if hazardous. These wastes will be disposed offsite by an approved contractor in an appropriate manner in accordance with the determination. In addition, the same procedure will be used every 3 to 5 years when the HRSGs require chemical cleaning.

5.4.3 *Ultimate Development and Impacts from Solid/Hazardous Waste Disposal*

Solid wastes generated from normal site operations will be recycled to the extent possible or hauled and disposed offsite. Spent SCR catalysts will be returned to the supplier for regeneration of the catalyst material.

Hazardous waste will be appropriately stored until it is transported and disposed offsite by a permitted hazardous waste company. Further, chemical and oil spills will be confined by berms or other containments. The spills will be collected and recycled or disposed of offsite by an approved contractor. Finally, chemical cleaning solutions will be collected, neutralized, and tested to determine the appropriate disposal method.

Consequently, there will be no adverse impacts from the storage or disposal of both solid and hazardous wastes generated by TCEC operations.

5.5 Sanitary and Other Waste Discharges

A minor amount of sanitary wastewater (approximately 1,000 gpd for Unit 1) will result from personnel operations at the TCEC. Sanitary wastewater will be collected in a separate collection system and routed to the FPUA force main located in the southern portion of the TCEC property.

The impact of process wastewater disposal is covered in Section 5.3.

5.5.1 *Ultimate Development and Impacts from Sanitary or Other Wastes*

The operation of four units will result in approximately 2,000 gpd of sanitary wastes being conveyed to the FPUA WWTP via the onsite force main. This quantity is considered negligible compared to the operating capacity of the wastewater treatment plant. Therefore, no adverse impact resulting from the disposal of sanitary wastewater is anticipated.

Ultimate impacts from industrial wastewaters generated from plant operations are addressed in Subsection 5.1.6 and 5.2.4.

5.6 Air Quality Impacts

The air quality impacts associated with the addition of Unit 1 and ancillary equipment are addressed in the PSD Air Permit Application attached to this Site Certification Application as Volume 3 under separate cover.

The air quality impacts associated with ultimate build-out can be conservatively estimated by multiplying the Unit 1 impacts by four. The estimated air quality impacts associated with ultimate build-out along with the associated Florida Ambient Air Quality Standards (FAAQS) are shown in Table 5.6-1.

Table 5.6-1 ISCST3 Model-Predicted Class II Impacts					
Pollutant	Averaging Period	Unit 1 Model-Predicted Impact ^(a) (µg/m ³)	Ultimate Site Build-out Predicted Impact ^(b) (µg/m ³)	FAAQS (µg/m ³)	Predicted FAAQS Exceedance
NO _x	Annual	0.66	2.64	100	NO
SO ₂	Annual	0.08	0.32	60	NO
	24 Hour	1.35	5.40	260	NO
	3 Hour	2.89	11.56	1,300	NO
PM/PM ₁₀	Annual	0.27	1.08	50	NO
	24 Hour	4.86	19.44	150	NO
CO	8 Hour	10.45	41.80	10,000	NO
	1 Hour	102.15	108.60	40,000	NO
^(a) Impacts represent the highest first high model-predicted concentration from all five years of meteorological data modeled. ^(b) It is conservatively assumed that ultimate site buildout impacts are four times the Unit 1 impacts.					

5.6.1 Impact Assessment

The air quality impacts associated with the addition of Unit 1 and ancillary equipment are addressed in the PSD Air Permit Application attached to this Site Certification Application as Volume 3 under separate cover. The Unit 1 model-predicted impacts are shown in Table 5.6-1 with the associated Florida Ambient Air Quality Standards (FAAQS).

5.6.2 Monitoring Program

As discussed in the PSD application (Volume 3), the modeled air quality impacts are well below the monitoring de minimis concentrations. Therefore, no pre-construction or post-construction air quality monitoring is required.

5.6.3 Ultimate Development and Impacts to Air Quality

The air quality impacts associated with ultimate buildout can be conservatively estimated by multiplying the Unit 1 impacts by four. The estimated air quality impacts associated with ultimate buildout with the associated FAAQS are shown in Table 5.6-1. This table shows that estimated ultimate impacts are well below the associated FAAQS values.

5.7 Noise

This section describes the potential facility noise emissions associated with the normal operation of the TCEC. In addition, a discussion of the potential impacts and compliance with local noise regulations related to facility operation, as well as mitigation, is included.

5.7.1 Noise Impact Significance Thresholds

The potential noise impacts have been evaluated based on the following significance thresholds. These thresholds are based on complying with applicable local regulations and minimizing the potential impacts to the neighboring residences.

5.7.1.1 Local Noise Ordinance. The St. Lucie County noise ordinance is located in Chapter 1-13.8 of the Code of Ordinances. The noise limits are based on the time of day and the receiving land use category. Table 5.7-1 summarizes the noise limits included in the County ordinance that are applicable to the TCEC. As shown in Table 5.7-1, the County ordinance includes octave band limits and overall A-weighted limits. Since the TCEC will operate continuously, the more stringent nighttime limits will apply and provide the basis of this evaluation. Furthermore, compliance with the nighttime noise limits will ensure compliance with the less restrictive daytime noise limits.

Table 5.7-1 St. Lucie County Permissible Noise Limits ¹										
Time ²	Octave Band, Hz									Overall dBA
	31.5	63	125	250	500	1K	2K	4K	8K	
Day	64	64	61	57	53	48	44	41	37	55
Night	59	59	56	52	48	43	39	36	32	50
¹ Based on Chapter 1-13.8, Noise Control, of the St. Lucie County Code of Ordinances. Sound levels included are indicative of limits for industrial sources to residential receivers only. ² Daytime is defined as the hours from 7:00 am to 10:00 pm. Nighttime is defined as the hours from 10:01 pm to 6:59 am.										

In addition to the limits listed in Table 5.7-1, the County ordinance includes an ambient sound level limit that cannot exceed the existing ambient sound level by more than 3 decibels. Pursuant to the ordinance, these limits apply at the boundary of the receiving property and are based on the equivalent-continuous sound pressure level (L_{eq}).

Lastly, in the event that the noise emissions include a steady, pure tone, the applicable sound level limits shall be reduced by five decibels in residential use districts.

According to the County ordinance, a “discrete tone is the condition of a noise source in which sharp, piercing or hum-like steady tones occur in the octave noise spectrum.” However, these types of noises are not expected to occur as a result of normal facility operation and are not indicative of combined cycle, electric generating facilities.

5.7.1.2 Increase in Future Background Sound Levels. In addition to regulatory limits, potential impacts to nearby receptors can also be evaluated against the existing background sound levels measured during the ambient noise survey to quantify the relative increase in background sound levels. It is important to note that evaluating the potential increase to background sound levels due to project noise emissions is subjective in nature and therefore lacks the measurable regulatory criteria previously discussed. However, such an evaluation provides additional criteria that can identify potential impacts that may occur despite compliance with regulatory limits. For reference, a 3 dB increase to the background sound level is generally considered “just barely perceptible” and a 5 dB increase to the background sound level is generally considered “clearly noticeable.” Similarly, a 10 dB change in the background sound level is generally considered to be a doubling (or halving) of the apparent loudness. Typically, an increase in the background sound level of 5 dB or less is generally considered not to be a significant increase.

5.7.2 Noise Emissions Modeling

The environmental noise emissions include the noise emitted by the TCEC to the surrounding community. The environmental noise emissions associated with the TCEC have been estimated in order to evaluate both the potential future noise impacts on the neighboring noise sensitive receptors and compliance with the applicable regulations.

5.7.2.1 Noise Modeling Methodology. The environmental noise emissions were modeled using noise prediction software (CadnaA version 3.4.109). The model simulated the outdoor propagation of sound from each noise source and accounted for sound wave divergence, atmospheric and ground sound absorption, sound directivity, and sound attenuation due to interceding barriers. A database was developed which specified the location, octave band sound levels, and sound directivity of each noise source. A receptor grid was specified which covered the entire area of interest. The model calculated the overall A-weighted sound pressure levels and the octave band sound levels within the receptor grid based on the octave band sound level contribution of each noise source. Finally, a noise contour plot was produced based on the overall sound pressure levels within the receptor grid, including specific receptor locations.

Noise modeling was conducted to predict the environmental noise emissions during normal facility operation, which excludes intermittent activities such as startup, shutdown, and any other abnormal or upset operating conditions.

5.7.2.2 Equipment Noise Sources. The major Unit 1 equipment will include one Frame 7FA combustion turbine generator unit (CTG), one heat recovery steam generator (HRSG), one steam turbine generator (STG), and one eight-cell mechanical draft cooling tower. These major equipment components are expected to be the primary noise contributors to the facility noise emissions. Secondary noise sources are expected to include generator step-up transformers, major pumps (e.g., boiler feedwater, circulating water, condensate, closed-cycle cooling water), and other associated equipment.

Equipment sound levels were based on a combination of available in-house data and data provided by the Edison Electric Institute (EEI) in the *Electric Power Plant Environmental Noise Guide* (1984).

5.7.2.3 Facility Noise Emissions. The resulting Unit 1 facility noise emissions are presented on Figure 5.7-1 as overall, A-weighted noise contours. Also shown on Figure 5.7-1 are the nearest noise sensitive receptors described in Subsection 2.3.8, Existing Acoustical Environment. These receptor locations are based on the inspection conducted during the ambient noise survey as detailed on Figure 2.3-26.

As shown, the overall sound pressure levels at the nearest noise sensitive receptors due to the normal operation of Unit 1 range from approximately 42 dBA to 47 dBA. It is important to note that these levels represent only the noise associated with Unit 1 and do not include the influence of any non-project background noise.

5.7.3 Project Noise Impacts

In order to evaluate the potential noise impacts on the neighboring noise sensitive receptors and compliance with the local ordinance, the predicted project sound levels are compared to both the measured background sound levels and the applicable regulations.

5.7.3.1 St. Lucie County Ambient Sound Level Limit. As mentioned in Subsection 5.7.1 of this report, the St. Lucie County noise ordinance includes a sound level limit based on the existing ambient sound level. Specifically, the proposed facility cannot exceed the existing ambient sound level by more than three decibels. The measured ambient sound levels range from 41 dBA to 46 dBA. As such, the resulting ambient sound level limits (based on the County noise ordinance) range from 44 dBA to 49 dBA (ambient plus 3 dB). As shown in Table 5.7-2, the noise emissions associated with Unit 1 are expected to range from 42 dBA to 47 dBA at the nearest receptors. Therefore, the noise emissions associated with Unit 1 are expected to be in compliance with the St. Lucie County ambient sound level requirement, as shown in Table 5.7-2.

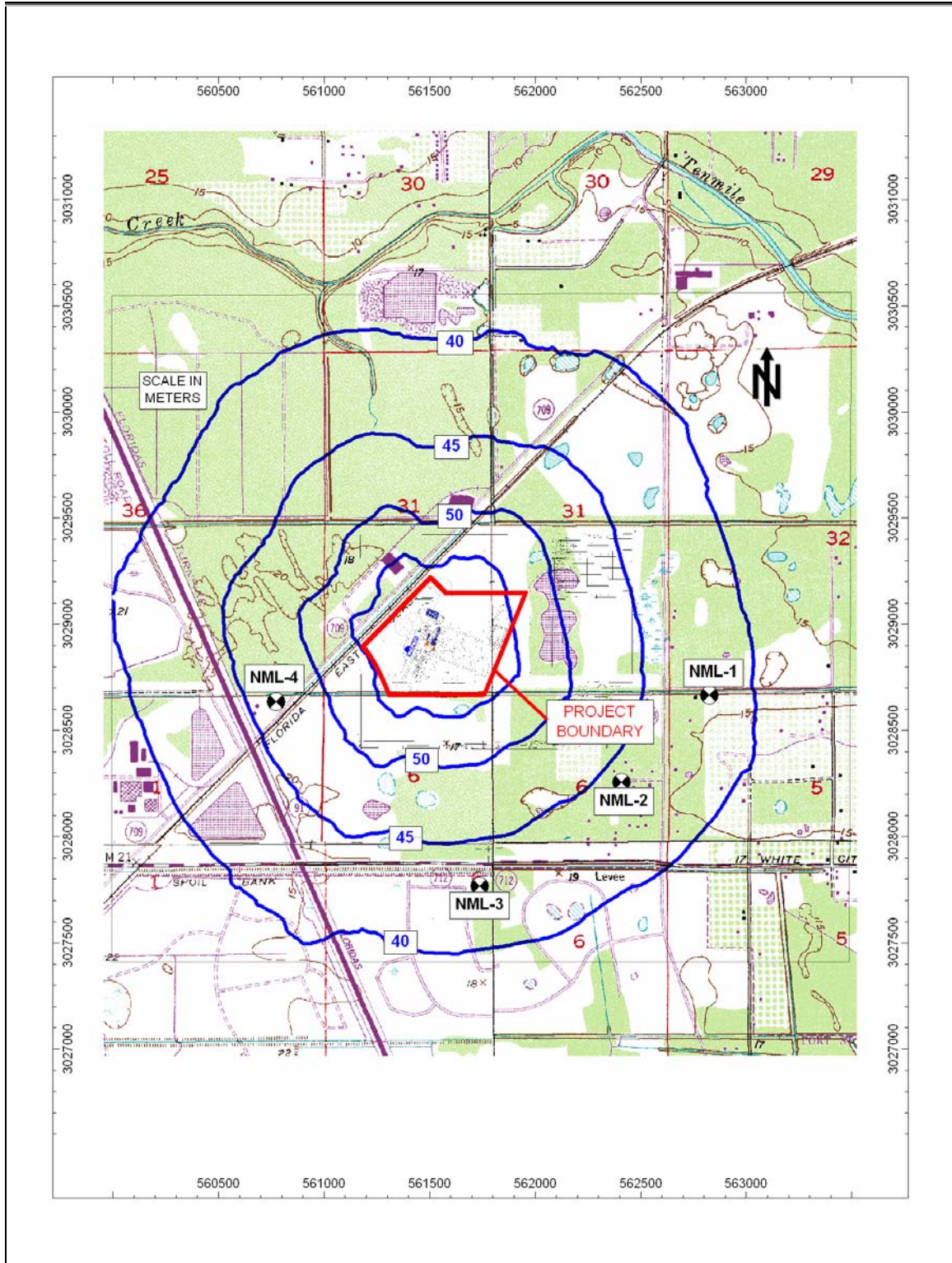


Figure 5.7-1
Unit 1 Noise Emissions

Table 5.7-2 Unit 1 Compliance with St. Lucie County Ambient Noise Requirement					
Noise Receptor Locations		Measured Background Sound Level (Hourly L ₉₀), dBA ¹	Predicted Unit 1 Sound Level, dBA	Ambient Limit ¹ (Measured Background plus 3 dB)	Compliance with St. Lucie County Ambient Sound Level Requirement
NML	Description	Median			
1	Nearest resident east of the TCEC site, east of the intersection of Selvitz Road and Devine Road.	41	42	44	Yes
2	Nearest resident southeast of the TCEC site, west of the intersection of Selvitz Road and Favorite Road.	43	44	46	Yes
3	Nearest resident south of the TCEC site on Omega Road, on the south side of Midway Road.	46	43	49	Yes
4	Nearest resident west-southwest of the TCEC site, immediately north of the crossing of Glades Cut-off Road and Florida's Turnpike.	45 ²	47	48	Yes
¹ As a conservative measure and in light of a lack of definition within the ordinance, existing ambient sound levels were based on the L ₉₀ statistical parameter. ² Measurements at NML 4 were limited to manned measurements due to limited access (private property) and because the property is bordered by two main arterials (Florida's Turnpike and Glades Cut-off Road). The sound level presented is based on the L ₉₀ statistical parameter measured during the manned measurements.					

5.7.3.2 St. Lucie County Octave Band and Overall Sound Level Limit. As previously discussed, compliance with the St. Lucie County noise ordinance is based on meeting octave band sound levels and overall A-weighted sound levels in addition to the ambient sound level increase criteria discussed above. Table 5.7-3 provides the results of the Unit 1 noise modeling in both octave bands and overall A-weighted sound levels at each receptor location.

As shown in Table 5.7-3, the noise emissions associated with Unit 1 are expected to comply with the St. Lucie County noise ordinance regarding both the octave band and overall A-weighted sound level limits.

Table 5.7-3 Predicted Unit 1 Sound Levels (dB)											
NML	Octave Band									dBA	Comp
	31.5	63	125	250	500	1K	2K	4K	8K		
1	55	58	49	43	39	36	29	5	5	42	Yes
2	57	59	51	45	41	38	33	5	5	44	Yes
3	56	58	50	44	40	37	31	5	5	43	Yes
4	57	58	54	48	44	41	36	13	5	47	Yes
Regulatory Limit											
Day	64	64	61	57	53	48	44	41	37	55	N/A
Night	59	59	56	52	48	43	39	36	32	50	N/A

5.7.3.3 Increase in Future Background Sound Levels. The increase in the existing overall background sound level (i.e., traffic, neighborhood sounds, Unit 1, etc.) due to the operation of Unit 1 is expected to range from 2 to 4 dB based on the measured background sound levels. As previously discussed, a 2 dB increase is typically perceived by the average listener as “imperceptible” and a 4 dB increase can be considered moderately noticeable (e.g., a 3 dB increase is typically considered “just barely perceptible” and a 5 dB increase is typically considered “clearly noticeable.”

The future background sound levels are based on combining the existing background sound level measured during the survey with the predicted Unit 1 sound level. It is important to note that the future background sound levels are based on the median sound level measured during the ambient sound level survey detailed in Subsection 2.3.8 and that the actual future sound level will fluctuate throughout the day depending on variation in significant non-facility noise sources (i.e., traffic). Furthermore, it is expected that Unit 1 will be inaudible at the nearest receptors during much of the day due to existing non-facility noise.

5.7.3.4 Noise Impact Summary and Mitigation. The noise emissions associated with the normal operation of Unit 1 are expected to comply with the applicable St. Lucie County noise ordinance. As stated above, the St. Lucie County noise ordinance includes octave band, overall, and ambient sound level requirements. Unit 1 is expected to meet these requirements by including noise mitigation in the design.

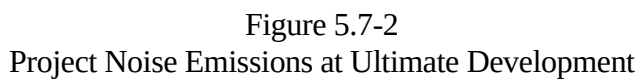
Although not required by noise regulations applicable to the TCEC, potential impacts to nearby receptors were evaluated by comparing the existing background sound level with the new background sound level expected to result from operation of Unit 1. The new future background sound level is expected to be below a level that is typically

considered “clearly noticeable.” As such, significant impacts to nearby receptors are not expected.

It is anticipated that noise mitigation will be incorporated into the final design to avoid potential adverse impacts and meet the regulatory requirements. Mitigation measures that were considered in this impact evaluation include upgrading the CTG and HRSG packages, installing a silencer in the HRSG exhaust stack, upgrading the cooling tower, and installing the STG package inside an acoustical enclosure. Selection of final noise mitigation measures will be determined during detailed design to ensure compliance with the County noise ordinance.

5.7.4 Project Noise Impacts with Ultimate Development

Ultimate development will include the installation of three additional 1-on-1 combined cycle units similar to Unit 1 for a total of four units. The resulting facility noise emissions associated with ultimate development (i.e., four units) are presented in Figure 5.7-2 as overall A-weighted noise contours. Also shown on Figure 5.7-2 are the nearest noise sensitive receptors described in Subsection 2.3.8. As shown, the overall sound pressure levels at the nearest noise sensitive receptors due to the normal operation of ultimate development range from approximately 43 dBA to 48 dBA at the receptors. It is important to note that these levels represent only the noise associated with the TCEC, and do not include the influence of any background noise.



5.7.4.1 St. Lucie County Ambient Sound Level Limit. As previously mentioned, the St. Lucie County noise ordinance includes a sound level limit based on the existing ambient sound level. Specifically, the proposed facility cannot exceed the existing ambient sound level by more than three decibels. The measured ambient sound levels range from 41 dBA to 46 dBA. As such, the resulting ambient sound level limits, based on the County noise ordinance, range from 44 dBA to 49 dBA (ambient plus 3 dB). As shown in Table 5.7-4, the noise emissions associated with the ultimate project are expected to range from 43 dBA to 48 dBA at the nearest receptors. Therefore, the noise emissions are expected to be in compliance with the St. Lucie County ambient sound level requirement, as shown in Table 5.7-4.

Table 5.7-4 Compliance with St. Lucie County Ambient Noise Requirement					
Noise Receptor Locations		Measured Background Sound Level (Hourly L ₉₀), dBA ¹	Predicted Facility Sound Level, dBA	Ambient Limit ¹ (Measured Background plus 3 dB)	Compliance with Ambient Sound Level Requirement
NML	Description	Median			
1	Nearest resident east of the TCEC site, east of the intersection of Selvitz Road and Devine Road.	41	43	44	Yes
2	Nearest resident southeast of the TCEC site, west of the intersection of Selvitz Road and Favorite Road.	43	46	46	Yes
3	Nearest resident south of the TCEC site on Omega Road, on the south side of Midway Road.	46	44	49	Yes
4	Nearest resident west-southwest of the TCEC site, immediately north of the crossing of Glades Cut-off Road and Florida's Turnpike.	45 ²	48	48	Yes
¹ As a conservative measure and in light of a lack of definition within the ordinance, existing ambient sound levels were based on the L ₉₀ statistical parameter. ² Measurements at NML 4 were limited to manned measurements due to limited access (private property) and because the property is bordered by two main arterials (Florida's Turnpike and Glades Cutoff Road). The sound level presented is based on the L ₉₀ statistical parameter measured during the manned measurements.					

5.7.4.2 St. Lucie County Octave Band and Overall Sound Level Limit. As previously discussed, compliance with the St. Lucie County noise ordinance is based on meeting octave band sound levels and overall A-weighted sound levels in addition to the ambient sound level increase criteria discussed above. Table 5.7-5 provides the results of

the TCEC noise modeling in both octave bands and overall A-weighted sound levels at each receptor location.

Table 5.7-5 Predicted Project Sound Levels (dB) at Ultimate Development											
NML	Octave Band									dBA	Comp
	31.5	63	125	250	500	1K	2K	4K	8K		
1	55	58	51	43	41	37	32	5	5	43	Yes
2	59	59	52	45	44	41	37	13	5	46	Yes
3	58	59	51	43	42	39	34	5	5	44	Yes
4	59	59	53	46	45	43	39	16	5	48	Yes
Regulatory Limit											
Day	64	64	61	57	53	48	44	41	37	55	N/A
Night	59	59	56	52	48	43	39	36	32	50	N/A

As shown in Table 5.7-5, the noise emissions associated with ultimate development are expected to comply with the St. Lucie County noise ordinance regarding both octave band and overall A-weighted sound level limits.

5.7.4.3 Increase in Future Background Sound Levels. In order to evaluate the potential noise impacts on the neighboring noise sensitive receptors and compliance with the local ordinance, the predicted sound levels at ultimate development are compared to both the measured background sound levels and the applicable regulations.

Potential impacts to nearby receptors have been evaluated against the existing background sound levels measured during the ambient noise survey. The increase in the existing ambient sound level due to the operation of the TCEC is expected to range from 2 to 5 dB based on the measured background sound levels. The largest increase is anticipated to occur at the residences located west (NML 4) and east (NML 1) of the site. As previously mentioned, a 2 dB increase is typically perceived by the average listener to be below a perceptible level and a 5 dBA increase is typically considered “clearly noticeable.”

The future sound levels are based on combining the existing background sound level measured during the survey with the predicted facility sound level. It is important to note that the future background sound levels are based on the median sound level measured during the ambient sound level survey detailed in Subsection 2.3.8 and that the actual future sound level will fluctuate throughout the day depending on variation in significant non-facility noise sources (i.e., traffic). Furthermore, it is expected that TCEC

will be inaudible at the nearest receptors during much of the day due to existing non-facility noise.

5.7.4.4 Ultimate Development Noise Impact Summary and Mitigation. The noise emissions associated with the normal operation of the project are expected to comply with the applicable St. Lucie County noise ordinance. As stated above, the St. Lucie County noise ordinance includes octave band, overall, and ambient sound level requirements. Ultimate development is expected to meet these requirements by including noise mitigation in the design.

Although not required by noise regulations applicable to the TCEC, potential impacts to nearby receptors were evaluated by comparing the existing background sound level with the new background sound level expected to result from operation of the TCEC. The new future background sound level is not expected to result in significant impacts to nearby receptors.

It is anticipated that noise mitigation will be required to avoid potential impacts to nearby receptors and meet the regulatory requirements at ultimate development. The required mitigation measures are in addition to those considered for the initial Unit 1 phase. Mitigation measures that were considered in this evaluation include further upgrades to the CTG and HRSG packages, installing an improved silencer in the HRSG exhaust stack, including an acoustical enclosure for each steam turbine generator package, upgrading the condenser package, mitigating noise from the cooling towers, and mitigating noise from the circulating water pumps.

It should be noted that the mitigation measures required to meet the octave band limits resulted in significant improvements to the overall A-weighted facility sound levels. As such, the overall A-weighted noise emissions resulting from the ultimate development are similar to those resulting from Unit 1 alone. Furthermore, the mitigation measures that were considered for Unit 1 in the ultimate development design exceed the mitigation measures considered in the design for Unit 1 by itself.

5.8 Changes in Nonaquatic Species Populations

5.8.1 Impacts

Studies of the TCEC site during the past 10 years have identified little in the way of wildlife utilizing the site wetlands or upland areas. This is in part because of the poor quality of the plant communities. Intuitively, however, some of the effect is surely the result of residential and industrial development in the vicinity. Site development admittedly diminishes available nonaquatic wildlife habitat in the TCEC vicinity. However, the actual impact on nonaquatic wildlife in the area with regard to species

composition, distribution, and dominance is insignificant. The reasons being that little wildlife appears to be present and those species present coexist with urban development.

5.8.2 Monitoring

No monitoring is proposed since impacts to nonaquatic wildlife are considered insignificant.

5.8.3 Ultimate Development and Impacts to Nonaquatic Species Populations

Nonaquatic species are not common to the site, and commercial and residential development is occurring in the surrounding areas. Observations made during two site visits and an evaluation of existing site conditions including vegetation types and surrounding land use correspond to a low quality habitat utilized infrequently by few nonaquatic species. Therefore, ultimate site development will have a minimal effect on wildlife populations onsite or in the surrounding vicinity.

5.9 Other Plant Operation Effects

The overriding operating effect of the TCEC plant will be a beneficial addition to the generating capability of FMPA that will benefit all ARP members, including FPUA. Additional positive impacts will be the continuation of stable, well paying jobs held by the plant operations staff. An initial 16 member staff is anticipated for the first TCEC unit and the payroll is expected to be approximately \$1.38 million per year. In addition, local purchases of certain site services and plant supplies will provide additional community employment and income benefits.

As discussed further below, the TCEC facility will have limited, if any, negative operational effects in the categories of traffic, water and wastewater requirements, housing, labor force, and community facilities and services.

5.9.1 Traffic Impacts

Regular vehicular traffic to the site will be limited to TCEC operation staff of 16 that will be divided into shifts to provide around-the-clock operation, plus occasional deliveries of plant supplies and support services. Access to the plant site will occur through the access road off of Selvitz Road and will not back up normal traffic flows.

Delivery of the primary fuel, natural gas, will occur through an underground natural gas pipeline to be constructed to the site, and will not require truck or rail hauling as needed for a coal plant.

Occasional deliveries will replenish the storage tanks holding the ultra-low-sulfur diesel fuel. The frequency of delivery will depend on the hours of operation on fuel oil, but such operation is not as cost-effective as operation on natural gas, and should only occur on a limited basis that may be caused, for instance, by an interruption in adequate supplies of natural gas.

As subsequent units are added, the plant operational staff will increase modestly, but is expected to reach approximately 60 staff for a 1,200 MW combined cycle plant. Again, this staff will be divided into around-the-clock shifts and will not result in a noticeable impact on local roadways. Additional deliveries would also occur, but should similarly be manageable given the periodic nature and dispersion throughout the daytime hours of operation.

5.9.2 Water

The TCEC facility will have annual average water requirements of 2.7 MGD that will be provided from three outside sources. The primary supply source will be an average of 2.547 MGD of reclaimed water to be provided by the FPUA municipal WWTP. This plant will be located adjacent to the TCEC site and is projected to be operational in late 2009. The second source will be onsite wells that will provide an average of 0.121 MGD, but which will also be used for cooling water during the period when the supply from the WWTP is not available when the TCEC is first brought online. The onsite wells will also be available as a temporary, 30 day per year backup supply if the reclaimed water is not available. The third outside water supply source will be the potable water supply from FPUA, projected to be 0.001 MGD (1,000 gallons per day). Because an average of 95 percent of the water requirements will be from the WWTP and less than half of one percent will be provided by FPUA's water supply, the impacts of the TCEC Unit 1 on the demand for groundwater will not be adverse.

As additional units are added to the TCEC site, additional water requirements will arise. These requirements will be met through a combination of supply from the FPUA WWTP, from onsite wells, and from the FPUA municipal supply. The annual average water requirement for the TCEC operating with four units is 10.7 MGD.

5.9.3 Wastewater

The TCEC-Unit 1 will produce an annual average of 0.645 MGD of wastewater that will be collected in the wastewater collection system, and delivered to the FPUA municipal WWTP. Process wastewaters will be conveyed from FMPA directly into the

FPUA Class I injection well. Sanitary wastewater will be conveyed to the FPUA wastewater force main located in the southern portion of the TCEC property.

Given the close proximity of the TCEC site to the future FPUA WWTP and the installation of new pipelines to deliver the wastewater from FMPA to the FPUA WWTP, there will be no adverse impacts on the existing FPUA wastewater system.

As additional units are added to the TCEC site, it is anticipated that a similar method for wastewater disposal will be utilized.

5.9.4 Power

Operation and future expansion of the TCEC facility will contribute to the safe, adequate, and reliable supply of electricity at the lowest reasonable cost and in an acceptable environmental manner for FMPA and its members. This will be achieved with minimal negative impacts on the surrounding land use or community, and will help preserve or create employment in St. Lucie County.

5.9.5 Landfill

During operation, a negligible amount of landfill waste will be generated. This waste will consist of typical waste generated as part of office operation, packaging of supplies and materials. The total amount of landfill waste is not expected to be significant due to the minimal number of staff (16 to operate Unit 1), and the limited amount of materials and supplies consumed during operations. It is anticipated that a single industrial sized dumpster emptied according to a routine weekly schedule will be sufficient most of the time, except when subsequent units are under construction. FMPA will pay user fees for this and all site services, and will not instill external costs to the surrounding community.

As subsequent units are added at the TCEC site, only modest increases in the need for landfill waste removal and disposal would be anticipated. Approximately 60 staff persons will be required when all four units are in commercial operation. It is expected that no more than two industrial sized dumpsters will be required at that time.

5.9.6 Ultimate Development and Impacts from Other Plant Operations

Ultimate site development will result in an increase in plant operational staff, but is expected to reach only approximately 60 persons. Since the staff will be divided into around-the-clock shifts, there will be no noticeable impact on local roadways. Further, vendor deliveries will also occur, but will be manageable given the periodic nature and dispersion throughout the daytime hours of operations.

5.10 Landmarks, Sensitive Areas, and Archaeological Sites

There are no recorded natural landmarks, sensitive areas, or archaeological sites located on the TCEC site. The nearest recorded national natural landmark is the Reed Wilderness Seashore Sanctuary located south of St. Lucie County in Martin County. There are several aquatic preserves located along the east shoreline of St. Lucie County. These include the Jensen Beach to Jupiter Inlet Aquatic Preserve; the Indian River Aquatic Preserve; the Savannas State Preserve; and the North Fork of the St. Lucie River Aquatic Preserve.

There are 15 sites in St. Lucie County that are recorded on the *National Register of Historic Places*. Six of these 15 sites are also registered with the Florida *Office of Cultural and Historical Programs*. Table 5.10-1 lists these sites. No impacts to these properties are anticipated from operation of the TCEC, as confirmed by the Division of Historical Resources by letter dated March 29, 2005 (included in Section 10.4.6).

Table 5.10-1 Historic Sites in St. Lucie County, Florida			
Site Name	National Register of Historic Places (Yes/No)	State of Florida Office of Cultural and Historical Programs (Yes/No)	City
Moore's Creek Bridge	Yes	No	Ft. Pierce
Casa Caprona	Yes	Yes	Ft. Pierce
Cresthaven	Yes	Yes	Ft. Pierce
Ft. Pierce Old City Hall	Yes	No	Ft. Pierce
Ft. Pierce Old Post Office	Yes	No	Ft. Pierce
Ft. Pierce Site	Yes	Yes	Ft. Pierce
Jules Frere House	Yes	No	Ft. Pierce
Captain Hammond House	Yes	Yes	White City
Zora Neale Hurston House	Yes	Yes	Ft. Pierce
Immokalee	Yes	No	Ft. Pierce
St. Anastasia Old Catholic School	Yes	No	Ft. Pierce
St. Lucie High School	Yes	Yes	Ft. Pierce
St. Lucie Village Historic District	Yes	Yes	St. Lucie Village
Sunrise Theatre	Yes	No	Ft. Pierce
Urca de Lima Shipwreck	Yes	No	Off-shore Ft. Pierce

5.11 Resources Committed

The TCEC site includes 68.1 acres dominated by improved pasture. Within the pastureland are areas of wet prairie, freshwater marsh, and thickets of Brazilian pepper. A total of 11.25 acres of wetlands will be dedicated resources due to development. Since there is no available space on the site for wetland mitigation, it is the intent of FMPA to provide mitigation by purchasing wetland mitigation bank credits sufficient to offset the impact loss. FMPA requests certification of the entire 68.1 acres for power development.

The impacts to the wetlands will be irreversible; FMPA proposes to purchase credits from an approved mitigation bank as the mitigation for unavoidable impacts to onsite wetlands. However, the developed land could be mostly returned to its original use after the plant ceases operations.

The materials used to construct Unit 1 will be dedicated resources. It is possible that some of the materials may be reclaimed after plant closure.

The natural gas and oil burned as fuel will be a permanent commitment of resources. The natural gas requirements will be obtained from the base case modeling, which is to be complete during detail design. It is estimated 6.7 million gallons of No. 2 fuel oil (500 hours/year) could be consumed annually over the 30 year operating period.

5.11.1 Ultimate Development and Impacts to Resources Committed

There will be an irreversible impact to 11.25 acres of low quality wetlands from ultimate site development. However, FMPA will mitigate impacts to these wetlands to ensure no net loss. Further, resources committed to construct all four units may be reclaimed after plant closure. The natural gas and oil burned as fuel will be a permanent commitment of those resources.

However, the overall benefits of the TCEC will result in positive impacts. Operation of the TCEC facility will contribute to the safe, adequate, and reliable supply of electricity at the lowest reasonable cost and in an acceptable environmental manner for FMPA and the ARP members. This will be achieved with minimal negative impacts on the surrounding land use or community, and will help preserve or create employment in St. Lucie County.

5.12 Variances

No variances are requested as part of this SCA.

5.13 References

Calculating Realistic PM₁₀ Emissions from Cooling Towers, Abstract 216, Reisman, Joel and Frisbie, Gordon. Air and Waste Management Association 94th Annual Conference and Exhibition in Orlando, Florida, June 25-28, 2001.

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6.0 Transmission Lines and Other Linear Facilities

6.1 Transmission Lines

Two new transmission lines are proposed to connect the Treasure Coast Energy Center (TCEC) Unit 1 with the existing Florida Power & Light Company (FPL) transmission system for distribution to FMPA customers. The need for these lines is contained in the application to the Public Service Commission for the transmission line portion of the Need Determination proceedings.

The proposed lines will be installed on new structures for the entire length of each transmission line corridor. Transmission Line 1 (TL1) will loop into the FPL system on the 230 kV Midway-Turnpike transmission line. TL1 parallels Glades Cutoff Road, then crosses the Florida Turnpike and I-95 as shown on Figure 6.1-1. Transmission Line 2 (TL2) will be a radial line directly into the FPL Midway Substation. TL2 will cross Glades Cutoff Road, parallel Landfill Road and FPL transmission lines, cross the Florida Turnpike and I-95, then turn southwest into Midway Substation, as shown on Figure 6.1-1. Each corridor is 1/4 mile wide except the southwest portion of TL2, which is approximately 1/2 mile wide.

It is anticipated that up to 50 feet of new right-of-way will be acquired parallel to Glades Cutoff Road for TL1 and up to 130 feet of new right-of-way will be acquired parallel to existing FPL right-of-way for TL2.

The overall electric transmission system that is 115 kV and higher is shown on Figure 6.1-2.

6.1.1 Project Introduction

TL1 will be a double-circuit, single-pole, 230 kV line. TL2 will be a single-circuit, single-pole, 230 kV line. The transmission line structures will be self-supporting spun concrete, tubular steel, or hybrid concrete/tubular steel poles, or a combination of these options. Spun concrete and hybrid poles will be direct embedded and tubular steel poles will be installed on drilled concrete pier foundations. In conjunction with the proposed transmission lines, a new 230 kV switchyard will be constructed on the TCEC site.

Figure 6.1-1
Proposed Transmission Line Corridors

Figure 6.1-2
Electric Transmission System 115 kV and Higher

6.1.2 Corridor Locations and Layout

The proposed routes for the 230 kV transmission lines will exit the TCEC site to the west from the switchyard. TL1 will follow a southwesterly route paralleling Glades Cutoff Road for a distance of approximately 3 miles, at which point it will connect (loop in) into the existing FPL Midway-Turnpike 230 kV transmission line. TL1 crosses two FPL 138 kV transmission lines that exit the Midway Substation.

TL2 will be a radial line directly into the FPL Midway Substation. TL2 will cross Glades Cutoff Road, parallel Landfill Road, and cross the Florida Turnpike and I-95. Immediately after TL2 crosses I-95, the route will turn to a south-southwest direction and follow the west side of the Midway Road exit ramp right-of-way (off of I-95 South). TL2 will then turn west, where it will follow Midway Road on the north side for approximately 1/2 mile before turning south into the FPL Midway Substation.

6.1.3 Transmission Line Design Characteristics

The TL1 and TL2 230 kV transmission lines will be constructed using single-pole structures as shown on Figures 6.1-3 and 6.1-4, respectively. The typical aboveground height of the structures will be approximately 100 feet. The structures will be spaced approximately 400 to 800 feet apart along the routes. One fiber-optic shield wire will be installed on the structures for shielding, relaying, and communications. TL1 will also have a conventional shield wire over the second circuit.

The transmission lines will be designed to meet the clearance requirements of the National Electrical Safety Code. A minimum ground clearance of 26 feet will be maintained to ground under the maximum design loading condition of the transmission lines. The structures may vary in height along the routes, depending on the span lengths and potential obstacles.

Access to the transmission lines will be from Glades Cutoff Road, Landfill Road, the I-95 exit ramp, or along the existing FPL transmission line rights-of-way. Although construction of access roads is not anticipated, if required, these roads will consist of geotextile fabric and 4 inches of crushed rock surfacing as shown on Figure 6.1-5.

The transmission lines will be designed for a normal operating capacity of 1,500 amps and emergency operating capacity of 2,000 amps.

Figure 6.1-3
Typical Transmission Structure – TL1

Figure 6.1-4
Typical Transmission Structure – TL2

Figure 6.1-5
Access Road – Typical Cross Section

6.1.4 Cost Projections

This cost projection is based on the conceptual design of the transmission facility and costs associated with similar projects. Actual cost will vary based on the final detailed design.

The estimated cost for the transmission line construction is \$1,500,000 per mile for TL1 and \$1,200,000 per mile for TL2. The switchyard cost is estimated to be \$5,400,000. The estimated total transmission project cost in 2005 dollars is \$13.5 million.

6.1.5 Corridor Selection

The selected corridors and routes are the most direct means with the least impact for connecting TL1 and TL2 into the FPL network, based on the following:

- Because of its capacity and proximity, Midway Substation has been selected as a line terminus.
- The existing 230 kV circuits going north from Midway Substation do not have the capacity to support the proposed TCEC loadings; therefore, these lines are not candidates to loop into the proposed TCEC substation.
- The existing 230 kV circuits going south from Midway Substation have the capacity to support the proposed TCEC loadings; however, in order to loop a line into the proposed TCEC substation, the “break in” location must occur within the first 1.2 miles after leaving Midway Substation. Within this distance, the existing FPL Midway-Turnpike 230 kV line (identified by FPL and FMPA as an acceptable line for this application) is located on the east side of the FPL transmission line right-of-way and is able to be intercepted by the proposed TL1 double-circuit line. After this point, the lines cross and turn east so that the Midway-Turnpike 230 kV line is located south of two FPL lines. FPL will not allow these two lines to be crossed or looped into the proposed TCEC substation.
- Proposed TL1 and TL2 follow existing road rights-of-way and impact industrial, utility, and transportation rather than residential properties.

6.1.6 Sociopolitical Environment of the Transmission Line Corridor Areas

6.1.6.1 Governmental Jurisdiction. As shown on Figure 6.1-6, TL1 and TL2 are located within unincorporated areas of St. Lucie County, except for the final 1.5 miles of TL1, which enters the City of Port St. Lucie.

6.1.6.2 Zoning and Land Use Plans. The proposed corridors for the transmission lines are located in commercial, industrial, and agricultural zoned areas as shown on Figure 6.1-6. No housing units will be moved as part of the transmission line installations; no residential areas will be impacted. The current and future corridor area land use is commercial and industrial, as shown on Figures 6.1-7 and 6.1-8.

6.1.6.3 Easements, Title, Agency Works. New rights-of-way will be required for operation of TL1 and TL2. However, it is anticipated that these new rights-of-way will be secured from private landowners.

Based on the proposed routes, authorizations from the Florida Department of Transportation, Florida Turnpike Authority, North St. Lucie River Water Control District, FPL, and St. Lucie County will be required. Port St. Lucie allows transmission lines in all zoning districts, and has no city permitting requirements if the line (TL1) is located within county rights-of-way.

6.1.6.4 Vicinity Scenic, Cultural, and Natural Landmarks. The TL1 and TL2 project area is essentially the same as the site project area due to the relatively short lengths of the lines. The resources described in Section 2.2.5 are applicable to the transmission lines project area.

6.1.6.5 Archaeological and Historic Sites. The TL1 and TL2 project area is essentially the same as the site project area due to the relatively short lengths of the lines. The resources described in Section 2.2.6 are applicable to the transmission lines project area.

6.1.7 Biophysical Environment of the Corridor Areas

The transmission line will be constructed completely within or adjacent to existing rights-of-way. These areas are maintained as utility or transportation rights-of-way, providing minimal ecological value.

Land Use/Vegetation. The existing land uses and vegetation of the proposed corridors are maintained for utility or industrial uses. No major clearing for either transmission line is proposed; only minimal clearing adjacent to existing corridors will be required. The Florida Land Use Cover and Classification System (FLUCCS) classifies the different types of land use around TL1 as industrial (150) and extractive (160) as it exits the site and parallels Glades Cutoff Road. After the intersection of Glades Cutoff Road and Midway Road, the surrounding land use is medium-density residential (120) on the

Figure 6.1-6
Zoning for Proposed Linear Facilities Corridors

Figure 6.1-7
Current Area Land Use for Linear Facilities Corridors

Figure 6.1-8
Future Area Land Use for Linear Facilities Corridors

south side of Glades Cutoff Road and the FEC Railroad. To the north of Glades Cutoff Road on both sides of I-95, the land use is largely cropland and pastureland (210). Slightly south of the area where TL1 is proposed to terminate, the land use category is upland shrub and brushland (320). The FLUCCS system classifies the different types of land use around TL2 as industrial and extractive for the length that it parallels Landfill Road. TL2 crosses through an area of cropland and pastureland just after turning south off of Landfill Road and before crossing I-95. After the I-95 crossing, it continues in the cropland and pastureland designation as it follows the Midway Road exit ramp off of I-95 South. At its junction with the Midway Substation, the land use is classified as industrial.

6.1.7.2 Affected Waters and Wetlands. TL1 will cross North St. Lucie River Water Control District (NSLRWCD) Canal 102 as it turns south and leaves the site. This will be an aerial crossing; there will be no transmission facilities in the canal. No impacts to waters or wetlands are anticipated.

TL2 is not anticipated to impact any waters or wetlands. There are two herbaceous (palustrine emergent) wetlands near the southwestern portion of TL2 north of Midway Road; however, the existing FPL corridor passes through this same area, and TL2 can be designed to avoid (span) these small wetlands. Wetlands near the transmission line corridors are shown on Figure 6.1-9.

Figure 6.1-9
Wetlands Near Linear Facilities Corridors

6.1.8 Effects of Right-of-Way Preparation and Transmission Line Construction

6.1.8.1 Construction Techniques. Several distinct tasks will be required for construction of the proposed transmission lines. These will include surveying, silt fence installation, clearing, foundation construction, structure assembly and erection, conductor and shield wire installation, and cleanup. These tasks will occur in the following sequence and will be separated in time by several days to several months.

No major right-of-way clearing is required for either route. A surveyor will stake structure locations. Silt fences will be erected to define the construction area, as well as to prevent soil and debris from leaving the construction area.

Drilled concrete pier foundations will be installed for the tubular steel pole structures. A hole will be excavated for installation of direct embedded concrete or hybrid pole structures. Direct embedded poles will be backfilled with either crushed rock or concrete. Equipment required for foundation construction consists of an augering machine mounted on tracks, “ready-mix” concrete trucks, water trucks, and medium sized (25 to 75 ton) tracked cranes or all-wheel-drive vehicles. Each work group will have a bulldozer available to assist in the installation. Tractors, trailers, and light vehicles will be used to transport materials and personnel.

The next series of tasks consists of hauling materials, assembly of structures, erection of structures, and installation of the conductors. The structures and conductor hardware will probably be hauled to the site by tractors and trailers, and offloaded with medium sized truck cranes or all-wheel-drive cranes. Medium sized (1-1/2 to 2 ton) all-wheel-drive trucks are typically used to transport personnel and tools. Medium sized trucks or all-wheel-drive cranes will be required to move structure components and place the structures for erection. The most common method of erecting the structure is using heavy-tracked cranes. A work group will normally place the entire structure in one “pick.” The boom “reach” will be sufficient to work the tallest structures. Insulators and roller blocks are installed during or immediately following this task. The location of the worksite for installation of conductors and shield wires are typically determined by the length of conductor on a reel or the line configuration. The basic equipment used for conductor installation is a matched set of machines (puller and tensioner) to pull the conductor and static wires through the rollers to the receiving end and, at the same time, to retard the conductor or maintain light tension at the sending end. The conductors and shield wires are typically hauled to the sending end on tractors and trailers. A variety of other equipment (radio-equipped pickups to medium sized cranes and bulldozers) is required at both ends to complete the pull. The puller and tensioner then “leap-frog” as consecutive sections are completed. A bulldozer with a 3- or 4-drum winch is ordinarily

used at the receiving end to bring the conductors to final tension. The rollers are then removed and the conductors are permanently affixed (“clipped”) to each structure. The time required to complete a “pull” averages less than a week.

Finally, at each “heavy-angle” or “dead-end” structure (where the wire has been stopped and/or started), it is necessary to install short pieces of conductor between the ends to electrically connect the conductors. Nearby structures, fences, and gates are grounded during this phase of construction and before the line is energized.

Soil and sediment control devices, such as silt fence and straw bales, will be installed along the right-of-way during construction to control soil and sediment runoff. These devices will be inspected and maintained on a regular basis to ensure their effectiveness. Each contractor will be required to have sufficient equipment and personnel to keep the right-of-way clear of debris and waste materials. Access to private lands or businesses will be maintained throughout the construction period. If necessary, restoration, including grading the soil and replanting or reseeding disturbed areas of the construction site(s), will be accomplished prior to the end of the construction phase of the project. Soil and sediment control devices will be removed after the right-of-way has sufficient grass cover to control erosion.

6.1.8.2 Impact on Water Bodies and Uses. No construction or facilities are proposed in waters or wetlands of the state.

6.1.8.3 Solid Wastes. Solid wastes generated during construction of the transmission lines will consist of construction material debris, which will be collected and disposed of at local landfills or other approved disposal sites.

6.1.8.4 Changes to Vegetation, Wildlife, and Aquatic Life. There will be minimal impacts to vegetation in the transmission line rights-of-way since there will be only minor clearing required for construction. Vegetation clearing adjacent to the rights-of-way is required for construction and will be minimal. When construction is complete, non-corridor lands disturbed from construction activities will be returned to pre-construction conditions. New right-of-way areas will be reseeded.

Since the transmission lines will be constructed in or adjacent to rights-of-way that are maintained for utility or transportation facilities, there is minimal ecological value afforded for wildlife. Therefore, FMPA believes there will be no adverse impact to wildlife from construction of the transmission lines. Further, the transmission lines construction will not impact a water body; thus, there will be no impacts to aquatic life.

6.1.8.5 Impact on Human Populations. Transmission line construction will be within or adjacent to existing rights-of-way. The future land use and current zoning in the proposed corridors is commercial, industrial, and agricultural. Further, since no

housing units will be moved and no residential areas impacted, FMPA believes there will be no adverse impact to human populations from the construction of the transmission lines.

6.1.8.6 Impact on Regional Scenic, Cultural, and Natural Landmarks.

Scenic, cultural, and natural landmarks described for the TCEC site in Section 2.2.5 are essentially the same as those for the site project area due to the relatively short lengths of the lines. FMPA believes no adverse impacts to these resources will occur from TCEC transmission line construction or operation.

6.1.8.7 Impacts on Archaeological and Historic Sites. No adverse impacts to these resources are anticipated from TCEC transmission line construction or operation, as confirmed by the Florida Division of Historical Resources letter dated March 29, 2005. A copy of this letter is included in Section 10.4 of this SCA.

6.1.9 Post-Construction Impacts and Effects of Maintenance

Transmission lines (structures, conductors) normally require minimal maintenance; however, lines are inspected on a regular basis for abnormalities possibly caused by weather or vandalism. The rights-of-way will be mowed or maintained at regular intervals to manage vegetation at acceptable heights. It is anticipated that no trees located outside the rights-of-way will present any danger or impact the lines.

6.1.9.1 Maintenance Techniques. FMPA will regularly inspect the transmission lines and line rights-of-way by vehicle and maintain the lines as needed in the event of damage or overgrowth of vegetation. Occasionally, the rights-of-way may be mowed, trees trimmed, and minimal amounts of approved herbicides used to control the growth of species that can affect the safety and reliability of the transmission facilities.

6.1.9.2 Multiple Uses. There are no multiple uses planned for the proposed transmission line rights-of-way.

6.1.9.3 Changes in Species Populations. No adverse long-term changes in the populations of threatened, endangered, or species of special concern within or near the transmission line corridors are expected as a result of operation or maintenance practices.

6.1.9.4 Effects of Public Access. The transmission lines will be at the edge of or near public or utility rights-of-way; no new public access will be created. Structures will meet Florida Department of Transportation clear zone requirements.

6.1.10 Other Post-Construction Effects

Other post-construction effects include impacts from electric and magnetic fields, audible noise, radio and television interference, and ozone. These effects will be kept within regulatory limits. An electromagnetic field assessment will be conducted in

compliance with Chapter 62-814 of the Florida Administrative Code and provided when available.

6.2 Natural Gas Pipeline

6.2.1 Project Introduction

A new natural gas pipeline of up to 16 inches in diameter is proposed to connect the TCEC with natural gas service. Florida Gas Transmission (FGT) will provide the TCEC with natural gas from an FGT natural gas main located approximately 3,700 feet southwest (near the Florida Turnpike) of the TCEC site. Discussions are currently underway between FMPA and FGT for delivery and supply of natural gas. As a result of these discussions, either FGT or FMPA may be the owner, constructor, and operator of the pipeline.

An active 8 inch natural gas pipeline is located on the north side of Glades Cutoff Road, but the lateral is not of adequate size to provide the TCEC with the quantity of natural gas required for the ultimate facility. Therefore, it is necessary to construct a new natural gas pipeline lateral appropriately sized for the TCEC's requirements.

6.2.2 Corridor Location and Layout

A 1,320 foot wide corridor centered on Glades Cutoff Road from the Florida Turnpike to the TCEC site is requested for certification. The proposed natural gas delivery pipeline between the FGT natural gas main and the TCEC site will likely be constructed within the Florida East Coast (FEC) Railroad Company's corridor adjacent to Glades Cutoff Road. If so, the natural gas pipeline will likely be constructed on the southern edge of the corridor, parallel to the rail. FMPA anticipates a 75 foot temporary easement for pipeline installation, and a permanent 40 foot right-of-way for operation.

The natural gas pipeline owner/operator will be required to maintain the permanent right-of-way width required for the pipeline from the interconnection with the FGT main to the TCEC site boundary. FMPA will be responsible for extending the natural gas pipeline from the TCEC property boundary to the TCEC gas metering/conditioning station. FMPA acknowledges that supplementary information regarding the final pipeline design and installation must be submitted prior to construction through the post-certification review process for any portion of the new lateral constructed by FMPA.

6.2.3 Natural Gas Pipeline Design Characteristics

The TCEC natural gas supply pipeline lateral will be manufactured according to American Petroleum Institute standards. All facilities will be built in accordance with the

requirements of the U.S. Department of Transportation (USDOT) (49 CFR, Part 192) as amended by the Materials Transportation Bureau, Office of Pipeline Safety Operations. Pursuant to Chapter 368, F.S., the Florida Public Service Commission (PSC) has authority to regulate safety considerations for intrastate gas transmission and distribution pipelines that operate exclusively within Florida. Under that authority, the PSC has adopted administrative rules, Chapter 25-12, Florida Administrative Code (F.A.C.), for gas pipeline safety, design, construction, and operation. These PSC regulations adopt and expand the federal safety regulations, particularly in the areas of pipeline welding and inspection, and drug testing of critical employees. The natural gas pipeline connecting the TCEC to the natural gas main will comply with applicable PSC and USDOT regulations.

6.2.4 Cost Projections

The estimated cost of the natural gas lateral pipeline is \$900,000.

6.2.5 Corridor Selection

The final route selected for the placement of the natural gas pipeline from the FGT natural gas main to the TCEC property boundary using existing transportation corridors will be the most direct with the fewest environmental and land use impacts. At present, FMPA expects the pipeline to be installed in the FEC Railroad right-of-way.

6.2.6 Sociopolitical Environment of the Natural Gas Pipeline Corridor Area

The proposed corridor for the natural gas pipeline is located in commercial and utility zoned areas wholly in the unincorporated area of St. Lucie County. Transportation and utility rights-of-way are permitted in all zoning districts. No residential areas will be impacted during construction of this underground facility. The current and future corridor area land use is commercial and industrial, which is compatible with the TCEC natural gas supply pipeline. The pipeline must cross NSLRWCD Canal 102, and will be constructed within their regulatory lines.

6.2.6.1 Governmental Jurisdictions. As shown on Figure 6.1-6, the natural gas lateral is located within unincorporated areas of St. Lucie County.

6.2.6.2 Zoning and Land Use Plans. The proposed corridor for the natural gas lateral is located within the FEC Railroad right-of-way (zoned transportation) among industrial and utility zoned areas as shown on Figure 6.1-6. The future land use designation for the corridor area is transportation/utility, as shown on Figure 6.1-7.

6.2.6.3 Easements, Title, Agency Works. Based on the proposed route, authorization from the FGT and FEC Railroad will be required.

6.2.6.4 Vicinity Scenic, Cultural, and Natural Landmarks. The natural gas lateral project area is essentially the same as the site project area due to the relatively short length of the proposed lateral. The resources described in Section 2.2.5 are applicable to the natural gas lateral project area.

6.2.6.5 Archaeological and Historic Sites. The natural gas lateral project area is essentially the same as the site project area due to the relatively short length of the lateral. The resources described in Section 2.2.6 are applicable to the natural gas lateral project area.

6.2.7 Biophysical Environment of the Natural Gas Pipeline Corridor Area

The natural gas pipeline is proposed for construction completely within the existing FEC Railroad corridor. This expected right-of-way is maintained as a transportation corridor, providing minimal ecological value. Existing land uses in the corridor include vacant land, industrial, and transportation facilities. No impacts to threatened and endangered species or surface water bodies/wetlands are anticipated.

6.2.7.1 Land Use/Vegetation. There will be minimal impacts to vegetation in the natural gas lateral right-of-way since there will be only minor clearing required for construction. Areas cleared during construction will be restored to a maintained right-of-way condition.

6.2.7.2 Affected Waters and Wetlands. The natural gas lateral will cross NSLRWCD Canal 102. This will be an underground, directional drilled crossing; there will be no facilities in the canal. No impacts to waters or wetlands are anticipated. Wetlands located near the natural gas lateral corridor are shown on Figure 6.1-9.

6.2.7.3 Ecology. The natural gas lateral will be constructed completely within the existing FEC Railroad right-of-way. This area is maintained as a transportation (railroad) right-of-way, providing minimum ecological value.

6.2.8 Effects of Right-of-Way Preparation and Natural Gas Pipeline Construction

6.2.8.1 Construction Techniques.

Pipeline construction activities differ slightly from pipeline to pipeline, but generally include the following, which are described in more detail below:

- Surveying and right-of-way preparation.
- Ditching/trenching.
- Installation.
- Testing.
- Right-of-way restoration.

Other specialized activities may take place, such as the following:

- Boring and installation of road, railroad, or waterway crossings.
- Installation of mainline block valve assemblies.

Applicable Codes. The key regulatory document for the design and construction of the pipeline will be Minimum Federal Safety Standards for Gas Lines, Part 192, Title 49, CFR, implemented by the USDOT and referred to as 49 CFR, Part 192 hereafter. The PSC has adopted the USDOT standards.

Surveying and Right-of-Way Preparation. Prior to construction, the entire route will be surveyed. The centerline of the pipeline will be marked at about 200 foot intervals. Within the route staked by the surveying crew, the contractor personnel will clear the terrain to provide a work platform or working strip allowing unimpeded progress of the construction activities.

The construction corridor will first be cleared of any brush and timber in accordance with the contract specifications and permit or regulatory limitations. The stumps will be grubbed, and all materials cleared will be disposed of in a manner consistent with the construction approvals and applicable state and local requirements. This may include upland burial onsite, burning, or hauling offsite. Generally, machetes, chain saws, bulldozers, backhoes, and trucks are the tools and equipment used during that operation.

Next, the topsoil layer within the route will be stripped with a dozer or grader where excavation will occur and bermed to one side of the working strip. The upper 6 inches of soil will be saved to be spread back over the stripped area during restoration of the disturbed areas.

The work platform will then be graded to provide smooth access for all equipment used in the following phases of construction.

The pipeline occupies only a small portion of the area necessary for the construction and possible future maintenance. Only 10 to 15 feet of area is needed to store the spoil excavated from the trench. For a 16 inch pipeline, the ditch bottom will be approximately 2 feet wide. Depending on the type of soil being excavated and type of ditching equipment used, the width of the trench at grade level may be only slightly wider than at the bottom (e.g., 6 feet), or it may be wider if unstable trench slopes are encountered.

The space adjacent to the trench is used to string the pipe joints on skids until ready for the welding operation. Working room is required on both sides of the pipe such that 10 to 12 feet must be reserved between the edge of the trench and the sideboom track. The width of the sideboom (also called pipelayer) for a 16 inch pipe is approximately 12 feet with counterweight retracted and 16 feet or more when extended.

Additional space is needed outside of the equipment for pickup trucks, lube truck, other sidebooms, and similar equipment to pass stationary equipment.

Trench Conditions. The trench excavation is called ditching and can be performed in a number of ways based on the local conditions of the area crossed by the line. Wheel ditchers are the most convenient and effective way of opening the ditch.

For this pipeline, except in rocky areas if any are crossed along the route, the total depth of the trench will be about 4 to 5 feet.

Ditching for minor drainage ditch crossings can be accomplished with backhoes or draglines. The choice of equipment will depend on the size of the ditch, water depth and current velocity, makeup of the channel bed, and required trench depth. To control the water turbidity or to limit its increase as a result of construction activities, various methods are available as a function of site-specific conditions. For small waterways, siltation barriers can be installed immediately downstream of the crossing. These siltation barriers consist of suspended fabric and/or straw bales.

Directional drilling is a method of installing underground pipes and conduits along a prescribed bore path from the surface with minimal impact to the surrounding area. Installation lengths up to 6,500 feet have been completed and diameters up to 48 inches have been installed in shorter runs. It is used for crossing waterways, roadways, shore approaches, congested areas, environmentally sensitive areas, and any area where other methods are more expensive or not feasible. Some advantages to using directional drilling include less traffic disruption, lower cost, deeper and longer installation, no access pit requirement, shorter completion time, directional capability, and safety for the environment.

Most directional boring machines use drilling fluid (mud), with a few machines designed to use air or air and foam. Air and foam machines are used for rock. Drilling fluid is generally a mixture of bentonite clay and water, with additives used to improve performance. In softer soils, the high pressure jet of fluid cuts through the soil, with the cuttings suspended in the fluid. As fluid is pumped down the hole, the cuttings are carried back out to the surface, where they are either allowed to settle out in a pit or removed mechanically in a cleaning system. Drilling fluid is classified as nontoxic and can be disposed of accordingly.

In softer soils, an angled bit is used and the pipe string is rotated, if necessary, to bore straight. To steer, rotation is stopped, the angle of the bit is aligned to the desired direction and forward thrust is applied. The directed jet of the drilling fluid and forward thrust cuts a new path.

The process begins when a directional bore machine pushes a bore head connected to hollow pipe into the ground at an angle. As each joint of drill pipe is pushed into the ground, a new one is added behind.

Directional drilling machine sizes range from small machines with a few thousand pounds of thrust and pullback, to the largest with over a million pounds of pullback force. Rotation is measured in pressure. Most machines are track or trailer mounted, with a few smaller machines designed to be used in pits.

To eliminate the disturbance to traffic brought on by using the open cut method of trenching across a roadway, boring techniques have been developed. The operation consists of drilling a hole horizontally under the road while inserting a pipe in that hole. The USDOT and counties typically regulate the minimum depth of cover between the top of the pipe and the road surface.

A boring machine is generally a motor driven auger equipped with a control panel and is mounted on a frame designed to straddle a pipe. A winch or hydraulic jacks provide the force applied to the auger and the pipe for horizontal progress.

Pipe Installation. Pipe installation, known as stringing pipe, can be accomplished just after the ditch has been opened or in other ways which also minimize the amount of time a trench is open. This sets up the work for the actual assembly of the pipeline.

Since the welding operation is all-important in ensuring the structural integrity of the pipeline, it is performed by highly skilled personnel. All welding personnel will be certified in the welding process associated with the gas pipeline. The validity of the welding method (called the weld procedure) is verified and qualified following the requirements of API Standard 1104 for Welding Pipe Lines and Related Facilities.

Hydrostatic Testing. The entire pipeline and its associated facilities will be pressure tested with water to prove integrity. No evidence of leakage is allowed for the pipeline to be authorized for operation. The records of all tests must be properly filed and maintained by the pipeline operator. Upon completion of all tests, the pipeline will be ready for commissioning.

Part 192 of 49 CFR and project specifications establish stringent limits and requirements for the hydrostatic test. Both maximum and minimum levels are prescribed for test pressures as a function of the pipe physical characteristics (diameter, wall thickness and steel grade), the class location, and the expected operating pressure. To satisfy all of these requirements, the range of required test pressures must be computed for each segment of the line. In any case, the minimum test pressure equals 110 percent of the maximum pressure at which the pipeline will be allowed to operate. A hydrostatic test program will be devised when the final design of the pipeline is completed. Potable water will be used for hydrostatic testing. No offsite surface or groundwater sources will be used for hydrostatic testing. FMPA requests discharge of the hydrostatic test waters to the onsite stormwater detention basin.

Land Restoration. During construction, topsoil will be saved to be spread back over the stripped area during the restoration of disturbed areas following pipe installation. Once the pipeline is buried in place, the stripped topsoil will be spread back in place to its

original location and topography. Hydroseeding will be undertaken as necessary to quickly stabilize soils with a vegetative cover.

6.2.8.2 Impacts on Water Bodies and Uses. No construction or facilities are proposed in waters or wetlands of the state.

6.2.8.3 Solid Wastes. Solid wastes generated during construction of the natural gas lateral will consist of construction material debris, which will be collected and disposed of at local landfills or other approved disposal sites.

6.2.8.4 Changes to Vegetation, Wildlife, and Aquatic Life. There will be minimal impacts to vegetation in the natural gas lateral right-of-way since there will be only minor clearing required for construction. When construction is complete, lands disturbed from construction activities will be returned to maintained right-of-way conditions.

Since the natural gas lateral will be constructed in a right-of-way that is maintained for transportation, there is minimal ecological value afforded for wildlife. Therefore, FMPA believes there will be no adverse impact to wildlife from construction of the natural gas lateral. Further, the natural gas lateral construction will not impact a water body; thus, there will be no impacts to aquatic life.

6.2.8.5 Impact on Human Populations. Natural gas lateral construction will be within an existing right-of-way. The zoning and future land use in the proposed corridor is transportation/utility, industrial, and mixed use. Further, since no housing units will be moved and no residential areas impacted, FMPA believes there will be no impact to human populations from the construction of the natural gas lateral.

6.2.8.6 Impact on Regional Scenic, Cultural, and Natural Landmarks. Scenic, cultural, and natural landmarks described for the TCEC site in Section 2.2.5 are essentially the same for the relatively short length of the natural gas lateral. No adverse impacts to these resources are anticipated from the TCEC natural gas lateral construction or operation.

6.2.8.7 Impact on Archaeological and Historic Sites. No adverse impacts to these resources are anticipated from TCEC natural gas lateral construction or operation, as confirmed by the Florida Division of Historical Resources letter dated March 29, 2005. A copy of this letter is included in Section 10.4 of this SCA.

6.2.9 Post-Construction Impacts and Effects of Maintenance

Natural gas pipelines normally require minimal maintenance; however, the pipeline corridors are inspected on a regular basis for abnormalities possibly caused by weather or vandalism. Recently implemented natural gas pipeline inspection regulations will also require pipe inspections on a regular basis.

6.2.9.1 Maintenance. The pipeline owner/operator will regularly inspect the pipeline right-of-way by vehicle and maintain the line as needed in the event of damage.

6.2.9.2 Multiple Uses. There are no multiple uses planned for the proposed pipeline corridor.

6.2.9.3 Changes in Species Populations. No adverse long-term changes in the populations of threatened, endangered, or species of special concern within the pipeline corridor are expected as a result of operation or maintenance practices.

6.2.9.4 Effects of Public Access. The pipeline will be within a private right-of-way. Public access will be prohibited.

6.2.10 Other Post-Construction Effects

The pipeline will be operated within regulatory limits. No post-construction effects are anticipated.

7.0 Economic and Social Effects of Plant Construction and Operation

7.1 Socioeconomic Benefits

7.1.1 Creation of Temporary and Permanent Jobs

Treasure Coast Energy Center Unit 1 (Unit 1) will result in significant job creation benefits for St. Lucie County and the surrounding region. As discussed in Subsection 4.6.3, benefits during Unit 1 construction include 3,714 man-months (309.5 man-years) of employment, and \$23.6 million in wage benefits. In addition to the direct project labor, the St. Lucie County area will benefit from the purchase of materials and supplies required for construction. Typically in power plant construction, local purchases include lumber, concrete and gravel, fuel for onsite vehicles and motors, office supplies, and site services such as security, trash hauling, and installation of security fencing. In addition, the construction workforce commuting to the site will generate income through additional purchases of fuel, food, and other consumables during the construction period. The total impacts of these indirect benefits are estimated as part of the multiplier impact analysis in Subsection 7.1.2.

During operation, Unit 1 will have modest direct employment impacts, with an operational staff of 16. Many of these will be staff relocated from the King Plant, which currently is only dispatched occasionally by FMPA. In that Unit 1 will contribute to the preservation of these quality jobs, it will also contribute to the economic well being of the city of Ft. Pierce and FPUA employees. The addition of the TCEC capacity to the FMPA system in the Ft. Pierce area will also eventually allow for the retirement of the King Plant as soon as reasonably possible, and will allow for the eventual redevelopment of the King site for commercial uses. The anticipated payroll for the Unit 1 operators is estimated to be \$1.38 million per year in 2008 and is the largest component of a total fixed O&M budget of \$2.83 million per year in the first year of operation.

The long-term employment at the TCEC site once the total buildout capacity (4 units/1,200 MW) is achieved is expected to be approximately 60 staff. The annual payroll for a staff of this size would be approximately \$4.7 million dollars (in 2008 dollars)

In addition to the direct employment and income benefits, operation of Unit 1 will generate additional benefits in the form of the continued purchase of consumables used onsite. These would include the purchase of water, wastewater, various site services, contract maintenance, and miscellaneous office supplies and consumables. These expenditures are part of the plant variable O&M budget, estimated to be \$3.6 million the first year with contract maintenance for overhauls comprising approximately \$2.6

million. The impacts of O&M expenditures on the local economy are estimated as part of the multiplier impact analysis in Subsection 7.1.2 below.

7.1.2 Additional Job Creation/Stimulation of Local Economies

The direct benefits associated with construction and operation of Unit 1 causes a multiplier effect in the local economy resulting in the creation of additional employment, income, and output. The primary impact will likely occur in St. Lucie County and neighboring counties that will be the source of most of the Unit 1 construction work force and operating staff. This section estimates the multiplier impacts associated with the TCEC facility.

There can be significant socioeconomic impacts associated with new power plant investment that are not directly accounted for in the direct construction and operating cost estimates of a plant. Foremost among the indirect socioeconomic benefits associated with the construction and operation of a power plant are the resulting increases in employment, output, and income which arise in a local or regional economy. Increases in these categories occur as labor is directly employed in the construction and operation of a power plant, as local goods and services are purchased and utilized, and as those directly realizing added income from the project spend a portion of that income in the local economy. As income is spent and respent, the total economic impact becomes a multiple of the original income, employment, and output originated by the direct plant expenditures. Other things being equal, the greater the initial expenditure, the greater the contribution of the local economy in providing inputs, and the greater spending in successive rounds remains within the local economy (fewer leakages), the greater the multiplier effect.

One means of estimating multiplier impacts is through the use of a regional input-output (I-O) model. Generally, I-O models estimate the interdependency of the various sectors of an economy through the establishment of an accounting matrix which shows the change in output, earnings, or employment in each industry due to a change in final demand. The model chosen is the Regional Input-Output Modeling System (RIMS II model), developed and maintained by the Florida Bureau of Economic Analysis (BEA). The history of the model dates to the 1970s, and is well suited to assess a power project as it can project impacts for any county or combination of counties in the US. In addition it includes multipliers for nearly 500 industry classifications. The RIMS II model is a static equilibrium model that predicts the total impact associated with an initial investment. It does not predict the timing of such impacts, even though the total impacts of investment and operation of a new facility will take many months, or even years, to work through the economy.

One of the more important decisions in developing the impact estimates is to select a geographical area for study with the RIMS II Model, called herein the “primary impact area.” For the Unit 1 analysis, it was appropriate to define the primary impact area consistent with the region from which the majority of construction and operating staff will originate, as this region will realize much of the multiplier benefits. While a broad area, such as the entire State of Florida could have been chosen, discussions with BEA staff indicate that the more accurate and conservative estimate would be to restrict the study area to the counties contiguous with St. Lucie County that will contribute most of the Unit 1 work force. Therefore, for purposes of this study, the primary impact area was defined as the Treasure Coast counties of St. Lucie and the contiguous Okeechobee, Martin, and Indian River. In addition, Brevard County to the north, and Palm Beach County to the south were also included.

As shown in Table 7.1-1, the 2003 population of the primary impact area counties was 2.23 million in 2003 with a labor force of 1.02 million, of which 76,744 workers were employed in the construction and real estate sector. This is a sufficiently large pool to justify the assumption that the study impact area will be able to provide the vast majority of the workforce, and these counties lie within reasonable commuting distances of the site (the maximum commuting range for the primary impact area counties is within the range as determined in the EPRI study of socioeconomic impacts discussed in Subsection 4.6.5).

Table 7.1-1 Statistics for the Project Primary Impact Area, 2003				
County	Construction and Real Estate Industry Employment	Total Employment	Labor Force	Population
Brevard	14,677	183,467	224,783	505,711
Indian River	4,107	42,786	52,931	120,463
Martin	5,622	52,060	56,271	135,122
Okeechobee	609	9,514	16,432	37,481
Palm Beach	46,832	503,574	584,597	1,216,282
St. Lucie	4,897	55,028	89,474	213,447
Total	76,744	846,429	1,024,488	2,228,506
Source: Enterprise Florida, http://www.eflorida.com/profiles/ .				

Having selected the primary impact area, the BEA staff performed a simulation of the RIMS II model for the selected primary impact area, calculating the corresponding output, earnings, and employment multipliers. The next step in the analysis involved determining the method of applying the multipliers provided. While a number of multiplier estimation methods can be used, the RIMS II User Handbook suggests that where possible, a “bill of goods” method should be used as it produces the most accurate impact estimates. For the construction period, the bill of goods method required dividing the total capital cost into major equipment and labor cost categories, and estimating the percent of these expenditures that would occur in the primary impact area. These expenditures were converted to producer prices and the final demand multipliers for the respective industries were applied. This subtotal was then combined with the initial change due to the investment to derive the total project impact estimates resulting from Unit 1 construction. A similar process was followed for the operation period, based on the fixed O&M and variable O&M costs of the facility. The result of the process produced an estimate of the output, earnings, and employment impact estimates for the project primary impact area.

The results of the analysis are summarized in Table 7.1-2. Listed in Table 7.1-2 are the direct plant investment cost (\$164.2 million), direct earnings (\$23.6 million), and direct man-years of employment (364) for the Unit 1 project. Following these figures are the estimated total indirect and total effects on output, earnings, and jobs projected for the region. Thus, the construction of the Unit 1 facility is projected to have a total (direct plus indirect) impact in the primary impact area of \$239.7 million in output, \$46.5 million in earnings, and the generation of 1,126 jobs (traditionally thought of as job-years).

Table 7.1-2 Projected Multiplier Impacts Associated with the TCEC Unit 1 Facility				
Period	Impact Category	Output (\$ millions)	Earnings (\$ millions)	Employment
Construction	Direct	164.2	23.6	364
	Indirect	75.5	22.8	762
	Total	239.7	46.5	1,126
Operation	Direct	6.4	2.6	26
	Indirect	1.9	0.5	16
	Total	8.4	3.1	42

During operation of the Unit 1 facility, regional benefits will continue to occur through the O&M expenditures (\$6.4 million first year total variable and fixed O&M) that will generate an estimated \$2.6 million earnings (\$1.4 million for plant staff wages plus earnings for other O&M and service personnel) and 26 jobs (16 plant staff and 10 supporting O&M and service personnel). When combined with the indirect impacts resulting from expenditures, Table 7.1-2 projects a total primary impact area final demand impact of \$8.4 million, an earnings impact of \$3.1 million, and 42 jobs. Over a 30 year operating life, ignoring inflation, these benefits would accumulate to an approximate \$250 million increase in final demand, \$93 million in earnings, and 1,250 man-years of employment in the primary impact area.

While any projection of the indirect economic impacts of a large new investment is subject to uncertainty, it can be concluded with confidence that the economic impact of the construction and operation of the TCEC facility will produce substantial economic benefits to the primary impact area in the form of added demand for output, increases in earnings, and employment. A substantial portion of these benefits will impact those not directly involved in the construction or operation of the plant, and this is an important consideration in weighing the overall costs and benefits of the project to the region. The regional economic benefits projected in this section are in addition to the benefit, already stated, that the TCEC facility has been identified as the best option to providing a safe and reliable supply of electricity for FMPA and ARP members at the lowest reasonable cost and in an environmentally acceptable manner.

7.1.3 Revenue Generation for State and Local Governments

The TCEC will be owned and operated by FMPA for the benefit of ARP members. As a public/municipal tax exempt agency, FMPA will not be required to pay property taxes. The local economy and public agency revenues will be enhanced by the addition of high paying jobs in the community and future potential commercial redevelopment of the retired King Plant site.

7.1.4 Creation or Improvement of Local Roads, Waterways, or Other Local Transportation Facilities

The TCEC is not expected to require any new or upgraded public roadways or other transportation facilities. There will, however, be a new access road built by the Midway Industrial Park developers from Selvitz Road to the interior of the industrial park. Site access will be from this industrial park road.

7.1.5 Increased Knowledge of the Environment

TCEC development is expected to have a neutral impact regarding an increased knowledge of the environment. The plant will use a proven technology and will be located at a relatively small site in St. Lucie County that does not include sensitive areas having unique environmental attributes.

7.1.6 Increased Land Use Efficiency

The TCEC will be a consistent and efficient use of land in St. Lucie County near the City of Fort Pierce, which constitutes a major advantage of the site. The site selected constitutes an efficient land use because it lies in an industrial park and is consistent with current zoning and future land use projections by the county, and will require minimal additional infrastructure. In addition, because the TCEC facility will utilize combined cycle technology, it will allow up to 1,200 MW of generating capacity to be located on a 68 acre site near Ft. Pierce.

7.2 Socioeconomic Costs

7.2.1 Temporary External Costs

Previously, Section 4.6 discussed the potential for temporary external costs during the construction period. Key aspects of this discussion are summarized in this section.

7.2.1.1 Housing. No adverse housing impacts are expected during the Unit 1 construction or operation phase. The key factor in making this determination is that the construction workforce in St. Lucie County and within 70 to 100 miles of the TCEC site – a reasonable commuting distance for power plant construction workers according to EPRI – is expected to be sufficiently large to provide virtually all of the craft labor. Because the construction workforce will be able to commute from existing residences, the potential for negative external impacts in a number of categories related to community facilities and services will be largely eliminated.

7.2.1.2 Traffic. There will be an increased traffic flow in the vicinity of the TCEC site during Unit 1 construction and a very slight increase in traffic during the operational period. During the 22 month construction period, the construction workforce will likely utilize I-95 and Highway 1 as the primary north-south routes to reach Midway Road in Ft. Pierce, and then take Midway Road to Selvitz Road to reach the site. Fortunately, the TCEC site is located within 2 miles of I-95 and this will allow the workforce located beyond Ft. Pierce to easily access the site with only very isolated disruption to traffic flows. Subsection 4.6.4 estimated that the increase in average annual daily traffic (AADT) flows at Midway Road east of I-95 will only be approximately 3.5 percent of the

2003 flow level during the peak month of construction. On average during the construction period, the increase will only be 2 percent.

During operation, there are projected to be 16 employees at the site for Unit 1 distributed among multiple shifts, in addition to maintenance/repair staff that will commute to the site on a periodic basis. These impacts on the traffic flow in vicinity of the site will not degrade the general flow of traffic.

7.2.1.3 Aesthetic Disturbances. Location of the TCEC at the selected site will not result in noticeable aesthetic disturbances to the Ft. Pierce community. Primarily, this is due to the location of the site in an industrial park on acreage zoned for utility use. The project is buffered by trees on most sides, by a power transmission line to the south, and by a railroad line to the west. The TCEC is not in immediate proximity to important recreational or visitor attractions. Thus, the TCEC will not result in the disturbance of an aesthetically valued area.

7.2.1.4 Use of Water and Sewage Treatment Facilities. The Unit 1 facility will utilize only a small amount of potable water from FPUA (1,000 gpd) and will not result in an overloading of water supply capabilities. Approximately 95 percent of the total water needs at the site will be FPUA wastewater treatment plant effluent used for cooling uses. In addition, onsite wells will be installed to provide a portion of the site water requirements. The plant will be interconnected with the Ft. Pierce sanitary collection system, which will transport an average of 1,000 gpd of sanitary wastewater to the FPUA WWTP. All process wastewaters will also be returned to the FPUA WWTP.

7.2.1.5 Crowding of Public Facilities and Services. The Unit 1 construction workforce is expected to reside within reasonable commuting distances of the site; therefore, no adverse impacts on local schools or other public facilities are expected from an influx of additional worker population.

The need for hospital and other emergency services is also expected to be minimal as a safety plan will be developed for the construction and operation phase. Should medical assistance be required, Ft. Pierce and St. Lucie County have multiple hospitals and health care facilities capable of treating all types of medical needs. The TCEC facility will not otherwise overtax community services. Rather, it will add to the power infrastructure needed in Ft. Pierce and by other FMPA members.

7.2.2 Long-Term External Costs

The TCEC is not expected to result in long-term external costs related to the impairment of recreational values, restrictions of access to land or water areas preferred for recreational use; deterioration of aesthetic and scenic values; restrictions on access to areas of scenic, historic, cultural, natural, or archaeological value; the removal of land

from present or contemplated alternative uses. The TCEC will not result in the creation of locally adverse meteorological conditions; reduction of regional products due to displacement of persons from the land proposed for the site; lost income from reductions in recreation, tourism, commercial fishing, and real estate values in areas adjacent to the proposed facility; increased costs to local government for services required by the permanently employed workers and their families.

8.0 Site and Plant Design Alternatives

This optional chapter of the SCA will not be submitted as part of this application because it is not anticipated that an Environmental Impact Statement (EIS) under the National Environmental Policy Act (NEPA) would be required for the Treasure Coast Energy Center Project.

9.0 Coordination

The following is a list of individuals within federal, state, regional, and local government agencies who were contacted to provide information for this project.

9.1 Federal

US Army Corps of Engineers

Mr. Brandon Howard
Jacksonville District, South Permits Branch
Palm Beach Gardens, FL

US Fish and Wildlife Service

Mr. Jay Slack, Field Supervisor
South Florida Ecological Services Office
Vero Beach, FL

9.2 State

Public Service Commission, Tallahassee

Mr. Tom Ballinger
Mr. Michael Haff

Department of Community Affairs, Tallahassee

Mr. Paul Darst
Ms. Jamie Coker

Department of Environmental Protection

Power Plant Siting Coordination, Tallahassee

Mr. Hamilton (Buck) Oven

Air Resources Management Division, Bureau of Air Regulation, Tallahassee

Ms. Trina Vielhauer
Mr. Al Linero
Mr. Jeff Koerner
Ms. Debbie Nelson
Ms. Cindy Mulkey

Environmental Resource Permitting Division, Southeast District, W. Palm Beach

Mr. Indar Jagnarine

Water Facilities Division, Southeast District, W. Palm Beach

Mr. Tim Powell

Water Resources Management and Environmental Planning, W. Palm Beach

Mr. Tim Gray

Fish and Wildlife Conservation Commission, W. Palm Beach

Mr. Chuck Collins, Regional Director

South Florida Water Management District, W. Palm Beach

Mr. Jim Golden, AICP, Senior Planner, Regulation Department

Mr. Tom Colios, Supervising Hydrogeologist, Water Use Regulation Department

Florida Division of Historical Preservation, Tallahassee

Mr. Frederick P. Gaske, State Historic Preservation Officer

Florida Natural Areas Inventory, Tallahassee

Mr. Jonathan Oetting, Conservation Information Coordinator

Treasure Coast Regional Planning Council, Stuart

Mr. Peter Merritt

9.3 Local

St. Lucie County, Ft. Pierce

Mr. Chris Lestrangle, Code Compliance

Mr. Ron Harris, Engineering & Surveying

Mr. Hank Flores, Planning

Ms. Janet LiCausi, Property Acquisition

Ms. Diane Waite, Planning

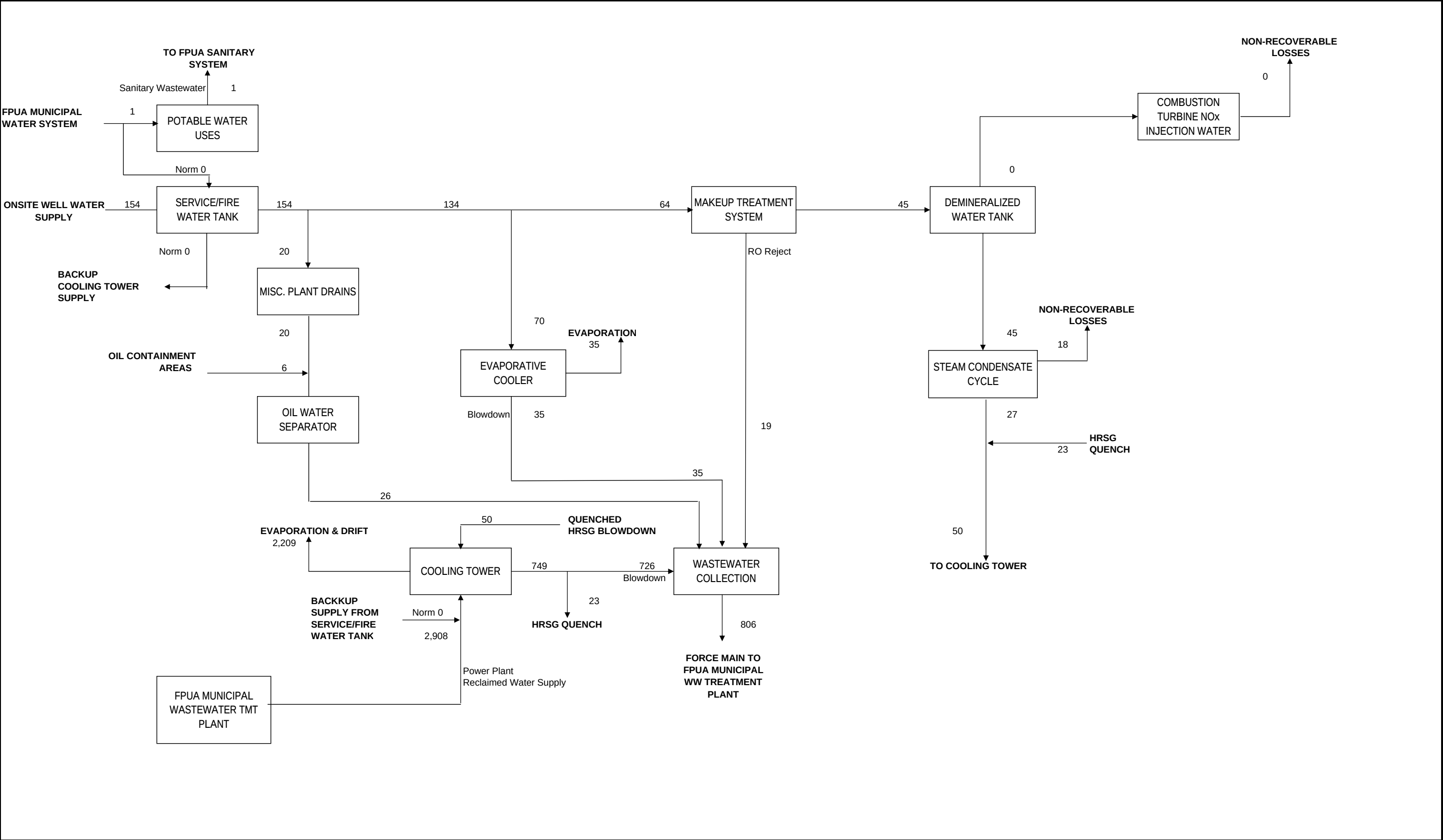
Mr. Mike Wrock, Engineering

Mr. David Kelly, Planning

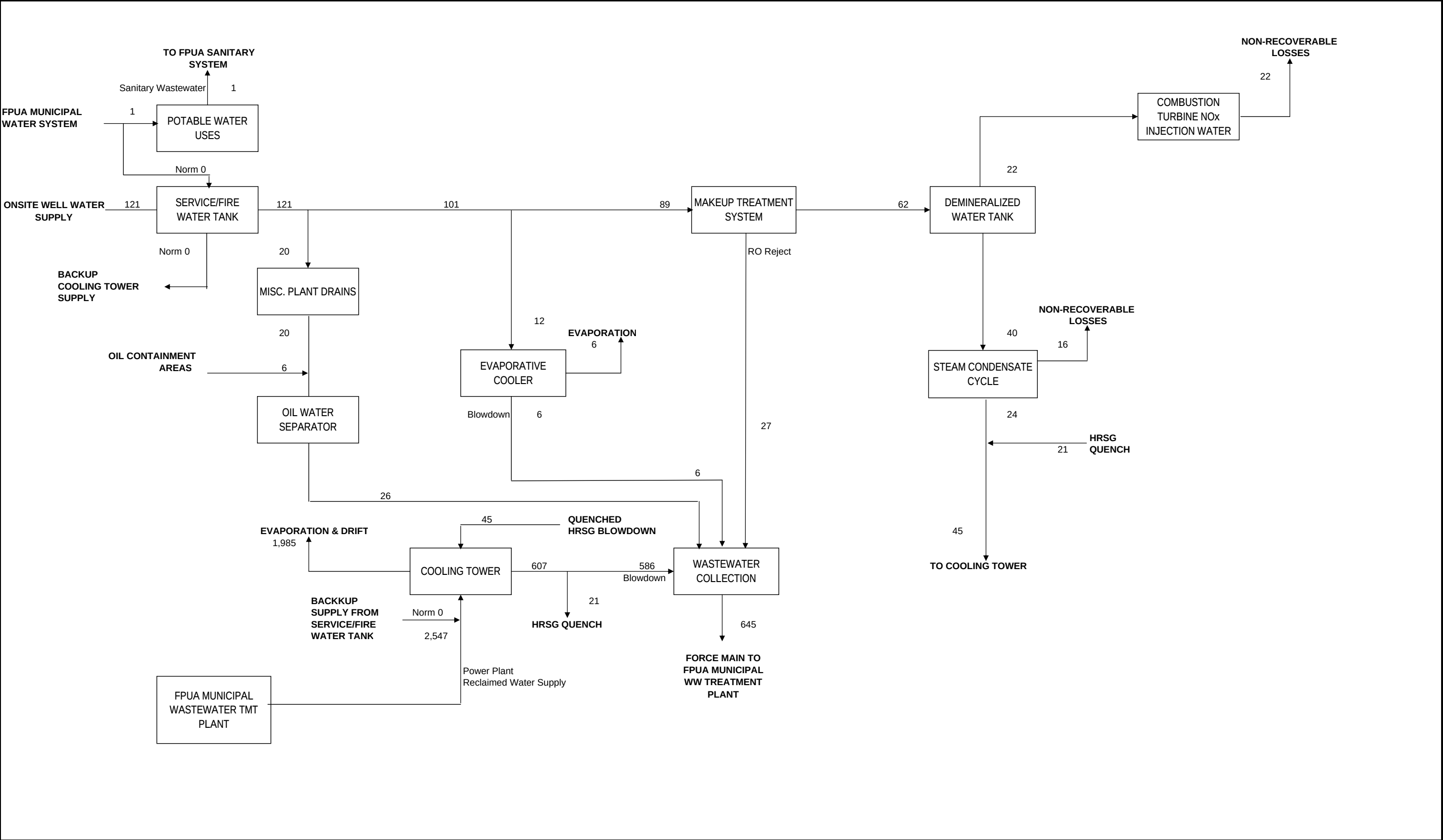
Ft. Pierce Utilities Authority, Ft. Pierce

Mr. Bill Thiess, Director of Water & Wastewater Systems

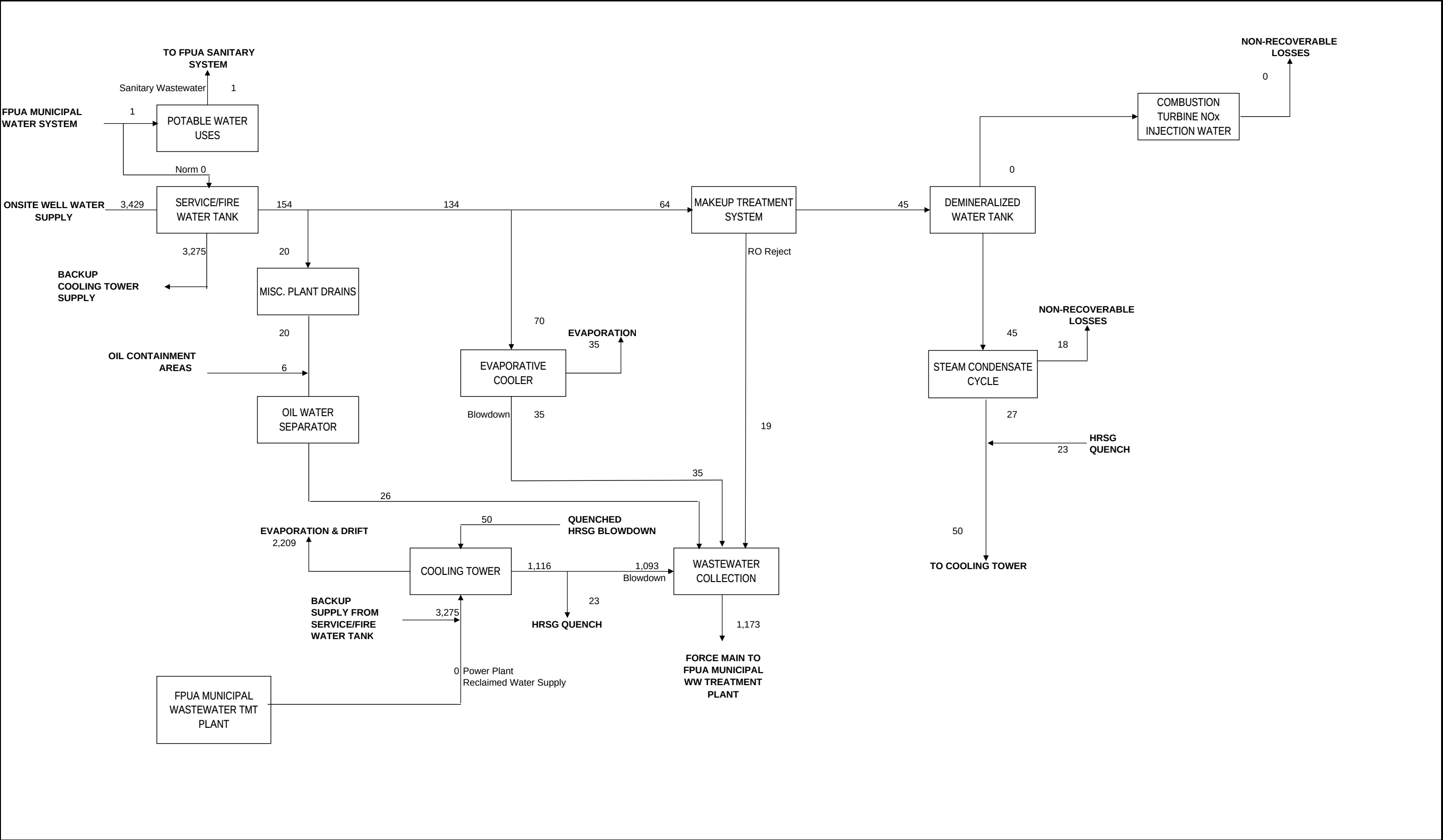
Mr. Ed Leongomez, Superintendent-Power Generation



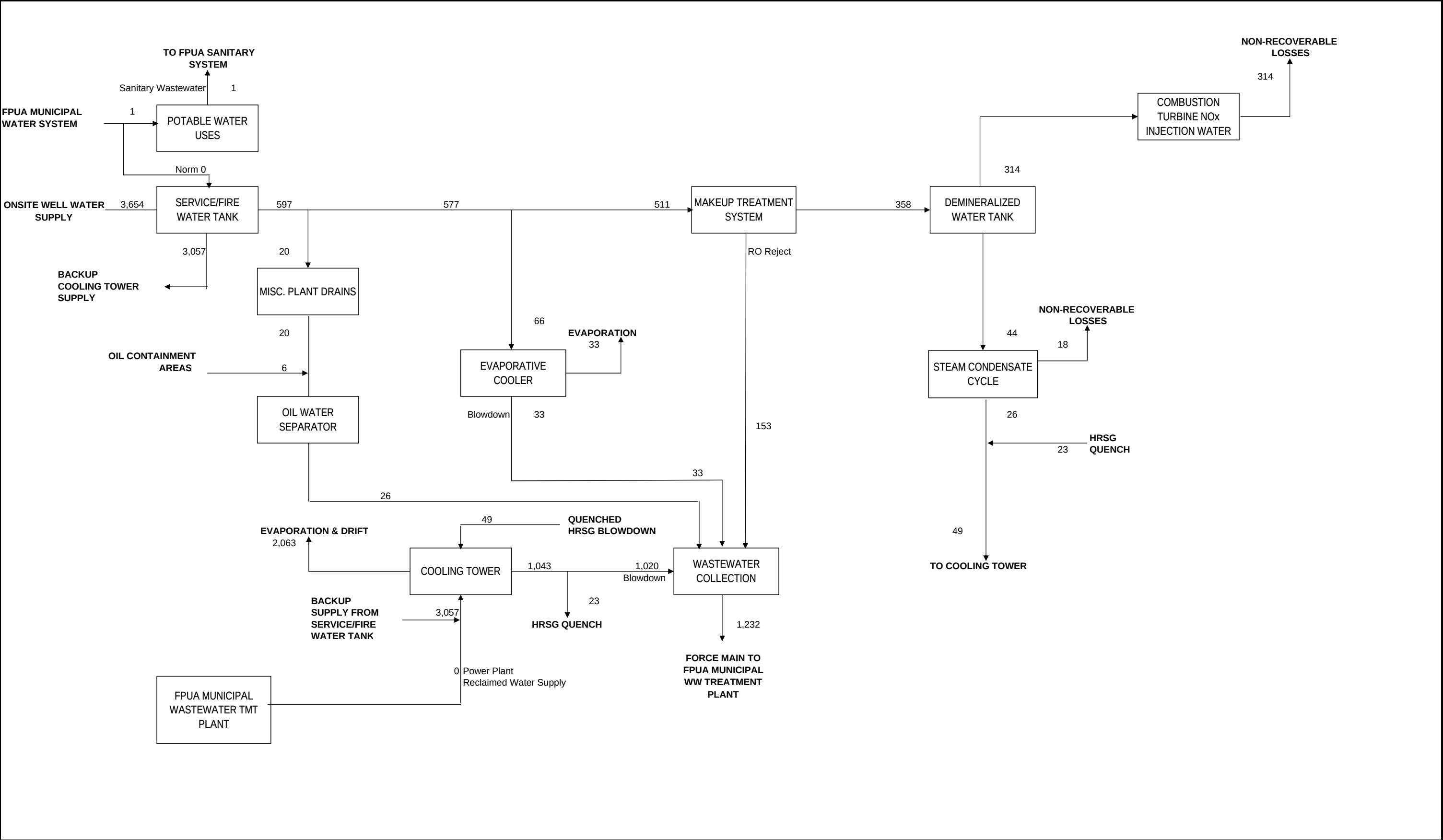
NOTE: 1. FLOWS ARE IN 1000 GALLONS PER Day (gpd).	COMBUSTION TURBINE FUEL	Natural Gas			BLACK & VEATCH	Florida Municipal Power Agency Treasure Coast Energy Center, Unit 1	Project 138859.0030	Drawing WMB-1	Rev 2
	NET PLANT OUTPUT (MW)	299.4	MAKEUP TREATMENT EFFICIENCY	70%					
	TURBINE CONFIGURATION	1 x1	CYCLE MAKEUP RATE	2.00%	Eng: KRW	Dwg: RMC	Figure 3.5-1		
	AMBIENT TEMP (°F)	100	LOAD FACTOR	100%	Check:	Date: 1/14/2005			
	DUCT FIRING	On	CYCLES OF CONCENTRATION	4.0					
						WATER MASS BALANCE HB Case 1 100 °F AMBIENT, FIRED, 100% LOAD, Natural Gas			



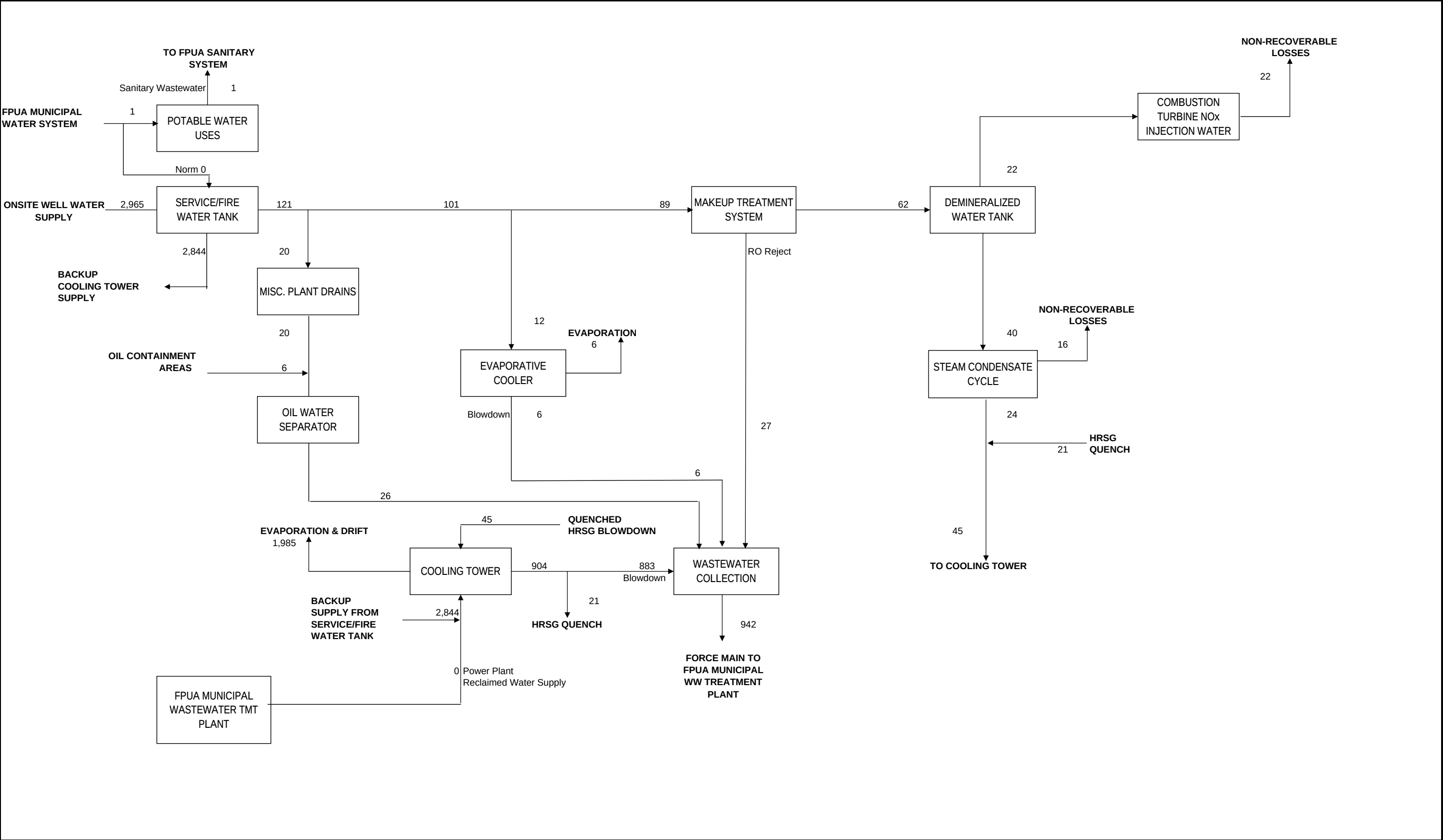
NOTE: 1. FLOWS ARE IN 1000 GALLONS PER Day (gpd).	COMBUSTION TURBINE FUEL	Annual Avg			 BLACK & VEATCH		Florida Municipal Power Agency Treasure Coast Energy Center, Unit 1		Project	Drawing	Rev
	NET PLANT OUTPUT (MW)	309.5	MAKEUP TREATMENT EFFICIENCY	70%			138859.0030		WMB-3	2	
	TURBINE CONFIGURATION	1 x1	CYCLE MAKEUP RATE	2.00%			WATER MASS BALANCE ANNUAL AVERAGE (500 hr on # 2 Fuel Oil)		Figure 3.5-3		
	AMBIENT TEMP (°F)	73	LOAD FACTOR	90%							
	DUCT FIRING	On	CYCLES OF CONCENTRATION	4.0							
					Eng: KRW	Dwg: RMC					
					Check:	Date: 1/14/2005					



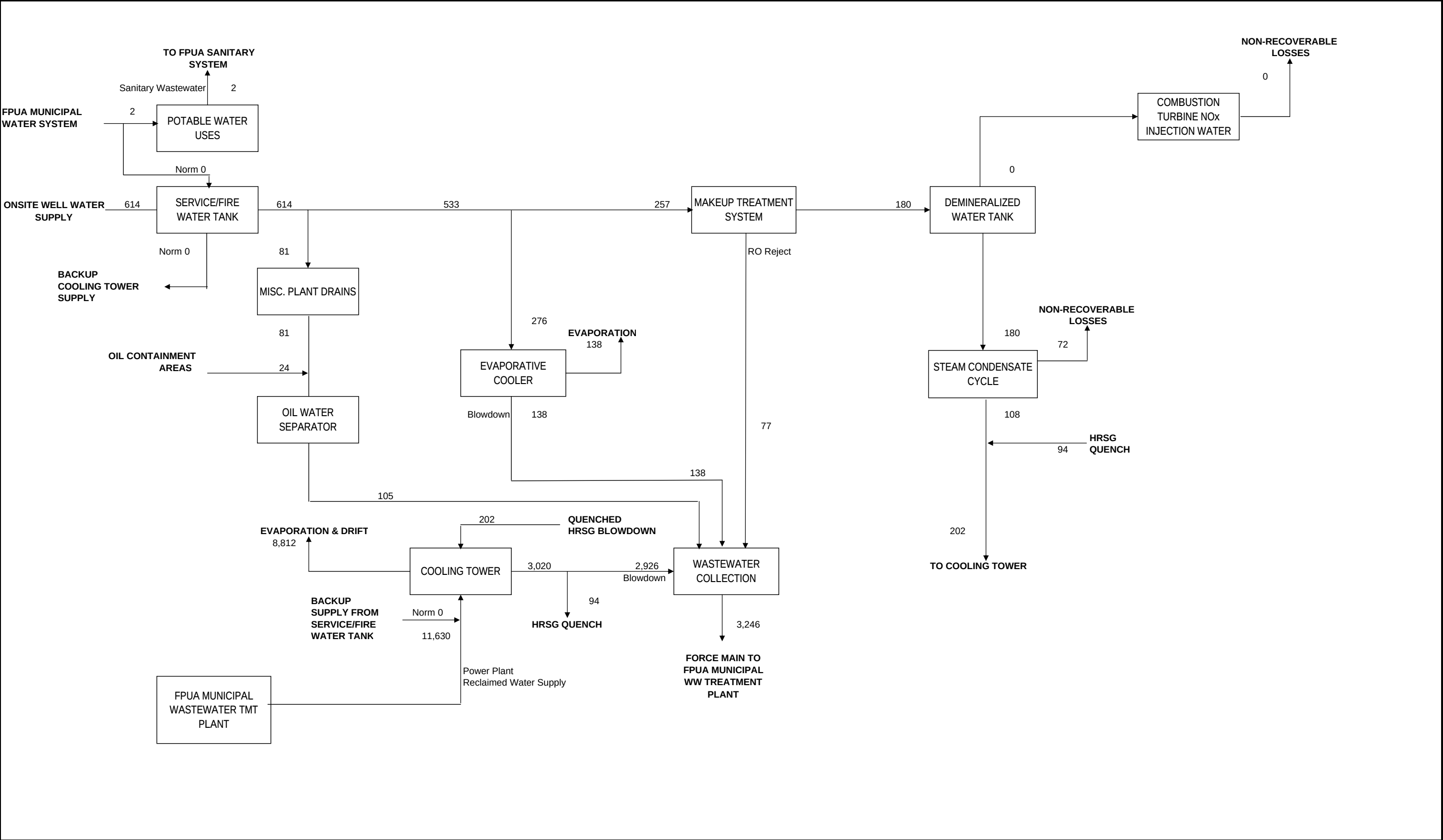
NOTE: 1. FLOWS ARE IN 1000 GALLONS PER Day (gpd).	COMBUSTION TURBINE FUEL	Natural Gas			 BLACK & VEATCH		Florida Municipal Power Agency Treasure Coast Energy Center, Unit 1	Project 138859.0030	Drawing WMB-1	Rev 0
	NET PLANT OUTPUT (MW)	299.4	MAKEUP TREATMENT EFFICIENCY	70%			WATER MASS BALANCE - WELL WTR MAKEUP HB Case 1	Figure 3.5-4		
	TURBINE CONFIGURATION	1 x1	CYCLE MAKEUP RATE	2.00%						
	AMBIENT TEMP (°F)	100	LOAD FACTOR	100%						
	DUCT FIRING	On	CYCLES OF CONCENTRATION	3.0						
					Eng: KRW	Dwg: RMC				
					Check:	Date: 1/25/2005				
							100 °F AMBIENT, FIRED, 100% LOAD, Natural Gas			



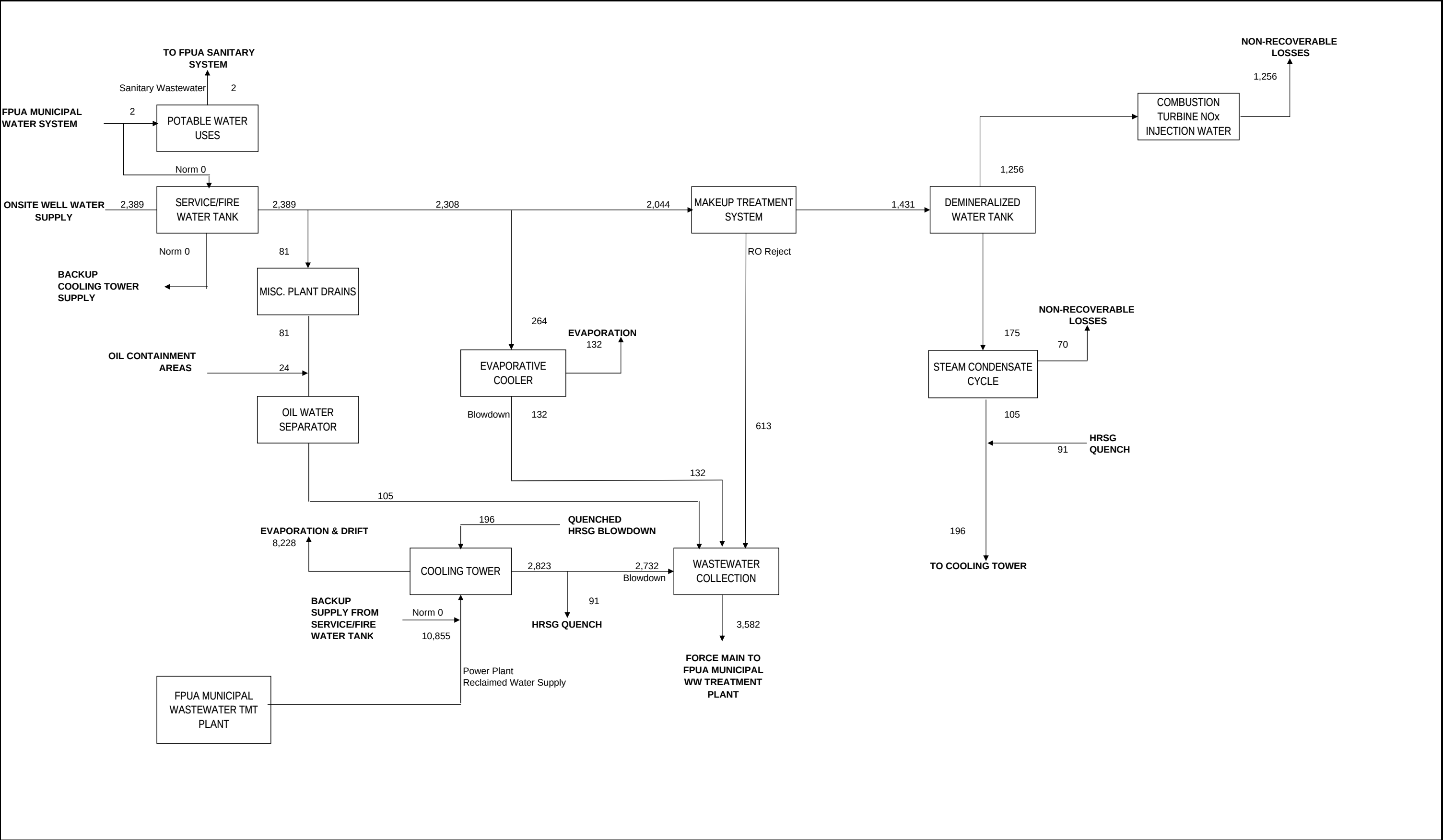
NOTE: 1. FLOWS ARE IN 1000 GALLONS PER Day (gpd).	COMBUSTION TURBINE FUEL	#2 Fuel Oil			 BLACK & VEATCH	Florida Municipal Power Agency Treasure Coast Energy Center, Unit 1	Project 138859.0030	Drawing WMB-2	Rev 0
	NET PLANT OUTPUT (MW)	299.5	MAKEUP TREATMENT EFFICIENCY	70%		WATER MASS BALANCE - WELL WTR MAKEUP HB Case 2 100 °F AMBIENT,FIRED, 100% LOAD, #2 Fuel Oil	Figure 3.5-5		
	TURBINE CONFIGURATION	1 x1	CYCLE MAKEUP RATE	2.00%	Eng: KRW	Dwg: RMC			
	AMBIENT TEMP (°F)	100	LOAD FACTOR	100%	Check:	Date: 1/25/2005			
	DUCT FIRING	On	CYCLES OF CONCENTRATION	3.0					



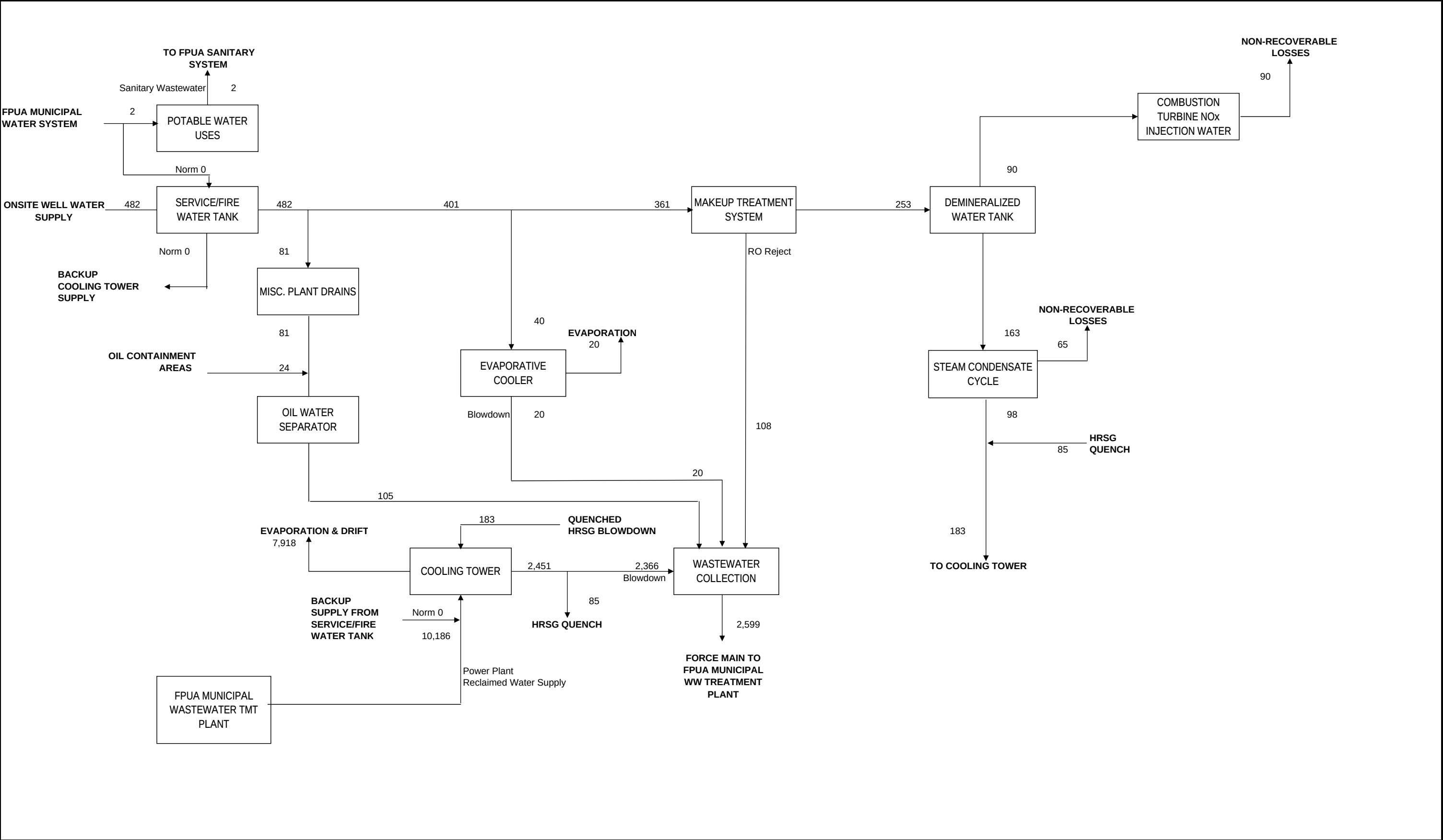
NOTE: 1. FLOWS ARE IN 1000 GALLONS PER Day (gpd).	COMBUSTION TURBINE FUEL	Annual Avg			 BLACK & VEATCH		Florida Municipal Power Agency Treasure Coast Energy Center, Unit 1		Project	Drawing	Rev
	NET PLANT OUTPUT (MW)	309.5	MAKEUP TREATMENT EFFICIENCY	70%			138859.0030		WMB-3	0	
	TURBINE CONFIGURATION	1 x1	CYCLE MAKEUP RATE	2.00%			WATER MASS BALANCE - WELL WTR MAKEUP ANNUAL AVERAGE (500 hr on # 2 Fuel Oil)		Figure 3.5-6		
	AMBIENT TEMP (°F)	73	LOAD FACTOR	90%							
	DUCT FIRING	On	CYCLES OF CONCENTRATION	3.0							
					Eng: KRW	Dwg: RMC					
					Check:	Date: 1/25/2005					



NOTE: 1. FLOWS ARE IN 1000 GALLONS PER Day (gpd).	COMBUSTION TURBINE FUEL	Natural Gas			BLACK & VEATCH	Florida Municipal Power Agency Treasure Coast Energy Center, Units 1 - 4	Project 138859.0030	Drawing WMB-4	Rev 0
	NET PLANT OUTPUT (MW)	1197.6	MAKEUP TREATMENT EFFICIENCY	70%		4-UNIT WATER MASS BALANCE HB Case 1 100 °F AMBIENT, FIRED, 100% LOAD, Natural Gas	Figure 3.5-7		
	TURBINE CONFIGURATION	Four 1 x 1	CYCLE MAKEUP RATE	2.00%					
	AMBIENT TEMP (°F)	100	LOAD FACTOR	100%	Eng: KRW Dwg: RMC				
	DUCT FIRING	On	CYCLES OF CONCENTRATION	4.0	Check: Date: 1/25/2005				



NOTE: 1. FLOWS ARE IN 1000 GALLONS PER Day (gpd).	COMBUSTION TURBINE FUEL	#2 Fuel Oil			 BLACK & VEATCH		Florida Municipal Power Agency Treasure Coast Energy Center, Units 1 - 4	Project 138859.0030	Drawing WMB-5	Rev 0
	NET PLANT OUTPUT (MW)	1198	MAKEUP TREATMENT EFFICIENCY	70%			4-UNIT WATER MASS BALANCE HB Case 2 100 °F AMBIENT, FIRED, 100% LOAD, #2 Fuel Oil	Figure 3.5-8		
	TURBINE CONFIGURATION	Four 1 x 1	CYCLE MAKEUP RATE	2.00%	Eng: KRW	Dwg: RMC				
	AMBIENT TEMP (°F)	100	LOAD FACTOR	100%	Check:	Date: 1/25/2005				
	DUCT FIRING	On	CYCLES OF CONCENTRATION	4.0						



NOTE: 1. FLOWS ARE IN 1000 GALLONS PER Day (gpd).	COMBUSTION TURBINE FUEL	Annual Avg			 BLACK & VEATCH		Florida Municipal Power Agency Treasure Coast Energy Center, Units 1 - 4		Project	Drawing	Rev
	NET PLANT OUTPUT (MW)	1237.9	MAKEUP TREATMENT EFFICIENCY	70%			138859.0030		WMB-6	0	
	TURBINE CONFIGURATION	Four 1 x 1	CYCLE MAKEUP RATE	2.00%			4-UNIT WATER MASS BALANCE ANNUAL AVERAGE (500 hr on # 2 Fuel Oil)		Figure 3.5-9		
	AMBIENT TEMP (°F)	73	LOAD FACTOR	90%							
	DUCT FIRING	On	CYCLES OF CONCENTRATION	4.0							
					Eng: KRW	Dwg: RMC					
					Check:	Date: 1/25/2005					