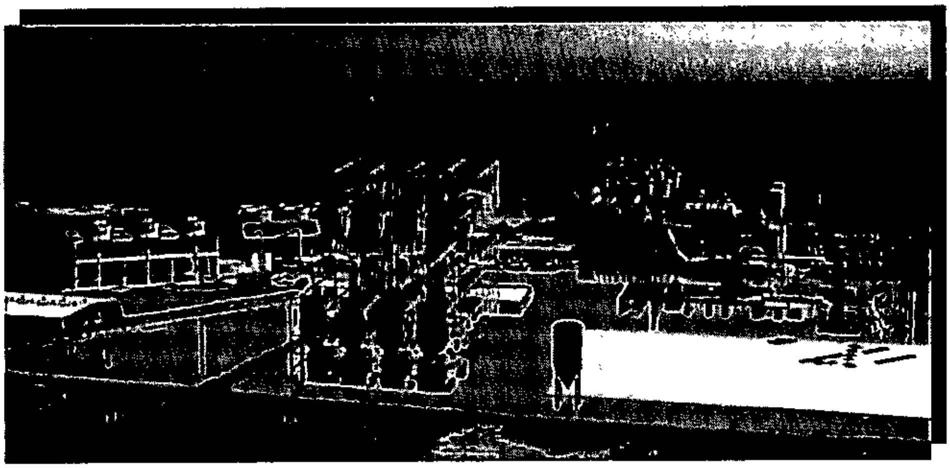
SUPPLEMENTAL SITE CERTIFICATION APPLICATION



ORLANDO UTILITIES COMMISSION CURTIS H. STANTON ENERGY CENTER UNIT B IGCC PROJECT

VOLUME 1

Prepared for:

OUC
The *Reliable* One®
Orlando, Florida

and

SOUTHERN COMPANY
Energy to Serve Your World℠
Southern Power Company-
Orlando Gasification LLC
Birmingham, Alabama

Prepared by:

ECT
Environmental Consulting & Technology, Inc.
3701 Northwest 98th Street
Gainesville, Florida 32606

ECT No. 051131-0100 **February 2006**

NOTE

Original signatures were filed with the Site Certification Application filed with Hamilton S. Oven, Jr., P.E., Administrator, Office of Siting Coordination, Florida Department of Environmental Protection. All copies of the Site Certification Application contain copies of the signature pages.

Original signature pages may be requested by contacting:

Jeffrey L. Meling, P.E., Vice President
Environmental Consulting & Technology, Inc.
3701 Northwest 98th Street
Gainesville, Florida 32606

APPLICANT INFORMATION

Co-Applicants' Official Names: Orlando Utilities Commission and Southern Power Company-Orlando Gasification LLC

Co-Applicants' Addresses:

Orlando Utilities Commission
500 South Orange Avenue
P.O. Box 3193
Orlando, Florida 32802

Southern Power Company-Orlando Gasification LLC
600 North 18th Street
Birmingham, Alabama 35291

Address of Official Headquarters: Southern Power Company-Orlando Gasification LLC 600 North 18th Street, Birmingham, Alabama 35291

Business Entity (corporation, partnership, co-operative): Orlando Utilities Commission (OUC) is a statutory commission created by the legislature of the State of Florida as a separate part of the government of the City of Orlando. OUC has the full authority over the management and control of the electric light and water works parts of the City of Orlando. It has the power to undertake, among other things, the construction, operation, and maintenance of electric generation, transmission, and distribution systems and water production, transmission, and distribution systems to meet the requirements of its customers.

Southern Power Company-Orlando Gasification LLC (SPC-OG) is a Delaware limited liability corporation authorized to transact business in Florida. SPC-OG is a subsidiary of Southern Company, which is one of the largest producers of electricity in the United States.

Owners: Orlando Utilities Commission and Southern Power Company-Orlando Gasification LLC

Names and Titles of Chief Executive Officers:

Kenneth P. Ksionek, General Manager & CEO
Orlando Utilities Commission

Ronnie L. Bates, President
Southern Power Company-Orlando Gasification LLC

Names, Addresses, and Phone Numbers of Official Representative Responsible for Obtaining Certification:

Frederick F. Haddad, Jr.
Orlando Utilities Commission
500 South Orange Avenue
Orlando, Florida 32802
407/244-8732

Site Location (County): Orange County

Nearest Incorporated City: Orlando, Florida

APPLICANT INFORMATION
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Latitude and Longitude: 28°29'17" North Latitude 81°10'03" West Longitude

UTM's: Northerly: 1507528 Easterly: 446825

Section, Township, Range: Sections 13 and 24 and the eastern half of Sections 14 and 23, Range 31 east, Township 23 south, and Sections 18 and 19, Range 32 east, Township 23 south

Location of any directly associated transmission facilities (counties): Orange County

Name Plate Generating Capacity: Unit B: Nominal 285 MW

Capacity of Proposed Additions and Ultimate Site Capacity (where applicable): Proposed Unit B Addition: 285 MW

Remarks (additional information that will help identify the applicant): 2,000 MW

STANTON ENERGY CENTER
UNIT B IGCC PROJECT

INTRODUCTION AND SYNOPSIS

INTRODUCTION AND BACKGROUND

Orlando Utilities Commission (OUC) and Southern Power Company – Orlando Gasification LLC (SPC-OG) are proposing to construct, own and operate a new integrated gasification combined-cycle (IGCC) power generation unit to be located at the site of the existing Stanton Energy Center in Orange County, southeast of Orlando. The new unit will be called Unit B. This facility will gasify sub-bituminous coal and supply syngas fuel for the generation of a nominal 285 megawatts (MW) in a combined-cycle power plant. The Unit B IGCC project will support OUC's generation expansion plan and the company's obligation to provide reliable and economical electrical power to its existing and future customers.

This introductory section presents necessary background information on the Unit B project, including the purpose of this Supplemental Site Certification Application (SCA). Following the introduction, a summary of the project and its potential impacts on the surrounding environment is provided. This summary presents some of the key facts concerning the application for authorization to construct and operate the Unit B IGCC project pursuant to the Florida Electrical Power Plant Siting Act (FEPPSA).

PURPOSES OF THE SUPPLEMENTAL SCA

This Supplemental SCA for Stanton Unit B provides the required information and analyses for agency review, including the Prevention of Significant Deterioration (PSD) permit application as required by the Clean Air Act and delegated to the Florida Department of Environmental Protection (FDEP), leading to the approval and certification of Unit B.

STANTON ENERGY CENTER CERTIFICATION BACKGROUND AND HISTORY

The Stanton site consists of 3,280 acres located in Orange County, Florida. The site was originally certified as a power plant site through the FEPPSA for Stanton Unit 1, a nominal 465-MW net[1] pulverized coal unit (Certification PA 81-14), on December 15, 1982. At the same time the Stanton Energy Center was certified for ultimate generating capacity of 2,000 MW of coal- and fuel oil-fired generation. Stanton Unit 2, a nominal 465-MW net1 pulverized coal unit, was certified under Supplemental Site Certification on December 17, 1991. The Conditions of Certification were modified to allow combustion of landfill gas and natural gas in both Units 1 and 2 on December 22, 1997. Stanton Unit A, a nominal 633-MW net natural gas- and oil-fueled combined-cycle unit, was certified under Supplement Site Certification on September 21, 2001.

Stanton Unit B is proposed as a nominal 285-MW IGCC unit using coal to produce syngas with the capability to operate on natural gas as well, to be certified under Supplemental Site Certification. Including Unit B, total capacity certified at Stanton will be a nominal 1,846 MW.

SUMMARY OF PROJECT, SITE FEATURES AND IMPACTS

Stanton Unit B is proposed to be a nominal 285 MW net IGCC unit. The new unit's key design features are described in detail in Chapter 3.0. Unit B will consist of the gasifier island and a combined-cycle plant that will combust syngas to produce electricity. The combined-cycle equipment will also have the capability to operate on natural gas. The gasifier will be jointly owned by SPC-OG and OUC. The combined-cycle equipment will be solely owned by OUC. The IGCC unit will be jointly operated by SPC-OG and OUC. Unit B will take advantage of existing infrastructure at Stanton and will not require any new off-site associated facilities.

Unit B is the result of the joint OUC and Southern Company Services (SCS) response to the U.S. Department of Energy's (DOE's) Clean Coal Power Initiative (CCPI). On October 21, 2004, DOE officially announced that it had selected SCS and its partners Southern Power Company (SPC), OUC, and Kellogg Brown & Root, Inc. (KBR) for negotiation of a $235 million cost-sharing cooperative agreement under the CCPI. Unit B will

[1]The nominal 465-MW net capacity is based on a December 22, 1997, Modification to the Conditions of Certification.

demonstrate the transport gasifier technology based on KBR's catalytic cracking technology at a commercial scale, a significant goal to be achieved by the Unit B IGCC project.

The Stanton site offers many advantages for construction and operation of Unit B. As mentioned previously, the first unit built was Unit 1, a pulverized coal-fired unit that began commercial operation in June 1987. Unit 2, another similarly sized pulverized coal-fired unit, began commercial operation in June 1996. During the initial site development, the facilities for coal delivery, handling, and storage and waste handling and disposal (onsite landfill) were also constructed. All of the coal for Units 1 and 2 is delivered to the site by rail. The most recent unit added to Stanton was Unit A, a 633-MW natural gas-fired combined-cycle unit. Construction of Unit A included the completion of a pipeline to deliver natural gas to the Stanton site. Unit A is also permitted to fire distillate fuel oil. It began commercial operation in October 2003.

Unit B project development plans have been designed to take full advantage, environmentally and economically, of the proposed site's location and proximity to key support facilities. The Unit B project will utilize existing Stanton coal delivery and handling systems, existing natural gas supply pipeline, and existing water supply and wastewater treatment systems, among others.

Stanton also already has an existing, onsite 230-kilovolt (kV) electrical substation. Unit B will be able to connect to the electrical grid with only a short, onsite transmission line needed. The Unit B location within the Stanton site and its close proximity to this existing substation will minimize the potential for energy losses, expenses, and environmental impacts associated with the project's interconnection to the State's transmission line grid.

Every aspect of the construction and operation of the Unit B project has been designed to ensure compliance with all of the applicable environmental and land use regulations.

Unit B will use syngas and natural gas as fuels and the best available control technologies to reduce airborne emissions. Unit B also will use an extremely efficient method of generating electricity. As a result of these three factors, Unit B will use less fuel and produce less pollution than most power plants.

The IGCC project's impacts on air quality will be minimal. Unit B will not cause or contribute to any violations of any national or state ambient air quality standards, or any Class I or II increments for the prevention of significant deterioration (PSD) of air quality.

The construction of the project will have minimal impacts on the environment. Approximately 35 acres of the site will be developed for permanent power generation facilities, and a small amount of additional land within the existing, onsite landfill will be required for disposal of byproducts. A short onsite transmission line will result in the only wetland impacts associated with the project.

There are no threatened, endangered, or listed wildlife species that will be impacted by project construction or operation.

Unit B will use mostly treated municipal effluent from a nearby facility for its water needs. Only a small quantity of ground water will be required for higher quality uses. The IGCC plant's small ground water use will be within the Stanton Energy Center's existing permitted limits.

As the Stanton Energy Center is a zero-discharge plant, the IGCC project will not discharge any wastewater to any offsite surface or ground waters. All of the wastewater from Unit B will be discharged to the existing plant wastewater treatment and reuse systems.

The Unit B project will provide significant economic benefits for Orange County. The project will provide up to 700 construction jobs and a total payroll of an estimated $64 million, 53 permanent jobs and an annual payroll of $6 million, ad valorem taxes, and fees for various services. Significant regional and indirect economic benefits will also accrue because of the Unit B project.

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LIST OF ACRONYMS

°C	degree Celsius
°F	degree Fahrenheit
μg/L	microgram per liter
μm	micrometer
μs/cm	microsiemen per centimeter
AAQS	ambient air quality standards
AQI	Air Quality Index
ARP	Acid Rain Program
B&V	Black and Veatch
BACT	best available control technology
BEBR	Bureau of Economic and Business Research
BMP	best management practice
BNSF	Burlington Northern-Santa Fe
BOD_5	5-day biochemical oxygen demand
Btu	British thermal unit
Btu/kWh	British thermal unit per kilowatt hour
Btu/lb	British thermal unit per pound
Btu/scf	British thermal unit per standard cubic foot
CAA	Clean Air Act
$CaCO_3$	calcium carbonate
CAIR	Clean Air Interstate Rule
CAMR	Clean Air Mercury Rule
CCPI	Clean Coal Power Initiative
CEM	continuous emissions monitoring
CFR	Code of Federal Regulations
cfs	cubic foot per second
CO	carbon monoxide
CO_2	carbon dioxide
COS	carbonyl sulfide
CT	combustion turbine
dBA	A-weighted decibel
DOAH	Division of Administrative Hearings
DOE	U.S. Department of Energy
DRI	Development of Regional Impact
ECT	Environmental Consulting & Technology, Inc.
EHS	environmental, health and safety
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
ERP	environmental resource permit
ESP	electrostatic precipitator
F.A.C.	Florida Administrative Code
F.S.	Florida Statutes
FCC	fluidized catalytic cracking
FDACS	Florida Department of Agriculture and Consumer Services
FDEP	Florida Department of Environmental Protection

LIST OF ACRONYMS
(Continued, Page 2 of 4)

FDHR	Florida Division of Historical Resources
FDLES	Florida Department of Labor and Employment Security
FDOT	Florida Department of Transportation
FEPPSA	Florida Electrical Power Plant Siting Act
FERC	Federal Energy Regulatory Commission
FGD	flue gas desulfurization
FGS	Florida Geological Survey
FLUCFCS	Florida Land Use, Cover and Forms Classification System
FNAI	Florida Natural Areas Inventory
fps	foot per second
FPSC	Florida Power Service Commission
ft	foot
ft bls	foot below land surface
ft^3	cubic foot
ft-msl	foot above mean sea level
FWC	Florida Fish and Wildlife Conservation Commission
GE	General Electric
gpm	gallon per minute
g/s	grams per second
gsf	gross square feet
H_2S	hydrogen sulfide
H_2SO_4	sulfuric acid
HAP	hazardous air pollutant
HCN	hydrogen cyanide
HHV	higher heating value
HRSG	heat recovery steam generator
HTHP	high-temperature, high-pressure
Hz	hertz
ICP	integrated contingency plan
IGCC	integrated gasification combined-cycle
KBR	Kellogg Brown and Root
kg	kilogram
kV	kilovolt
lb	pound
lb/hr	pound per hour
lb/MMBtu	pound per million British thermal unit
lb/yr	pound per year
LDC	Land Development Code
L_{eq}	time-averaged equivalent noise level
m/s	meter per second
mg/L	milligram per liter
MGD	million gallons per day
mi^2	square mile
mm/yr	millimeter per year

LIST OF ACRONYMS
(Continued, Page 3 of 4)

MMBtu/hr	million British thermal units per hour
mph	mile per hour
MW	megawatt
MW-hr	megawatt-hour
N/A	not applicable
NAAQS	national ambient air quality standards
NCDC	National Climatic Data Center
NEPA	National Environmental Policy Act of 1969
NESC	National Electric Safety Code
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NOAA	National Oceanic and Atmospheric Administration
NO_x	nitrogen oxides
NO_2	nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NPRM	Notice of Proposed Rule Making
NSCR	non-selective catalytic reduction
NSPS	new source performance standards
NSR	New Source Review
NWI	National Wetlands Inventory
O&M	operation and maintenance
OAQPS	Office of Air Quality Planning and Standards
OCBCC	Orange County Board of County Commissioners
OIA	Orlando International Airport
OSHA	Occupational Safety and Health Administration
OUC	Orlando Utilities Commission
PRB	Powder River Basin
PC	pulverized coal
P-D	Planned Development
PM	particulate matter
$PM_{2.5}$	particulate matter less than or equal to 2.5 micrometers
PM_{10}	particulate matter less than or equal to 10 micrometers
ppbvd	part per billion dry volume
ppmv	part per million volume
ppmvd	part per million dry volume
ppmw	part per million by weight
PSD	Prevention of Significant Deterioration
PSDF	Power Systems Development Facility
Pt-Co	platinum-cobalt unit
PWRCA	priority water resource caution area
RARE	roadless area review and evaluation
RCRA	Resource Conservation and Recovery Act
RIMS	Regional Input-Output Modeling System
s.u.	standard unit
SCA	site certification application

LIST OF ACRONYMS
(Continued, Page 4 of 4)

scf/hr	standard cubic foot per hour
SCR	selective catalytic reduction
SCS	Southern Company Services
SCS	Soil Conservation Service
SJRWMD	St. Johns River Water Management District
SNCR	selective non-catalytic reduction
SO_2	sulfur dioxide
SO_x	sulfur oxides
SPCC	spill prevention, control, and countermeasure
SPC-OG	Southern Power Company – Orlando Gasification LLC
SR	State Road
T/E	threatened/endangered
TDS	total dissolved solids
ton/hr	ton per hour
tpy	ton per year
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDC	U.S. Department of Commerce
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VMT	vehicle-miles traveled
VOC	volatile organic compound
WMD	Water Management District
yd^3	cubic yard

1.0

NEED FOR POWER AND THE PROPOSED FACILITIES

A Petition to Determine Need for Stanton Energy Center Unit B will be submitted to the Florida Public Service Commission (PSC) by Orlando Utilities Commission (OUC) on or before February 22, 2006, in accordance with Section 403.519, Florida Statutes.

Unit B is proposed as a nominal 285-megawatt (MW) integrated gasification combined-cycle (IGCC) unit to be constructed at Stanton Energy Center in Orlando, Florida. The 3,280-acre Stanton site was certified for an ultimate 2,000 MW of coal- and natural gas-fired electrical generating capacity in the Florida Division of Administrative Hearings (DOAH) Case No. 81-1431 and subsequent modifications. The combined-cycle equipment associated with Unit B will be owned solely by OUC and jointly operated by OUC and Southern Power Company – Orlando Gasification LLC (SPC-OG).

Unit B will burn syngas from transport gasifiers also to be constructed at the site and will also be capable of continuous operation firing natural gas. The syngas will be produced from sub-bituminous coal. The transport gasifiers will be jointly owned and operated by OUC and SPC-OG. Unit B is scheduled to commence commercial operation on June 1, 2010.

Unit B will use existing onsite and associated facilities at Stanton Energy Center. No new associated facilities will be required.

2.0

SITE AND VICINITY CHARACTERIZATION

To assess the potential impacts a project may have, it is necessary to characterize the environment in which the project will be located. This chapter provides that characterization for the Stanton Energy Center Unit B IGCC project and contains sections that provide environmental information to describe the physical, environmental, socioeconomic, cultural, and aesthetic features and conditions of the site and surrounding areas. This chapter begins by describing the Stanton Energy Center and Unit B site and their Orange County environs. Following the site description are detailed characterizations of the sociopolitical and biophysical environment. This chapter contains the following specific sections, per the Florida Department of Environmental Protection (FDEP) Instruction Guide:

- 2.1—Site and Associated Facilities Delineation.
- 2.2—Socio-Political Environment.
- 2.3—Biophysical Environment.

Chapter 2.0 presents detailed information describing the project site and immediate surroundings and their environmental characteristics and serves to document the baseline from which the proposed project's impacts are evaluated. The information provided in this chapter was developed from field surveys and information and data collected from literature and other publicly available sources, including environmental documents associated with existing Stanton Energy Center facilities. In particular, the Supplemental SCA submitted for Unit A in January 2001 (OUC, 2001), the most recent major application related to the facility, provided some useful information on the site and its environmental characteristics. Information from the Unit A and previous Units 1 and 2 SCAs are not, however, duplicated or repeated in detail in this application.

2.1 SITE AND ASSOCIATED FACILITIES DELINEATION

The Stanton Unit B IGCC facility will be constructed on approximately 35 acres of the 3,280-acre site of OUC's existing Stanton Energy Center located southeast of Orlando in eastern Orange County, Florida. Figure 2.1-1 shows the general location of the site within the state of Florida, and Figure 2.1-2 shows the site location within the east-central Florida region. Figure 2.1-3 shows the site relative to Orlando and major highways. Figure 2.1-4 shows the Stanton site and surrounding area using a recent aerial photograph.

The Stanton Energy Center site, overall, totals 3,280 acres, of which approximately 1,100 have been licensed by the state of Florida for an ultimate site capacity of up to 2,000 MW of power generation and supporting facilities. Most of the remaining 2,180 acres of the Stanton Energy Center site has been left in its preexisting condition and provides buffer between the main generating units and the surrounding area, as shown in Figure 2.1-4.

The proposed Unit B IGCC project will involve mostly portions of the Stanton site already developed (i.e., within the 1,100-acre developed area). In general, the project will take advantage of the existing overall infrastructure (e.g., plant roads and onsite electrical substation) provided by the Stanton Energy Center. Of particular interest, the project will benefit from the existing coal delivery and handling facilities, water/wastewater systems, and solid waste landfill. These areas of the site, along with the area where the proposed IGCC equipment will be placed, are outlined in Figure 2.1-5. Throughout the remainder of this chapter describing the existing environment, these areas are described in greater detail than other areas of the plant site.

A new onsite transmission line is necessary to connect Unit B to the main Stanton electrical substation. The new transmission line will be located on undeveloped land, but entirely on Stanton property, as shown in Figure 2.1-5. Chapter 6.0 presents information concerning this new transmission line, and the impacts will be addressed in the environmental resource permit (ERP) application.

Alafaya Trail (from the north) currently provides the primary access to the Stanton site. Limited ingress/egress is also available from a southern access road. The immediately

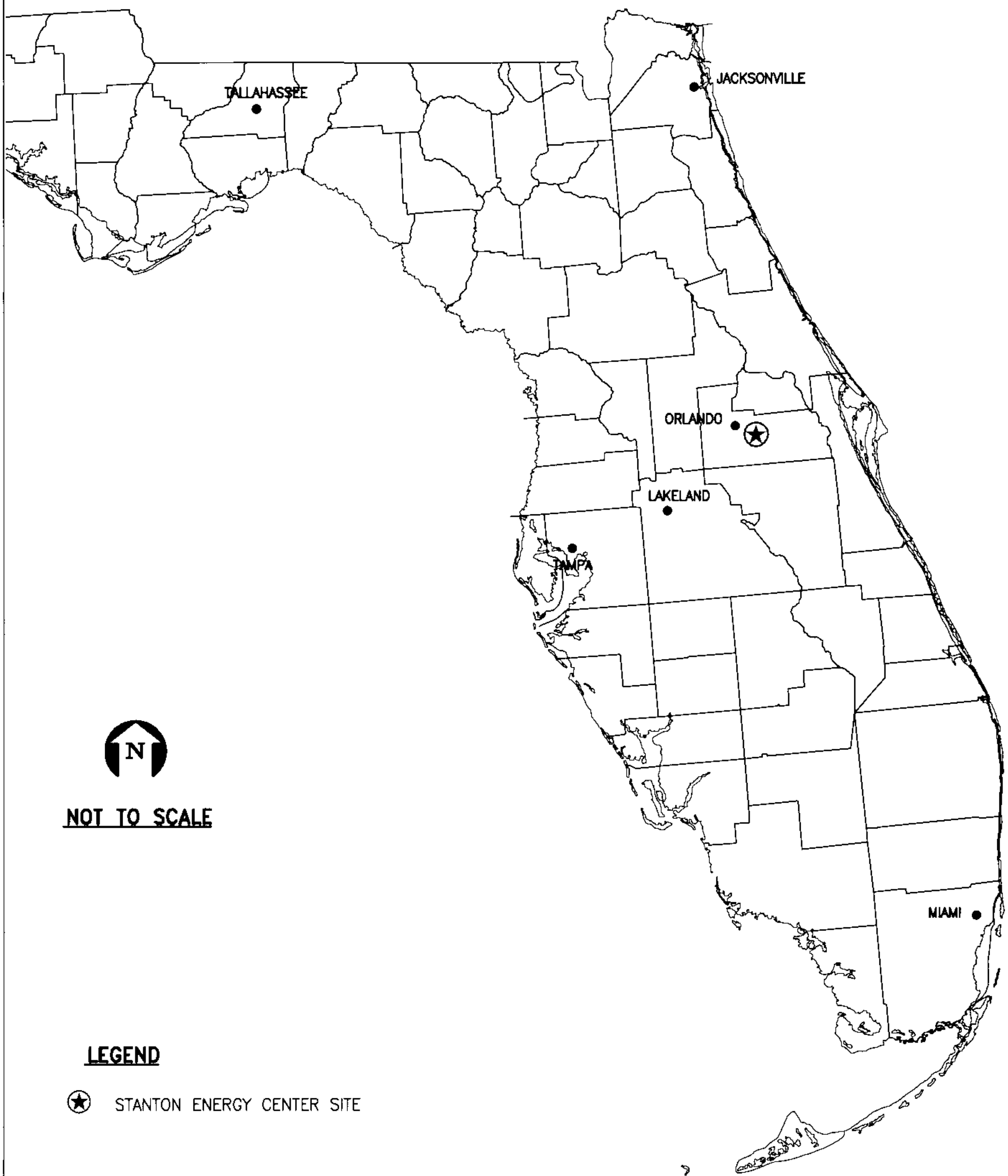

FIGURE 2.1-1.

LOCATION OF THE STANTON SITE WITHIN THE STATE OF FLORIDA

Source: ECT, 2005.

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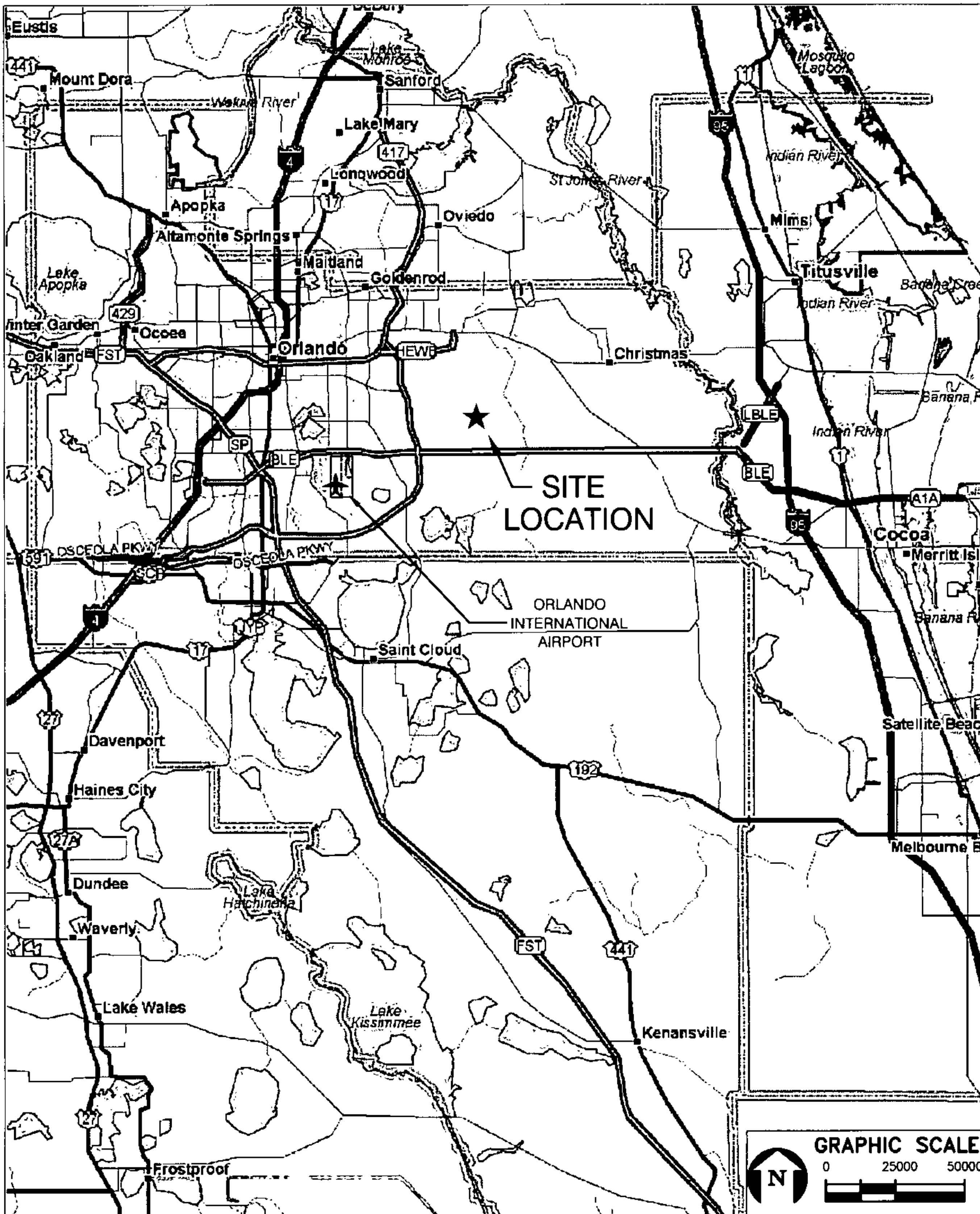

FIGURE 2.1-2.

STANTON SITE REGIONAL LOCATION MAP

Source: DeLorme, 2003; ECT, 2005.

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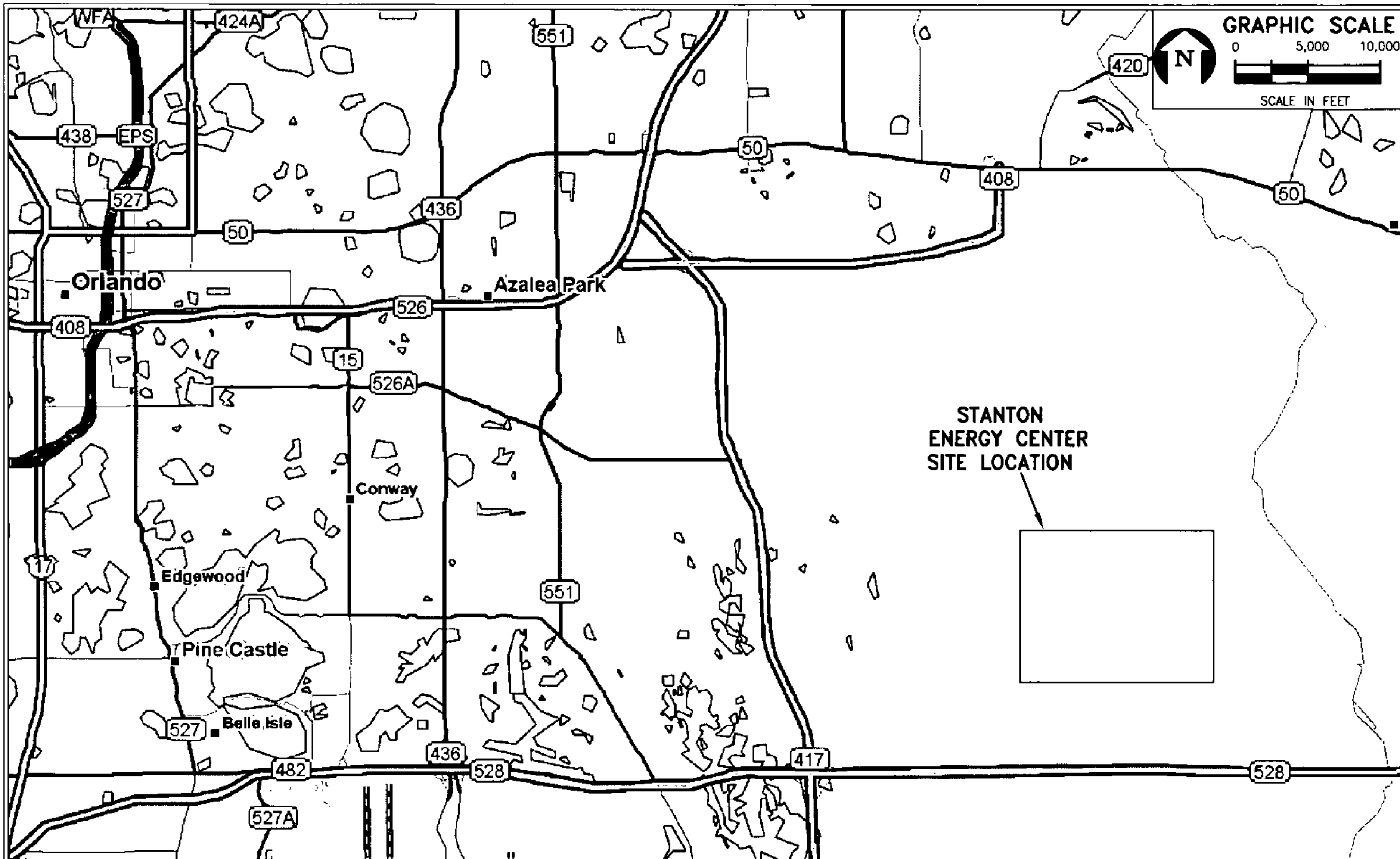

FIGURE 2.1-3.
STANTON SITE LOCATION RELATIVE TO ORLANDO

Source: DeLorme, 2003; ECT, 2005.

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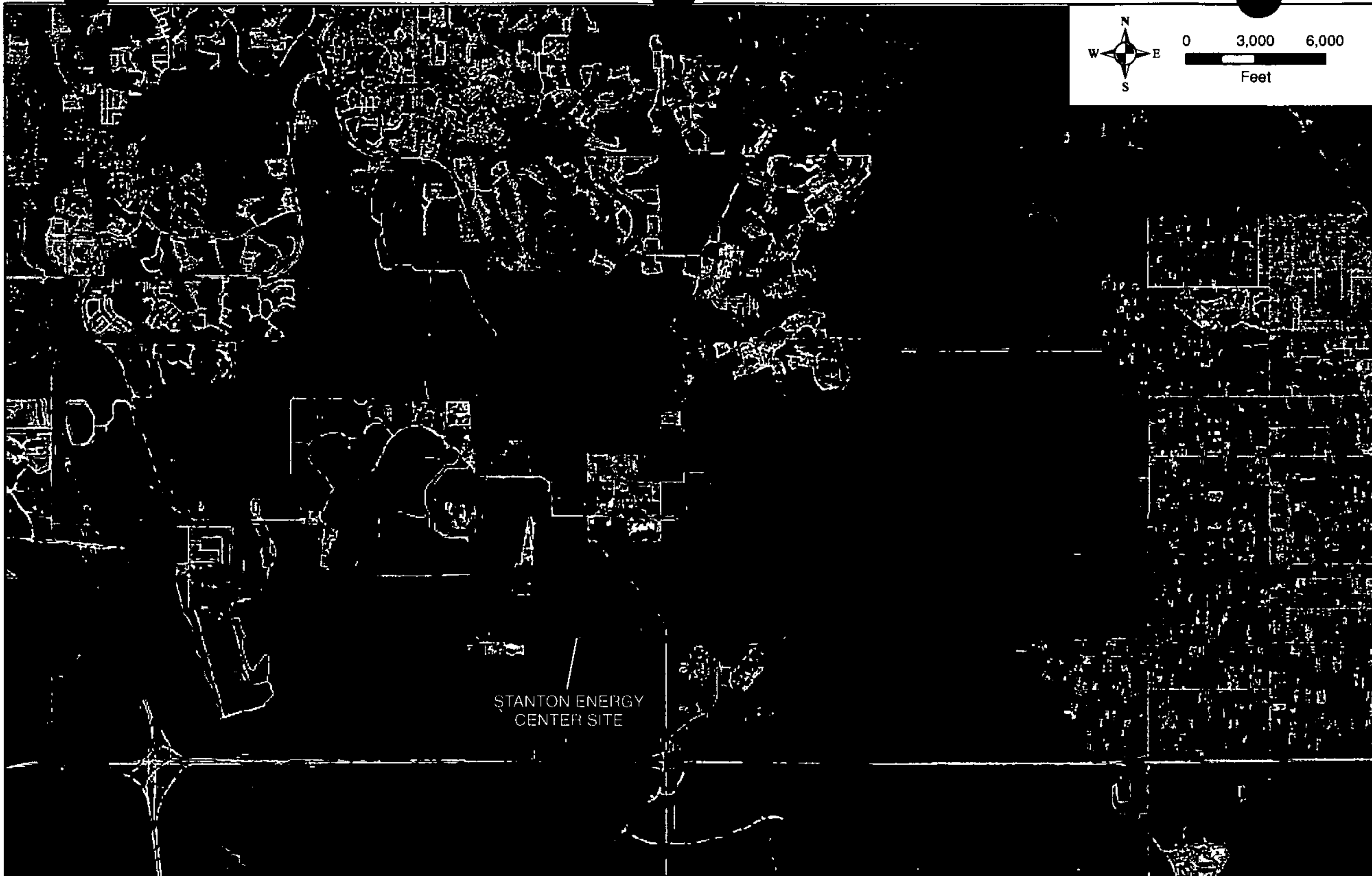

FIGURE 2.1-4.
2004 AERIAL PHOTOGRAPH OF STANTON SITE AND SURROUNDING AREA

Sources: SJRWMD Aerials, 2004; ECT, 2005.

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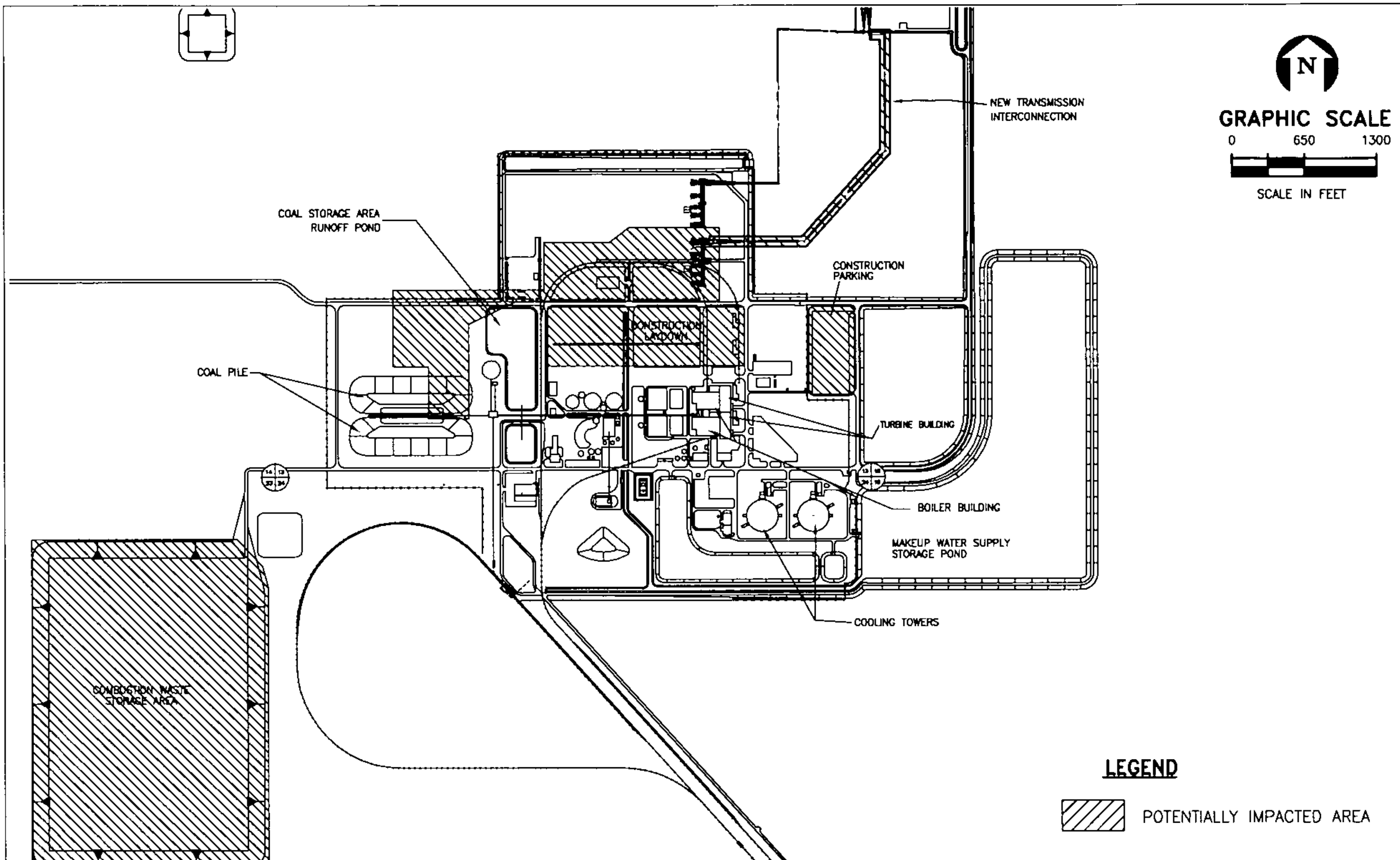

FIGURE 2.1-5.
POTENTIALLY IMPACTED AREAS OF THE STANTON SITE

Sources: SCS, 2005; ECT, 2006.

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Environmental Consulting & Technology, Inc.

surrounding road system—and site access—will be improved greatly by the completion of the Avalon Park Boulevard extension project (Innovation Way), currently slated to commence construction in mid-2006 and complete construction in mid-2008, and the widening of Alafaya Trail, estimated to be completed in 2009 or 2010. Section 2.2.7 discusses these road improvement projects in more detail.

The Stanton site is zoned Farmland Rural, as is much of the surrounding property. Land uses at adjacent properties include mixed commercial-residential to the north, a preserve and park to the east, a correctional facility to the south, and a municipal landfill to the west. Figure 2.1-6 shows the site and identifies abutting and adjacent properties. More details regarding surrounding land uses and zoning are provided in Sections 2.2.2 and 2.2.3.

The topography of the property and immediate area is mostly flat, with elevations generally ranging between approximately 75 and 85 feet above mean sea level (ft-msl) (see Figure 2.1-7). The elevation of the 1,100-acre developed portion of the site was raised and leveled at approximately 79 to 80 ft-msl as part of constructing Unit 1 in the early 1980s. All Unit B facilities will be located above the 100-year flood elevation.

2.2 SOCIO-POLITICAL ENVIRONMENT

The FDEP rules for certification of a site or new generating facilities meeting certain criteria require an analysis of various land use and socioeconomic baseline conditions and projected impacts in accordance with local government comprehensive plans, zoning ordinances, and development regulations. The various planning issues relevant to the site fall within the following generalized categories: existing land use, comprehensive plans and zoning ordinances, infrastructure and growth management, cultural resources, aesthetics, and socioeconomics. This section includes the following subsections:

- 2.2.1—Governmental Jurisdictions.
- 2.2.2—Zoning and Land Use Plans.
- 2.2.3—Demography and Ongoing Land Use.
- 2.2.4—Easements, Title, Agency Works.
- 2.2.5—Regional Scenic, Cultural, and Natural Landmarks.

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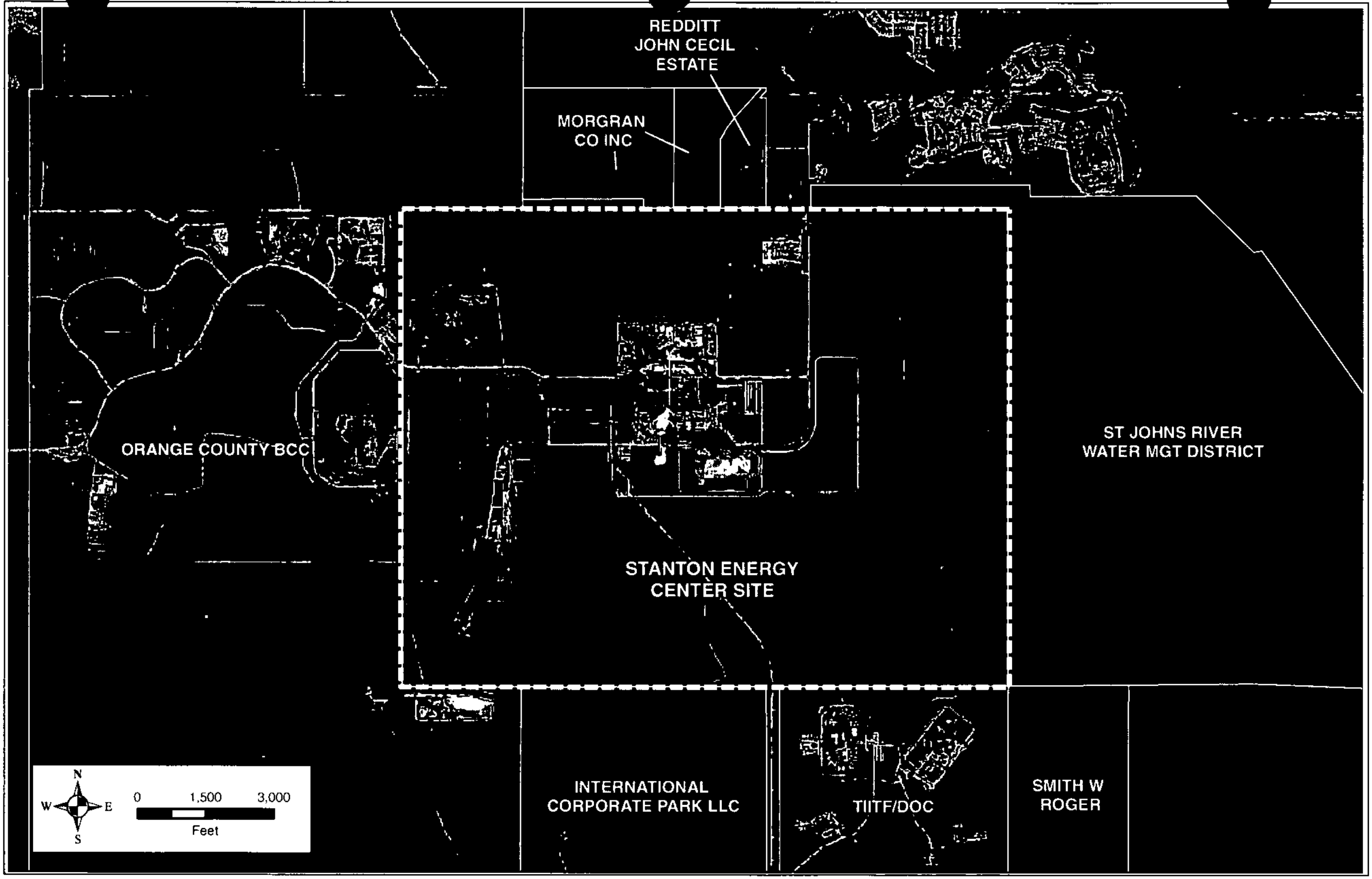

FIGURE 2.1-6.
PROPERTIES ABUTTING AND ADJACENT TO THE STANTON ENERGY CENTER

Sources: SJRWMD Aerials, 2004; ECT, 2005.

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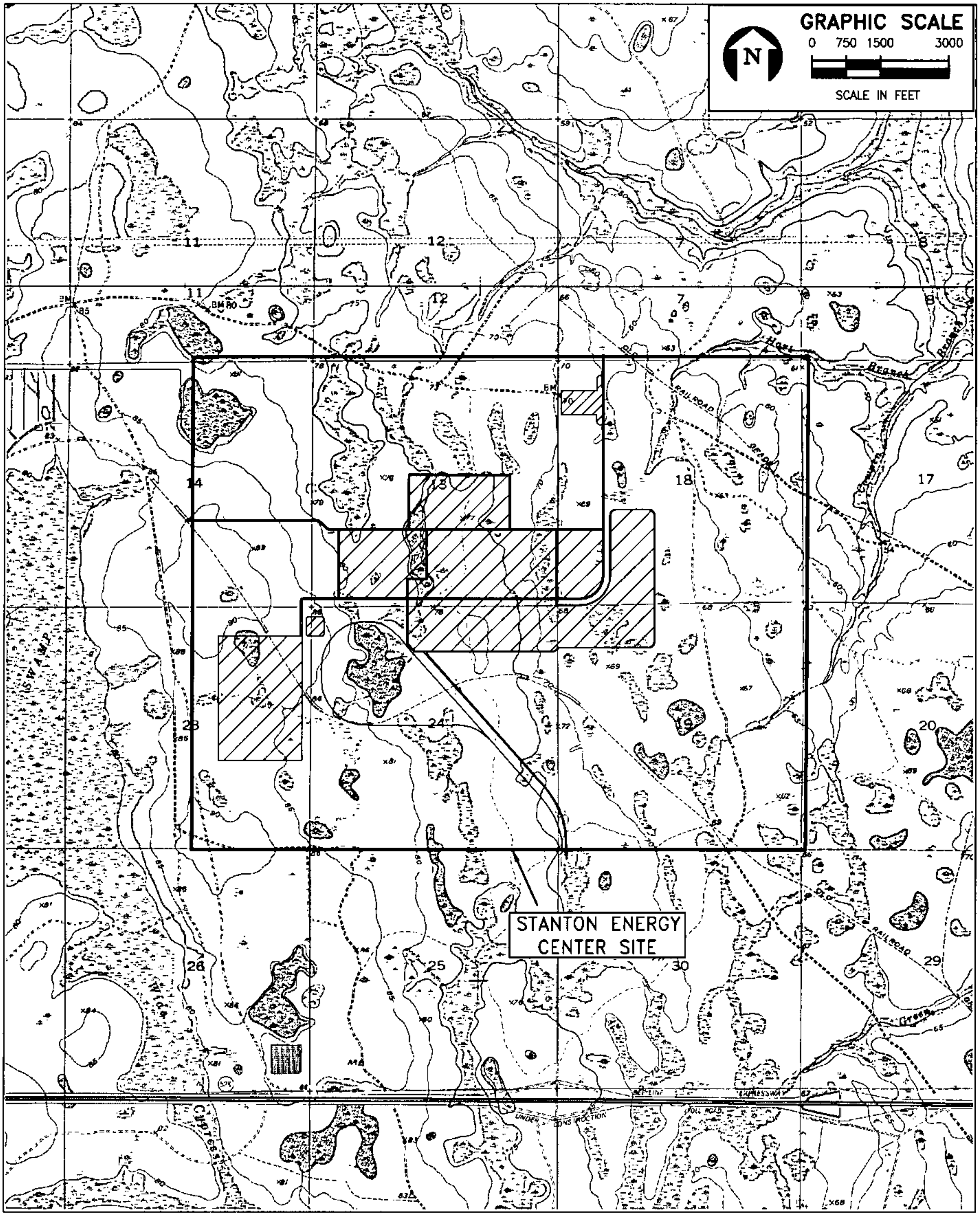

FIGURE 2.1-7.

STANTON SITE TOPOGRAPHY

Sources: USGS Quads: Oviedo SW and Narcoossee NW, FL, 1980; ECT, 2005.

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- 2.2.6—Archaeological and Historic Sites.
- 2.2.7—Socioeconomics and Public Services.

2.2.1 GOVERNMENTAL JURISDICTIONS

As shown in Figure 2.2-1, which depicts the Stanton site location in relation to the incorporated and unincorporated areas in a 5-mile radius, the site is located in an unincorporated area of Orange County. The closest boundary of the Stanton site is located less than 1 mile west of the unincorporated area known as Wedgefield, approximately 3 miles southwest of unincorporated Bithlo and approximately 3.2 miles east of Orlando.

Figure 2.2-2 depicts the public lands located in the area surrounding the site. The Hal Scott Regional Preserve and Park, immediately east of the site, is the only local, regional, state, or federal area within 5 miles that is associated with environmental resources or protection. This park is approximately 9,000 acres in size. The acquisition of this property was partially provided for through funds from the Orlando-Orange County Expressway Authority and the Florida Department of Transportation as part of the mitigation for the construction of the southern connector known as the BeeLine Expressway. Other funding was through the Save Our Rivers program. Orange County funding provided the partnership with SJRWMD to establish the regional preserve. The SJRWMD's Division of Land Management serves as lead manager of the preserve in close cooperation with Orange County.

Other public lands depicted in the Figure in proximity to the Stanton site are the OUC Stanton property itself and the Florida Department of Corrections Central Reception Center to the south of the site and the Orange County Landfill to the west.

Finally, Figure 2.2-3 shows the 2004 aerial photograph of the area at a scale of 1:24000, with the area within 1 mile of the proposed Unit B IGCC stack highlighted.

2.2.2 ZONING AND LAND USE PLANS

The current zoning and land use plan designations for the site are described in the following sections, based on the applicable portions of the Orange County Comprehensive Plan

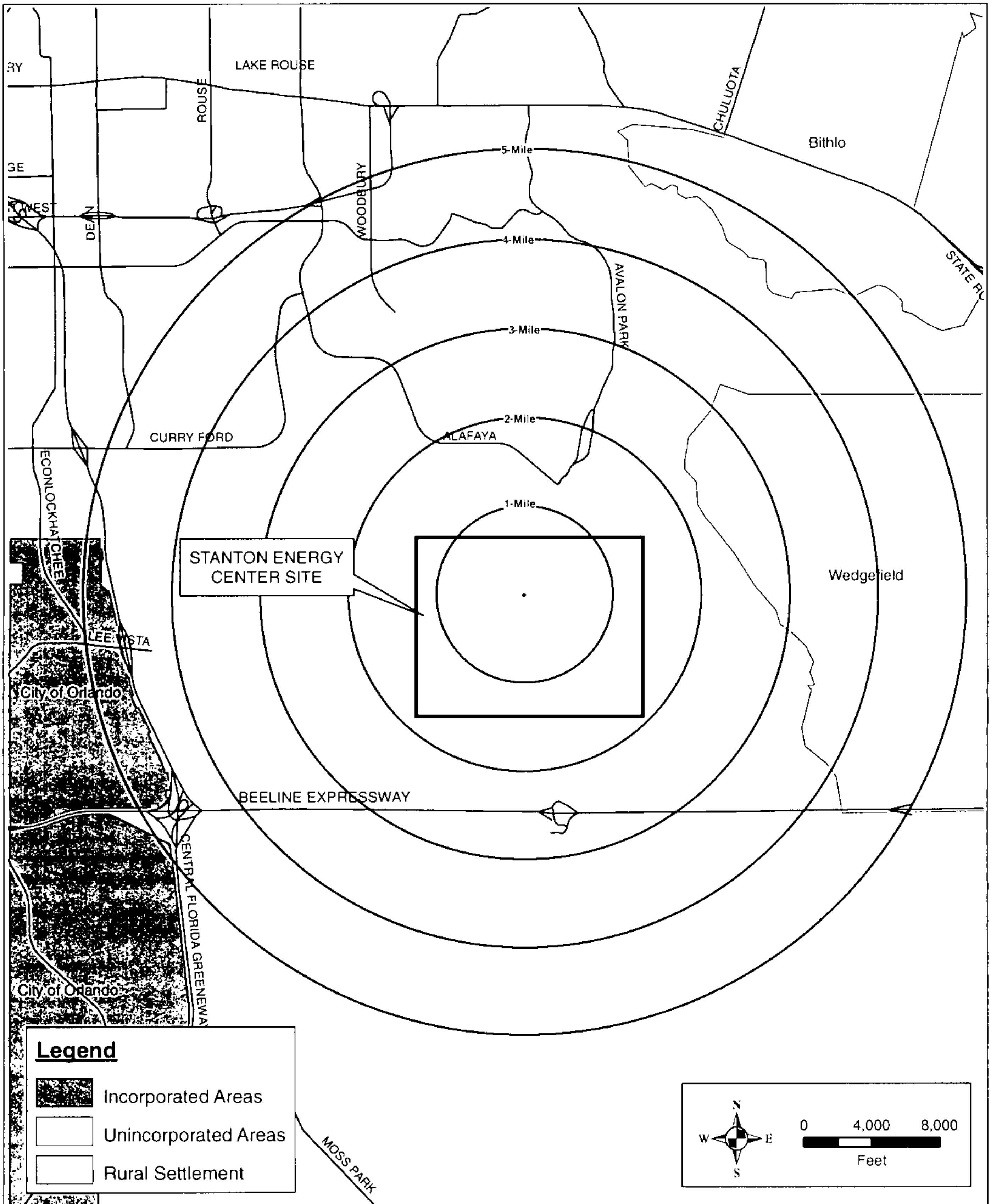

FIGURE 2.2-1.
STANTON SITE LOCATION IN RELATION TO INCORPORATED AND UNINCORPORATED AREAS

Sources: City of Orlando, FL, 2005; SJRWMD, 2005; ECT, 2005.

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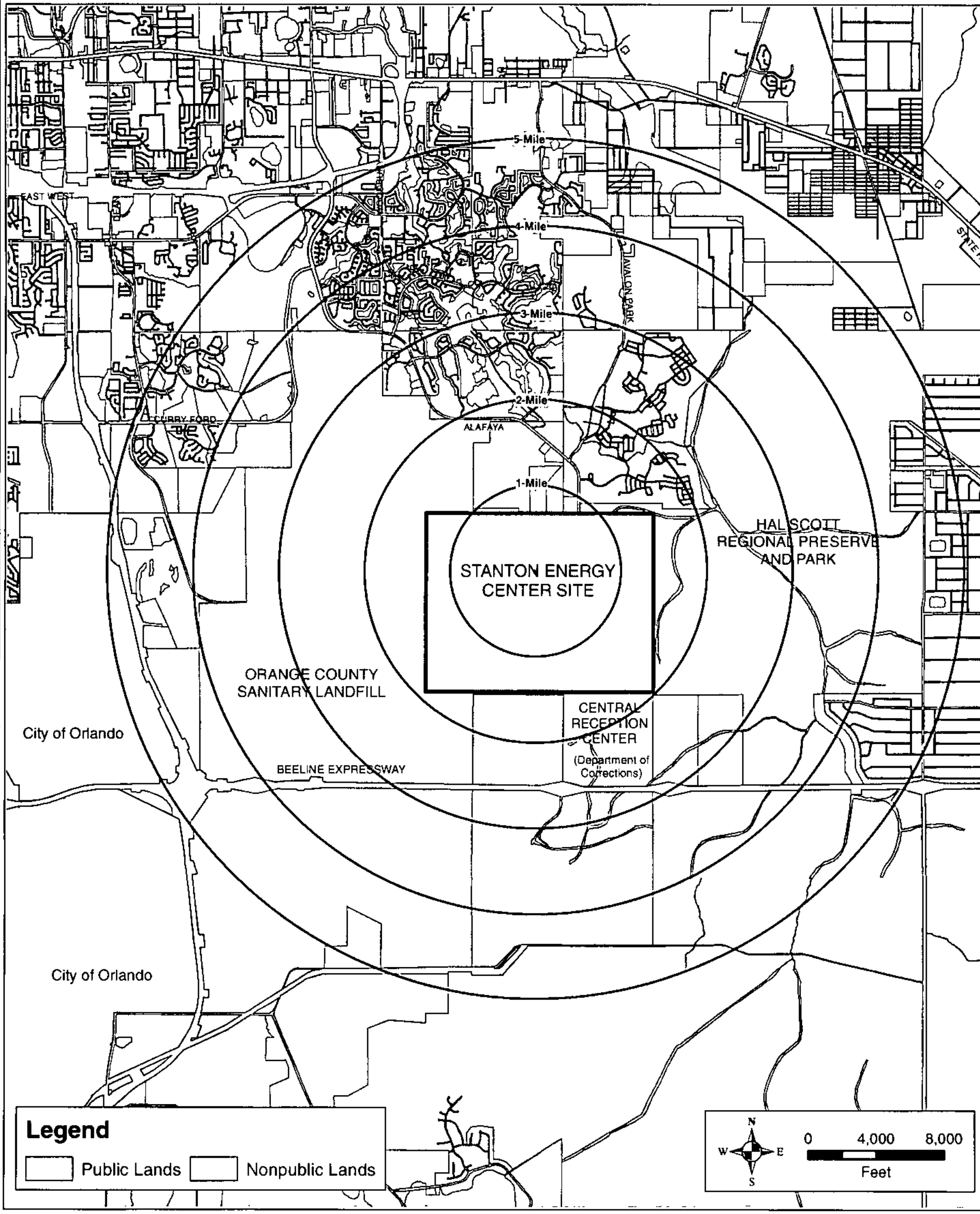

FIGURE 2.2-2.
PUBLIC LANDS AROUND STANTON SITE

Sources: Orange County, FL, 2005; ECT, 2005.

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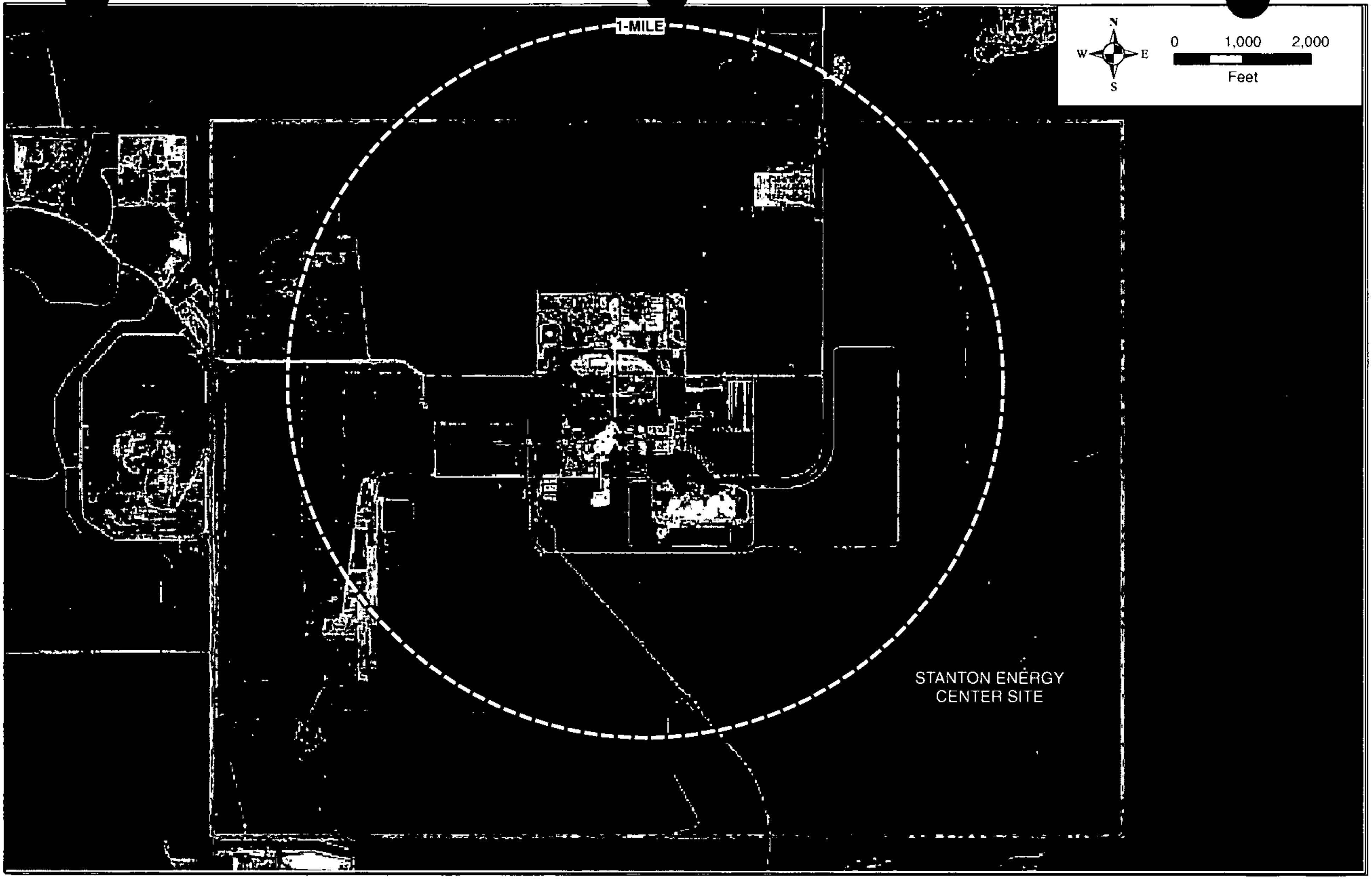

FIGURE 2.2-3.
AREA WITHIN 1 MILE OF SITE SHOWN ON 2004 AERIAL

Sources: SJRWMD Aerials, 2004; ECT, 2005.

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and the Land Development Code (LDC), respectively. Information satisfying the requirements of 62-17.121(3)(a) has been submitted in previous applications and is also summarized here.

2.2.2.1 Zoning

The entire Stanton site is zoned Farmland Rural (A-2), as shown in Figure 2.2-4. Table 2.2-1 provides the key to the remaining zoning classifications.

The Institutional land use designation, as discussed subsequently, allows for any zoning district, according to the Future Land Use Element of the Comprehensive Plan. The LDC contains a table of permitted uses, special exceptions, and prohibited uses. The table lists power plants, and, within the A-2 zoning district, power plants are identified as a *special exception* required.

A 1981 resolution by the Orange County Board of County Commissioners granted a special exception permitting the construction of the Stanton Energy Center and associated facilities within the A-2 zoning district. The special exception was applied to the entire 3,280-acre site, including future units such as Unit B.

As noted subsequently, the site is consistent with the Comprehensive Plan.

The majority of the surrounding area, including the Orange County Sanitary Landfill and the Hal Scott Preserve and Park, is also zoned A-2. The Planned Development (P-D) zoning south of the Stanton site is for the International Corporate Park. The P-D zoning to the north is the previously described Morgan P-D with primarily residential uses.

2.2.2.2 Comprehensive Plan Future Land Use Map and Element

Figure 2.2-5 depicts the portion of the Orange County Future Land Use Map (Orange County Comprehensive Plan) showing the Stanton site and vicinity. Table 2.2-2 provides the key to all of the land use designations.

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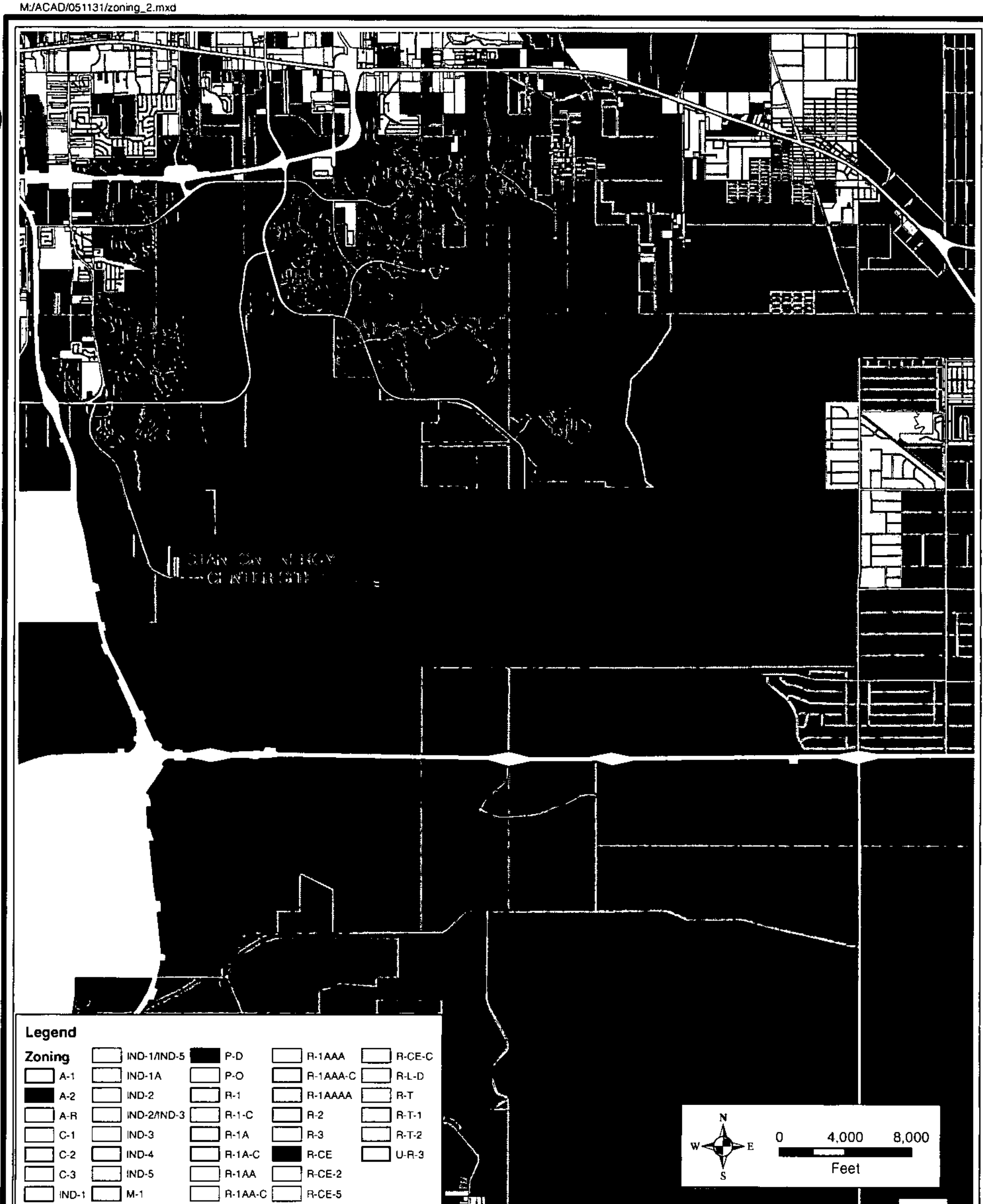

FIGURE 2.2-4.
ZONING OF STANTON SITE AND SURROUNDINGS

Sources: Orange County, FL, 2005; ECT, 2005.

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Table 2.2-1. Key to Orange County Zoning Classifications

Zoning Category	Description
Agricultural Districts	
A-1	Citrus rural
A-2	Farmland rural
A-R	Agricultural-residential district
Residential District	
R-CE	Country estate district
R-CE-2	Rural country estate residential district
R-1, R-1A and R-1AA	Single-family dwelling districts
R-1AAA and R-1AAAA	Residential urban district
R-2	Residential district
R-3	Multiple-family dwelling district
X-C	Cluster districts (where *x* is the base zoning district)
R-T	Mobile home park district
R-T-1	Mobile home subdivision district
R-T-2	Combination mobile home and Single-family dwelling district
R-L-D	Residential-low-density district
Non-Residential Districts	
P-O	Professional office district
C-1	Retail commercial district
C-2	General commercial district
C-3	Wholesale commercial district
I-1A	Restricted industrial district
I-1/I-5	Restricted industrial district
I-2/I-3	Industrial park district
I-4	Industrial district
Other Districts	
P-D	Planned development district
U-V	Urban village district

Source: Orange County Zoning Web site (Zoning Designations 2002).

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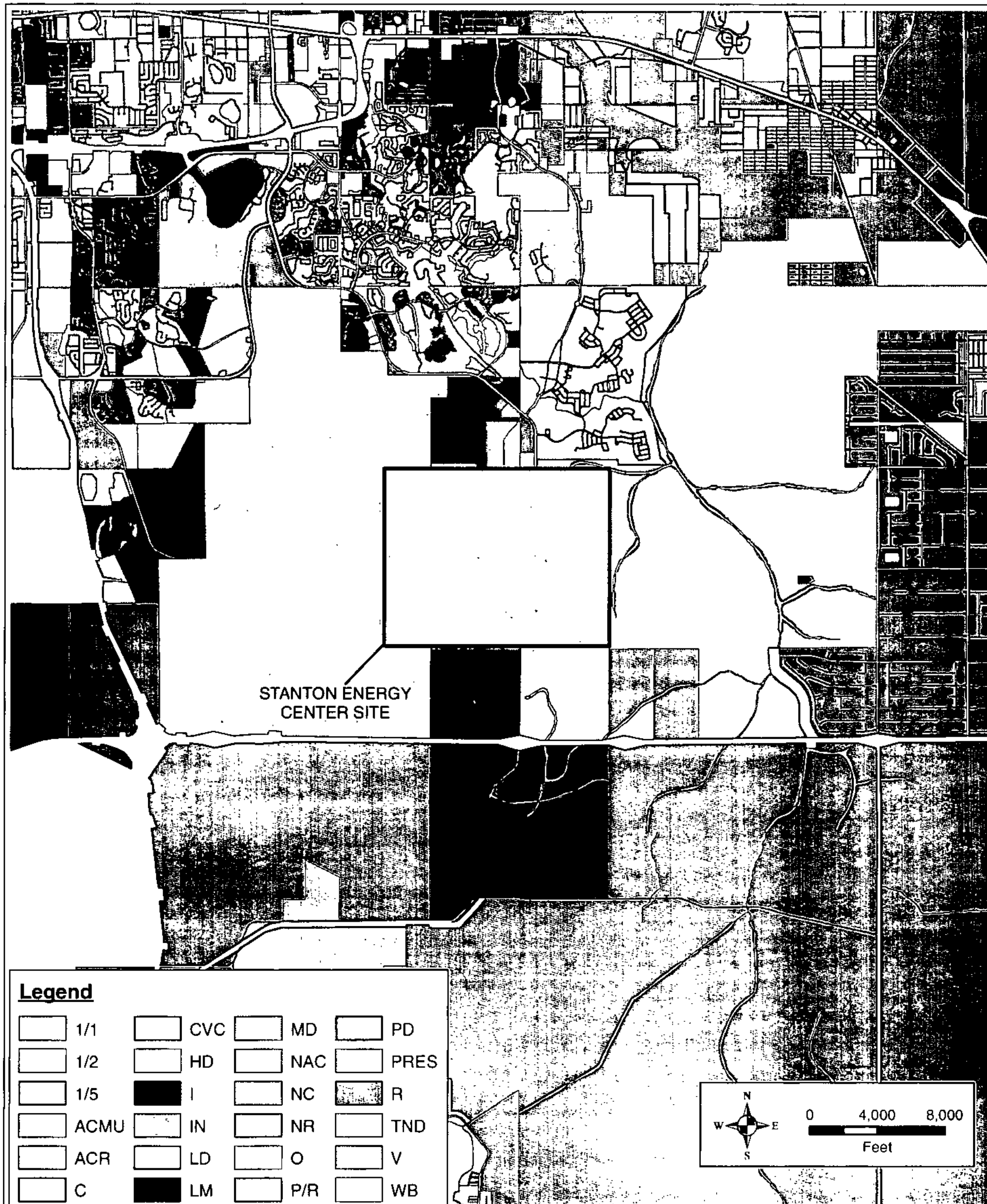

FIGURE 2.2-5.
FUTURE LAND USE AROUND STANTON SITE

Sources: Orange County, FL, 2005; ECT, 2005.

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Table 2.2-2. Key to Orange County Land Use Designations

Land Use Category	Description
LDR	Low density residential
LMR	Low-medium density residential
MDR	Medium density residential
HDR	High density residential
O	Office
C	Commercial
I	Industrial
INST	Institutional
P/R	Parks / recreation
WB	Water bodies
ACMU	Activity center mixed use
ACR	Activity center residential
RS 1/1	Rural settlement 1/1
RS ½	Rural settlement 1/2
RS 1/5	Rural settlement 1/5
R	Rural / agricultural
PD	Planned development
RSLD 2/1	Rural settlement / low density
V	Village
CVC	Community village center
TND	Traditional neighborhood development
NAC	Neighborhood activity corridor
NC	Neighborhood center
NR	Neighborhood residential

Source: Orange County Planning Web site (Future Land Use Designations 2002).

The site is within the jurisdiction of unincorporated Orange County, which has designated the entire site as Institutional. Development of the Stanton Energy Center predated the adoption of the Comprehensive Plan and the site has, therefore, always been designated as Institutional.

2.2.3 DEMOGRAPHY AND ONGOING LAND USE

2.2.3.1 Demography and Existing Populations

The 2000 Census indicated that the population of Orange County was approximately 896,000. Table 2.2-3 provides population trends for Orange County, Orlando, and the state of Florida.

Table 2.2-3. Orange County and Florida Population Trends

Area	Population 1970	Percent Change 1960 to 1970	Population 1980	Percent Change 1970 to 1980	Population 1990	Percent Change 1980 to 1990	Population 2000	Percent Change 1990 to 2000
Orange County	344,311	30.6	470,865	36.8	677,491	43.9	896,344	32.3
Orlando	99,006	12.3	128,291	29.5	164,674	28.4	185,951	12.9
Florida	6,791,418	37.2	9,746,961	43.5	12,938,071	32.7	15,982,400	23.5

Source: BEBR Statistical Abstract, 2003.

The population has been growing at a rate greater in Orange County since 1980 than in the state as a whole. Orange County is currently the fifth most populous of the 67 counties in Florida.

Table 2.2-4 provides estimates of population of the median projections prepared by the Bureau of Economic and Business Research (BEBR) at the University of Florida.

Table 2.2-4. Median Projections of Estimates of Population

Area	Population 2002	Population 2010	Population Change 2002 to 2010	Population 2015	Population 2020	Population Change 2010 to 2020	Population 2025
Orange County	896,344	1,135,000	26.6	1,252,500	1,373,300	21.0	1,491,100
Florida	16,674,608	18,978,400	13.8	20,386,900	21,807,100	14.9	23,177,700

Source: BEBR Statistical Abstract, 2003.

It is anticipated that Orange County will experience a higher growth rate than that of the state as a whole through 2020.

Table 2.2-5 provides a breakdown of the racial makeup of Florida and Orange County estimated for the year 2003 and projected for the years 2010 and 2030.

Table 2.2-5. Racial Makeup

Area	Year	Total	Non-Hispanic White	Non-Hispanic Black	Hispanic
Florida	2003	17,072,000	11,120,000	2,552,000	3,007,000
Florida	2010	19,397,000	12,176,000	2,982,100	3,750,000
Florida	2030	25,495,000	14,933,000	4,043,000	5,733,000
Orange County	2003	983,000	550,000	188,000	203,000
Orange County	2010	1,167,000	595,000	237,000	279,000
Orange County	2030	1,654,000	718,000	358,000	483,000

Source: BEBR Statistical Abstract, 2004.

Table 2.2-6 provides a breakdown of the age distribution in Florida and Orange County estimated for the year 2003 and projected for the years 2010 and 2030.

Table 2.2-6. Age Distribution

Area	Year	Less than 18	18 to 64	65 to 79	65 to 74	75 to 84	80+	85+
Florida	2003	3,857,472	10,281,729	2,072,575			859,732	
Florida	2010	4,240,098	11,730,426		1,783,758	1,133,671		509,461
Florida	2030	5,289,598	13,920,717		3,497,031	2,069,052		718,239
Orange County	2003	251,734	635,122	70,597			25,712	
Orange County	2010	294,075	757,999		62,372			15,270
Orange County	2030	403,589	1,007,813		145,989			23,043

Note: Blanks in table reflect the different age spreads used for the 2003 estimates and the future projections.

Source: BEBR Statistical Abstract, 2004.

The median age for Florida estimated in 2003 was 40.8 and in Orange County was 34.1. Orange County has the fifth lowest median age of the 67 counties in Florida. While the median age in Florida is projected to rise to 42.1 years in 2030, the median age in Orange County is projected to increase only to 35.1 years in 2030.

2.2.3.2 Existing Land Use

Existing land uses within a 5-mile radius of the site are depicted on Figure 2.2-6 (based on Level II categories of the Florida Land Use and Cover Classification System [FLUCCS]). (The land uses map is dated 2000. Given the amount of development since 2000, this map no longer presents a fully accurate picture of land use in the vicinity of the Stanton site. Figure 2.1-4, the 2004 aerial photograph of the site and vicinity, provides a more up-to-date picture of land use in the area and can be used as a supplement to Figure 2.2-6.) As shown, the developed portion of the Stanton site that houses the power generating facilities is classified as an *electric power facilities* land use, except for the manmade ponds, which are classified as *reservoirs*.

Land use to the east is public land in the Hal Scott Preserve and Park, then the unincorporated, low-density residential area known as Wedgefield. Immediately south of the southeastern portion of the site is the Florida Department of Corrections Central Florida Reception Center. This facility has three units (Main, East, and South) with a total capacity of 2,520 inmates. South and southeast of the Stanton site is undeveloped land, both north and south of the BeeLine Expressway. A significant portion of this land is the planned development known as International Corporate Park. To the west of the site is the Orange County Landfill. Further west to State Road (SR) 417 is primarily undeveloped land. Immediately north of Stanton is more undeveloped land known as the Morgran Planned Development. Although shown as rural agriculture on the 1997 land use map, single-family residential developments are located further to the north, primarily east of Alafaya Trail, the closest of which is Avalon Park. Commercial development is located in the vicinity of the intersection of Alafaya Trail and SR 408, approximately 8 miles to the north of the site.

Avalon Park, located northeast of the site, is an approved development of regional impact (DRI). Approved land uses include 4,831 dwelling units, 221,710 gross square feet (gsf) of office use, 221,260 gsf of commercial use, 185,000 gsf of industrial use, 300 hotel

Legend

- 11: Residential, low density - less than 2 dwelling units/acre
- 12: Residential, medium density - 2-5 dwelling units/acre
- 13: Residential, high density - 6 or more dwelling units/acre
- 14: Commercial and services
- 15: Industrial
- 16: Extractive
- 17: Institutional
- 18: Recreational
- 19: Open land
- 21: Cropland and pastureland
- 22: Tree crops
- 23: Feeding operations
- 24: Nurseries and vineyards
- 31: Herbaceous upland nonforested
- 32: Shrub and brushland (wax myrtle or saw palmetto, occasionally scru
- 33: Mixed upland nonforested
- 41: Upland coniferous forests
- 42: Upland hardwood forests
- 43: Upland mixed forest
- 44: Tree plantations
- 51: Streams and waterways
- 52: Lakes
- 53: Reservoirs - pits, retention ponds, dams
- 61: Wetland hardwood forests
- 62: Wetland coniferous forests
- 63: Wetalnd forested mixed
- 64: Vegetated non-forested wetlands
- 74: Disturbed land
- 81: Transportation
- 82: Communications
- 83: Utilities

N W E S

0 4,000 8,000
Feet

FIGURE 2.2-6.
EXISTING LAND USE ON STANTON SITE AND SURROUNDINGS AS OF 2000

Sources: SJRWMD, 2005; SFWMD, 2005; ECT, 2005.

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rooms, and an elementary school and a middle school. The original build out date for this DRI was 2007. This date has been extended by almost 5 years. As of the most recently published Annual Report (East Central Regional Planning Council, 2003 & 2004 Biennual DRI Status Report), subdivision plan and site development approvals have been granted to all of the proposed 3,400 single-family units, 299 of the proposed 1,431 multifamily units, and 176,620 gsf of the proposed 626,970 gsf of the proposed commercial/office use.

2.2.3.3 Proposed Development and Projected Land Uses

A substantial portion of the surrounding area is either fully developed, approved for development, or cannot be developed. The property to the east, northeast, and southeast of the Stanton site is the Hal Scott Preserve and Park. Only recreational uses are allowed within this Preservation/Recreation area. There are no known plans to expand the Department of Corrections facility located to the south of the site. The western adjacent property is the Orange County Sanitary Landfill. Landfilling activities are anticipated to continue for at least the next 15 years.

To the south of the Stanton site is the proposed International Corporate Park, which is an approved Planned Development with uses of 12,188,994 gsf of industrial/office, 240,500 gsf of retail/service, and 321 hotel rooms. Recently, changes have been proposed to change the mix of approved uses to add residential and a civic facility. The proposed plan is 4,446,700 gsf of industrial use, 410,000 gsf of retail/service use, 320 hotel rooms, 3,440 dwelling units, and 10,000 gsf of civic use. According to the Orange County Planning Department (Planner of the Day, 2006) the proposed change in land use mix has been submitted as a substantial deviation to the approved Development of Regional Impact (DRI). There are hearings pending before the Planning Commission and the Board of County Commissioners to approve the proposed changes.

The undeveloped land located north of the Stanton site is known as the Morgran Planned Development comprising approximately 505 acres. Approved in 2004, the proposed land uses are 379 single-family units, 496 townhomes, 670 multifamily units, and 120,000 gsf of commercial use. There are also designated wetlands, parklands, and upland buffers.

An extension of Avalon Park Boulevard (known as Innovation Way) to connect, as a four-laned roadway, to SR 528 is scheduled for construction in fiscal years 2006 through 2008 with completion in mid-2008 (see also Section 2.2.7).

2.2.4 EASEMENTS, TITLE, AGENCY WORKS

The entire 3,280-acre Stanton Energy Center site is owned by OUC. The proposed Unit B IGCC facilities will be contained within the existing site. No additional easements or rights-of-way will be required.

2.2.5 REGIONAL SCENIC, CULTURAL AND NATURAL LANDMARKS

There are no onsite regionally significant scenic, cultural, or natural landmarks. The Natural Resources of Regional Significance Public Lands and Resource Management Areas map prepared by the East Central Florida Regional Planning Council (1998) identifies the Stanton Energy Center as Other Public Lands. Offsite, the Department of Corrections Central Florida Reception Area adjacent to the southeast is also identified as Other Public Lands. Adjacent to the site is the Hal Scott Regional Preserve and Park identified as Water Management District Owned Lands. The web site for this park (http://www.orangecountyfl.net/dept/cesrvcs/parks/ParkDetails.asp?parkid=17), which is managed by the St. Johns River Water Management District (SJRWMD), lists the amenities as including hiking trails, access to the scenic shoreline of the Econlockhatchee River, and wildlife viewing. Other maps prepared by the East Central Florida Regional Planning Council as part of the Strategic Regional Policy Plan are Surface Water Resource areas, Habitat Areas, and Ground Water Resource Areas. The only wetlands (surface water resources) depicted onsite are a portion of Hart Branch in the northeastern portion of the Stanton site and an unnamed wetland in the southwestern undeveloped portion of the site. No regionally significant habitat areas are depicted onsite.

The following areas are *not* found within a 5-mile radius of the site:

- National parks.
- National forests.
- National seashores.
- State parks.
- State forests.
- National memorials or monu-

- Military lands.
- Roadless area review and evaluation (RARE) areas.
- National wild and scenic rivers.
- Scenic and wild rivers.

ments.

- Areas of critical state concern.
- National marine and estuarine sanctuaries.
- Indian reservations.

2.2.6 ARCHAEOLOGICAL AND HISTORIC SITES

According to a recent review of the Florida Master Site File (TRS Search, 2005; Division of Historical Resources letter, 2005), there are four previously recorded archaeological sites and no historical structures located within the boundaries of the Stanton site. Two additional sites are located just offsite. None of the listed sites are located in the developed portion of the site. The sites are located in the forested buffer that is to remain undisturbed.

In March 1981, in association with construction and operation of Unit 1, personnel from the Florida Secretary of State, Division of Archives, History, and Records Management, conducted an archaeological and historic survey of the property. The four previously mentioned prehistoric archaeological sites and one historic hunting lodge from about the early 20th century were found during the surveys. This lodge is located just off Stanton property near the southwestern corner. The Division of Archives, History, and Records Management concluded that the sites represented no significant archaeological or historical resources, and construction of the original Stanton units within the certified area would not adversely impact any significant archaeological or historical resources (OUC, 2001). It has also been confirmed that the area within which the Unit B transmission interconnection will be constructed is clear of any known archaeological or historic resources (Florida Department of Historical Resources [FDHR], 2006).

2.2.7 SOCIOECONOMICS AND PUBLIC SERVICES

2.2.7.1 Social and Economic Characteristics

Employment and Income

The Florida Statistical Abstract (BEBR, 2003) provides employment and economic information at the county level. Orange County had an anticipated labor force of 538,261 in

2002. Unemployed persons in 2002 totaled 28,860 for an unemployment rate of 5.4 percent. The unemployment rate in 2001 was 4.0. The statewide unemployment rate in 2002 was 5.5 percent and 4.8 percent in 2001. The total number of Orange County jobs was 658,746 in 2001, indicating the county imports workers from surrounding counties. Major industries in terms of employment in Orange County in 2002 were as follows:

Industry	Number of Persons Employed	Percent of Total Persons Employed
Accommodation and food services	75,759	19.0
Government	64,788	16.3
Retail trade	59,793	15.0
Arts, entertainment, and recreation	53,555	13.4
Health care and social assistance	49,887	12.5
Professional, scientific, and technical services	37,150	9.3
Manufacturing	29,139	7.3
Construction	28,617	7.2

Per capita personal income in Orange County in 2001 was $27,257 compared to the Florida and national per capita figures of $29,048 and $30,413, respectively. The differences between nonfarm per capita income to the Florida and national averages was comparable: $27,175 versus $28,936 and $30,273, respectively. Per capita transfer payments (income maintenance, unemployment insurance, retirement, and dividends) in 2001 were lower in Orange County than in Florida or the nation: $2,948 versus $4,109 and $3,748, respectively.

Housing

The 1980 Census indicated that there were a total of 183,373 housing units in Orange County. The 1990 Census indicated an increase to 282,686 total units, and the 2000 Census indicated a total of 361,349 units. From 1980 to 2000 the rate of increase in units was, thus, 97 percent (that is, the number of units almost doubled during that 20-year period). The following information appears in the Housing Element of the Orange County Comprehensive Plan or the 2000 U.S. Census providing a breakdown of housing types:

Housing Type	1970	Percent	1980	Percent	1987	Percent	2000	Percent
Single-family	89,043	76	119,677	65	149,538	62	227,164	63
Multifamily	22,139	19	51,300	28	77,181	32	113,310	31
Mobile home	5,779	5	12,196	7	14,471	6	20,068	6

In 1980, 62 percent of the housing units were owner-occupied. The corresponding percent for 2000 is 60.7 percent. Household size has decreased from 2.67 in 1980 to 2.61 in 2000. The Orlando metropolitan area continues to add housing stock at a rapid pace. In 1999, 16,368 residential units were started. In 1999, more than 113,000 rental apartments existed in the greater Orlando area, with 6,103 units vacant. There are more than 188,000 (2000 to 2001) listed hotel rooms in the greater Orlando area due to its vacation destination status. The median price of a home in Orlando was $112,500 in 1999, less than the national average of $175,400. The median monthly rent in greater Orlando in 1999 for a two-bedroom unit was $680 per month and $695 in eastern Orange County.

2.2.7.2 Area Public Services and Utilities

Orange County has prepared an online service known as Info Map, an interactive mapping site that provides pertinent information for locating public services (http://www.orangecountyfl.net/cms/BUSINESS/gis/default.htm). This online service and a reconnaissance of the area were used to compile the following information unless otherwise indicated.

Education

According to the Orange County School Board Web site (http://www.ocps.k12.fl.us/), there are 108 elementary schools, 29 middle schools, and 17 high schools in the school district. There are also three kindergarten through 8th grade schools, six ninth grade centers, four technical education centers, 24 alternative education facilities, and five exceptional education facilities. Figure 2.2-7 shows the schools closest to the Stanton Energy Center site.

The Web site also provides a map for the proposed schools and school sites. A review of this map indicates that there are no proposed schools within approximately 3 miles of the Stanton site boundaries.

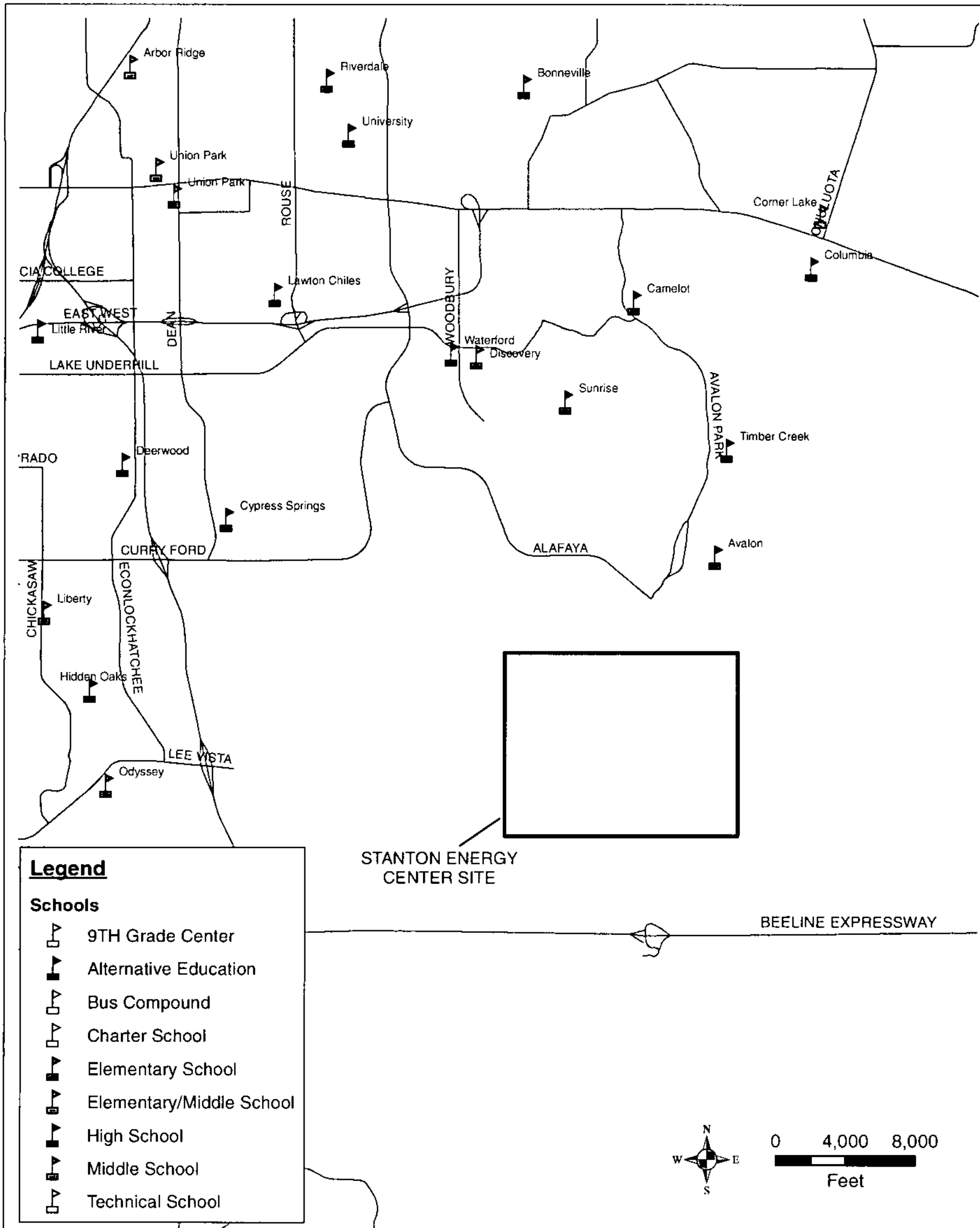

FIGURE 2.2-7.
SCHOOLS IN THE VICINITY OF THE STANTON SITE

Sources: Orange County, FL, 2005; ECT, 2005.

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Hospitals

The nearest hospital to the Stanton site is Florida Hospital East Orlando located at 7727 Lake Underhill Road, approximately 10.9 miles from the entrance to the site. This facility is a 144-bed full-service community hospital with more than 900 employees. There is a 24-hour emergency department. The Orlando Regional Medical Center, a 517-bed tertiary care center, is located approximately 17 miles from the site, and the 881-bed acute care community hospital, Florida Hospital Orlando, is located approximately 21 miles away.

Police and Fire Protection

Police protection is provided by the Sector 2 Substation of the Orange County Sheriff's Department located at 15244 East Colonial Drive, approximately 9 miles from the entrance of to the Stanton site. As of March 2005, a total of 65 sworn deputies were assigned to this substation (Hanley, 2005).

Fire protection is provided by the Orange County Fire Rescue Department. The nearest station is Station 85, located at 13801 Townsend Drive, approximately 1.8 miles from the entrance to the Stanton site. Both engine and rescue vehicles are assigned to this station. There are six firefighters assigned to this station. Additional responding stations include Station 83 located at 11950 Lake Underhill Road, approximately 5.6 miles from the site, and Station 80 at 1841 Bonneville Drive, approximately 8.4 miles from the Stanton site. Hazardous materials (Hazmat) facilities are located at Station 83.

Parks and Recreation

There is no public use of the Stanton Energy Center site itself. The only public recreation facility depicted in proximity to the site is the Hal Scott Preserve and Park located adjacent and to the east. This 9,000-acre regional park and preserve offers wildlife viewing and recreational activities, including hiking, horseback riding, bicycling, fishing, picnicking, and primitive camping.

The Orange County Parks and Recreation Department operates 93 parks, facilities, and trails. In the southeastern portion of Orange County where the Stanton site is located, there are 17 of these facilities. Except for the adjacent Hal Scott Reserve, none of these facilities are located within 5 miles of the location of the proposed IGCC unit stack.

Utilities

The Stanton site does not utilize Orange County public water or wastewater services. The nearest wastewater treatment and reclaimed water plant is located at 1621 South Alafaya Trail, approximately 3.4 miles from the site entrance. There is a 30-inch diameter reclaimed water line that supplies treated effluent to Stanton. The nearest water treatment plant is located at 9150 Curry Ford Road (approximately 9 miles from the Stanton site entrance) and is known as the East Regional Facility.

The Stanton site is located immediately adjacent to the east of the Orange County Sanitary Landfill. This facility is approximately 4,800 acres in size and is both a Class I and Class III landfill. According to the Solid Waste Element of the Orange County Comprehensive Plan (Orange County Comprehensive Plan), it is estimated that there is sufficient landfill capacity to last until 2020. The landfill receives approximately 3,800 tons of trash per day from 600 to 700 truck deliveries.

Transportation Infrastructure

Roads

Figure 2.2-8 shows the network of roads and streets in the immediate vicinity of the Stanton. As shown, the primary routes of access to the Stanton site are currently via: (a) Alafaya Trail from either Highway 408 (East-West Expressway) or Curry Ford Road, and (b) Avalon Park Boulevard from Highway 50 (Colonial). The Stanton site has limited access to the south to the interchange of H.C. Kelley Road and the BeeLine Expressway.

Alafaya Trail is classified as a minor arterial in the Orange County functional classification system. According to the 2003 annual count report prepared by the Orange County Traffic Engineering Department, the annual average daily traffic on the link of Alafaya Trail from Curry Ford Road to the Stanton site was 24,775, and the p.m. peak hour count was 1,971 with 999 of these trips in the northbound direction. According to the Orange County Traffic Engineering Department, the portion of Alafaya Trail that provides access

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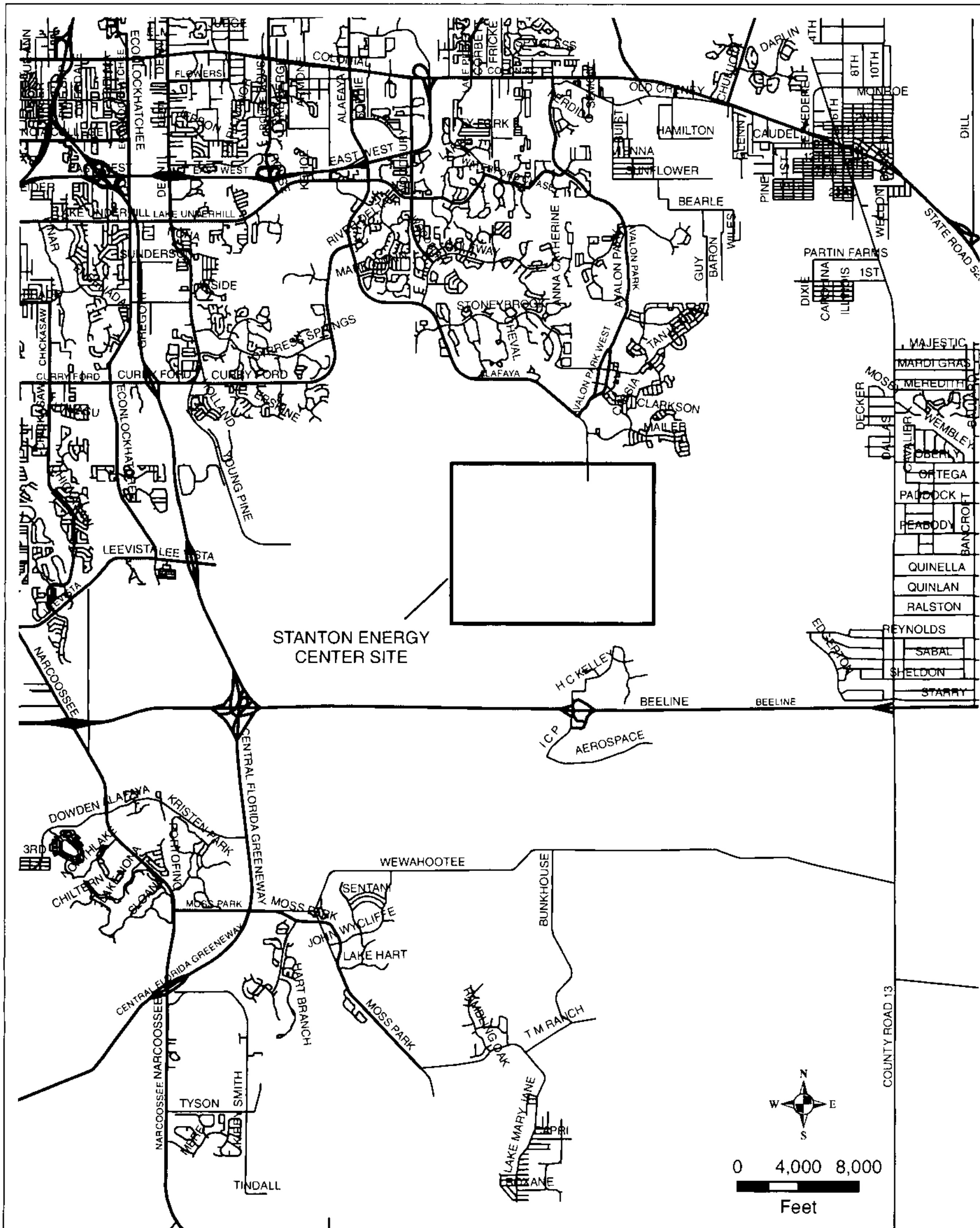

FIGURE 2.2-8.
ROADS AND STREETS IN VICINITY OF STANTON SITE

Sources: Orange County, FL, 2005; ECT, 2005.

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to the Stanton site (Curry Ford Road to Curtis Stanton Energy Center) is operating at level of service "F", the lowest possible rating. Alafaya Trail to the north provides direct access to SR 408, a toll road, and Curry Ford Road, which connects to another toll road, SR 417.

This current level of service on Alafaya Trail and the approved future development in the area are major reasons for two planned road improvement projects. First, the Public Works Department Roadway Program Capital Improvement Program includes funding for the construction of a four-lane extension of Avalon Park Boulevard westward and southward to form a new interchange with the BeeLine Expressway (Orange County Comprehensive Plan, 2002). The new road has variously been referred to as the Alafaya Trail extension and the Avalon Park Boulevard extension, but will be known as Innovation Way.

Figure 2.2-9 shows the planned route for the project. This new roadway will be approximately 4.8 miles in length. Over two miles of that proposed route will border on or cross OUC's Stanton property. As can be seen, the new road will parallel the northern boundary of the Stanton site, traverse diagonally across the site's northwest corner, then skirt the west side of the property continuing southward to and beyond the BeeLine. The exact configuration of the interchange with the BeeLine is uncertain at present.

Orange County has entered into an agreement with the owner of the proposed development (known as International Corporate Park) to complete Innovation Way within 24 months of the receipt of the applicable permits and construction documents or the conveyance of required right-of-way to the County (OCBCC, 2001). Innovation Way is planned for construction by the County to commence in mid-2006 (Kunkel, 2006). Thus, given 24 months for construction, completion of the project should occur by mid-2008. The Stanton power plant's access to Innovation Way will be to the north via Alafaya Trail at a new signalized intersection of the two roads; this access will differ little from the existing situation.

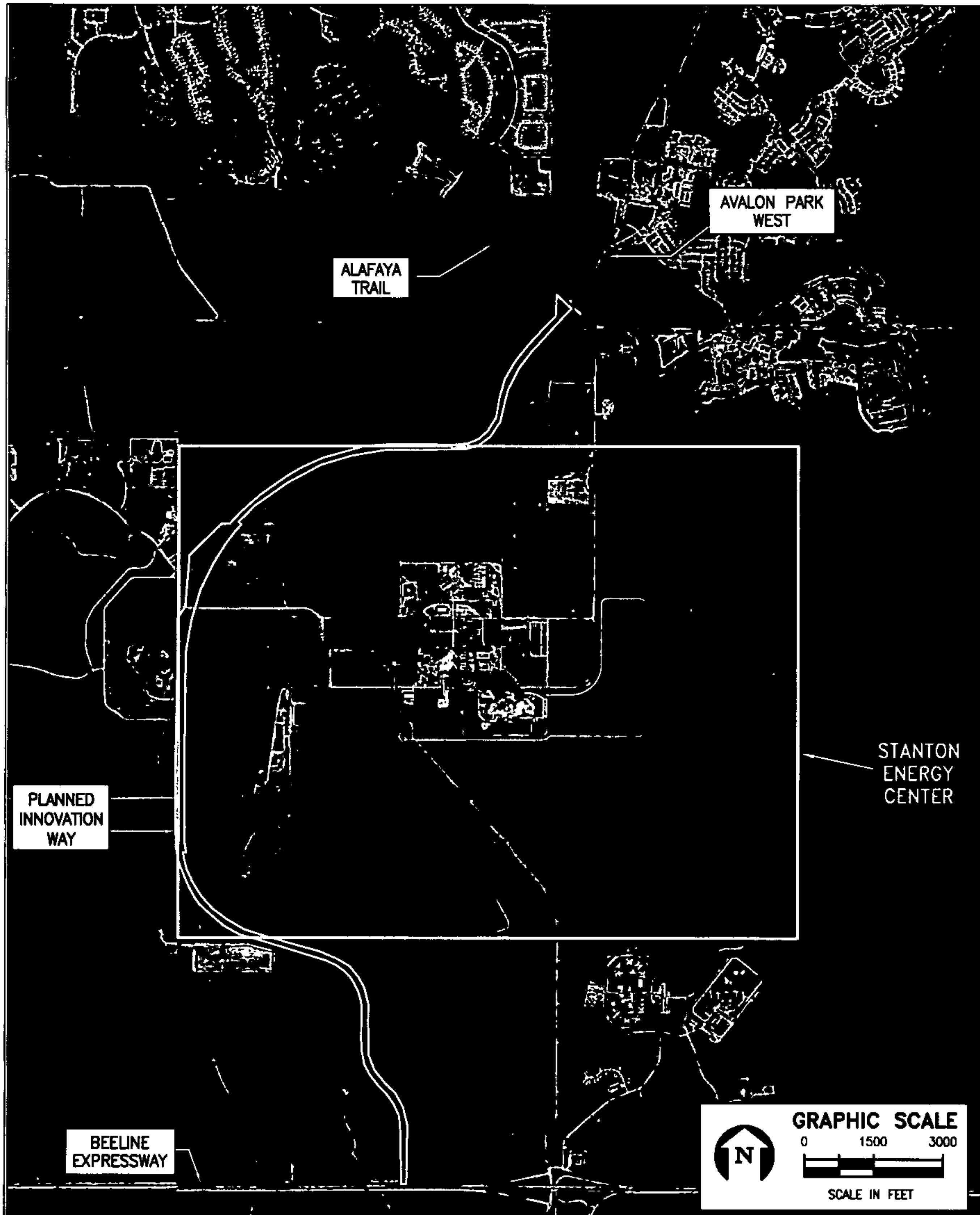

FIGURE 2.2-9.

PLANNED ROUTE OF INNOVATION WAY

Sources: SJRWMD 2004 aerials; BDA, 2002; OUC, 2005; ECT, 2005.

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Second, the Orange County Board of County Commissioners recently agreed to expedite the planned widening of Alafaya Trail from the existing two-lane configuration to four lanes from Avalon Park Boulevard northward to Curry Ford Road. Funding will include the advancement of impact fees from the planned development of two approved mixed-use projects (Avalon Park and Morgran) located near the current terminus of Alafaya Trail. Completion of the roadway widening project by 2009 or 2010 is planned.

Railroads

A rail spur owned by OUC currently serves the Stanton site. The rail spur is used to deliver coal to the existing Units 1 and 2. At this time, the rail cars exit the plant site empty. There are currently five deliveries of coal in a typical week, which represent less than 3 percent of overall rail traffic in the Orlando area.

2.3 BIOPHYSICAL ENVIRONMENT

Section 2.3 presents information to characterize the existing biophysical environment of the Stanton Energy Center site and vicinity. This characterization provides the baseline from which impacts are assessed. Per the FDEP instructions, this section includes the following subsections:

- 2.3.1—Geohydrology.
- 2.3.2—Subsurface Hydrology.
- 2.3.3—Site Water Budget and Area Users.
- 2.3.4—Surficial Hydrology.
- 2.3.5—Vegetation/Land Use.
- 2.3.6—Ecology.
- 2.3.7—Meteorology and Ambient Air Quality.
- 2.3.8—Noise.
- 2.3.9—Other Environmental Features.

These subsections include relevant existing information and the results of field data collection and analyses conducted specifically for the Stanton Unit B project. As noted previously, substantial information on the site's biophysical environment exists in the SCAs for Units 1 and 2 and Unit A.

2.3.1 GEOHYDROLOGY

This section describes the general geology of Orange County, including the area of the Stanton energy Center. The geologic stratigraphy, lithology, structures, and physiography are presented in this section. Additional information is provided in Section 2.3.2.

2.3.1.1 Geologic Description of Site Area

The Stanton Energy Center site lies within the physiographic boundary identified as the Osceola Plain, bordered on the east by the Eastern Valley and on the west by the Mount Dora and Orlando Ridges (Figure 2.3-1). The Osceola Plain is generally nearly level and varies from undulating to nearly flat with few shallow depressions.

The Osceola Plain is located in the central geomorphic zone of the Florida section of the Coastal Plain province. The central zone may be characterized as having discontinuous highlands forming subparallel ridges separated by broad valleys, all roughly paralleling the present coastline. The dissolution of limestone and the marine processes are the dominant forces responsible for the development of the surface features observed in this region (U.S. Department of Agriculture [USDA] Soil Conservation Service [SCS], 1989.).

Numerous depressions are present within the region. The depressions are the result of longshore current modifications of former sandbars or may have developed from solution action begun in depressions formed by hurricane winds and water. Some contain cypress trees and some contain water during the rainy seasons.

Regional geology for this area consists of recent and Pleistocene Age undifferentiated surficial deposits underlain by the Miocene Age Hawthorn Group underlain by Eocene Age limestone deposits. Figures 2.3-2 and 2.3-3 present a geologic map and a generalized geologic cross section of Orange County, respectively.

According to Lichtler *et al.* (1968), the county is underlain by marine deposited beds of sand, silt, clay, limestone, dolomite, and shale to approximately 6,500 ft bls. The upper

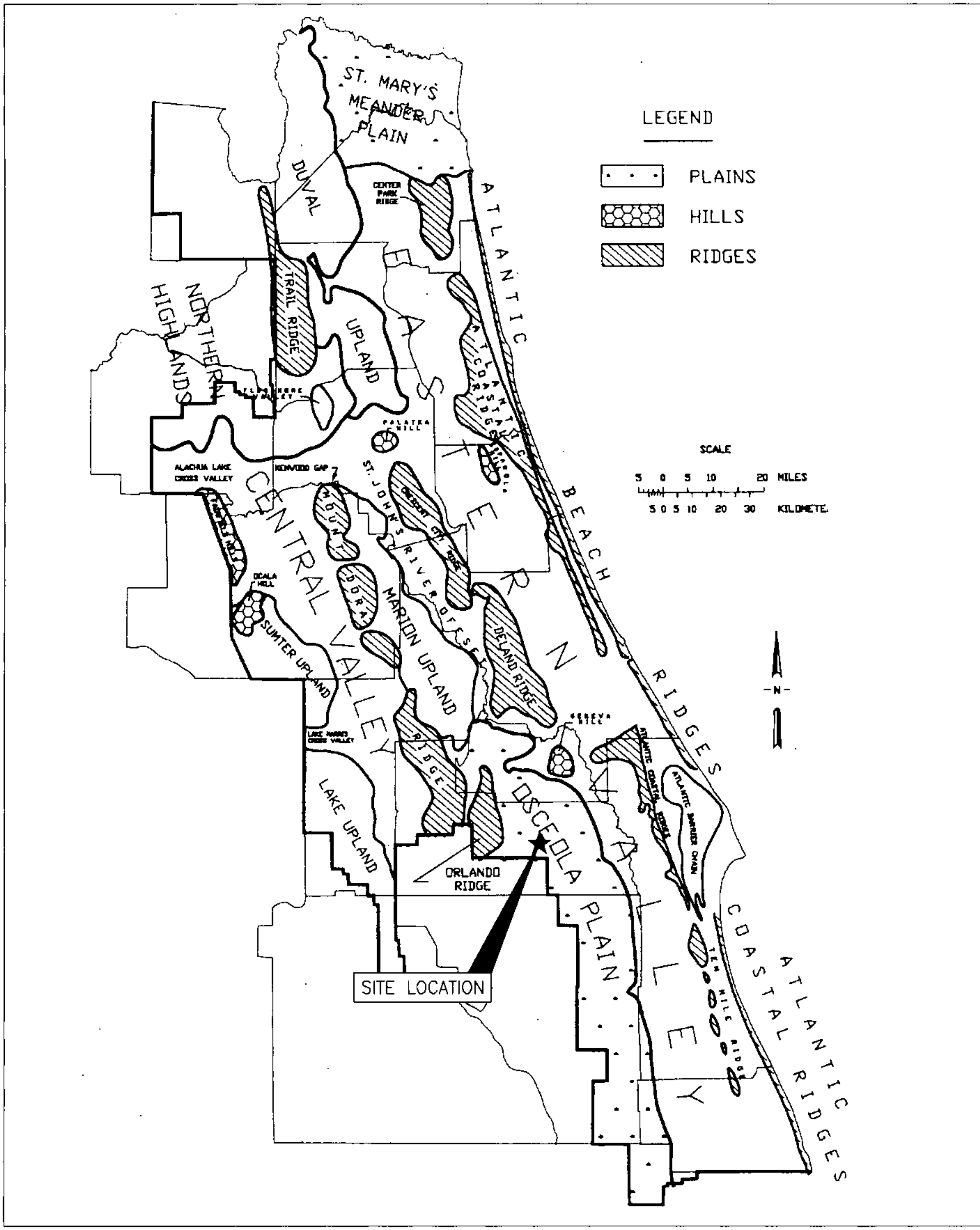

FIGURE 2.3-1.

GEOMORPHOLOGIC FEATURES OF ST. JOHNS RIVER MANAGEMENT DISTRICT

SOURCE: White, 1970; Florida Geological Survey; ECT, 2005.

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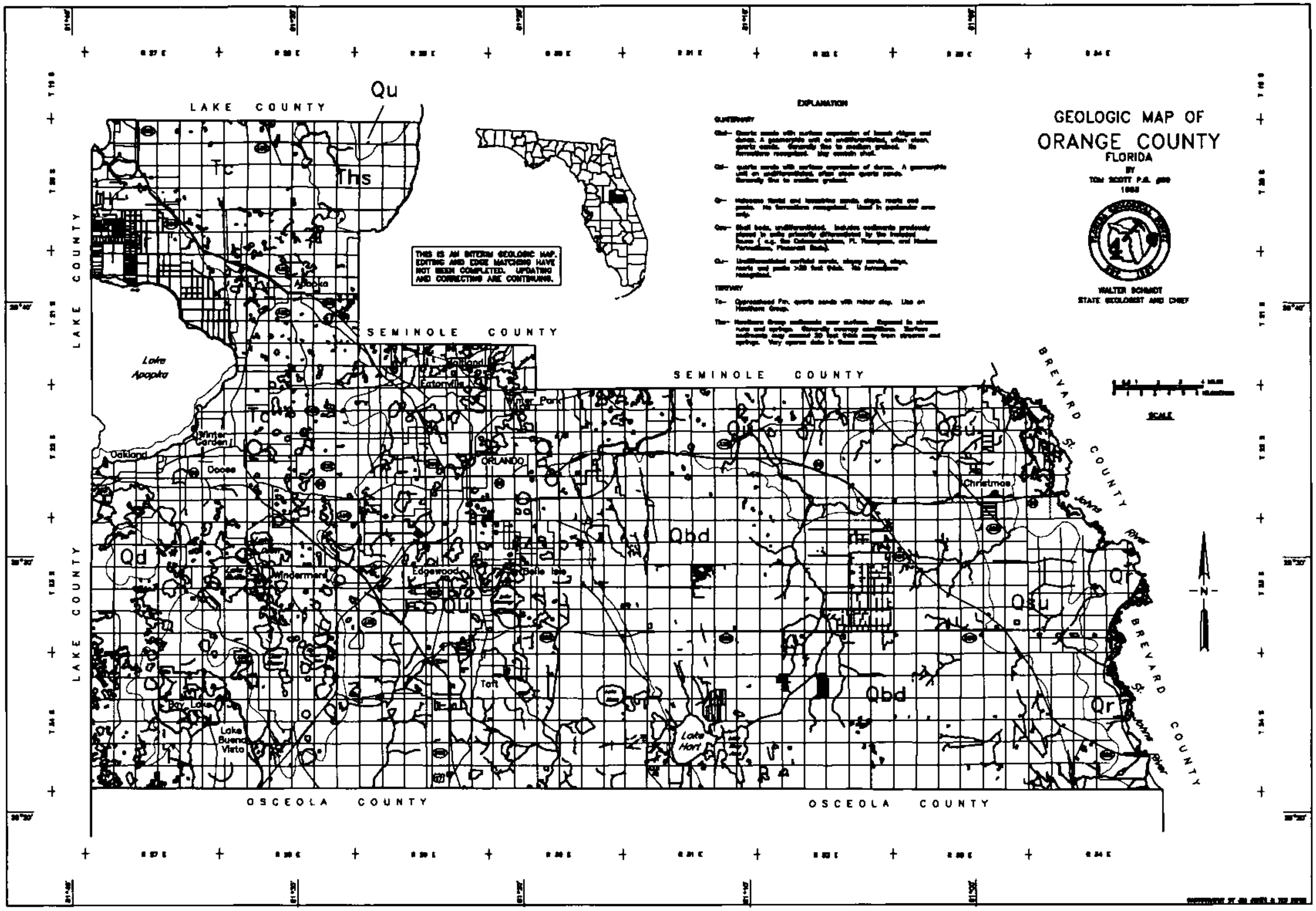

FIGURE 2.3-2.

GEOLOGIC MAP OF ORANGE COUNTY

Source: Florida Geological Survey, 1993; ECT, 2005.

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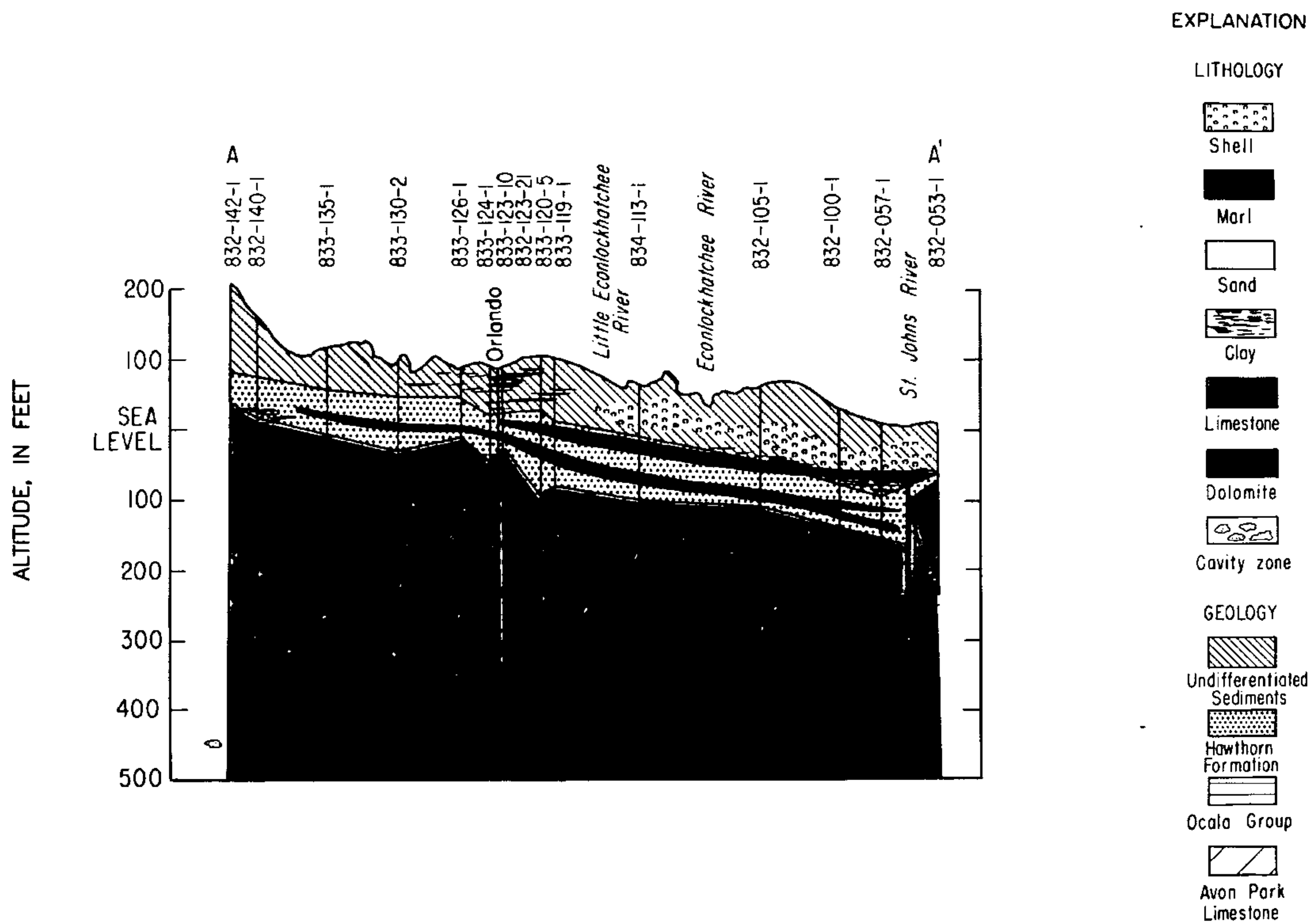

FIGURE 2.3-3.
GEOLOGIC CROSS-SECTION OF ORANGE COUNTY

Source: W. F. Lichtler, 1968; ECT, 2005.

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most unit is Pleistocene to Recent in age and generally composed of unconsolidated, very fine to medium-grained quartz sand with some clays. Within the site vicinity, this unit is approximately 35 ft thick, below which the sands become more course and clayey.

The Pleistocene and Recent Age sediments are underlain by the Hawthorn Group of Miocene Age (approximately 25 million years old). In general, the Hawthorn Group is highly variable and diverse, including interbedded and interfingered sand, clayey sand, sandy-clayey phosphatic sediments, dolomite, and limestone (USDA SCS, 1989). According to Lichtler *et al.* (1968), Orange County lies in a transitional zone between the limestone-clay type of Hawthorn within north-central Florida, and the clay-sand Hawthorn of south-central Florida. In the vicinity of the site, the top of the Hawthorn Group is estimated to occur at 35 ft bls. Lichtler stated that in Orange County the contact between the top of the Hawthorn and the overlying deposits is gradational, but the lower contact with the Eocene limestone is quite distinct.

The Miocene age sediments are underlain by a thick sequence of late Eocene Age limestone formations known as the Ocala Group. It is described as gray clay and gravel to white, soft limestone.

The Ocala Group Limestone is underlain by the Avon Park Limestone, which is also of Eocene age. This formation is composed of similar materials, but distinguished from overlying units by the occurrence of sand-sized, cone-shaped foraminifera. The formation is usually tan in color but can range from chalky white to light brown or ashen gray.

The Lake City Limestone of middle Eocene Age underlies the Avon Park Limestone. It is similar in lithology and water-bearing properties to the Avon Park Limestone and makes up the bottom portion of the Floridan aquifer.

2.3.1.2 Detailed Site Lithologic Description

The site-specific geologic information was obtained from borings advanced at various locations on and around the Stanton site during a number of previous investigations (e.g., licensing studies for the existing units). These investigations included soil borings, installation of shallow piezometers, soil resistivity tests, and laboratory tests on selected samples. Soil borings were advanced to depths ranging from 25 to 265 ft bls. The subsurface investigations indicated that soils are predominantly loose to medium dense sands with intermittent, discontinuous thin clay layers. The detailed data collected during the previous subsurface investigations and submitted in support of the license applications for existing units are available upon request.

The strata beneath the site to a depth of approximately 200 ft are divided into five stratigraphic layers: a surficial sand layer, intermediate cohesive layer, lower sand layer, lower cohesive layer, and limestone bedrock. Figures 2.3-4 and 2.3-5 provide stratigraphic cross-sections.

The surficial sand layer consists of a heterogeneous arrangement of loose to dense, gray to brown sand, silty sand, and clayey sand, with an intermittent thin clay layer. This surficial layer varies in thickness from 32 to 71 ft. The granular soil is generally fine-grained above elevation 46 ft-msl, grading to medium- and coarse-grained with occasional shell fragments below that elevation. An intermittent cohesive layer of soft to stiff, gray, highly plastic clay and sandy clay, less than 4 ft thick, was encountered at depths between 32 and 35 ft.

Underlying the surficial sand layer is an intermediate cohesive layer of soft to stiff, gray to brown highly plastic clay, sandy clay, and silty clay, with occasional shell fragments. The layer was encountered at a maximum elevation of 58 ft-msl and a minimum elevation of 3 ft-msl, varying in thickness from 4 to 15 ft. This intermediate cohesive layer is not continuous under the Stanton site, since it was absent in some of the borings.

The intermediate cohesive layer is underlain by a lower sand layer of loose to dense, white, gray, and olive, fine- to coarse-grained, poorly graded sand, silty sand, and clayey sand. This layer was encountered at elevations ranging from -1 to 17 ft-msl, with a thickness varying from 78 to 81 ft.

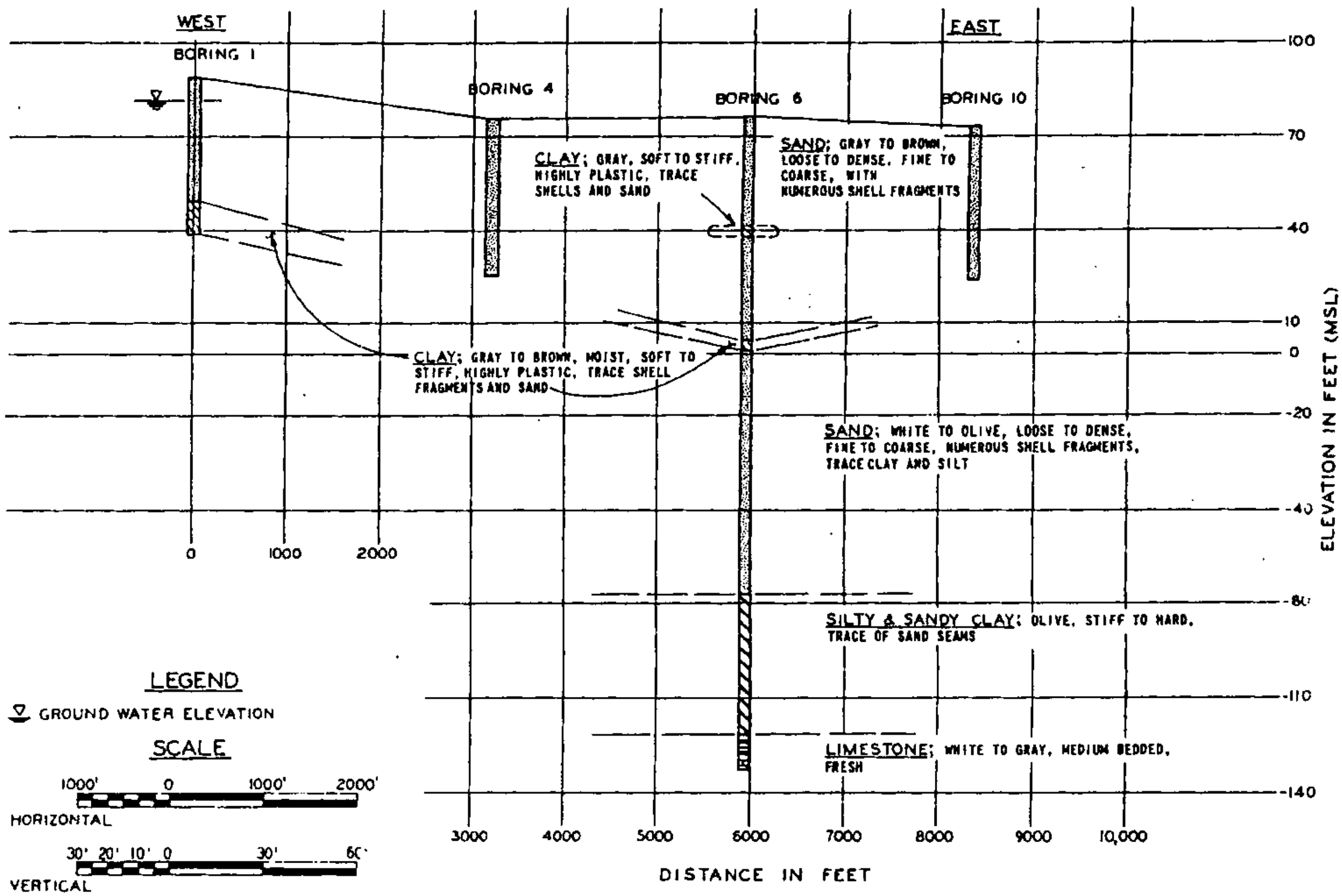

FIGURE 2.3-4.

STRATIGRAPHIC PROFILE BENEATH THE STANTON SITE (EAST-WEST)

Source: OUC, 2001; ECT, 2005.

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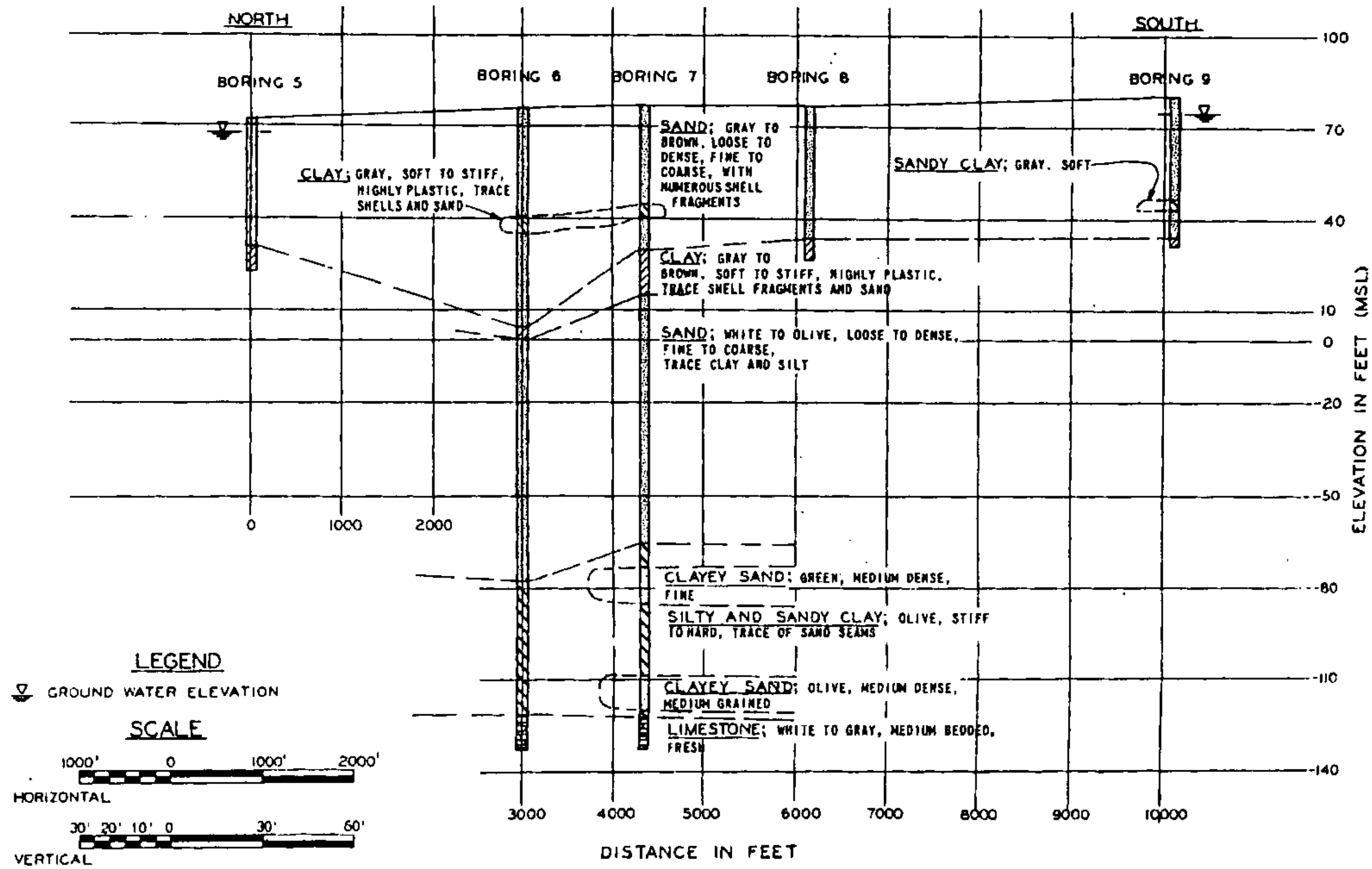

FIGURE 2.3-5.

STRATIGRAPHIC PROFILE BENEATH THE STANTON SITE (NORTH-SOUTH)

Source: OUC, 2001; ECT, 2005.

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Below the lower sand layer is a lower cohesive layer consisting of sandy clay and silty clay. This material is olive in color and has a stiff to hard consistency. This layer was encountered at elevations ranging from -56 to -79 ft-msl, with a thickness varying from 43 to 61 ft. Intermittent layers of a medium dense, olive, fine- to medium-grained clayey sand, 7 to 11 ft in thickness, were encountered within this lower cohesive layer.

Limestone bedrock was encountered underlying the lower cohesive layer, at elevations ranging from –121 to -135 ft-msl. The limestone is white to olive gray in color and is medium to thin bedded. It is argillaceous, fossiliferous, and fresh to slightly weathered. At two locations, the limestone had voids between elevations –126 and –131 ft. No other voids were reported in the Phase II deep borings.

The natural elevation on the Stanton site varies from approximately 92 ft-msl in the southwest to approximately 52 ft -msl in the northeast, although the elevation of most of the site varies more narrowly between 75 and 85 ft-msl. The terrain is generally level with gradients of 15 ft per mile in the northeast. Grade at the main plant complex, including the area for Stanton B, was raised to an elevation of approximately 80 ft-msl, requiring an average of 5 ft of compacted fill, to raise the developed area of the site above the 100-year flood elevation.

Turning to site soils, according to the Soil Survey of Orange County, Florida (USDA SCS, 1989), the principal soil types at the site include Smyrna fine sand, St. Johns fine sand, and Sanibel Muck, as shown in Figure 2.3-6. The Smyrna fine sand is nearly level, poorly drained and is found on broad areas in the flatwoods. Slopes are smooth and range from 0 to 2 percent. Smyrna soil is characterized by black fine sand underlain by various shades of fine sand. This soil has a seasonal high water table within 10 inches of the surface for 1 to 4 months in most years. Permeability is rapid and the available water capacity is low in the surface, subsurface, and in the substratum but medium in the subsoil. Natural vegetation includes longleaf and slash pines, lopsided indiangrass, inkberry, saw palmetto, waxmyrtle, pineland threeawn, bluestem, panicum, and othergrasses. Under natural conditions, this soil type has severe limitations for building site development, sanitary facilities, and recreational use because of excessive wetness.

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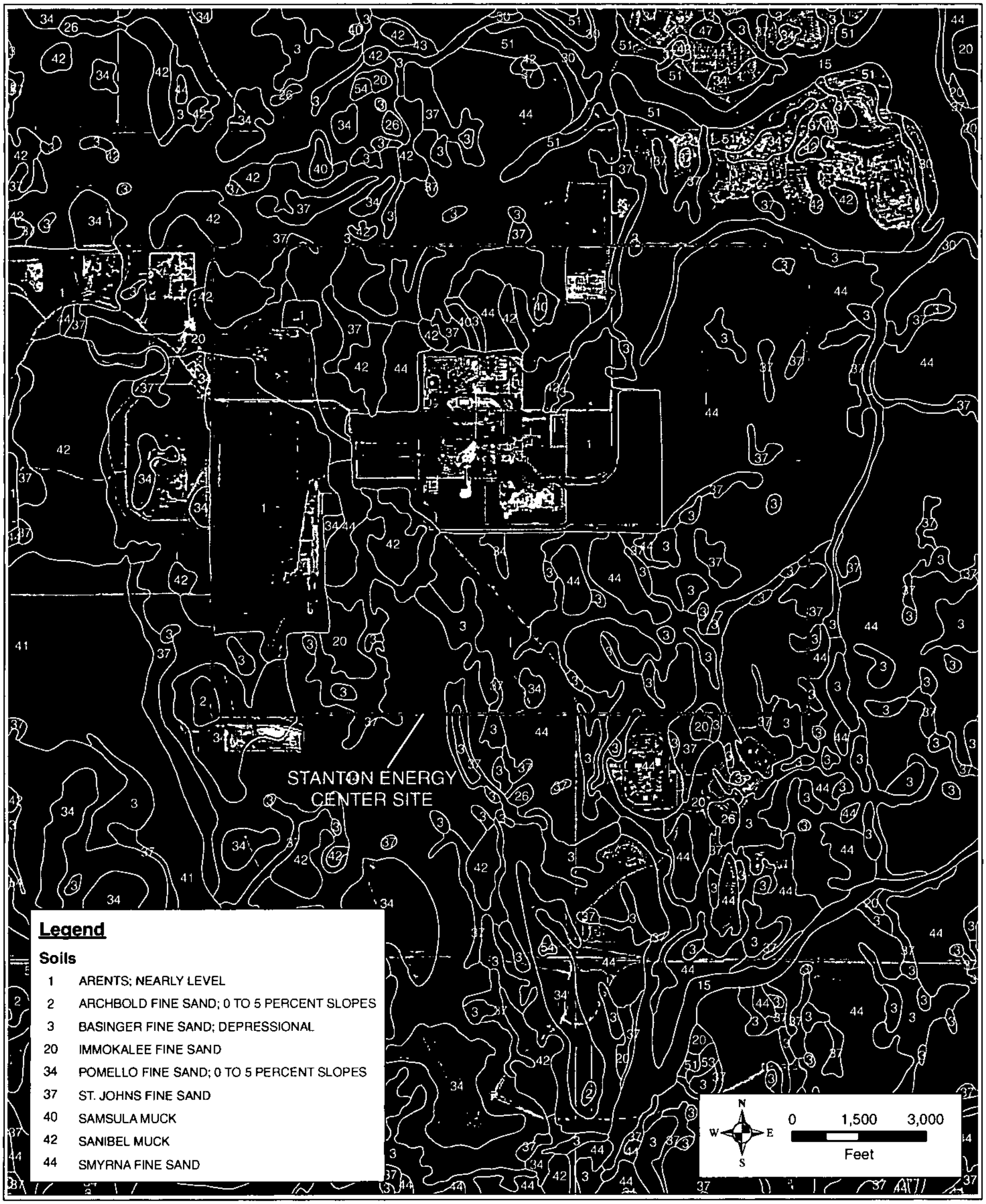

FIGURE 2.3-6.
SOILS MAP OF STANTON SITE

Sources: SJRWMD Aerial, 2004; SJRWMD Soils, 2005; ECT, 2005.

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The St. Johns fine sand soil type is nearly level and poorly drained. This soil type is characterized by an upper surface layer of black fine sand underlain by a dark gray fine sand layer. The seasonal high water table for this soil is typically within 10 inches of the surface. The permeability of this soil is rapid in the surface, subsurface, and substratum layers. The available water capacity is medium in the surface layer and low to very low in the subsurface and substratum layers. This soil has severe limitations for sanitary facilities, building site development, and recreational use.

The Sanibel muck is nearly level and very poorly drained. This soil type typically has an organic surface layer of black muck underlain by black fine sand. In most years, this soil is ponded except during extended dry periods. The permeability is rapid throughout this soil stratum. The available water capacity is very high in the organic layer and is medium to low in the underlying sandy material. Under natural conditions, this soil type has severe limitations for building site development, sanitary facilities, and recreational use because of ponding and excess humus.

2.3.1.3 Geologic Maps

Maps describing the site's geology and soils have been presented in the previous sections.

2.3.1.4 Bearing Strength

Geotechnical subsurface investigations have been conducted at the Stanton site. Information from these investigations indicates the subsurface characteristics are suitable for construction and will be used as a preliminary guide to design the foundation systems for the proposed IGCC unit. Existing heavy loaded or sensitive structures at the Stanton site have deep foundations consisting of friction pilings. These foundations have performed satisfactorily, and it is anticipated that similar methods will be used for the IGCC project. Geotechnical subsurface investigations will be conducted in the future to provide detailed bearing strength characteristic information to facilitate the final engineering design effort.

The Stanton site is located in an area of low seismic (earthquake) hazard, as illustrated in Figure 2.3-7. USGS produces earthquake hazard maps that depict the expected ground

Peak Acceleration (%g) with 2% Probability of Exceedance in 50 Years
USGS Map, Oct. 2002

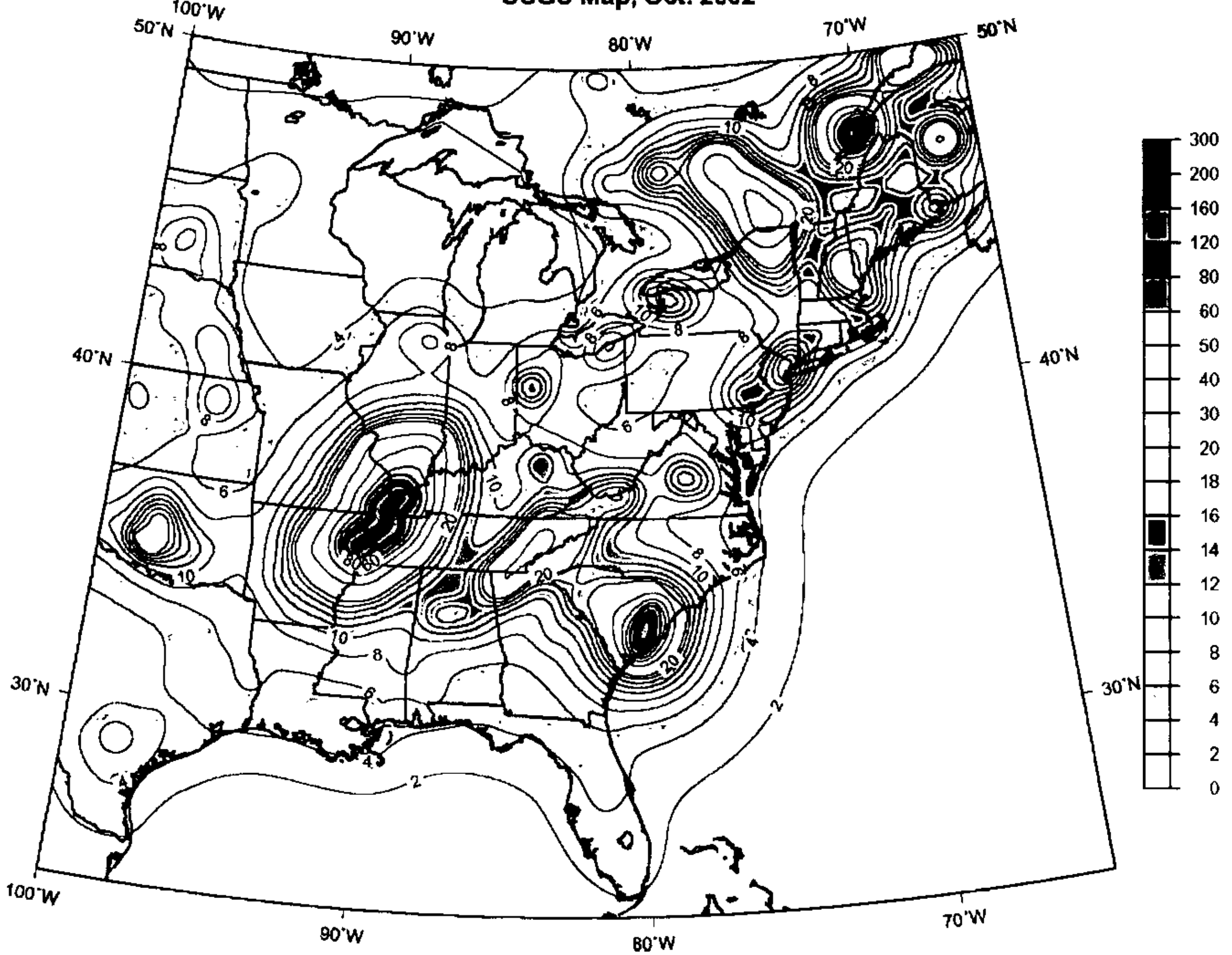

FIGURE 2.3-7.
SEISMIC HAZARD MAP OF THE EASTERN UNITED STATES

Source: http://earthquake.usgs.gov/hazmaps/products_data/2002/2002October/CEUS/CEUSpga500v3.pdf

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shaking at selected probabilities and over a specific time period. The maps are based on the rate of earthquake occurrence and how strong shaking extends from the quake source. Florida is in one of the lowest hazard areas (USGS, 2001 and 2002). Therefore, the potential for earthquake occurrence and damage from a seismic event is minimal.

Past occurrences of earthquakes in Florida include accounts of heavy shaking in northeast Florida near St. Augustine in 1879; a report of strong shock felt locally in Key West in 1880; the Charleston, South Carolina, quake of 1886 that was felt throughout north Florida; a minor shock felt in Jacksonville in 1893; and several other minor shocks in the mid-1900s. None of the quakes caused major damage.

2.3.2 SUBSURFACE HYDROLOGY

According to Lichtler *et al.* (1968), ground water occurs in both artesian and nonartesian conditions in Orange County. Ground water in the site vicinity and in Orange County occurs within the unconfined surficial aquifer, the secondary artesian aquifers, and the semi-confined Floridan aquifer. The nonartesian or surficial aquifer is composed mainly of sand and shell with varying amounts of clay and provides limited amounts of water. The secondary artesian aquifer and the Floridan aquifer are the two types of artesian aquifers in Orange County. The secondary artesian aquifer generally yields less water than the Floridan aquifer, but yields more than the nonartesian aquifers. The secondary artesian aquifer contains undifferentiated sediments and is more extensive in the Hawthorn Group. The quality of the secondary artesian aquifer varies with depth, location, and local geologic and hydrologic conditions.

The surficial and Floridan aquifers are hydraulically separated by the Hawthorn Group. The Hawthorn Group includes secondary artesian aquifers interbedded between semi-confining layers. The three aquifers are hydraulically separated by or within the Hawthorn Group. The degree of isolation depends on three factors: (1) the occurrence of low-permeability clay beds that compose the semi-confining unit, (2) the respective hydraulic head within each aquifer, and (3) the resulting hydraulic gradient between the aquifers.

Each of the three area aquifers (unconfined surficial aquifer, intermediate secondary artesian aquifer, and Floridan aquifer) is discussed in more detail in the following paragraphs.

The unconfined aquifer is a surficial water table aquifer and consists primarily of sands and shell with varying amounts of clay and hardpan. The thickness of the aquifer is highly variable, ranging from less than 10 ft in areas of the St. Johns River Basin to greater than 150 ft along the high ridge areas of west Orange and east Lake counties. The base of the surficial aquifer is approximately 40 ft bls in much of Orange County (Lichtler *et al.*, 1968.).

The intermediate secondary artesian aquifer regionally separates the unconfined aquifer and the Floridan aquifer but is limited in continuity. This aquifer includes all sediment beds of the Hawthorn Group. The intermediate secondary artesian aquifer consists of interbedded and interfingered sand, clayey sand, silty and sandy clay, and clay units.

Throughout the region, the quality of the water varies with depth, location, and local geologic and hydrologic conditions. Where present, the intermediate secondary artesian aquifer is the least likely to be polluted because the overlying, low permeability beds offer protection from surface pollution and because drainage wells are usually cased through these aquifers into the deeper Floridan aquifer.

The Floridan aquifer underlies all of Florida. In Orange County, the Floridan aquifer includes the Lake City Limestone, Avon Park Limestone, Ocala Group, and parts of the Hawthorn Group. The aquifer consists of alternating layers of limestone and dolomite or dolomitic limestone. This aquifer is one of the most productive in the world. The Floridan aquifer thickness is generally approximately 2,000 ft. The limestone is extensively solutioned, increasing the secondary porosity. The Floridan aquifer contains numerous solution cavities and channels that are often interconnected, facilitating the movement of water within the aquifer.

The Floridan aquifer system is subdivided into the Upper Floridan aquifer, middle semi-confining unit, and Lower Floridan aquifer. The Upper Floridan aquifer consists of the Ocala limestone and the dolomite and dolomitic limestones of the upper one-third of the Avon Park Formation. The middle semiconfining unit consists of less permeable, soft micritic limestone and dense dolomitic limestone in the middle one-third of the Avon Park Formation. The Lower Floridan aquifer includes the bottom one-third to one-half of the Avon Park Formation and all of the Oldsmar Formation. Some interconnected solution channels exist within the middle semiconfining unit of this aquifer, providing some connection between the Upper and Lower parts of the aquifer. Lichtler (1968) indicates that the Upper Floridan extends from approximately 150 to approximately 600 ft bls; the Lower Floridan extends from approximately 1,100 to 1,500 ft bls to 2,000 ft bls or more.

Yields from the Floridan aquifer have been measured up to several thousand gallons per minute; however, lower figures are more common. In most areas, the Floridan aquifer will produce more potable water from the upper 1,000 ft of the aquifer.

The potentiometric surface of the Floridan aquifer varies depending on location. On average, the potentiometric surface of the Floridan aquifer within the IGCC is at 45 ft bls (approximate elevation 35 ft-msl). St. Johns River Water Management District (SJRWMD) indicates that between July 1999 and July 2000, there was a decrease of approximately 3 to 6 ft in the potentiometric surface of the Floridan aquifer in the general region of the Stanton site. In general, the potentiometric surface of the Floridan aquifer in the region is approximately 10 to 12 ft lower than in 1980. This is mainly due to increased ground water withdrawals from new users in the region as well as below normal precipitation levels.

The gradient of the potentiometric surface is to the northeast at approximately 2 ft per mile. The aquifer discharges to the St. Johns River located approximately 18 miles east of the site where the potentiometric surface is above the ground surface, and artesian wells flow at the surface (Lichtler *et al.*, 1968).

The aquifers beneath the site have been classified as G-II by the Florida Environmental Regulation Commission. A G-II aquifer is one that can/is used for potable water and has a total dissolved solids (TDS) content of less than 10,000 milligrams per liter (mg/L). Water quality in these aquifers varies depending on the chemical composition of the aquifer and the content of the calcium carbonate in the area.

The ground water in the surficial aquifer is generally less mineralized than water from the underlying aquifers; however, because of the high porosity of the surficial sands and the relatively shallow water table, the surficial aquifer is inherently more susceptible to contamination. The somewhat impervious overlying beds of the Hawthorn Group tend to impede the downward migration of pollutants into the Floridan aquifer.

The water quality of the Upper Floridan aquifer in the eastern portion of Orange County and the SJRWMD is increasingly exceeding the drinking water standards for chlorides and TDS (SJRWMD Technical Publication SJ2002-1, 2002). Figures 2.3-8 through 2.3-10 depict the chloride, sulfate and TDS concentrations observed in the Upper Floridan aquifer, respectively. The declines in the potentiometric surface in the upper Floridan aquifer have increased the potential for upward movement of highly mineralized water from lower zones through leaky confining beds.

2.3.2.1 <u>Subsurface Hydrologic Data for the Site</u>

This section describes the ground water aquifers beneath the Stanton site. The description is based on published data and data from piezometers and monitoring wells installed at the Stanton site during previous investigations (OUC, 2001).

The three aquifers beneath the site are the unconfined, intermediate secondary artesian, and Floridan aquifers.

At the site, the bottom of the unconfined aquifer was encountered at depths ranging from 32 to 71 ft bls, the top of the intermediate cohesive layer. Beneath the intermediate cohesive layer, there is approximately 80 ft of sand underlain by the lower cohesive layer (Hawthorn Group). Since the intermediate cohesive layer is absent at some boring locations, it is assumed there is a hydraulic connection between the ground water in the sands above and below the intermediate cohesive layer. However, based on published data, the

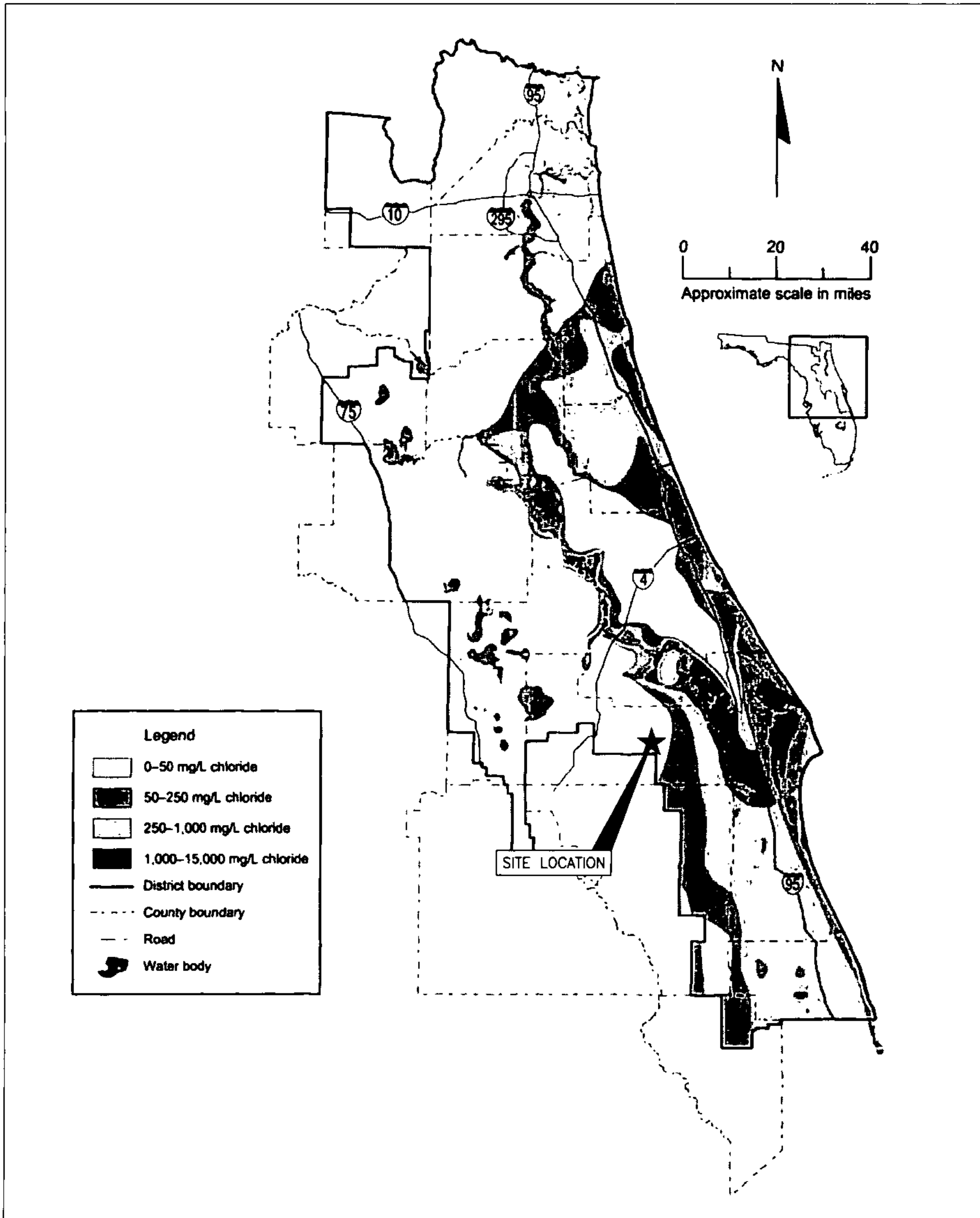

FIGURE 2.3-8.

CHLORIDE CONCENTRATIONS IN THE UPPER FLORIDAN AQUIFER

Source: SJRWMD, 2002; ECT, 2005.

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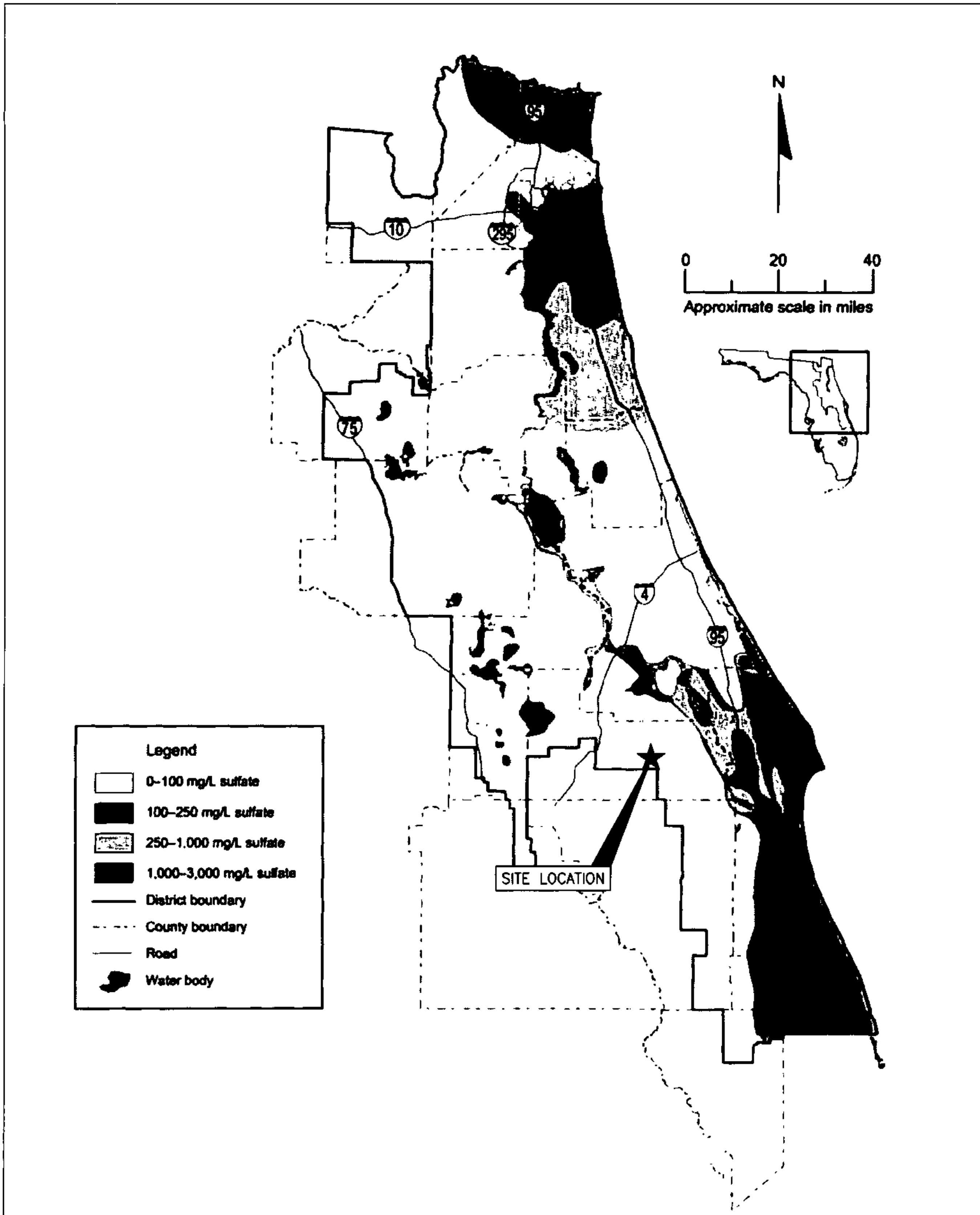

FIGURE 2.3-9.

SULFATE CONCENTRATIONS IN THE UPPER FLORIDAN AQUIFER

Source: SJRWMD, 2002; ECT, 2005.

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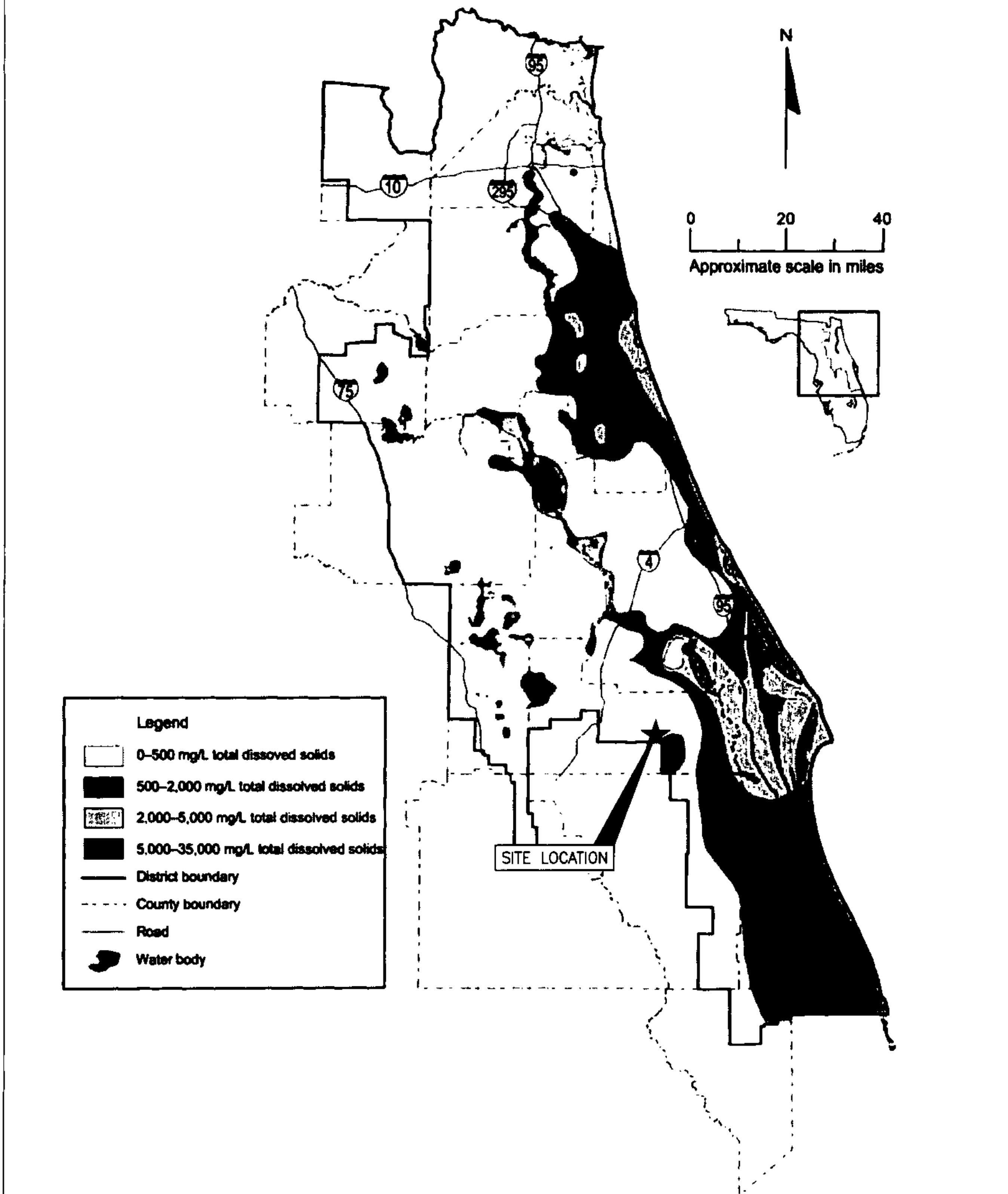

FIGURE 2.3-10.

TDS CONCENTRATIONS IN THE UPPER FLORIDAN AQUIFER

Source: SJRWMD, 2002; ECT, 2005.

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intermediate cohesive layer is considered to represent the base of the unconfined aquifer in the region.

The intermediate secondary artesian aquifer under the site has a thickness ranging from 125 to 156 ft. This thickness includes the intermediate cohesive layer, lower sand layer, and lower cohesive layer encountered during the subsurface investigations. Due to the absence of the intermediate cohesive layer at some boring locations, the continuous lower cohesive layer is believed to act as the primary aquitard between the unconfined and Floridan aquifers underneath the site. The lower cohesive layer has a thickness of approximately 50 ft.

The top of the Floridan aquifer at the site is at approximately 200 ft bls.

2.3.2.2 Karst Hydrogeology

Karst develops when natural waters become slightly acidic and cause limestones and other soluble rocks to dissolve. Water passing through the void spaces dissolves the carbonate minerals in the rock and gradually enlarges the voids and causes the formation of karst features. The Stanton site is located in an area where the potentiometer surface is near the land surface and the clastic overburden is greater than 100 ft thick (Figure 2.3-11). Additionally, in 1982, as a part of the original SCA for Stanton Units 1 and 2, a sinkhole evaluation potential study was performed by Jammal and Associates, Inc. (OUC 2001). The conclusion from that study was that the potential for sinkholes is very low. No sinkholes have been reported at the site, and sinkholes are not expected to be an issue at the site, based on the previous studies cited.

2.3.3 SITE WATER BUDGET AND AREA USES

2.3.3.1 Precipitation and Evapotranspiration

The site water budget for the area begins with consideration of precipitation. (See Section 2.3.7.1 for ambient temperature data.) Average annual rainfall is approximately 48 inches. The greatest rainfall typically occurs during the beginning of the hurricane season (June through November) in June, July, and August. June and July typically have the greatest monthly rainfall at more than 7 inches on average. The most frequent type of

KARST DEVELOPMENT

Introduction

Karst features are initiated when natural waters become slightly acidic and cause soluble rocks, such as limestone and dolostone to dissolve. Waters passing through void spaces dissolve carbonate minerals, thus gradually enlarging the voids and contributing to formation of karst features (Lane, 1986).

Distribution of Sinkholes in Florida

Virtually the entire state of Florida is subject to the development of sinkholes. The distribution of sinkholes is, however, not uniform across the state (Sinclair and Stewart, 1985). The limestones of the Floridan aquifer system are defined by Parker and others (1955) as including "part or all of the Middle Eocene (Avon Park and Lake City limestones), Upper Eocene (Ocala Group), Oligocene (Suwannee Limestone) and Miocene (Tampa Formation) as well as permeable parts of the Hawthorn Formation that are in hydrologic contact with the rest of the aquifer." These limestones are exposed near the surface in the north-central panhandle of Florida and also in the central and north-western peninsula (refer to the geologic map). Sinkholes are most common in these areas (Schmidt and Scott, 1984).

Sinkholes are also developed in association with carbonate rocks other than those of the Floridan aquifer system. Carbonates of the Hawthorn Formation, Tamiami Formation, Caloosahatchee Formation, Miami Limestone and Key Largo Limestone tend to develop shallow sinks which may be large enough for mapping at a scale of 1:24,000. Shell beds of the Tamiami Formation, Caloosahatchee Formation, and unnamed shelly units of Pliocene-Pleistocene age develop sinkholes when shell material is dissolved.

Sinkholes and other karst features are most common where limestone is near the surface and overlain by permeable clastic sediments (quartz sands and silts). Thus, most areas of Florida are subject to some degree of sinkhole development. The stratigraphy (the sequence of layered rocks and their textural characteristics) of an area is the primary factor controlling the development of sinkholes and other karst features. Stratigraphy is not uniform across the state and neither is the development of sinkholes and other karst features.

Karst and Waste Disposal

Sinkholes are a part of the recharge systems for various aquifers which underlie Florida. These sinkholes intersect permeable zones and may allow direct passage of contaminants into aquifers. The entrance of contaminants into the aquifer may be quite rapid especially if the retarding effects of clays and soils are absent. In addition to sinkholes, abandoned pits and quarries may act to recharge aquifers in areas underlain by limestone. In these areas, limestone may be subject to continued sinkhole development by sudden collapse. This could destroy the integrity of a system designed to contain waste and its leachate.

References

Lane, B. E., 1986, Karst in Florida: Florida Department of Natural Resources, Bureau of Geology, Special Publication No. 29, 100 p.

Parker, G. G., Ferguson, G. E., and Love, S. K., 1955, Water resources of Southeastern Florida: U.S. Geological Survey Water Supply Paper No.1255, 965 p.

Schmidt, W. and Scott, T. M., 1984, Florida Karst--its relationship to geologic structure and stratigraphy: in Beck, B., Proceedings of the first multidisciplinary conference on sinkholes, Orlando, Florida: Rotterdam, Boston, A. A. Balkema, 429 p.

Sinclair, W. C., and Stewart, J. W., 1985, Sinkhole type, development, and distribution in Florida: Florida Department of Natural Resources, Bureau of Geology, Map Series No. 110.

Wright, A. P., 1974, Environmental geology and hydrology, Tampa area, Florida: Florida Department of Natural Resources, Bureau of Geology, Special Publication No. 19, 94 p.

The large portion of the State represents the area where the piezometric surface is at or above land surface and/or the clastic overburden is in excess of 100 feet thick. It appears to be the least probable area for sinkhole development.

This area is the portion of the State characterized by stable prehistoric sinkholes, usually flat bottomed, steep sided, both dry and containing water. Modifications in geology and hydrology may activate process again.

This portion of the State is characterized by limestones at or very near the surface. The density of sinkholes in this area is high; however, the intensity of surface collapse is moderate due to the lack of overburden. Exploration by drilling and geophysical methods for near-surface cavities can be realistically accomplished.

This region has moderate overburden above cavernous limestones and appreciable water use. These areas have histories of steep-walled, wider sinkhole collapse. A thick overburden or high water table may lessen the probability of sinks occurring.

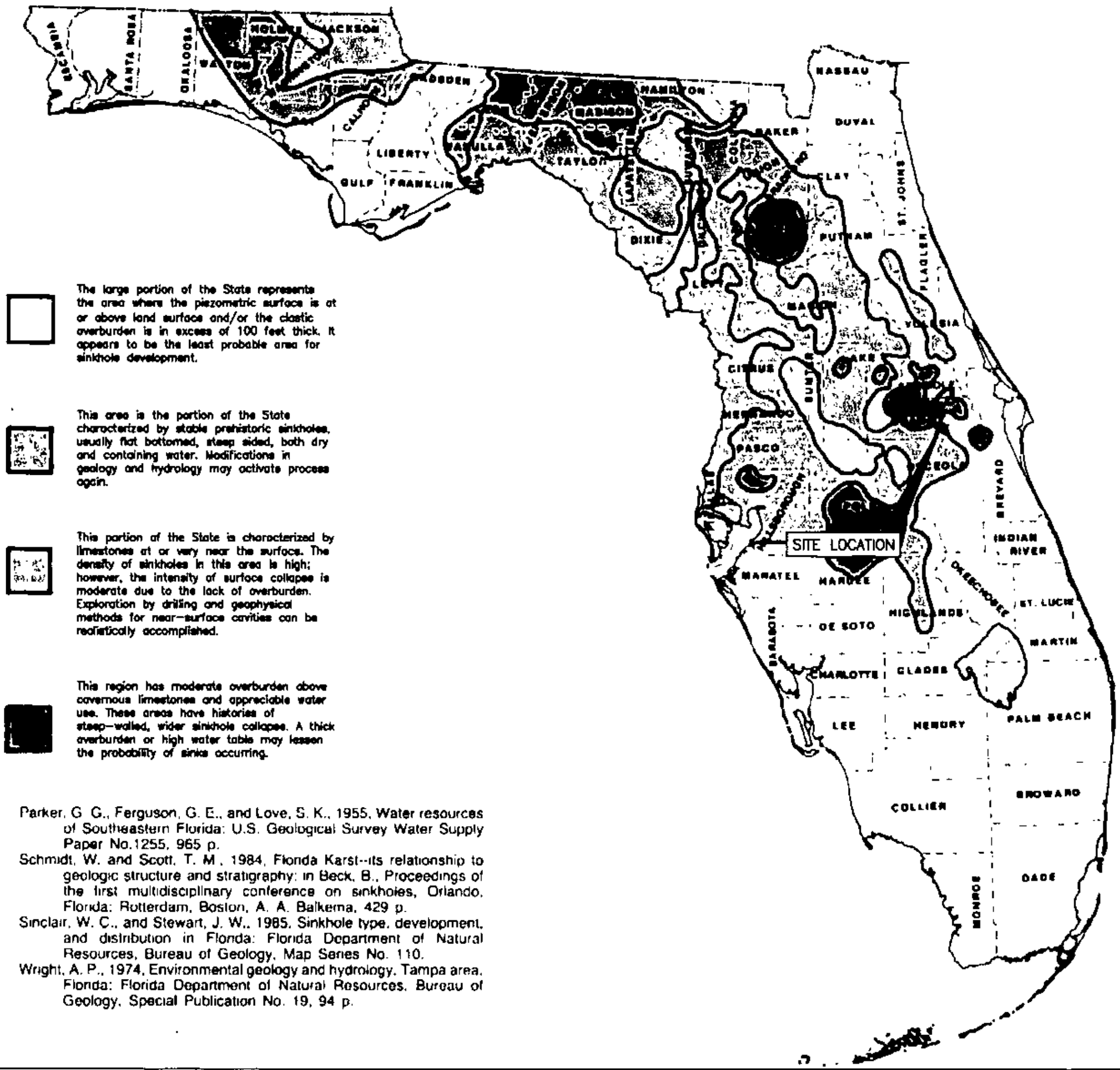

FIGURE 2.3-11.
KARST DEVELOPMENT IN FLORIDA

Sources: Wright, A.P., 1974; Department of Natural Resources; ECT, 2005.

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storm event during this time is the afternoon thunderstorm. In contrast, the lowest precipitation occurs between November and January, with November and December having an average monthly rainfall of approximately 1.8 inches. Table 2.3-1 provides a summary of the area's rainfall data.

Table 2.3-1. Rainfall Data for Orlando, Florida

	Precipitation (inches)	
Month	USDC* 1961 to 1990	NOAA† 1951 to 1980
January	2.30	2.10
February	3.02	2.83
March	3.21	3.20
April	1.80	2.19
May	3.55	3.96
June	7.32	7.39
July	7.25	7.78
August	6.78	6.32
September	6.01	5.62
October	2.42	2.82
November	2.30	1.78
December	2.15	1.83
Annual	48.11	47.83

Sources: *USDC. 1999.
†NOAA. 1985.

Evapotranspiration, the combined processes by which water from the land surface (evaporation) and by which water vapor from vegetation (transpiration) pass into the atmosphere, is an integral part of an area's surface water budget. Since the rate at which this transfer occurs is highly variable as a function of land surface cover, temperature and other climatic variables, a range is more fitting for discussion. Given the wide variability, both potential and actual rates of evapotranspiration should be taken into account as well as respective components of evaporation and transpiration for this discussion. Table 2.3-2 provides the available evapotranspiration data for central Florida region (no similar data was available for the immediate area of the site).

Table 2.3-2. Potential Evapotranspiration Rates

Location	Distance (miles) and Direction from Site	Evapotranspiration Rate: Potential mm/yr	Potential inch/yr	Actual mm/yr	Actual inch/yr
Lakeland*	60 – Southwest	1,334	52.5	—	—
Osceola County	50 – South	—	—	1,080†‡ 940‡ 840**	42.5 37 33
Taylor Creek	85 – Southeast	—	—	890 910 920	35 35.8 36.2
Green Swamp	45 – West	—	—	1,020	40.2

*Calculated from Penman Method for full crop canopy ($\alpha = 0.23$).
†Area includes lakes, wetlands, and uplands.
‡Area includes wetlands but no lakes.
**Area includes no wetlands.

Source: Jones, 1984.

Evaporation data for the site area include both Class A pan evaporation and free-water surface evaporation. Class A pan evaporation measurements are accepted as standard by the U.S. Weather Bureau and are defined by a pan of specific material and color, of a specific size and depth, and at a specified height above land surface. The following general data were obtained for Orange County (NOAA, 1982a):

- Free water evaporation (annual): 48 inches.
- Free water evaporation (May through October): 30 inches.
- Class A pan evaporation (May through October): 40 inches.
- Free water evaporation/Class A pan evaporation: 75 percent.

In addition, Table 2.3-3 presents monthly and annual values for Class A pan evaporation and estimated (calculated) evaporation from a second source (NOAA, 1982b).

Table 2.3-3. Evaporation Data for the Orlando Area

Month	Average Evaporation (inches) Class A Pan* 1960 to 1979	Estimated Evaporation† 1956 to 1970
January	2.75	3.66
February	3.30	4.39
March	5.01	6.00
April	6.59	7.66
May	7.15	8.53
June	6.61	7.75
July	6.55	7.74
August	6.02	7.10
September	5.09	6.23
October	4.44	5.78
November	3.21	4.51
December	2.69	3.80
Annual	59.41	72.39

*Station location—Lisbon, Florida; located approximately 50 miles northwest of the site.
†Station location—Orlando Airport. Computed using Penman Equation.

Source: NOAA, 1982b.

With respect to the total water budget, evaporation and transpiration, as the combined unit of evapotranspiration in conjunction with infiltration and runoff losses, constitute the major components of the final disposition of precipitation. As previously discussed, the annual average rainfall for the site is approximately 48 inches. The evaporation and evapotranspiration data indicates a wide range of values that could be applicable to the site. Conservatively, an estimate of approximately 33 to 40 inches per year of evapotranspiration losses is appropriate.

2.3.3.2 Surface Water Use

While numerous surface water features exist in the vicinity, the major water supply source for water users in the area is ground water. The most prominent natural surface waters are the Econlockhatchee and Little Econlockhatchee Rivers, their tributaries, and the St. Johns River (see Section 2.3.4 for detailed discussions). None of these rivers are believed to be used as significant water supply sources.

Other area potential water uses include community water supplies, agricultural irrigation, recreation, and transportation. In general, agricultural water use is predominantly for livestock watering and miscellaneous rural domestic usage. The amount of irrigated cropland in the vicinity of the site is considered quite small.

No reservoirs exist within 5 miles of the site. However, many lakes exist throughout the vicinity, primarily to the south. The nearest lakes are Lake Hart and Lake Mary Jane located approximately 5 miles south (see Section 2.3.4). The predominant uses of these two lakes, as well as the many others in the area, are recreation and irrigation.

Another notable surface water feature is the Disston Canal, which connects Lake Mary Jane to the Econlockhatchee River. This represents a cross-basin transfer since Lake Mary Jane is within the Kissimmee River basin and the Econlockhatchee River is in the St. Johns River basin.

The numerous lakes in the vicinity of eastern Orange County and neighboring northern Osceola County are used for abundant recreational activities. In addition, the Econlockhatchee and Little Econlockhatchee Rivers are used for recreational activities.

Area surface waters are not known to be used for commercial transportation.

2.3.3.3 Ground Water Recharge and Use

The unconfined surficial aquifer is recharged primarily by direct rainfall and irrigation but may receive some recharge by upward leakage through the semi-confining unit from the underlying Floridan aquifer in areas where the potentiometric surface of the semi-confined aquifer is higher than the water table surface. The surficial aquifer provides limited quantities of water used mainly for livestock, irrigation, and limited domestic supply.

Water in the unconfined aquifer may seep into lakes, streams, and ditches or, in places, downward into the Floridan aquifer system. Water in the unconfined aquifer can also be lost to pumping and evapotranspiration. Water levels in the unconfined aquifer fluctuate in a seasonal pattern responding mainly to local rainfall. During most years, low rainfall occurs from November through February, and high rainfall occurs from June through September.

Ground water recharge of the Floridan aquifer in Orange County comes from annual rainfall. Water also enters the Floridan aquifer by underground flow from outside the region. It is also recharged where the local water table is higher than the potentiometric surface of the Floridan aquifer and the material (usually Hawthorn sediments) between the Floridan and the water table is either absent or permeable enough to allow downward migration of water into the aquifer. Minor amounts of recharge are also provided from leakage through the overlying confining layer and via connector and drainage wells constructed through the confining layer that hydraulically join the unconfined aquifer and the Floridan aquifer. Figure 2.3-12 shows information regarding recharge of the Floridan aquifer. The Stanton site is in an area where the rate of recharge is low.

Outflow from the Floridan aquifer discharges through artesian springs, pumping, outflow to other areas, and seepage into the St. Johns River system (USDA SCS, 1989).

Major ground water uses in the Stanton site vicinity are for agricultural purposes such as irrigation, livestock watering, and domestic uses. The primary source of ground water in the area is the Floridan aquifer. Existing plant supply wells drilled into the Floridan aquifer are currently used for plant potable water and demineralizer system demands and will be used for the proposed IGCC expansion. Figure 2.3-13 illustrates the location of the existing plant supply wells.

Figure 2.3-14 shows the locations of public-supply wells in the county that tap the Floridan aquifer. The Cocoa well field municipal water supply is located approximately 6 miles south and southeast of the site, is owned and operated by the City of Cocoa, and supplies approximately 15.5 MGD to central Brevard County. The Cocoa well field consists of 48 wells drilled to the Floridan Aquifer. The depths of the wells range from approximately 370 to 700 ft. The closest wells are located approximately 3 miles from the site. In addition, the new Orange County eastern regional municipal well field consists of

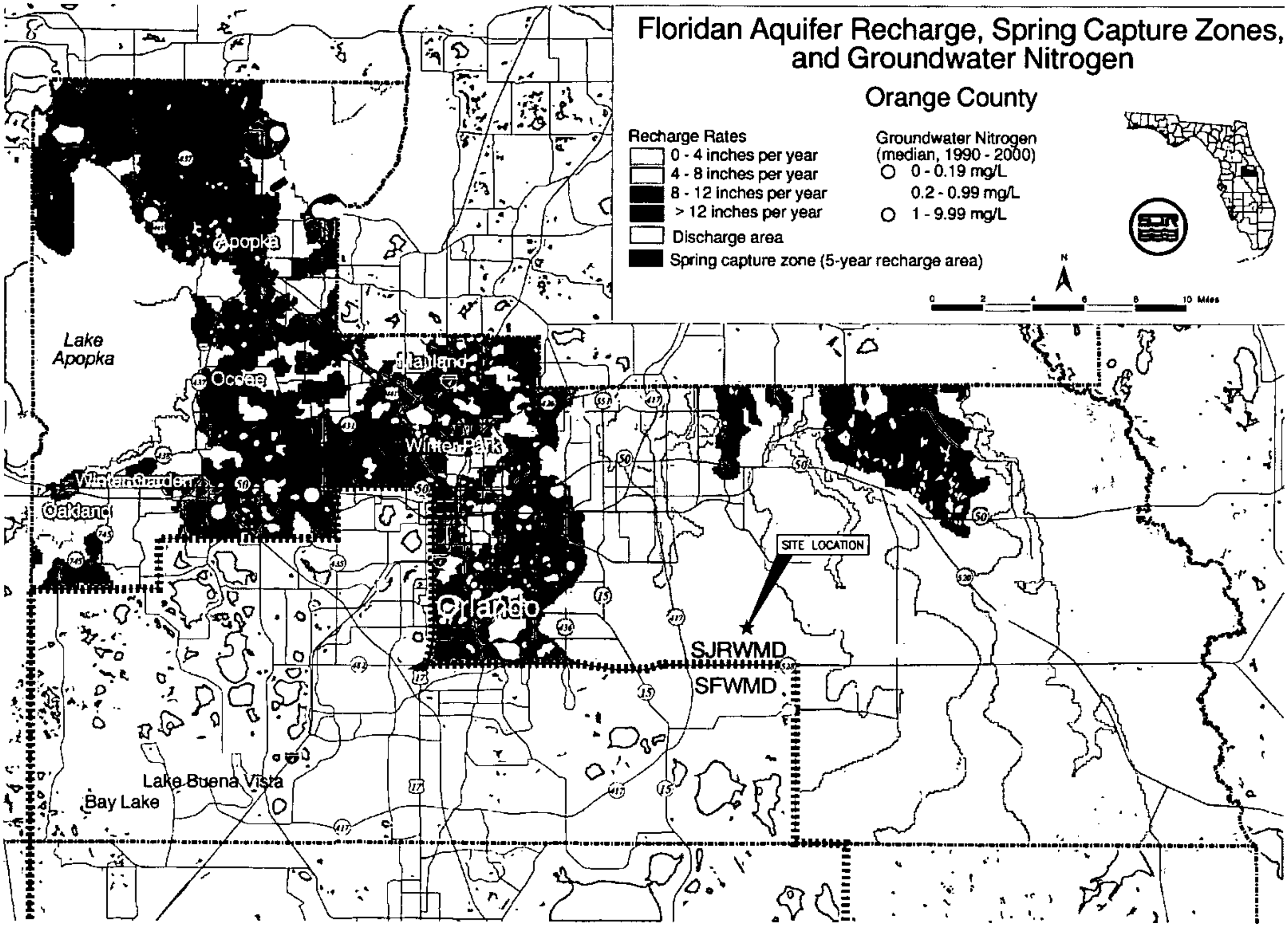

FIGURE 2.3-12.
FLORIDAN AQUIFER RECHARGE

Sources: SJRWMD, 2003; ECT, 2005.

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Environmental Consulting & Technology, Inc.

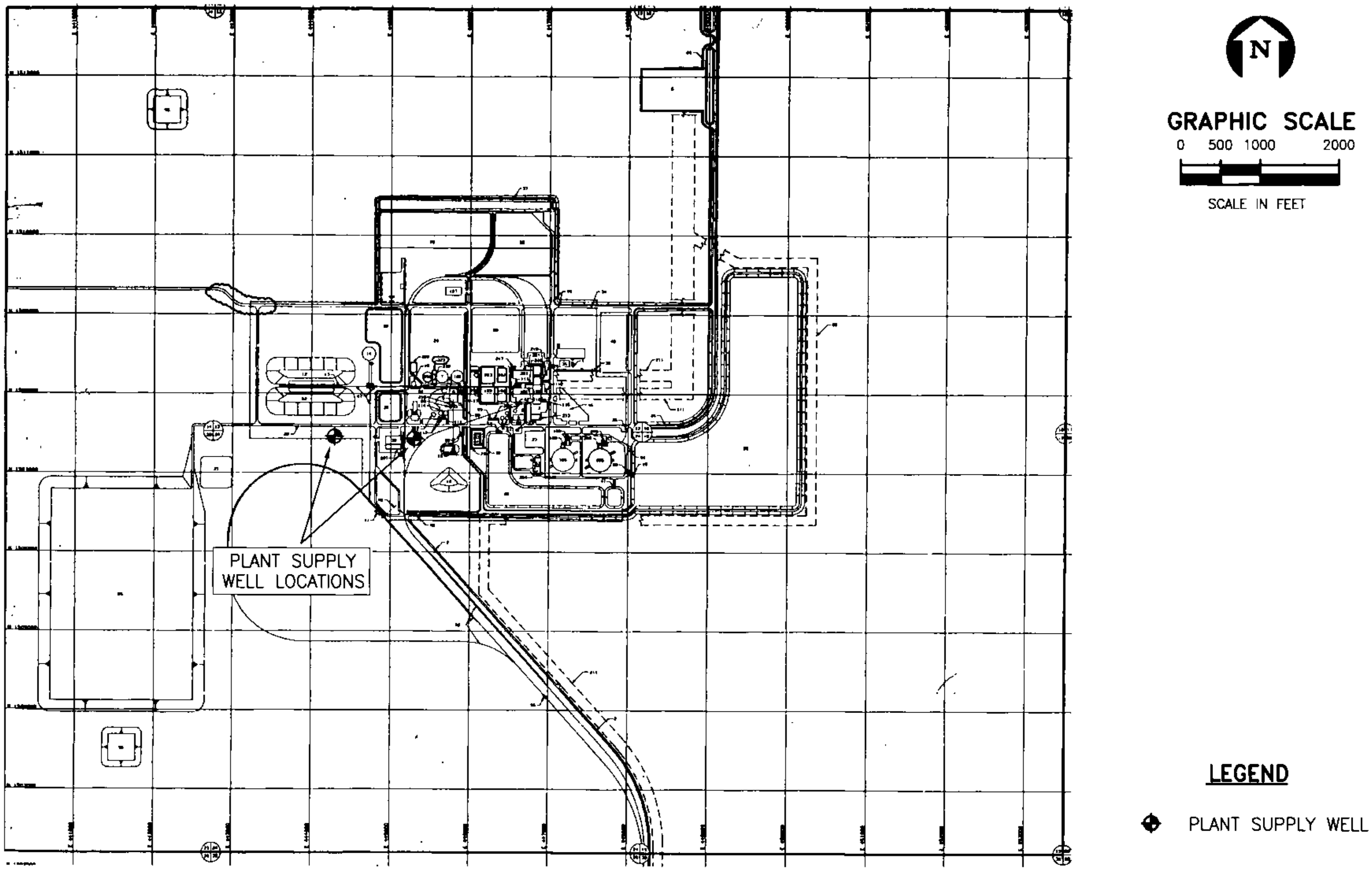

FIGURE 2.3-13.
PLANT SUPPLY WELLS

Sources: OUC, 2005; ECT, 2005.

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Environmental Consulting & Technology, Inc.

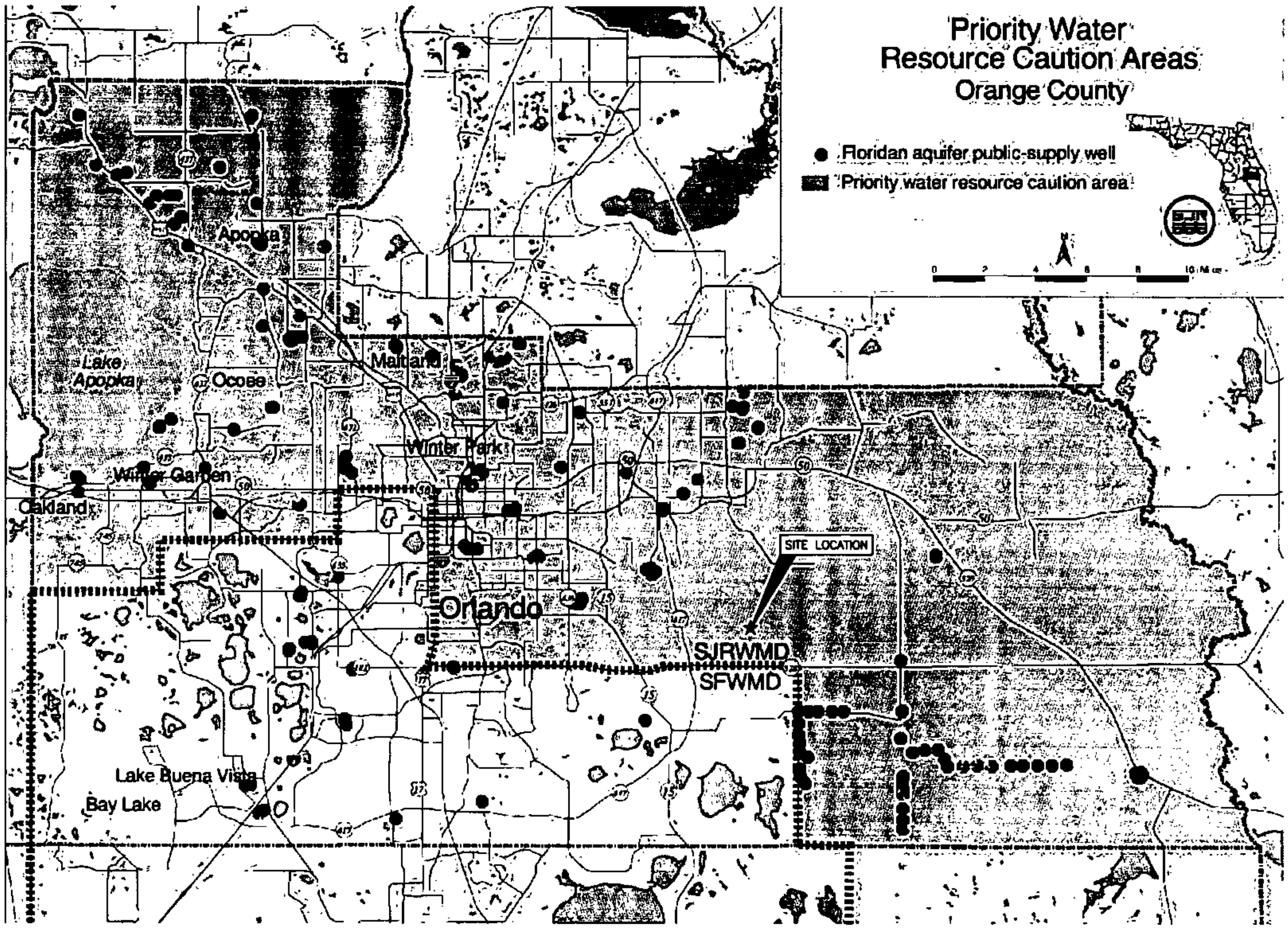

FIGURE 2.3-14.

FLORIDAN AQUIFER PUBLIC SUPPLY WELLS AND PWRCA

Sources: SJRWMD, 2003; ECT, 2005.

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Environmental Consulting & Technology, Inc.

10 wells drilled to the Floridan Aquifer. The Orange County well field is approximately 6 miles west of the site and currently withdraws approximately 20 MGD.

There are no potable water supply wells currently in use within a 1-mile radius of the Stanton site boundaries. The nearest water supply wells are located approximately 1.25 miles west of the site boundary.

It is noted that, according to SJRWMD, the three water supply wells referenced in the Unit A SCA (OUC, 2001) are no longer active. The two State of Florida Department of Correction wells have been closed/capped, and the Waste Management, Inc., of Florida well is not located within 1 mile of the site.

According to Figure III-1 in SJRWMD's District Water Management Plan (2000), and as shown in Figure 2.3-14, the Stanton site is within a defined *priority water resource caution area* (PWRCA). A PWRCA is an area "where existing and reasonably anticipated sources of water and conservation efforts may not be adequate: (1) to supply water for all existing legal users and reasonably anticipated future needs, and (2) to sustain the water resources and related natural systems." Water resource constraints used to establish the PWRCAs include impacts to wetlands and spring flows, saltwater intrusion, and impacts to existing users. In PWRCAs reuse of water (use of reclaimed water) is required if economically, environmentally, and technically feasible.

2.3.4 SURFICIAL HYDROLOGY

2.3.4.1 Hydrologic Characterization

The existing Stanton Energy Center operates as a zero-discharge facility. That is, from within the developed 1,100-acre portion of the site, no wastewater streams from Units 1, 2, or A discharge to nearby surface waters. Nor will stormwater (except as a result of major storm events) discharge to nearby surface waters. (Of course, stormwater from the undeveloped buffer areas of the site does drain offsite.) Despite the fact that there are—and will continue to be—essentially no discharges to surface waters, a general characterization of the nearby surface waters is provided for background.

The Stanton Energy Center site is located primarily within the Econlockhatchee River basin, which is the focus of the following discussion. It is noted that a relatively small portion of the western side of the 3,280-acre property is within the Little Econlockhatchee drainage basin; no project activities will occur within this small area. Figure 2.3-15 shows the site location in relation to the drainage basins. Figure 2.3-16 shows the surface water bodies themselves.

The watershed for the Econlockhatchee River basin is approximately 260 square miles (mi^2), eventually draining to the St. Johns River at a point located approximately 15 miles northeast of the site. The Econlockhatchee River generally flows north from its headwaters, the Econlockhatchee River Swamp located near the Orange-Osceola County line, approximately 10 miles south of the site. The river's largest tributary is the Little Econlockhatchee River, located west of the site, which has its confluence with the Econlockhatchee approximately 12 miles north of the site.

The physical description of the Econlockhatchee River is consistent with what is common in this part of central Florida. In general, it can be characterized as having a relatively wide river floodplain, small channel, shallow depth, and a mild slope. In the lower reaches of the river, the channel is more prominent. The overall gradient is less than 2 ft per mile from the headwaters of approximately 65 feet above mean sea level (ft-msl) to 5 ft-msl at the confluence with the St. Johns River, or a decrease of 60 ft over approximately 32 miles.

Based on historical U.S. Geological Survey (USGS) water quality data, the Econlockhatchee River is characteristic of a swamp-fed Florida river draining through an urban area. High tannin content will typically give the water a strong tea color. Overall, the water is relatively low in hardness and low to moderate in total dissolved solids (TDS), with a slightly acidic to neutral pH. Nitrogen and phosphorus levels are generally moderate to high, while 5-day biochemical oxygen demand (BOD_5) concentrations are relatively low.

As noted previously, the rainy season occurs between June and September. Naturally, higher river discharges result during this period. The greater flow rates occur between

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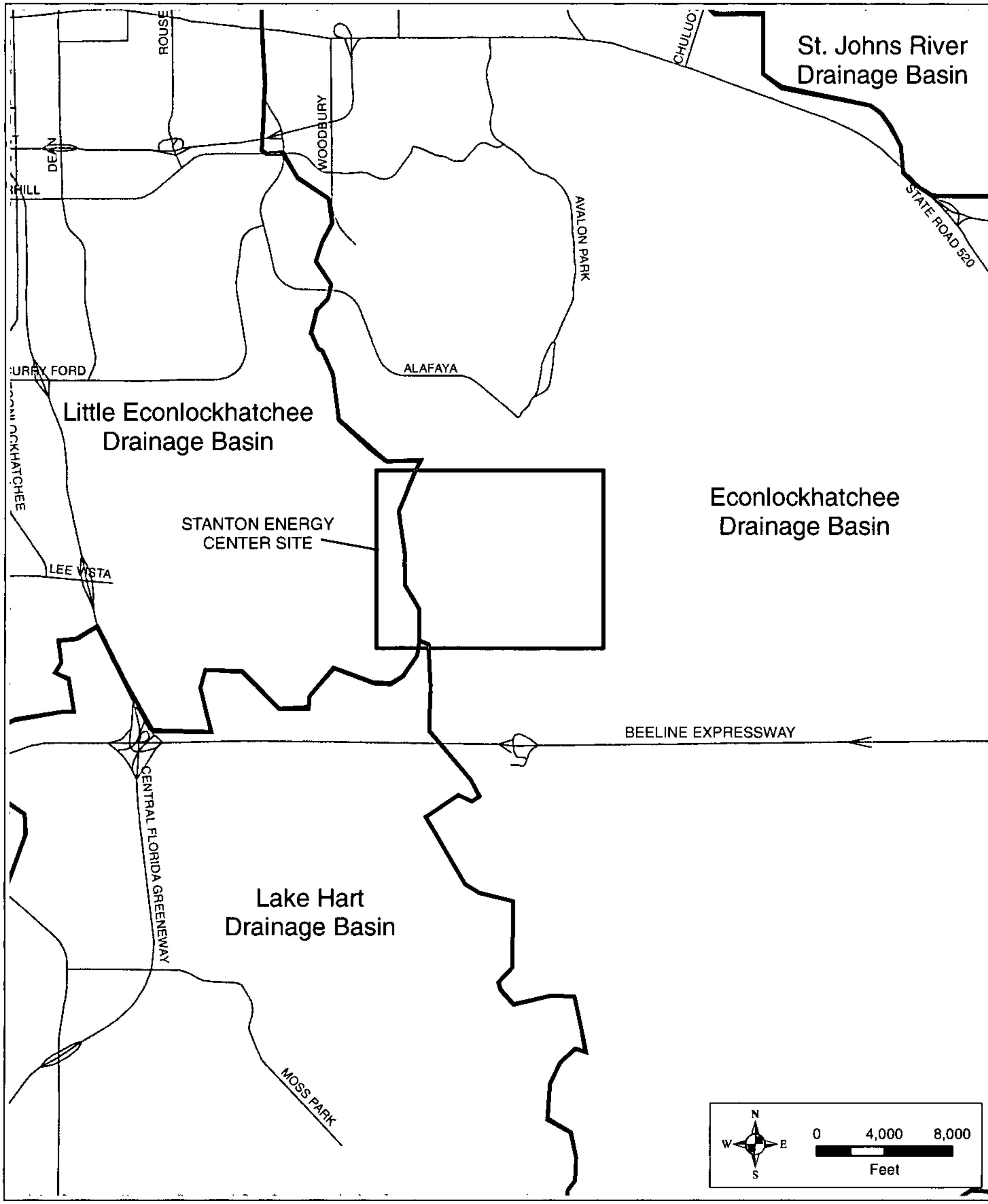

FIGURE 2.3-15.
AREA DRAINAGE BASINS

Sources: Orange County, FL, 2005; ECT, 2005.

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Environmental Consulting & Technology, Inc.

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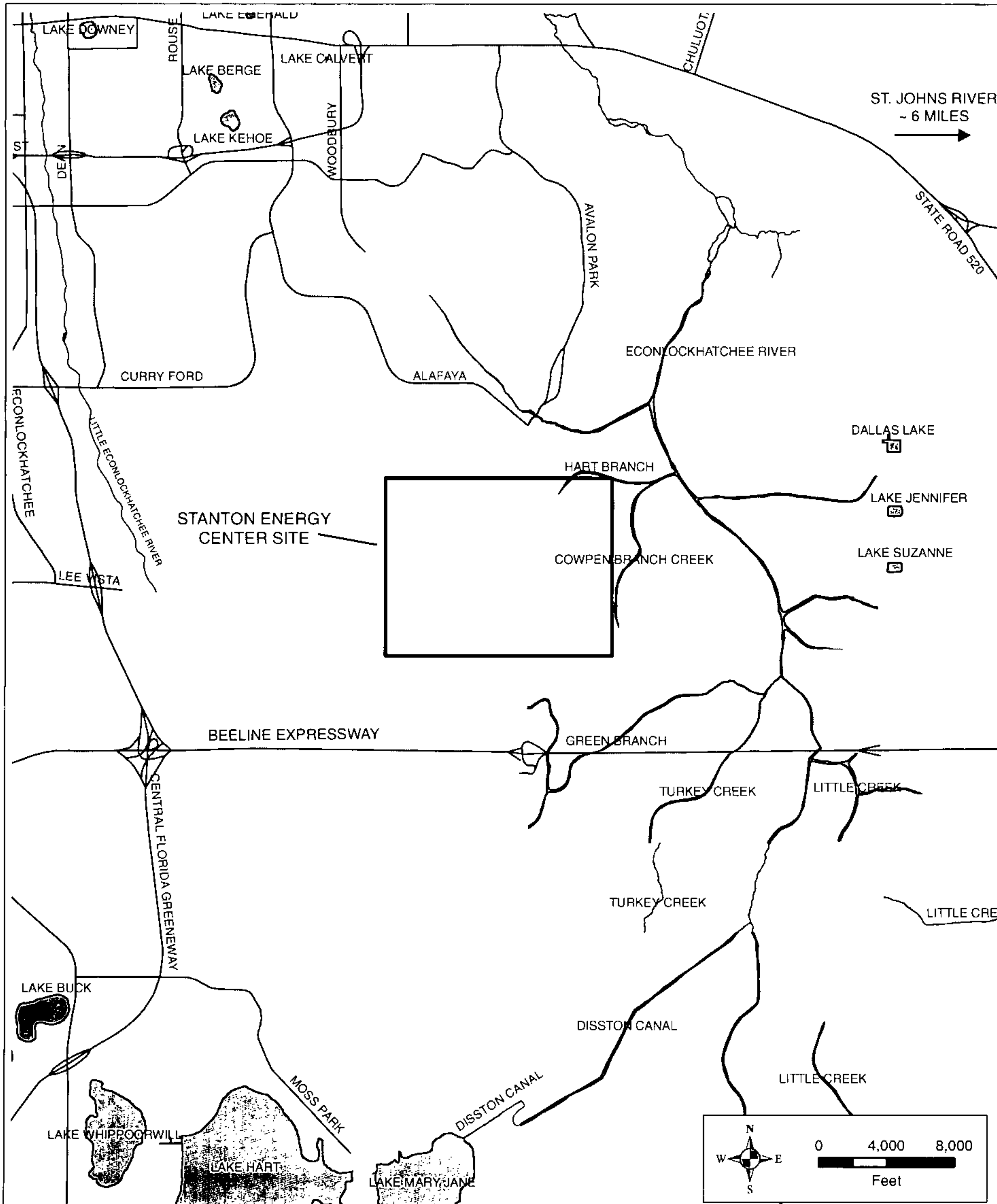

FIGURE 2.3-16.
SURFACE WATERS NEAR THE STANTON SITE

Sources: Orange County, FL, 2005; ECT, 2005.

ECT
Environmental Consulting & Technology, Inc.

July and October and are typically 1.5 to 2 times greater than the average monthly discharge. May commonly has the lowest monthly average discharge on the order of approximately 3 to 10 times less than the high discharge months or nearly 25 to 50 percent of the average annual flow. The most significant manmade discharge to the basin is treated effluent from the Orange County Eastern Regional Water Reclamation Facility, which discharges to a wetland, which eventually drains to the Little Econlockhatchee River. (As discussed subsequently and in Section 1.4.2.3, the reclamation facility supplies the Stanton Energy Center with 13 MGD of treated effluent on an annual average basis.)

In general, the Econlockhatchee River basin can be characterized as wetlands and forested marshes from which the several creeks (tributaries) drain. The predominant surficial soils are fine sands with a varying degree of organic content. Sheet flow is the primary type of flooding within the area.

The Econlockhatchee River and its tributaries are classified as Class III waters according to Chapter 62-302, Florida Administrative Code (F.A.C.). This classification corresponds to surface waters designated for recreation, propagation, and maintenance of healthy, well-balanced fish and wildlife.

Most of the tributaries are small and upstream of the site, in contrast to the Little Econlockhatchee River, the largest tributary. Eleven tributaries are located either upstream or near the immediate vicinity of the site:

- Hart Branch.
- Cowpen Branch.
- Green Branch.
- Turkey Creek.
- Little Creek.
- Unnamed branch (west side).
- Five unnamed branches (east side).

They range in length from approximately 1 to 5 miles. The nearest tributaries are Hart Branch and Cowpen Branch, which are on the north and east sides of the site, as shown in Figure 2.3-16. In addition to the natural tributaries, Disston Canal discharges from Lake Mary Jane upstream of the site. The Little Econlockhatchee River is located west and north of the site with its headwaters due west approximately 4 miles. It has an approximate length of 15 miles prior to its confluence with the Econlockhatchee River.

USGS gauging stations were sources for the basin water quality and discharge data. Four gauging stations (two active and two inactive) on the Econlockhatchee River, one upstream and three downstream of the site, are summarized in Table 2.3-4.

Table 2.3-4. Summary of Econlockhatchee River Gauging Stations

USGS Station	Location	County	Up- or Downstream of Stanton Site	Latitude Longitude	Drainage Area (mi^2)	Period of Record	Status
2233001	Magnolia Ranch	Orange	Upstream	28° 25' 27" 81° 7' 10"	32.9	1972 to 2001	Inactive
2233100	Bithlo	Orange	Downstream	Unknown	119	1959 to 1965	Inactive
2233484	Oviedo	Seminole	Downstream	28° 39' 19" 81° 10' 12"	225	2002 to 2003	Active
2233500	Chuluota	Seminole	Downstream	28° 40' 40" 81° 6' 51"	241	1935 to 2003	Active

Source: USGS, 2005.

Stream flow data from the gauging stations were used to characterize the Econlockhatchee River. The nearest USGS gauging station (2233001) is 6 miles upstream of the site. With a drainage basin of 32.9 square miles (mi^2), river discharge at this station over the period of record ranged from no flow to 474 cubic feet per second (cfs) with a period average of 27 cfs. Occurrences of no flow are frequent at this station. Table 2.3-5 provides a summary of the stream flow data. Approximately 6 miles downstream of the site was a former gauging station (2233100), where the measured discharge ranged from no flow to 7,840 cfs. The average flow for the 7-year period of record was 88 cfs.

Table 2.3-5. Summary of Stream Flow Data for the Econlockhatchee River

USGS Station	Distance from Site	Drainage Area (mi^2)	Discharge (cfs)			Period of Record (years)
			Minimum	Maximum	Average	
2233001	6 miles up-stream	32.9	0	474	27	30 (1972 to 2001)
2233100	6 miles down-stream	119	0	7,840	88	7 (1959 to 1965)
2233484	15 miles downstream	225	Unknown	3,810	422	2 (2002 to 2003)
2233500	19 miles downstream	241	6.7	11,000	279	69 (1935 to 2003)

Source: USGS, 2005.

The other two gauging stations (2233484 and 2233500) are considerably farther downstream of the site, 15 and 19 miles, respectively. The first one is a new station with only 2 years of data. The second one (2233500) has 69 years of recorded data, as shown. Discharges have ranged from a minimum of 6.7 cfs to a maximum of 11,000 cfs. The average flow at this location for the period was 279 cfs.

Over the four gauging stations, the water levels (gauge height) for the corresponding maximum discharges (flood conditions) ranged from approximately 18.7 to 62.6 ft-msl. The difference between the water level for the average and maximum discharges for the gauging stations varied from approximately 2.5 to 13 ft, with the greatest at the station farthest downstream. Water levels corresponding to the average discharge were approximately 5.5, 15.1, and 60.0 ft-msl for the two stations farthest downstream and the one upstream station, respectively.

Stream flow velocity was reported for one station (2233484). The flow velocity for the average flow was approximately 1 to 1.5 feet per second (fps).

Focusing in on the Stanton Energy Center site, itself, as the existing site features constitute the immediate baseline for the planned project, the prominent surface water feature is a large, manmade pond. The 93-acre pond, located east of the main plant facilities (refer to Figures 2.1-7 or 2.2-3) is currently used as the cooling water makeup supply storage pond and will continue to be used for the proposed Unit B IGCC project. At the normal water level elevation of 77.0 to 77.5 ft-msl, the pond is 16 ft deep. The typical water level range is 75.5 to 77.5 ft-msl, for an average fluctuation of 1.5 to 2 ft, whereas the maximum range is 69 to 78 ft-msl. The emergency overflow structure outfall elevation is 78 ft-msl. Although no discharge from the pond has occurred since its inception, if an overflow event were to occur, the discharge would drain to the wetlands in the southeastern portion of the site. The Orange County Eastern Regional Water Reclamation Facility, the supplier of the treated effluent that is used for cooling water, controls the water level in the pond.

As indicated previously, under normal circumstances, no stormwater runoff from the developed portion of the site discharges to the site's undeveloped areas or offsite. (The site's stormwater management systems have been designed for the 25-year, 24-hour storm event.) Stormwater from the undeveloped buffer areas drains naturally to the nearest surface water feature, such as Hart Branch in the northeastern area of the site and Cowpen Branch in the southeastern area.

Recorded water quality data for the Econlockhatchee River indicate it is characteristic of other Florida flatwood river systems. Data from two USGS gauging stations collected between 1954 and 2001 are used to describe the river. Overall, the inorganic and organic content are low to moderate, based on the TDS and BOD_5 concentrations at average values of 180 and 3 milligrams per liter (mg/L), respectively. Nitrogen and phosphorus concentrations are also considered moderate at 3.3 mg/L and 1 mg/L average concentrations, respectively. Table 2.3-6 presents a summary of the water quality data.

Table 2.3-6. Summary of Water Quality Data for the Econlockhatchee River

Parameter	Range	Average
Temperature (°C)	12 to 30	22
pH (s.u.)	3.7 to 7.6	—*
Dissolved oxygen (mg/L)	0.9 to 11.8	4.9
Color (Pt-Co)	11 to 500	160
Conductivity (µs/cm)	33 to 873	320
Hardness (mg/L as $CaCO_3$)	9 to 160	70
TDS (mg/L)	31 to 468	180
Total nitrogen (mg/L)	1.2 to 7.7	3.3
Phosphorus (mg/L)	0.018 to 4.9	1†
BOD_5 (mg/L)	0.5 to 8.6	3

Note: °C = degree Celsius.
s.u. = standard unit.
Pt-Co = platinum-cobalt unit.
µs/cm = microsiemens per centimeter.
$CaCO_3$ = calcium carbonate.

*Typical 6.5 to 7 s.u.
†More recent data: <0.2 mg/L.

Source: USGS Gauging Stations 2233001 (1972 to 1984) and 2233500 (1954 to 2001).

Only limited recent data are apparently available regarding mercury concentrations in area surface waters. Bortles (2005) provided two data points for mercury concentrations in the Econlockhatcheee River of 0.019 and 0.022 microgram per liter (µg/L), slightly above the detection limit of 0.018 µg/L. As discussed in Section 2.6.3, fish consumption advisories have been issued for selected species in the river due to mercury bioaccumulation.

Turning to the site's principal surface water feature, Table 2.3-7 provides a brief summary of water quality data of the treated effluent stored in the onsite cooling water makeup supply storage pond.

Table 2.3-7. Summary of Water Quality Data for the Stanton Cooling Water Makeup Supply Storage Pond—January 2004 through April 2005

Parameter	Range	Average
pH (s.u.)	7.4 to 8.2	—
Hardness (mg/L as $CaCO_3$)	130 to 146	135
Silica (mg/L)	9.6 to 13.2	12
Conductivity (μS/cm)	662 to 828	724
Chloride (mg/L)	78 to 129	101
Phosphorus (mg/L)	0.26 to 2.77	0.82

Source: OUC, 2005.

2.3.4.2 Measurement Programs

OUC monitors several water quality parameters in Hart Branch (in the far northeastern corner of the Stanton Energy Center site), Cowpen Branch (southeastern corner), and Green Branch (also southeastern corner). Tables 2.3-8 through 2.3-10 present the results of the last 5 years of monitoring at these locations.

2.3.5 VEGETATION/LAND USE

2.3.5.1 Introduction

The Stanton Energy Center site was originally studied rigorously for ecological resources in the early 1980s in preparation of the SCA for Units 1 and 2. Detailed descriptions of the site's terrestrial and wetland habitats, wildlife and botanical resources, and threatened/endangered (T/E) species were provided at that time. For the permitting of Stanton Unit A in 2001 and supplemental amendments, additional ecological studies were performed. Results of those studies appear in the Unit A Supplemental SCA, the environmental resource permit (ERP) application for Unit A, and the ongoing ecological monitoring reports for the entire property. The ongoing ecological studies at Stanton are primarily associated with the required monitoring of the endangered red-cockaded woodpecker populations onsite.

As discussed previously, the key areas of the site requiring more detailed study for this project include portions of the existing power block, especially the location of the

Table 2.3-8. Hart Branch Water Quality at Stanton Site

Parameter	January	February	March	April	May	June	July	August	September	October	November	December
<u>2005 Monthly Analytical Results (mg/L)</u>												
Chloride	36.1	48.7	27.4	46	Dry	42.4	32.8	24.5	Dry	59.2		
Nitrogen, Nitrate	0.025U	0.025 U	0.025 U	0.025 U	Dry	0.025 U	0.025 U	0.025 U	Dry	0.025 U		
Phosphorus, Total	0.067	0.143	0.064 V	0.163 V	Dry	0.04	0.02 U	0.02 U	Dry	0.02 U		
Sulfate	3.7	0.61	0.791	0.341	Dry	4.6	0.172	5.95	Dry	20		
Iron	1.14	1.05	1.89	1.4	Dry	0.337	1.87	0.485	Dry	0.359		
Specific Conductivity	420	474	691	439	Dry	314	391	341	Dry	433		
Turbidity	7.4	3.96	10.3	4.82	Dry	0.74	1.7	1.32	Dry	1.27		
pH	7.09	7.04	7.21	7.03	Dry	7	7.2	7.78	Dry	6.74		
Temperature	17.9	15.4	11.7	18.3	Dry	23.4	28.1	25.6	Dry	24.5		
<u>2004 Monthly Analytical Results (mg/L)</u>												
Chloride	49.1	42.6	37.6	Dry	53.7	Dry	20.5	35.8	13	27	24.7	27.5
Nitrogen, Nitrate	<0.025	0.025	0.025 U	Dry	0.025	Dry	0.025 U	0.025 U	0.025 U	0.025 U	0.05	0.028
Phosphorus, Total	0.11	<0.05	0.065	Dry	0.059	Dry	0.05 U	0.05 U	0.09	0.068	0.118	0.07
Sulfate	0.256	3.63	0.76	Dry	2.95	Dry	1.48	0.299	0.51	0.34	0.14	0.31
Iron	1.007	0.2376	0.4529	Dry	0.2271	Dry	0.476	0.666	0.591	1.22	2.39	3.019
Specific Conductivity	448	287	322	Dry	301	Dry	172	359	135	270	359	506
Turbidity	3.31	0.58	0.77	Dry	0.59	Dry	0.78	0.945	0.9	1.26	5.3	22.8
pH	6.74	6.84	6.67	Dry	7.04	Dry	6.56	6.73	6.47	6.43	7.01	7.35
Temperature	12.5	15.8	18.1	Dry	18.7	Dry	25.3	25.8	26.6	24.9	23.2	19.3
<u>2003 Monthly Analytical Results (mg/L)</u>												
Chloride	23.7	29.7	38	28.4	38	26.3	37.8	7.84	24.7	37.4	Dry	Dry
Nitrogen, Nitrate	<0.022	0.22	<0.022	<0.022	0.044	0.073	<0.022	<0.022	<0.022	<0.022	Dry	Dry
Phosphorus, Total	<0.05	0.06	0.11	0.15	<0.05	<0.05	<0.050	<0.05	0.07	<0.05	Dry	Dry
Sulfate	0.43	1.3	1.03	1.21	0.514	3	0.21	1.56	0.281	3.43	Dry	Dry
Iron	1.618	0.92	0.64	2.32	1.24	0.3015	2.04	0.28	1.06	0.427	Dry	Dry
Specific Conductivity	476	467	312	396	415	185	408	91	333	357	Dry	Dry
Turbidity	6.64	2.18	0.06	21	1.6	1.08	8.02	2.43	2.05	1.09	Dry	Dry
pH	6.7	7	7.25	6.62	6.78	6.65	7.06	6.54	6.84	7.01	Dry	Dry
Temperature			26.6	21.3		23.7	21.9	24.3	25	23.2	Dry	Dry
<u>2002 Monthly Analytical Results (mg/L)</u>												
Chloride	85	85	48	Dry	Dry	32.1	28.3	33.5	45.7	Dry	Dry	28.2
Nitrogen, Nitrate	<0.02	BDL	BDL	Dry	Dry	<0.01	<0.01	<0.022	<0.022	Dry	Dry	<0.022
Phosphorus, Total	0.06	0.07	0.08	Dry	Dry	<0.05	<0.05	<0.05	<0.05	Dry	Dry	<0.05
Sulfate	6.67	0.24	0.34	Dry	Dry	1.91	0.27	2.6	0.41	Dry	Dry	8.74
Iron	0.1962	0.7048	2.52	Dry	Dry	0.526	1.3	0.47	1.04	Dry	Dry	0.2
Specific Conductivity	383	600	500	Dry	Dry	249	309	248	342	Dry	Dry	223
Turbidity	0.78	0.79	3.7	Dry	Dry	0.48	0.87	1	1.62	Dry	Dry	3.61
pH	6.39	6.47	6.4	Dry	Dry	5.72	5.83	6.38	6.55	Dry	Dry	5.7
<u>2001 Monthly Analytical Results (mg/L)</u>												
Chloride	Dry	Dry	Dry	Dry	Dry	18.5	21.8	27.4	95.2	49.9	18.9	Dry
Nitrogen, Nitrate	Dry	Dry	Dry	Dry	Dry	BDL	BDL	BDL	BDL	BDL	BDL	Dry
Phosphorus, Total	Dry	Dry	Dry	Dry	Dry	0.09	0.12	0.15	BDL	BDL	0.27	Dry
Sulfate	Dry	Dry	Dry	Dry	Dry	7.02	1.18	0.32	7.95	0.39	0.89	Dry
Iron	Dry	Dry	Dry	Dry	Dry	0.51	0.82	1.76	1.14	1.18	3.1	Dry
Specific Conductivity	Dry	Dry	Dry	Dry	Dry	573	204	307	252	461	466	Dry
Turbidity	Dry	Dry	Dry	Dry	Dry	1.4	0.4	1.2	0.73	1.5	11	Dry
pH	Dry	Dry	Dry	Dry	Dry	6.18	6.3	6.05	6.21	6.63	6.47	Dry

Source: OUC, 2005.

Table 2.3-9. Cowpen Branch Water Quality at Stanton Site

Parameter	January	February	March	April	May	June	July	August	September	October	November	December
2005 Monthly Analytical Results (mg/L)												
Chloride	Dry	Dry	Dry	Dry	Dry	8.04	Dry	Dry	Dry	3.05		
Nitrogen, Nitrate	Dry	Dry	Dry	Dry	Dry	0.025 U	Dry	Dry	Dry	0.025 U		
Phosphorus, Total	Dry	Dry	Dry	Dry	Dry	0.028	Dry	Dry	Dry	0.02 U		
Sulfate	Dry	Dry	Dry	Dry	Dry	4.51	Dry	Dry	Dry	0.643		
Iron	Dry	Dry	Dry	Dry	Dry	0.291	Dry	Dry	Dry	0.15		
Specific Conductivity	Dry	Dry	Dry	Dry	Dry	55	Dry	Dry	Dry	25		
Turbidity	Dry	Dry	Dry	Dry	Dry	4.11	Dry	Dry	Dry	3.35		
pH	Dry	Dry	Dry	Dry	Dry	5.88	Dry	Dry	Dry	6.01		
Temperature	Dry	Dry	Dry	Dry	Dry	28.5	Dry	Dry	Dry	27		
2004 Monthly Analytical Results (mg/L)												
Chloride	Dry	20.7	11.9	Dry	7.23	Dry	5.47	Dry	13.9	27.1	Dry	Dry
Nitrogen, Nitrate	Dry	0.025	0.025 U	Dry	0.149	Dry	0.025 U	Dry	0.025 U	0.025 U	Dry	Dry
Phosphorus, Total	Dry	<0.05	0.05 U	Dry	0.052	Dry	0.05 U	Dry	0.05 U	0.063	Dry	Dry
Sulfate	Dry	11.1	3.05	Dry	2.56	Dry	2.06	Dry	1.15	0.88	Dry	Dry
Iron	Dry	0.1477	0.1919	Dry	0.3059	Dry	0.3945	Dry	0.853	0.68	Dry	Dry
Specific Conductivity	Dry	110	60	Dry	53	Dry	33	Dry	61	94	Dry	Dry
Turbidity	Dry	4.62	1.21	Dry	1.51	Dry	2.03	Dry	0.91	1.5	Dry	Dry
pH	Dry	6.57	4.85	Dry	5.25	Dry	5	Dry	5.6	5.86	Dry	Dry
Temperature	Dry	18.5	21.6	Dry	21.3	Dry	28.3	Dry	28	26.4	Dry	Dry
2003 Monthly Analytical Results (mg/L)												
Chloride	Dry	Dry	Dry	Dry	Dry	7.68	Dry	6	Dry	Dry	Dry	Dry
Nitrogen, Nitrate	Dry	Dry	Dry	Dry	Dry	0.196	Dry	<0.022	Dry	Dry	Dry	Dry
Phosphorus, Total	Dry	Dry	Dry	Dry	Dry	<0.05	Dry	<0.05	Dry	Dry	Dry	Dry
Sulfate	Dry	Dry	Dry	Dry	Dry	1.87	Dry	5.48	Dry	Dry	Dry	Dry
Iron	Dry	Dry	Dry	Dry	Dry	0.2717	Dry	0.5	Dry	Dry	Dry	Dry
Specific Conductivity	Dry	Dry	Dry	Dry	Dry	49	Dry	40	Dry	Dry	Dry	Dry
Turbidity	Dry	Dry	Dry	Dry	Dry	1.68	Dry	1.14	Dry	Dry	Dry	Dry
pH	Dry	Dry	Dry	Dry	Dry	5.17	Dry	5.5	Dry	Dry	Dry	Dry
Temperature				Dry		26.7	Dry	25.7	Dry	Dry	Dry	Dry
2002 Monthly Analytical Results (mg/L)												
Chloride	Dry	Dry	Dry	Dry	Dry	31.3	Dry	16.3	Dry	Dry	Dry	26.7
Nitrogen, Nitrate	Dry	Dry	Dry	Dry	Dry	0.02	Dry	<0.022	Dry	Dry	Dry	<0.022
Phosphorus, Total	Dry	Dry	Dry	Dry	Dry	<0.05	Dry	<0.05	Dry	Dry	Dry	<0.05
Sulfate	Dry	Dry	Dry	Dry	Dry	2.35	Dry	14.7	Dry	Dry	Dry	8.47
Iron	Dry	Dry	Dry	Dry	Dry	0.716	Dry	0.35	Dry	Dry	Dry	0.19
Specific Conductivity	Dry	Dry	Dry	Dry	Dry	133	Dry	102	Dry	Dry	Dry	151
Turbidity	Dry	Dry	Dry	Dry	Dry	0.6	Dry	0.77	Dry	Dry	Dry	8.74
pH	Dry	Dry	Dry	Dry	Dry	4.74	Dry	5.28	Dry	Dry	Dry	4.68
2001 Monthly Analytical Results (mg/L)												
Chloride	Dry	Dry	Dry		Dry	Dry	36.7	Dry	Dry	Dry	Dry	Dry
Nitrogen, Nitrate	Dry	Dry	Dry		Dry	Dry	BDL	Dry	Dry	Dry	Dry	Dry
Phosphorus, Total	Dry	Dry	Dry		Dry	Dry	0.12	Dry	Dry	Dry	Dry	Dry
Sulfate	Dry	Dry	Dry		Dry	Dry	1.91	Dry	Dry	Dry	Dry	Dry
Iron	Dry	Dry	Dry		Dry	Dry	1.06	Dry	Dry	Dry	Dry	Dry
Specific Conductivity	Dry	Dry	Dry		Dry	Dry	149	Dry	Dry	Dry	Dry	Dry
Turbidity	Dry	Dry	Dry		Dry	Dry	0.4	Dry	Dry	Dry	Dry	Dry
pH	Dry	Dry	Dry		Dry	Dry	5.27	Dry	Dry	Dry	Dry	Dry

Source: OUC, 2005.

Table 2.3-10. Green Branch Water Quality at Stanton Site

Parameter	January	February	March	April	May	June	July	August	September	October	November	December
2005 Monthly Analytical Results (mg/L)												
Chloride	450	24.2	36.8	300	300	180	223	485	Dry	180		
Nitrogen, Nitrate	0.025 U	0.025 U	0.025 U	0.025 U	0.04	0.025 U	0.025 U	0.025 U	Dry	0.118		
Phosphorus, Total	0.032	0.057	0.064 V J4	0.074 V J4	0.033 V, I	2.15	0.216	0.0952	Dry	0.02 U		
Sulfate	87.8	64.5	70.5	55	88	50	42	63.7	Dry	90		
Iron	0.2567	0.589	0.438	0.402	13.5	0.912	1.18	1.29	Dry	0.99		
Specific Conductivity	1426	1026	1481	1070	1133	727	1432	180	Dry	1032		
Turbidity	1.55	0.45	0.96	0.352	19.9	7.92	4.17	3.08	Dry	1.35		
pH	4.52	4.53	4.63	4.34	4.34	4.39	4.32	4.16	Dry	4.6		
Temperature	18.5	16.6	15.5	21.2	22.6	25.6	28.7	30.7	Dry	27.5		
2004 Monthly Analytical Results (mg/L)												
Chloride	475	249	96.2	414	286	Dry	53.2	272	33.9	113	184	450
Nitrogen, Nitrate	<0.025	0.19	0.025 U	0.042	0.025	Dry	0.025 U	0.025 U	0.025 U	0.025 U	0.14	0.025 U
Phosphorus, Total	<0.05	<0.05	0.05 U	0.06	0.052	Dry	0.05 U	365.4	0.09	<0.05 U	0.053	0.02
Sulfate	200	111	36.4	101	63	Dry	17.3	44.6	11.1	41.5	48.9	74
Iron	0.3226	0.2095	0.4856	0.6348	1.255	Dry	1.04	0.4512	1.6	0.54	0.318	0.2615
Specific Conductivity	1797	978	20.9	1466	1143	Dry	174	765	133	407	654	1477
Turbidity	0.4	0.49	0.67	2	2.12	Dry	0.839	0.293	0.95	0.61	0.75	1.81
pH	4.46	4.27	4.63	4.4	4.65	Dry	4.33	6.39	4.89	4.33	4.64	4.99
Temperature	14.2	17.8	20.9	24	22.3	Dry	29	27.3	27.8	26.7	25.4	20.5
2003 Monthly Analytical Results (mg/L)												
Chloride	176	217	88	117	83.2	96.6	120	12.3	130	216	374	356
Nitrogen, Nitrate	<0.022	<0.022	<0.022	<0.022	0.027	0.169	<0.022	<0.022	<0.022	<0.022	0.111	<0.022
Phosphorus, Total	<0.05	<0.05	<0.1	0.15	<0.05	<0.05	<0.050	<0.05	<0.05	<0.05	<0.05	<0.05
Sulfate	89	121	32	45.2	38.8	36.9	38.7	1.1	56	87	96	118
Iron	0.3058	0.41	0.68	0.55	1.142	0.5344	1.32	0.7	0.6	0.4395	1.39	0.2632
Specific Conductivity	854	1005	357	546	424	409	550	74	512	870	1313	1297
Turbidity	2.7	1.8	0.45	0.356	1.11	0.65	0.59	0.92	0.61	0.5	6.2	0.47
pH	4.79	4.5	4.49	4.21	4.38	4.89	4.08	5	4.53	4.34	4.44	4.45
Temperature			29.8	23.4		25.6	28.4	26.4	26.6	24.1	27.3	15.6
2002 Monthly Analytical Results (mg/L)												
Chloride	155	180	104	Dry	Dry	57.1	28	91.2	35.1	162	Dry	132
Nitrogen, Nitrate	<0.02	BDL	BDL	Dry	Dry	0.02	<0.01	<0.022	<0.022	<0.022	Dry	<0.022
Phosphorus, Total	<0.05	0.051	0.07	Dry	Dry	<0.05	<0.05	<0.05	<0.05	0.05	Dry	<0.05
Sulfate	80	81.2	37.4	Dry	Dry	46	12.8	56.1	16.9	58.2	Dry	68.4
Iron	0.2909	0.3716	0.53	Dry	Dry	1.76	1.56	0.68	1.04	0.49	Dry	0.51
Specific Conductivity	453	708	166	Dry	Dry	274	153	431	185	648	Dry	647
Turbidity	0.57	2	0.75	Dry	Dry	0.6	0.43	0.72	0.53	0.67	Dry	0.66
pH	4.56	4.01	4.27	Dry	Dry	3.73	4.35	1.31	4.28	3.3	Dry	3.62
2001 Monthly Analytical Results (mg/L)												
Chloride	Dry	Dry	Dry		Dry	Dry	83	57.7	89.5	163	170	210
Nitrogen, Nitrate	Dry	Dry	Dry		Dry	Dry	BDL	BDL	BDL	BDL	BDL	<0.02
Phosphorus, Total	Dry	Dry	Dry		Dry	Dry	0.12	0.11	BDL	BDL	0.29	0.17
Sulfate	Dry	Dry	Dry		Dry	Dry	80.1	20.5	8.73	78.8	77	90
Iron	Dry	Dry	Dry		Dry	Dry	1.46	1.63	1.08	0.5	0.68	0.7
Specific Conductivity	Dry	Dry	Dry		Dry	Dry	453	264	299	655	586	532
Turbidity	Dry	Dry	Dry		Dry	Dry	0.95	0.5	0.4	0.5	1.3	0.8
pH	Dry	Dry	Dry		Dry	Dry	4.44	4.43	4.29	4.21	4.36	4.23

Source: OUC, 2005.

proposed Unit B power block, the existing coal storage area, and the existing solid waste disposal area (landfill). The proposed transmission line interconnect is addressed in Chapter 6.0 of this application.

2.3.5.2 Descriptions of Vegetation and Land Use

Figure 2.3-17 illustrates the vegetation and land cover for the Stanton site and immediate vicinity. This figure shows the current vegetation/land cover communities as well as existing land uses according to Level III of the Florida Land Use, Cover and Forms Classification System (FLUCFCS) from the Florida Department of Transportation (FDOT) (1999). Figure 2.3-18 shows the FLUCFCS Level III vegetation/land use cover types out to a 5-mile radius of the site.

The entire Stanton property is primarily comprised of the following land use/cover types:

FLUCFCS Category	Description
211	Improved pastures (monoculture, planted forage crops)
310	Herbaceous upland nonforested
320	Shrub and brushland (wax myrtle or saw palmetto, occasionally scrub)
330	Mixed upland nonforested
411	Pine flatwoods
530	Reservoirs—pits, retention ponds, dams
617	Mixed wetland hardwoods
621	Cypress
630	Wetland forested mixed
641	Freshwater marshes
643	Wet prairies
644	Emergent aquatic vegetation
646	Mixed scrub-shrub wetland
831	Electrical power facilities
832	Electrical power transmission lines
835	Solid waste disposal

Overall Stanton Site

The land covers associated with the undeveloped portions of the Stanton site generally consist of typical central Florida uplands and wetlands. The predominant upland vegetation cover type is pine flatwoods (FLUCFCS 411).

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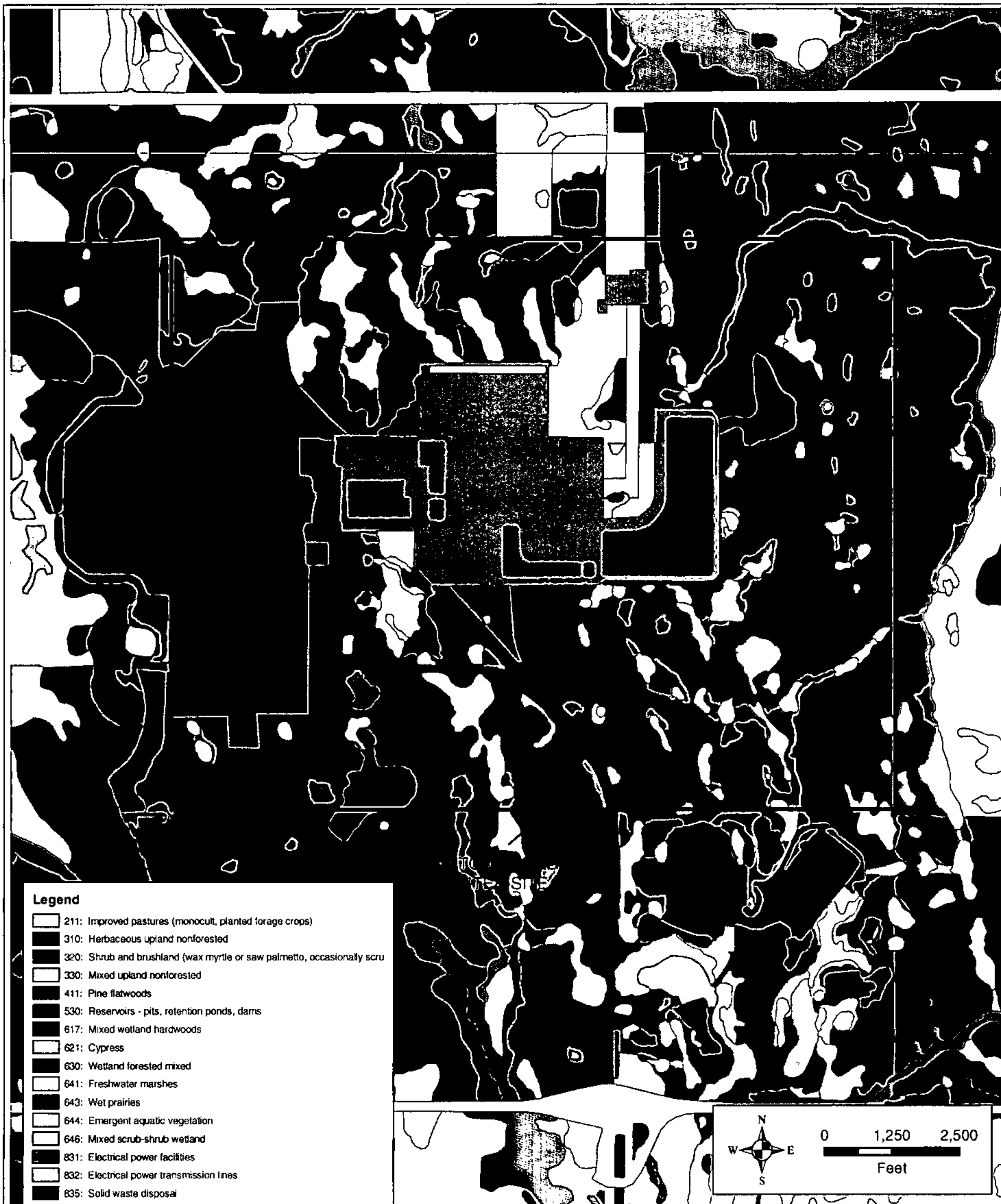

FIGURE 2.3-17.
VEGETATION/LAND USE COVER CLASSIFICATIONS FOR STANTON ENERGY CENTER SITE

Sources: SJRWMD, 2005; ECT, 2005.

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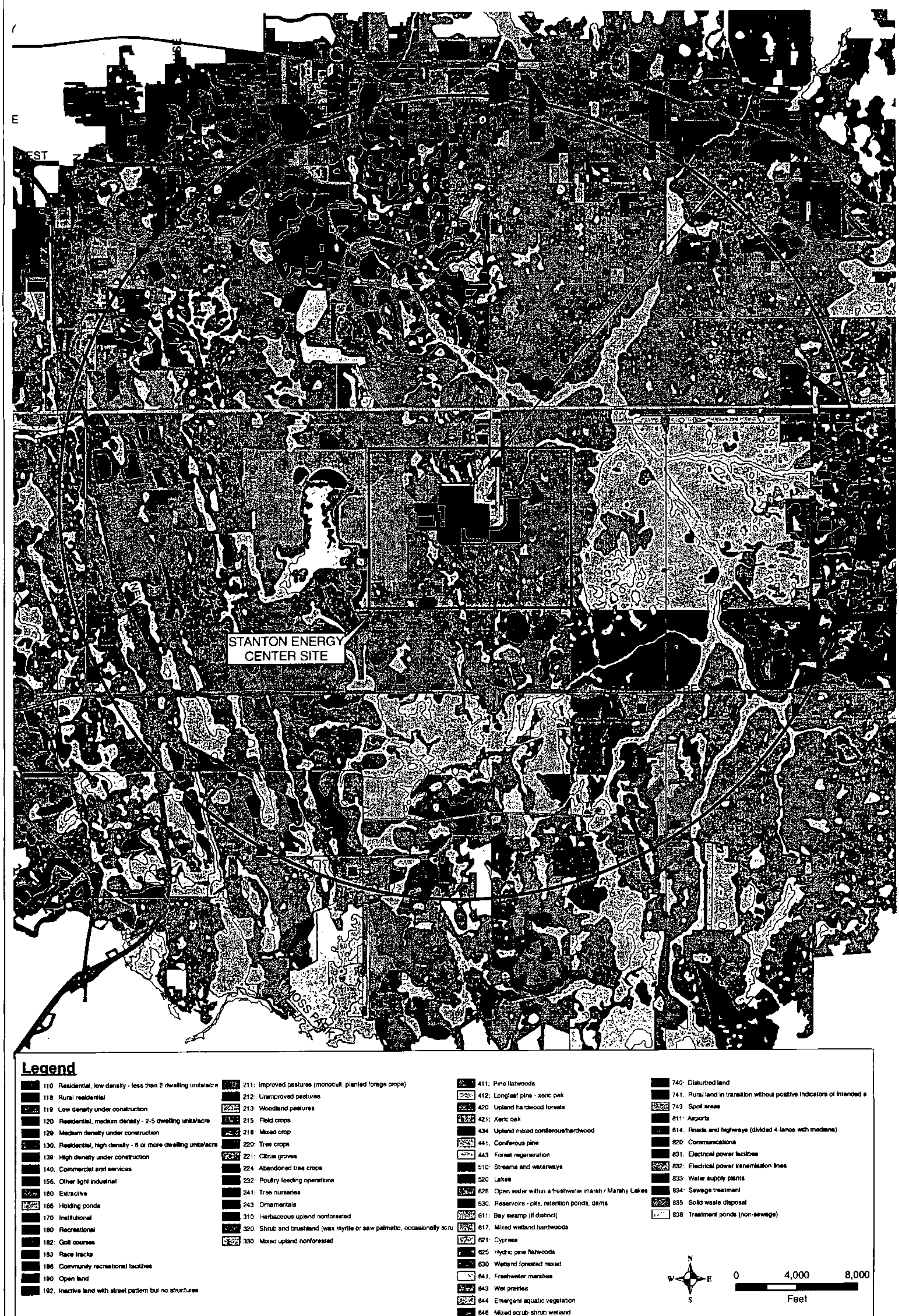

FIGURE 2.3-18.
VEGETATION/LAND USE COVER CLASSIFICATIONS WITHIN A 5-MILE RADIUS OF THE STANTON SITE

Sources: SJRWMD, 2005; SFWMD, 2005; ECT, 2005.

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Pine flatwoods is an upland community with flat to slightly sloping topography and well to moderately well drained soils. Pine flatwoods is a fire climax community (i.e., the plant community condition/seral stage is maintained by the advent of periodic fires). The pine flatwoods onsite are being burned at periodic intervals to maintain their natural state. Longleaf pine (*Pinus palustris*) is the characteristic canopy tree species in the flatwoods. The extremely open overstory allows development of a rich understory of shrubs and herbaceous species. Saw palmetto (*Serenoa repens*) is the most abundant shrub in the flatwoods. Other common shrub species within the flatwoods include coastal plain staggerbush (*Lyonia fruticosa*), shiny lyonia (*Lyonia lucida*), paw paw (*Asimina reticulata*), shiny blueberry (*Vaccinium myrsinites*), blue huckleberry (*Gaylussacia frondosa*), gopher apple (*Licania michauxii*), and gallberry (*Ilex glabra*). Wiregrass (*Aristida beyrichiana*) dominates the herbaceous layer but is accompanied by a diverse array of herbaceous species, such as black root (*Pterocaulon pycnostachyum*), roundpod St. John's-wort (*Hypericum cistifolium*), white-topped aster (*Oclemna reticulatus*), grassleaf roseling (*Callisia graminea*), broomsedge (*Andropogon virginicus*), whitehead bogbuttons (*Lachnocaulon anceps*), yellow star grass (*Hypoxis lutea*), yellow and orange milkworts (*Polygala rugellii* and *P. lutea*), bracken fern (*Pteridium aquilinum*), and Adam's needle (*Yucca filamentosa*).

As evidenced by Figure 2.3-17, there are also other upland vegetation cover types including improved pasture (FLUCFCS 211), herbaceous upland nonforested (FLUCFCS 310), shrub and brushland (FLUCFCS 320), and mixed upland nonforested (FLUCFCS 330).

Improved pasture is composed of land that has been cleared, tilled, reseeded with forage grasses, and managed for livestock grazing. Bahia grass (*Paspalum notatum*) is the dominant forage grass cover. Areas of former pasture, which were abandoned and are being reclaimed by native grasses and other pioneer vegetation, can be referred to as herbaceous upland nonforested communities or herbaceous rangeland. Herbaceous rangeland consists of open, grassy areas, which are either naturally occurring within pine flatwoods or resulted from manmade disturbances. These open areas may contain occasional longleaf pine or pond pine (*Pinus serotina*) in the canopy and shrubs such as wax myrtle

(*Myrica cerifera*), groundsel (*Baccharis halimifolia*), and gallberry in the understory. The ground layer consists of a mixture of native grasses, forbes, composites, legumes, and other typical flatwoods vegetation such as broomsedge, slender goldenrod (*Euthamia caroliniana*), bahia grass, common carpetgrass (*Axonopus furcatus*), camphorweeds (*Pluchea* spp.), black root, dog fennel (*Eupatorium capillifolium*), ticktrefoil (*Desmodium incanum*), oakleaf fleabane (*Erigeron quercifolius*), greenbrier (*Smilax auriculata*), climbing hempvine (*Mikania scandens*), prickley pear cactus (*Opuntia humifusa*), and Nuttall's thistle (*Cirsium nutallii*).

Shrub and brushland includes treeless areas dominated by the growth of one or more species of shrubs such as saw palmetto, wax myrtle, and gallberry. The most prevalent plant cover associated with this community type is saw palmetto. Where saw palmetto is the dominant, this community type resembles pine flatwoods without the pine canopy. When more than one third intermixture of either grassland or shrub-brushland range species occurs, the classification is changed to mixed upland nonforested or mixed rangeland. Mixed rangeland may have occasional longleaf pine in the overstory. The understory layers consist of a moderately dense shrub layer and open ground layer. The shrub layer is typically dominated by wax myrtle. Other shrub layer associates can include groundsel, shiny lyonia, shiny blueberry, Darrow's blueberry (*Vaccinium darrowii*), and gallberry. Due to shading from the shrub layer, the ground stratum is typically not densely vegetated. Typical ground stratum plants can include needlepod rush (*Juncus scirpoides*), orange and yellow milkworts, Elliott's milkpea (*Galactia elliottii*), whitehead bogbuttons, wiregrass, fourpetal St. John's-wort (*Hypericum tetrapetalum*), yellow star grass, broomsedge, black root, vanilla leaf (*Carphephorus odoratissimus*), ticktrefoil, pink sundew (*Drosera capillaris*), gopher apple, St. Andrew's-cross (*Hypericum hypericoides*), Mohr's thoroughwort (*Eupatorium mohrii*), and occasional club-mosses (*Lycopodiella* spp.) and lichens such as reindeer moss (*Cladonia* sp.).

No wetlands occur within the developed portions of the Stanton site. However, wetlands do occur within the remaining, undeveloped areas, including the northern buffer area. The site's wetlands within the buffer areas are interspersed within the pine flatwoods community type. Wetlands can be mostly characterized as linear strand formations oriented north to south across the property. The more common wetlands occurring within the northern-most undeveloped area of the Stanton site are pond cypress swamp (FLUCFCS 621), pond pine swamp (FLUCFCS 630-Wetland Forested Mixed), mixed bay swamp (FLUCFCS 617-Mixed Wetland Hardwoods), and oak hammock (FLUCFCS 617-Mixed Wetland Hardwoods) strands. In addition to the FLUCFCS map (Figure 2.3-17), Figure 2.3-19 also shows these wetlands based on the National Wetlands Inventory (NWI) mapping.

Pond cypress swamp strands are stillwater swamp communities in either circular or linear depressions that are flooded for most of the year. The vegetation is dominated by a canopy of pond cypress (*Taxodium ascendens*) but also includes pond pine, swamp tupelo (*Nyssa biflora*), and sweetbay magnolia (*Magnolia virginiana*). The understory ranges from dense to somewhat open and includes wax myrtle, St. John's wort (*Hypericum fasciculatum*), shiny lyonia, dahoon holly (*Ilex cassine*), and gallberry. Characteristic species of the ground cover include beak rushes (*Rhynchospora* spp.), sphagnum moss (*Sphagnum* spp.), sawgrass (*Cladium jamaicense*), tenangle pipewort (*Eriocanlon decangulare*), grape (*Vitus rotundifolia*), greenbriers (*Smilax* spp.), and net-vein chain fern (*Woodwardia virginica*).

Pond pine swamp strand is a wetland community that is typically dominated by pond pine, which occurs on wetter flats with acidic soils. The understory is dominated by gallberry and saw palmetto. The ground cover is sparse, except for sphagnum moss, because of the dense shrub and tree canopies.

Mixed bay swamp strand is a wetland community with flat to slightly sloping topography, which may be inundated for up to 6 months per year. The tree canopy is dominated by sweetbay magnolia and loblolly bay (*Gordonia lasianthus*), but other wetland hardwoods are also present. The understory and ground cover plants present in bay swamp are similar to those in the cypress swamp, except for bay species (sweetbay magnolia, loblolly bay, and red bay [*Persea palustris*]) present in the understory.

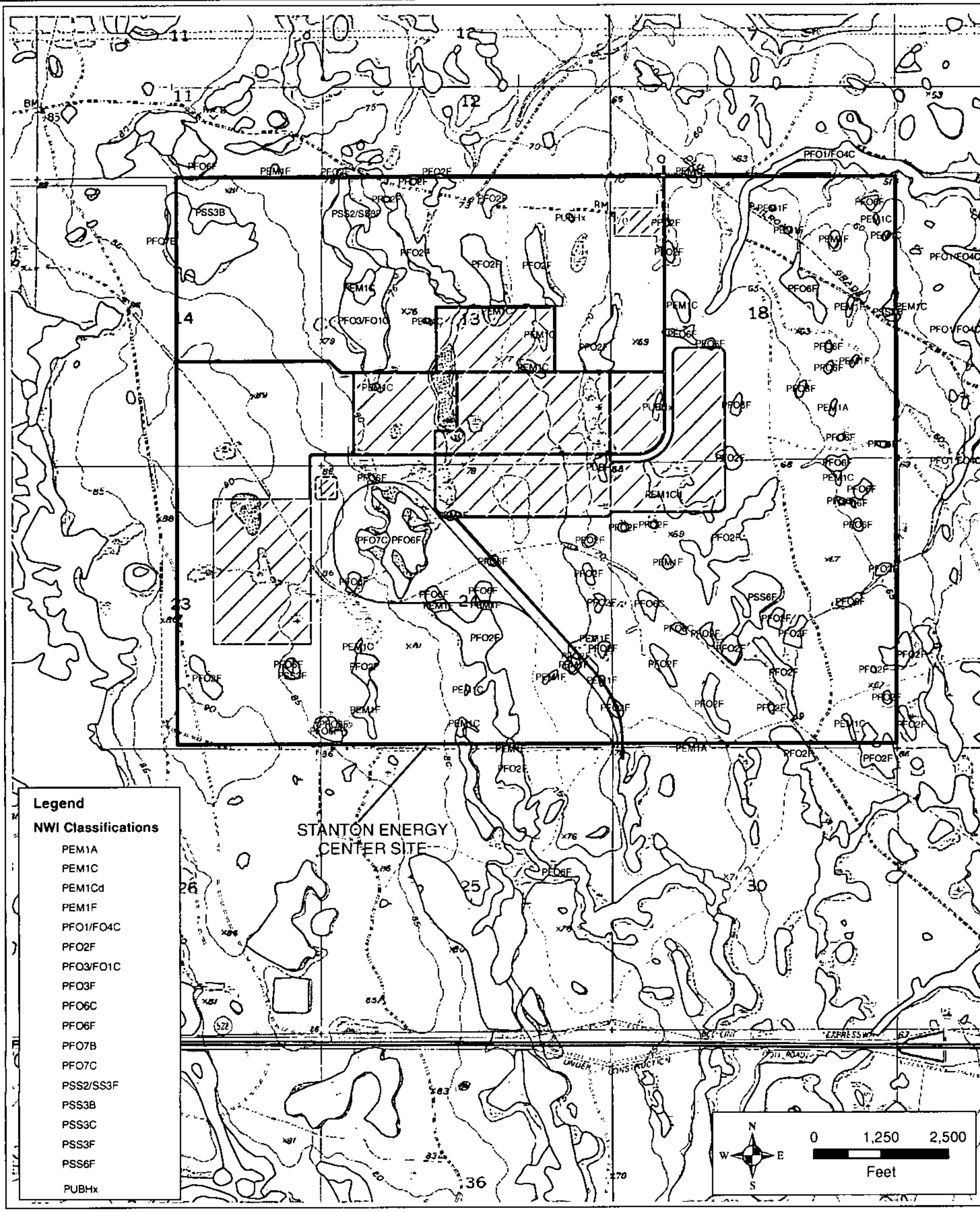

FIGURE 2.3-19.
NWI MAP FOR STANTON ENERGY CENTER SITE

Sources: USGS Quads: Oviedo SW and Narcoossee NW, FL, 1980; Orange County NWI data, 2005.

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Oak hammock strand is a wetland community with flat to slightly sloping topography, which may be flooded for up to 6 months per year. The canopy is dominated by water oak (*Quercus nigra*). Other trees present include red maple (*Acer rubrum*), cabbage palm (*Sabal palmetto*), sweetbay magnolia, and live oak (*Quercus virginiana*). The understory is dominated by wax myrtle and also includes persimmon (*Diospyros virginiana*). The ground layer is characterized by a dense cover of mesic herbaceous species such as broomsedge and bottlebrush threeawn (*Aristida spiciformis*).

The surrounding edges of the referenced swamp systems also support nonforested wetlands, such as freshwater marshes (FLUCFCS 641), wet prairies (FLUCFCS 643), emergent aquatic vegetation (FLUCFCS 644), and mixed scrub-shrub wetlands (FLUCFCS 646). Freshwater marshes are treeless wetlands, which are seasonally flooded and vegetated by emergent wetland species. Some areas of freshwater marsh are dominated by the growth of St. John's wort. However, most of the freshwater marsh is vegetated by a mixture of wetland plants such as coinwort (*Centella asiatica*), sedges (*Cyperus surinamensis*, *C.* spp.), mermaid's weed (*Prosepinaca pectinata*), camphorweeds, grassleaf arrowhead (*Sagittaria graminea*), beak sedges, marsh pennywort (*Hydrocotyle umbellata*), spike rush (*Eleocharis baldwinii*), lemon bacopa (*Bacopa caroliniana*), rushes (*Juncus marginatus*, *J. megacephalus*, *J.* spp.), marsh pink (*Sabatia grandiflora*), giant whitetop sedge (*Rhychospora latifolia*), southern umbrellasedge (*Fuirena scirpoidea*), and tenangle pipewort. Wet prairies are typically shallower than the deeper freshwater marshes and are vegetated by a variety of grasses and forbes such as wiregrass, blue maidencane (*Amphicarpum muhlenbergianum*), dichanthelium grasses (*Dichanthelium* spp.), colic root (*Aletris lutea*), sedges, and rushes. Emergent aquatic vegetation communities are deeper zones of freshwater marshes that support the growth of both floating vegetation and vegetation that occurs either partially or completely under the water's surface. An example of emergent aquatic vegetation is floating white water lily (*Nymphaea odorata*). Mixed scrub-shrub wetlands are similar to marshes and wet prairies, except for the presence of a dense to moderately dense shrub layer of wax myrtle and/or willow (*Salix caroliniana*).

As seen in the NWI map (Figure 2.3-19), the previously described forested wetlands are all classified as Palustrine Forested (PFO) systems. There are also smaller areas of the aforementioned nonforested Palustrine shrub swamp (PSS) and Palustrine emergent (PEM) wetland types as well.

Both the original Units 1 and 2 SCA and the Unit A Supplemental SCA provide detailed inventories of plant species found throughout the entire Stanton property.

Stanton Unit B Site Areas

The areas of the Stanton site that will be affected by the Unit B facilities (other than the transmission line interconnection [see Chapter 6.0]) include only three of these FLUCFCS land cover classifications: 831, 832, and 835. These are described in the following paragraphs, based on surveys conducted in November 2005.

Solid Waste Disposal Area (FLUCFCS 835)

The existing solid waste storage site is an area which was historically altered from its native pine flatwoods condition for use in the storage of wastes generated from the existing Stanton power generating facility. The southeastern corner of the site is actively being utilized for waste disposal. The remainder of the site consists of berms/side slopes along ditches/swales and ruderal wetland/upland cover. The northern boundary of the site contains an unpaved access road, which slopes down into the adjacent drainage swale/ditch. The other borders consist of a larger drainage ditch with steep sides or a smaller ditch/swale system.

The majority of the highly altered site consists of mixed ruderal wetland/upland cover. This mixed plant association mostly supports the growth of an open overstory with occasional trees such as pond pine (*Pinus serotina*), slash pine (*Pinus elliottii*), longleaf pine (*Pinus palustris*), camphor tree (*Cinnamomum camphora*), eastern cedar (*Juniperus virginiana*), Chinese tallow tree (*Sapium sebiferum*), and cabbage palm (*Sabal palmetto*). The understory has an open cover of shrubs such as wax myrtle (*Myrica cerifera*), saw palmetto (*Serenoa repens*), groundsel tree (*Baccharis halimifolia*), saltwater falsewillow (*Baccharis angustifolia*), fetterbush (*Lyonia lucida*), and Brazilian pepper (*Schinus tere-*

binthifolius). The ground layer contains a mixture of upland and wetland grasses and herbs such as slender goldenrod (*Euthamia caroliniana*), dogfennel (*Eupatorium capillifolium*), false fennel (*Eupatorium leptophyllum*), narrowleaf yellowtops (*Flaveria linearis*), narrowleaf silkgrass (*Pityopsis graminifolia*), sweetbroom (*Scoparia dulcis*), St.-John's-worts (*Hypericum tetrapetalum, H. cistifolium, H. fasciculata, H. hypericoides*), coinwort (*Centella asiatica*), beardgrasses (*Andropogon* spp.), purple lovegrass (*Eragrostis spectabilis*), rustweed (*Polypremum procumbens*), Indian cupscale (*Sacciolepis indica*), bladderpod (*Sesbania vesicaria*), needlepod rush (*Juncus scirpoides*), pinebarren goldenrod (*Solidago fistulosa*), annual saltmarsh aster (*Aster subulatus*), capeweed (*Phyla nodiflora*), soft rush (*Juncus effusus*), Elliott's milkpea (*Galactia elliottii*), pineland rayless goldenrod (*Bigelowia nudata*), Mohr's thoroughwort (*Eupatorium mohrii*), woolly witchgrass (*Dichanthelium scabriusculum*), black-eyed Susan (*Rudbeckia hirta*), toothpetal false reinorchid (*Habenaria floribunda*), Mexican primrosewillow (*Ludwigia octovalvis*), seaside goldenrod (*Solidago sempervirens*), haspan flatsedge (*Cyperus haspan*), bulltongue arrowhead (*Sagittaria lancifolia*), redroot (*Lachnanthes caroliana*), spangletop (*Leptochloa* sp.), common carpetgrass (*Axonopus fissifolius*), blackroot (Pterocaulon pycnostachyum), pinebarren flatsedge (*Cyperus retrorsus*), seaside primrosewillow (*Ludwigia maritima*), lanceleaf rose gentian (*Sabatia difformis*), and smallfruit primrosewillow (*L. microcarpa*). Deer moss (Cladina evansii), a ground lichen, also occurs along the drier areas of the site.

The highest and driest ruderal areas occurring along the tops of side slopes and mounds are vegetated by common weedy upland plants such as common ragweed (*Ambrosia artemisiifolia*), beggarticks (*Bidens alba*), coastal sandbur (*Cenchrus incertus*), pinewoods fingergrass (*Eustachys petraea*), dogfennel, capeweed, sensitive pea (*Chamaecrista nictitans*), candlestick plant (*Senna alata*), and cogongrass (*Imperata cylindrica*).

The steep side slopes of the deeper ditches onsite also support trees such as camphor tree, eastern cedar, longleaf pine, swamp red bay (*Persea palustris*), and sweetbay (*Magnolia virginiana*); shrubs such as wax myrtle, groundsel tree, and saw palmetto; and herbs such as swamp flatsedge (*Cyperus ligularis*), manyflower marshpennywort (*Hydrocotyle um-*

bellata), needlepod rush, pinebarren goldenrod, climbing hempvine (*Mikania scandens*), torpedograss (*Panicum repens*), and creeping primrosewillow (*Ludwigia repens*).

The shallower ditches and swales on the site are dominated by wetland vegetation such as southern cattail (*Typha domingensis*), annual saltmarsh aster, pink sundew (*Drosera capillaris*), yellow-eyed grasses (*Xyris* spp.), beakrushes (*Rhynchospora* spp.), knotroot foxtail (*Setaria parviflora*), vaseygrass (*Paspalum urvillei*), roadgrass (*Eleocharis baldwinii*), purple spikerush (*Eleocharis atropurpurea*), needlepod rush, Indian cupscale, herb-of-grace (*Bacopa monnieri*), southern umbrellasedge (*Fuirena scirpoidea*), hairy umbrellasedge (*Fuirena squarrosa*), sweetscent (*Pluchea odorata*), climbing hempvine, shortbeak beaksedge (*Rhynchospora nitens*), Malaysian false pimpernel (*Lindernia crustacea*), dwarf St. John's-wort (*Hypericum mutilum*), manyflower marshpennywort, woolly witchgrass, marsh seedbox (*Ludwigia palustris*), largeflower rose gentian (*Sabatia grandiflora*), bushy bluestem (*Andropogon glomeratus*), coinwort, blue maidencane (*Amphicarpum muhlenbergianum*), foxtail club-moss (*Lycopodiella alopecuroides*), chalky bluestem (*Andropogon virginicus* var. *glaucus*), lax hornpod (*Mitreola petiolata*), hemlock witchgrass (*Dichanthelium portoricense*), Virginia buttonweed (*Diodia virginiana*), erectleaf witchgrass (*Dichanthelium erectifolium*), pinewoods fingergrass, marsh fimbry (*Fimbristylis spadicea*), torpedograss, purple spikerush, colicroot (*Aletris lutea*), and St. John's-wort.

Electrical Power Facilities (FLUCFCS 831 and 832)

The developed areas at the locations of the proposed power block and construction laydown/parking mostly consist of open, maintained fields as part of the existing Stanton Units 1, 2, and A. The herbaceous ground cover over the sandy/shell substrate supports a mixture of grasses and other weedy, opportunistic plants such as Bermuda grass (*Cynodon dactylon*), beggarticks, pinewoods fingergrass, capeweed, bahiagrass (*Paspalum notatum*), knotroot foxtail, marsh fimbry, common ragweed, sweetbroom, sensitive pea, tropical flatsedge (*Cyperus surinamensis*), and coastal sandbur. Swales located along roadsides and rail spurs are lower/wetter and dominated by wetland herbaceous plants such as torpedograss, roadgrass, herb-of-grace, purple spikegrass, annual saltmarsh aster, manyflower marshpennywort, and starrush whitetop (*Rhynchospora colorata*).

Figure 2.3-20 provides representative photographs of the more common FLUCFCS land covers occurring at the Stanton site.

2.3.6 ECOLOGY

The discussion of the Stanton site as well as the Unit B project areas' ecological resources are included in the following sections. Ecology descriptions for the Stanton site in general come from the SCAs for Units 1 and 2, Supplemental SCA for Unit A, ERP application for Unit A, and ECT's site reconnaissance conducted in the summer of 2005. All information is deemed to be accurate within 12 months.

2.3.6.1 Species Environmental Relationships

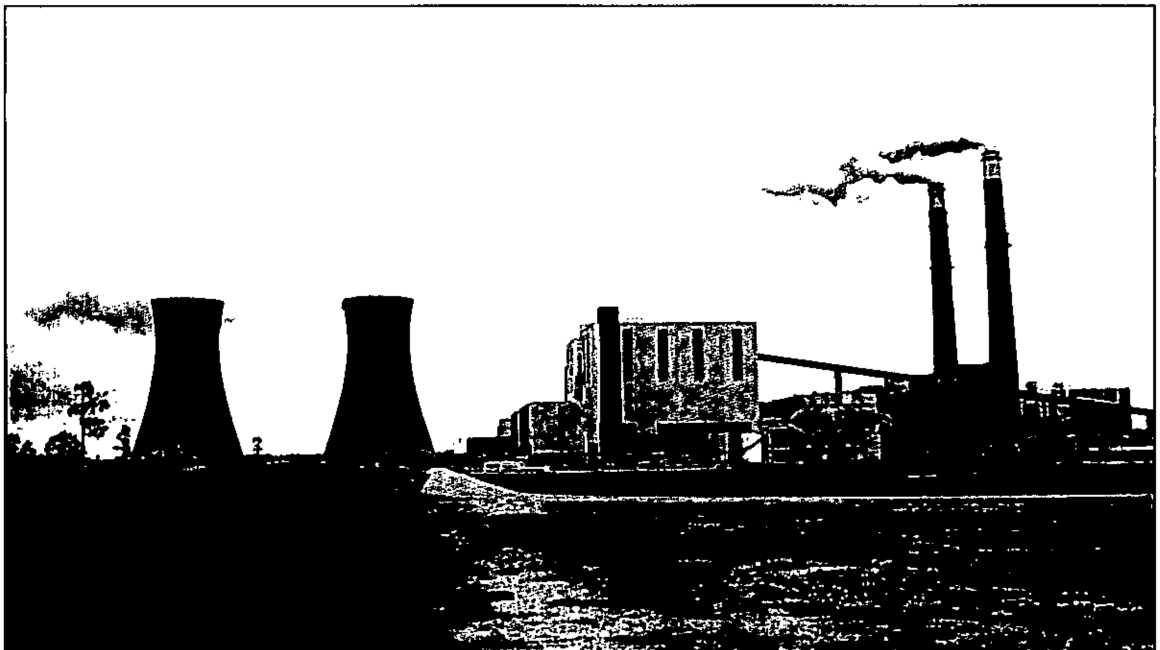
Surface Water Systems

Although some manmade ponds (FLUCFCS 530) do occur within the developed portion of the Stanton site, the site contains no significant surface water resources such as lakes, rivers, or streams.

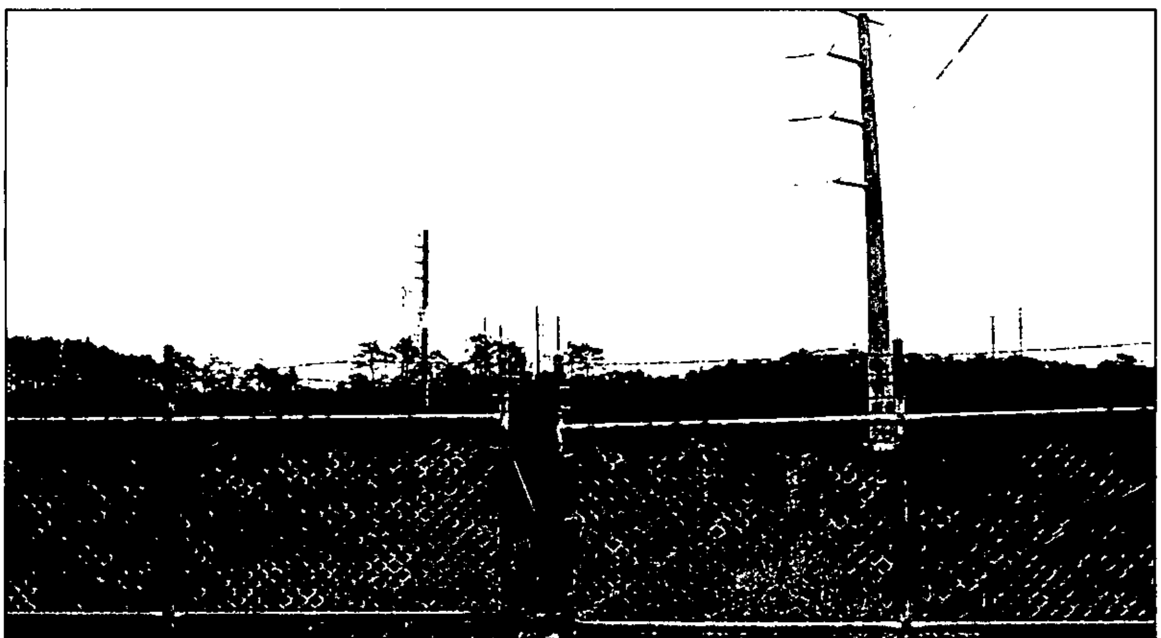
The nearest significant surface water resource is the Econlockhatchee River, approximately 1 mile away. This river falls within SJRWMD's Econlockhatchee subbasin, which is part of the Middle St. Johns River Basin. The watershed for the Big Econlockhatchee River is 38 miles long and 25 miles wide, including both Orange and Seminole Counties. The system is a blackwater river system and characterized by nearby level topography, poorly drained soils, and scattered swamps with limited flow. The Econlockhatchee River is designated as an *Outstanding Florida Water* (Section 62-302.700, F.A.C.).

The stretch of the river nearest the Stanton site has had biological water quality violations recently. These are typically Class III waters, and the violations centered on fecal coliform counts. The high counts are attributed to extensive cattle ranching operations farther south (upstream) of this vicinity.

Further downstream (north), the water quality improves, and the stream supports a large and diverse macroinvertebrate community and freshwater fisheries population. The river



A. Existing power plant facilities (FLUCFCS 831)



B. Existing transmission line interconnect (FLUCFCS 832)

FIGURE 2.3-20. (1 of 4)

PHOTOGRAPHS OF COMMON VEGETATION COMMUNITIES IN NORTHERN BUFFER AREA

Source: ECT, 2005.

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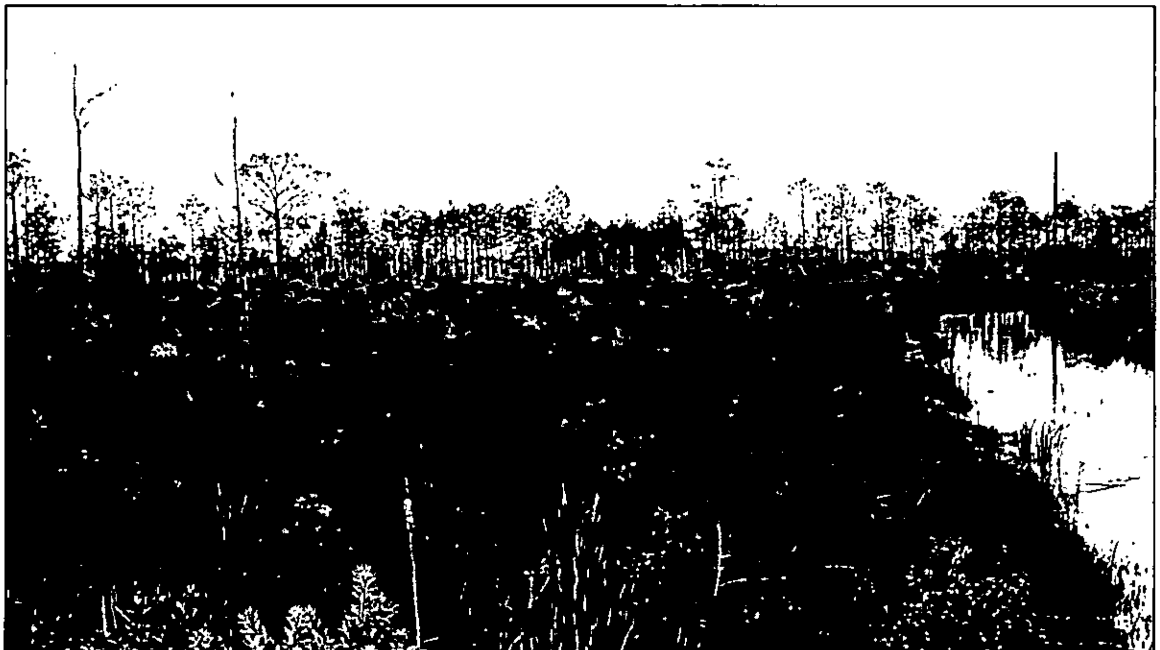

C. Freshwater marsh (FLUCFCS 641)

D. Wet prairie foreground (FLUCFCS 643) and pine flatwoods background (FLUCFCS 411)

FIGURE 2.3-20. (2 of 4)

PHOTOGRAPHS OF COMMON VEGETATION COMMUNITIES IN NORTHERN BUFFER AREA

Source: ECT, 2005.

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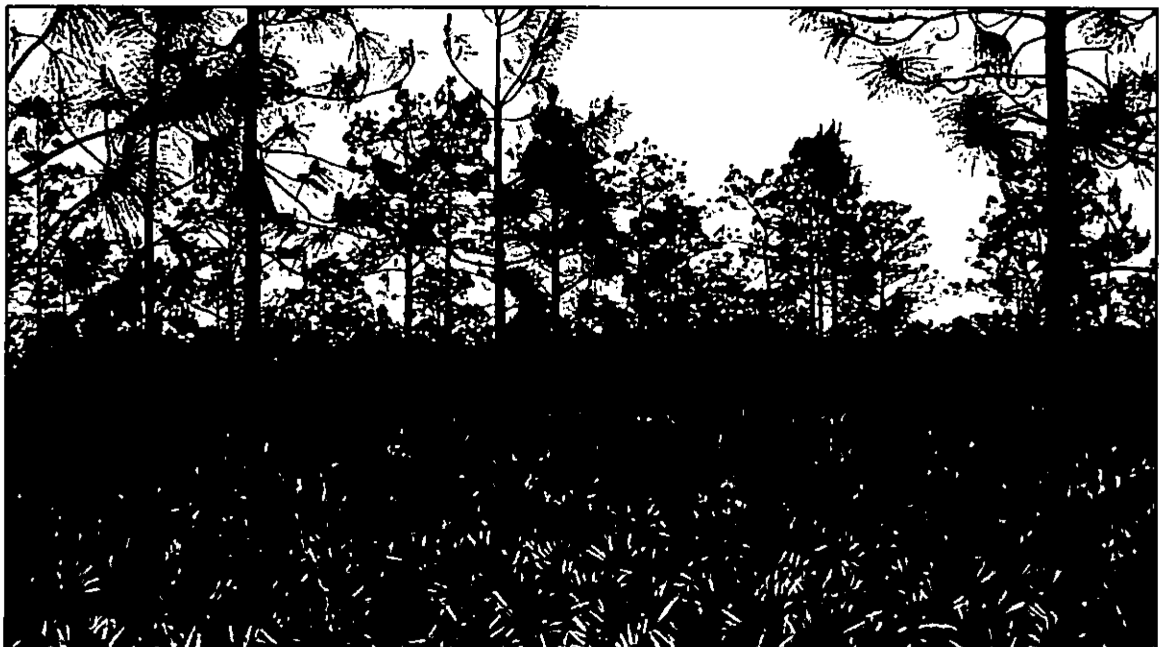
E. Shrub and brushland (FLUCFCS 320)



F. Pine flatwoods (FLUCFCS 411)

FIGURE 2.3-20. (3 of 4)

PHOTOGRAPHS OF COMMON VEGETATION COMMUNITIES IN NORTHERN BUFFER AREA

Source: ECT, 2005.

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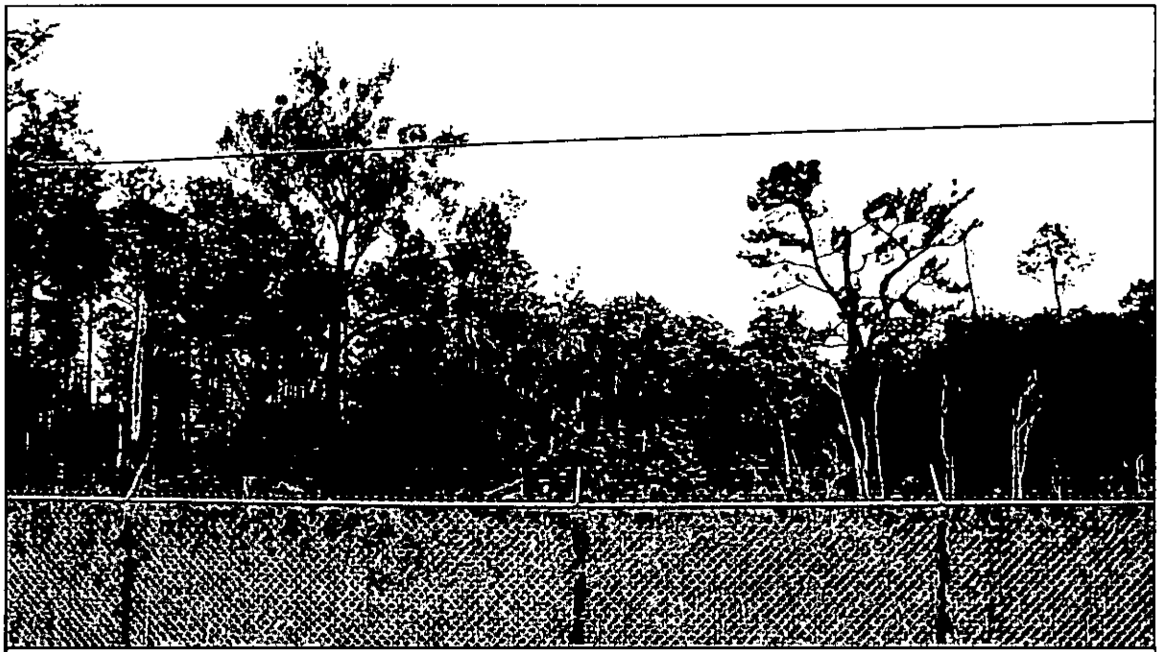
G. Emergent aquatic vegetation (FLUCFCS 644)



H. Mixed bay swamp/oak hammock strand (FLUCFCS 617)

FIGURE 2.3-20. (4 of 4)

PHOTOGRAPHS OF COMMON VEGETATION COMMUNITIES IN NORTHERN BUFFER AREA

Source: ECT, 2005.

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is a popular fishing location. However, due to existing mercury levels in the river, the Florida Department of Health (2005) lists a *no consumption* warning for largemouth bass, gar, and bowfin. These species are typically predatory in nature and would accumulate mercury in their systems more than other popular fish, such as panfish.

The Econlockhatchee River floodplain is also rich in wildlife, with approximately 119 wildlife species recorded. A total of 18 listed wildlife species has been documented for the basin as well (http://yosemite.epa.gov/water/restorat.nsf/).

<u>Terrestrial Systems</u>

Flora

Section 2.3.5.2 includes the descriptions of the vegetation composition found in the Unit B project areas, which are all developed as electrical power plant facilities and a solid waste disposal area. Although native vegetation communities exist within these areas, they have all been altered from their historical state.

Fauna

Common wildlife species found in central Florida are expected to occur over the entire acreage and diverse habitats of the Stanton site. However, the total acreage encompassed by the Unit B project footprint contains power plant facilities, managed landscapes, and ruderal communities. Wildlife usage is therefore expected to be lower than in natural habitats occurring over the remainder of the Stanton site.

Detailed lists of wildlife found on the Stanton property were previously addressed in the SCA for Units 1 and 2, the Supplemental SCA for Unit A, and the ERP application for Unit A. Wildlife monitoring reports for the site are also available as part of condition compliance for the previously mentioned units.

For preparation of this SCA, wildlife surveys for the relevant areas of the site were conducted on November 9, 2005. Results are presented in Table 2.3-11.

Table 2.3-11. Wildlife Species Observed within the Unit B Areas—November 9, 2005

Common Name	Scientific Name
Amphibians	
Oak toad	*Bufo quercicus*
Reptiles	
American alligator	*Alligator mississippiensis*
Gopher tortoise	*Gopherus polyphemus*
Birds	
Florida sandhill crane	*Grus canadensis pratensis*
Common snipe	*Capella gallinago*
Red-tailed hawk	*Buteo jamaicensis*
Bald eagle	*Haliaeetus leucocephalus*
Turkey vulture	*Cathartes aura*
Black vulture	*Coragyps atratus*
Gray catbird	*Dumetella carolinensis*
Palm warbler	*Dendroica palmarum*
Boat-tailed grackle	*Quiscalus major*
Rufous-sided towhee	*Pipilo erythrophthalmus*
Mammals	
Opossum	*Didelphis virginiana*
Raccoon	*Procyon lotor*
White-tailed deer	*Odocoileus virginianus*
Armadillo	*Dasypus novemcinctus*

Source: ECT, 2005.

Most of the species observed were found in the ruderal habitats in the undeveloped portions of the solid waste disposal area. The coal storage area and proposed power block area are grassed and maintained and therefore provide very little habitat for wildlife. The only exception was a family of Florida sandhill cranes that commonly forage in these grassy areas.

Threatened and Endangered Species

Flora

Extensive surveys for T/E species have been conducted in support of the two existing SCAs and ERP application for Unit A. Plant species listed by the Florida Department of Agriculture and Consumer Services (FDACS) have been documented for the Stanton site and are listed in Table 2.3-12. No species listed by the USFWS have been documented on the property.

Table 2.3-12. State or Federally Listed Plant Species Documented on or Near the Stanton Site

Common Name	Scientific Name	Status	
		USFWS	FDACS
Plants			
Greenfly orchid	*Epidendrum conopseum*		C
Catesby's lily (pine lily)	*Lilium catesbei*		T
Cinnamon fern	*Osmunda cinnamomea*		C
Royal fern	*Osmunda regalis*		C
Yellow-flowered butterwort	*Pinguicula lutea*		T
Rose pogonia	*Pogonia ophioglossoides*		T
Hooded pitcher plant	*Sarracenia minor*		T
Common wild pine	*Tillandsia fasiculata*		E
Giant wild pine	*Tillandsia utriculata*		E

Note: C = commercially exploited.
E = endangered.
T = threatened.

Sources: OUC's Supplemental Site Certification Application for Unit A, January 2001.
ECT, 2005.

Of the nine species identified as possibly occurring on the Stanton site (Table 2.3-12), none are likely to be found within the Unit B project's power block and coal pile footprints. This is due to their habitats being absent from these areas. Some of these species are found or likely to be found along the new transmission line interconnect, however (as discussed in Chapter 6.0 of this SCA).

Fauna

Table 2.3-13 presents state- or federally listed wildlife species that could potentially occur on the Stanton site. This list was developed from the Florida Natural Areas Inventory (FNAI) list for Orange County, Florida Fish and Wildlife Conservation Commission (FWC), U.S. Fish and Wildlife Service (USFWS), and prior records contained in the previous SCA's and wildlife studies performed on the Stanton site. Table 2.3-13 also addresses the likelihood of the listed species occurring within the Unit B project areas.

The only two listed bird species observed in the Unit B footprint areas were the bald eagle and sandhill crane. Other than foraging habitat for the cranes in the grassy areas and swales of the Unit B site, neither species would be expected to depend on these areas for their basic habitat needs. Certainly neither species would be expected to breed in habitats that will be impacted by Unit B construction.

The FWC Web site for eagle nest locations lists an eagle nest located in Section 23, Range 31 east, Township 23 south, and another in Section 19, Range 32 east, Township 23 south. The former site is approximately 0.5 mile west of the Stanton property (offsite) and, therefore, more than 1.5 miles from the Unit B IGCC power block area. The latter nest is on the property approximately 0.5 mile southeast of the proposed Unit B power block area. However, this nest, according to OUC staff, was destroyed by hurricanes that hit the site in 2004. No records are known of where those eagles are currently located.

No wading bird colonies are known to exist onsite according to FWC's Web site, although various listed wading bird species would be expected to forage onsite. Woodstorks were observed flying over the northern buffer area during the May 2005 site reconnaissance.

Two reptiles, the American alligator and gopher tortoise, were observed in the solid waste disposal portion of the site. The alligator was in the western rim ditch, and the active gopher tortoise burrow was found along the northern access road berm. The solid waste disposal area is not considered ideal habitat for the gopher tortoise. This animal's habitat needs are better suited in the northern Stanton buffer area across the road from the burrow.

Alligators are ubiquitous in Florida waters, and the rim ditch would likely be sufficient to support a viable alligator population.

Table 2.3-13. State- or Federally Listed Wildlife Species Potentially Occurring on the Stanton Site

Common Name *Scientific Name*	Status* USFWS	 FWC	Likelihood of Occurrence Within Unit B Project Areas
Amphibians			
Gopher frog *Rana capito*	—	SSC	Low—suitable habitat and gopher tortoise densities minimal
Reptiles			
American alligator *Alligator mississippiensis*	T(S/A)	SSC	Present—observed in western rim ditch of solid waste disposal area
Eastern indigo snake *Drymarchon corais couperi*	T	T	Low—suitable habitat and gopher tortoise densities minimal
Gopher tortoise *Gopherus polyphemus*	—	SSC	Present—one active burrow found along northern edge of solid waste disposal area
Florida pine snake *Pituophis melanoleucus migitus*	—	SSC	Low—habitat minimal
Short-tailed snake *Stilosoma extenuatum*	—	T	Low—habitat minimal
Birds			
Florida scrub jay *Aphelocoma c. coerulescens*	T	T	Low—habitat absent
Limpkin *Aramus guarauna*	—	SSC	Low—habitat absent
Florida burrowing owl *Athene cunicularia*	—	SSC	Low—habitat minimal
Little blue heron *Egretta caerulea*	—	SSC	Moderate—could forage in western rim ditch
Snowy agret *Egretta thula*	—	SSC	Moderate—could forage in western rim ditch
Tricolored heron *Egretta tricolor*	—	SSC	Moderate—could forage in western rim ditch
White ibis *Eudocumus albus*	—	SSC	Moderate—could forage in solid waste disposal area and swales along power block
Peregrine falcon *Falco peregrinus*	—	E	Low—possible migrant over the site; may forage along Orange County landfill or onsite ponds
Southeastern American kestrel *Falco sparverius paulus*	—	T	Moderate—may be expected on the pine flat-woods/open areas of the Stanton property
Florida sandhill crane *Grus canadensis pratensis*	—	T	Present—commonly observed on the grassed areas near the power block
Bald eagle *Haliaeetus leucocephalus*	T	T	Present—commonly observed over the site and adja-cent Orange County landfill
Wood stork *Mycteria americana*	E	E	Moderate—may forage in western rim ditch or shal-low marsh in the solid waste disposal area
Red-cockaded woodpecker *Picoides borealis*	E	SSC	Low on the OGP site due to absence of habitat; bird, however, is well documented for pine flatwoods else-where on Stanton property
Kirtland's warbler *Dendroica kirtlandii*	—	E	Low—only occurs as a migrant, usually along coastal areas of Florida
Mammals			
Florida mouse *Podomys floridanus*	—	SSC	Low—habitat minimal and low density of gopher tortoises
Sherman's fox squirrel *Sciurus niger shermani*	—	SSC	Low—habitat absent
Florida black bear *Ursus americanus floridanus*	—	T	Low—habitat absent

*E = endangered.
T = threatened.
T(S/A) = threatened due to similarity of appearance.
SSC = species of special concern.

Source: ECT, 2005.

Although other listed species found on the Stanton property could utilize portions of the Unit B areas, it is not expected that any other species depends on these habitats for survival on the property.

Of the listed wildlife species, only the eastern indigo snake, pine snake, gopher tortoise, bald eagle, scrub jay, red-cockaded woodpecker, and Sherman's fox squirrel have been documented onsite by previous ecological surveys. The Kirtland's warbler has not been observed onsite, but it could possibly be seen during winter migration. The southeastern kestrel has not been positively identified onsite, although the more common northern migrant has been observed. The Florida black bear has not been observed, although it has been recorded along riverine systems to the east of the Stanton property.

The occurrence of the red-cockaded woodpecker onsite is well documented. Nesting clusters are all south and east of the existing power block, in habitats not slated for construction as part of the Unit B IGCC facilities and well away from areas of the site that will be impacted by Unit B. No nesting areas are currently documented within the buffer area to the north of the developed portion of the site (DeLotelle & Guthrie, Inc., 2003).

2.3.6.2 Preexisting Stresses

The presence of the existing Units 1, 2, and A and associated facilities such as transmission lines, access roads, railroad spur, and landfill areas are the predominant preexisting stresses to the onsite natural habitats/species assemblages. These facilities have eliminated or altered some onsite habitats and serve to be the cause of ongoing impacts such as noise, dust, human presence, and traffic.

However, with the presence of Units 1 and 2 from the early 1980s, current species existence and success are attributable to adaptation to these stresses. This was evidenced by the sandhill cranes foraging in grassy areas near power plant facilities.

Ongoing engineering of the Innovation Way/Avalon Park Boulevard road extension project is expected to be completed and construction begun during 2006. The improved roadway will run along the northern and western boundaries of the Stanton site, partially on OUC property. An ERP application (BDA, 2002) was submitted in early 2002 for the road project, and environmental permits have been issued. When construction of this significant road project begins, new stresses to vegetation, wetlands, and wildlife in the northwest corner of the Stanton property and along the western edge of the solid waste disposal area will occur. One confirmed result of the road project, based on its layout, will be the isolation of the northwest corner portion of the Stanton buffer area from the rest of OUC's property. OUC staff have already authorized relocation of gopher tortoises from the proposed road location to other suitable habitats in the northern buffer area.

The road construction likely will have some temporary impacts on the western rim ditch of the property. These impacts are most likely to be noise, human presence, and possibly minor turbidity in the water. Construction will likely be mostly completed prior to Unit B site construction reaching its peak level.

Once completed, Innovation Way will represent a major thoroughfare and continue to create minor impacts along the Stanton site's western border. These impacts will be permanent habitat loss, noise, traffic, human presence, and creation of a barrier to wildlife movements.

2.3.6.3 Measurement Programs

The primary sources of information in this section include the many studies already performed on the Stanton site, including but limited to the SCA for Units 1 and 2, Supplemental SCA for Unit A, ERP application for Unit A, and ecological monitoring reports prepared by DeLotelle & Guthrie, Inc.

Additionally, ECT biologists performed a site reconnaissance of the existing facilities and northern buffer area in May 2005. Two senior botanists and a senior wildlife biologist performed detailed ecological surveys of the Unit B footprint areas and proposed transmission corridor in November 2005. No wildlife trapping or vegetation collections were made, nor were these activities necessary in describing the ecological resources present.

2.3.7 METEOROLOGY AND AMBIENT AIR QUALITY

2.3.7.1 Meteorology/Climatology

The climate of central Florida is characterized as subtropical. With the Atlantic Ocean on one side and the Gulf of Mexico on the other, only relative slight variations in humidity and temperature result through the seasons. Summers are humid, warm to hot, and long. Winters are typically mild with weak cold fronts occurring, which in rare instances produces a frost. Table 2.3-14 provides a summary of average monthly temperature data, and Table 2.3-15 summarizes relative humidity data.

Table 2.3-14. Temperature Data for Orlando, Florida

Month	Temperature (°F) USDC* 1961 to 1990	Temperature (°F) NOAA† 1951 to 1980
January	59.7	60.5
February	61.2	61.5
March	66.7	66.8
April	71.2	72.0
May	76.9	77.3
June	81.1	80.9
July	82.3	82.4
August	82.5	82.5
September	81.0	81.1
October	75.2	74.9
November	68.0	67.5
December	62.1	62.0
Annual	72.3	72.4

Sources: *USDC, 1999.
†NOAA, 1985.

Table 2.3-15. Normal Relative Humidity Data for Orlando, Florida

Month	Relative Humidity (%) Hour (Local Time)—1961 to 1990			
	0100	0700	1300	1900
January	84	87	56	68
February	84	87	53	63
March	84	88	51	62
April	83	87	46	58
May	86	88	49	63
June	89	90	57	73
July	89	91	59	75
August	91	92	60	78
September	90	91	60	78
October	87	88	55	74
November	87	89	55	73
December	86	87	56	72
Annual	87	89	55	70

Source: USDC, 1999.

Generally, winter temperatures are quite temperate and less humid. Wintertime temperatures generally range between approximately 50 and 75°F, with a relative humidity slightly lower than summer. Typical monthly summertime temperatures range between 70 and 92 degrees Fahrenheit (°F), with a relatively humidity of 85 to 90 percent during the night and early morning to 55 to 70 percent in the afternoon.

Average daily maximum and minimum temperatures occurring during the summer months are 91.2 and 72.9°F, respectively. Average daily maximum and minimum temperatures occurring during the winter months are 72.7 and 49.1°F, respectively. The mild winter climate can be attributed to the close proximity of the site to the Atlantic Ocean, which is approximately 25 miles to the east. During the winter the Atlantic coast nearest to the site is warmed by the Gulf Stream carrying warm water from the Caribbean. The extreme maximum and minimum temperatures that occurred during the period of 1943 to 1996 are 102 and 19°F, respectively.

Relative humidity in the Orlando area varies from 46 to 92 percent throughout the year. The highest relative humidity normally occurs between the hours of 0100 and 0700 with a range of 83 to 92 percent and an average of approximately 87 percent. The relative humidity during the daytime hours ranges from approximately 46 to 78 percent, with the highest relative humidity occurring near the hour of 1900.

The normal annual precipitation is approximately 48 inches, with most of this precipitation occurring during the summer months (see Section 2.3). The maximum rainfall during the period of 1943 to 1998 for June and July is 18.3 and 19.6 inches. The winter months are much drier with the monthly precipitation averaging 2 to 3 inches per month. The large amount of summer rainfall is attributed to strong afternoon thunderstorms that can become extremely intense at times. These thunderstorms are a result of the moisture and heat introduced into the atmosphere during the hot summer days. Rainfall during the winter months results from frontal systems moving through the Orlando area.

Wind data from the Orlando International Airport (OIA) have been collected since 1944. The OIA is located approximately 8 miles southwest of the Stanton site. A windrose generated from the airport data for the period of 1996 to 2000 is shown in Figure 2.3-21. The predominant winds are from the north and east. The wind direction varies significantly with the seasons. The average wind speed remains constant throughout most of the year with the summer season experiencing more calm winds. Figures 2.3-22 through 2.3-25 show windroses for the winter, spring, summer, and fall seasons, respectively, generated from the 1996 to 2000 data. The winter winds are predominantly from the north. The average winter wind speed is 3.5 meters per second (m/s). Winds during the spring are highly variable with winds from the east-southeast being slightly more dominant. The average spring wind speed is 3.8 m/s. Winds during the summer are predominantly from the south-southwest. The average summer wind speed is 2.8 m/s, with calm winds occurring 12.1 percent of the time. Winds during the fall are predominantly from the northeast. The average fall wind speed is 3.3 m/s.

Distributions of atmospheric stability classes and mixing heights, given for annual average and seasonally, are presented in Table 2.3-16 and 2.3-17, respectively. Neutral to

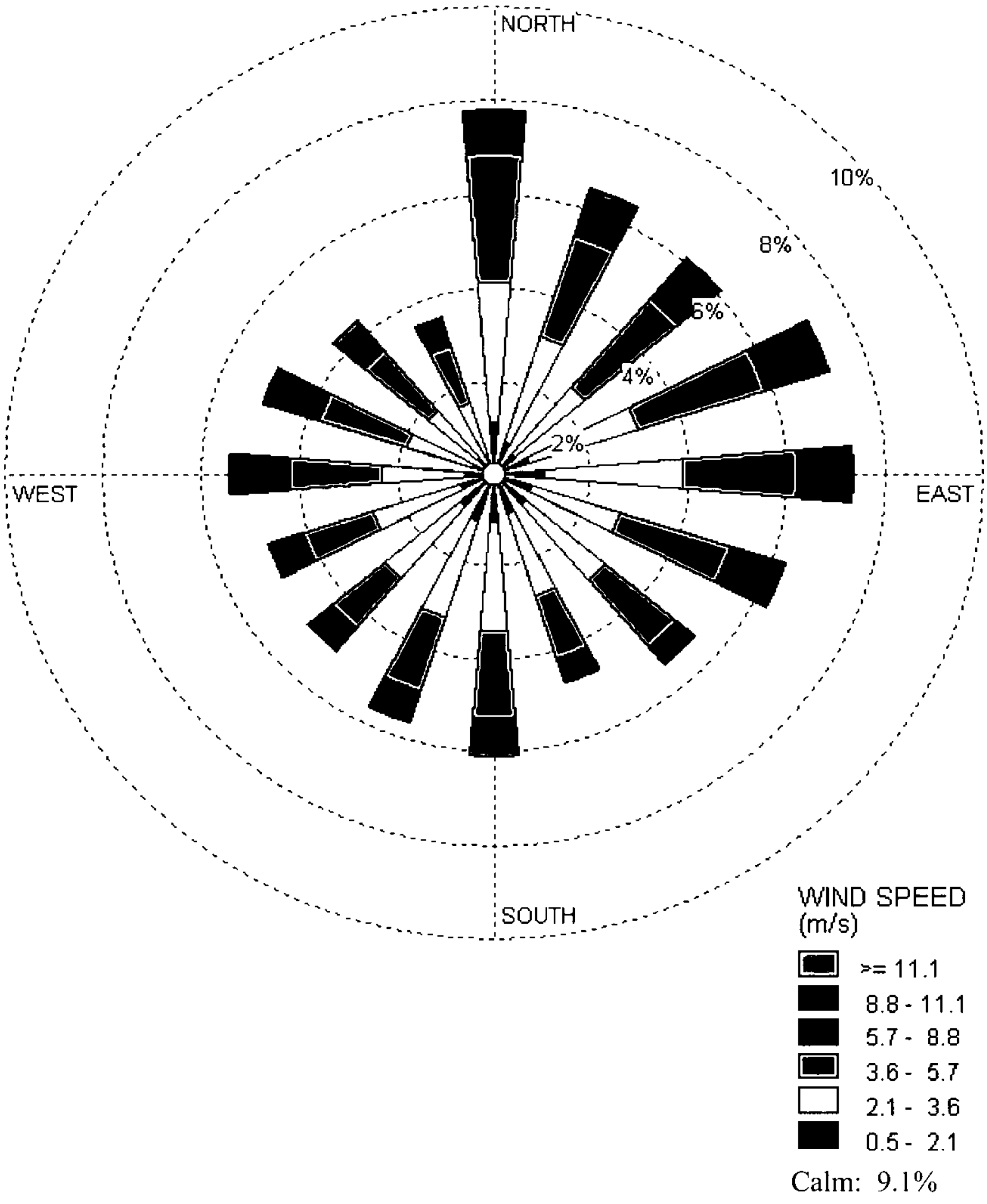

FIGURE 2.3-21.

5-YEAR WIND ROSE FOR OIA (1996 TO 2000)

Sources: NCDC, 2005. ECT, 2005.

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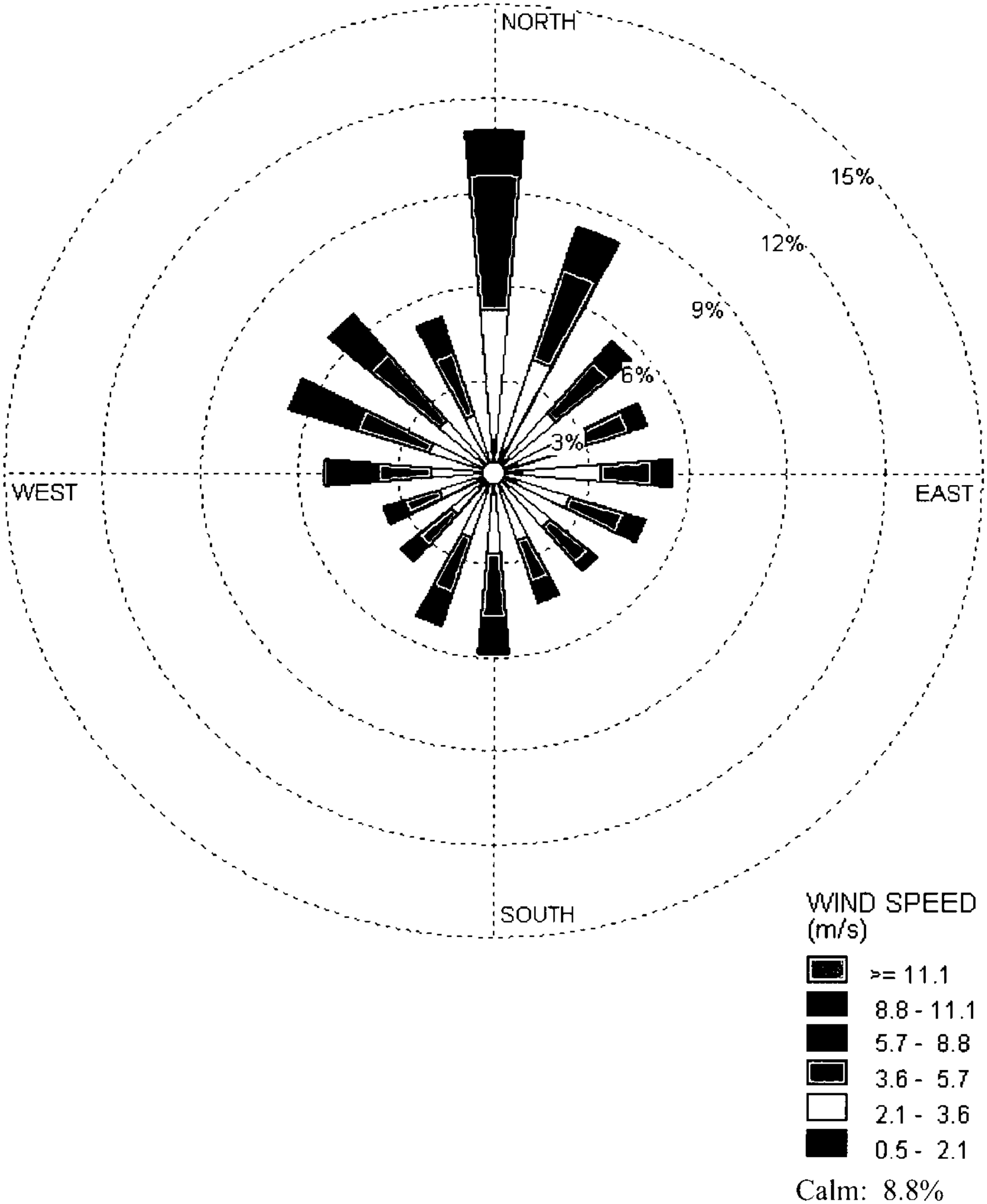

FIGURE 2.3-22.

5-YEAR WINTER SEASON WIND ROSE FOR OIA (1996 TO 2000)

Sources: NCDC, 2005. ECT, 2005.

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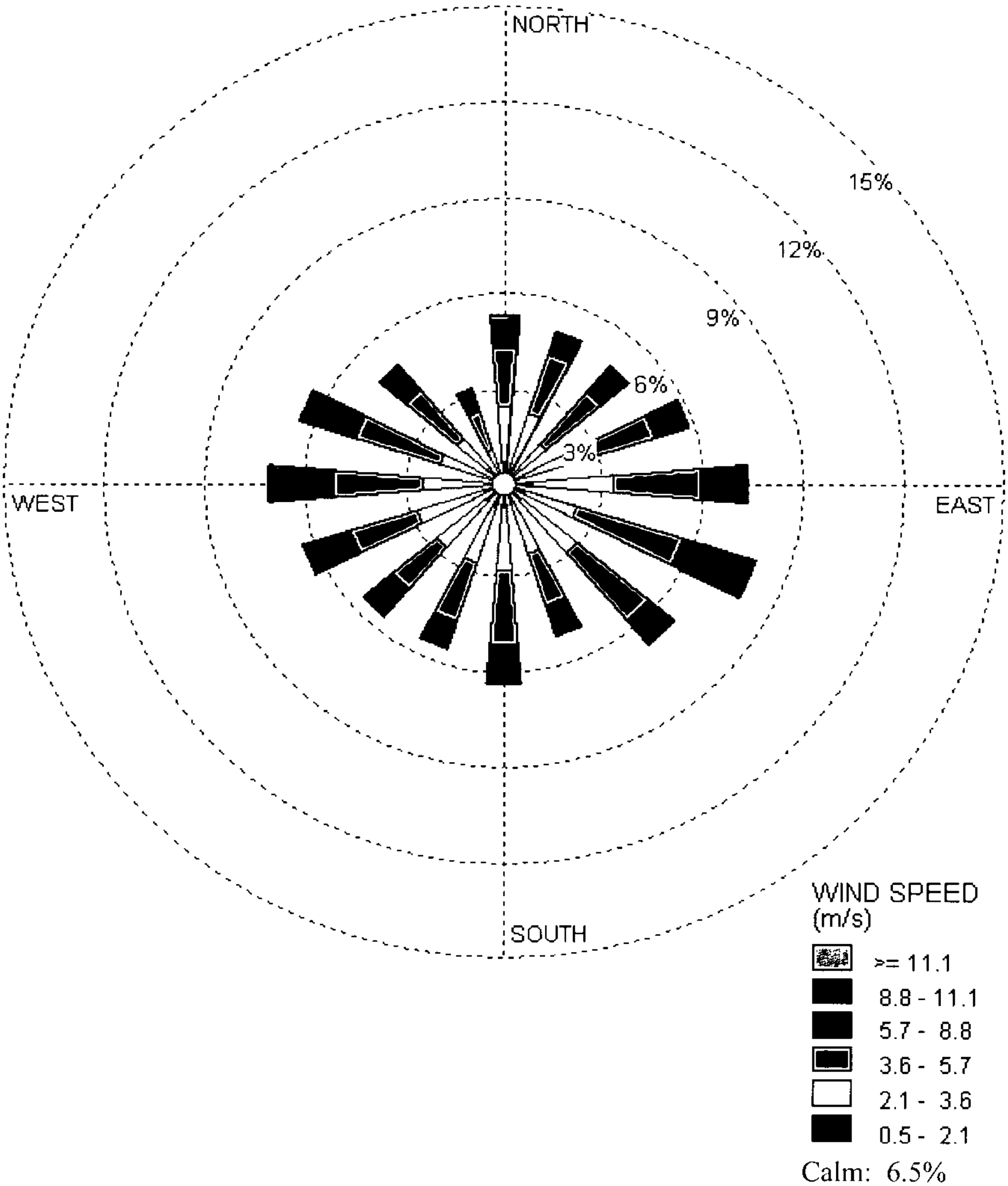

FIGURE 2.3-23.

5-YEAR SPRING SEASON WIND ROSE FOR OIA (1996 TO 2000)

Sources: NCDC, 2005. ECT, 2005.

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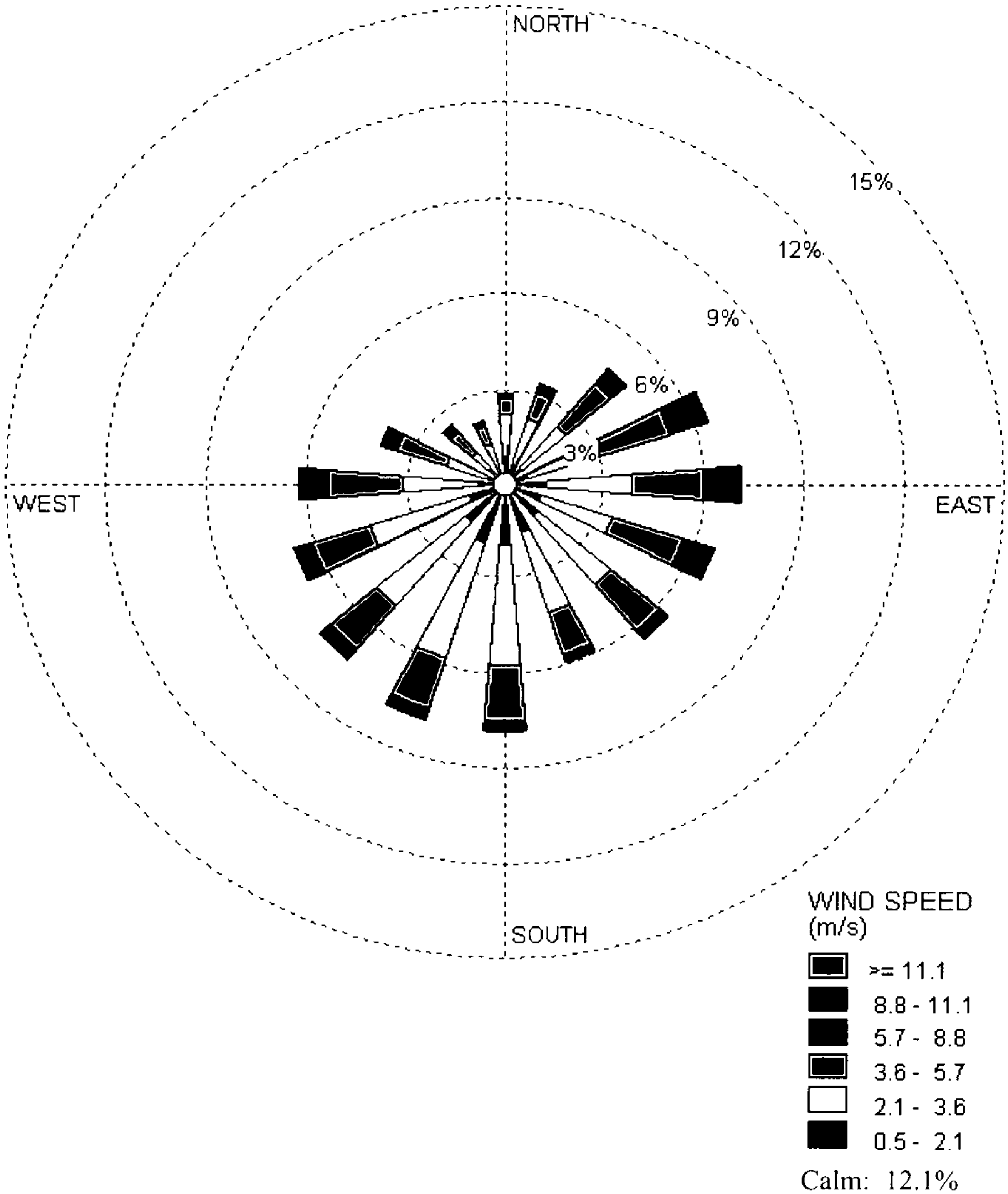

FIGURE 2.3-24.

5-YEAR SUMMER SEASON WIND ROSE FOR OIA (1996 TO 2000)

Sources: NCDC, 2005. ECT, 2005.

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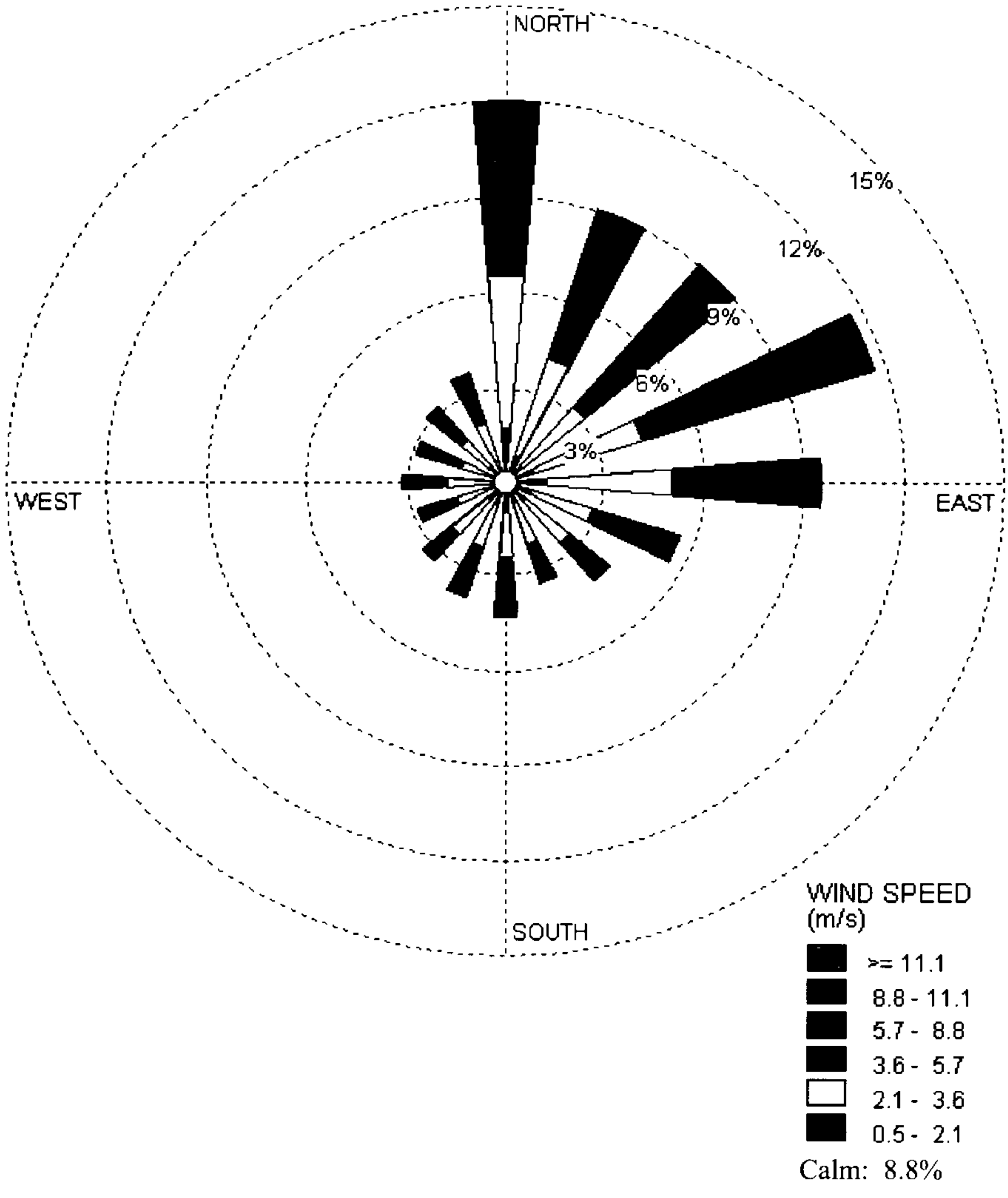

FIGURE 2.3-25.

5-YEAR FALL SEASON WIND ROSE FOR OIA (1996 TO 2000)

Sources: NCDC, 2005. ECT, 2005.

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moderately stable atmospheric conditions predominate, and mixing heights within 300 to 400 ft during the morning and 1,100 to 1,500 ft in the afternoon are typical.

Table 2.3-16. Annual and Seasonal Average Distribution of Atmospheric Stability Classes for Orlando, Florida (1996 through 2000)

	Occurrence (%) of Stability Class					
Season	Very Unstable	Moderately Unstable	Slightly Unstable	Neutral	Slightly Stable	Moderately Stable
Winter	0.1	4.4	13.3	35.3	20.1	26.9
Spring	1.3	7.8	19.7	30.5	20.2	20.5
Summer	4.2	11.7	15.3	15.3	12.6	35.4
Fall	0.6	7.1	15.1	29.0	19.3	29.0
Annual	**1.6**	**7.8**	**15.9**	**27.5**	**18.1**	**28.0**

Sources: NCDC, 2005.
ECT, 2005.

Table 2.3-17. Annual and Seasonal Average Mixing Heights for Orlando, Florida (1996 through 2000)

	Mixing Height (meters)	
Season	Morning	Afternoon
Winter	281	1,096
Spring	380	1,516
Summer	454	1,509
Fall	382	1,251
Annual	**375**	**1,346**

Sources: NCDC, 2005.
ECT, 2005.

As dramatically illustrated during 2004, central Florida can feel the brunt of hurricanes. Based on data from 1900 through 2004, the area of central Florida within approximately 75 miles of the Stanton site experienced 43 tropical storms or hurricanes, or approximately one such storm every 2 to 3 years (National Oceanic and Atmospheric Administration [NOAA], 2005). The possibility of a *hurricane-strength* tropical storm (winds greater than 74 miles per hour [mph]) crossing somewhere in that portion of central Florida in any given year is, based on this historical data, approximately 20 percent. Narrowing that geographic range, four hurricanes passed within 25 miles of the site from 1900 through 2004, reducing the probability in any given year for that smaller area to approximately 4 percent.

2.3.7.2 Ambient Air Quality

Ambient air quality is affected by meteorology, atmospheric chemistry, and pollutant emissions. The type, toxicity, amount, and location of emission points can affect ambient air quality. Meteorology controls the distribution, dilution, and removal (e.g., deposition) of pollutants. Atmospheric chemistry governs the reactions that transform well known pollutants into other chemical compounds also considered secondary pollutants. It is during periods of low wind speeds that the maximum ground level concentration of pollutants normally occurs. During the summer months, the intensity of sunlight is at its highest peak. The combination of high pollutant concentrations and an abundance of ultraviolet light cause the production of photochemical smog, which contains pollutants such as ozone. Relative humidity is important to atmospheric dispersion and chemical transformation because of the interaction between pollutants and water molecules.

Air pollutants are broken down into two different categories, primary and secondary. Primary pollutants are generated directly from the source (i.e., nitrogen oxides [NO_x], sulfur oxides [SO_x], carbon monoxide [CO], and particulates). Secondary pollutants are formed when primary pollutants react with typical atmospheric compounds (water, nitrogen, oxygen) under various atmospheric conditions (temperature, humidity, light intensity). An example of a secondary pollutant is ozone, which is formed when NO_x and organic compounds combine in the presence of light.

The U.S. Environmental Protection Agency (EPA) has established national ambient air quality standards (NAAQS) for six different pollutants: sulfur dioxide (SO_2), nitrogen dioxide (NO_2), CO, particulate matter (PM), lead, and ozone. These six pollutants are referred to as *criteria* pollutants.

As a criteria pollutant, PM is separated into two different size categories. The latest NAAQS for particulate matter less than or equal to 10 micrometers (PM_{10}) was promulgated with the Clean Air Act Amendments of 1990, while the NAAQS for particulate matter less than or equal to 2.5 micrometers ($PM_{2.5}$) was promulgated in September 1997.

The 8-hour ozone NAAQS was also promulgated in July 1997, and EPA issued a new implementation rule in April 2004. The 8-hour ozone standard is in effect, and the 1-hour ozone standard has been revoked, except in specific metropolitan areas (in Florida these are Jacksonville, Miami-Fort Lauderdale-West Palm Beach, and Tampa-St. Petersburg-Clearwater).

There are two sets of federal limits developed for each criteria pollutant, primary and secondary NAAQS. Primary NAAQS are health-based, with the principle objective being to protect human health. Secondary NAAQS were developed to protect the environment and physical property. Table 2.3-18 shows the primary and secondary NAAQS developed for different averaging times dependent on the characteristics of the pollutant. The states have the right to establish more stringent ambient air quality standards (AAQS). Table 2.3-18 also shows the AAQS developed for the state of Florida. Florida has adopted the federal limits for all pollutants except for the annual and 24-hour standards for SO_2, which, in Florida, are more stringent.

Orange County, the surrounding counties, and the entire state of Florida are designated as attainment for all AAQS. On April 30, 2004, EPA issued final designations for the 8-hour ozone NAAQS. For Florida, 40 CFR 81.310 was revised to designate all areas of the state, including Orange County, as unclassifiable/attainment for the 8-hour ozone NAAQS.

Ambient air quality monitors collect data used to determine the attainment status of counties and parts of counties. Figure 2.3-26 shows the locations for the ambient monitors in the Orlando area. Table 2.3-19 shows the most recent 5 years of ambient air quality data from these monitors and compares these data to the most stringent AAQS for the respective averaging periods.

Table 2.3-18. NAAQS and Florida AAQS (micrograms per cubic meter [$\mu g/m^3$] unless otherwise stated)

Pollutant	Averaging Periods	National Standards Primary	National Standards Secondary	Florida Standards
SO_2	3-hour[1]		1,300	1,300
	24-hour[1]	365		260
	Annual[2]	80		60
PM_{10}	24-hour[3]	150	150	150
	Annual[4]	50	50	50
$PM_{2.5}$	24-hour[5]	65	65	
	Annual[6]	15	15	
CO	1-hour[1]	40,000		40,000
	8-hour[1]	10,000		10,000
Ozone (ppmv)	1-hour[7]			0.12[9]
	8-hour[8]	0.08	0.08	
NO_2[10]	Annual[2]	100	100	100
Lead	Calendar quarter arithmetic mean	1.5	1.5	1.5

[1]Not to be exceeded more than once per calendar year.
[2]Arithmetic mean.
[3]The standards are attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$, as determined in accordance with 40 CFR 50 Appendix K, is equal to or less than one.
[4]The standards are attained when the expected annual arithmetic mean concentration, as determined in accordance with 40 CFR 50 Appendix K, is less than or equal to 50 $\mu g/m^3$.
[5]98th percentile concentration, as determined in accordance with 40 CFR 50 Appendix N.
[6]Arithmetic mean concentration, as determined in accordance with 40 CFR 50 Appendix N.
[7]Standard attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than 1, as determined by 40 CFR 50, Appendix H. The 1-hour ozone standard was revoked on June 15, 2005, one year following the effective date of the 8-hour ozone standard designations.
[8]Standard attained when the average of the annual 4th highest daily maximum 8-hour average concentration is less than or equal to the standard, as determined by 40 CFR 50, Appendix I.
[9]Applies only in Jacksonville, Miami-Fort Lauderdale-West Palm Beach, and Tampa-St. Petersburg-Clearwater.
[10]NO_2 is the regulated ambient air pollutant. When referring to emissions, the term NO_x is used. NO_x consists of NO_2 and NO, which rapidly oxides to NO_2 in the atmosphere.

Sources: 40 CFR 50.
Section 62-204.240, F.A.C.

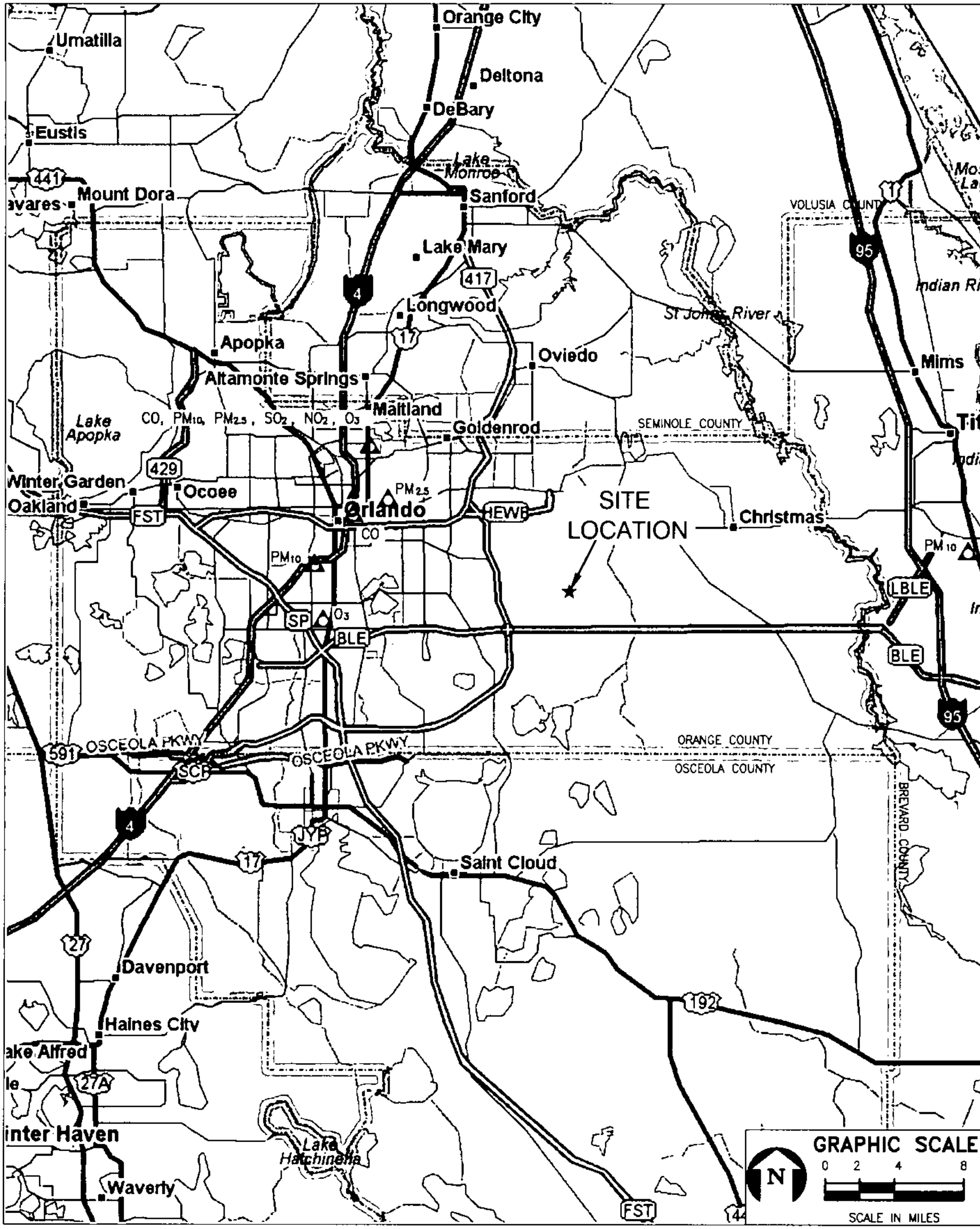

FIGURE 2.3-26.

LOCATION OF AMBIENT AIR QUALITY MONITORS NEAR THE STANTON SITE

Source: DeLorme, 2003; ECT, 2005.

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Table 2.3-19. Orlando Area Ambient Air Quality Data—2000 through 2004

Pollutant	Site Location		Site Name	Site Number	Distance From Site (km)	Direction From Site (Vector °)	Year	Averaging Period	Number of Observations	Ambient Concentration (μg/m³)				
	County	City								1st High	2nd High	Arithmetic Mean	Standard	Percent of Standard
PM_{10}	Orange	Winer Park	Morris Boulevard	120952002	23	306	2000	24-hour	61	46	39		150*	30.7
							2001	24-hour	60	46	41		150*	30.7
							2002	24-hour	60	33	30		150*	22.0
							2003	24-hour	61	30	28		150*	20.0
							2004	24-hour	56	41	27		150*	27.3
							2000	Annual	61			21	50†	42.0
							2001	Annual	60			20	50†	40.0
							2002	Annual	60			17	50†	34.0
							2003	Annual	61			18	50†	36.0
							2004	Annual	56			18	50†	36.0
		Orlando	North Primrose Avenue	120951004	19	295	2000	24-hour	60	37	37		150*	24.7
							2001	24-hour	59	48	43		150*	32.0
							2002	24-hour	61	35	31		150*	23.3
							2003	24-hour	61	56	47		150*	37.3
							2004	24-hour	59	41	36		150*	27.3
							2000	Annual	60			21	50†	42.0
							2001	Annual	59			22	50†	44.0
							2002	Annual	61			18	50†	36.0
							2003	Annual	61			20	50†	40.0
							2004	Annual	59			19	50†	38.0
			Sheriff's Department	120950007	24	278	2000	24-hour	61	48	44		150*	32.0
							2001	24-hour	61	53	50		150*	35.3
							2002	24-hour	61	41	38		150*	27.3
							2003	24-hour	59	39	37		150*	26.0
							2000	Annual	61			27	50†	54.0
							2001	Annual	61			23	50†	46.0
							2002	Annual	61			23	50†	46.0
							2003	Annual	59			21	50†	42.0
	Brevard	Titusville	Tico Airport	120090004	37	84	2000	24-hour	48	35	34		150*	23.3
							2001	24-hour	357	96	55		150*	64.0
							2002	24-hour	334	66	38		150*	44.0
							2003	24-hour	354	170	79		150*	113.3
							2004	24-hour	334	61	46		150*	40.7
							2000	Annual	48			17	50†	34.0
							2001	Annual	357			19	50†	38.0
							2002	Annual	334			17	50†	34.0
							2003	Annual	354			19	50†	38.0

Table 2.3-19. Orlando Area Ambient Air Quality Data—2000 through 2004 (Continued, Page 2 of 4)

Pollutant	Site Location: County	Site Location: City	Site Name	Site Number	Distance From Site (km)	Direction From Site (Vector °)	Year	Averaging Period	Number of Observations	Ambient Concentration ($\mu g/m^3$): 1st High	2nd High	Arithmetic Mean	Standard	Percent of Standard
							2004	Annual	334			17	50†	34.0
$PM_{2.5}$	Orange	Winer Park	Morris Boulevard	120952002	23	306	2000	24-hour	345	35	34		65*	53.8
							2001	24-hour	336	61	41		65*	93.8
							2002	24-hour	353	26	25		65*	40.0
							2003	24-hour	357	23	22		65*	35.4
							2004	24-hour	326	28	26		65*	43.1
							2000	Annual	345			11.9	15†	79.3
							2001	Annual	336			10.7	15†	71.3
							2002	Annual	353			9.5	15†	63.3
							2003	Annual	357			9.3	15†	62.0
							2004	Annual	326			9.9	15†	66.0
		Orlando	North Primrose Avenue	120951004	19	295	2000	24-hour	353	35	34		65*	53.8
							2001	24-hour	353	52	41		65*	80.0
							2002	24-hour	349	30	27		65*	46.2
							2003	24-hour	345	23	21		65*	35.4
							2004	24-hour	307	38	26		65*	58.5
							2000	Annual				12	15†	80.0
							2001	Annual				10.9	15†	72.7
							2002	Annual				9.7	15†	64.7
							2003	Annual				9.4	15†	62.7
							2004	Annual				10.1	15†	67.3
SO_2	Orange	Winer Park	Morris Boulevard	120952002	23	306	2000	3-hour	8,420	109.7	70.5		1,300‡	8.4
							2001	3-hour	8,401	83.6	70.5		1,300‡	6.4
							2002	3-hour	8,571	34.0	28.7		1,300‡	2.6
							2003	3-hour	8,647	31.3	28.7		1,300‡	2.4
							2004	3-hour	8,324	36.6	23.5		1,300‡	2.8
							2000	24-hour	8,420	34.0	23.5		365‡	9.3
							2001	24-hour	8,401	36.6	20.9		365‡	10.0
							2002	24-hour	8,571	13.1	13.1		365‡	3.6
							2003	24-hour	8,647	15.7	10.4		365‡	4.3
							2004	24-hour	8,324	13.1	13.1		365‡	3.6
							2000	Annual	8,420			7.8	80†	9.8
							2001	Annual	8,401			5.2	80†	6.5
							2002	Annual	8,571			2.6	80†	3.3
							2003	Annual	8,647			2.6	80†	3.3
							2004	Annual	8,324			2.6	80†	3.3

Table 2.3-19. Orlando Area Ambient Air Quality Data—2000 through 2004 (Continued, Page 3 of 4)

Pollutant	Site Location: County	Site Location: City	Site Name	Site Number	Distance From Site (km)	Direction From Site (Vector °)	Year	Averaging Period	Number of Observations	Ambient Concentration (µg/m³): 1st High	2nd High	Arithmetic Mean	Standard	Percent of Standard
NO_2	Orange	Winer Park	Morris Boulevard	120952002	23	306	2000	Annual	8,470			22.5	100†	22.5
							2001	Annual	8,495			22.5	100†	22.5
							2002	Annual	8,485			20.7	100†	20.7
							2003	Annual	8,437			20.7	100†	20.7
							2004	Annual	8,418			18.8	100†	18.8
CO	Orange	Winer Park	Morris Boulevard	120952002	23	306	2000	1-hour	8,542	8,571	8,571		40,000‡	21.4
							2001		8,438	9,143	3,086		40,000‡	22.9
							2002		8,619	4,343	4,000		40,000‡	10.9
							2003		8,667	2,971	2,629		40,000‡	7.4
							2004		8,460	2,743	2,743		40,000‡	6.9
							2000	8-hour	8,542	5,371	2,743		10,000‡	53.7
							2001		8,438	2,400	2,286		10,000‡	24.0
							2002		8,619	3,200	2,857		10,000‡	32.0
							2003		8,667	1,714	1,714		10,000‡	17.1
							2004		8,460	1,829	1,829		10,000‡	18.3
		Orlando	Orange Avenue	120951005	21	289	2000	1-hour	8,619	5,143	5,143		40,000‡	12.9
							2001		8,572	4,800	4,343		40,000‡	12.0
							2002		8,530	5,143	5,029		40,000‡	12.9
							2003		8,551	3,886	3,657		40,000‡	9.7
							2004		8,596	4,686	3,086		40,000‡	11.7
							2000	8-hour	8,619	2,971	2,971		10,000‡	29.7
							2001		8,572	2,743	2,400		10,000‡	27.4
							2002		8,530	3,314	2,857		10,000‡	33.1
							2003		8,551	2,286	2,286		10,000‡	22.9
							2004		8,596	2,171	2,057		10,000‡	21.7
Ozone	Orange	Winer Park	Morris Boulevard	120952002	23	306	2000	1-hour	242	214	208		235**	90.9
							2001	1-hour	228	196	182		235**	83.4
							2002	1-hour	237	208	196		235**	88.4
							2003	1-hour	244	186	178		235**	79.2
							2004	1-hour	233	178	174		235**	75.9
							2000	8-hour***	242	165	159		157††	97.8
							2001	8-hour***	228	159	153		157††	94.8
							2002	8-hour***	237	153	149		157††	94.0
							2003	8-hour***	244	149	145		157††	N/A
							2004	8-hour***	233	151	149		157††	N/A

Table 2.3-19. Orlando Area Ambient Air Quality Data—2000 through 2004 (Continued, Page 4 of 4)

	Site Location									Ambient Concentration (μg/m³)				
Pollutant	County	City	Site Name	Site Number	Distance From Site (km)	Direction From Site (Vector °)	Year	Averaging Period	Number of Observations	1st High	2nd High	Arithmetic Mean	Standard	Percent of Standard
Ozone (cont.)		Orlando	Winegard Road	120950008	21	262	2000	1-hour	245	212	198		235**	90.0
							2001	1-hour	241	186	184		235**	79.2
							2002	1-hour	228	206	200		235**	87.5
							2003	1-hour	244	182	174		235**	77.5
							2004	1-hour	163	194	184		235**	82.5
							2000	8-hour***	245	159	155		157††	96.1
							2001	8-hour***	241	153	153		157††	94.0
							2002	8-hour***	228	147	145		157††	92.3
							2003	8-hour***	244	145	145		157††	N/A
							2004	8-hour***	163	147	145		157††	N/A
Lead	Orange	Winer Park	Morris Boulevard	120952002	23	306	1994 to 1996	24-hour	182	0.0	0		1.5†	0.0
		Orlando	Sheriff's Department	120950007	24	278	1994 to 1996	24-hour	182	0.00	0		1.5†	0.0

*98th percentile.
†Arithmetic mean.
‡2nd high.
**4th highest day with hourly value exceeding standard over a 3-year period.
††4th highest daily maximum 8-hour concentation over a 3-year period.
***Monitor values represent 3rd and 4th highest 8-hour concentrations.

Sources: FDEP, 2005.
EPA, 2005.
ECT, 2005.

EPA has developed a descriptor of air quality that can be used to characterize the air quality in the site vicinity. This descriptor is called the air quality index (AQI). Air quality is described over a range from *good* to *hazardous* based on a calculated numerical value, as follows (http://www.epa.gov/airnow/aqibroch/aqi.html#intro):

Air Quality Index (AQI) Values	Levels of Health Concern	Colors
When the AQI is in this range:	***...air quality conditions are:***	***...as symbolized by this color:***
0 to 50	Good	Green
51 to 100	Moderate	Yellow
101 to 150	Unhealthy for sensitive groups	Orange
151 to 200	Unhealthy	Red
201 to 300	Very unhealthy	Purple
301 to 500	Hazardous	Maroon

Each category corresponds to a different level of health concern. The following describes the six levels of health concern and what they mean:

- Good—The AQI value for your community is between 0 and 50. Air quality is considered satisfactory, and air pollution poses little or no risk.
- Moderate—The AQI for your community is between 51 and 100. Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people. For example, people who are unusually sensitive to ozone may experience respiratory symptoms.
- Unhealthy for Sensitive Groups—When AQI values are between 101 and 150, members of sensitive groups may experience health effects. This means they are likely to be affected at lower levels than the general public. For example, people with lung disease are at greater risk from exposure to ozone, while people with either lung disease or heart disease are at greater risk from exposure to particle pollution. The general public is not likely to be affected when the AQI is in this range.
- Unhealthy—Everyone may begin to experience health effects when AQI values are between 151 and 200. Members of sensitive groups may experience more serious health effects.

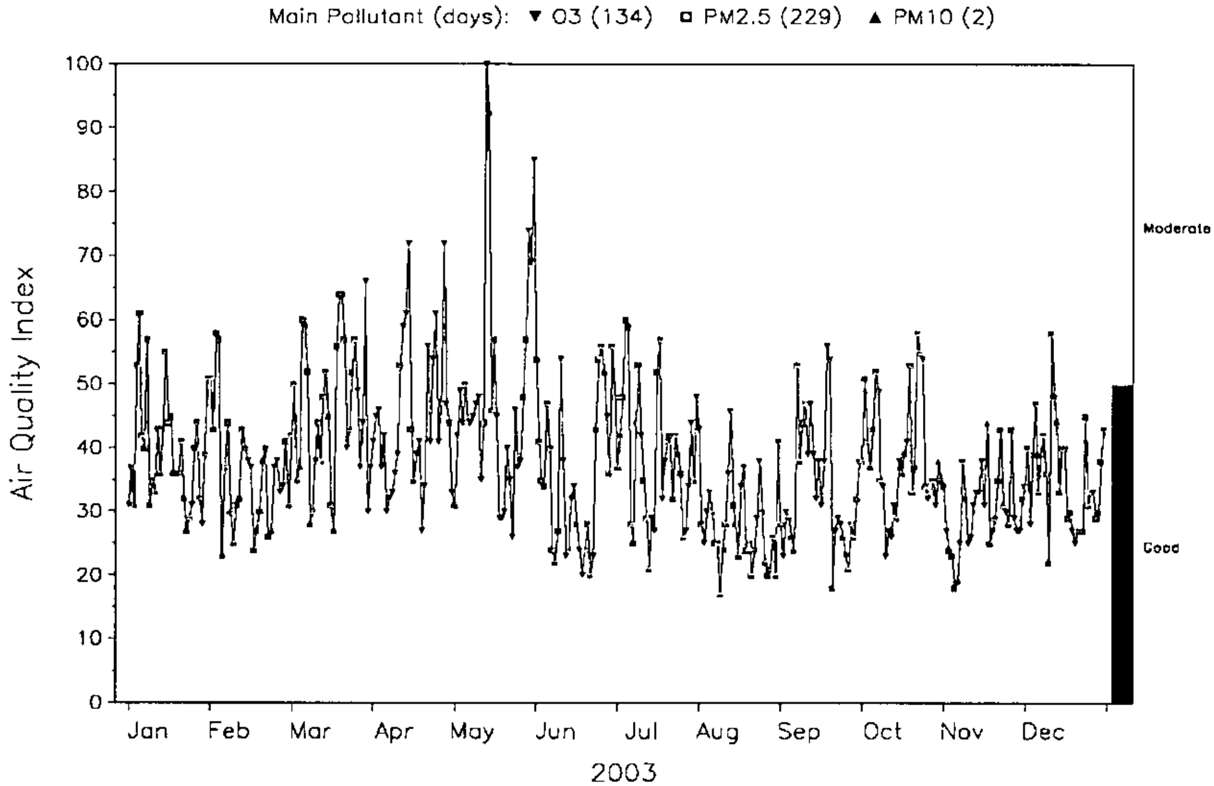
- Very Unhealthy—AQI values between 201 and 300 trigger a health alert, meaning everyone may experience more serious health effects.
- Hazardous—AQI values over 300 trigger health warnings of emergency conditions. The entire population is more likely to be affected.

The higher the AQI value, the greater the level of air pollution and the greater the health concern. For example, an AQI value of 50 represents good air quality with little potential to affect public health, while an AQI value more than 300 represents hazardous air quality.

An AQI value of 100 generally corresponds to the NAAQS for the pollutant, which is the level EPA has set to protect public health. AQI values below 100 are generally thought of as satisfactory. As AQI values go above 100, air quality is considered to be unhealthy—at first for certain sensitive groups of people, then for everyone as AQI values get higher.

Figure 2.3-27 provides AQI charts for Orange County for 2003 and 2004. In 2003, Orange County experienced 310 *good* air quality days and 55 *moderate* days. In 2004, there were 308 *good* and 58 *moderate* days. Overall, based on these charts, air quality in Orange County is generally satisfactory or *good*. The pollutant primarily affecting air quality in Orange County is ozone, which is a regional pollutant formed in the atmosphere in the summer. As shown in Figure 2.3-27, days having the highest AQI values are mostly caused by elevated concentrations of ozone in the spring and summer months.

Air quality is, of course, influenced by the emissions of pollutants into the air. Emissions come from a variety of sources, including the combustion of fuel by stationary sources (e.g., power plants, factories, home furnaces fired by natural gas), automobiles, and manufacturing processes. Figures 2.3-28 through 2.3-32 summarize data on emissions of five criteria pollutants in Orange County for the year 1999 (the latest year for which such data are readily available). Most emissions of PM_{10} were attributed to fugitive dust. Stationary fuel combustion of sulfur-containing fuels results in the greatest amounts of SO_2 emissions in the county. Not unexpectedly in an urban county, vehicles emit the greatest percentages of NO_x, CO, and VOC, which are all products of incomplete combustion.



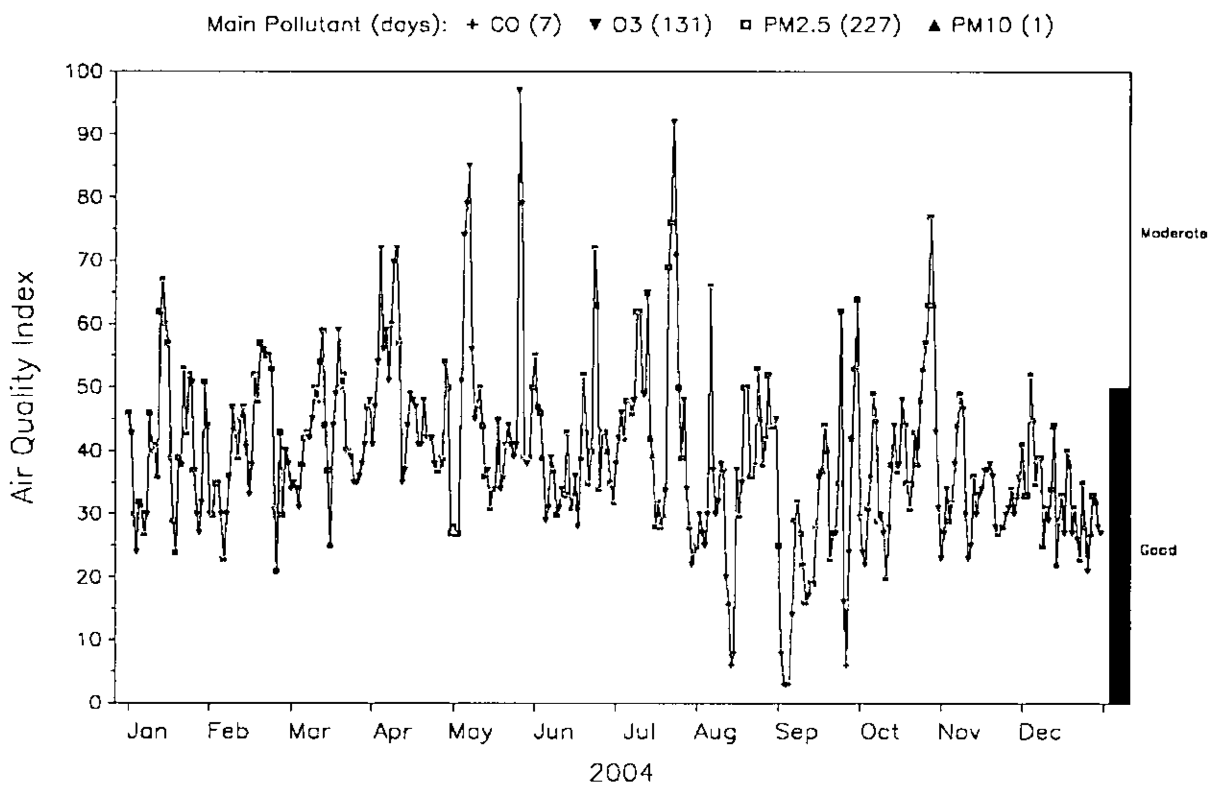


FIGURE 2.3-27.

AIR QUALITY INDEX CHARTS FOR ORANGE COUNTY, FLORIDA—2003 AND 2004

Sources: www.epa.gov/air/data/monaqi.html, 2005. ECT, 2005.

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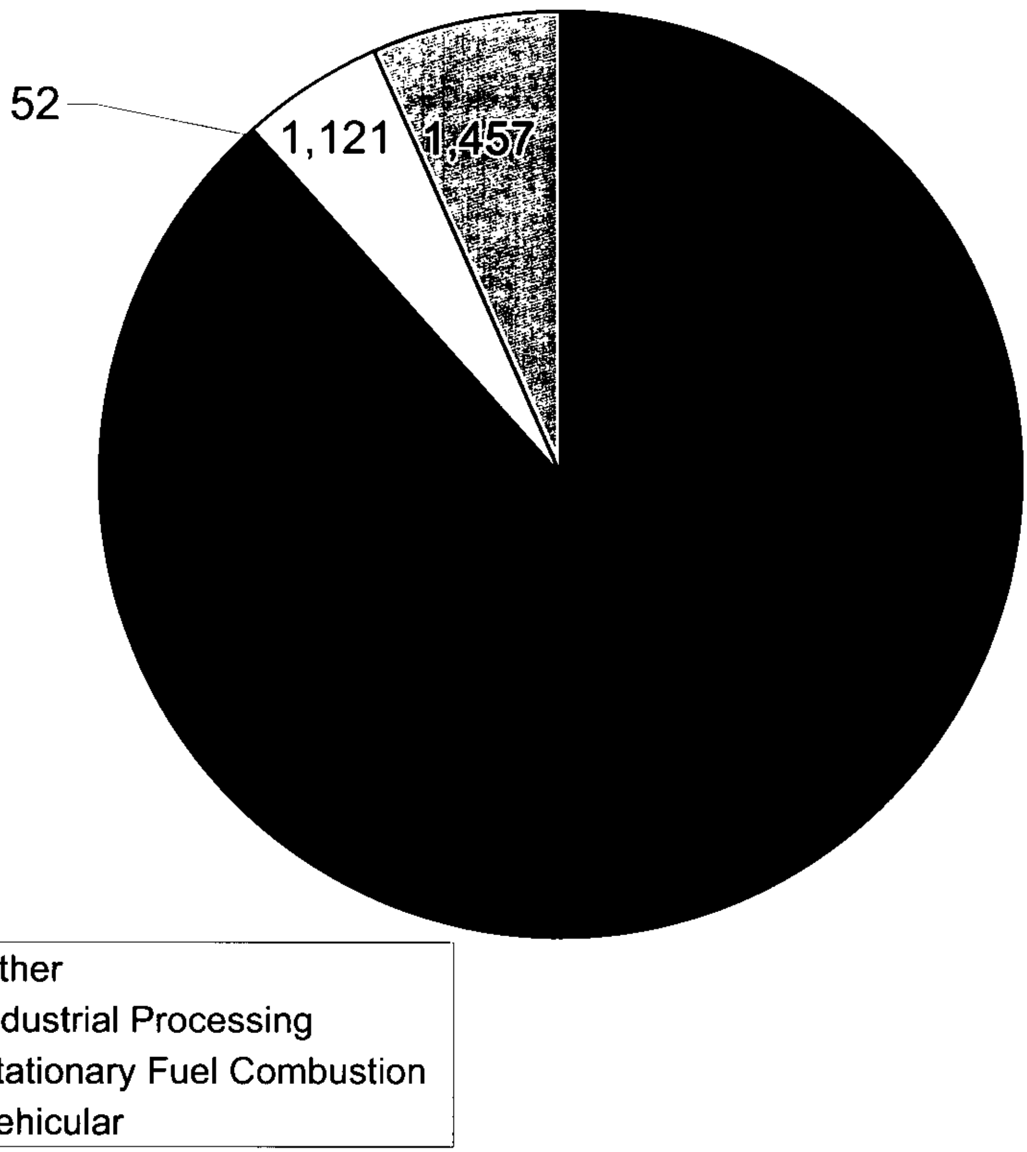
Particulate Matter (PM_{10})—tpy

Total: 21,894 tpy



Note: Existing source emissions = EPA "AIRD*ata*" for 1999.

FIGURE 2.3-28.

EXISTING ORANGE COUNTY EMISSIONS OF PM_{10}

Sources: EPA, 2005. ECT, 2005.

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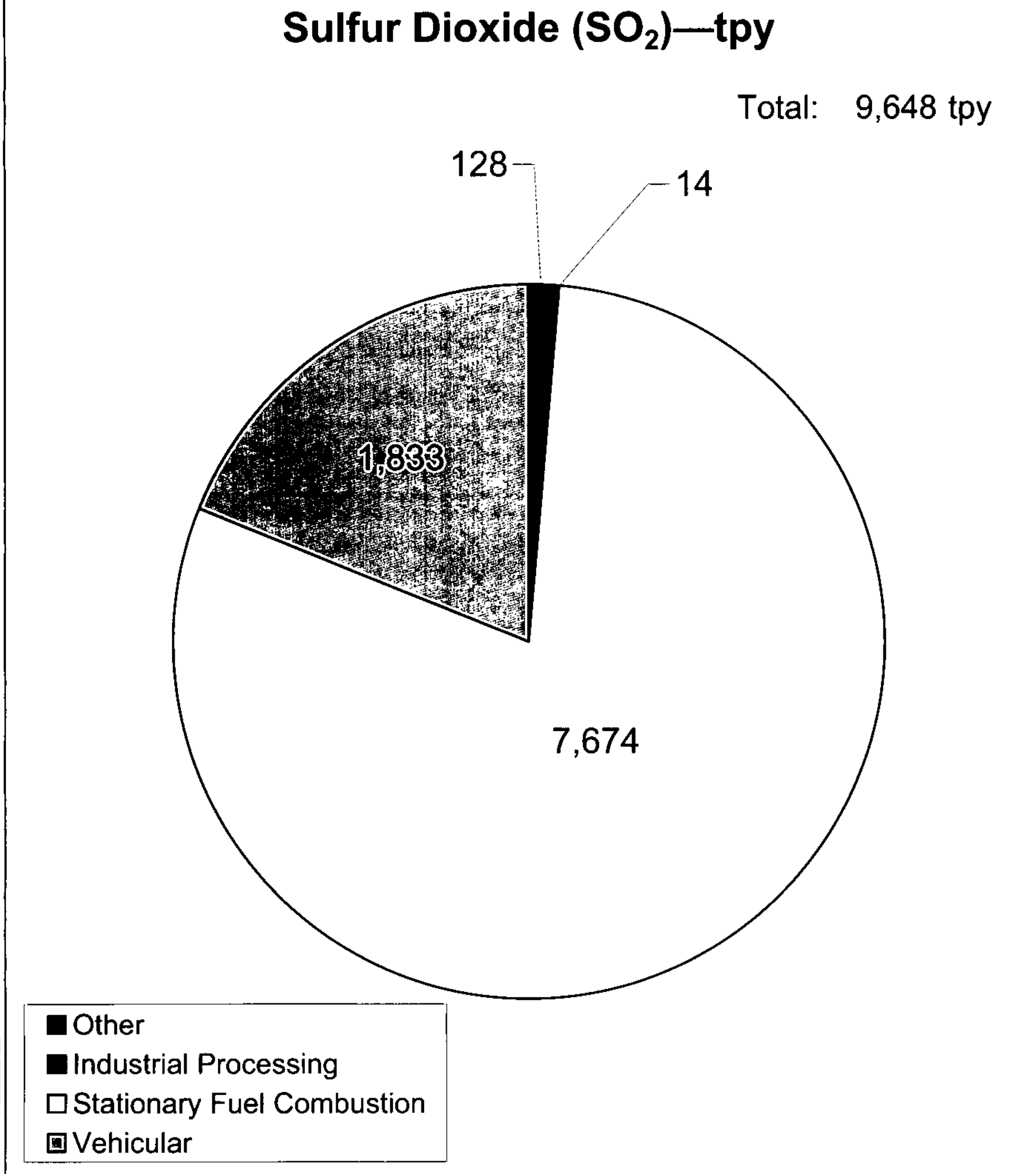

Note: Existing source emissions = EPA "AIR*Data*" for 1999.

FIGURE 2.3-29.

EXISTING ORANGE COUNTY EMISSIONS OF SO_2

Sources: EPA, 2005. ECT, 2005.

ECT
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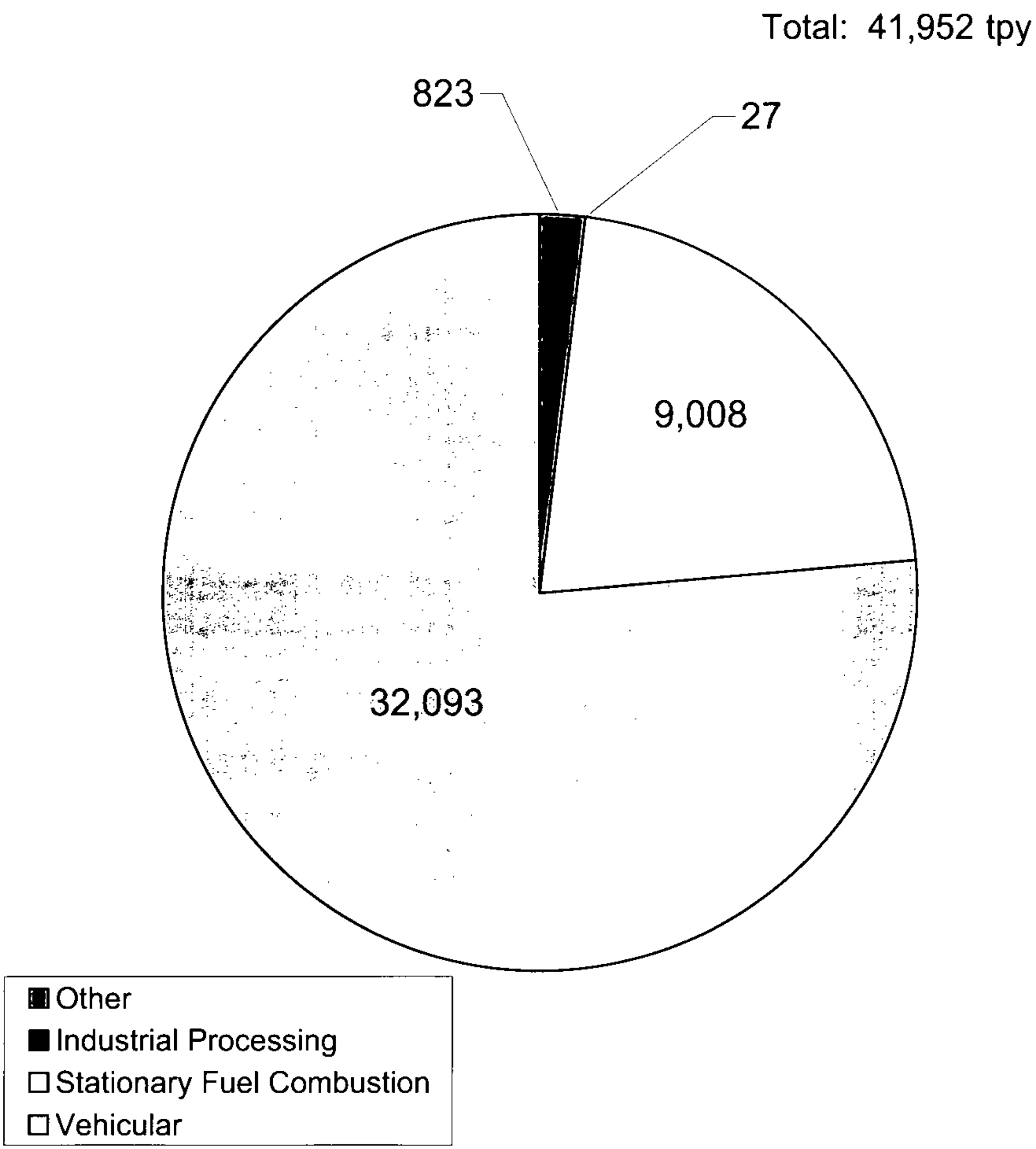
Nitrogen Oxides (NO_x)—tpy



Note: Existing source emissions = EPA "AIR*Data*" for 1999.

FIGURE 2.3-30.

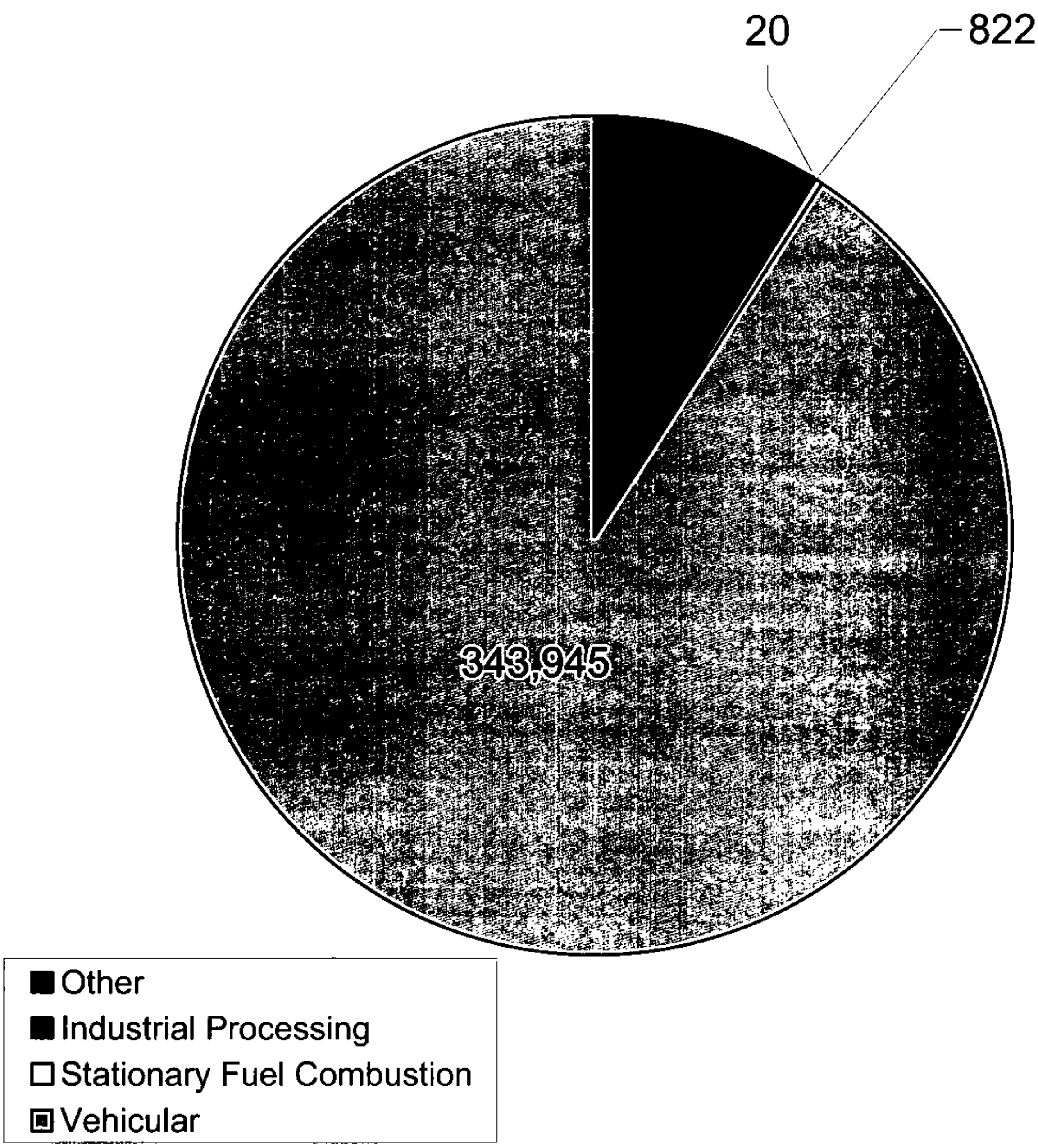
EXISTING ORANGE COUNTY EMISSIONS OF NO_x

Sources: EPA, 2005. ECT, 2005.

ECT
Environmental Consulting & Technology, Inc.

Carbon Monoxide (CO)—tpy

Total: 378,124 tpy



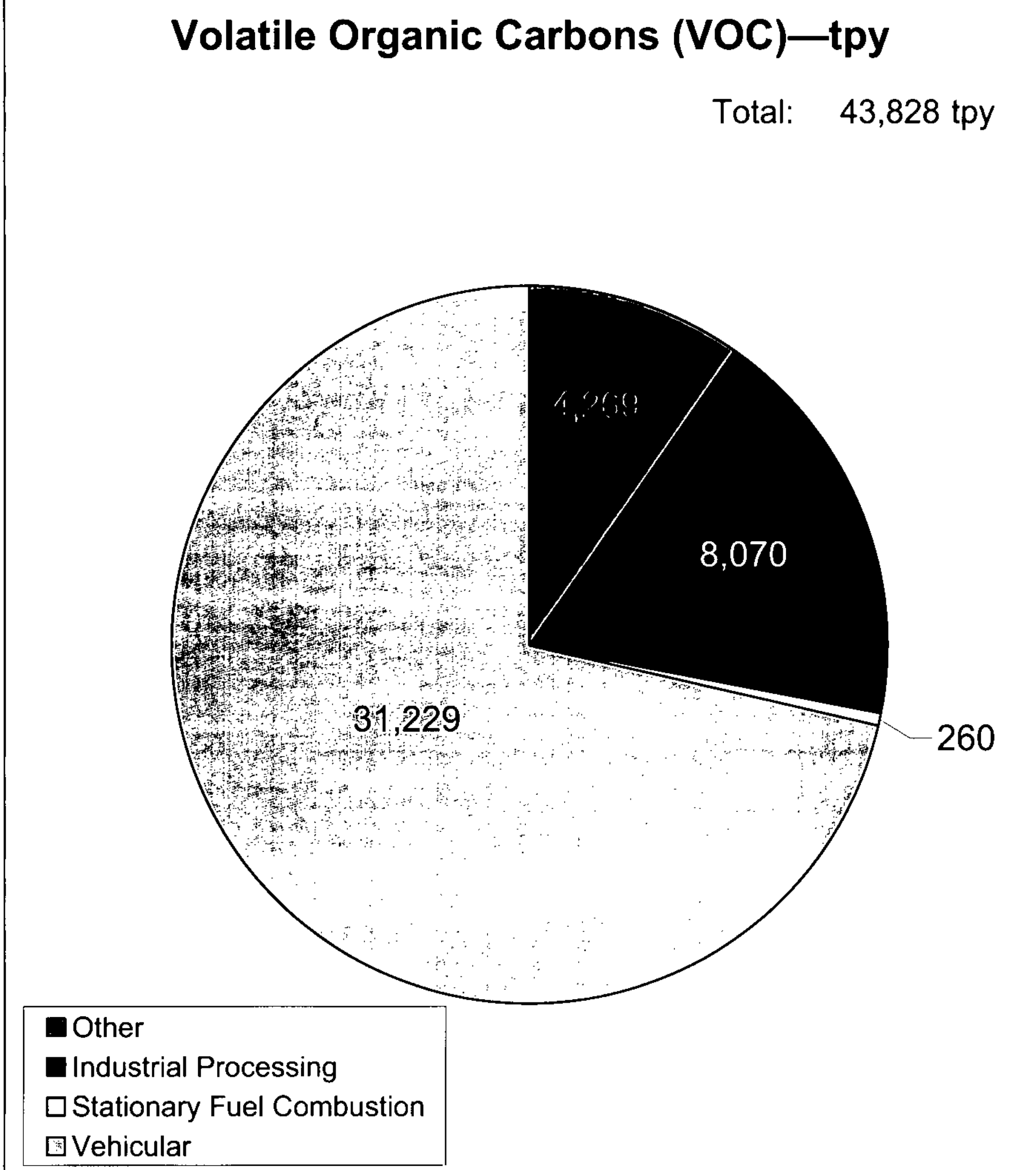
Note: Existing source emissions = EPA "AIRD*ata*" for 1999.

FIGURE 2.3-31.

EXISTING ORANGE COUNTY EMISSIONS OF CO

Sources: EPA, 2005. ECT, 2005.

ECT
Environmental Consulting & Technology, Inc.



Note: Existing source emissions = EPA "AIR*Data*" for 1999.

FIGURE 2.3-32.

EXISTING ORANGE COUNTY EMISSIONS OF VOC

Sources: EPA, 2005. ECT, 2005.

ECT
Environmental Consulting & Technology, Inc.

Recall that there are no ambient air quality standards for VOC; rather, VOC emissions contribute to the formation of ozone, for which ambient standards have been set.

In addition to the six criteria pollutants, EPA categorizes 188 other compounds as *noncriteria* air pollutants, or hazardous air pollutants (HAPs). HAPs are those pollutants known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. Examples of HAPs include benzene, which is found in gasoline; perchlorethlyene, which is emitted from some dry cleaning facilities; and methylene chloride, which is used as a solvent and paint stripper by a number of industries. Examples of other listed air toxics include dioxin, asbestos, toluene, and metals such as cadmium, mercury, chromium, and lead compounds.

Besides the five criteria pollutants addressed in Figures 2.3-28 through 2.3-32, EPA has tabulated 1999 emissions data for lead and noncriteria pollutants (no AAQS have been established for noncriteria pollutants). Table 2.3-20 presents emissions data for Orange County and provides a comparison of how those levels of emissions compare to those from other Florida counties having the greatest emissions total for each pollutant.

Large point sources of emissions may contribute to air quality in a given area at a given time, depending on wind direction and other meteorological variables. Figure 2.3-33 shows the locations of the largest point sources of air emissions in the area. Actual emissions data for the Stanton Energy Center (Units 1, 2, and A) for the past 4 years are summarized in Table 2.3-21.

2.3.7.3 Measurement Programs

No measurements of ambient air quality are conducted at the Stanton Energy Center. Existing data presented in the previous section are more than adequate to describe background meteorological and air quality conditions.

Table 2.3-20. Lead and Noncriteria Pollutant Emissions, 1999 (pound per year [lb/yr])

Pollutant	Orange County	County with Highest Emissions	
		County	Emissions
Lead compounds*	9,860	Palm Beach	236,840
Acetaldehyde*	378,640	Miami-Dade	692,960
Acrolein*	122,120	Miami-Dade	313,320
Antimony compounds	11.5	Brevard	5,420
Arsenic compounds*	160	Hillsborough	3,000
Benzene*	2,125,880	Miami-Dade	3,717,220
Beryllium compounds*	18.1	Escambia	1,260
1,3-Butadiene*	322,640	Miami-Dade	587,300
Cadmium compounds*	40	Hillsborough	880
Carbon disulfide	2,760	Bay	43,240
Chromium compounds*	440	Hillsborough	4,360
Cobalt compounds	240	Brevard	6,620
Ethylbenzene	1,029,900	Miami-Dade	1,634,880
Formaldehyde*	1,302,880	Miami-Dade	2,651,120
Manganese compounds*	480	Palm Beach	14,900
Mercury compounds*	500	Hillsborough	2,700
Naphthalene	94,520	Palm Beach	525,760
Nickel compounds*	780	Duval	123,680
Propylene oxide	620	Miami-Dade	1,140
Selenium compounds	140	Citrus	10,000
Toluene	6,053,120	Miami-Dade	10,764,100
Xylenes	4,048,660	Miami-Dade	6,412,560
Sum of *urban HAPs*	5,382,400	Miami-Dade	10,279,400

*One of the 33 *urban HAPs*, defined by EPA as "the 33 air toxics that present the greatest threat to public health in the largest number of urban areas." All of the urban HAPs listed in this table generally have most of their emissions contributed from area (small but numerous, such as gas stations and dry cleaners) and mobile (vehicular) sources. In Orange County, 88 percent of the urban HAPs emissions in 1999 were attributed to area and mobile sources.

Sources: http://www.epa.gov/air/data/ntisumm.html.
ECT, 2005.

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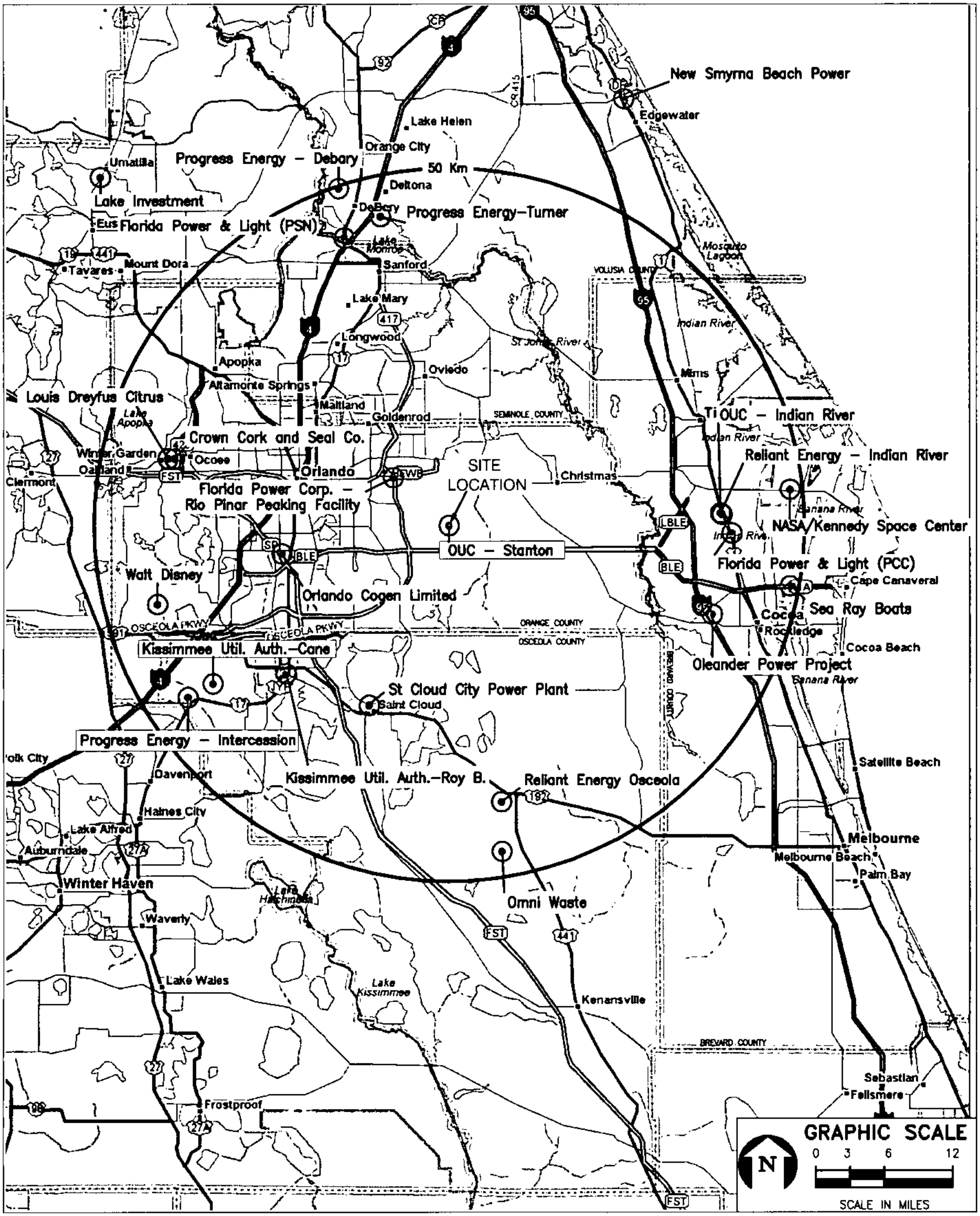

FIGURE 2.3-33.

LOCATION OF MAJOR EMISSION SOURCES WITHIN 50 KM OF STANTON SITE

Sources: DeLorme, 2003; ECT, 2005.

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Table 2.3-21. Stanton Energy Center Annual Emissions—2001 through 2004

Pollutant	2001	2002	2003	2004
Units in tpy				
CO	772.2	785.1	779.6	813.3
NO_x	10,347.3	8,835.9	8,644.3	8,683.6
PM	246.5	295.8	321.0	415.8
PM_{10}	91.8	168.4	201.5	415.8
SO_2	9,930.0	7,722.0	7,747.0	6,754.1
VOC	89.8	89.6	93.6	111.9
Lead	0.059	0.047	0.044	0.045
H_2SO_4	80.4	77.2	72.2	78.4
Hydrogen chloride (maximum HAP)	1,460.2	1,419.1	1,380.8	1,403.2
Hydrogen fluoride	182.7	177.6	89.2	88.9
Total HAPs	1,643.9	1,597.7	1,471.0	1,493.0
Units in lb/yr				
Antimony compounds*	1.5	2.0	2.9	2.5
Beryllium compounds	8.2	7.9	7.4	7.7
Cadmium compounds	39.7	38.5	37.3	38.0
Chromium compounds	303.9	294.6	284.4	290.2
Formaldehyde	667.6	712.9	714.3	743.7
Manganese compounds	350.6	340.0	328.3	335.2
Mercury compounds	202.0	196.3	191.0	194.1
Nickel compounds	358.4	356.8	365.6	371.5

*Data reported for Unit 1 only.

Note: Data include Units 1 and 2 (all years) and Unit A (2003, partial year, and 2004, full year).

Sources: OUC, 2002, 2003, 2004, and 2005.
ECT, 2005.

2.3.8 NOISE

2.3.8.1 Noise Concepts

Noise metrics are used to quantify sound pressure levels and describe a sound's loudness, duration, and tonal character. A commonly used descriptor is the A-weighted decibel (dBA). The A-weighting scale approximates the human ear's sensitivity to certain frequencies by emphasizing the middle frequencies and de-emphasizing the lower and higher frequency sounds. The decibel is a logarithmic unit of measure of sound. A 10-decibel change in the sound level means a 10-fold change in sound pressure, which roughly corresponds to a doubling or halving of perceived loudness. A 3-dBA change in the noise level is generally defined as being just perceptible to the human ear. Table 2.3-22 provides the subjective effect of different changes in sound levels.

Table 2.3-22. Subjective Effect of Changes in Sound Pressure Levels

Change in Sound Level	Apparent Change in Loudness
3 dBA	Just perceptible
5 dBA	Noticeable
10 dBA	Twice (or half) as loud

Source: ASHRAE Handbook—Fundamentals, Atlanta, 1989.

Sound level measurements sometimes include the analysis and breakdown of the sound spectrum into its various frequency components to determine tonal characteristics. The unit of frequency is the hertz (Hz), measuring the cycles per second of sound waves, and typically the audible frequency range from 16 to 16,000 Hz is broken down into 11 (full octave) or 33 (half octave) bands. A source is said to create a pure tone, also called a prominent discrete tone in some noise regulations, if the one-third octave band sound pressure level in the band with the tone exceeds the arithmetic average of the sound pressure levels of the two contiguous one-third octave bands by 5 dBA for center frequencies of 500 Hz and above, by 8 dBA for center frequencies between 160 and 400 Hz, and by 15 dBA for center frequencies less than or equal to 125 Hz. Examples of pure tone sounds are a backup alarm on a large motor vehicle, siren on an emergency vehicle, or squeaky ventilation fan.

When pure tones are present in a noise spectrum, the dBA level is not adequate to predict human response because pure tones, especially at higher frequencies, are much more annoying than a broadband noise of the same decibel level. Therefore, sound level measurements typically include the analysis and breakdown of the sound spectrum into its various frequency components to determine tonal characteristics.

2.3.8.2 Noise Regulations

Article V of Chapter 15 of the Ordinances of Orange County regulates noise in the County (Orange County, 2004). (The article is cited as "Noise and Vibration Control Ordinance of Orange County, Florida." Florida has no applicable state noise laws or regulations.) Maximum permissible sounds levels, which "no person shall produce, cause to be produced, or allow to be produced" (per Sec. 15-184), are specified in Sec. 15-182 and are summarized as follows:

Table 2.3-23. A-Weighted Sound Pressure Level Limits (Time Averaged [L_{eq}])

Land Use Category	Time	Sound Level Limit (dBA)
Noise-sensitive zone*	Any time	55
Residential and other areas†	7 a.m. to 10 p.m.	60
	10 p.m. to 7 a.m.	55

*Per Sec. 15-180 (21): "*Noise-sensitive zone* shall mean a quiet zone where serenity and quiet are of extraordinary significance, which is open or in session, and which is demarcated by conspicuous signage identifying it as a noise-sensitive or quiet zone. Noise-sensitive zones may include schools, public libraries, churches, hospitals, nursing homes, and other areas defined as such pursuant to a resolution adopted by the board of county commissioners."
†Including "residences, hotels, motels, time share condominiums, picnic areas, recreation areas, playgrounds, active sports areas, or parks."

Source: Orange County, 2004.

The term L_{eq} represents the equivalent or average sound energy level as measured continuously over a specified time period. An L_{eq} represents, in a single constant numerical value, the amount of actual time-varying sound energy received during the time interval.

The strength of the L_{eq} lies in the ability to assess the total time-varying effects of noise on sensitive receptors. The U.S. Environmental Protection Agency (EPA) has selected the L_{eq} as one of the best environmental noise descriptors because of its reliable evaluation of pervasive, long-term noise, simplicity, and good correlation with known effects of noise on individuals (EPA, 1974).

The Orange County noise ordinance also regulates sound pressure levels by octave bands (variable by time of day) and maximum impulsive sound levels (e.g., sound of short duration and high intensity, such as explosions and barking dogs).

Sec. 15-185 lists exemptions to the prohibitions stated in Sec. 15-184. Among the exemptions are the following, noteworthy in the context of this project:

(1) Railway locomotives or cars activity conducted in accordance with federal laws and regulations.

(5) Emergency signals during emergencies.

(6) Emergency testing between 7 a.m. and 7 p.m.

(7) Motor vehicles operating on a public right-of-way subject to F.S. § 316.293, and applicable federal criteria.

(9) Construction activities for which the county has issued a development permit, as defined in F.S. § 163.3164, provided such activity occurs between 7 a.m. and 10 p.m.

2.3.8.3 Ambient Noise Levels

The acoustic environment in the vicinity of the Stanton site is a product of the power plant itself, other human activities, and natural sources. To gauge the combined impacts of these sources, background noise levels were measured for brief periods at a number of locations on the Stanton site and in the immediate vicinity of the site. These data, collected at locations shown in Figure 2.3-34 are presented in Table 2.3-24.

The ambient noise data summarized in Table 2.7-3 were collected under conditions of light winds, generally from the south, and with Units 1 and 2 and Unit A in operation. The narrow range of noise levels at Location 1 resulted from the steady noise generated

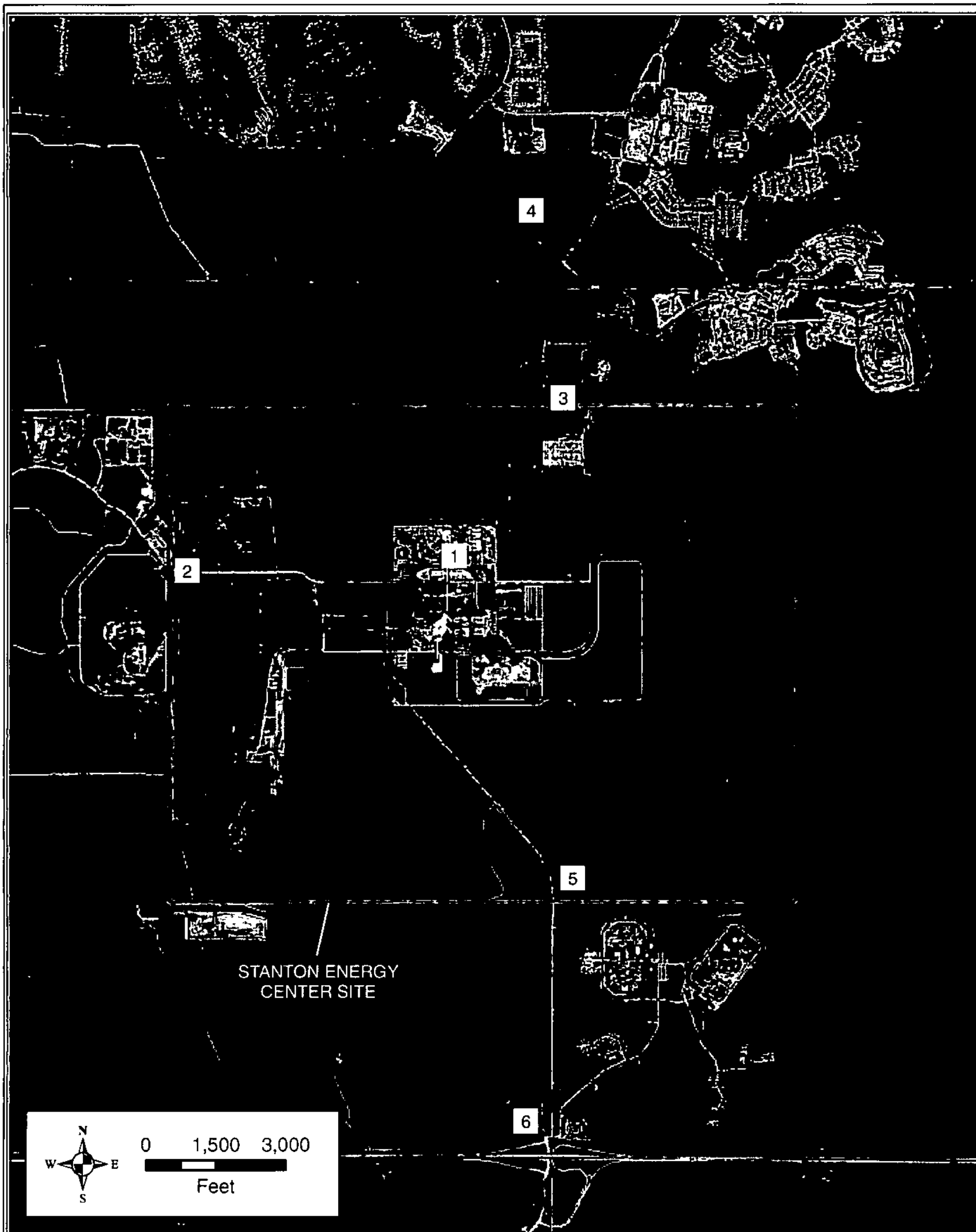

FIGURE 2.3-34.
AMBIENT NOISE SURVEY LOCATIONS

Sources: SJRWMD Aerial Photo, 2004; ECT, 2005.

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Table 2.3-24. Ambient Noise Survey Results (August 16 and 17, 2005)

Location	Location Description	Date	Time	Duration (minutes)	Range of Noise Levels (dBA)	L_{eq} (dBA)	Predominant Noise Sources
1	100 yards south of Unit A	August 16	10:44 a.m.	11	68.2 to 77.2	69.2	Unit A, Unit A cooling tower, gas metering station, passing vehicles, Units 1 and 2
2	West property boundary (Gate 6)	August 16	11:04 a.m.	9	45.7 to 80.9	61.2	Insects, compressor engine, heavy equipment on landfill, passing garbage trucks, heavy equipment
3	North property boundary (100 yards north of main gate)	August 16	11:25 a.m.	19	49.1 to 79.1	58.2	Concrete batch plant, passing trucks, insects
		August 17	6:50 p.m.	23	40.1 to 70.1	52.2	Insects, passing trucks, jet overflights, power plant, traffic on BeeLine Expressway (both faint)
4	Alafaya Trail northwest of entrance to Avalon Park	August 16	1:32 p.m.	12	44.6 to 94.1	73.3	Passing vehicles, insects
5	South property boundary	August 16	2:02 p.m.	14	43.1 to 75.3	54.9	Insects, static from overhead transmission lines, jet overflights, traffic on BeeLine Expressway (faint)
6	Entrance to corrections center	August 16	2:23 p.m.	11	47.6 to 72.7	57.1	Insects, birds, traffic on BeeLine Expressway, trucks on on-ramp, vehicles in/our of corrections center

Source: ECT, 2005.

by the operation of Unit A and its associated cooling tower, both of which were nearby. Wider variability in measured noise levels was found at most of the other locations, where passing vehicles and other brief events caused higher maximum levels and greater disparity relative to the lowest levels. It is noteworthy that noise from the Stanton generating units and associated facilities was only faintly observed at the northern property boundary during the evening of August 17 and was not detected at any other location. Generally speaking, the measured noise levels in the area of the Stanton Energy Center could be characterized as typical of an urban area, based on a comparison with the typical peak sound levels presented in Table 2.3-25.

Table 2.3-25. Typical Sound Levels

Activity	dBA
Threshold of pain	130
Chipping on metal	120
Loud rock band	110
Jack hammer	100
Jet airliner 0.5 mile away	95
Threshold of hearing damage	90
Freeway traffic—downtown streets	80
Urban residential area	70
Normal conversation	60
Normal suburban area	50
Quiet suburban area	40
Rural area	30
Wilderness area	25
Threshold of audibility	0

Source: Tech Environmental, 2002.

2.3.9 OTHER ENVIRONMENTAL FEATURES

The aesthetic character of a site reflects a number of the topics covered previously in this chapter, such as cultural resources, land use, and transportation infrastructure. The visual characteristics of the existing Stanton Energy Center site and facilities and those of the surrounding area are the key elements in the consideration of aesthetics. Said another way, the aesthetic character of the Stanton site is a product of (a) both the onsite generating and associated facilities and (b) features of surrounding and area properties.

The existing setting or aesthetic character of the Stanton Energy Center can be described as follows:

- Approximately 1,100 acres of developed land generally surrounded by approximately 2,180 acres of mostly undeveloped land.
- The Orange County municipal landfill directly west of and adjacent to the site.
- The Florida correctional center directly south of and adjacent to the site.
- Electrical transmission lines from the generating units connected to an onsite substation and then to additional lines running east-west just to the north of the site, plus additional lines exiting the site to the south.
- Golf course-residential and mixed residential-commercial developments located close-by and north of the site.
- Major roadways located nearby (Highway 528, also called the BeeLine Expressway, south of the Stanton site; Highway 417 to the west).
- OIA located approximately 8 miles to the southwest.

The undeveloped 2,180 acres is predominantly forested, mature, pine flatwoods providing a ground level and tree level buffer to surrounding land uses. An additional approximately 9,000 acres of primarily undeveloped and preserved land is located immediately east of the site, comprising the Hal Scott Regional Preserve and Park. A large area south of the site, currently undeveloped, is approved as a planned unit development known as the International Corporate Park.

The BeeLine Expressway (Highway 528) is located approximately two miles south of the center of the Stanton site, and SR 417 is located approximately four miles to the west. The site is located approximately 8 miles from the OIA, which is located to the southwest (aircraft arriving or taking off are frequently visible from the site).

The Stanton generating units and associated facilities are buffered from the surrounding lands by the existence of many acres of forested land. In fact, the undeveloped portion of the site (i.e., 2,180 of the site's 3,280 acres) mostly remains in its forested condition. This undeveloped, forested buffer complies with Condition of Certification IV.Q., which requires "screening of the site to the extent feasible through the use of aesthetically acceptable structures, vegetated earthen walls and/or existing or planted vegetation." Impacts within this onsite buffer are not allowed by the plant's state Certification.

In addition to the onsite, forested buffer, the surrounding properties contain many more acres of similar buffer. These additional areas can be seen in Figure 2.3-35 (referenced below). Furthermore, even considering the large amount of land development ongoing in the area, it is likely that much of this offsite vegetative visual buffer will remain as is, since significant portions are wetlands and conservation lands and/or parks/recreation lands and are, therefore, subject to development limitations.

The large areas buffering the Stanton site from its surroundings tend to minimize the visual and aesthetic impacts of the existing facilities. In general, where visible at all, the cooling towers and the two main stacks are the only onsite facilities that can be seen from homes in the area, and then only from few vantage points. Figures 2.3-35 and 2.3-36 illustrate. The first figure provides the key to photographs shown in the second. The first photo shown in Figure 2.3-36 was taken from the entrance to Avalon Park, the residential neighborhood closest to and north of the site. From this vantage point, the cooling towers are clearly visible, while the two main exhaust stacks are screened to a large degree by trees. From Avalon Park's central commercial area, the second photo shows the tops of the cooling towers and stacks visible in the distance. The third photo was taken from the entrance to the Orange County wastewater treatment plant. Again, the tops of the cooling towers and stacks are just visible on the horizon. The very tops of the stacks are visible from the entrance to a residential neighborhood located along Curry Ford Road, as shown in the fourth photo. And from the south, from the entrance to the correctional center (fifth photo), portions of the Stanton facilities can be seen, but trees screen the rest.

The plant facilities are generally not visible from several other locations of note. Except from atop the highway overpass (see Location A in Figure 2.3-35), the vegetative screening and intervening development, terrain, and vegetation prevent the plant from being visible from anywhere along Highway 417. Similarly, only the tallest plant structures

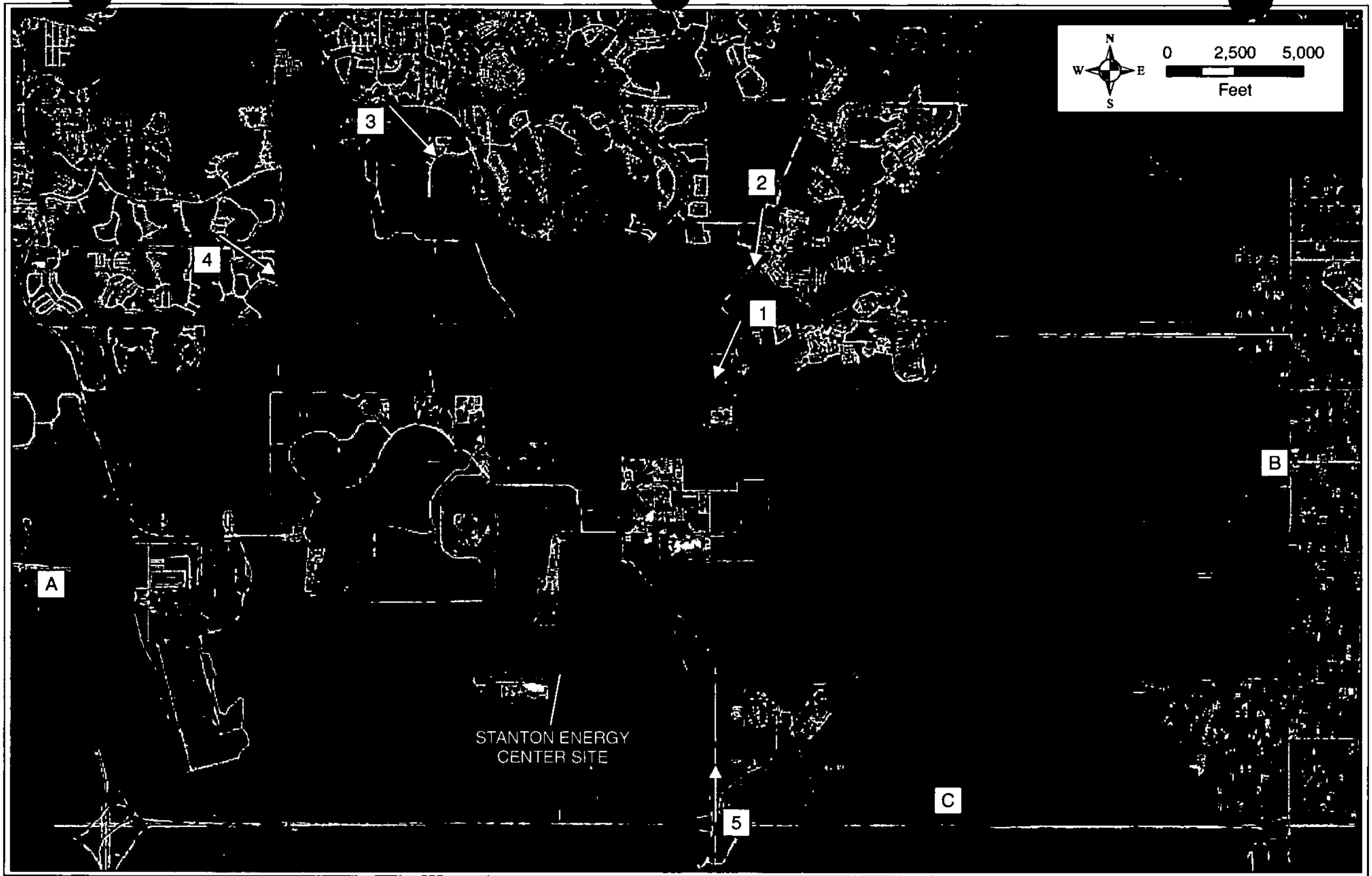

FIGURE 2.3-35.
KEY TO PHOTOGRAPHS

Sources: SJRWMD Aerials, 2004; ECT, 2005.

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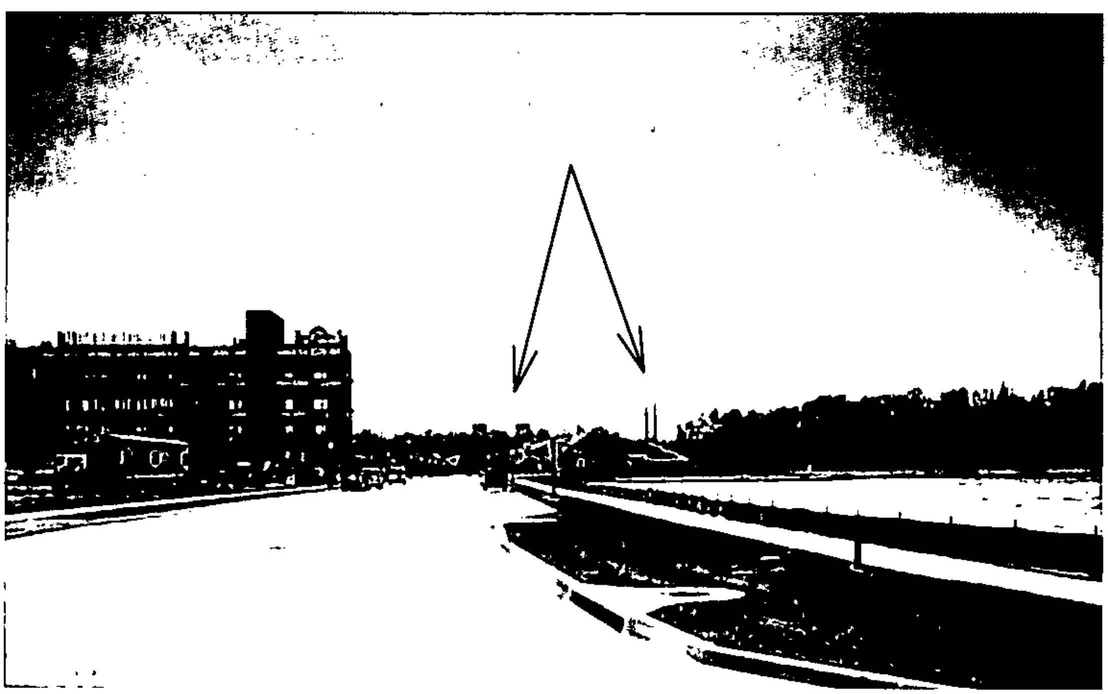
FROM THE ENTRANCE TO AVALON PARK OFF ALAFAYA TRAIL, LOOKING SOUTHWEST.



FROM THE CENTRAL COMMERCIAL AREA OF AVALON PARK, LOOKING GENERALLY SOUTH.

FIGURE 2.3-36. (1 OF 2)

PHOTOGRAPHS OF STANTON ENERGY CENTER FROM AREA VANTAGE POINTS

Source: ECT, 2005.

ECT

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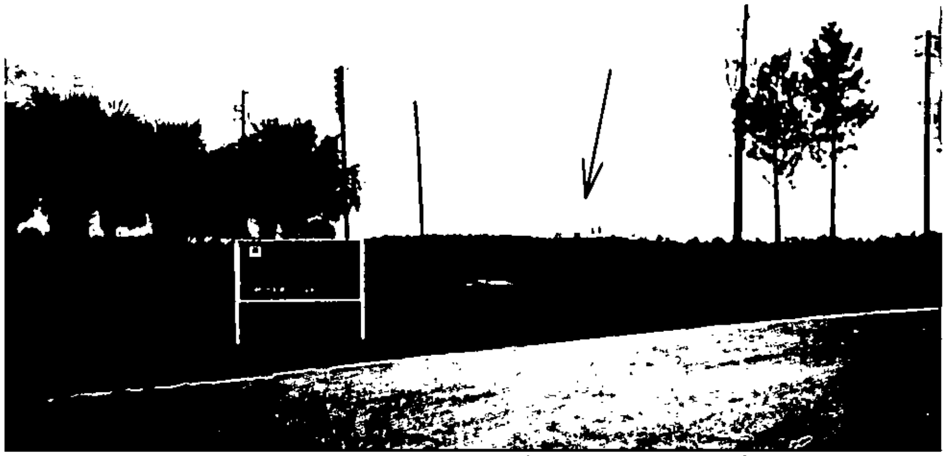
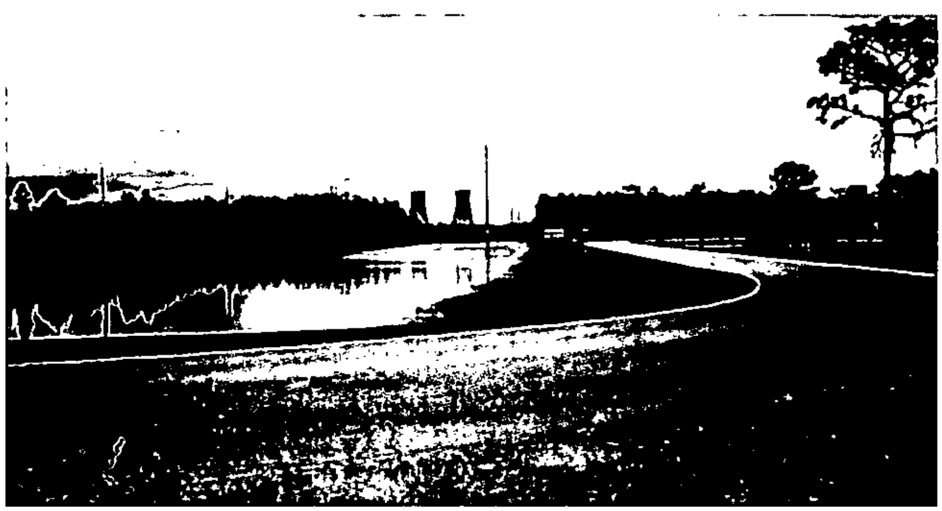


From the Orange County East Water Reclamation Facility (wastewater treatment plant), looking southeast.

From the entrance to the Andover Cay development along Curry Ford Road, looking southeast.



From the entrance to the correctional facility, looking north.

FIGURE 2.3-36. (2 OF 2)

PHOTOGRAPHS OF STANTON ENERGY CENTER FROM AREA VANTAGE POINTS

Source: ECT, 2005.

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(Units 1 and 2 stacks and cooling towers) are visible from a few isolated locations along Dallas Boulevard (Location B) where breaks in trees and vegetation offer a clear line of site to the west. The plant is only intermittently visible along the BeeLine Expressway (Location C).

Finally, the potential aesthetic impact of a site or facility is influenced by proximity to areas of cultural or community importance or significance. Recreational areas, parks, and federal, state, regional, or local scenic or natural landmarks are examples. Only the Hal Scott Preserve and Park exists within 5 miles of the Stanton site. The popular tourist attractions such as Walt Disney World, Sea World, and Universal Studios, are located 20 to 25 miles west and southwest of the Stanton Energy Center.

REFERENCES

BDA Environmental Consultants. 2002. Application for and Environmental Resource Permit on the Alafaya Trail Extension Project Site, Orange County, Florida. Document 99119-10.3. January 11. Winter Park, Florida.

Bureau of Economic and Business Research (BEBR). 2003. Florida Statistical Abstract. University of Florida, Gainesville, Florida.

DeLotelle & Guthrie, Inc. 2003. Progress Report on Red-Cockaded Woodpeckers and Southern Bald Eagles for the Curtis H. Stanton Energy Center During 2002. Prepared for Orlando Utilities Commission.

East Central Florida Regional Planning Council (ECFRPC). 1998. Natural Resources of Regional Significance Public Lands and Resource Management Areas Map. Strategic Regional Policy Plan. Adopted 1998. Water, Plants and Concrete 1998.

Florida Department of Health. 2005. Your Guide to Eating Fish Caught in Florida.

Florida Division of Historical Resources (FDHR). 2006. Letter from Frederick P. Gaske, Director and State Historic Preservation Officer (SHPO), to Darren Stowe, ECT. January 24.

Florida Department of Transportation (FDOT). 1999. Florida Land Use, Cover and Forms Classification System (FLUCFCS). January. FDOT Handbook.

Florida Master Site File, TRS Search. 2005. April 6.

Jones, J.A., et al. 1984. Estimated and Measured Evapotranspiration for Florida Climate, Crops, and Soils. Bulletin No. 840, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, Florida.

Kunkel, 2006. Personal Communication Between Joseph Kunkel, Orange County Public Works Department, and Jeffrey Meling, Environmental Consulting & Technology, Inc. (ECT), January 2006.

Lichtler, W.F., Anderson, W., and Joyner, B.F. 1968. Water Resources of Orange County, Florida. U.S. Geological Survey with Division of Geology, Florida Board of Conservation, and Board of County Commissioners of Orange County. Report of Investigation No. 50. Tallahassee, Florida.

National Oceanic and Atmospheric Administration (NOAA), National Climatic Data Center. 2005. Personal communication: Joe Dertien, ECT. April 4.

Orange County Board of County Commissioners (OCBCC). 2001. Alafaya Trail Agreement. Agreement between Orange County, Florida; Orlando Business Park, LLC; Orlando Utilities Commission; and City of Orlando, Florida. July 31.

Orange County Comprehensive Plan. Capital Improvements Element. Last Updated October 29, 2002.

Orange County Planning Department. 2006. Personal communication: Darren Stowe, ECT, with Planner of the Day. February 9.

Orange County Sheriff's Department. 2005. Personal communication: Darren Stowe, ECT, with Officer Hanley. April 27.

Orlando Utilities Commission (OUC). 2005. 2004 Annual Operating Report. Prepared for Florida Department of Environmental Protection (FDEP). March.

OUC. 2004. 2003 Annual Operating Report. Prepared for Florida Department of Environmental Protection (FDEP). March.

OUC. 2003. 2002 Annual Operating Report. Prepared for Florida Department of Environmental Protection (FDEP). March.

OUC. 2002. 2001 Annual Operating Report. Prepared for Florida Department of Environmental Protection (FDEP). March.

OUC. 2001. Supplemental Site Certification Application, Combined-Cycle Unit A. January.

U.S. Department of Agriculture (USDA). 1989. Soil Conservation Service (SCS) Soil Survey of Orange County, Florida.

U.S. Department of Commerce (USDC). 1999. Local Climatological Data—Annual Summary with Comparative Data, 1998; Orlando, Florida. National Climatic Center, Asheville, North Carolina.

USDC, National Oceanic and Atmospheric Administration (NOAA). 1985. Climates of the States, Volume 1

USDC, NOAA. 1982a. Evaporation Atlas for the Contiguous 48 United States. NOAA Technical Report NWS 33.

USDC, NOAA. 1982b. Mean Monthly, Seasonal, and Annual Pan Evaporation for the United States. NOAA Technical Report NWS 34.

U.S. Environmental Protection Agency (EPA). 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. Report No. 550/9-74-004.

U.S. Geological Survey (USGS), Orlando Office. 2005. Personal communication: Joe Dertien, ECT. April 4.

U.S. Geological Survey (USGS). Revised 2001. Fact Sheet 183-96, Hazard Maps Help Save Lives and Property, William M. Brown III, et al.

USGS. 2002. Fact Sheet 131-02, Earthquake Hazard in the Heart of the Homeland, October.

WEB SITES

National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center	<http://hurricane.csc.noaa.gov/hurricanes>
Orange County. 2004. Orange County Code	<http://library.municode.com/gateway.dll/FL/florida/3184?f=templates&fn=default.htm&npusername=10182&nppassword=MCC&npac_credentialspresent=true&vid=default]>
St. Johns River Water Management District (SJRWMD). 2005.	<http://sjr.state.fl.us/programs/watersupply.html>
SJRWMD. 2005. District Water Management Plan	<http://sjr.state.fl.us/programs/outreach/pubs/dwmp/dwmp.html>
U.S. Environmental Protection Agency (EPA). 2005.	<http://www.epa.gov/compliance/basics/ej.html>
U.S. Fish & Wildlife Service (USFWS), North Florida Field Office	<http://northflorida.fws.gov/CountyList/Orange>

3.0

THE PLANT AND DIRECTLY ASSOCIATED FACILITIES

This chapter provides descriptions of the proposed power plant facilities, the key components and systems of the plant and their operations, and the directly associated facilities that will comprise the Stanton Energy Center Unit B IGCC project. The descriptions include, to the extent possible, estimates of the expected character, quality, and quantity of discharges and emissions from the plant facilities and operations. Also, proposed measures and systems to control and, as necessary, treat the expected emissions and discharges are described in order to provide reasonable assurance that the plant operations comply with applicable regulatory requirements and standards. The specific sections in this chapter are:

- 3.1—Background.
- 3.2—Site Layout.
- 3.3—Fuel.
- 3.4—Air Emissions and Controls.
- 3.5—Plant Water Use.
- 3.6—Chemical and Biocide Waste.
- 3.7—Solid and Hazardous Waste.
- 3.8—Onsite Drainage System.
- 3.9—Materials Handling.

The descriptions presented in this chapter are based on current plans and available engineering, design, and vendor information for the proposed project; some information may be preliminary in nature.

3.1 BACKGROUND

3.1.1 OVERVIEW

The Stanton Unit B IGCC project will involve the design, construction, and operation of electric generation units and associated facilities on a portion of the Stanton Energy Center. The IGCC unit will be co-owned by OUC and SPC-OG. It will gasify sub-bituminous coal and supply syngas fuel for the generation of 285 MW of electricity (net) at a heat rate of 8,430 British thermal units per kilowatt-hour (Btu/kWh) (40.5 percent efficiency, higher heating value basis). The principal components of Unit B will consist of coal gasification equipment and a combustion turbine (CT) in combined-cycle configuration. The CT will be capable of firing natural gas in addition to syngas. The electricity produced by the plant will be transmitted to an onsite electrical substation for distribution to the power grid.

In total, approximately 28 months will be needed for construction of Unit B. OUC/SPC-OG plan to begin onsite construction of the project late in 2007. Construction phases will include:

- Site preparation and excavation.
- Pile installation, if needed.
- Pouring of concrete foundations.
- Steel erection.
- Mechanical equipment installation.
- Piping, electrical, and controls.
- Cleanup.
- Equipment startup and testing.

The various phases of construction will result in some modest environmental impacts, despite the use of best management practices (BMPs). Examples of short-term, temporary construction impacts are increased noise levels from earth-moving equipment, increases in local traffic, and airborne dust. On the other hand, the construction of the Unit B project (as well as its operation) will have beneficial impacts, such as job creation, a positive impact on the local economy from sales to workers, and a cost-effective and efficient source of electricity for the community. Chapters 4.0 and 5.0 discuss the impacts resulting from various phases of construction and operation, respectively, while Chapter 7.0 presents an assessment of the social and economic effects of plant construction and operation.

OUC/SPC-OG's Unit B project development plans have been designed to take full advantage, environmentally and economically, of the proposed site's location and proximity to key support facilities. The site for Unit B is the Stanton Energy Center, which is the site of three existing power generation units (two 468-MW conventional coal-fired boilers and one 633-MW natural gas-fired combined-cycle unit [Unit A]) and associated support facilities. The Unit B project will utilize existing Stanton coal delivery and handling systems, existing natural gas supply pipeline, and existing water supply and wastewater treatment systems, among others.

Stanton also already has an existing, onsite 230-kV electrical substation. Unit B will be able to connect to the electrical grid with only a short, onsite transmission line needed. The Unit B site's close proximity to this existing substation will minimize the potential for energy losses, expenses, and environmental impacts associated with the project's interconnection to the State's transmission line grid. Chapter 6.0 presents the plans for the onsite electrical transmission interconnection and addresses the potential impacts associated with its construction and operation.

Also, the proposed project will make maximum use of treated effluent (or reuse water) available from the nearby Eastern Water Reclamation Facility. Unit B will require relatively little ground water.

Section 3.1.3 provides descriptions of the proposed coal gasification and electric generating equipment, the operations of major processes and systems, and other facilities that will comprise the Stanton Unit B IGCC project. Also, as appropriate, specific references are provided to other sections in this chapter and elsewhere in this SCA that present more detailed descriptions of the proposed facilities, systems, and processes.

As discussed further in the next section, it is noteworthy that the gasifier portion of the Unit B IGCC facility is a U.S. Department of Energy (DOE) Clean Coal Power Initiative (CCPI) project. CCPI is intended to demonstrate energy efficient coal-based technologies that are capable of being commercialized while operating in an environmentally acceptable manner.

As discussed in more detail in Section 3.1.2, the overall objectives of the proposed IGCC project are two-fold:

- Support OUC's generation expansion plan and the company's obligation to provide reliable and economical electric power to its existing and future customers.
- Demonstrate and evaluate the performance and benefits of a commercial-sized, air-blown gasifier island unit utilizing a *Transport Gasifier*.

The fact that the gasifier portion of the Unit B project is a CCPI project is relevant to the SCA process in that it limits the need to examine alternatives. Specifically, as discussed at somewhat greater length in the next section, in Chapter 8.0, and elsewhere, the demonstration aspects of this project dictate certain elements of facility technology selection and design, such that employing alternatives that might otherwise be considered would be counter to the project objectives.

3.1.2 PROJECT NEEDS, OBJECTIVES AND BENEFITS

There are two principal needs to be addressed by the proposed Unit B:

- Cost-effective integration of this gasifier technology with a combined-cycle power plant to meet OUC's need for power.
- Commercial demonstration of an advanced air-blown Transport Gasifier technology.

One of the purposes of DOE's CCPI program is to demonstrate coal-based power generation technologies at a scale that accelerates their widespread deployment within the power industry. The economic, environmental, and thermal performance of these technologies must be able to show progress consistent with DOE's goals. Thus, a primary objective of the Unit B project is to design, build, and operate a state-of-the-art commercial-scale coal *gasification island* utilizing KBR air-blown Transport Gasifier technology and integrate it with a planned *combined-cycle island.* Other objectives of the project include:

- To design, construct, and operate an advanced syngas cleanup system that includes sulfur removal and recovery; high-temperature, high-pressure (HTHP) particulate filtration; ammonia recovery; and mercury removal.
- To demonstrate high availability, high thermal efficiency, low cost, and low emissions of the IGCC unit in commercial operating mode.
- To develop an effective commercialization strategy to accelerate the Transport Gasifier technology penetration in the United States and international markets to achieve full repayment of DOE's cost share.
- To disseminate information on the development of the Transport Gasifier technology through reports and conference presentations. The information reported should include plant efficiency, environmental status, and cost successes for ready replication into commercial practice.

The first need to be met by the proposed project is cost-effective supply of electricity. As a public utility, OUC has the obligation to provide reliable and economical electric power service to its existing and future customers. To meet this obligation, OUC conducts ongoing, long-range power resource planning and load (i.e., demand) forecasting programs to predict its future power supply needs and evaluate available options to meet these needs. These programs also consider OUC's extensive efforts to encourage conservation and load management programs to reduce future power needs.

Florida statutes require all Florida utilities to prepare planning documents looking ahead 10 years (10-year site plans). Based on the anticipated continuing growth in the Orlando area, OUC's latest plan has forecast needs for approximately 300 MW of additional generating capacity in the 2010 timeframe (Black and Veatch, 2005). The planned Unit B combined-cycle generating unit will be the means to meet the forecasted need. OUC needs this new capacity to maintain adequate system reliability in meeting the expected increasing demands of its customers for electrical energy. The objective of the power resource planning process is to ensure that future service to OUC's customers remains economical and reliable, while meeting all environmental regulatory requirements and standards.

The technology to be demonstrated will utilize two air-blown Transport Gasifiers to fuel a nominal 285-MW combined-cycle power plant. The Transport Gasifier design is based on KBR's fluidized catalytic cracking (FCC) design. The Transport Gasifier offers a simpler and more robust method for generating power from coal than other alternatives. It is unique among coal gasification technologies in that it is cost-effective when handling low rank coals (i.e., coals with lower energy contents) and when using coals with high moisture and/or high ash contents. These coals make up half the proven reserves in both the United States and around the world.

The largest Transport Gasifier built to date, with a maximum coal-feed rate of 5,500 lb/hr (or 2.75 tons per hour [ton/hr]), commenced operation in 1996 at the PSDF (a joint research facility sponsored by DOE, Southern Company, and other industrial participants). The operating experience at the PSDF has resulted in a deep understanding of Transport Gasifier performance and its fluid mechanics, and also of the performance of supporting ancillary equipment such as coal-feed and ash-removal systems and HTHP gas filters. Economic and engineering evaluation studies completed by SCS in conjunction with DOE, the Electric Power Research Institute (EPRI), and KBR, conclude that the most economical application of the technology for power generation is as an air-blown Transport Gasifier.

The technology is now ready to be demonstrated on a commercial scale to confirm these advantages (with Unit B), after which it is projected to be widely deployed as an advanced coal-based power generating technology. It is planned that future IGCC units based on the proposed project's design and integration with the combined-cycle unit will be capable of generating more power and running at increased efficiencies.

Benefits associated with this project can be described according to general categories: operational, socioeconomic, and environmental. Further, these benefits can be considered in local, regional, and national contexts.

From an operational perspective, the gasification piece of the Unit B project is designed, first and foremost, to address and overcome challenges associated with scaling up from pilot to commercial size and successfully demonstrating the Transport Gasifier technology, which is expected to have national (and international) implications. The project technology also has the potential to significantly reduce future coal-based power generation costs while using coal to satisfy the nation's energy independence objectives. The use of coal, an abundant, low-cost domestic fuel, is consistent with the national goals of the CCPI program. As a whole, the IGCC unit provides cost-effective electric generation for meeting the requirements of OUC's generation expansion plan and constitutes a local and regional operational benefit associated with this project.

Successful demonstration of the Transport Gasifier at Stanton will have a number of other operational benefits compared to other IGCC technologies or standard coal-based generation technologies (e.g., pulverized coal [PC]). These include:

- Efficiency improvements.
- Reduced capital costs in line with DOE goals for coal-based generation technologies.
- Competitive cost of electricity with the best opportunity to achieve DOE's cost goals.
- Potential for rapid commercial deployment (potentially including refueling natural gas-fired combined-cycle power plants to operate using more cost-effective fuel).

Socioeconomic benefits are those normally associated with new industrial activity, including increased local tax base and employment opportunities. These benefits are discussed in detail in Chapter 7.0.

Consistent with DOE objectives, a major objective of the Unit B project is to maintain acceptable environmental performance while commercial scale operation is being demonstrated. A successful demonstration will result in the availability of a coal-based technology to the utility industry having lower emissions overall than conventional coal technologies. In addition, the project will have comparably lower water consumption and land use requirements than conventional coal technologies.

In summary, the proposed Unit B IGCC generating unit will demonstrate the air-blown Transport Gasifier technology, for which the primary market is the global coal-based power generation industry. The economic advantages of this technology will be tested, and its potential for wider use confirmed. The proposed demonstration project is an essential step in the commercialization of the process. Once the gasification unit is constructed and operated and its advantages confirmed, the Transport Gasifier process will be well situated to be effectively marketed worldwide.

The operational, socioeconomic, and environmental benefits associated with successful demonstration of the Transport Gasifier compare favorably to those from other coal-based technologies. Long-term and cumulative effects of the commercial use of this technology should be beneficial to the environment when compared to conventional coal-fired technologies. Further, commitments of vital resources are minimized by IGCC power generation by virtue of higher thermal efficiency, which provides more energy at a lower level of resource consumption.

3.1.3 DESCRIPTION OF PROJECT TECHNOLOGIES

The gasification system portion of the Unit B IGCC facility is projected to produce a fuel that, when combusted, will achieve high environmental standards for emissions of SO_2, NO_x, PM, and mercury. Means of reducing water consumption are also incorporated in the design. The design also incorporates removal and recovery of commercial-grade anhydrous ammonia and sulfur by-products. The syngas produced by this advanced technology will be used in the combined-cycle power-generating unit that takes advantage of proven, reliable, and widely demonstrated technology.

Figure 3.1-1 provides an overall block flow schematic diagram of the proposed gasification equipment and its integration with the combined-cycle unit.

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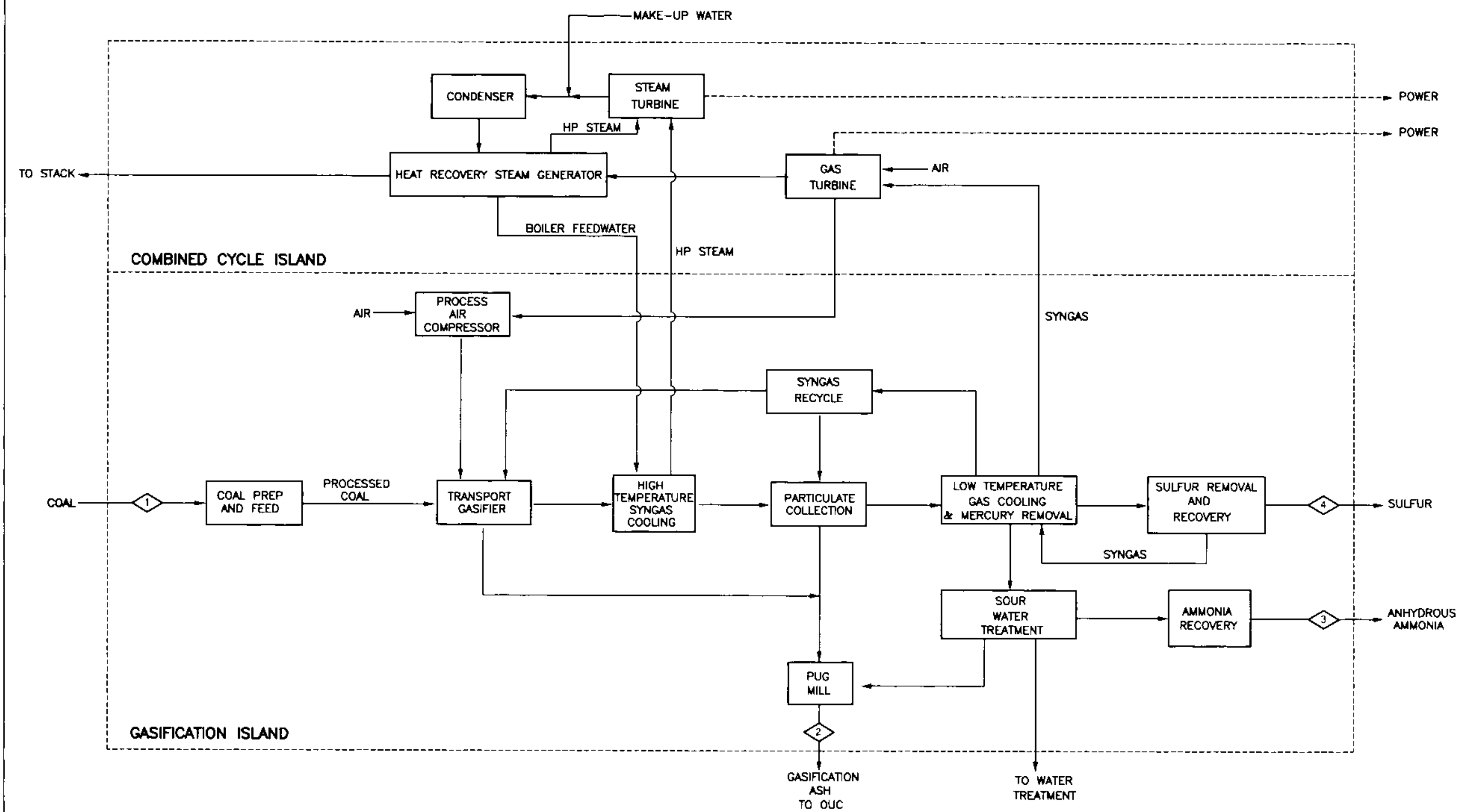

FIGURE 3.1-1.

OVERALL PROCESS FLOW DIAGRAM

Source: SCS, 2005.

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3.1.3.1 Unit B Gasification Island

Unit B's gasification island will employ two identical gasifier trains. Once the coal enters the gasification island structure, it will be separated to feed the two parallel trains. Each gasification train is designed to produce 50 percent of the total syngas requirement for the gas turbine. With few exceptions, the equipment in each train will be completely separate, and the two syngas streams will be combined just prior to the gas turbine. The exceptions are:

- The coal will enter the gasification island structure on a single conveyor and fall onto a tripper conveyor system that will separate the coal between the two gasification trains.
- There will be a startup stack and multipoint flare for the gasification island.
- The sulfur removal equipment will include two contactors, one for each of the two syngas streams. However, there will be a single solvent recovery process for the two contactors.
- There will be a single sour water treatment and ammonia recovery system that serves both trains.

The design coal feed rate to each gasifier will be approximately 68.5 ton/hr (137 ton/hr, total). The plant will be 100-percent coal-fired, designed for low-sulfur Powder River Basin (PRB) sub-bituminous coal. Carbon conversion is projected to be 97 percent. Sulfur and other pollutants in the coal will be removed from the syngas before delivery to the gas turbine. Each gasifier will produce approximately 225 ton/hr (450 ton/hr, total) of syngas having a lower heating value of approximately 125.7 British thermal units per standard cubic foot (Btu/scf). Table 3.1-1 summarizes the main inputs to and outputs from the gasifier. The following paragraphs provide details of the key processes within the gasification island.

Coal Preparation and Feeding

The design coal is sub-bituminous PRB with an as-received higher heating value of 8,760 British thermal units per pound (Btu/lb) and 0.26 percent sulfur. Two to three unit trains per week, each train using the existing unloading system for Units 1 and 2, will deliver the coal (see also Section 3.3). The conveyor delivers the coal into a hopper, where

Table 3.1-1. Expected Operating Characteristics—Input and Output Quantities Specific to Transport Gasifier Island

		Description	Quantity
	Inputs		
1	Coal	Designed for PRB sub-bituminous coal used to produce syngas	274,000 lb/hr
	Sand	Used once at initial startup to make up gasifier bed; the bed material may be recycled, reducing/eliminating the need for additional sand; additional requirements of sand to be determined by operational experience	62 tons (for initial startup)
	Natural gas	Used during startup/trips/transitional periods of gasifier operation as needed	50 (flare pilot) to 31,000 lb/hr (during startup)
	Nitrogen	Inerting gas, purge flow	Nitrogen plant capacity = 30 ton/hr
	Outputs		
	Syngas	Coal derived syngas produced by gasifier for combustion in gas turbine	890,000 lb/hr (gasifier island at full load)
2	Gasification-ash (g-ash)	Fine g-ash removed from hot-gas filter vessel (possibly some from gasifier); contains more carbon than combustion ash does	18,300 lb/hr
3	Anhydrous ammonia	Ammonia removed in scrubber and captured in sour water treatment plant	1,960 lb/hr
4	Sulfur	Product of sulfur recovery process	760 lb/hr

Source: SCS, 2005.

a belt conveyor delivers it to a radial-pedestal stacker conveyor, then to a storage pile. The coal from the storage pile will be discharged onto a reclaim belt conveyor and then delivered to the crusher shed at grade. After passing through tramp screens, a magnetic separator, and an automatic sampling system, a single crusher reduces the coal size from 3 to 0.75 inch. The crushed coal is transported on a belt conveyor to a tripper conveyor in the process structure and then into crushed coal silos.

A conveyor feeds crushed coal from each storage silo to its dedicated pulverizer. The pulverizers are roll-mill crushers using hot gas to dry the coal. The inert, recirculating drying gas enters at the base of the pulverizer, and this mixture of pulverized coal and gas is conveyed to a cyclone, where the majority of the coal is removed and falls through a rotary pressure seal into a surge bin. The dusty gas then flows to a baghouse where the coal is separated and discharged through a rotary pressure seal into the same surge bin. An induced-draft fan after the baghouse drives the gas through the drying circuit.

Water-cooled shell-and-tube exchangers cool the drying gas to condense the moisture picked up in the dryer. Since the condensate withdrawn from the knockout drum may include coal dust transmitted through the baghouse, it is passed to the sour-water treatment plant prior to reuse. The cooled gas is reheated in shell-and-tube heaters using intermediate-pressure steam. Then the hot gas is recirculated back to the pulverizer to dry more coal. Steam heating is preferred because it avoids the operating cost associated with fuel-fired burners. It also minimizes the amount of moisture present in the drying gas and improves drying efficiency.

The pulverized coal is transferred from the surge bin by gravity to a high-pressure coal feeder. The coal enters the feeder at atmospheric pressure and the pressure is then increased to the operating pressure of the gasifier.

Transport Gasifier

The design of the Transport Gasifiers is based on KBR's FCC technology and SCS's operating experience at the PSDF. Each gasifier consists of several components, as shown in Figure 3.1-2. Each of the two Transport Gasifiers will be designed to convert the

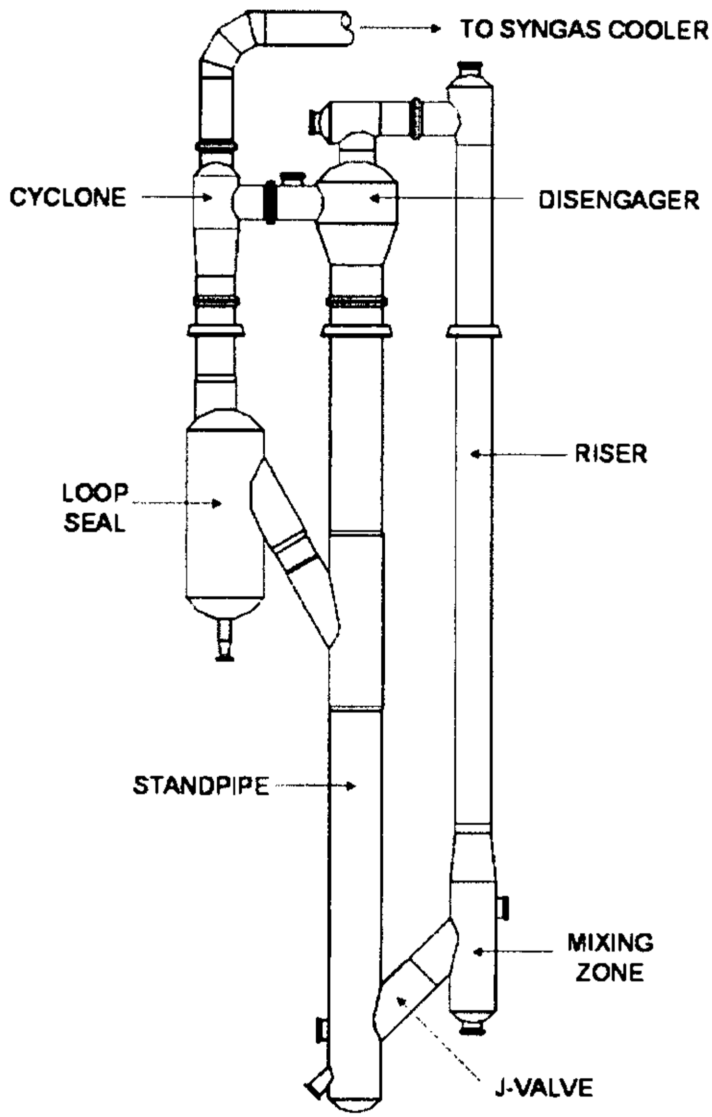

FIGURE 3.1-2.

SIDE ELEVATION OF A TRANSPORT GASIFIER

Source: SCS, 2005.

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68.5 ton/hr of PRB coal into approximately 450,000 lb/hr of syngas (850 million British thermal units per hour [MMBtu/hr]). The gasifiers will be constructed from refractor-lined pipe and have a height of approximately 160 feet (ft).

Nearly 350 ton/hr of compressed air are supplied to the two gasifiers during operation. This air originates from two sources; roughly 25 percent of the air will be extracted from the combined-cycle unit's gas turbine, and the balance is ambient air.

Coal and air are fed into the mixing zone at the base of the riser section and mixed with gasifier ash recirculated through the *J-valve* from the standpipe. Gasifier ash is primarily coal ash and unreacted carbon but may contain sand. Coal is fed near the top of the mixing zone and air is fed at the bottom. Oxygen in the air is consumed by carbon present in the recirculating ash, forming primarily carbon monoxide (CO), and releasing the heat required to maintain reactor temperature. A consequence of this partial oxidation is that the coal devolatilizes in an almost oxygen-free environment. This staging effect results in a syngas with more methane than that from other fluidized-bed gasifiers. The hot recirculating ash heats the coal rapidly, minimizing tar formation.

Gasification ash and syngas pass from the mixing zone up to the riser. Syngas and gasification ash pass to a disengager where larger, denser particles are removed by gravity and fall into a standpipe. The syngas passes to a cyclone where most of the remaining gasification ash is removed and passed into a loop seal. The syngas leaving the cyclone passes along a refractory-lined pipe to the high-temperature syngas cooler, and after cooling, passes along a metal alloy pipe to the HTHP filter for final particulate removal.

Gasification ash flowing through the cyclone loop seal combines in the standpipe with gasification ash from the disengager. The combined stream passes down the standpipe and through the J-valve into the mixing zone. The J-valve and loop seal are nonmechanical valves that allow the gasification ash to flow against a reverse pressure gradient. To achieve reliable flow in these valves, the solids have to be well aerated. Recycled syngas is used for aeration rather than nitrogen to avoid diluting the product syngas and to reduce operating costs.

To maintain constant gasifier bed inventory, gasification ash can be removed periodically from the lower region of the standpipe. The gasification ash, still at pressure, flows through a bank of cooling tubes and heat passes into the condensate system. The gasification ash is cooled and then passes into a lock vessel to be depressurized. Syngas vented from the lock vessel passes to the syngas header to be compressed and returned to the Transport Gasifier. Nitrogen is used to pressurize the lock vessel. If required, sand can be fed to increase the gasifier solids inventory.

High Temperature Syngas Cooling

As shown in Figure 3.1-1, the syngas stream leaving each gasifier cyclone passes to a high temperature syngas cooler that lowers the syngas temperature before it enters the HTHP filter system. The heat transferred is used to raise the temperature of high-pressure superheated steam. The heat duty of each syngas cooler is approximately 190 MMBtu/hr.

The syngas cooler consists of three stages: an evaporator, a superheater, and an economizer. The evaporator has a natural circulation steam drum operating at above steam turbine inlet pressure and at saturated temperature. The steam raised in the evaporator is passed to a superheater, where it is heated to the steam turbine inlet temperature. This steam is mixed with the superheated steam exiting the combined-cycle unit's heat recovery steam generator (HRSG) before passing into the steam turbine. Boiler feed water enters the economizer and is heated to near saturation before entering the steam drum.

All three coolers are shell and tube heat exchangers, with the particulate-laden syngas flowing downward in a single pass through vertical tubes. The cooling fluid, water or steam, flows upward in a single pass through the shell side of the exchanger.

Particulate Collection

Particulate-laden syngas leaves the high temperature syngas cooler and enters the HTHP filter system. The filter system uses rigid, barrier-type filter elements to remove essentially all of the particulate in the syngas stream. Recycled syngas is used to pulse clean the filters as they accumulate particulate from the unfiltered syngas. The cleaned syngas particulate loading is projected to be less than 0.1 part per million by weight (ppmw). Downstream of each filter element, a safeguard device is installed to protect the combustion turbine from particulate-related damage in the event of a filter element failure.

Each of the two HTHP gas filter systems removes approximately 5 ton/hr of fine particulate from the syngas stream. The particulate (gasification ash) is cooled and depressurized to atmospheric pressure before leaving the gasifier island.

The syngas streams exit the filter vessels and flow to the low-temperature heat recovery system. The fine ash, still at pressure, flows down through a bank of cooling tubes and the heat is transferred to the condensate system. The cooled solids pass into a proprietary continuous fine ash removal system.

Low Temperature Gas Cooling and Mercury Removal

Before the filtered syngas leaving the HTHP filters is combusted in the gas turbine, sulfur, mercury, and nitrogenous-compound content is decreased. Cooling the syngas facilitates removal of these species, along with hydrocarbons, fluorides, and chlorides. Recuperative exchangers are incorporated in the cooling circuits to keep the final *sweet* syngas (syngas after sulfur removal) temperature high and so help preserve thermal efficiency.

The syngas leaves each HTHP filter and is cooled to the operating temperature of the sulfur removal process using high- and medium-temperature recuperators. Both coolers condense water and certain hydrocarbons from the *sour* syngas (i.e., syngas that has not gone through the sulfur removal system). The water dissolves almost all the nitrogenous compounds, chloride, and fluoride present along with lesser amounts of carbon dioxide (CO_2), CO, hydrogen sulfide (H_2S), and carbonyl sulfide (COS). This aqueous mixture is removed from the syngas flow in a knockout drum after the last cooler and passed to the sour water treatment plant. An aqueous scrubber is located downstream of these exchangers to further reduce the ammonia and other constituents in the syngas. The gas then flows into the sulfur removal process for H_2S removal before re-entering the low-temperature gas cooling area to be reheated and then combusted in the gas turbine.

As the gas is being cooled, it flows through additional gas cleanup processes. One of these is a COS hydrolysis unit that catalytically converts most of the COS to H_2S. The desulfurization process will not remove COS from the syngas stream, so the COS is converted to H_2S to minimize sulfur emissions. The reaction takes place over an alumina-based catalyst. The second reactor is a packed bed of sulfur-impregnated activated carbon to remove mercury from the syngas.

Sulfur Removal and Recovery

Syngas leaves the low-temperature gas cooling system at a temperature slightly above ambient and enters the sulfur removal process. In this process, the syngas is contacted with a solvent that removes a high percentage of the H_2S from the syngas stream. The H_2S in the solvent is converted to elemental sulfur. The solvent is regenerated and returned to the sulfur removal process. The sweet syngas leaves the contactor at a temperature slightly above ambient and then reenters the low-temperature gas cooling process where the syngas is heated before it is combusted in the gas turbine.

Prior to final recuperation, approximately 2 percent of the sweet syngas is removed and passed to the syngas recycle system. Some of this syngas is sent to the pulse-gas reservoirs and used to pulse clean the HTHP filters, and the remainder is used for aeration in the gasifier.

Isolation valves before the gas turbine allow one gasifier train to be brought on line while the other remains out of service. This arrangement simplifies the overall plant startup and, by allowing one unit to remain in service when the other is offline, contributes to increased overall plant availability.

The combined-cycle unit's gas turbine compressor provides the combustion air for the syngas and approximately 25 percent of the air required by the gasifier at full load. The remaining air required is delivered by a motor-driven process air compressor.

Sour Water Treatment and Ammonia Recovery

The water removed by the coal preparation system, the process air compressor intercoolers, water condensed from the syngas in the low-temperature gas cooling process, and water produced in the sulfur removal process is collected and sent to the single sour water treatment and ammonia recovery unit that treats approximately 150 gallons per minute (gpm) of *sour water*. The combined water flow passes to a filter to remove particulate and an activated carbon bed to remove organic material before entering a degassing drum. The ammonia in the water retains most of the dissolved H_2S, and the gas released is mainly light hydrocarbons, which pass to the vent gas recycle header. The filter cake and spent activated carbon will be disposed of in a manner that complies with applicable regulations.

Next, the sour water is heated in a stripped-water recuperator and passed to the steam-heated H_2S stripper where H_2S, hydrogen cyanide (HCN), CO, and CO_2 are released and passed to the vent gas recycle header. The header syngas stream is compressed and injected into the oxidation zone of the gasifier, where the HCN is destroyed. The water from the H_2S stripper discharges to the steam-heated ammonia stripper to produce a concentrated ammonia solution. The water drawn from the bottom of the ammonia stripper passes to the stripped-water recuperator and is pure enough for plant reuse.

The concentrated ammonia solution is further processed in two additional steam-heated strippers, the first releasing any remaining dissolved H_2S into the vent gas recycle header and the second increasing the ammonia concentration to 99.7 percent. The water drawn from the bottom of the columns is sufficiently pure for plant reuse. The ammonia produced is commercial-grade anhydrous ammonia, which OUC and SPC-OG intend to use at Stanton in the other, existing onsite generating units (see Section 3.7.1.1). Excess anhydrous ammonia may be sold in the commercial market.

Flare

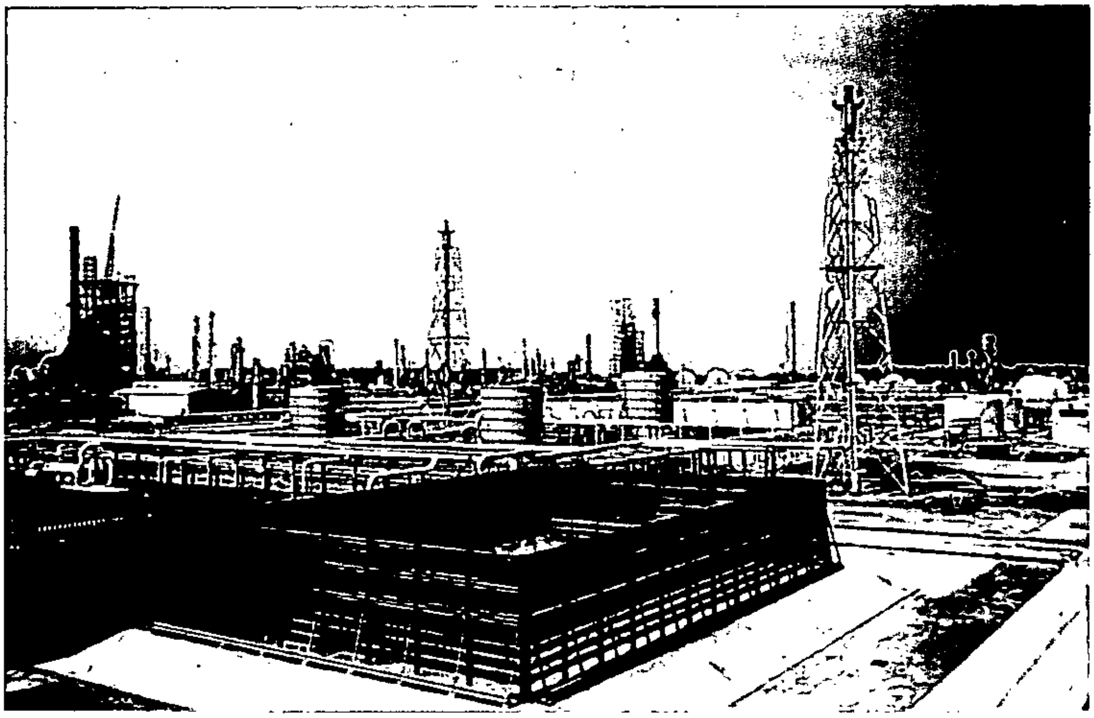
Although not shown in Figure 3.1-1, the Unit B gasification island will be equipped with a flare to combust syngas during startup and during plant upsets, such as a trip of the combined-cycle unit's gas turbine. A *multipoint* flare system will be used and has been selected in preference to the more conventional stack flare design. The multipoint design, like the stack design, is well proven in the petrochemical industry and has been installed in hundreds, if not thousands of applications. Figure 3.1-3 shows two photographs of representative applications of the multipoint flare system similar to that planned for Unit B.

Relative to stack flares, the multipoint flare is a newer technology and was developed to resolve aesthetic issues (e.g., visual impacts) related to flares. Instead of having a single stack that is 100 to 200 ft tall with a single flame that may also be several hundred feet long and visible for many miles, the multipoint flare divides the gas into a number of smaller flames. These flames will be placed behind a thermal barrier fence. The multipoint design places the burners only approximately 10 ft above ground level. For this project the flare system will have a footprint of approximately 214 by 123 ft. The surrounding thermal barrier fence will be 20 ft tall. Flame temperature when fully employed will be approximately 1,800 degrees Fahrenheit (°F), and flame height will rise to approximately 40 ft above the burners at full load. The flame will be smokeless and invisible during the day (only shadows of the heat effects will be visible). At night, the blue/purple flame will be visible for some distance. Eight pilots fired with natural gas at a flowrate of 80 standard cubic feet per hour (scf/hr) per pilot will be on at all times.

3.1.3.2 Combined-Cycle Island

The current IGCC design basis assumes a General Electric (GE) 7FA gas turbine (or CT) will be used. GE has designed and built 20 gas turbines (primarily 7FA designs) for operation on syngas, all from oxygen-blown gasifiers. The total 7FA fleet operating time on syngas is approximately 600,000 hours. Some of the syngas-operated gas turbines have approximately 50,000 hours of operation.

To prevent flashback caused by the hydrogen content of the syngas, the CT will utilize diffusion flame-type combustors. These combustors are also capable of burning natural gas. When syngas is not available during startup and gasifier outages, the CT will fire natural gas.



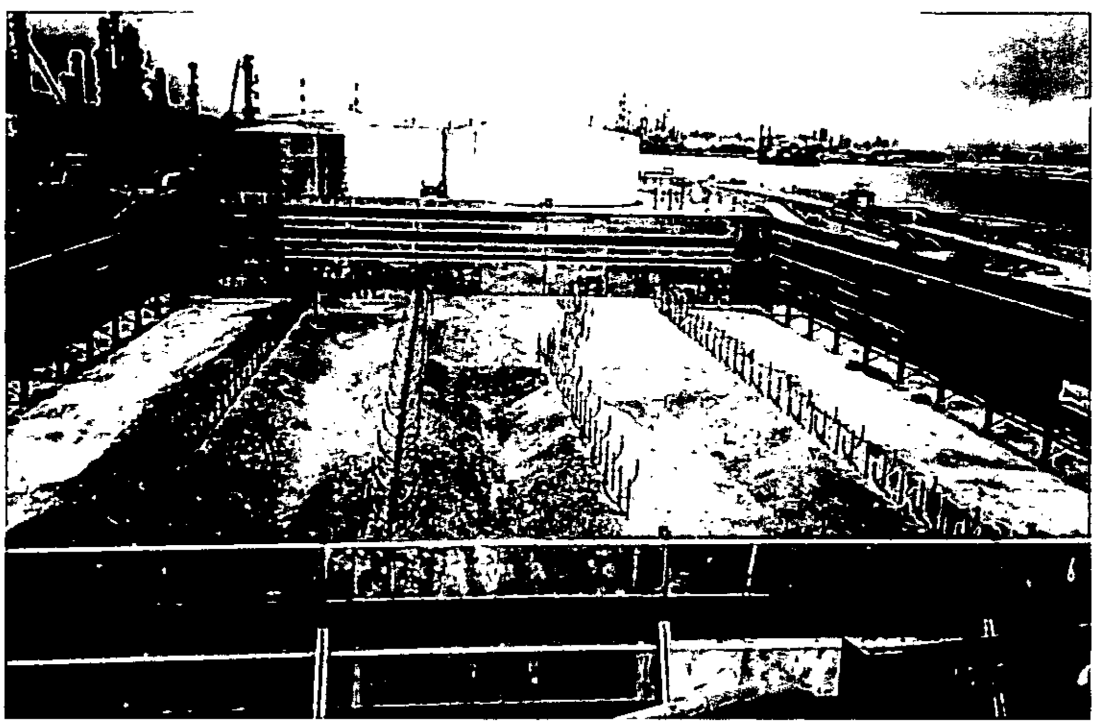


FIGURE 3.1-3.

TWO REPRESENTATIVE APPLICATIONS OF MULTIPOINT GROUND FLARE SYSTEM

Source: Callidus, 2005.

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The IGCC unit's combined-cycle island power block will consist of the CT/generator unit with a dedicated HRSG, a single steam turbine generator (i.e., a 1-on-1 CT/HRSG configuration), and associated auxiliary and control systems. The CT/HRSG unit will be constructed to allow only combined-cycle operation (i.e., the CT will not have a bypass stack allowing simple-cycle operation). The HRSG will be equipped with natural gas-fired duct burners to boost power generation capability during periods of peak demand. Firing syngas as a base load unit, the combined-cycle unit will produce a net of 285 MW of electricity. When firing natural gas in both the CT and HRSG duct burners, the capacity of the combined-cycle unit is 310 MW.

Figure 3.1-4 provides a simple schematic of a basic combined-cycle system showing a CT, an HRSG, and other key components. CTs are advanced technology engines that convert latent fuel energy into mechanical energy using compressed hot gas (i.e., air and products of combustion) as the working medium. CTs deliver mechanical energy by means of a rotating shaft that is used to drive an electrical generator, thereby converting a portion of the engine's mechanical output to electrical energy. In the CT cycle, ambient air is first filtered and then compressed by the CT compressor section. The CT compressor section increases the pressure of the combustion air stream and also raises its temperature. The compressed combustion air is then combined with fuel, which is ignited in the CT's high-pressure combustor to produce hot exhaust gases. These high-pressure, hot gases expand and drive the CT's turbine section to produce rotary shaft power. The turbine rotor is coupled to an electric generator as well as to the CT combustion air compressor rotor.

When CTs are used as simple-cycle (stand-alone) units, the hot combustion gases are released to the atmosphere at approximately 1,000 °F after they have passed through the turbine. The efficiency of a power plant's electric power production is significantly improved when the simple-cycle design is modified to include an HRSG and a steam turbine in what is termed a combined-cycle power plant. In a combined-cycle system, the heat in the CT exhaust gases is used to generate steam in an HRSG, where gas temperatures are reduced to approximately 270°F before release to the atmosphere. The steam is

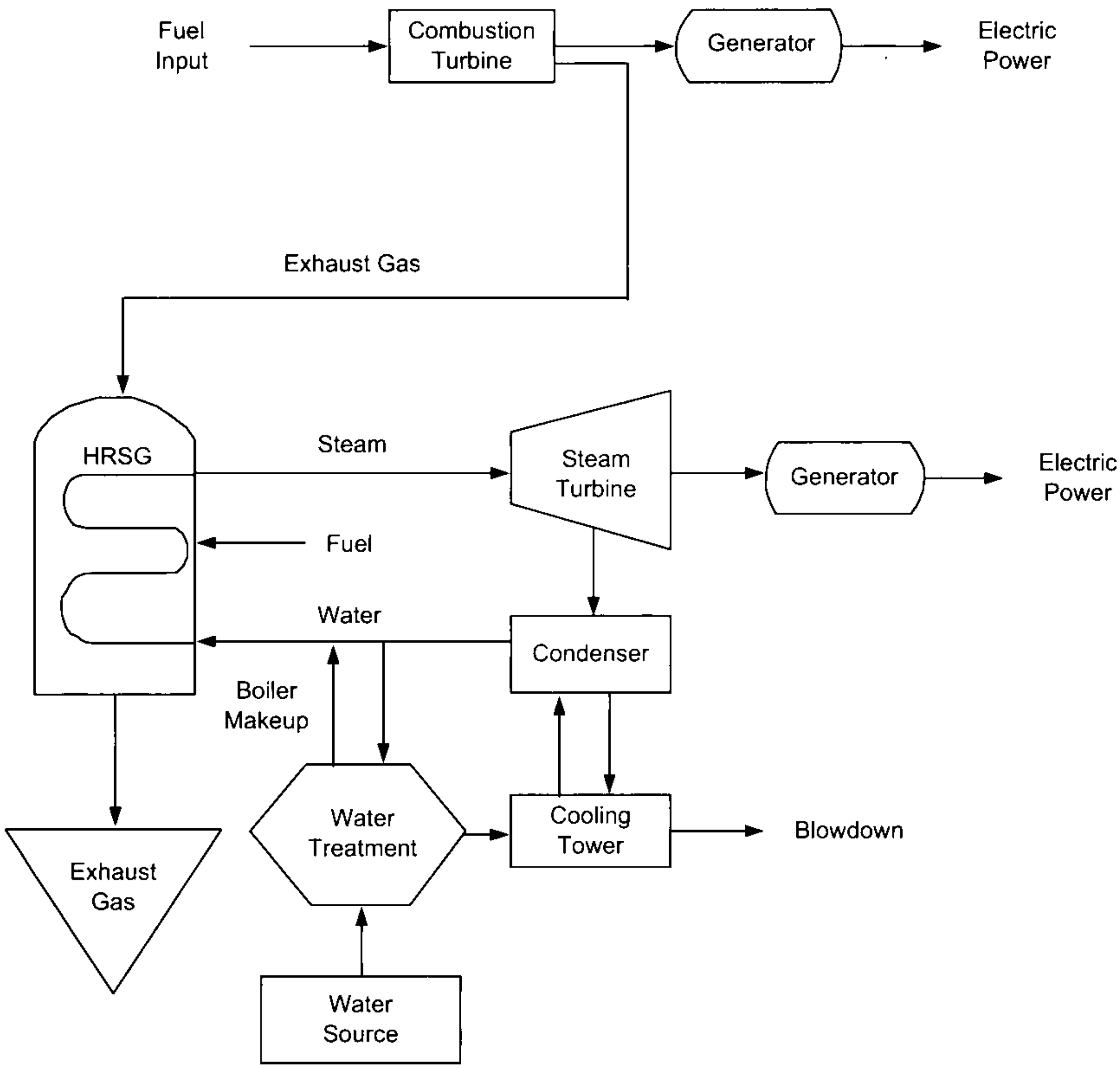

FIGURE 3.1-4.

SIMPLIFIED FLOW DIAGRAM OF A BASIC COMBINED-CYCLE POWER SYSTEM

Source: ECT, 2005.

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then used to drive a steam turbine and generator to produce additional electricity, as shown in Figure 3.1-4.

Condensate from the Unit B steam turbine condenser is used for cooling in the gasification process and then returned to the HRSG and further heated before being deaerated. High-, medium-, and low-pressure superheated steam are raised in the HRSG and sent to the steam turbine. High-pressure feedwater is also sent from the HRSG to the gasifier island, where it is used in the syngas cooler to raise high-pressure superheated steam, which is also sent to the steam turbine.

High-pressure superheated steam from the syngas cooler and the HRSG enters the steam turbine. Steam exhausted from the high-pressure turbine is reheated in the HRSG, expanded through the intermediate- and low-pressure turbines, and then condensed.

The Unit B power block will be equipped with a multicell wet evaporative mechanical draft cooling tower for the purpose of providing the cooling necessary to condense the steam that exhausts from the steam turbine. A water-cooled steam surface condenser will also be used, and the condensate will be collected in the hot well of the condenser and pumped back to the HRSG. Cooling water will be supplied to the surface condenser from the multicell cooling tower. See Section 3.5 for additional discussion of water supply and wastewater discharges.

3.2 SITE LAYOUT

With the exception of the electrical transmission line interconnection to the onsite substation, the proposed Unit B IGCC facility will be constructed entirely within the 1,100-acre developed power plant site. The permanent IGCC facilities will be located in the graded area immediately south of existing Unit A. Figure 3.2-1 provides a more detailed arrangement of the IGCC facilities. Coal for the gasification island will be stored in a separate pile just north of the coal piles for Units 1 and 2. While not shown in Figure 3.2-1, a portion of the existing landfill will be used for the disposal of gasification ash and sulfur.

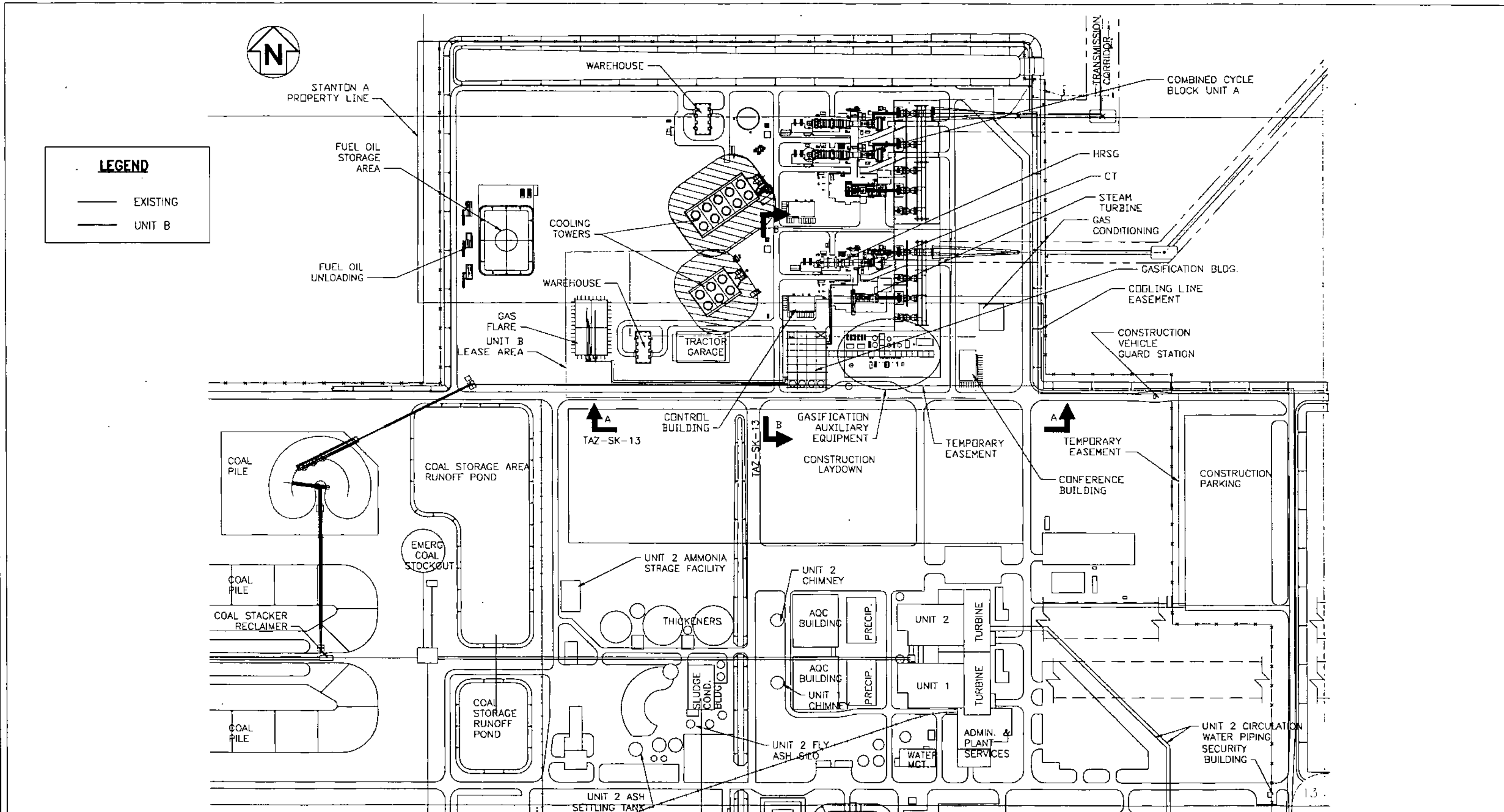

FIGURE 3.2-1.

DETAILED ARRANGEMENT

Source: SCS, 2006.

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Both the gasification and combined-cycle islands will involve large, physical structures. The major structures and facilities will include the following:

- Gasification island:
  - Transport Gasifier air-blown gasifier.
  - Nitrogen plant.
  - Syngas cleanup system.
  - Particulate removal system.
  - Sulfur recovery system.
  - Ammonia recovery system.
  - Sour water system.
  - Ground-level flare.
  - Coal pile.
- Combined-cycle island:
  - CT.
  - Steam turbine.
  - HRSG.
  - Cooling tower.

Figure 3.2-2 views the area of the Stanton site where the new IGCC facilities will be built, as it currently exists. Figure 3.2-3 illustrates the same area and includes the new combined-cycle unit, while Figure 3.2-4 adds the gasification island. Illustrations of multipoint flare system in-place at refineries, including a close-up of the system's multiple burners, were provided in Figure 3.1-3.

The IGCC unit will use other *existing* onsite facilities and equipment, including coal delivery, handling, and storage facilities; ash handling and storage facilities; water supply wells and treatment plant; cooling water pond; brine treatment facilities; industrial wastewater treatment facilities; and the electrical substation.

3.3 FUEL

Unit B will be able to operate on either coal-derived syngas and natural gas. The following paragraphs describe the characteristics of these two fuels.

3.3.1 COAL AND SYNGAS

The new IGCC unit will operate primarily on syngas derived from coal. The combined-cycle island will also be capable of operating on natural gas (both the CT and the HRSG duct burners).

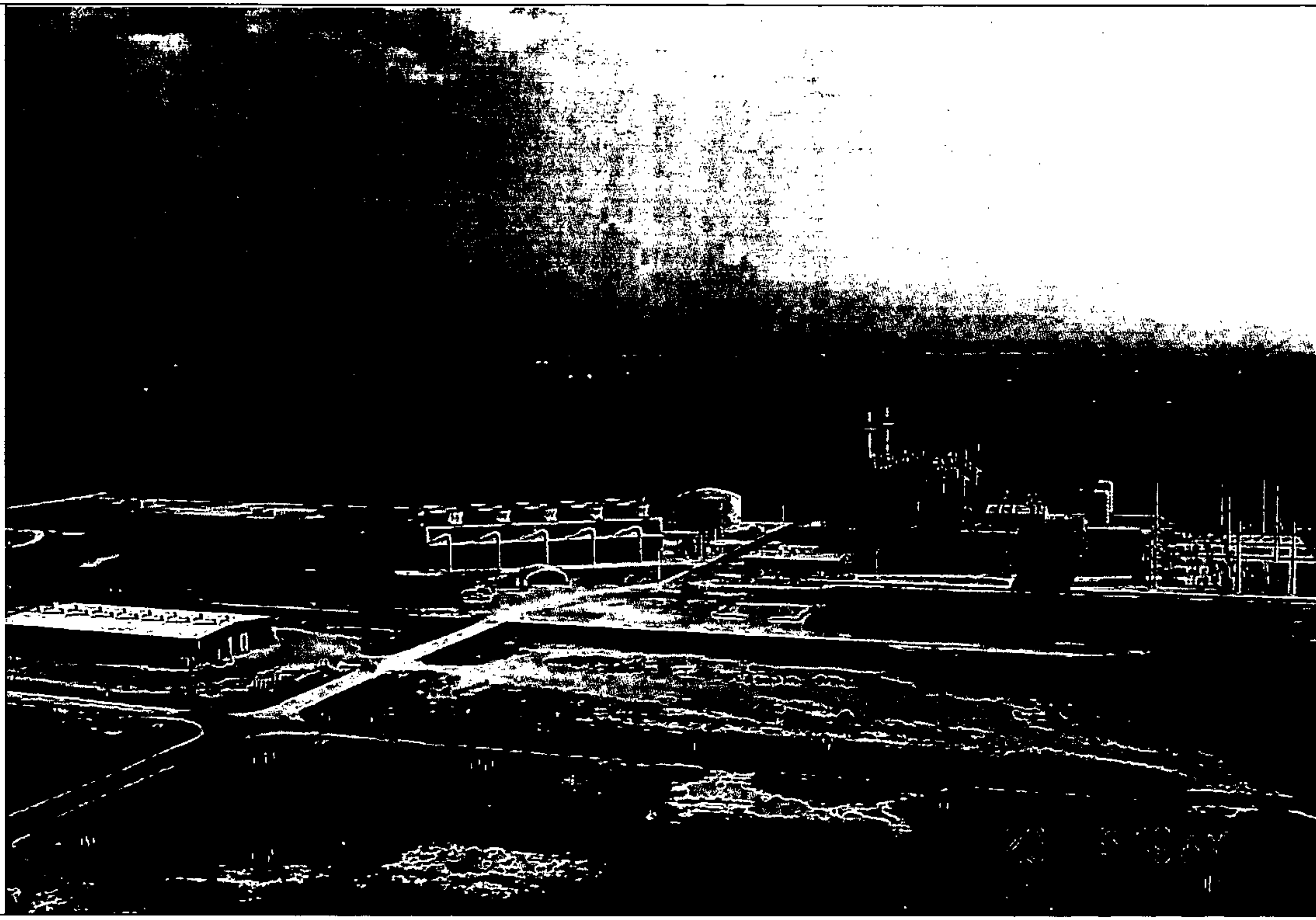

FIGURE 3.2-2.
CURRENT VIEW OF PLANNDED IGCC FACILITIES AREA

Source: SCS, 2005.

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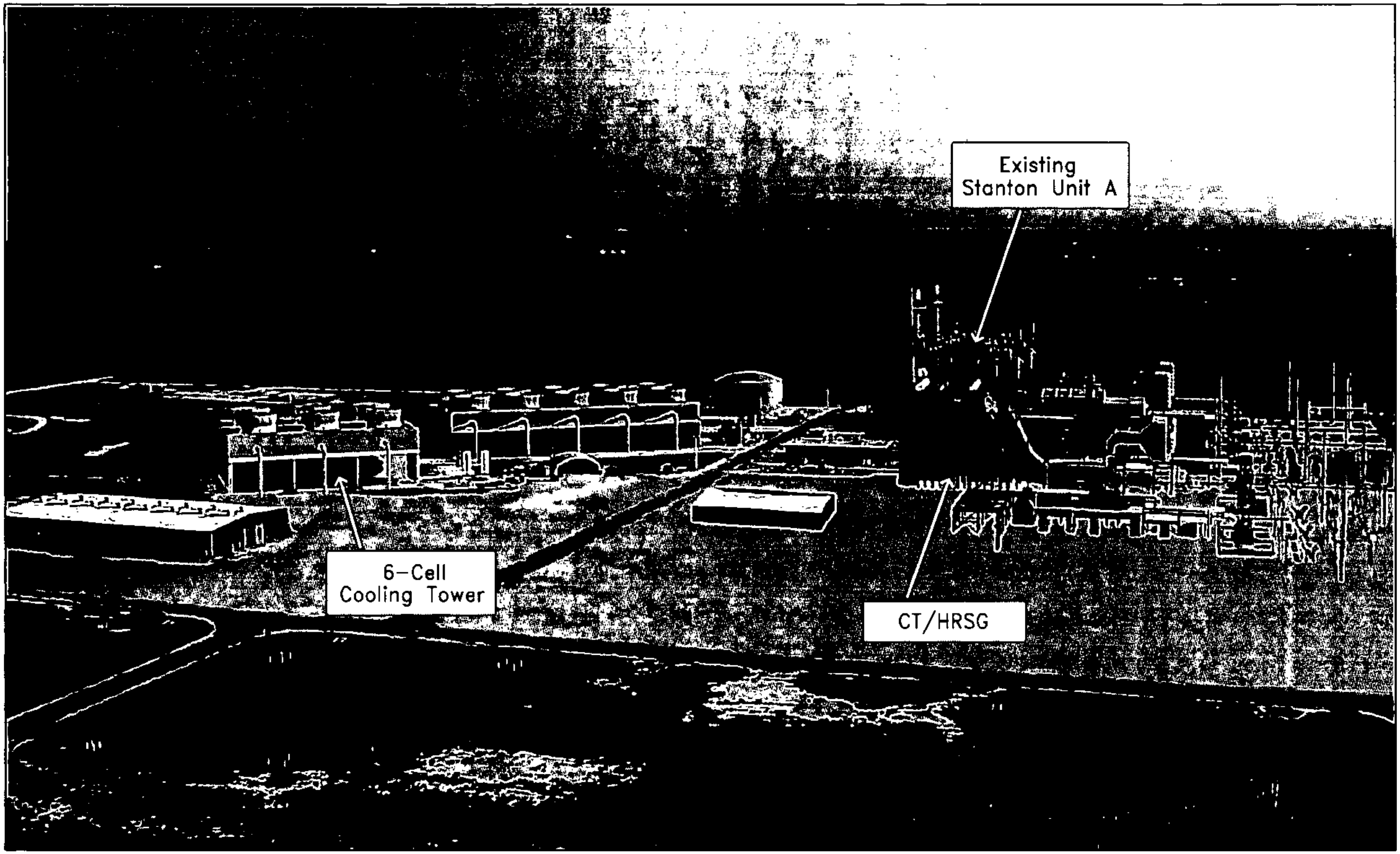

FIGURE 3.2-3.

RENDERING SHOWING ADDITION OF COMBINED-CYCLE ISLAND

Source: SCS, 2005.

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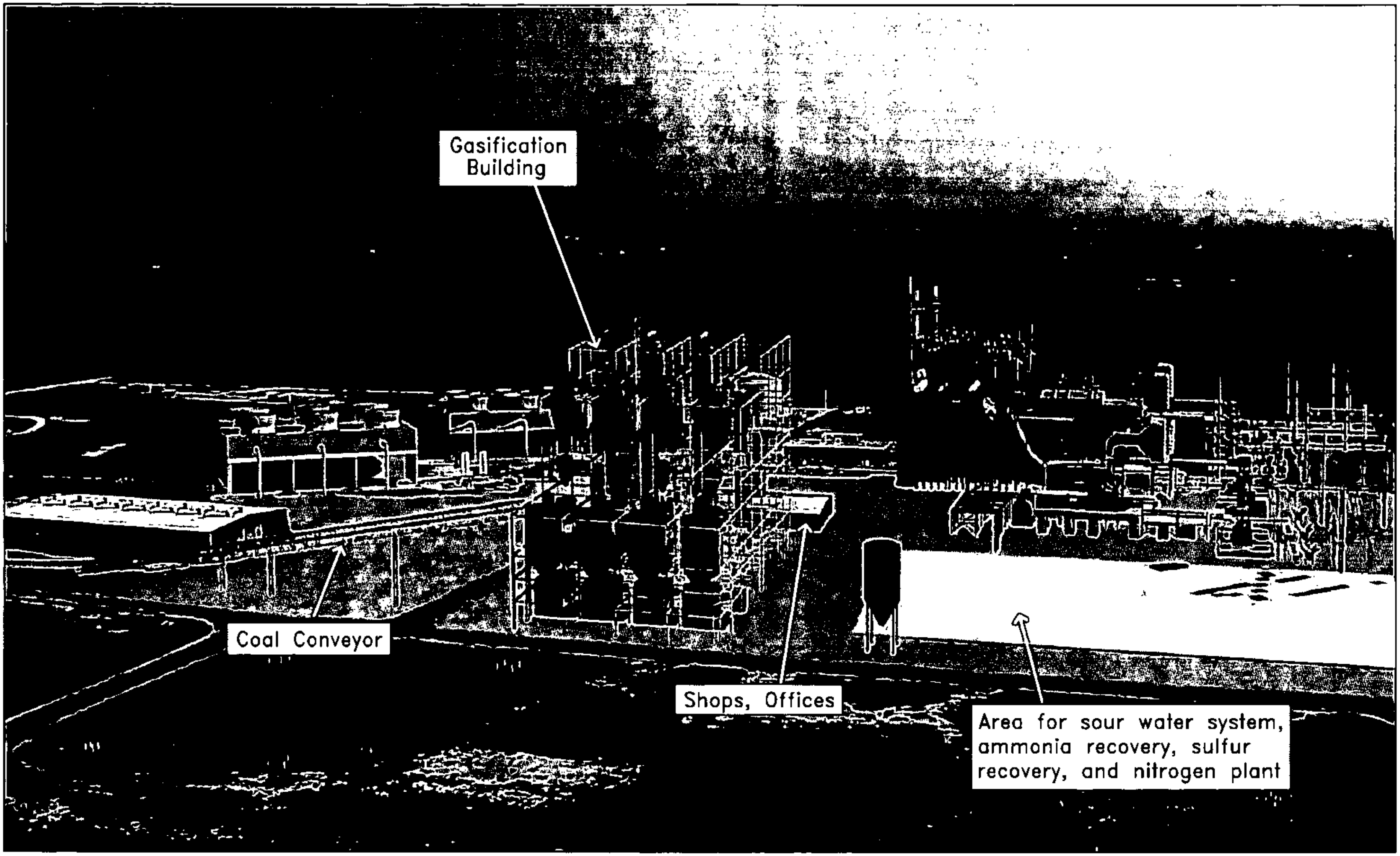

FIGURE 3.2-4.

RENDERING SHOWING ADDITION OF GASIFICATION ISLAND

Source: SCS, 2005.

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At full capacity, the gasifier island will consume approximately 137 ton/hr of coal. Assuming a design coal analysis of 8,760 Btu/lb, the energy input to the gasification plant will be approximately 2,400 MMBtu/hr at maximum continuous rated power production. Approximately two to three trains per week will be required to meet plant coal energy needs. Table 3.3-1 summarizes descriptive analytical parameters for the design coal. Table 3.3-2 presents the approximate composition of the syngas to be produced in the gasifier. Figure 3.3-1 is an overall energy balance for the IGCC and shows a 40.5-percent efficiency of converting coal energy to electrical energy.

Coal will be delivered to the site by rail from sources in the western United States. Rail access to the Stanton Energy Center already exists, and the existing rail access to the site will also adequately serve the new IGCC unit's needs for coal without improvement. To supply Stanton Units 1 and 2, five trains typically unload coal to the facility per week. Unit B will require an additional two to three trainloads of coal per week to supply the gasification island. Unit B will be served by three railcar sets. OUC will contract with CSX for coal delivery. Coal from the Powder River Basin (western United States) will be delivered by CSX and the Burlington Northern-Santa Fe (BNSF) Railroad, through a separate contract with CSX, to the Stanton Energy Center and Unit B.

Coal unloading and handling systems also already exist at Stanton. Coal will be unloaded within the existing rail unloading building via bottom dump rail cars. As discussed previously in Section 3.1.3.1, from the unloading facilities, the coal will be conveyed, via closed conveyor, to the coal storage area. The coal storage area will be sized to provide fuel for approximately 45 days of operation. Also, the coal storage area will be lined with a synthetic liner and will use the existing leachate and stormwater runoff collection systems and a retention basin to prevent seepage to ground water and runoff from the area.

3.3.2 NATURAL GAS

When operating on natural gas, the combined-cycle unit will consume approximately 2 million cubic feet (ft^3) of natural gas per hour operating at full load and with duct burners operating.

Table 3.3-1. Characteristics of Design Coal

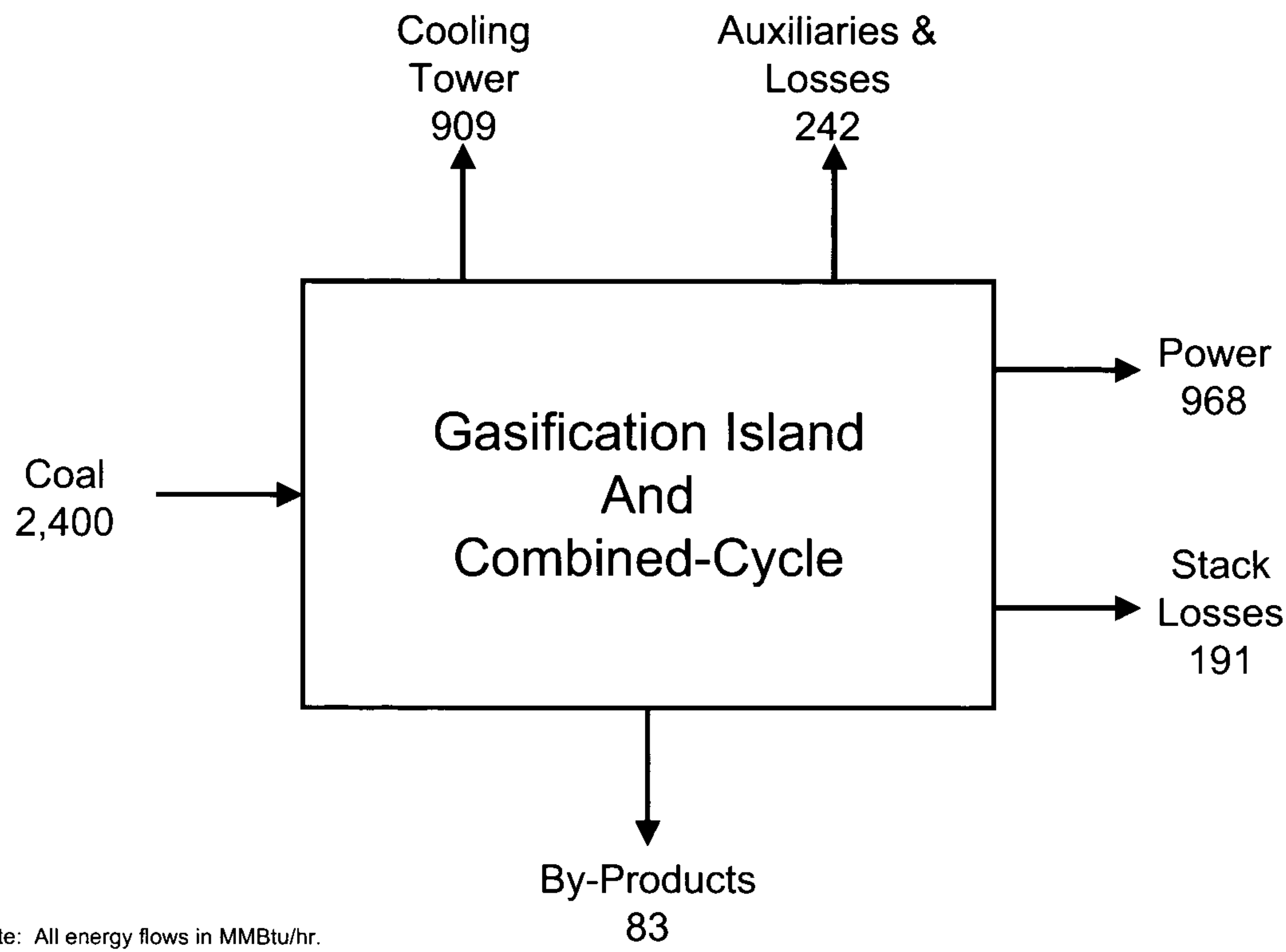
	Minimum (%)	Maximum (%)
Proximate, as received		
Moisture	26.54	30.60
Ash	4.40	5.45
Volatile matter	30.25	31.73
Fixed carbon	32.91	37.10
Btu (per pound)	8,300	8,884
Sulfur	0.20	0.40
Proximate, dry		
Ash	6.10	7.42
Volatile matter	42.80	45.32
Fixed carbon	47.42	51.10
Btu (per pound)	11,942	12,127
Sulfur	0.28	0.55
Ultimate analysis, dry basis		
Carbon	69.90	71.17
Hydrogen	4.63	5.18
Nitrogen	0.88	1.10
Chlorine	0.01	0.01
Sulfur	0.28	0.55
Ash	6.10	7.42
Oxygen	14.69	17.02
Ultimate analysis, as received		
Moisture	26.54	30.60
Carbon	48.58	52.17
Hydrogen	3.24	3.76
Nitrogen	0.63	0.80
Chlorine	0.00	0.01
Sulfur	0.20	0.40
Ash	4.43	5.45
Oxygen	10.66	12.40

Source: SCS, 2005.

Table 3.3-2. Approximate Syngas Composition

Components	Mole Percent	ppm
Major		
Methane	2.2	—
Carbon monoxide	23.7	—
Carbon dioxide	7.0	—
Hydrogen	12.1	—
Water	1.0	—
Nitrogen	53.9	—
Minor		
Carbonyl sulfide	—	4
Hydrogen cyanide	—	79
Hydrochloric acid	—	24
Hydrofluoric acid	—	0.4
Hydrogen sulfide	—	12
Ammonia	—	67
Lower heating value (Btu/scf)	—	125
Molecular weight	—	25.9

Source: SCS, 2005.



Note: All energy flows in MMBtu/hr.

FIGURE 3.3-1.

ENERGY BALANCE

Source: SCS, 2005.

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Natural gas used for IGCC startup and fired in the CT and duct burners during periods when the gasifier is not operating will be obtained from the existing onsite pipeline that serves Unit A. The existing pipeline is capable of supplying gas to the planned combined-cycle unit operating at full load on gas. Unit B will require no upgrades or significant modifications to the existing natural gas supply facilities. Natural gas will not be stored on the site.

3.4 AIR EMISSIONS AND CONTROLS

3.4.1 AIR EMISSION TYPES AND SOURCES

3.4.1.1 Types of Air Emissions

The sources of air emissions during the operation of Unit B may be broadly categorized as follows:

- Fugitive emissions from material handling and storage.
- Particulate emissions from discrete material transfer points.
- Stack emissions.
- Flare emissions.
- Particulate emissions contained in drift (mist) from the mechanical draft cooling tower.

The types of emissions associated with these sources are described in the following paragraphs.

Material handling and storage will generate fugitive particulate emissions. The principal materials being handled are coal and gasification ash. For coal handling, the dust control system involves a combination of controls, including rail car unloading in the existing enclosed building, enclosure of certain coal conveyors and transfer points, and baghouse particulate control at storage silos and bins. Baghouse control technology will also be employed to control PM from the gasification ash storage silo.

The primary source of emissions in the IGCC unit is combustion of syngas (or natural gas) in the CT. The CT exhaust gas is discharged to the atmosphere via the HRSG stack. Emissions from the HRSG stack are primarily NO_x, SO_2, CO, VOC, PM, and other trace constituents. Stack emissions will reflect emission rates consistent with best available control technology (BACT) determinations. Similar constituents will be emitted from the CT (and duct burners) when firing natural gas.

The flare for the gasification island will normally have only minimal emissions associated with the natural gas-fired pilot flame. Higher emission rates will occur during startup and shutdown of the IGCC unit and during facility upsets. The gasifier startup stack will only be used during gasifier startups (i.e., during the gasifier preheat period) and will exhaust the products of combustion of natural gas and a small amount of coal (when coal is first introduced into the gasifier). During gasifier startups, the products of fuel combustion will flow through the particulate filtration process prior to being discharged from the gasifier startup stack. Any syngas that is flared will flow through the syngas clean-up processes.

3.4.1.2 Quantity of Air Emissions

The first consideration is limitation of particulate emissions from material handling equipment. Measures to reduce fugitive emissions from the coal and gasification ash handling systems have been incorporated into the design of the system. For example, coal and ash conveyors and transfer points will be enclosed.

A second consideration for the limitation of fugitive emissions is the moist climate. High humidity tends to suppress fugitive emissions, not only from the material itself, but also from the equipment operation on the roads. Because rain occurs frequently (averaging every other day during the summer months), uncovered coal at the storage site will maintain a high degree of moisture until conveyed for processing. In addition, the as-received PRB coal that will be processed by Unit B is relatively moist (i.e., has an approximate moisture content of 25 percent).

A third consideration is the infrequency of high winds in the area. High winds would tend to greatly increase windblown fugitive emissions.

The combination of these factors should enhance the ability of the operators to limit the fugitive emissions, although they cannot be eliminated.

Table 3.4-1 provides preliminary estimates of emissions from the CT/HRSG stack. These preliminary estimates are based in part on the best information available at the time of SCA preparation and best engineering judgment. Since detailed design of Unit B has yet to be performed, these estimates do contain some amount of uncertainty. Where possible, emission rates have been estimated using vendor guarantees based only on theoretical calculations using expected syngas compositions (not based on syngas combustion testing). Emission factors included in published test reports from other IGCC projects have also been used. Parameters shown in this table generally represent maximum anticipated emissions and, as such, should provide conservative estimates for purposes of modeling air impacts. It is noted that emissions and emissions impacts will vary with unit load, ambient conditions, and other factors. Emissions information for various operating scenarios has been developed for evaluation in the licensing/permitting process and is presented in the prevention of significant deterioration (PSD) permit application (Volume 2).

Another source of air pollutant emissions will be the flare. As previously indicated, the flare will be employed to combust syngas during gasifier startup/shutdown and plant upsets. Under normal operations of Unit B (i.e., all syngas produced by the gasification equipment routed to the combined-cycle unit), the only emissions from the flare will be the result of combusting natural gas in eight pilots. These pilots will be on at all times.

During startup, natural gas-fired startup burners are used to heat the gasifier. Once the gasifier reaches the necessary temperature, coal feed begins, and the temperature is increased. From the initial startup to this time, the atmosphere in the gasifier is oxidizing, and the gas produced has no heating value (flue gas). Therefore, if the gas were sent to the flare, natural gas would have to be added to produce a combustible mixture. So instead, the flue gas exhaust will be vented to the startup stack.

Once the gasifier is at the proper temperature, the airflow is reduced until the atmosphere in the gasifier is reducing. At that point, the coal is being gasified and syngas is being

Table 3.4-1. Preliminary Estimates of Air Pollutant Emissions from CT/HRSG Stack

Pollutant	lb/hr		Annual Emissions*
	Syngas	Natural Gas	
			Units of tpy
SO_2	36.1	1.4	157.1
NO_x (Phase I)	228.3	44.6	987.1
NO_x (Phase II)	137.0	44.6	592.3
PM_{10}	36.3	23.3	156.7
CO	143.2	140.8	615.3
VOC	31.0	31.1	128.3
Lead	0.0007	—	0.023
			Units of lb/yr
Antimony	0.0095	—	83.07
Arsenic	0.0050	—	43.61
Beryllium	0.00022	—	1.87
Cadmium	0.0069	—	60.23
Chromium	0.0064	—	56.07
Cobalt	0.0014	—	11.84
Manganese	0.0074	—	64.38
Mercury	0.0022	—	18.90
Nickel	0.0093	—	81.00
Selenium	0.0069	—	60.23
Acenaphthyalene	0.000062	—	0.54
Acetaldehyde	0.0043	0.077	614.57
Benzaldehyde	0.0069	—	60.23
Benzene	0.0116	0.024	193.95
Benzo(a)anthracene	0.0000055	—	0.05
Benzo(e)pyrene	0.000013	—	0.11
Benzo(g,h,i)perylene	0.000023	—	0.20
Carbon disulfide	0.107	—	934.57
Formaldehyde	0.080	0.61	4,951.57
2-Methylnaphthalene	0.00086	—	7.48
Naphthalene	0.0013	0.0028	22.76
1,3-Butadiene	—	0.00083	6.61
Acrolein	—	0.012	98.33
Ethylbenzene	—	0.062	491.65
PAH	—	0.0043	33.80
Propylene oxide	—	0.056	445.56
Toluene	—	0.25	2,012.86
Xylenes	—	0.12	983.31

*All estimates based on representative, full-load operating scenarios. Short-term estimates firing natural gas include emissions from duct burners. Annualized emissions (tpy or lb/yr) assume continuous, year-round operation using higher of syngas or natural gas emission rate.

Sources: SCS, 2006.
ECT, 2006.

produced. Initially, the flow of syngas will be insufficient to send to the gas turbine, so it will be sent to the flare and burned. Varying amounts of syngas will be combusted by the flare as the syngas production of the gasifier is increased. When the gasification island reaches a syngas production level at which it can support the operation of the gas turbine, the syngas will be diverted from the flare to the gas turbine.

The length of time of this entire startup sequence will vary based on a number of factors, including the starting temperature of the gasifier. During a cold start of the gasifier, it is expected it may take up to 24 hours to begin sending syngas to the gas turbine due to the length of time required to heat the gasifier refractory. This would include approximately 17 hours of exhausting flue gas through the startup stack and approximately 7 hours of combusting syngas in the flare.

In the event of process upsets of either the gasification equipment or the combined-cycle unit, syngas may also be routed to the flare for combustion. During such events, the duration of syngas combustion will vary depending on the type of upset.

Prior to being exhausted through the startup stack, the flue gas will go through the particulate filtration process. Syngas that is flared will flow through the syngas cleanup process.

3.4.1.3 Odors

Some odors will be emitted during operation of Unit B that may be detectable or noticeable onsite. Sources for these odors may include storage and handling for sulfur and ammonia.

Any potential odors emitted from the operations should be limited to the immediate site area and should not affect offsite areas.

3.4.2 AIR EMISSION CONTROLS

The design of Unit B incorporates state-of-the-art technology at every step, starting with the assumed selection of an advanced firing temperature F-class CT. The high thermal efficiency of the project will reduce emissions per unit of output by producing each megawatt-hour (MW-hr) of electricity with less combustion of fuel. The use of syngas and natural gas as the only fuels for the CT also has the benefit of reducing emissions.

Table 3.4-2 presents a summary of air emission controls. The use of low-sulfur, low-ash syngas and natural gas, along with highly efficient combustion, will limit PM/PM_{10} emissions from the CT. CO and VOC emissions from the CTs will be controlled by the use of advanced combustion equipment and operational practices to obtain efficient combustion. Highly efficient combustion will, in turn, result in low CO and VOC emission rates. The CT will be equipped with a selective catalytic reduction (SCR) system to abate NO_x emissions. SO_2 and H_2SO_4 emissions will be controlled by the use of low-sulfur fuels. Finally, the use of drift eliminators to limit drift of circulating water will control PM emissions from the cooling tower.

3.4.3 BEST AVAILABLE CONTROL TECHNOLOGY

The PSD air permitting regulations require detailed consideration of alternative means of emission control on a pollutant-by-pollutant basis. The purpose of this control technology review process is to determine the BACT. As defined by Rule 62-210.200(38), F.A.C., BACT represents an emission limitation that reflects the maximum degree of pollutant reduction achievable, determined on a case-by-case basis, with consideration given to energy, environmental, and economic impacts. BACT emission limitations must be no less stringent than any applicable new source performance standards (NSPS) (Chapter 40, Part 60, Code of Federal Regulations [CFR]), National Emission Standards for Hazardous Air Pollutants (NESHAP) (40 CFR 61 and 40 CFR 63), and state emission standards (Chapter 62-296, F.A.C., Stationary Sources—Emission Standards).

A complete BACT evaluation for Unit B is contained in the PSD permit application in Volume 2. Proposed BACT emission limitations for Unit B's key equipment are summarized in Table 3.4-3. An abbreviated discussion of the BACT review is provided in the following subsections.

Table 3.4-2. Summary of Air Emission Controls

Pollutant	Means of Control
Coal Handling	
PM/PM_{10}	• Application of water, as necessary, at the coal storage pile. • Enclosure of material conveying and transfer points. • Baghouses on coal and gasification ash storage silos and bins.
CT/HRSG	
PM/PM_{10}	• Exclusive use of low-sulfur, low-ash syngas and natural gas. • Efficient and complete combustion.
CO and VOC	• Efficient and complete combustion.
NO_x	• Use of SCR.
SO_2/H_2SO_4	• Exclusive use of low-sulfur syngas and natural gas.
Cooling Tower	
PM/PM_{10}	• Efficient drift elimination.

Sources: SCS, 2006.
ECT, 2006.

Table 3.4-3. Summary of Proposed BACT Emission Limitations

Pollutant	Proposed BACT Emission Limits* ppmvd†‡	lb/10^6 Btu†
Coal handling		
PM/PM_{10}	Application of water, enclosures, baghouses	
Unit B IGCC – Syngas with duct burner firing**		
PM/PM_{10}	N/A	0.013
CO	21	0.050
NO_x – Phase I	20	0.080
NO_x – Phase II	12	0.048
SO_2	N/A	0.015
H_2SO_4	SO_2 limits used as a surrogate	
Unit B IGCC – Natural gas with duct burner firing**		
PM/PM_{10}	N/A	0.017
CO	28	0.060
NO_x	5	0.018
SO_2	Pipeline natural gas	
H_2SO_4	Pipeline natural gas	
Cooling tower		
PM/PM_{10}	0.002 percent drift loss rate	

*Maximum rates for all operating scenarios.
†24-hour block average.
‡Corrected to 15-percent oxygen.
**Duct burners will fire natural gas.

Note: For syngas, emission limits in units of lb/10^6 Btu are based on heat input to the gasifiers, HHV.
For natural gas, emission limits in units of lb/10^6 Btu are based on heat input to the gasifies, HHV.

Sources: SCS, 2006.
ECT, 2006.

As indicated in the PSD application, air emission controls planned for Unit B are expected to fully comply with all applicable state and federal regulations. Specific design concepts are summarized as follows:

- Application of BACT for all affected pollutants and emission sources.
- Use of low-sulfur fuels.
- Use of SCR to minimize NO_x emissions.
- Use of efficient combustion to minimize emissions of pollutants associated with incomplete combustion.

The project will use the most efficient technology available to convert coal (or natural gas) to electrical power. On a total power production basis, air emissions are minimized by using technology that produces the most power for each unit of fuel consumed at near complete combustion. Emissions, on a pound-per-megawatt basis, are well below the rates generated by conventional oil- and coal-fired power plants, as well as some other technologies using natural gas (e.g., steam electric).

Air emission control technologies planned for the project reflect the application of BACT for each affected pollutant and emission source. The proposed emission limitations are well below applicable state and federal emission standards (e.g., NSPS).

3.4.3.1 Methodology

As described in detail in the PSD permit application, BACT analyses were performed in accordance with the EPA *top-down* method. The first step in the top-down BACT procedure was the identification of all available control technologies. Alternatives considered included process designs and operating practices that reduce the formation of emissions, post-process stack controls that reduce emissions after they are formed, and combinations of these two control categories. Following the identification of available control technologies, the next step in the analysis was to determine which technologies might be technically infeasible. Technical feasibility was evaluated using the criteria contained in Chapter B of the EPA New Source Review (NSR) Workshop Manual (EPA, 1990a). The third step in the top-down BACT process was the ranking of the remaining technically feasible control technologies from high to low in order of control effectiveness. Assessment of energy, environmental, and economic impacts was then performed. The economic analyses of the technologies used the procedures found in the current edition of the Office of Air Quality Planning and Standards (OAQPS) Air Pollution Control Cost Manual. The fifth and final step was the selection of a BACT emission limitation corresponding to the most stringent technically feasible control technology that was not eliminated based on adverse energy, environmental, or economic grounds. Control technology analyses using the five step *top-down* BACT method were prepared for combustion products, products of incomplete combustion, and acid gases, respectively. The following is a summary of the BACT analyses that are contained in the PSD permit application, focusing on the principal emission source, the combined-cycle unit.

3.4.3.2 Summary of BACT Determinations

PM/PM_{10}

Available technologies considered for controlling PM/PM_{10} from CTs and duct burners include the following postprocess controls:

- Centrifugal collectors.
- Electrostatic precipitators (ESPs).
- Good combustion practice.
- Fabric filters or baghouses.
- Wet scrubbers.
- Clean fuels.

Post-process stack controls for PM/PM_{10} are not appropriate for CTs because of the low concentrations of PM/PM_{10} emissions in the exhaust. The use of good combustion practices and clean fuels is considered to be BACT. The CTs will use utilize efficient combustion to minimize PM/PM_{10} emission rates. The CTs will be fired exclusively with syngas and natural gas.

For coal and other material handling, a variety of control measures will be implemented including water suppression, enclosure, and fabric filter technology.

For the cooling tower, the only practical means of limiting PM emissions in drift are to limit cooling water cycles of concentration (i.e., to keep dissolved solids at lower concentrations) and/or apply drift eliminators. Because of the desire to limit water use, cooling water will be recycled to the maximum practical degree. Drift eliminators will then be used to limit drift to no more than 0.002 percent of circulating water flow.

CO

There are two available technologies for controlling CO from CTs and duct burners: combustion process design and oxidation catalysts.

Combustion process controls involve combustion chamber designs and operation practices that improve the oxidation process and minimize incomplete combustion. Due to the high combustion efficiency of CTs and duct burners, approximately 99 percent, CO emissions are inherently low. CO emissions from the combined-cycle unit at base load with duct burner firing will be less than or equal to 21 and 28 parts per million by dry volume (ppmvd), corrected to 15-percent oxygen.

The use of oxidation catalyst to control CO from CTs is typically required only for facilities located in CO and/or ozone nonattainment areas. Oxidation catalysts have not been demonstrated on any coal-fired IGCC unit and are susceptible to deactivation due to a variety of impurities. Due to the lack of operating experience and potential catalyst deactivation, the performance and reliability of oxidation catalyst controls applied to syngas fired CT/HRSGs are unknown. In addition, use of oxidation catalyst will significantly exacerbate the formation of ammonium bisulfate by substantially increasing sulfite (SO_3), as up to 90 percent of SO_2 will be oxidized to SO_3 by an oxidation catalyst. During syngas firing, this will significantly increase the formation of ammonium bisulfate

Use of combustion controls and good operating practices to minimize incomplete combustion are proposed as BACT for the combined-cycle unit. These control methods are consistent with recent FDEP BACT determinations for CO emissions from combined-cycle units that have been based on the use of good combustion techniques.

NO_x

Available technologies for controlling NO_x emissions from CTs and duct burners include combustion process modifications and post-combustion exhaust gas treatment systems. A listing of available technologies for each of these categories follows:

Combustion Process Modifications:

- Water or steam injection
- Diluent addition.
- Dry-low NO_x combustor design.
- XONON™

Postcombustion Exhaust Gas Treatment Systems:

- Selective non-catalytic reduction (SNCR).
- Non-selective catalytic reduction (NSCR).
- SCR.
- EMx™ (formerly SCONOx™)

For the Unit B project, OUC/SPC-OG proposes the use of wet injection (for natural gas) and SCR (for both syngas and natural gas) to control NO_x emissions from the combined-cycle unit. The use of water or steam/diluent injection is not technically feasible for Unit B CT while firing syngas. Although it is feasible for an oxygen-blown IGCC, the oxygen-blown gasification process first removes nitrogen from the gasifier inlet air stream and then returns this nitrogen to the syngas as a diluent for thermal NO_x reduction. In contrast, the air-blown gasification process retains the inlet air nitrogen throughout the process. Accordingly, the air-blown gasification process produces a syngas that already includes nitrogen diluent. Due to the combustion characteristics of syngas, dry-low NO_x combustor technology is not currently available for syngas-fired CTs. The XONON™ Cool Combustion technology has not been demonstrated on large, heavy-duty CTs and on CTs fired with syngas and, therefore, is not considered to be a technically feasible control technology for the Unit B CT/HRSG.

Regarding the postcombustion NO_x control technologies, SNCR is not technically feasible because the temperature required for this technology (between 1,600 and 2,000°F) exceeds that found in the Unit B CT exhaust gas stream when firing either syngas or natural gas. NSCR is also not technically feasible because the process must take place in a fuel-rich (less than 3-percent oxygen) environment. Due to high excess air rates, the oxygen content of the Unit B CT exhaust is approximately 11 percent. The EMx™ control technology has not been commercially demonstrated on large CTs or on CTs fired with syngas and, therefore, is not considered to be a technically feasible control technology for the Unit B CT/HRSG.

SCR has not been demonstrated on any operating coal-derived IGCC. Nor has it been installed on any coal-derived IGCC. The performance and reliability of SCR applied to coal-derived syngas fired CT/HRSGs are unknown. Unit B will employ air-blown gasification technology to produce syngas from sub-bituminous PRB coal. Unit B will be the first application of this gasification technology for power generation and is a demonstration project under the Department of Energy's Clean Coal Power Initiative (CCPI). Actual performance of the Unit B gasification process, including the syngas clean-up components, will not be known with any certainty until the 4-year DOE demonstration period is completed. These uncertainties prevent SCR control technology from being considered applicable to Unit B when operating on syngas. Although SCR has been installed on natural gas-fired combined-cycle units, SCR is not applicable to Unit B when firing syngas, and therefore is not considered technically feasible.

Although the application of conventional SCR is not considered technically feasible for Unit B while firing syngas, a major objective of the Unit B DOE demonstration project is to evaluate the viability of SCR control technology to syngas-fired CT/HRSG units. To achieve this objective, a two-phase NO_x reduction program during Unit B syngas-firing is proposed. For the first phase, a combination of SCR operation and combustion tuning will achieve a NO_x concentration of 20 ppmvd corrected to 15-percent oxygen. This Phase I NO_x limit would be applicable during the 4-year DOE demonstration period. In Phase II, a SCR outlet NO_x concentration of 12 ppmvd corrected to 15-percent oxygen is proposed as the limit that will become effective following completion of the 4-year DOE demonstration period. This limit will become effective unless the Phase I technical report demonstrates that Unit B cannot technically achieve this level of NO_x control. If the Phase II limit is shown to be unachievable, the final Unit B CT/HRSG NO_x emission limit would be set at the lowest level demonstrated to be achievable and no higher than the Phase I limit.

SO_2 and H_2SO_4

Technologies employed to control SO_2 and H_2SO_4 emissions from combustion sources consist of postcombustion add-on controls (i.e., flue gas desulfurization [FGD]) systems. These controls are applied to facilities burning high-sulfur fuels (e.g., coal). There have been no applications of FGD technology to combined-cycle units fired with syngas and natural gas because these fuels contain low sulfur contents. The sulfur content of syngas, the primary fuel source for Unit B, is much lower than the fuels (e.g., coal) employed in boilers using FGD systems. In addition, combined-cycle operates with a significant amount of excess air that generates high exhaust gas flow rates. Because FGD SO_2 removal efficiency decreases with decreasing inlet SO_2 concentration, application of an FGD system to a combined-cycle exhaust stream will result in unreasonably low SO_2 removal efficiencies. Due to low SO_2 exhaust stream concentrations, FGD technology is not considered to be technically feasible for combined-cycle because removal efficiencies would be unreasonably low. Similarly, use of mist eliminators to control H_2SO_4 mist emissions is not technically feasible due to the very low combined-cycle H_2SO_4 mist exhaust concentrations.

Because postcombustion SO_2 and H_2SO_4 mist controls are not applicable, use of low sulfur fuel is considered to represent BACT for the Unit B CT/HRSG. This high sulfur removal rate via the Unit B coal gasification process represents the application of new technology and will be a major technical accomplishment due to the relatively low sulfur content of PRB coal. Syngas and natural gas combusted in the Unit B CT will contain less than 20 and 4 parts per million of sulfur by volume (ppmv), respectively. Since reducing the sulfur content of the fuels combusted in the Unit B CT/HRSG also serves to control H_2SO_4 mist emissions, the SO_2 BACT emission limit proposed for syngas firing is considered a surrogate BACT limit for H_2SO_4 mist.

3.4.4 DESIGN DATA FOR CONTROL EQUIPMENT

Control of air emissions for the Stanton Unit B project will be accomplished by the use of highly efficient process technologies and clean fuels. These process technologies and fuels will achieve low emission rates without the application of post-combustion control equipment. Process descriptions, emission rates and exhaust gas characteristics, and fuel specifications are provided in Section 3.3 of this SCA.

3.4.5 DESIGN PHILOSOPHY

Air emission controls planned for the Unit B project have been designed to fully comply with all applicable state and federal regulations. Specific design concepts are summarized as follows:

- Application of BACT for all affected pollutants and emission sources.
- Use of low-sulfur fuels.
- Use of SCR to minimize NO_x emissions.
- Use of efficient combustion to minimize emissions of pollutants associated with incomplete combustion.

The project will use the most efficient technologies available to convert coal and natural gas to electrical power. On a total power production basis, combined-cycle air emissions are minimized by using technology that produces the most power for each unit of fuel consumed at near complete combustion. Emissions, on a pound-per-megawatt basis, are well below the rates generated by conventional oil- and coal-fired power plants, as well as other technologies using natural gas (e.g., steam electric).

Air emission control technologies planned for the project reflect the application of BACT for each affected pollutant and emission source. The proposed BACT limitations are well below applicable state and federal emission standards (e.g., NSPS).

3.5 PLANT WATER USE

Stanton Unit B will obtain all necessary water for operations from existing Stanton systems. The principal sources of water at Stanton are treated effluent from the nearby Eastern Water Reclamation Facility and ground water from onsite wells. The addition of the

IGCC unit at Stanton will require a somewhat greater supply of treated effluent. OUC is working with Orange County to amend the existing cooling water supply agreement to obtain the additional water needed for Unit B. A small amount of additional ground water will be needed for demineralized water, evaporative cooler makeup, and potable use, but the additional amounts withdrawn from onsite wells will be within existing Stanton permit limits.

Unit B water use is described in Figures 3.5-1 through 3.5-3 and Table 3.5-1. (The table provides the flow quantities for the numbered streams shown in the second and third figures.) On an annual average basis, approximately 2.6 MGD of treated effluent will be drawn from the onsite storage pond. On a short-term basis, water use can change, due to changes in ambient temperature and/or relative humidity, both of which affect consumption of water. Other variables that impact water use are plant load and cooling tower cycles of concentration. Highlights related to water supply requirements from the water balance diagrams include:

- Cooling tower makeup from onsite pond—2.6 MGD.
- Demineralized water from existing Stanton plant—0.14 MGD.*
- Water for evaporative coolers—0.04 MGD.*
- Potable water—0.6 gpm.*

  *From onsite wells.

The largest need for water will be the cooling water system. More than 80 percent of the cooling system demand is related to the combined-cycle unit's operation, while less than 20 percent is attributable to the gasification processes. Makeup water must be supplied to this system to replace cooling tower evaporative losses and *blowdown*. Blowdown is water discharged from the system to maintain water quality in the cooling tower at levels necessary for the system's proper functioning. One of Stanton Energy Center's prominent features is the use of treated effluent to supply the makeup to cooling systems, thereby recycling this water and displacing the need for higher quality water. Water quality data for the makeup supply storage pond are provided in Table 2.3-7 (page 2-74). Noncooling water requirements will include makeup to the HRSG, makeup to the CT evaporative cooler, and potable water.

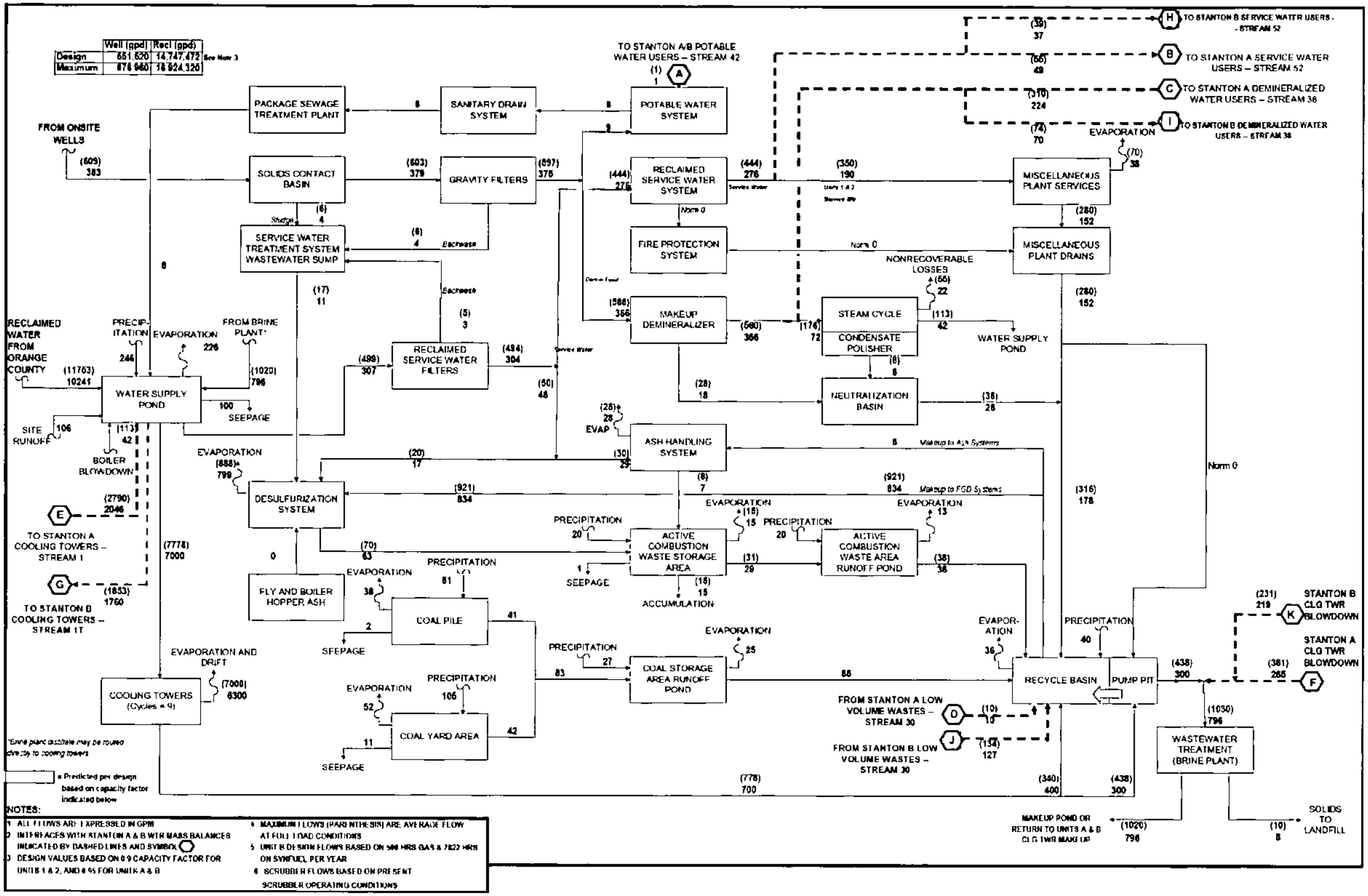

FIGURE 3.5-1.

OVERALL STANTON WATER BALANCE DIAGRAM, INCLUDING UNIT B

Source: B&V, 2006.

ECT
Environmental Consulting & Technology, Inc.

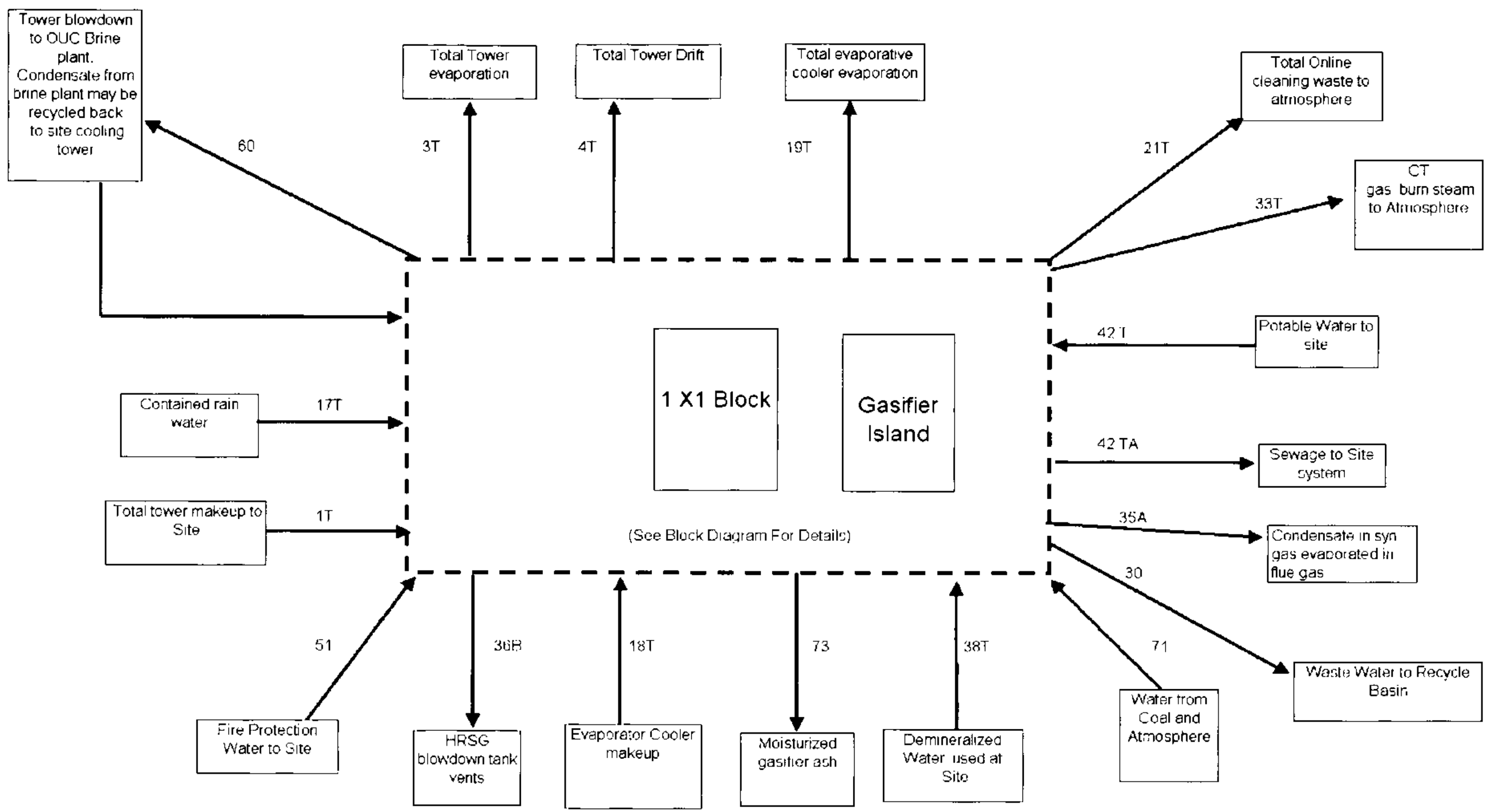

FIGURE 3.5-2.

SIMPLIFIED UNIT B WATER BALANCE DIAGRAM

Source: SCS, 2006.

ECT
Environmental Consulting & Technology, Inc.

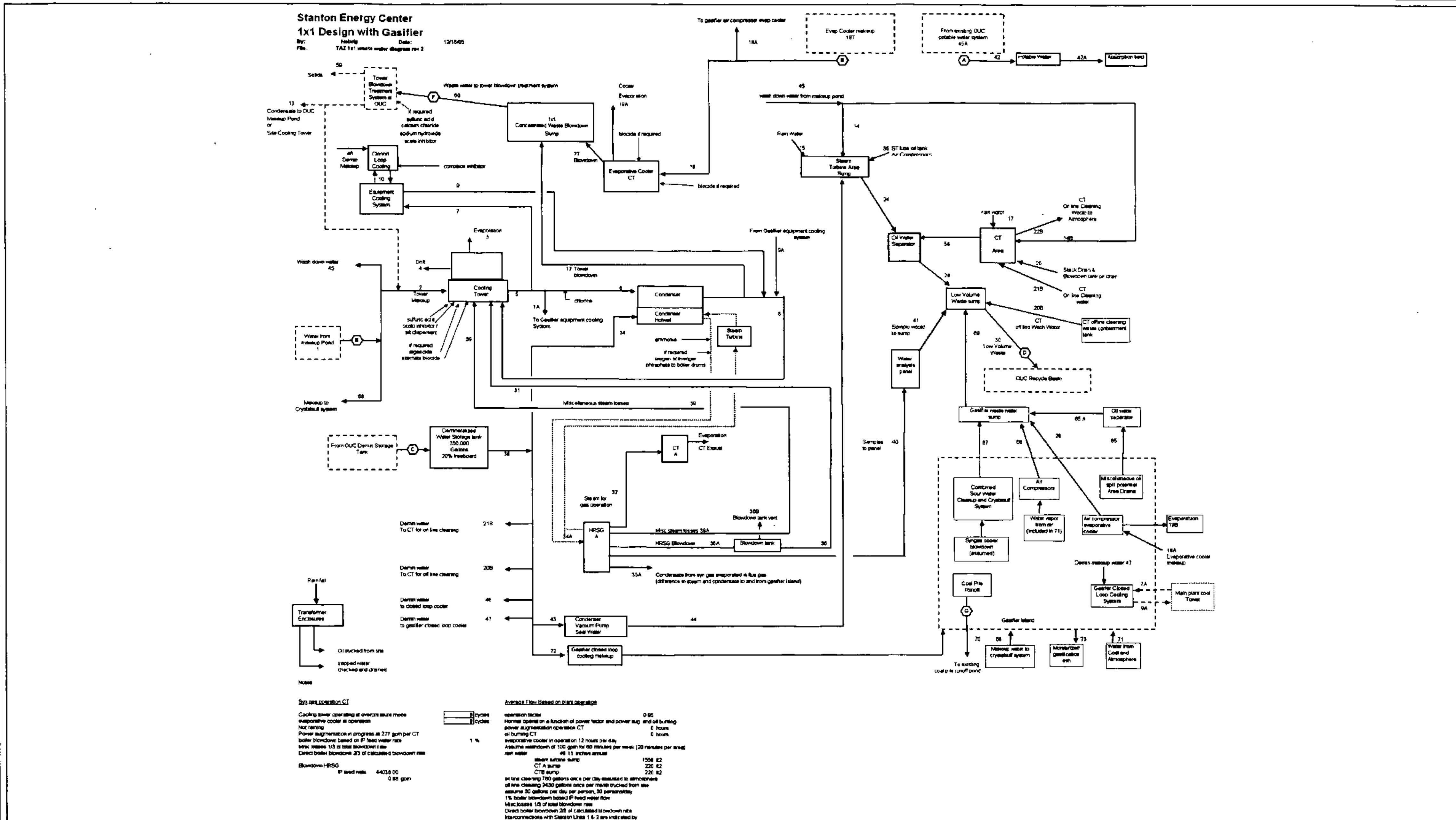

FIGURE 3.5-3.

DETAILED UNIT B WATER BALANCE DIAGRAM

Source: SCS, 2006.

ECT
Environmental Consulting & Technology, Inc.

Table 3.5-1. Water and Wastewater Stream Flow Rates

Line No.	Stream (Flows are Block Flows Unless Otherwise Noted)	CT Syngas Scenario (gpm)	CT Natural Gas Scenario (gpm)	Continuous 24-Hour Yearly (gpm)	Average 24-Hour Yearly Based on Plant Operation (gpm)
1	Makeup water from OUC makeup pond	1,853.2	1,853.0	1,853.21	1,853.38
1T	Total makeup water from OUC make pond	1,853.2	1,853.0	1,853.21	1,853.38
2	Main Cooling tower makeup	1,850.7	1,850.5	1,850.71	1,850.70
2T	Total site cooling tower makeup	1,850.7	1,850.5	1,850.71	1,850.70
3	Cooling tower evaporation	1,629.0	1,629.0	1,629.00	1,629.00
3T	Total site cooling tower evaporation	1,629.0	1,629.0	1,629.00	1,629.00
4	Cooling tower drift	4.3	4.3	4.30	4.30
4T	Total site cooling tower drift	4.3	4.3	4.30	4.30
5	Circulating water pump discharge	86,000.0	86,000.0	86,000.00	86,000.00
6	Condenser inlet	70,000.0	70,000.0	70,000.00	70,000.00
7	Cooling water to equipment cooling water system	6,000.0	6,000.0	6,000.00	6,000.00
7A	Cooling water to gasifier cooling water system	10,000.0	10,000.0	10,000.00	10,000.00
7T	Spare				
8	Condenser and service water cooler discharge to tower	85,772.0	85,772.0	85,772.00	85,772.00
9	Equipment cooling system return hot water form service water system	6,000.0	6,000.0	6,000.00	6,000.00
9A	Equipment cooling system return hot water from gasifier	10,000.0	10,000.0	10,000.00	10,000.00
9T	Spare				
10	Closed loop cooling flow	9,500.0	9,500.0	9,500.00	9,500.00
11	spare				
11T	spare				
12	Cooling tower blowdown	228.0	228.0	228.00	228.00
12T	Total site cooling tower blowdown	228.0	228.0	228.00	228.00
13	Waste treatment condensate to OUC makeup pond or site tower	208.3	208.3	206.74	208.29
13T	Spare				
14	Makeup pond water to steam turbine area for wash down	0.0	0.0	0.00	0.00
14A	Spare				
14b	Makeup pond water to CT area	0.0	0.0	0.00	0.19
15	Rain water to steam turbine area	0.0	0.0	0.00	0.09
16	Spare				
17	Rain water to CT area	0.0	0.0	0.00	0.01
17T	Total contained rain water	0.0	0.0	0.00	0.10
18	Makeup water to CT evaporative cooler	27.4	27.4	13.71	27.43
18A	gasifier air compresssor evap cooler makeup	12.0	12.0	6.00	12.00
18T	Total evap cooler makeup from OUC site	39.4	39.4	19.71	39.43
19A	CT evaporative cooler evaporation	24.0	24.0	12.00	24.00
19B	Crystalizer air compressor evap cooler evaporation	10.5	10.5	5.25	10.50
19T	Total site evaporative cooler evaporation	34.5	34.5	17.25	34.50
20A	Spare				
20B	CT off line cleaning wash water	0.0	0.0	0.06	0.05
21A	Spare				
21B	CT on line wash water	0.0	0.0	0.54	0.51
21T	Total site on line wash water	0.0	0.0	0.54	0.51
22A	Spare				
22B	On line wash water to atmosphere	0.0	0.0	0.54	0.51
23	Spare				
24	Steam turbine area to oil water separator	5.0	5.0	5.00	5.09
25	Spare				
26	CT stack drain and blowdown tank pit drain	0.0	0.0	0.00	0.00
27	CT evap cooler blowdown	3.4	3.4	1.71	3.43
28	Crystalizer air compressor evap cooler blowdown	1.5	1.5	0.75	1.50
29	Oil water separator to low volume sump	5.0	5.0	5.00	5.29
30	Low volume waste to OUC recycle basin	133.6	133.6	132.93	133.96
31	Total block boiler blow down	0.6	0.8	0.6	0.6
32	Steam for gas burn for CT	0.0	334.5	0.00	20.10

Table 3.5-1. Water and Wastewater Stream Flow Rates (Continued, Page 2 of 3)

Line No.	Stream (Flows are Block Flows Unless Otherwise Noted)	CT Syngas Scenario (gpm)	CT Natural Gas Scenario (gpm)	Continuous 24-Hour Yearly (gpm)	Average 24-Hour Yearly Based on Plant Operation (gpm)
33	Spare				
33T	Total site power augmentation and CTB gas burn to atmosphere	0.0	334.5	0.00	20.10
34	Makeup to Condenser Hotwell	50.3	355.8	50.3	68.6
34a	Makeup for losses at HRSG	50.3	355.8	50.27	68.62
34b	Spare				
35	Steam turbine lube oil tank and Air Compressors	0.0	0.0	0.00	0.00
35A	Condensate from syn gas evaporated in flue gas	29.4	0.0	29.39	27.62
36	HRSG Blowdown to tower	0.59	0.82	0.59	0.60
36A	HRSG Blowdown	0.88	1.22	0.88	0.90
36B	HRSG blowdown tank vent	0.29	0.40	0.29	0.30
37	Spare				
37A	Spare				
37B	Spare				
38	Demin. water to process	55.3	360.8	55.87	74.19
38T	Total site demin water to process	55.3	360.8	55.87	74.19
39	Total HRSG miscellaneous losses	10.0	10.0	10.00	10.00
39A	HRSG misc. losses	10.0	10.0	10.00	10.00
39B	Spare				
40	Water analysis panel waste	10.0	10.0	10.00	10.00
41	Panel waste to low volume sump	10.0	10.0	10.00	10.00
42	Potable water to block from potable water supply	17.0	17.0	0.21	0.59
42T	Potable water to site from potable water supply	17.0	17.0	0.21	0.59
42A	Sewage to treatment from block	17.0	17.0	0.21	0.59
42TA	Sewage to treatment for site	17.0	17.0	0.21	0.59
43	Condenser vacuum pump seal water makeup	5.0	5.0	5.00	5.00
44	Condenser vacuum pump seal water waste	5.0	5.0	5.00	5.00
45	washdown water	0.0	0.0	0.00	0.19
45A	From existing OUC potable/service water system	17.0	17.0	0.21	0.59
46	CC Closed loop cooling water makeup	0.0	0.0	0.00	0.00
47	Gasifier closed loop cooling water makeup	0.0	0.0	0.00	0.00
48	Spare				
49	Spare				
50T	Spare				
51	Fire Protection water to site	0.0	0.0	0.00	0.00
52	Spare				
53	Spare				
54	Spare				
55	Spare				
56	CT – A area sump to oil water separator	0.0	0.0	0.00	0.20
57	Spare				
58	Spare				
59	Water in solids to land fill	23.1	23.1	22.97	23.14
60	Conc. Waste sump to OUC tower blowdown sump	231.4	231.4	229.71	231.43
61	Spare				
62	Spare				
63	Spare				
64	Spare				
65	Gasifier misc oil spill potential area drains to oil water separator	0.0	0.0	0.00	0.00
65A	Gasifier misc oil spill potential area drains to oil water separator	0.0	0.0	0.00	0.00
66	Gasifer air compressors	18.1	18.1	18.12	18.12
67	Gasifier CrystaSulf and sour water cleanup combined waste	99.0	99.0	99.00	99.00
68	Gasifier crystafsulf makeup	2.5	2.5	2.50	2.50
69	Gasifier waste water sump to low volume waste sump	118.6	118.6	117.87	118.62
70	Gasifier coal pile runoff to existing coal pile runoff pond	0.0	0.0	0.00	0.00
71	Water Addition from the Coal and atmosphere	139.2	139.2	139.22	139.22

Table 3.5-1. Water and Wastewater Stream Flow Rates (Continued, Page 3 of 3)

Line No.	Stream (Flows are Block Flows Unless Otherwise Noted)	CT Syngas Scenario (gpm)	CT Natural Gas Scenario (gpm)	Continuous 24-Hour Yearly (gpm)	Average 24-Hour Yearly Based on Plant Operation (gpm)
72	Demin water makeup to gasifier island closed loop cooling	0.0	0.0	0.00	0.00
73	Moisturized gasification ash	24.6	24.6	24.60	24.60

Note: Average flow operating assumpitions:
Operating factor = 0.95 of a year.
Hours in year = 8760 hours.
Hours CTA oil = d 0 hours.
Hours CTA power aug = b 0 hours.
Hours CTB gas = c 500 hours.
Hours syn operation = a 7822 hours.
Total hours in operation = 8322 hours.

Source: SCS, 2006.

3.5.1 HEAT DISSIPATION SYSTEM

The cooling water will circulate through a counter-flow, mechanical draft cooling tower that uses electric motor-driven fans to move the air in a direction opposite to the flow of the cooling water. The heat removed in the condenser will be discharged to the atmosphere by heating the air and through evaporation of some of the cooling water.

A chemical feed system will supply water-conditioning chemicals to the cooling tower basin to minimize corrosion and control the formation of mineral scale and biofouling. Sulfuric acid will be fed into the circulating water system in proportion to makeup water flow for alkalinity reduction to control the scaling tendency of the circulating water within an acceptable range.

To prevent biofouling in the circulating water system, gaseous chlorine will be fed continuously into the system as the primary biocide. A secondary biocide (algaecide) will be fed as needed. Other chemicals likely to be used in the cooling water system include a silt dispersant and an iron dispersant (if Stanton wastewater treatment plant effluent water is included in the makeup supply).

3.5.2 DOMESTIC/SANITARY WASTEWATER

The domestic and sanitary wastewater generated by Unit B operations personnel will be treated and discharged via a new septic system constructed near the new unit. This system will be designed and constructed to meet applicable requirements.

3.5.3 POTABLE WATER SYSTEMS

The small amount of additional potable water required for Unit B will be provided by the existing Stanton potable water system.

3.5.4 PROCESS WATER SYSTEMS

Demineralized water will be needed as makeup to the steam cycle to replace HRSG blowdown and steam losses. Demineralized water for Unit B will be supplied from the existing Stanton system.

3.6 CHEMICAL AND BIOCIDE WASTE

During operation, Unit B systems will produce various process wastewaters, all of which will be discharged to the existing Stanton treatment and reuse systems. No process waste streams or water treatment discharges will be released offsite. The principal wastewater streams will originate with the combined-cycle unit and will consist of cooling tower blowdown and low-volume wastes. Process wastewater containing oils will be collected in an oily wastewater sump, where an oil/water separator will remove the oil. All treated wastewater and blowdown from the cooling tower will be discharged to the onsite systems. Highlights related to wastewater discharges from the water balance diagrams include:

- Cooling tower blowdown to Stanton wastewater treatment plant—0.33 MGD.
- Low-volume wastes to Stanton recycle basin—0.18 MGD.

The chemical feed area drains will collect spillage, tank overflows, and liquid from area washdowns. The collected chemical drain effluent will be routed to the waste neutralization system for pH adjustment.

Chemical cleaning wastes will be generated from the periodic cleaning of the HRSGs. These wastes will consist of alkaline and acidic cleaning solutions used for chemical cleaning of the HRSGs after the units are put into service, and for turbine wash and HRSG fireside wash waters. These wastes generally contain high concentrations of heavy metals. Chemical cleaning services will be conducted by outside contractors who will be responsible for removal of their waste products from the site.

3.7 SOLID AND HAZARDOUS WASTES

3.7.1 SOLID WASTES

3.7.1.1 Gasification Island

As discussed previously, the primary by-products produced by the gasification and gas cleanup systems are gasification ash, elemental sulfur, and anhydrous ammonia. Disposal of each of these by-products is discussed in the following paragraphs. The principal potential onsite impact associated with disposal would be landfilling the gasification ash and sulfur in the existing Stanton landfill.

Other low-volume solid wastes that will be generated by the unit include solids from water and wastewater treatment systems (e.g., sour water treatment), air filter replacement, and general office wastes. The nonhazardous wastes will be disposed offsite in permitted landfills in the region. Any waste determined to be hazardous under the Resource Conservation and Recovery Act (RCRA) regulations will be transported offsite by a licensed contractor to a RCRA-permitted treatment and disposal facility or provided to the manufacturer for treatment and recycling.

Gasification Ash

Gasification ash (coal ash and unreacted carbon) is removed from the HTHP filters and gasifier. Gasification ash is nonhazardous, and disposal requirements would be similar to those experienced for fly ash from conventional boilers. Treatment of the gasification ash will include wetting it to minimize dust emissions. The gasification process will produce approximately 18,300 lb/hr of gasification ash. Gasification ash will be stored in an atmospheric silo as it is generated. Prior to transferring, the ash is mixed with water to minimize dust emissions. After this conditioning, the ash will be sent to the onsite landfill. (OUC/SPC-OG may also explore offsite markets for the gasification ash. Beneficial uses might include activated carbon and cement kiln fuel.)

Southern Company and OUC have extensive experience in handling solids from PC plants. In addition, Southern Company has tested gasification ash from the Transport Gasifier at the PSDF to evaluate disposal and utilization options. Although the ash produced in a Transport Gasifier differs from PC ash in carbon content and surface area, the equipment used for handling the two materials is the same.

The primary issue regarding ash conditioning for disposal is dust control. Testing commissioned by SCS demonstrated that wetting of the gasification ash could be accomplished without surfactants. The water requirements for wetting were higher than for PC ash, but the end product was easily handled and compacted well for disposal. Wetting did not release excessive heat, so heat dissipation will not be required. Liner tests did not reveal any incompatibility with either clay or synthetic liners. It was concluded that the gasification ash disposal requirements are the same as those of coal ash from PC boilers. Therefore, based on all current information, disposal of the gasification ash in the existing onsite landfill is planned.

Test results indicate that Transport Gasifier ash meets all regulatory requirements defining nonhazardous materials: toxicity, ignitability, corrosivity, and reactivity. The calcium sulfide levels in the gasification ash had no adverse impact on waste disposal in terms of toxicity, ignitability, reactivity, or corrosivity.

Material conditioning by mixing with water prior to landfilling would be required mainly for convenience and then most likely for dust control. In general, the disposal requirements of gasification ash should be no more rigorous than that currently experienced with conventional fly ash, and no significant waste treatment prior to disposal is expected. In addition, as discussed in Section 5.4, the existing, permitted landfill at the Stanton site has more than adequate capacity to accommodate the relatively modest amounts of ash that the Unit B gasifier will produce.

Sulfur

The gasifier gas cleanup system will produce approximately 760 lb/hr of 99-percent pure elemental sulfur. The primary method of disposal for this sulfur by-product will be landfilling in the onsite landfill. As previously stated, the onsite landfill has available capacity, and the small amount of sulfur produced by the gasification process will easily be accommodated.

This sulfur by-product is also expected to be of marketable-grade quality and have commercial uses. As with ash, commercial opportunities will be investigated. Assuming a commercial market, the sulfur would be transported offsite by truck or rail and sold. The sulfur is removed from the process and stored as a solid in an atmospheric silo that is adjacent to the gasification island. Based on the amount of sulfur in the design coal, and assuming it is shipped as a solid, the quantities produced would correspond to three trucks of sulfur per week. Onsite sulfur storage systems will have the capacity to store several days of sulfur from the recovery system.

Ammonia

Anhydrous ammonia (99.7-percent grade) will be produced as a byproduct of the gasification process at a rate of approximately 1,960 lb/hr. As the ammonia is produced, it is stored in a tank located near the gasification island. The onsite SCR units will be consumers of the ammonia produced, but, even assuming the gasifier supplies ammonia for all of these onsite *consumers*, there will still be a net production of 1,600 lb/hr, which will be transported offsite by truck or rail and sold into the commercial market. If by truck, at periodic intervals, an ammonia tanker truck would arrive onsite, and the stored ammonia would be pumped into the tanker truck and carried offsite to be sold. Approximately six trucks per week of anhydrous ammonia would leave the site. At present, approximately one truck per week brings anhydrous ammonia to the site for use by the existing consumers of ammonia. Transport offsite by rail would be another option to be investigated.

Gas Cleanup Sorbents/Catalysts/Chemicals

Other wastes, listed in Table 3.7-1, will result from the gasification processes. Catalysts (e.g., for the COS hydrolyzer) will be regenerated and reused if possible. Sour water treatment sorbent and sulfur removal chemicals will be characterized for proper waste treatment requirements.

Table 3.7-1. Expected Operating Characteristics—Materials Requiring Periodic Replacement

	Description	Quantity/Replacement Requirements
Mercury sorbent	Sulfur-impregnated activated carbon used in two mercury adsorption columns	3,400 ft^3 once per 12 to 18 months per column*
COS hydrolyzer catalyst	Alumina-based catalyst used to convert COS to H_2S for H_2S enrichment/sulfur removal/SO_x reduction	2,000 ft^3 once per 3 years
Sour water sorbent	Activated carbon used for sour water treatment	3,400 ft^3 once per month*
Sulfur removal chemical	Further engineering is required to identify chemicals and amounts required	Unknown

Note: COS = carbonyl sulfide.
H_2S = hydrogen sulfide.
SO_x = sulfur oxides.
ft = foot.
ft^3 = cubic foot.

*Preliminary estimates of volume.

Source: SCS, 2005.

Combined-Cycle Island

During operation of the combined-cycle unit (firing either syngas or natural gas), non-hazardous solid wastes will be generated periodically. Wastes generated by the plant will include used air inlet filters, waste oils, and other maintenance wastes, along with plant refuse. These wastes will be disposed of at an offsite, licensed landfill.

The facility will also produce maintenance and other wastes typical of power generation operations. Used oils collected from the oil/water separator, spent lubricating oils, and used oil filters from the CT will be transported offsite by an outside contractor and recycled or disposed. Other maintenance-related wastes will include rags, broken and rusted metal and machine parts, defective or broken electrical materials, empty containers, and other miscellaneous solid wastes. These wastes and the typical refuse generated by plant personnel will also be disposed of in an offsite, licensed landfill.

3.7.2 HAZARDOUS WASTES

Minimal quantities of hazardous wastes will only be occasionally produced at the plant. All attempts will be made to select and use solvents, paints, and other maintenance chemicals to produce nonhazardous wastes. In the circumstance where hazardous wastes are generated by the plant, the wastes will be managed in accordance with applicable federal and state requirements. Mercury sorbent will likely be disposed of as hazardous waste.

Chemical cleaning wastes will also be generated periodically when the combined-cycle unit's HRSG is cleaned. These wastes were described previously.

3.8 ONSITE DRAINAGE SYSTEM

Stormwater runoff from Unit B facilities will be controlled, treated, and managed in accordance with existing, approved plans for the Stanton Energy Center and in compliance with applicable federal, state, and local requirements. Runoff from areas associated with industrial activity, including the coal storage areas, and equipment and floor drains will be routed to the recycle basin. This system includes pH adjustment, oil separation, and suspended solids removal. Treated wastewater from this system will be discharged to the recycle basin for reuse. Stormwater will be routed via sheet flow to culverts and directed to existing, onsite stormwater retention ponds.

3.9 MATERIALS HANDLING

For a project such as Stanton Unit B, large construction equipment, including cranes, trucks, and other heavy machinery; quantities of construction materials (refer to Section 5.11); and the key components of both the gasification and combined-cycle islands themselves (e.g., transport reactor, CT, cooling tower, HRSG) will be required. Such materials and equipment will be delivered to the site by truck or rail. If by truck, potential routes will include Alafaya Trail, the BeeLine Expressway via the Stanton site's south access road, and the BeeLine via the new Innovation Way (see the discussion of transportation infrastructure in Section 2.2.7.2 and further discussion in Section 4.6.3.3). (Construction of Unit A in 2001 and 2002 relied upon the existing two-lane Alafaya Trail.)

Construction equipment and materials will be stored onsite during the construction period at a designated laydown area, which is shown in Figure 2.1-7.

REFERENCES

Black & Veatch. 2005. 2005 Ten-Year Site Plan. Prepared for OUC. File No. 140548.0040. April.

4.0

ENVIRONMENTAL EFFECTS OF SITE PREPARATION, AND PLANT AND ASSOCIATED FACILITIES CONSTRUCTION

This chapter identifies and discusses the potential impacts from construction of the proposed power plant and associated facilities, on the social, physical, and natural resources of the site and vicinity. In accordance with FDEP instructions, this chapter includes the following sections:

- 4.1—Land Impact.
- 4.2—Impact on Surface Water Bodies and Uses.
- 4.3—Ground Water Impacts.
- 4.4—Ecological Impacts.
- 4.5—Air Impact.
- 4.6—Impact on Human Populations.
- 4.7—Impact on Landmarks and Sensitive Areas
- 4.8—Impact on Archaeological and Historic Sites.
- 4.9—Special Features.
- 4.10—Benefits from Construction.
- 4.11—Variances.

The potential impacts are presented in terms of their relationships with the resources and populations described in Chapter 2.0, as well as in terms of compliance with applicable regulations and standards.

4.1 LAND IMPACT

With respect to most of the environmental disciplines discussed next, it is noteworthy that a small amount of acreage (relative to the 3,280-acre Stanton site and the 1,100-acre developed power plant area) will be impacted by construction of the Unit B IGCC facilities, including the onsite transmission interconnection (see Chapter 6.0), and much of that land will be used only temporarily. Specifically:

- Once constructed, the gasification island will impact approximately 10 to 12 acres, and the combined-cycle island will affect approximately 10 to 12 acres. Together these IGCC facilities will impact 20 to 25 acres.
- The transmission line interconnection from the IGCC unit to the onsite substation may impact up to approximately 5 acres of land outside the developed portion of the site.
- The Unit B coal pile will occupy approximately 10 acres.
- Disposing of gasification ash and sulfur in the onsite landfill would impact up to approximately 25 acres over 30 years of operation (maximum acreages required if no ash is reused).
- Another 20 acres will be used temporarily for laydown of construction materials.
- Construction worker parking will require approximately 5 acres (this area is already an existing parking lot).

With the exception of the transmission interconnection, all of the land requirements just mentioned will be within the boundaries of the previously disturbed 1,100-acre developed power plant area.

This information regarding land areas should be kept in mind when reviewing the rest of Chapter 4.0. For example, the 20- to 25-acre area being disturbed by IGCC unit site clearing is small enough that the dust generated by clearing activities should be modest and not result in any significant impacts in fugitive dust emissions.

4.1.1 GENERAL CONSTRUCTION IMPACTS

The general site preparation and construction activities associated with the overall development of the project site include the following:

- Construction of temporary stormwater controls.
- Sequential dewatering of low areas of the site.

- Stabilizing, grading, filling, and contouring the area for power plant facilities.
- Performing ground work as necessary for construction of facility footings, foundations, and underground utilities including electrical, water, wastewater, and other piping systems.
- Power plant facilities construction.
- Earthmoving, grading, recontouring, and landscaping.

Site preparation will consist of grading and leveling. Topsoil suitable for reuse will be stockpiled for landscaping and in establishing vegetation after construction has been completed. During early site preparation activities, best management practices (BMPs) will be employed to manage stormwater runoff. The following subsections provide additional details on general construction impacts.

4.1.1.1 Use of Explosives

The Unit B project will not require the use explosives for any portion of the construction work.

4.1.1.2 Laydown Areas

Laydown areas for storage of construction materials and plant equipment components will be required for construction of Unit B. Approximately 20 acres of land will be needed for storage and staging of materials and equipment. The area planned for Unit B laydown was shown on Figures 2.1-7 and 3.2-1.

The laydown area will be graded for proper drainage, and a course of gravel base material will be applied (if necessary). Wood timbers will be used, as appropriate, to help keep plant equipment components and materials stored safely off the ground. After construction is complete and laydown areas are no longer needed, wood timbers will be removed and the surface areas will be graded for drainage and planted with grass.

4.1.1.3 Temporary and Permanent Plant Roads

The existing network of onsite roads will be adequate to support Unit B construction. No new onsite roads will be needed.

4.1.1.4 Railroads

No new railroad tracks will be needed for Unit B construction.

4.1.1.5 Bridges

Any plant equipment to be delivered by truck that exceeds bridge and/or overpass height limits will be routed such that no impacts to existing bridges will result from Unit B construction, nor will any new bridges or overpasses be required.

4.1.1.6 Service Lines

Other service lines required for Unit B (e.g., natural gas) already exist. No new lines will be needed.

4.1.1.7 Disposal of Trash and Other Construction Wastes

No significant impacts from construction wastes are anticipated. During construction, the craft and management labor force will utilize portable chemical toilets. A qualified and licensed contractor will furnish chemical toilets, along with routine maintenance and service. Sanitary wastes generated during construction will be removed from the site, transported, and properly disposed by the contractor in an approved disposal and treatment facility. All portable toilets will be removed from the plant site upon completion of the construction phase of the Unit B project.

The amount of construction waste generated will be minimized to the extent practicable. An authorized and licensed waste-handling contractor will remove construction waste materials from the site for proper disposal.

4.1.1.8 Clearing, Site Preparation, and Earthwork

The Unit B plant site within the developed Stanton power plant area is already cleared of large vegetation. Rough grading, excavation, and backfill activities will be performed to prepare the site for underground utilities, concrete foundations, and surface drainage.

Structural backfill materials may be imported to the site for constructing concrete foundations and to raise the site elevation to achieve proper drainage. Piling for concrete foundation supports may also be required and would be performed immediately after grading and earthwork activities are substantially complete. After construction of the project is essentially complete, any remaining areas that do not have an impervious surface will be revegetated with native grasses and plant life.

4.1.1.9 Impact of Construction Activities on Existing Terrain

The existing terrain is essentially flat. The contours of site terrain will not be altered to any significant degree by Unit B construction activities.

4.1.2 ROADS

Access for the construction activities will be provided by the existing access road and site entrance. No new roads are proposed for construction as a result of this project.

4.1.3 FLOOD ZONES

All of the proposed Unit B facilities will be constructed outside the 100-year floodplain.

4.1.4 TOPOGRAPHY AND SOILS

Since the site is in a flat area (i.e., little topographic relief) and relatively few acres will be impacted, Unit B construction will not cause adverse impacts to topographic conditions. Runoff will be managed with the stormwater management system (i.e., pond, weirs, orifices, etc.) to mimic preconstruction conditions.

A discussion of the potential for subsidence and sinkhole formation was provided in Section 2.3.1. Based on their low probability of occurrence, construction activities are not expected to cause or exacerbate these phenomena.

Certain structures associated with Unit B will be visible from varying distances because the structures will protrude above the existing facilities and/or tree line. However, there are no vantage points that would have their views obstructed by the plant. Only the relatively taller plant structures (e.g., exhaust stack, HRSG, transmission line structures) will be visible from a few public viewpoints in the vicinity of the Stanton site.

4.2 IMPACT ON SURFACE WATER BODIES AND USES

4.2.1 IMPACT ASSESSMENT

Surface waters near the site include Hart Branch and Cowpen Branch (see Figure 2.3-16) and wetlands present in the Stanton site buffer areas (see Figures 2.3-17 and 2.3-19).

Impacts to surface waters associated with construction could be caused by erosion and sedimentation associated with stormwater runoff and dewatering activities (see next section). To limit impacts associated with runoff, an erosion control plan will be developed to minimize impacts during construction. To prevent the deposition of sediments beyond the construction areas, appropriate BMPs will be selected. The use of the BMPs should minimize runoff. Runoff from beyond the construction areas may be diverted around disturbed areas to avoid additional erosion potential in the construction areas.

In the unlikely event there is a spill of fuels, lubricants, and other liquids, plant personnel will initiate the response procedures described in their SPCC plan. By implementing the appropriate procedures, potential impacts to surface waters will be minimized, should they occur.

It is anticipated that stormwater from the IGCC construction areas will ultimately flow into the existing Stanton stormwater management systems and will be contained within the developed, previously impacted power plant portion of the site. In addition, while constructing the individual transmission line tower pads, the construction areas will utilize BMPs (e.g., silt screens, hay bales, etc.) to minimize runoff.

4.2.2 MEASUREMENT AND MONITORING PROGRAMS

The project is not expected to have impacts on surface water bodies and users. Therefore, no measurement or monitoring programs are warranted.

4.3 GROUNDWATER IMPACTS

4.3.1 IMPACT ASSESSMENT

During construction of the Unit B IGCC facilities, potential impacts on ground water aquifers at the site are primarily related to construction dewatering activities. Temporary dewatering activities will be required during the initial phase of construction of the project. Existing grade elevations are approximately 80 ft-msl. Ground water levels are estimated to occur anywhere from existing grade to 6 ft below existing grade. Fluctuations in ground water levels are expected to occur throughout the year due to rainfall, natural drainage systems, and manmade drainage systems.

Dewatering systems will be installed and maintained throughout the civil engineering phase of construction to accommodate the construction of the overall IGCC facilities on approximately 20 to 25 acres. The dewatering systems are necessary for excavation, backfill, and certain construction operations. It is anticipated that a low-point well and ditch system will be used to lower the ground water elevation sufficiently below the bottom of excavation to preclude problems with backfilling, soil compaction, and other related activities. Ground water collected as a result of dewatering will be pumped to the existing Stanton stormwater management system, likely the existing Stanton Unit A stormwater pond.

The potential temporary effects on existing ground water quality of the surficial aquifer due to earth-moving and dewatering activities at the site during site preparation and construction are anticipated to be minimal, in part due to low ground water flow velocities in the area and the fact that any surficial aquifer drawdown impacts will be localized within the Stanton Energy Center site boundaries. That the dewatering activities will likely be required on less than 25 acres also supports the conclusion of minimal impacts, which, of course, will be temporary during a portion of the early construction phase.

Dewatering and other construction activities are not anticipated to have any effect on the Upper Floridan aquifer because a low-permeability confining layer (the Hawthorn Group) separates the surficial and Floridan aquifer systems (see Section 2.3.1). Accordingly, temporary dewatering activities in the surficial aquifer are not expected to affect drinking water supplies or other uses of the Upper Floridan aquifer.

Much of the dewatering discharge volume from the surficial aquifer will be offset by the increased infiltration and recharge of water to the aquifer system, and by the decreased evapotranspiration that accompanies a lowered water table. Therefore, any potential surficial aquifer impacts from dewatering activities will be insignificant and short term.

Minor chemical effects can result from dewatering activities through the mobilization of constituents from the soils into the dewatering discharge and from oxidation of the ground water. The surficial aquifer sediments at the site are composed predominantly of fine quartz sands (which are not readily soluble). Therefore, because the surficial aquifer stratum is composed primarily of silica sands, oxidation reactions will be minimal, and potential ground water quality impacts will be insignificant. The shallow aquifer materials will also act to filter out the suspended solids, absorb dissolved constituents, and thereby limit or preclude migration of these constituents in the surficial aquifer.

After excavation, backfill, compaction, construction of the permanent IGCC facilities drainage system, and certain concrete construction activities are complete, the dewatering system will be removed. Any restoration needed for affected areas will be performed after the dewatering equipment is removed.

Construction contractors will be required to implement practices to minimize the potential for spills of fuels or chemicals. Maintenance will be performed only in designated areas. In the unlikely event that spills do occur, they will be managed in an approved manner, in accordance with local, state, and federal regulations.

In conclusion, the proposed construction activities for the proposed project are not expected to adversely impact onsite or offsite ground water resources. Any impacts should be minor and temporary.

4.3.2 MEASURING AND MONITORING PROGRAMS

Ground water monitoring is not proposed as part of the construction activities for the project. Construction activities are not expected to cause meaningful ground water impacts. In the unlikely event that there is a fuel spill or other release, assessment and recovery of the spill or release would be conducted in accordance with FDEP requirements.

4.4 ECOLOGICAL IMPACTS

4.4.1 IMPACT ASSESSMENT

4.4.1.1 Surface Water Systems

As discussed in Section 2.3.6.1, there are no natural surface water systems within the proposed footprint of the Unit B project. Therefore, significant aquatic ecology resources will not be directly affected by IGCC power block and coal pile construction since these habitats are absent from these areas. As already discussed in Section 2.3.6.1, the nearest significant surface water resource is the Econlockhatchee River, approximately 2 miles east of the Unit B and combined-cycle construction areas of the Stanton site. Due to BMPs employed in construction of the project and existing means of collecting and handling site stormwater, it is highly unlikely any impacts will occur to this relatively distant riverine habitat.

4.4.1.2 Terrestrial Systems

Flora

The entire footprint of the Unit B facility (excluding the transmission line) will occur on previously altered habitats. This impact area includes existing Stanton Units 1, 2, and A facilities. While these land cover types will remain within the current FLUCFCS designations after construction of Unit B, some remnant ruderal habitats will be permanently displaced.

The displaced ruderal habitats include approximately 35 acres for the power block and coal handling facilities. These areas are managed lawnscapes and are described in Section 2.3.5.2. Gradually, additional solid waste disposal areas will be prepared for operation of Unit B. As such, those ruderal communities described in Section 2.3.5.2 will also be lost or altered. No forested areas or natural communities will be affected by construction of the Unit B power block or coal pile.

Fauna

Although wildlife usage of these habitats is limited, the project will result in a net decrease of these ruderal areas. This will cause relocation of these wildlife species to other similar habitats on the Stanton property. Construction of the Unit B power block and coal pile is not expected to affect any important habitats for state or federally listed plants or wildlife. Regional populations of wildlife or listed species will not be affected by construction of Unit B. Unit B construction may temporarily displace some wildlife species in the immediate vicinity due to increased noise, dust, and human presence.

4.4.2 MEASURING AND MONITORING PROGRAMS

The results of the ecological measuring program conducted on the site in support of this SCA are described in Section 2.3.6. No continued monitoring programs are warranted or proposed for biological resources during the construction phase of the proposed project. Any mitigation required as a result of state and federal wetlands permitting may require monitoring, but the extent of such mitigation and resultant monitoring is to be determined.

4.5 AIR IMPACT

Three general activities will generate air emissions during construction of the Unit B IGCC facilities. First, land clearing, site preparation, and vehicle movement will generate fugitive dust emissions. Second, internal combustion engines in construction equipment will release NO_x, CO, and other combustion products. And third, construction worker travel to and from the site will result in vehicular emissions.

The quantity of any emissions released during the construction process will generally be low, but will vary due to weather conditions and will fluctuate on an hourly and daily basis as construction progresses. Fugitive dust emissions will be greatest during the site preparation phase. Fugitive dust emissions will also be greater during the more active construction periods as a result of increased vehicle traffic on the construction site.

Fugitive dust emissions from the construction site will be minimized using appropriate dust suppression control methods. However, as the Stanton site has an existing network of paved access roads, standard control methods used at *greenfield* sites, such as applying dust-suppressing chemicals or water to unpaved roads and other exposed surfaces, should not be required. Existing public roads (e.g., Alafaya Trail) leaving the site are currently paved. Of course, all construction-related fugitive dust emissions will be temporary and will stop once construction is completed.

Increased emissions from internal combustion engines will occur during site preparation and construction due to the amount of onsite construction equipment using engines for site excavation and grading, concrete placement, and structural steel and major equipment installation. Other potential minor sources of VOCs include:

- Evaporative losses from onsite painting.
- Refueling of construction equipment.
- Application of adhesives and waterproofing chemicals.

Construction of Unit B will occur over an approximately 28-month period. As presented in Section 4.6.2, there will be an average of approximately 300 to 400 workers during that time, with peak employment of approximately 600 to 700 construction workers. It is possible that some of these construction personnel will be drawn from outside Orange County and will commute to the job site. Conversely, construction workers from Orange County who currently commute to job sites *outside* the county would travel fewer miles to the site. While not readily quantifiable, the temporary net changes in vehicle-miles traveled (VMT) in the area would be insignificant, as would any temporary net changes in areawide vehicular emissions, especially in the context of a large metropolitan area like Orlando.

The air quality impacts caused by construction activity will vary from day to day as a function of the level of activity, the specific nature of the activity, the weather conditions while the activity is occurring, and the emission controls applied to the activity. However, even under worst-case conditions, the maximum ambient impacts caused by construction emissions are expected to be modest, temporary, and limited to the general area of the site under construction. Also, the main construction activities will take place approximately 2,500 to 3,000 ft from the nearest Stanton site property boundary and more than 1 mile from the closest residential area. Thus, based on the type and nature of the construction-related emission sources, potential maximum air quality impacts caused by potential construction-related emissions should be localized, primarily limited to the immediate onsite area of the construction activity, and well within the Stanton site boundaries.

4.6 IMPACT ON HUMAN POPULATIONS

4.6.1 PROXIMITY OF POPULATIONS TO CONSTRUCTION AREAS

Figure 2.1-7 and various figures presented in Section 2.2 describe the area surrounding the Stanton site. The lands to the east and west of the site are public and not occupied by human populations (see Figures 2.2-2 and 2.2-4). The nearest human populations are the residential areas to the north of the site and the population located at the correctional facility to the southeast. The portion of the Avalon Park development closest to the site is approximately 1 mile from the Unit B IGCC facilities area.

4.6.2 PROJECT WORKFORCE

Figure 4.6-1 shows the estimated construction workforce for Unit B. Construction employment is expected to be highest from mid-2008 through mid-2009 because of the combined construction activities and needs associated with both the gasification and combined-cycle islands. Construction employment is expected to peak at approximately 600 to 700 workers for a 9-month duration and to average approximately 350 workers throughout the projected 28-month construction phase. Figure 4.6-1 shows needs for construction workers through mid-2010, as some construction laborers will be required through the gasifier startup process.

OUC/SPC-OG will draw the construction workforce primarily from Orange County and the surrounding area. Only a limited number of construction workers are expected to temporarily relocate to the project area; therefore, potential impacts on housing, schools, and other public facilities and services should be minimal. Most construction is expected to occur during daylight hours.

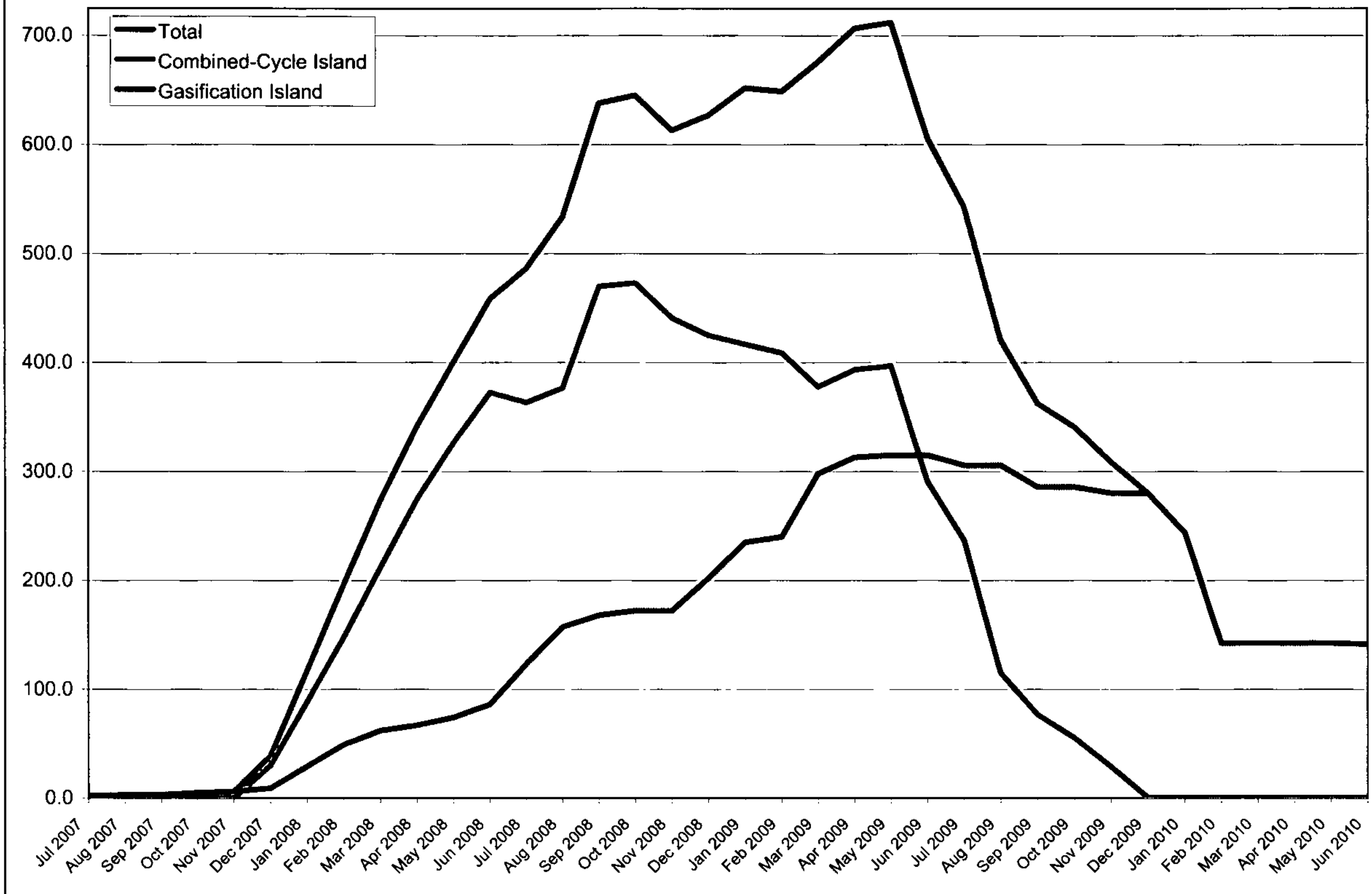

FIGURE 4.6-1.

CONSTRUCTION LABOR FORCE

Sources: SCS, 2005. ECT, 2006.

Environmental Consulting & Technology, Inc.

4.6.3 POTENTIALLY UNDESIRABLE IMPACTS

4.6.3.1 Noise

Unit B construction is expected to be typical of other power plants in terms of schedule, equipment utilized, and types of activities. Construction can generally be divided into several phases, with the noise level varying with the construction phase (based on Barnes *et al.*, 1977). The various construction phases are:

- Site preparation and excavation.
- Concrete pouring.
- Clean up.
- Steel erection.
- Mechanical and electrical.
- Startup and testing.

The typical high-pressure steam- or air-blow activity, a repetitive, short-duration noise, is generally assessed separately because of the high noise levels and the potential for significant impact.

During the initial site preparation and reclamation and foundation excavation phase, heavy diesel-powered earth-moving equipment is the major source of noise. This equipment includes bulldozers, graders, sheepsfoot roller compactors, dump trucks, backhoes, and front-end loaders. Typical noise levels such equipment produces can approach 100 A-weighted decibels (dBA) at 50 ft. For example, a front-end loader produces 79 dBA, and a dump truck produces 91 dBA at 50 ft (EPA, 1971).

Equipment used during the concrete pouring stage includes concrete trucks, cranes, and some earth-moving equipment for backfilling foundations. A pile driver (101 dBA at 50 ft; EPA, 1971) will also be used on the site. The steel erection phase requires the use of cranes in varying sizes, air compressors, welders, material delivery trucks, concrete trucks, and front-end loaders. The machinery installation phase requires the same types of equipment as the steel erection phase.

The final phase, consisting generally of site cleanup and plant startup activities, is typically 10 dBA quieter than the other phases (Barnes *et al.*, 1977), except during the one period of time when the steam lines in the HRSG are being cleaned. Steam is blown through the lines to remove scale or welding debris before being allowed to pass through the turbines, where such materials could damage the blades. The steam is vented to the atmosphere through a temporary bypass line and specially designed baffles constructed specifically for that purpose.

Noise related to truck traffic could be significant during construction due to noise levels generated (91 dBA at 50 ft [EPA, 1971]) and frequency. However, such impacts will be temporary since it would be limited to the construction phase.

An estimated construction equipment inventory was developed, with the high noise level equipment identified for evaluation. The loudest equipment types generally operating at a site during each construction phase are presented in Table 4.6-1. The composite average or equivalent site noise level, representing noise from all equipment averaged over the workday, is also presented.

During construction, average or equivalent construction noise levels projected at the nearest property boundary (i.e., approximately 3,000 ft immediately north of the IGCC facilities construction area) are presented in Table 4.6-2. Construction noise levels were not projected for a residence because no residences are located within 1 mile of the active site areas. These noise results are conservative because the only attenuating mechanism assumed was divergence of the sound waves; no attenuation from vegetation or intervening structures was factored into the analysis. Average noise levels during the loudest construction activities (excepting steam blows) are projected to be between 52 and 55 A-weighted decibels (dBA) at the property boundary. These levels are less than the ambient noise levels measured at a nearby location (Location 3 in Table 2.3-34 and Figure 2.3-24). The construction noise will likely not be audible at the gate to the Stanton site at Alfaya Trail, the nearest point of public access.

The final phase, consisting generally of site cleanup and plant startup activities, is typically 10 dBA quieter than the other phases (Barnes *et al.*, 1977), except during the one period of time when the steam lines are being cleaned. As discussed previously, one-time cleanings of both the combined-cycle unit's HRSG and steam turbine and the gasification

Table 4.6-1. Construction Equipment and Composite Site Noise Levels

Construction Phase	Loudest Construction Equipment	Equipment Noise Level at 50 ft (dBA)	Composite Site Noise Level at 50 ft (dBA)
Site clearing and excavation	Bulldozer	90	89
	Truck	82	
	Backhoe	84	
	Grader	85	
	Tractor scraper	87	
	Compactor	83	
Concrete pouring	Ready-mix truck	84	87
	Mobile crane	85	
	Concrete pump	82	
	Pile driver*	102	
Steel erection	Pneumatic tools	90	90
	Air compressor	76	
	Mobile crane	85	
	Cherry picker	80	
Mechanical	Pneumatic tools	90	89
	Air compressor	76	
	Mobile crane	85	
Cleanup	Truck	84	86
	Front-end loader	87	

*Pile driving may not be needed.

Sources: Barnes *et al.*, 1977.
ECT, 2006.

Table 4.6-2. Average Construction Noise Levels (dBA) at Nearest Property Boundary

Construction Phase	Noise Level (dBA)
Site clearing and construction	54
Concrete pouring	52
Steel erection	55
Mechanical	54
Cleanup	51

Sources: ECT, 2006.

island's steam lines will be required toward the end of the construction phase. Cleaning of the steam lines for the HRSG and steam turbine will require five blows of approximately 18 to 24 hours each over a period of 6 days. The one-time cleaning of the steam lines associated with the gasification island will be 4 to 5 months later and will require four blows of approximately 18 to 24 hours each over a period of 5 days.

For all of these steam blows, a peak sound pressure level at 50 ft of approximately 102 dBA will be produced. This noise source translates to a level of approximately 66 dBA at the nearest property boundary and 60 dBA at the nearest residential area. These levels of noise could represent significant, though temporary noise impacts. Comparing to the noise levels cited previously in Table 2.7-4, a level of 60 dBA would be typical of normal conversation. However, it is noted that the estimated noise level at the nearest residential area (located approximately 6,500 ft northeast of the planned IGCC area) did not take into account any sound attenuation that might result from existing structures or vegetation. The predicted noise level also applies to receptors outdoors; that is, persons indoors would not experience the same level of noise.

4.6.3.2 Impacts on Housing and Educational Facilities

For the year 2002, the Florida Department of Labor and Employment Security (FDLES) reported more than 28,000 construction workers in Orange County (BEBR, 2003). Based on this available construction workforce, the majority of construction workers are expected to be drawn from within the area and not permanently relocate to the area. It is therefore expected that the majority of these construction workers will commute daily to and from the Stanton Energy Center.

A few construction workers potentially may come from outside the area and would potentially occupy rental housing for a portion or the duration of the 28-month construction phase. Given that Orange County had a reported 113,000 available rental units, including seasonal and recreational units, with a vacancy rate of 5.4 percent and more than 188,000 listed hotel rooms in the greater Orlando area (U.S. Census, 2000), the likely small additional demand on available rental housing or hotels would be readily absorbed by the county's available rental housing stock and hotel rooms.

Therefore, even the overall project construction workforce is not expected to negatively impact the housing stock in the region. Those commuting workers are expected to maintain their established patterns of use based on their existing residences, which should not create any additional housing demands in the area.

Given that the majority of construction employees are expected to be from the local and surrounding areas and the construction period is only 28 months, no significant increase in the number of people living in the area is expected to occur. With no significant increases in local population expected during either construction or operation, impacts on schools are expected to be insignificant.

4.6.3.3 Impacts on Transportation Infrastructure

As described in Section 2.2.7.2, the primary routes of access to the Stanton site are currently via: (a) Alafaya Trail from either Highway 408 (East-West Expressway) or Curry Ford Road, and (b) Avalon Park Boulevard from Highway 50, with limited ingress/egress allowed from the south via an access road connected to the BeeLine Expressway. Peak-hour and average daily traffic on Alafaya Trail, from the entrance of the Stanton Energy Center to Curry Ford Road, is operating at level of service "F" for a two-laned roadway. Significant growth has taken place around the Stanton site, primarily in the mixed use and residential developments located to the north of the site, east of Alafaya Trail.

This current level of service on Alafaya Trail and the approved future development in the area are major reasons for two planned road improvement projects. For further development to proceed in this area of Orange County, developers have provided: (a) design and construction plans and permitting for Innovation Way, a four-lane extension of Avalon Park Boulevard to the Beeline Expressway and then southward to International Corporate Park, and (b) funding for the four-laning of Alafaya Trail from Avalon Park Boulevard north to Curry Ford Road. Innovation Way is planned for construction by the County to commence in mid-2006 and be completed within 24 months, pursuant to an agreement with the developer of International Corporate Park (OCBCC, 2001). The current estimate for completion of the four-laning of Alafaya Trail is 2009 or 2010 (Kunkel, 2006). The proposed Innovation Way will link primarily residential developments with the proposed, large scale International Corporate Park (an anticipated large attractor of work trips) located south of the BeeLine Expressway. The four-laning of Alafaya Trail will allow for planned development in Avalon Park and the approved Morgran development, the latter located on the western side of Alafaya Trail in proximity to the Stanton site.

The completion of Innovation Way (expected in mid-2008) would greatly improve traffic flow on Alafaya Trail in general and reduce the impacts of Unit B construction activities at Stanton, as more trips could access the local and regional roadway network by traveling west and south on Innovation Way to the BeeLine Expressway. As shown in Figure 4.6-1, construction employment during the first half of 2008 will increase from a low number to a maximum of approximately 400, as construction activities associated with both the gasification and combined-cycle islands ramp up. Based on past construction experience and traffic analyses for similar power plants, a vehicle occupancy rate of 1.4 is expected for the Stanton site. Based on this vehicle occupancy rate, a maximum of 285 daily roundtrips would be expected in June and July 2008, at about the time Innovation Way is expected to be completed. As discussed in Section 2.2.7.2, a total of 1,971 p.m. peak hour trips were measured in 2003 for the Stanton Energy Center to Curry Ford Road link on Alafaya Trail. Assuming (conservatively) that all of this construction traffic accessed the site via Alafaya Trail (i.e., none via Avalon Park Boulevard), and given the expected increase in p.m. peak hour trips during June and July 2008 of 285, an increase in the amount of traffic on Alafaya Trail of approximately 14 percent would result during this period OUC and SPC-OG will encourage car-pooling, other transit programs, and off-peak travel to the extent possible to reduce the number of temporary construction-related vehicle trips on the road networks, particularly at peak hours.

For the expected average of 350 total construction workers based on the same assumptions, 250 daily roundtrips would be estimated for the overall 28-month initial construction phase. Employment will peak at approximately 700 during the period from late 2008 to mid-2009. An estimated 500 daily roundtrips would be expected during that period. The impact of the peak construction traffic is expected to occur after the local road network has been relieved by the completion of Innovation Way.

At various times during the construction period, construction vehicles will also access the site. However, the majority of these heavy construction vehicles are anticipated to remain onsite for the duration of the initial construction activities, entering at initiation and exiting at completion. Since the majority of these vehicles are not expected to make daily trips to and from the site, the potential traffic impacts from these vehicles are expected to be minimal to the regional road network. In addition, access to the Stanton site is at the terminus of Alafaya Trail, so that slowing construction traffic entering the site would not generally interfere with other traffic further to the north.

In summary, there will be an increase in average daily and peak hour traffic resulting from Unit B construction traffic. During the first half of 2008, as the level of construction activity increases and prior to the expected completion of Innovation Way, this traffic will impact Alafaya Trail and Avalon Park Boulevard. However, with the completion of Innovation Way in mid-2008, impacts resulting from Unit B construction traffic will be substantially reduced.

4.6.3.4 Aesthetics

The IGCC unit's tallest structures will be the CT/HRSG stack (205 ft tall), the gasfier building (174 ft), and the HRSG (114 ft). While not insignificant on their own, their location and the presence of the existing Stanton facilities should minimize any visual and aesthetic impacts. For purposes of comparison, heights of existing Stanton facilities are as follows:

- Units 1 and 2 stacks—550 ft.
- Units 1 and 2 cooling towers—431 ft.
- Units 1 and 2 boiler buildings—225 ft.
- Unit A stacks—160 ft.
- Unit A HRSGs—84 ft.

Residential areas are expected to experience minimal impacts from construction or operation of this project due to distance from the site, presence of existing Stanton facilities (Unit B will be located between existing units: north of Units 1 and 2, south of Unit A), and adequacy of existing forested land that screens much of the plant site. Most onsite activities associated with the proposed project will not be visible to residences in the area.

Review of the first photograph provided in Figure 2.3-36 verifies that even from the closest residences, the visual impact of Unit B structures should not be significantly different from existing views. As the other Figure 2.3-36 photographs show, the overall project's visual and aesthetic impacts from any vantage point should be little to none.

4.7 IMPACT ON LANDMARKS AND SENSITIVE AREAS

The only federal, state, regional, or local scenic, cultural, or natural landmark located in the vicinity of the Stanton site is the adjacent Hal Scott Regional Preserve and Park, directly east of the site. As with the nearby residential areas, no impacts are anticipated due to the separation of the proposed facilities from this park by more than a mile, presence of existing Stanton facilities, and adequacy of existing forested land that screens much of the planned IGCC plant site. Therefore, the construction of Unit B will have no impact upon this resource.

4.8 IMPACT ON ARCHAEOLOGICAL AND HISTORIC SITES

As documented in Section 2.2.6, no known cultural resources, either on- or offsite, would be impacted by construction of the IGCC facilities. Documented archaeological and historic sites within the Stanton site boundaries are outside the developed power plant area and will be unaffected by construction and operation of the IGCC facilities.

4.9 SPECIAL FEATURES

There are 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 site and the adjacent areas.

4.10 BENEFITS FROM CONSTRUCTION

Benefits to the region that will result from construction of Unit B include construction employment and associated payroll, payroll taxes, and purchases of goods and services by construction workers. A detailed discussion of these and other benefits is provided in Chapter 7.0.

4.11 VARIANCES

Construction of the Project will meet all applicable local, state, and federal guidelines. No variances for construction will be required.

REFERENCES

Barnes, J.D., Miller, L.N., and Wood, E.W. 1977. Power Plant Construction Noise Guide. Report No. 3321, Bolt Beranek and Newman, Inc., Cambridge, MA.

Bureau of Economic and Business Research (BEBR). 2003. Florida Statistical Abstract. University of Florida, Gainesville, Florida.

Kunkel, 2006. Personal Communication Between Joseph Kunkel, Orange County Public Works Department, and Jeffrey Meling, Environmental Consulting & Technology, Inc. (ECT), January 2006.

Orange County Board of County Commissioners (OCBCC). 2001. Alafaya Trail Agreement. Orlando Business Park, LLC; Orlando Utilities Commission; City of Orlando; Orange County. January 9.

U.S. Environmental Protection Agency (EPA). 1971. PB 206 717. Noise From Construction Equipment and Operations, Building Equipment, and Home Appliances.

WEB SITES

U.S. Census Bureau. 1990, 2000, and 2005. <http://www.census.gov/>

5.0

EFFECTS OF PLANT OPERATION

This section provides a description and assessment of impacts the IGCC unit's operations will have on the site and vicinity. Where practicable, the impacts are quantified and described in terms of short-term, long-term, local, etc. Where required, descriptions of operational monitoring and measurement programs are presented. Consistent with FDEP requirements, this chapter provides the following sections:

- 5.1—Effects of the Operation of the Heat Dissipation System.
- 5.2—Effects of Chemical and Biocide Discharges.
- 5.3—Impacts on Water Supplies.
- 5.4—Solid/Hazardous Waste Disposal Impacts.
- 5.5—Sanitary and Other Waste Discharges.
- 5.6—Air Quality Impacts.
- 5.7—Noise.
- 5.8—Changes in Nonaquatic Species Populations.
- 5.9—Other Plant Operation Effects.
- 5.10—Archaeological Sites.
- 5.11—Resources Committed.
- 5.12—Variances.

As was the case in Chapter 4.0, the existing environmental conditions described in Chapter 2.0 constitute the baseline for assessing impacts. In addition, applicable rules and regulations are employed to assess impacts.

5.1 EFFECTS OF THE OPERATION OF THE HEAT DISSIPATION SYSTEM

The Stanton Unit B IGCC plant will obtain cooling and process water from the existing Stanton Energy Center systems and facilities. Reclaimed water for cooling will be drawn from the existing onsite pond, which stores treated effluent for use throughout Stanton. Heat will be dissipated from Unit B through the use of a cooling tower. Cooling tower blowdown will be recycled within Stanton via the existing wastewater treatment facilities. A small amount of higher quality water for process uses will be obtained from existing and permitted wells tapping into the Upper Floridan aquifer. As described subsequently, the IGCC plant's use of ground water will be limited (0.2 MGD). Unit B will not require surface water diversions, interception, additions to surface water flow, or withdrawals and consumptive uses of surface waters.

5.1.1 TEMPERATURE EFFECT ON RECEIVING BODY OF WATER

As just discussed, all cooling tower blowdown and process effluents generated by Unit B's operations will be discharged to the existing Stanton wastewater management and reuse systems. There will be no direct discharge of cooling or other process wastewater to any surface waters. Therefore, surface waters in the area will not be adversely impacted by any thermal discharge.

5.1.2 EFFECTS ON AQUATIC LIFE

Unit B will not cause any impacts to aquatic life because there will be no thermal or other process wastewater discharges to any surface water body.

5.1.3 BIOLOGICAL EFFECTS OF MODIFIED CIRCULATION

Since no surface waters will be involved, Unit B will not cause any changes in circulation patterns.

5.1.4 EFFECTS OF OFFSTREAM COOLING

Unit B will include a cooling tower for heat dissipation. The IGCC unit's mechanical draft cooling tower will transfer heat from plant processes to the atmosphere through the evaporation and dispersion of cooling water. Depending on the meteorological conditions, warm, moist air leaving the tower may become cooled to the point of saturation causing the water to condense and form a visible plume. Ground level fogging may occur if this plume does not rise. The drift from the tower carries dissolved and suspended solids that are deposited locally and may have the potential to affect soils and vegetation.

Unit B's cooling tower will be similar in design to (but smaller than) the cooling tower constructed for Unit A. The Unit A cooling tower was evaluated in detail in the application for Unit A (OUC, 2001) and found to result in low levels of impacts. No detailed assessments of potential cooling tower-related fogging or drift were deemed necessary for this study of Unit B. Based on the similarity and smaller size of the planned cooling tower to that of Unit A (Unit A's cooling tower has ten cells; the IGCC unit's cooling tower will have only six), the IGCC unit's cooling tower is not anticipated to adversely impact area fogging or soils and vegetation.

5.1.5 MEASUREMENT PROGRAM

Since there will be no discharges to surface water bodies, surface water monitoring will not be needed.

5.2 EFFECTS OF CHEMICAL AND BIOCIDE DISCHARGES

5.2.1 INDUSTRIAL WASTEWATER DISCHARGES

All cooling tower blowdown and process wastewater from Unit B will be discharged to the existing Stanton treatment and recycling system. The potential for impacts to waters of the state from Unit B's industrial discharges is minimal and includes these potential sources of impacts to onsite or nearby surface waters during operations:

- Potential Impacts Due to Direct Discharge of Cooling and Process Effluents—See previous discussion.
- Potential Impacts Due to Significant Changes in Stormwater Quantities and/or Qualities Discharged Offsite—Stormwater management will be integrated into the existing Stanton systems. Thus, no impacts to any surrounding surface waters are expected as a result of facility operations.
- Potential Impacts Due to Release of Runoff from Coal or Ash Storage—As discussed in the next section, the areas where the Unit B coal will be stored and gasification ash landfilled (onsite) have been designed to collect and reuse runoff.
- Potential Impacts Due to Accidental Spills of Onsite Chemicals, Lubricants, or Other Possible Contaminants—Unit B facilities will be designed to contain and control spills, as developed under the an approved spill prevention,

control, and countermeasure (SPCC) plan. Plan procedures will be strictly followed. These procedures will be designed to minimize the opportunity for accidental spills, and identify the appropriate procedures to be followed in case of an accidental spill.

- Potential Impacts Due to Deposition of Air Emissions—Unit B facilities will emit air pollutants that might be deposited on area surface waters. As discussed in another section, air quality impacts of IGCC CT/HRSG stack emissions will fall well below all regulatory limits and other evaluation criteria. Therefore, minimal impacts to area surface waters will result.

In summary, Unit B operations will not significantly affect surface water quantities or quality, or affect the natural hydrologic processes in the areas on or surrounding the site. The operation of the proposed IGCC power generating unit is expected to have no significant impacts on surface water supplies.

5.2.2 COOLING TOWER BLOWDOWN

As discussed previously, all cooling tower blowdown (and process effluents) generated by Unit B-related operations will be discharged to the existing Stanton wastewater management and reuse systems. There will be no direct discharge of blowdown to any surface waters. The project will not discharge cooling tower blowdown to waters of the state

5.2.3 MEASUREMENT PROGRAMS

Additional monitoring of surface waters is not proposed for Unit B.

5.3 IMPACTS ON WATER SUPPLIES

5.3.1 SURFACE WATER

Cooling and process water for Unit B will be obtained from existing systems (including reuse of treated municipal effluent) and from existing wells tapping into the Upper Floridan aquifer. The Unit B project does not propose surface water diversions, interception, additions to surface water flow, or withdrawals and consumptive uses of surface waters. As described below, the unit's use of ground water will be carefully limited to ensure that drawdowns do not affect surface waters. Consequently, Unit B will not affect surface water quantities or quality, or affect the natural hydrologic processes in the areas on or surrounding the site. The operation of the proposed Unit B is expected to have no impacts on surface water supplies.

5.3.2 GROUNDWATER

5.3.2.1 Impacts from Plant Pollutants

The principal means by which the Unit B facilities could potentially impact ground water resources are:

- Introduction of pollutants into the subsurface.
- Withdrawal of ground water for process uses.

As discussed in Chapter 3.0 and under the heading of surface water, above, Unit B will be designed to safely manage raw materials, wastes, chemicals, and other materials. The dedicated coal storage pile will be lined, and stormwater runoff and leachate will be collected and handled in the systems in place for the existing coal piles, and then treated and reused within the processes of the existing coal-fired units at the Stanton plant. Gasification ash and sulfur will be disposed of in the existing onsite landfill. An enhanced *pozzetec* material (characterized by very low permeability) will be used as the base liner in any new landfill cell used to dispose of gasification ash. Testing of gasification ash has also indicated that little or no leachate from this ash would be expected. Thus, in both cases (coal storage and ash/sulfur disposal), the potential for impacts to ground water are minimal. Other chemicals and materials will be handled and stored using appropriate control measures to prevent leaks, spills, and the likelihood of releases to the environment, as discussed previously.

5.3.2.2 Impacts from Ground Water Withdrawals

As mentioned previously, Unit B will use ground water for processes requiring higher quality water. This water will be drawn from existing onsite wells tapping the Upper Floridan aquifer. The total ground water withdrawals for all uses on the Stanton site will remain within previous limits established in the Conditions of Certification (OUC, 2003). Currently, ground water withdrawals to support the three existing units average 0.5 MGD. Another 0.2 MGD will be needed to support the proposed IGCC unit. The currently permitted maximum daily level of ground water withdrawal (2.0 MGD) was evaluated in the application for Unit A (OUC, 2001) and found to result in acceptable levels of impact (e.g., drawdown) to the aquifer (as well as surface water features). No changes to the permitted limits will be required for the Unit B project.

5.3.3 DRINKING WATER

The small quantity of drinking water and other potable water needed by plant personnel will be supplied from the existing potable water supply system at Stanton. There will, therefore, be no significant hydrological changes due to plant potable water use. There will also be no discharges from the plant to any drinking water source, because cooling tower blowdown and process wastewaters will be sent to the existing Stanton wastewater treatment and reuse system.

5.3.4 LEACHATE AND RUNOFF

As discussed previously, runoff from the coal storage pile associated with Unit B and from the landfill where gasification ash and sulfur will be stored will be handled as it is from the existing Stanton facilities.

Following construction, the stormwater management plan will take advantage of existing systems and will protect adjacent water bodies from the unit's stormwater runoff. Erosion and sedimentation should be minimal due to grass and other vegetative cover reducing velocities of runoff, which inhibits suspension of soils. Most silts that do reach suspension will be deposited in the stormwater pond. As needed, maintenance of the pond includes removal of sediments and other debris from the sump that may have been washed from the site.

5.3.5 MEASUREMENT PROGRAMS

No new measurement programs are proposed to monitor ground water or surface waters.

5.4 SOLID/HAZARDOUS WASTE DISPOSAL IMPACTS

Please refer to the discussion of solid and hazardous wastes found in Section 3.7.

5.4.1 SOLID WASTE

As discussed previously and in Section 3.7, the principal solid waste that will be generated by the operation of Unit B is gasification ash (approximately 68,000 tpy). Elemental sulfur will also be generated by the gasification process, but in substantially lesser quantities (approximately 2,800 tpy). Both the ash and the elemental sulfur are planned to be landfilled in the existing, permitted Stanton landfill, although markets for other, beneficial uses will be sought for each byproduct.

OUC conducts volumetric surveys periodically to assess the rate at which the onsite landfill is used and the available space remaining for ash disposal. The onsite area designated as landfill is approximately 347 acres. According to OUC (2004) estimates, 3,911,000 cubic yards (yd^3) of waste material generated by Units 1 and 2 have been landfilled, using less than 7.5 percent of the available storage space. There are approximately 323 total available unused acres in the landfill.

After the addition of water, the approximately 18,300 lb/hr of gasification ash generated by Unit B would equate to 125,800 yd^3 per year requiring disposal. At this rate, over the assumed 30-year life of the project, the total amount of landfill space needed for Unit B gasification ash would come to 25 acres. As a percentage of the available space, Unit B would require, as a maximum, approximately 8 percent. Sulfur would add modestly to the use of the Stanton landfill.

Other than gasification ash and sulfur (see Section 3.7), Unit B is expected to generate typical amounts of solid waste during operations. As with all industrial facilities, some miscellaneous wastes will be generated. When possible, these wastes will be recycled/reused. For example, lubricating oils, batteries, and scrap metals may be recycled. As the volume of nonash solid wastes generated during operation are expected to be insignificant in comparison to available regional disposal capacity, no significant impacts are expected to result to existing county solid waste facilities.

5.4.2 HAZARDOUS WASTE

Any hazardous wastes generated during operation, potentially including spent sorbents, will be properly manifested and disposed according to state regulations. As the quantities and types of hazardous wastes are expected to be ordinary and of low volume, no significant impacts are expected to result to any existing regional hazardous waste disposal facilities.

5.5 SANITARY AND OTHER WASTE DISCHARGES

Similar to Unit A, sanitary wastewater from Unit B personnel will be discharged via a new septic system that will be designed and constructed consistent with applicable regulations.

5.6 AIR QUALITY IMPACTS

5.6.1 IMPACT ASSESSMENT

5.6.1.1 Introduction

Analyses were conducted to calculate the potential air quality impacts of emissions from the Stanton Unit B project. These analyses are described in detail in the PSD permit application contained in Appendix 10.1.5 (Volume 2). This section presents a summary of the approach used and the results obtained. The results demonstrate that the operation of Unit B will not cause or contribute to a violation of any PSD increment or AAQS.

5.6.1.2 Regulatory Applicability and Overview of Impact Analyses

Under federal PSD review requirements, all major new or modified sources of air pollutants regulated under the Clean Air Act (CAA) must be reviewed and approved by EPA or by the state agency if PSD review authority has been delegated. A *major stationary source* is defined as any 1 of 28 named source categories that has the potential to emit 100 tpy or more, or any other stationary source that has the potential to emit 250 tpy or more, of any pollutant regulated under CAA. *Potential to emit* means the capability at maximum design capacity to emit a pollutant after the application of control equipment.

The Unit B project constitutes a major facility since it falls into one of the named source categories and will have the potential to emit more than 100 tpy of at least one pollutant. Therefore, the facility must undergo PSD review. Furthermore, more than one pollutant is subject to review. Table 5.6-1 summarizes the facility's proposed annual emissions and compares the projected totals to the significant emission rate thresholds for PSD review.

Table 5.6-1. Projected IGCC CT/HRSG Stack Emissions Compared to PSD Significant Emission Rates

Pollutant	Potential IGCC Annual Emissions (tpy)*	PSD Significant Emission Rate (tpy)	PSD Applicability
CO	653.5	100	Yes
NO_x (Phase II)	611.4	40	Yes
SO_2	161.5	40	Yes
PM	~~175.9~~188.5	25	Yes
PM_{10}	~~174.0~~179.2	15	Yes
Ozone/VOC	128.9	40	Yes
Lead	~~0.023~~0.03	0.6	No
Mercury	0.0095	0.1	No
Total fluorides	Negligible	3	No
H_2SO_4 mist	24.0	7	Yes
Hydrogen sulfide	Negligible	10	—
Total reduced sulfur (including H_2S)	Negligible	10	—
Reduced sulfur compounds (including H_2S)	Negligible	10	—
Municipal waste combustor acid gases (measured as SO_2 and hydrogen chloride)	Not Present	40	No
Municipal waste combustor metals (measured as PM)	Not Present	15	No
Municipal waste combustor organics (measured as total tetra- through octa-chlorinated dibenzo-p-dioxins and dibenzofurans)	Not Present	3.5×10^{-6}	No

*All estimates based on representative, full-load operating scenarios. Emissions assume continuous, year-round operation using higher of syngas or natural gas emission rate.

Note: H_2S = hydrogen sulfide.

Sources: 40 CFR 52.21(b)(23).
Section 62-212.400, F.A.C.
SCS, 2006.
ECT, 2006.

Emissions of air pollutants that could impact air quality will result from a number of activities and sources once the IGCC unit becomes operational. These sources include coal handling and transfer points, a startup stack, and the flare, which are all part of the gasification island, as well as the cooling tower and the CT/HRSG exhaust stack, both elesubject to review. Table 5.6-1 summarizes the facility's proposed annual emissions and compares the projected totals to the significant emission rate thresholds for PSD review.

Table 5.6-1. Projected IGCC CT/HRSG Stack Emissions Compared to PSD Significant Emission Rates

Pollutant	Potential IGCC Annual Emissions (tpy)*	PSD Significant Emission Rate (tpy)	PSD Applicability
CO	653.5	100	Yes
NO_x (Phase II)	611.4	40	Yes
SO_2	161.5	40	Yes
PM	175.9	25	Yes
PM_{10}	174.0	15	Yes
Ozone/VOC	128.9	40	Yes
Lead	0.023	0.6	No
Mercury	0.0095	0.1	No
Total fluorides	Negligible	3	No
H_2SO_4 mist	24.0	7	Yes
Hydrogen sulfide	Negligible	10	—
Total reduced sulfur (including H_2S)	Negligible	10	—
Reduced sulfur compounds (including H_2S)	Negligible	10	—
Municipal waste combustor acid gases (measured as SO_2 and hydrogen chloride)	Not Present	40	No
Municipal waste combustor metals (measured as PM)	Not Present	15	No
Municipal waste combustor organics (measured as total tetra- through octa-chlorinated dibenzo-p-dioxins and dibenzofurans)	Not Present	3.5×10^{-6}	No

*All estimates based on representative, full-load operating scenarios. Emissions assume continuous, year-round operation using higher of syngas or natural gas emission rate.

Note: H_2S = hydrogen sulfide.

Sources: 40 CFR 52.21(b)(23).
Section 62-212.400, F.A.C.
SCS, 2006.
ECT, 2006.

Emissions of air pollutants that could impact air quality will result from a number of activities and sources once the IGCC unit becomes operational. These sources include coal handling and transfer points, a startup stack, and the flare, which are all part of the gasification island, as well as the cooling tower and the CT/HRSG exhaust stack, both elements of the combined-cycle island. The emissions from the CT/HRSG stack will represent the most significant source of emissions.

Analyses were conducted to calculate the potential air quality impacts of emissions from Unit B emission sources. This section presents a summary of the approach used and the results obtained.

Note that the emission rates used in this application are based in part on the best information available at the time of preparation and best engineering judgment. Since detailed design of Unit B has not yet been performed, these estimates do contain some amount of uncertainty. Where possible, emission rates have been estimated using vendor guarantees based only on theoretical calculations using expected syngas compositions (not based on combustion testing of syngas). Emission factors included in published test reports from other IGCC projects have also been used.

PSD review is used to determine whether significant air quality deterioration will result from the new or modified source. PSD review requirements are contained in Chapter 62-212.400, F.A.C., Prevention of Significant Deterioration. Major sources may be required to undergo the following reviews related to PSD for each pollutant emitted in significant amounts:

- Control technology review.
- Air quality analysis (monitoring).
- Source impact analysis.
- Source information.
- Additional impact analyses.

The control technology review includes determination of BACT for each applicable pollutant. BACT emission limits cannot exceed applicable emission standards (e.g., NSPS). The air quality analysis (monitoring) portion of PSD review may require continuous ambient air monitoring data to be collected in the impact area of the proposed source. PSD review includes thorough assessments of potential facility impacts on air quality. The source impact analysis requires demonstration of compliance with federal and state

AAQS and allowable PSD increment limitations. Projected ambient impacts on designated nonattainment areas and federally promulgated PSD Class I areas must also be addressed, if applicable. Source information, including process design parameters and control equipment information, must be submitted to the reviewing agencies. Additional analyses of the proposed source's impact on soils, vegetation, and visibility, especially pertaining to PSD Class I areas, must be performed, as well as analysis of impacts due to growth in the area associated with the proposed source. Impacts assessments have been completed for the IGCC unit and are summarized in the following paragraphs.

5.6.1.3 Analytical Approach

Air Quality Models

Air quality models are applied at two levels: screening and refined. At the screening level, models provide conservative estimates of impacts to determine whether more detailed modeling is required. Screening modeling can also be used to identify worst-case operating scenarios for subsequent refined modeling analysis. The current version of the U.S. Environmental Protection Agency's (EPA's) SCREEN3 Dispersion Model (Version 96043 – February 12, 1996) was employed as a screening tool to evaluate the various Unit B CT/HRSG operating scenarios.

The refined level consists of techniques that provide more advanced technical treatment of atmospheric processes. Refined modeling requires more detailed and precise input data, but also provides improved estimates of source impacts. The AMS/EPA Regulatory Model (AERMOD) modeling system and 5 years of hourly meteorological data from the National Oceanographic and Atmospheric Administration (NOAA) National Climatic Data Center (NCDC) were used in the ambient impact analysis. AERMOD was used to obtain refined impact predictions for short-term periods (i.e., periods equal to or less than 24 hours). AERMOD was also utilized to obtain refined predictions of annual average concentrations.

Meteorological Data

Detailed meteorological data are needed for modeling with the AERMOD modeling system model. For this effort, meteorological data were selected consistent with EPA guidance and FDEP practice. Specifically, surface data from Orlando International Airport, and mixing height data from Ruskin, Florida, for the 5-year period 1996 through 2000 were employed.

Emission Source Input Data

The Unit B CT/HRSG will operate under a variety of operating scenarios. These scenarios include different loads and ambient air temperatures, and the optional use of supplemental duct burner firing and inlet air evaporative cooling. Plume dispersion and, therefore, ground-level impacts, will be affected by these different operating scenarios since emission rates, exit temperatures, and exhaust gas velocities will change. The SCREEN3 dispersion model was used to evaluate each Unit B CT/HRSG operating scenario for each pollutant of concern to identify the scenarios that cause the highest impacts. A nominal emission rate of 10.0 grams per second (g/s) was used for all SCREEN3 model runs. The SCREEN3 model results were then adjusted to reflect the maximum emission rate for each operating scenario (i.e., model results were multiplied by the ratio of maximum emission rates [in g/s] to 10.0 g/s).

As a means of gaining some perspective on the potential emissions from the proposed IGCC facility, comparisons of the maximum potential annual emissions (assuming continuous operation at maximum capacity) to estimates of actual emissions in Orange County, which were presented graphically in Chapter 2.0, are useful. As the following Table 5.6-2 data show, even with a highly conservative method of calculating emissions, they will constitute modest increases in county emission totals on a percentage basis.

Revised March 17, 2006

Table 5.6-2. Potential Unit B Emissions Estimates Compared to County Totals

Pollutant	1999 Orange County Emission Totals (tpy)	Unit B Emissions tpy	Unit B Emissions Percent of Orange County Totals
PM_{10}	21,894	~~174.0~~179.2	0.8
SO_2	9,648	161.5	1.7
NO_x*	41,952	611.4	1.5
CO	378,124	653.5	0.2
VOC	43,828	128.9	0.3

*Phase II.

Sources: EPA, 2005.
SCS, 2006.
ECT, 2006.

5.6.1.4 Summary of Air Quality Impacts

Criteria pollutant emissions from the CT/HRSG stack were modeled using AERMOD. Table 5.6-3 summarizes the results of the maximum IGCC impact modeling runs for the criteria pollutants. The maximum predicted impacts are compared to the modeling *significance levels*. The significance levels are impact thresholds above which additional analysis of air quality impacts (i.e., evaluation of other, existing air emission sources in the area) is required. The significance thresholds are low fractions of the NAAQS (only 1 percent in the case of NO_2), and an impact above a significance level does not necessarily indicate a threat to compliance with an AAQS. Table 5.6-3 shows that impacts were found to be less than the significance levels for all pollutants and averaging times.

Revised March 17, 2006

Table 5.6-3. Unit B Criteria Pollutant Maximum Impacts (Syngas and Natural Gas CT/HRSG Operating Scenarios)

Pollutant	Averaging Time	Maximum Unit B Impact* (µg/m³)	Significance Level (µg/m³)
NO_2	Annual	0.6	1.0
PM_{10}	Annual	~~0.3~~0.35	1.0
	24-Hour	~~4.3~~4.4	5.0
SO_2	Annual	0.12	1.0
	24-Hour	1.4	5.0
	3-Hour	3.1	25.0
CO	8-Hour	10.2	500
	1-Hour	13.7	2,000

*Maximum from either syngas or natural gas scenario.

Source: ECT, 2006.

Figures 5.6-1 through 5.6-4 compare maximum predicted impacts attributable to emissions from Unit B to estimates of existing air quality (as stated in Section 2.3.7, air quality in Orange County is good) and the most stringent AAQS.

5.6.1.5 Other Air Quality-Related Impacts

Impacts Due to Associated Growth

Unit B will employ a total of a maximum (during the federal demonstration period) of 72 operational workers. The operational workforce will also include annual contracted maintenance workers to be hired for periodic routine services. The workforce needed to operate the proposed unit represents a small fraction of the population already present in the immediate area, Orlando, and Orange County. Thus, no measurable growth in population—and any associated air quality impacts—should result from operation of Unit B.

A new or expanded industrial facility can also sometimes generate growth in other industrial or commercial operations needed to support the new/expanded facility. Given the

Table 5.6-2. Potential Unit B Emissions Estimates Compared to County Totals

Pollutant	1999 Orange County Emission Totals (tpy)	Unit B Emissions	
		tpy	Percent of Orange County Totals
PM_{10}	21,894	174.0	0.8
SO_2	9,648	161.5	1.7
NO_x*	41,952	611.4	1.5
CO	378,124	653.5	0.2
VOC	43,828	128.9	0.3

*Phase II.

Sources: EPA, 2005.
SCS, 2006.
ECT, 2006.

5.6.1.4 Summary of Air Quality Impacts

Criteria pollutant emissions from the CT/HRSG stack were modeled using AERMOD. Table 5.6-3 summarizes the results of the maximum IGCC impact modeling runs for the criteria pollutants. The maximum predicted impacts are compared to the modeling *significance levels*. The significance levels are impact thresholds above which additional analysis of air quality impacts (i.e., evaluation of other, existing air emission sources in the area) is required. The significance thresholds are low fractions of the NAAQS (only 1 percent in the case of NO_2), and an impact above a significance level does not necessarily indicate a threat to compliance with an AAQS. Table 5.6-3 shows that impacts were found to be less than the significance levels for all pollutants and averaging times.

Table 5.6-3. Unit B Criteria Pollutant Maximum Impacts (Syngas and Natural Gas CT/HRSG Operating Scenarios)

Pollutant	Averaging Time	Maximum Unit B Impact* (μg/m³)	Significance Level (μg/m³)
NO_2	Annual	0.6	1.0
PM_{10}	Annual	0.3	1.0
	24-Hour	4.3	5.0
SO_2	Annual	0.12	1.0
	24-Hour	1.4	5.0
	3-Hour	3.1	25.0
CO	8-Hour	10.2	500
	1-Hour	13.7	2,000

*Maximum from either syngas or natural gas scenario.

Source: ECT, 2006.

Figures 5.6-1 through 5.6-4 compare maximum predicted impacts attributable to emissions from Unit B to estimates of existing air quality (as stated in Section 2.3.7, air quality in Orange County is good) and the most stringent AAQS.

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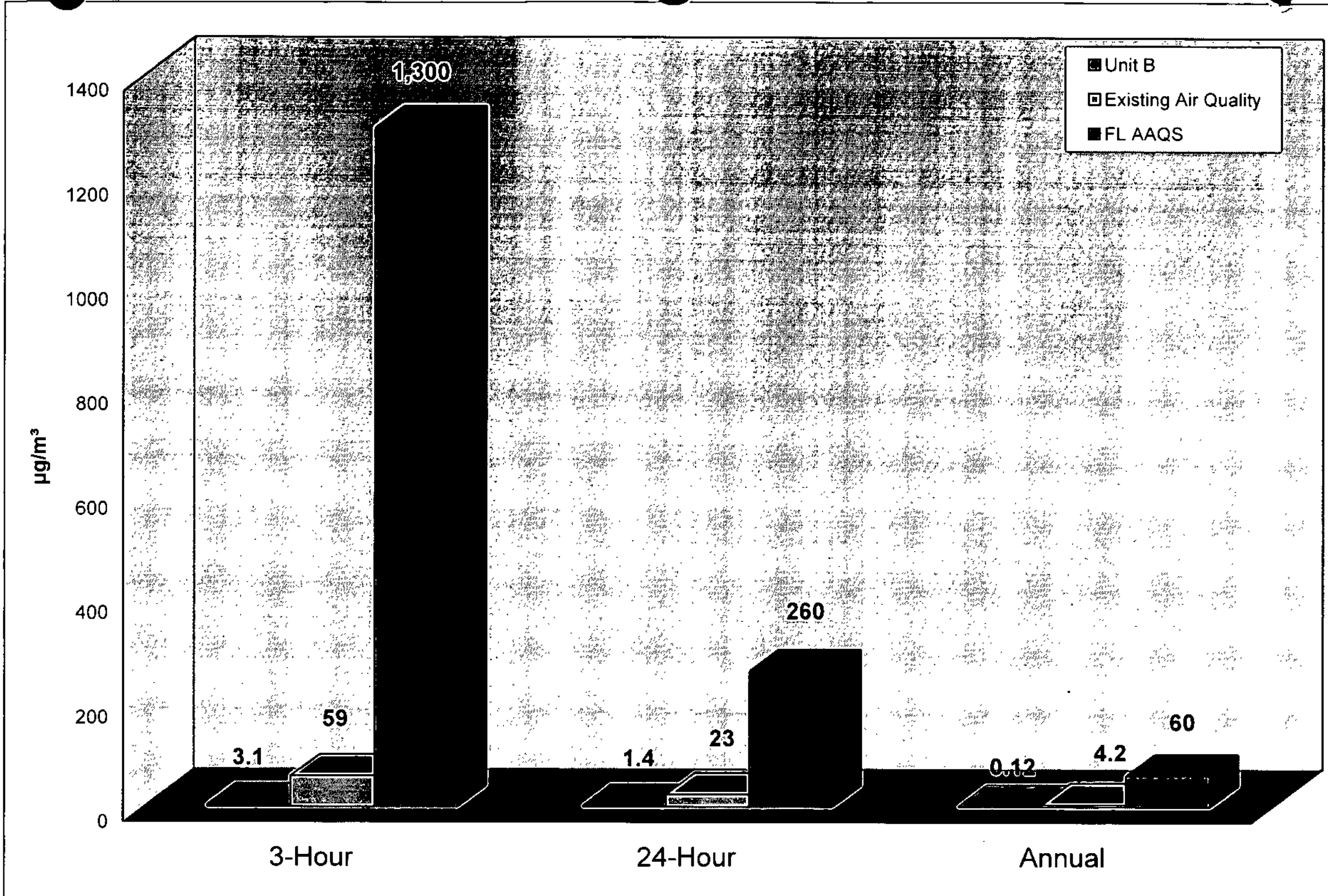

FIGURE 5.6-1.

ESTIMATED AIR QUALITY IMPACTS—UNIT B COMPARED TO EXISTING AIR QUALITY AND AAQS: SO_2

Source: ECT, 2005.

Environmental Consulting & Technology, Inc.

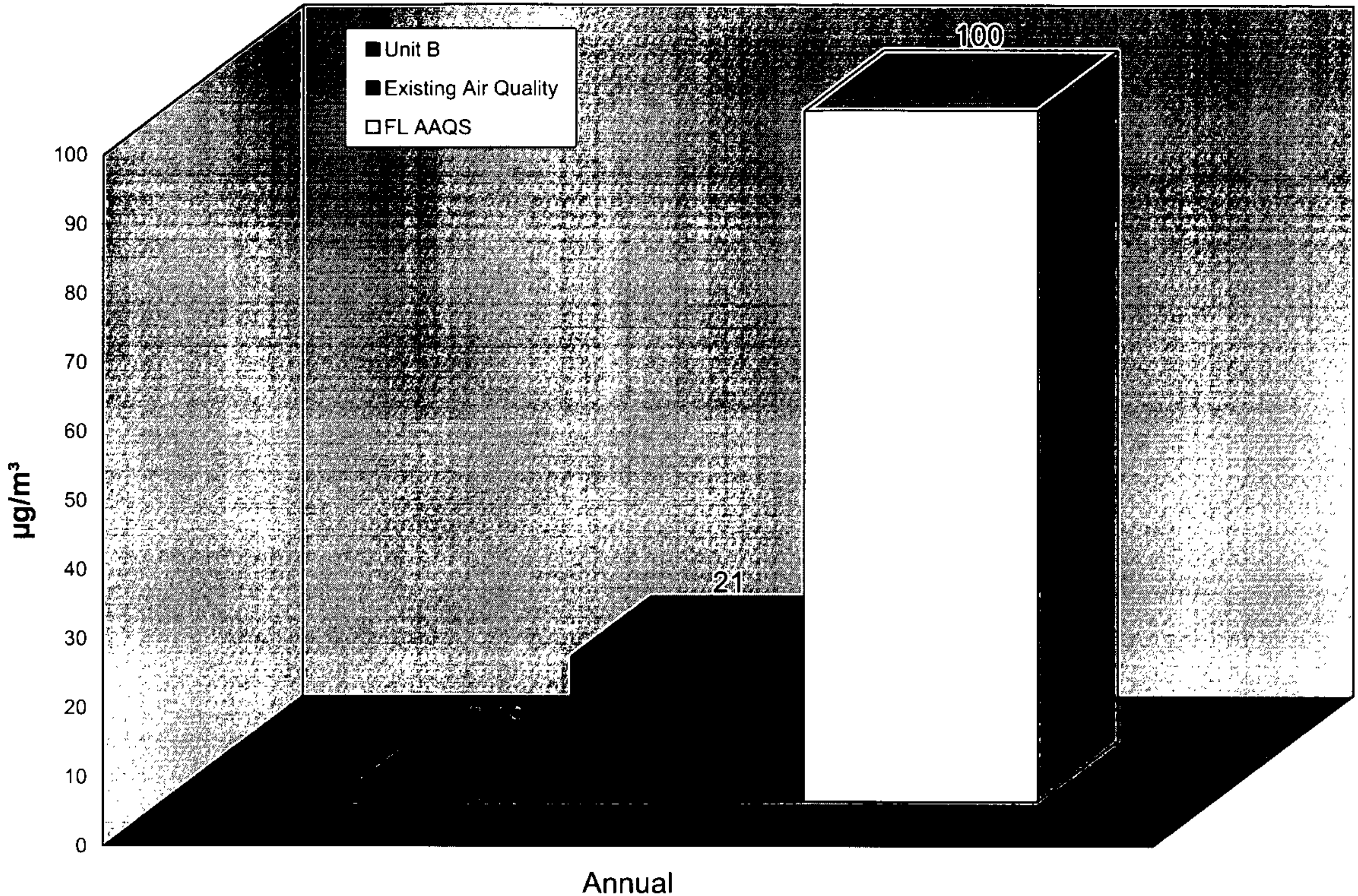

FIGURE 5.6-2.

ESTIMATED AIR QUALITY IMPACTS—UNIT B COMPARED TO EXISTING AIR QUALITY AND AAQS: NO_2

Source: ECT, 2005.

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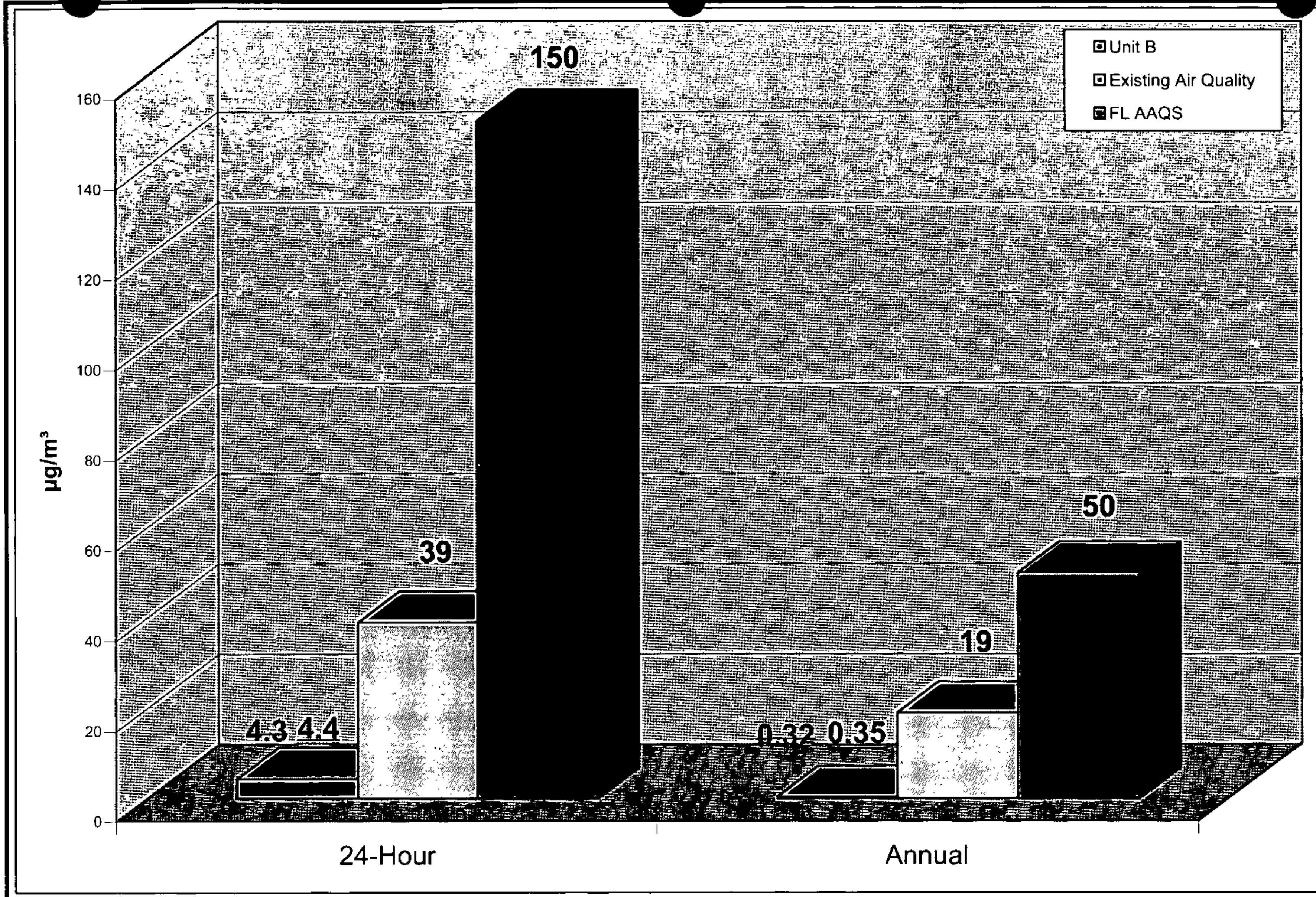

FIGURE 5.6-3.

ESTIMATED AIR QUALITY IMPACTS—UNIT B COMPARED TO EXISTING AIR QUALITY AND AAQS: PM_{10}

Source: ECT, 2005.

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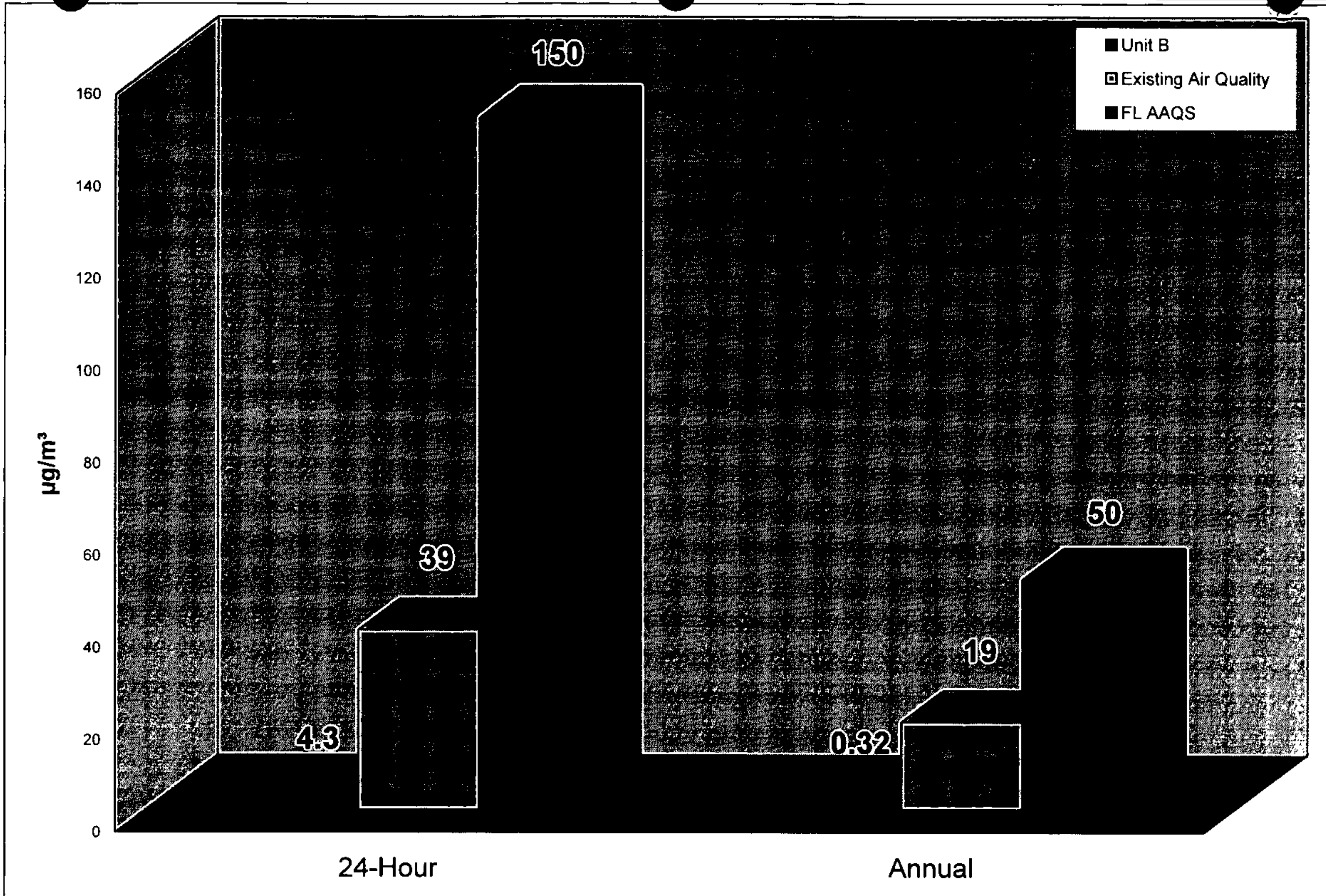

FIGURE 5.6-3.

ESTIMATED AIR QUALITY IMPACTS—UNIT B COMPARED TO EXISTING AIR QUALITY AND AAQS: PM_{10}

Source: ECT, 2005.

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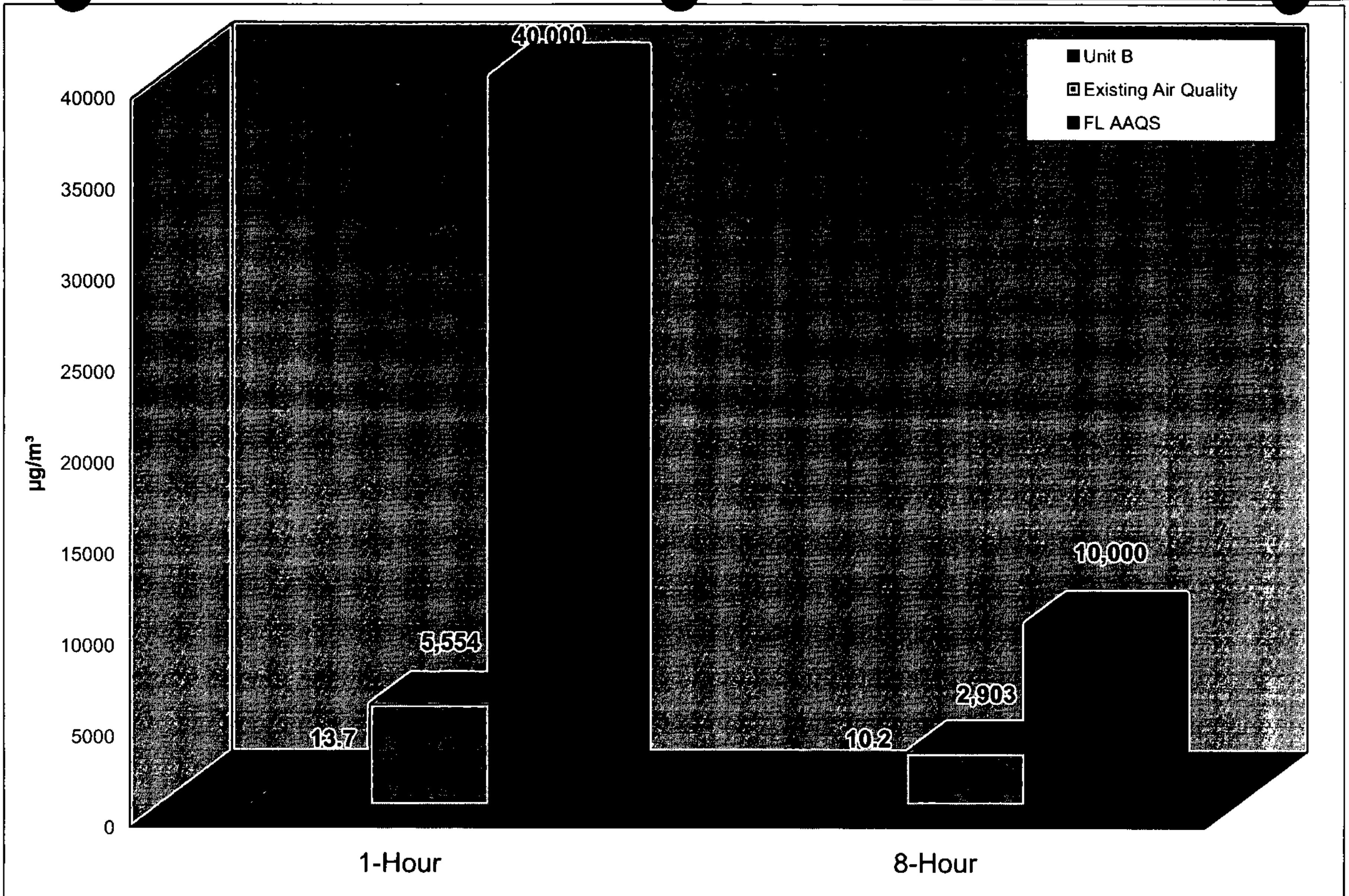

FIGURE 5.6-4.

ESTIMATED AIR QUALITY IMPACTS—UNIT B COMPARED TO EXISTING AIR QUALITY AND AAQS: CO

Source: ECT, 2005.

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site's long-time use for power generation and its proximity to the Orlando metropolitan area, however, the existing commercial infrastructure should be more than adequate to provide any support services that the proposed facility might require. Therefore, no air quality impacts due to associated industrial/commercial growth would be expected.

Impacts on Visibility and on Soils, Vegetation, and Wildlife

No visibility impairment at the local level is expected due to the types and quantities of emissions projected from Unit B emission sources. The opacity of combustion exhausts from the IGCC facility will typically be very low. Emissions of primary particulates and sulfur oxides due to combustion will also be low due to the predominant use of low-sulfur fuels (syngas and natural gas) over the lifetime of the facility. While the facility will emit NO_x, the potential to impair visibility at the local level should be relatively low, given the very low expected NO_x emissions and exhaust opacity. The contribution of emissions of VOCs to the potential for haze formation in the area is expected to be minimal.

Certain air pollutants in acute concentrations or chronic exposures can impact soils, vegetation, or wildlife resources. Soils impacts can result from SO_2 and NO_x deposition creating an acidic reaction or lowering of soil pH. In this case, the site soils are naturally acidic and the SO_2 and NO_x emissions from the project are not expected to adversely affect soils in the plant vicinity.

Vegetation is sometimes affected by acute exposures to high concentrations of pollutants often resulting in foliar damage. Lower dose exposure over longer periods of time (chronic exposure) can often affect physiological processes within plants causing internal and external damage. Based on an evaluation of the literature for effects from SO_2, acid rain (H_2SO_4 mist), NO_x, CO, and combinations of these pollutants (synergistic effects), insignificant impacts to regional vegetation are anticipated due to the project's estimated emissions.

Releases of air pollutants can also affect wildlife through inhalation, exposure through skin, or ingestion. However, based on comparatively low emission levels and resulting insignificant impacts from this project, natural dispersion of emissions, and mobility of wildlife, insignificant impacts to regional wildlife resources are expected.

Based on this preliminary assessment, emissions from Unit B sources will not likely cause harm to soils, vegetation, or wildlife.

5.6.2 MONITORING PROGRAMS

No monitoring of ambient air quality is planned, nor is ambient monitoring warranted given the low impacts on air quality predicted for the Unit B project.

The project will be subject to several NSPS including Subpart Y (Coal Preparation Plants), Subpart GG or KKKK when the Unit B CT/HRSG is firing natural gas (Stationary Gas Turbines), and Subpart Da when the Unit B CT/HRSG is firing syngas. Emissions monitoring will be performed as required by each of these NSPS.

Unit B will also be subject to the requirements of the Acid Rain Program (ARP), the Clean Air Interstate Rule (CAIR), and the Clean Air Mercury Rule (CAMR). Monitoring of Unit B emissions will be conducted in accordance with the requirements of these federal programs including continuous emissions monitoring of NO_x, SO_2, CO_2, and mercury.

Continuous emissions monitoring of NO_x and a diluent (oxygen and carbon dioxide [CO_2]) will be conducted in accordance with the provisions of 40 CFR 75. Monitoring of SO_2 and CO_2 emissions will be conducted using procedures specified in 40 CFR 75, Appendices D and G, respectively.

Initial and periodic compliance testing of pollutants emitted by Unit B will be conducted pursuant to FDEP requirements as specified in the SCA Approval Order. FDEP test methods are specified in Section 62-297.401, F.A.C.

5.7 NOISE

During operation of Unit B, the primary sources of noise will include coal handling and crushing equipment, ventilating and circulating air fans, gas turbines, gas and air compressors, boiler feed pumps, gas flow control valves, and the cooling tower. The design engineer will determine the need for noise control on any specific piece of equipment such that the total plant noise level will achieve the proposed design objective of a noise level (L_{eq}) consistent with the applicable requirements of the Orange County Code (Article V of Chapter 15) for plant noise. Also, the operations will comply with applicable Occupational Safety and Health Administration (OSHA) requirements for worker noise protection.

In preparation for constructing Unit B at the Stanton site, a noise analysis was performed. This analysis estimated the noise levels expected at the property lines and around the site with this new unit in operation. This model was developed using SoundPLAN modeling software. The noise analysis was conducted and this section of the Unit B Supplemental SCA was prepared by SCS.

5.7.1 SOURCE DATA

Most of the source data used was taken from previous combined-cycle noise models developed for other Southern Company sites. In most cases, combined-cycle units consist of two gas turbine/generators and a single steam turbine. For Stanton Unit B, there will be a single gas turbine/generator and a single steam turbine. For this noise modeling assessment, the second gas turbine was removed and some layout dimensions modified, but the same noise contributions were used for each other significant component. This approach was conservative in that there may be some reduction in noise levels due to the lower steam flows that would result from the slightly smaller Unit B.

For Unit B, there will be additional noise sources associated with the gasification island—sources that are not present in a traditional combined-cycle plant. Among the additional sources are a coal crusher, a coal mill, miscellaneous fans and compressors, piping flow noise and the gas flare. Vendor data were obtained to characterize some sources. Where vendor data were not available, the best engineering estimates were developed.

To accurately predict noise propagation over a distance, the frequency content of the noise must be known. For the near-field levels provided, no frequency content was available. To use this near-field information in the model, the frequency content was estimated using the EEI (1984) noise guide. This publication provides a means for estimating sound power levels at the various octave-band frequencies for equipment commonly found in an electric power plant. The information in this reference was compiled from actual power plant equipment.

Based on the relative frequency components in the EEI guide, the octave band levels for the gasification equipment were adjusted until the expected dBA level at four feet away matched the levels measured at the PSDF. The placement in the model of the various pieces of equipment in the gasification island was approximated. However, since the model is intended to predict levels a great distance from the plant, it is believed that the exact placement is not critical.

Some of the sources were noted to have varying levels over time. For this model, the worst-case levels were used.

5.7.2 RESULTS

The model was run two times to predict noise levels: once with Unit A off and only Unit B running, and again with both units in operation. Noise from existing Stanton Units 1 and 2 was not included in either of these model runs. However, given the distance separating Units A and B from Units 1 and 2, noise contributions from the latter units would not be critical to the analysis performed. The receiver locations were set at approximately 5 feet above the ground elevation. The ground elevation was assumed to be level over the entire site and surroundings.

Table 5.7-1 shows the predicted noise levels at 10 receptor points around the site. These points are also shown in Figures 5.7-1 and 5.7-2. Figure 5.7-1 shows predicted noise contours around the plant site due to the expected noise produced by Unit B only. Four receptors were chosen to coincide with the corners of the Stanton Energy Center property

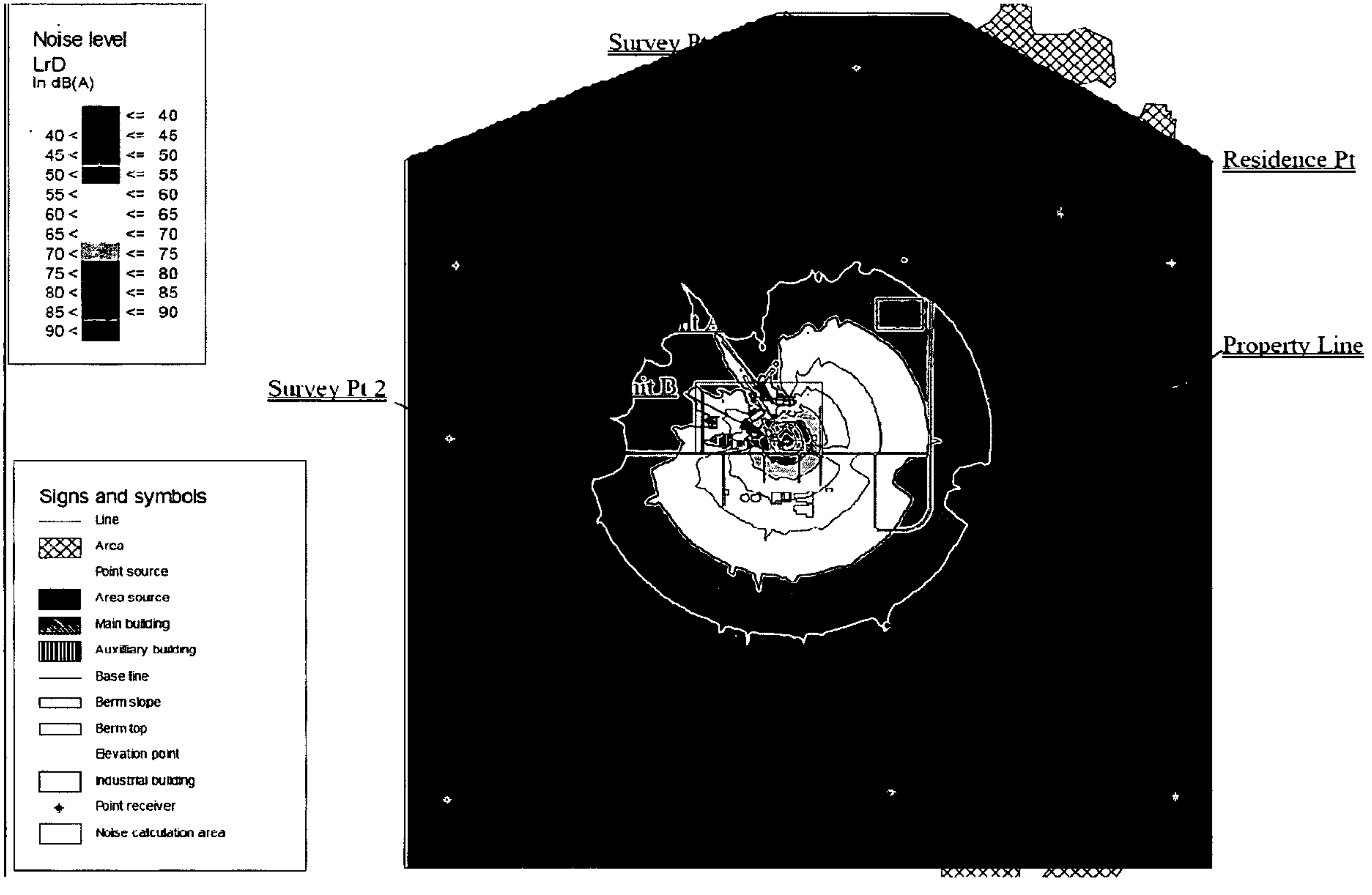

FIGURE 5.7-1.

NOISE GRID MAP FOR STANTON UNIT B OPERATING SOLO

Source: SCS, 2006.

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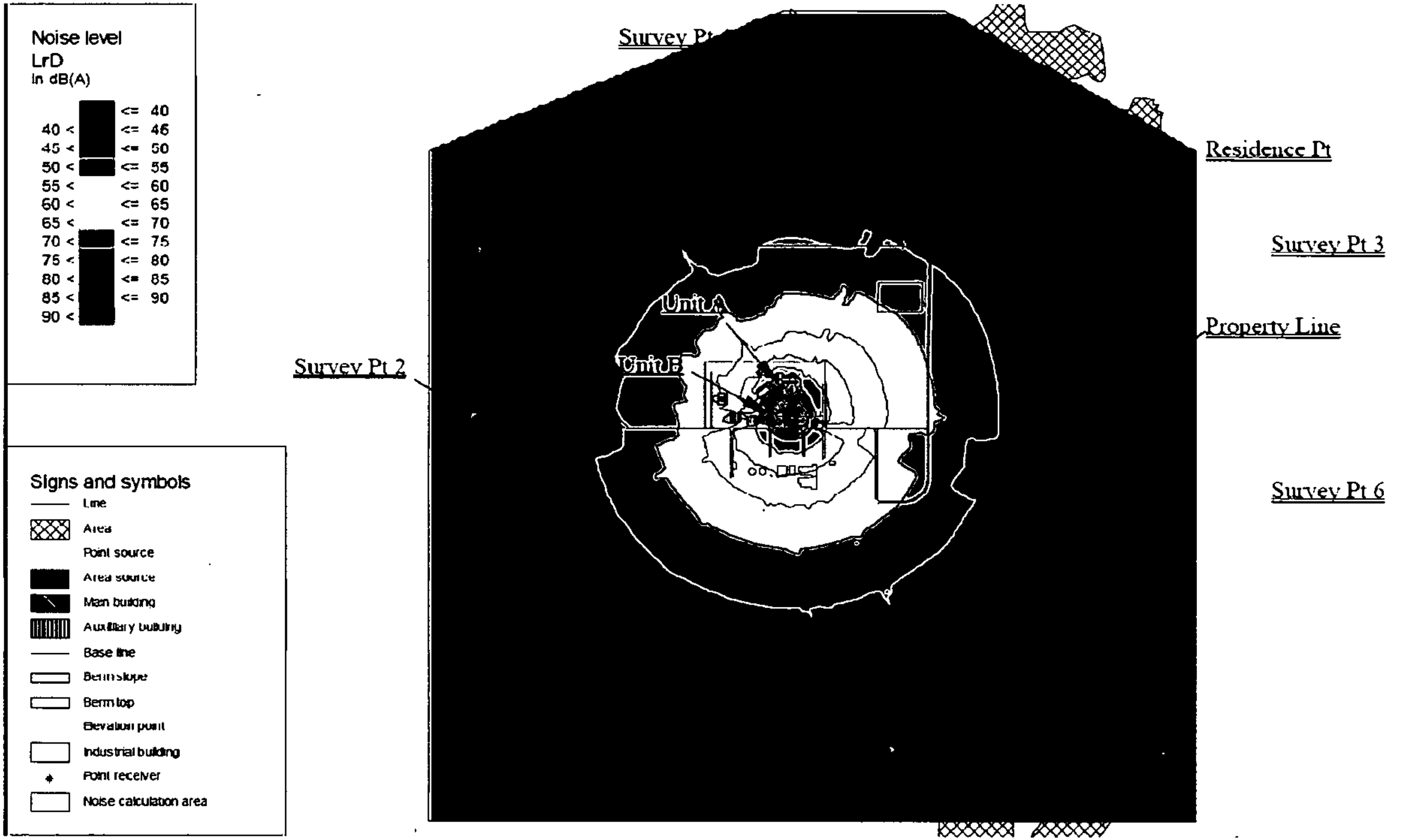

FIGURE 5.7-2.

NOISE GRID MAP FOR STANTON UNITS A AND B OPERATING TOGETHER

Source: SCS, 2006.

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line. These points show predicted noise levels ranging between 35 and 38 dBA. Five receptor points were chosen at the locations of the nearest residential area. The highest noise levels predicted by the model for Unit B alone were at Survey Point 3 (nearest to the plant) with a predicted level of 48 dBA. The level predicted for the nearest residential location due to Unit B operation was 40.9 dBA.

Table 5.7-1. Predicted Noise Levels at Several Points around Site

Location	Unit B Solo (dBA)	Units A and B (dBA)
Property line, northwest corner	37.9	40.4
Property line, northeast corner	38.4	40.0
Property line, southeast corner	34.6	36.0
Property line, southwest corner	35.3	36.5
Survey point 2	39.4	41.4
Survey point 3	48.1	49.4
Survey point 4	37.4	40.3
Survey point 5	41.7	41.1
Survey point 6	33.4	33.6
Northeast residence point	40.9	42.5

Source: SCS, 2006.

Figure 5.7-2 shows the predicted noise contours with both Units A and B operating. As expected, the points to the north of the site showed the biggest increase when Unit A is factored in. The four property line points increased approximately 2 dBA when both units were operating. Ambient survey point 3 was again predicted to have the highest levels at 49.4 dBA. The residential point would experience 42.5 dBA due to the two units operating together.

The 2- to 3-dBA increase in noise levels when Unit A is added to the model with Unit B suggests that the two plants will produce similar levels of noise. Because of the logarithmic nature of decibel levels, when two sources of the same level operate together, the resulting noise level is expected to be 3 dB higher than the individual levels. This provides some confidence that the approximations made in arriving at sound power levels for the gasification components were reasonable.

The Orange County noise ordinance calls for daytime levels less than 60 dBA and night-time levels less than 55 dBA in residential areas. Based on the noise model, the highest level at the nearest property line due to both units running is expected to be 51 dBA. The predicted level of 42.5 dBA at the nearest residential area easily falls within the Orange County criteria.

It should be noted that the predicted levels assume no noise from any other sources at each of the receivers. The ambient levels recorded at survey points 2 through 6 were higher than the levels predicted by the model at the same points, with the exception of point 3. Consequently, although the plant may be audible, the noise levels at these locations should not be dominated by the noise from the plant and should not exceed the Orange County ordinance due to noise from the plant.

5.8 CHANGES IN NONAQUATIC SPECIES POPULATIONS

5.8.1 IMPACTS

Potential effects of Unit B on onsite and regional ecological resources could arise from cooling tower drift and stack emissions, additional coal handling, operational noise, human presence, operation of the flare, maintenance of the transmission corridor, and stormwater runoff. Given the low air quality impacts predicted for the project (see Section 5.6), potential effects of air emissions on all ecological resources can be characterized as minimal. The following is a description of other potential impacts to onsite and nearby ecological resources that may result from Unit B.

The presence of humans and associated noise will constitute indirect effects of facility operation that could potentially affect surrounding wildlife. Mammal and bird species would be expected to experience the most effects since their auditory systems are the most developed. However, the permanent facilities will represent only a modest addition to the Stanton site (new Unit B facilities will occupy approximately 30 to 60 acres out of the 1,100-acre power plant area, and the transmission line interconnection will require 5 acres or less). Many of the species observed onsite are obviously well adapted to the presence of humans and the existing Stanton facilities and will continue to coexist with the plant. Further, the Unit A facilities are between the Unit B area and the nearest non-power plant land uses and will act as a buffer.

Another possible cause of potential impacts to wildlife that might result from Unit B would be operation of the flare associated with the gasification unit. While it is difficult to predict what effect, if any, operation of the flare might have on area wildlife, the estimated 40-ft-high flame (visible only at night) would, at night, represent a new visual disturbance. However, the flare will be employed only occasionally and will be located within the already developed plant area and amongst other generating facilities.

Finally, stormwater from the Unit B facility areas will be managed as part of the overall Stanton collection and reuse system so that no impacts to any nearby ecological resources will result from Unit B. Stormwater from permanent structures associated with the short, new electrical interconnection will be minimal and will pose no real potential for impacting the ecological resources of the northern buffer area.

In summary, operational impacts on nonaquatic species will be minimal and not significantly different from those impacts already created by the existing plant operations. No regional populations of any species are expected to be affected by the Unit B operation.

5.8.2 MONITORING

No ecological monitoring program is proposed or known to be required for operation of Unit B due to the negligible impacts to ecological resources associated with unit operation.

5.9 OTHER PLANT OPERATION EFFECTS

Operations of Unit B will have some impacts on traffic in the vicinity of the Stanton site, but those impacts are predicted to be minimal for two reasons: 1) improvements to the local road network and 2) the relatively few personnel required to operate Unit B.

First, as discussed in Section 2.2.7.2, by the time Unit B comes online in late 2009 and into 2010, the road network in the vicinity of the Stanton Energy Center will have been improved significantly from the current situation. Innovation Way will be complete, providing ready access to the BeeLine Expressway. By 2010 it is also likely that the project to widen Alafaya Trail to four lanes will have been completed. Thus, access to the Stanton site will exist via Alafaya Trail, Innovation Way, and Avalon Park Boulevard/Highway 50.

Second, daily traffic resulting from operation of Unit B will be modest. There will be an estimated 72 employees during the federal demonstration phase of the project and a total of 53 fulltime employees thereafter to operate Unit B facilities. The daytime shift is projected to consist of 57 employees during the demonstration phase and 38 employees thereafter. Using a conservative vehicle occupancy rate of 1.1, the expected number of inbound trips in the a.m. peak hour is 52 for the demonstration phase and 35 for the operation phase after commissioning and demonstration. However, even during the p.m. peak hour, the addition of approximately 65 vehicles will not constitute a significant impact on the improved network of local roadways. Even if all of the unit's operations traffic accessed the site via Alafaya Trail, it would amount to only an approximately 3 percent increase, based on the 2003 traffic data.

Additional trips may be the result of deliveries of supplies and the outbound removal of ammonia. Approximately 40 trucks per week would likely be required for normal deliveries of supplies (mostly on weekdays), and approximately six truckloads of anhydrous ammonia per week would be needed to transport the unconsumed anhydrous ammonia. Thus, the total maximum number of additional daily trips (nonemployee) to and from Unit B is estimated to be on the order of 50 per week. Many of these trips will likely not be during the peak traffic hours. By way of comparison, as indicated in Chapter 3.0, truck traffic in and out of Stanton currently runs at the rate of approximately 90 per day (weekdays). It is also noted that transport of sulfur, ammonia, and/or gasification ash offsite by rail would be investigated as an alternative to using the local roads.

Based on the relatively small number of permanent employees and deliveries, the associated trips to and from the Stanton site are not expected to create significant traffic impacts on the local roadways, especially considering the improved road network that will be in-place by that time. The improved flow of traffic around the Stanton site that will result from the Innovation Way and Alafaya Trail projects will be such that impacts from operations, beginning in late 2009 and early 2010, will be insignificant.

The addition of Unit B will result in an average of two to three additional trainloads of coal per week delivered to the site. This small addition in rail traffic should not impact the rail network in the surrounding area. If sulfur, ammonia, and/or gasification ash were transported offsite by rail, the expected additional rail activity would also likely impact the system only to a minimal extent.

5.10 ARCHAEOLOGICAL SITES

As documented in Section 2.2.6, no known cultural resources, either on- or offsite, that would be impacted by construction of Unit B. Documented archaeological and historic sites within the Stanton site boundaries are outside the developed power plant area and will be unaffected by any aspect of Unit B operations, including the transmission interconnection.

5.11 RESOURCES COMMITTED

The proposed Unit B will result in commitments of resources that would be irreversible or irretrievable. In other words, the resources consumed by the project would be neither renewable nor recoverable for future use.

The major irreversible and irretrievable commitments of state and local resources due to the operation of the project are as follows:

- Use of land.
- Consumption of coal.
- Consumption of natural gas.
- Consumptive use of water (both treated effluent and ground water).
- Consumption of air quality increments.

The use of land by the project, while irreversible, will be relatively small. The permanent Unit B IGCC equipment and facilities, including separate coal pile, will require approximately 35 to 40 acres. Some additional land from the onsite landfill will also be required for gasification ash and sulfur disposal (assuming these byproducts do not find other, beneficial uses). But, with the exception of approximately 5 acres that will be needed for the electrical transmission line interconnection to the onsite substation, the land planned for use for Unit B will all be within the existing, 1,100-acre developed power plant site. The permanent IGCC facilities will be located in the graded area immediately south of existing Unit A.

Coal will be consumed to produce syngas for the CT. The quantities are presented in Chapter 3.0. While the IGCC unit will produce electricity using state-of-the-art technology, which will result in efficient use of fuel, the coal consumed nonetheless represents an irreversible and irretrievable commitment of energy resources for the production of electricity. It is worth emphasizing, though, that the types of coals planned for demonstration and long-term use in the Unit B gasifier are of lower rank and available in much greater quantities, both in the U.S. and worldwide.

Small amounts of natural gas will normally be consumed by Unit B operations during startup. Greater quantities would be consumed if the CT and HRSG duct burners were fueled on natural gas. Unit A at Stanton fires natural gas as its primary fuel, and operating experience has shown natural gas to be readily available. Again, it is the intent that Unit B run primarily on syngas from widely available low rank coals, not on natural gas.

In addition to these fuels, Unit B will require electrical energy to run motors to power pumps, blowers, grinders, conveyor belts, and other machinery.

Water evaporated by the cooling tower as part of the heat transfer process represents a consumptive use of water. This consumptive use will be minimized by the utilization of treated effluent; the project will require only very small quantities of higher-quality ground water. Ground water consumed by the operation of the plant for noncooling purposes will be withdrawn in a manner that will result in acceptable impacts, as determined in previous Stanton licensing studies and using criteria developed by the SJRWMD, and within existing permitted limits.

The air quality increments consumed by air pollutant emissions from the project are expected to be negligible. The project's emissions should not impede any additional industrial growth in the area.

In addition to the resources discussed above, small quantities of process chemicals, paints, degreasers, and lubricants will be consumed, as at any industrial facility.

Finally, it is appropriate to mention in this context that Unit B may actually *produce* two commodities: ammonia and sulfur (if markets for these byproducts are found and sulfur is not landfilled onsite). Both of these materials are expected to be suitable for sale into commercial markets, and, in this way, Unit B may contribute in a small way to the supplies of these materials. In addition, the gasification ash, if not landfilled or burned beneficially in the Stanton PC units, would potentially have offsite commercial uses.

5.12 VARIANCES

No variances from any federal, state, or local regulations, standards, or guidelines will be needed for operation of the Stanton Unit B project.

REFERENCES

Edison Electric Institute (EEI). 1984. Power Plant Environmental Noise Guide, 2nd Edition.

Orlando Utilities Commission (OUC). 2001. Supplemental Site Certification Application, Combined-Cycle Unit A. January.

OUC. 2003. Curtis H. Stanton Energy Center Units 1 and 2 and Combined Cycle Unit A, Conditions of Certification.

OUC. 2004. Internal E-mails from Garfield Blair and Matthew Blankner. October.

6.0

TRANSMISSION LINES AND OTHER LINEAR FACILITIES

6.1 TRANSMISSION LINE

One new transmission line is proposed to connect the new Stanton Unit B with OUC's existing Stanton Substation No. 17 (Sub. 17).

The proposed 230-kV line will be installed on new structures for the entire length of the transmission line corridor. The proposed transmission line route is entirely within the existing Stanton Energy Center site as shown on Figure 6.1-1.

6.1.1 PROJECT INTRODUCTION

The proposed 230-kV transmission line will be a single-circuit, heavy-duty, single-pole transmission line. The transmission line structures will be steel poles with drilled concrete pier foundations or self-supporting concrete poles. Both structure types will be capable of supporting a single circuit configuration. The proposed right-of-way corridor width is 80 ft.

6.1.2 CORRIDOR LOCATION AND LAYOUT

The proposed route for the 230-kV transmission line will exit Unit B and follow an easterly alignment for approximately 900 ft. At this point, the line will turn northeast for approximately 1,100 ft, where it intersects a point just south of an existing OUC distribution line. The line will then turn to the north and parallel the existing OUC distribution line to just south of Sub. 17, where it will turn to the west for approximately 140 ft before turning to the north into a new substation bay at Sub. 17. The total length of the transmission line is approximately 3,200 ft.

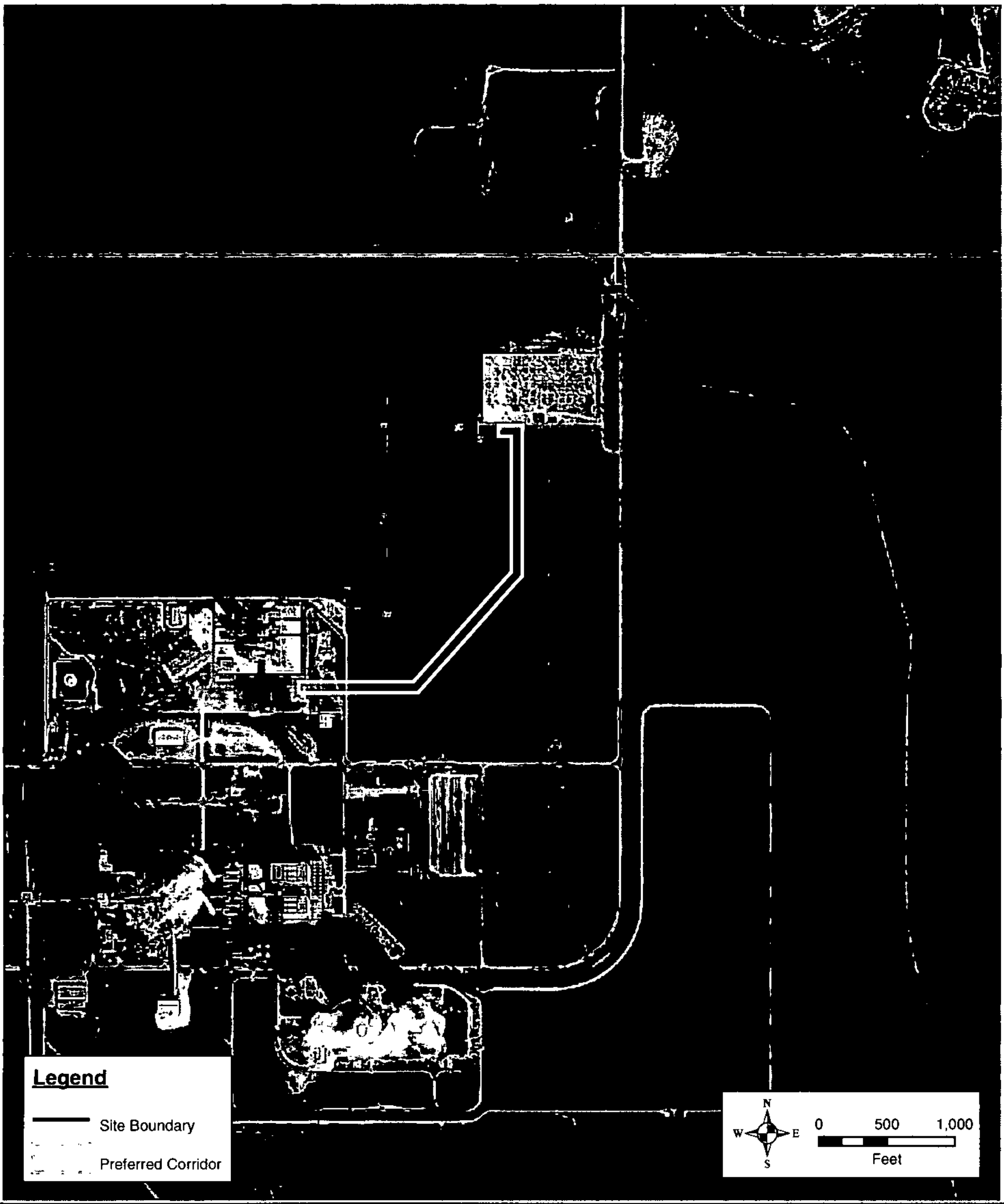

FIGURE 6.1-1.
LOCATION OF PROPOSED TRANSMISSION LINE CORRIDOR

Sources: SJRWMD, 2005; ECT, 2005.

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Figure 6.1.2 shows the proposed onsite corridor and all existing transmission lines located within 5 miles.

6.1.3 TRANSMISSION LINE, ROAD, AND SUBSTATION DESIGN CHARACTERISTICS

The proposed 230-kV transmission line for Unit B will be constructed using single-pole tubular steel structures or direct embedded concrete poles, as shown on Figure 6.1-3. The structures will be designed to support one 230-kV circuit. The structures will be spaced approximately 325 to 750 ft apart along the route. The transmission line conductors will be 1,272 kcmil 39/19 ACSS/TW conductors. One fiber optic shield wire will be installed on the structures for shielding, relaying, and communications. An existing underground fiber optic path from combined-cycle Unit A will likely be used as a redundant communication path for Unit B.

The transmission line will be designed to meet the clearance requirements of the National Electric Safety Code (NESC). A minimum ground clearance of 27 ft will be maintained to ground under the maximum design loading condition of the transmission line. The structures will vary in height along the route, depending upon the span lengths and obstacles that must be crossed.

Access to the new transmission line will be from existing roads where practical. Construction of access roads and pole keyhole pads is anticipated. The access roads and keyhole pads are necessary, not only for initial construction, but also for the maintenance of the transmission line. Figure 6.1-3 shows a typical cross-section of an associated keyhole pad and access road. The access road and keyhole pad will be constructed with compacted native soil backfill with grass surface and side slope. Where necessary, a geotextile fabric liner will be installed to stabilize the access road and keyhole pad. Corrugated metal pipe culverts will be installed in the access road to permit any natural flow through the area to continue.

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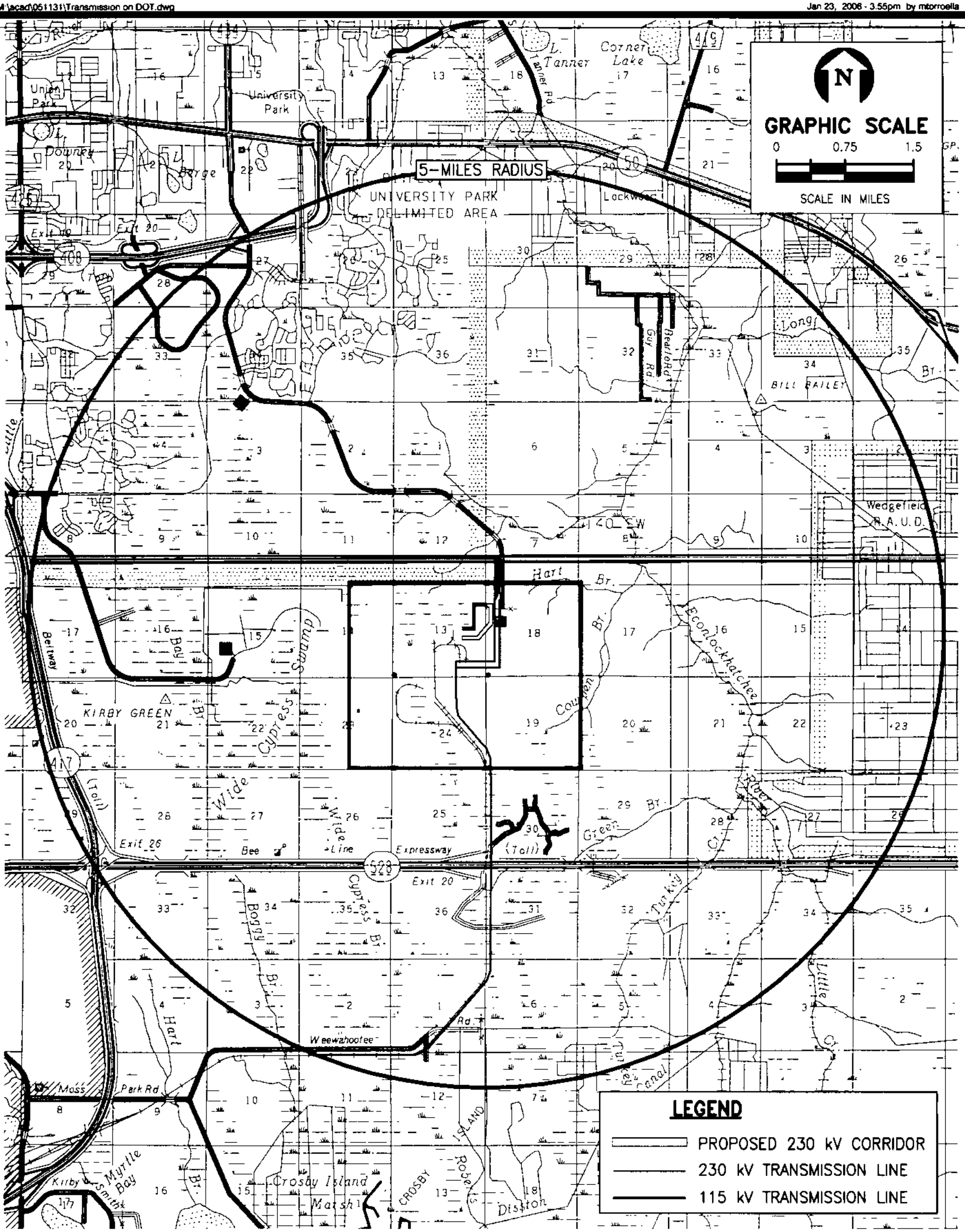

FIGURE 6.1-2.

TRANSMISSION SYSTEM WITHIN 5 MILES OF STANTON ENERGY CENTER

Source: ECT, 2006.

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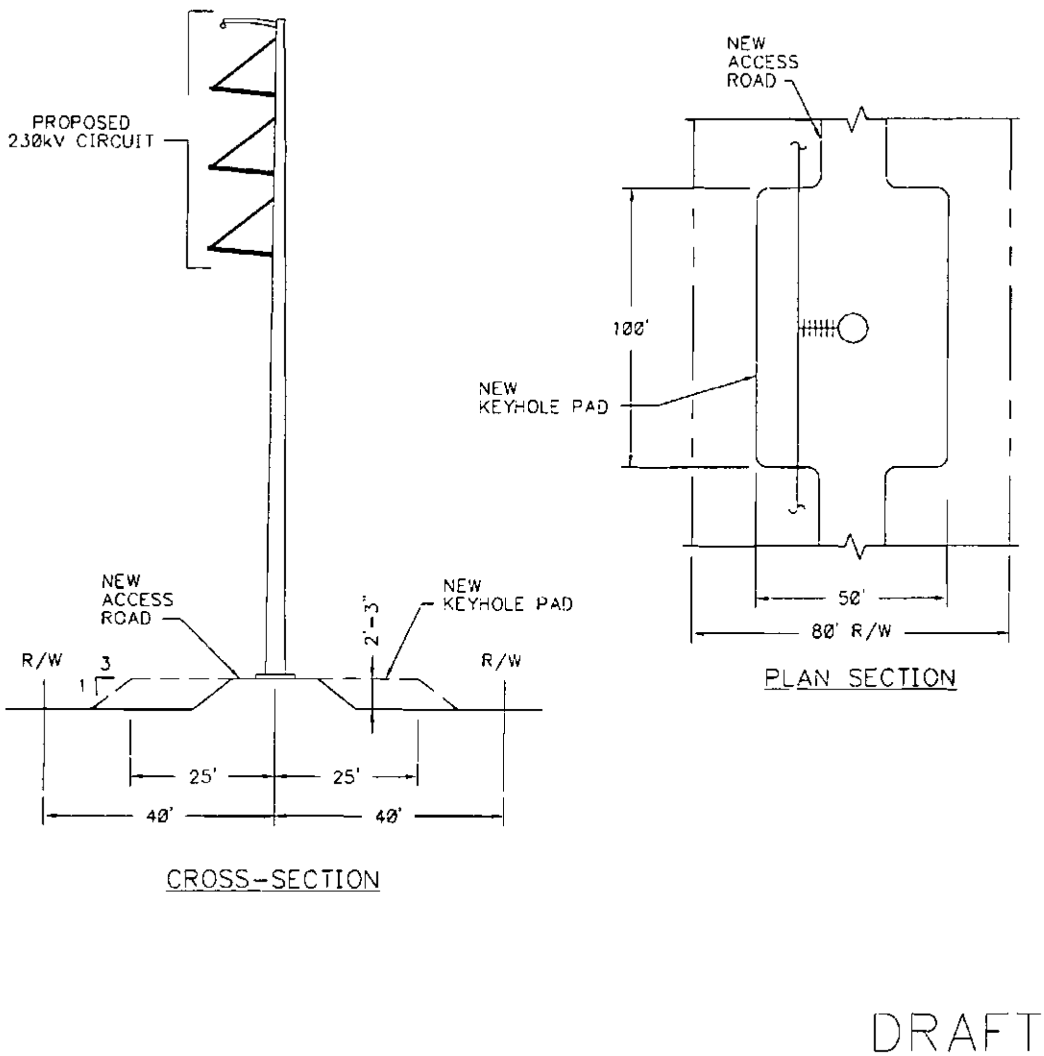

FIGURE 6.1-3.

TYPICAL TRANSMISSION STRUCTURE

Source: OUC, 2005.

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Figure 6.1-4 shows where the construction of the access road and keyhole pads are anticipated along the route.

6.1.4 COST PROJECTIONS

Table 6.1-1 summarizes the estimated total cost of the proposed Unit B 230-kV transmission line.

Table 6.1-1. Transmission Line Cost Estimate

Item	Description	Cost
1	Transmission line structures	$600,000
2	Conductor, insulators, wire	130,200
3	Survey, soil borings	60,000
4	Construction labor	850,000
5	Engineering	530,000
6	OUC costs	210,000
		$2,380,200*

*Costs do not include wetland mitigation.

Source: OUC, 2005.

6.1.5 CORRIDOR SELECTION

Studies of OUC's electric transmission system showed that a connection from the Stanton Unit B switchyard to Sub. 17 integrated very well with the existing system and is preferred to other possible connections or system upgrades for the addition of Unit B.

Two other route options were evaluated. These routes were a slightly shorter distance and would parallel an existing transmission line on a common set of structures. Federal Energy Regulatory Commission (FERC) regulations require that when generation transmission lines for separate generation units totaling more than 900 MW share a common structure, this single structure loss scenario must be considered with regard to reliable

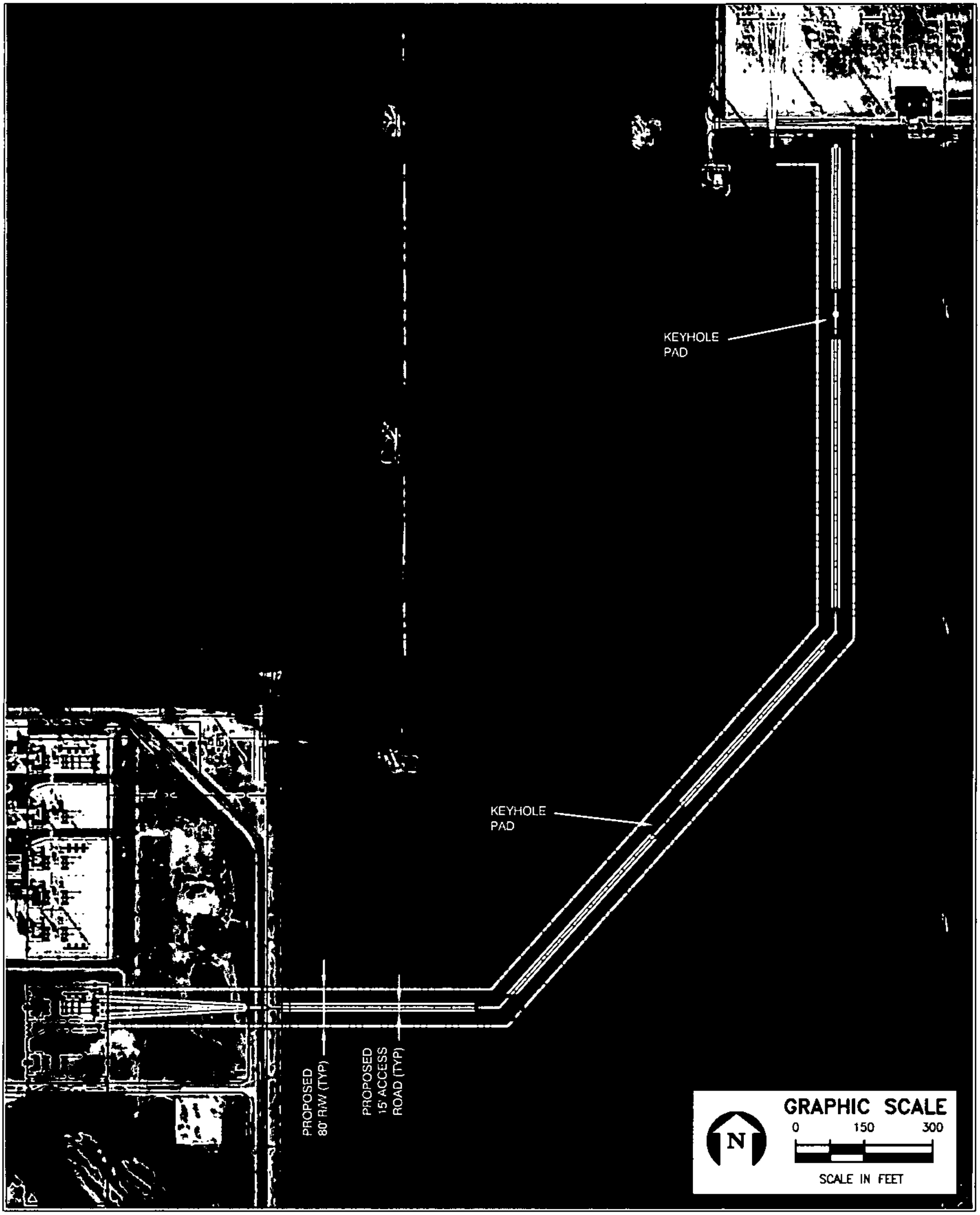

FIGURE 6.1-4.

LOCATION OF ACCESS ROAD AND KEYHOLE PADS ALONG THE TRANSMISSION CORRIDOR

Sources: SJRWMD 2004 aerials; OUC, 2005; ECT, 2005.

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operations and generator spinning reserves. It was not deemed to be a prudent, economically feasible, or reliable utility practice to risk the loss of two generators by placing them on a common set of structures. Therefore, the common structure routes were rejected.

6.1.6 SOCIOPOLITICAL ENVIRONMENT OF THE CORRIDOR AREA

6.1.6.1 Governmental Jurisdictions

The proposed transmission corridor lies entirely within the boundaries of OUC's Stanton site (Orange County) and, therefore, does not cross any other government jurisdictions. No other jurisdictions exist within 0.5 mile of the corridor.

6.1.6.2 Zoning and Land Use Plans

As previously described in Section 2.2.2.1, the entire Stanton site is zoned Farmland Rural (A-2). A special exception was applied to the entire 3,280-acre site for future electric generating plants and associated facilities.

Section 2.2.2.2 describes the current land use designations for the Stanton site. The entire property, including this proposed transmission corridor, lie within an Institutional land use designation.

6.1.6.3 Easements, Title, and Agency Works

The entire transmission corridor is encompassed within OUC's Stanton property and, therefore, will require no additional easements, titles, or approvals for any works of any agency.

6.1.6.4 Vicinity Scenic, Cultural, and Natural Landmarks

There are no scenic, cultural, or natural landmarks within or along the proposed corridor. Section 2.2.5 describes those resources, or lack thereof, in the Stanton property vicinity.

6.1.6.5 Archaeological and Historic Sites

A DHR Master Site File search for known archaeological/historic sites was conducted for this SCA, and results are discussed in Section 2.2.6. Four previously recorded archaeological sites and no previously recorded historic sites exist within the Stanton site boundaries. Figure 2.2.7 depicts these locations. None of the four archaeological sites exist within 0.5 mile of the proposed corridor. Furthermore, in response to a request specific to the area where the new transmission line will be constructed, FDHR (2006) advised that no cultural resources are recorded in that area.

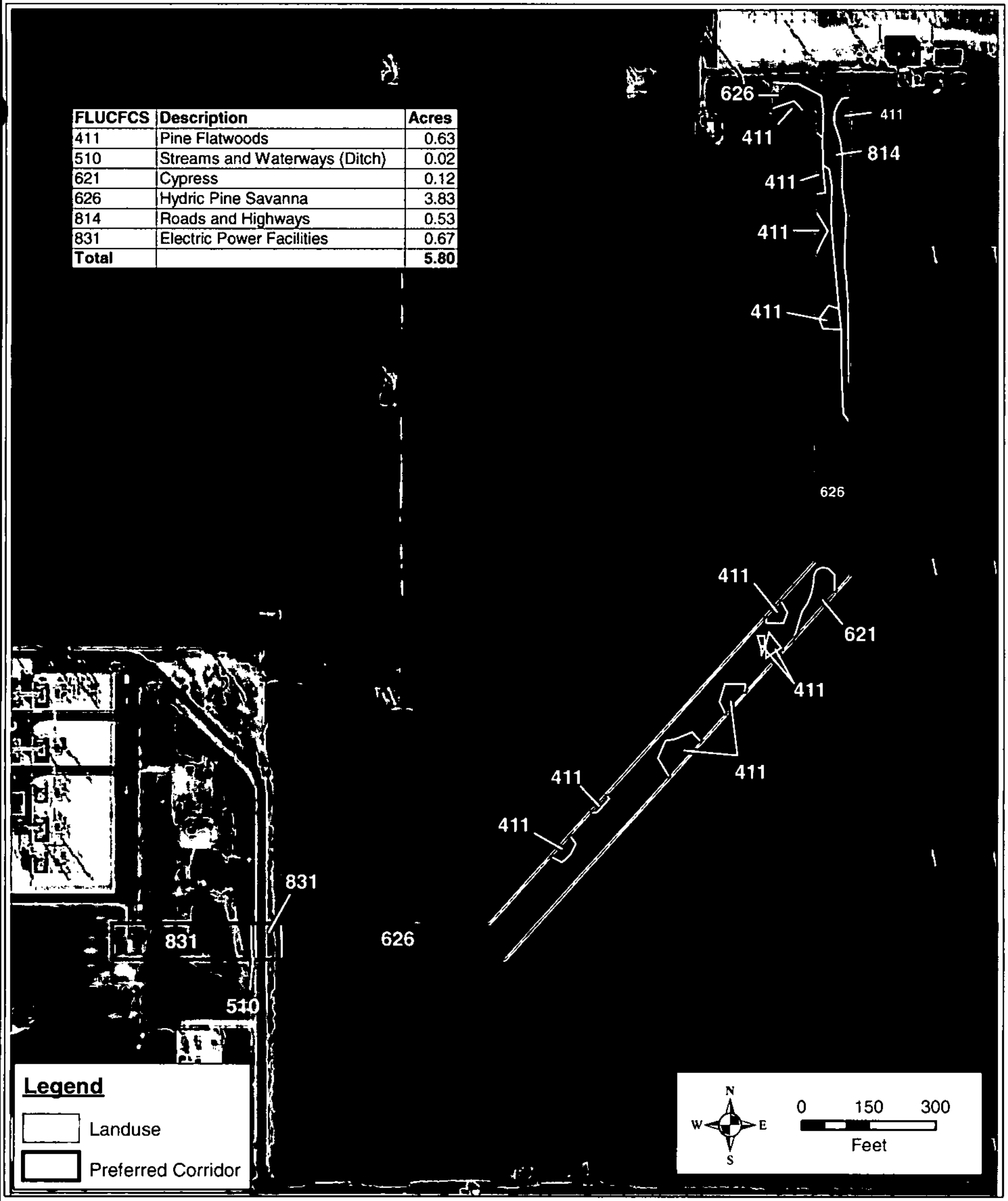
6.1.7 BIOPHYSICAL ENVIRONMENT OF THE CORRIDOR AREA

6.1.7.1 Land Use and Vegetation

Figure 6.1-5 illustrates the vegetation and land cover types occurring along the proposed transmission line corridor according to Level III of the Florida Land Use, Cover and Forms Classification System (FLUCFCS) from the Florida Department of Transportation (FDOT) (1999). Figure 2.3-17 provided the FLUCFCS coverages for the corridor vicinity. The proposed transmission line right-of-way is an 80-ft-wide, approximately 3,035-ft-long corridor, which will connect the proposed Unit B switchyard to the existing electrical Sub. 17 located to the northeast.

The transmission line corridor exits the proposed Unit B switchyard (FLUCFCS 831) and heads due east approximately 375 ft, crossing an interior paved road and 0.02 acre of manmade roadside ditch. This section of the corridor, containing the switchyard grounds, totals 0.67 acre. The corridor proceeds due east approximately 485 ft across hydric pine savanna (FLUCFCS 626). From there, the corridor turns northeast for approximately 1,125 ft crossing hydric pine savanna and upland *islands* of pine flatwoods (FLUCFCS 411). The corridor then turns due north crossing the tip of a cypress swamp (FLUCFCS 621). It continues north approximately 300 ft crossing native hydric pine savanna. At this point, the corridor follows an old access road (FLUCFCS 814) and OUC distribution line north approximately 750 ft. There it turns back due west approximately 140 ft within the existing Sub. 17 before connecting to a new bay within the substation. Total area included within this proposed new transmission corridor is approximately 5.8 acres.

Pine flatwoods are upland coniferous forests, which are common throughout the OUC property and much of central Florida. The pine flatwoods on the property are relatively



FLUCFCS	Description	Acres
411	Pine Flatwoods	0.63
510	Streams and Waterways (Ditch)	0.02
621	Cypress	0.12
626	Hydric Pine Savanna	3.83
814	Roads and Highways	0.53
831	Electric Power Facilities	0.67
Total		**5.80**

FIGURE 6.1-5.
LAND COVER/VEGETATION ALONG THE PROPOSED CORRIDOR

Sources: SJRWMD, 2005; ECT, 2005.

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undisturbed and support a canopy dominated by longleaf pine (*Pinus palustris*). The 0.63 acre of larger upland pine flatwood areas and smaller isolated *islands* along the proposed transmission line corridor typically support an open canopy of longleaf pines with occasional live oak (*Quercus virginiana*). The shrub layer is dominated by saw palmetto (*Serenoa repens*). Other shrub layer associates include dwarf live oak (*Quercus minima*), running oak (*Quercus pumila*), shiny blueberry (*Vaccinium myrsinities*), American beautyberry (*Callicarpa americana*), gallberry (*Ilex glabra*), and Coastalplain staggerbush (*Lyonia fruticosa*). The herbaceous layer is mostly wiregrass (*Aristida beyrichiana*). Other herbs within the ground stratum include whitetop aster (*Aster reticulatus*), slender goldenrod (*Euthamia caroliniana*), Elliott's milkpea (*Galactia elliottii*), blackroot (*Pterocaulon pycnostachyum*), bracken fern (*Pteridium aquilinum*), bottlebrush threeawn (*Aristida spiciformis*), pricklypear (*Opuntia humifusa*), Southeastern sunflower (*Helianthus agrestis*), Adam's needle (*Yucca filamentosa*), pale meadowbeauty (*Rhexia mariana*), and narrowleaf silkgrass (*Pityopsis graminifolia*).

The majority of the corridor (3.83 acres) contains a hydric pine savanna. Hydric pine savanna is an open, coniferous wetland forest community with a sparse canopy of longleaf pines and a ground cover of grasses, herbs, and wetland shrubs. The overstory layer also supports occasional pond cypress (*Taxodium ascendens*). The understory is almost completely open, except for occasional saw palmetto, gallberry, and wax myrtle (*Myrica cerifera*). The wet to flooded ground layer is mostly dominated by wiregrass. Other herbaceous stratum associates include longleaf threeawn (*Aristida palustris*), arrowfeather threeawn (*Aristida purpurascens*), roundpod St. John's-wort (*Hypericum cistifolium*), sandweed (*Hypericum fasciculatum*), swamp flatsedge (*Cyperus ligularis*), haspan flatsedge (*Cyperus haspan*), Carolina redroot (*Lachnanthes caroliana*), roadgrass (*Eleocharis baldwinii*), blue maidencane (*Amphicarpum muhlenbergianum*), erectleaf witchgrass (*Dichanthelium erectifolium*), giant whitetop (*Rhynchospora latifolia*), narrowfruit horned beaksedge (*Rhynchospora inundata*), Florida tickseed (*Coreopsis floridana*), hairy umbrellasedge (*Fuirena squarrosa*), tenangle pipewort (*Eriocaulon decangulare*), woolly witchgrass (*Dichanthelium scabriusculum*), white lobelia (*Lobelia paludosa*), bluestems (*Andropogon* spp.), southern shield fern (*Thelypteris kunthii*), yelloweyed grasses (*Xyris* spp.), bighead rush (*Juncus megacephalus*), false fennel (*Eupatorium leptophyllum*), rosy camphorweed (*Pluchea rosea*), pineland daisy (*Chaptalia tomentosa*), pineland rayless goldenrod (*Bigelowia nudata* subsp. *nudata*), Seminole false foxglove (*Agalinis filifolia*), sugarcane plumegrass (*Saccharum giganteum*), knotroot foxtail (*Setaris parviflora*), sawtooth blackberry (*Rubus argutus*), and laurel greenbrier (*Smilax laurifolia*).

Cypress swamps are coniferous, forested wetlands occurring within low-lying areas, which are seasonally flooded. The 0.12 acre of cypress swamp within the proposed transmission line corridor is the northern extent of a strand system. The cypress strand is dominated by pond cypress in the overstory. Other overstory/subcanopy trees include dahoon holly (*Ilex cassine*) and swamp tupelo (*Nyssa sylvatica* var. *biflora*). Epiphytes on overstory trees include Spanish moss (*Tillandsia usneoides*) and Florida airplant (*Tillandsia simulata*). The shrub layer contains wax myrtle. The inundated ground layer supports a mix of emergents such as longleaf threeawn, warty sedge (*Carex verrucosa*), water cowbane (*Oxypolis filiformis* subsp. *filiformis*), taperleaf waterhorehound (*Lycopus rubellus*), sandweed, blue maidencane, narrowfruit horned beaksedge, tenangle pipewort, Carolina redroot, hairy unbrellasedge, yelloweyed grasses, giant white top, zigzag bladderwort (*Utricularia subulata*), mermaid's weed (*Prosperpinaca pectinata*), false nettle (*Boehmeria cylindrica*), and lemon bacopa (*Bacopa caroliniana*).

6.1.7.2 Affected Waters and Wetlands

No water bodies will be affected by the proposed transmission corridor. However, the corridor will contain wetlands that will be affected by transmission construction. These wetlands are depicted in Figure 6.1-5 and include the following types and acreages:

Wetland Types	FLUCFCS No.	Acreage
Cypress strand	621	0.12
Hydric pine savanna	626	3.83
Roadside ditch	510	0.02
TOTAL		3.97

The roadside ditch will be spanned by the proposed transmission line, and, since no clearing or filling will be required, it will not be affected by construction.

6.1.7.3 Ecology

Flora

The westerly portion of the corridor begins on the existing Unit A power block area (proposed Unit B switchyard), which was previously described in Section 2.3.6. This area is managed landscape and provides very little native habitat.

The remainder of the corridor (approximately 2,300 ft) traverses previously undisturbed pine flatwoods, hydric pine savanna, and various disturbed utility uses.

Table 6.1-2 lists the threatened, endangered, or protected plant species that have been documented as occurring on or near the Stanton site with their current protected status. The listed species table does not contain any federally protected plant species. The plant species listed are all only protected under Florida Department of Agriculture and Consumer Services (FDACS), which protects against over-harvesting by collectors. Out of the nine FDACS-listed species on Table 6.1-2, five were found growing along and/or in the vicinity of the proposed transmission line corridor.

Ferns

Cinnamon fern (*Osmunda cinnamomea*) and royal fern (*Osmunda regalis*) were identified as potentially occurring within the Stanton property (see Table 6.1-2). Both of these ferns are classified by FDACS as commercially exploited species. These listed fern species are fairly common throughout Florida, occur in a variety of wetland habitats, and were observed on and in the vicinity of the proposed transmission line corridor. Sparse populations of cinnamon fern were observed in hydric pine savanna and cypress swamp along the proposed transmission line corridor. Royal fern was only seen at one locale in hydric pine savanna. Given their range in habitat, these species would be expected to persist along the undisturbed areas of the corridor following the construction of the transmission line.

Table 6.1-2. Threatened/Endangered/Protected Plant Species Documented On or Near the Transmission Line Corridor

Common Name	Scientific Name	Status		
		USFWS	FWC	FDACS
Greenfly orchid	*Epidendrum conopseum*			C
Catesby's lily (pine lily)	*Lilium catesbei*			T
Cinnamon fern	*Osmunda cinnamomea*			C
Royal fern	*Osmunda regalis*			C
Yellow-flowered butterwort	*Pinguicula lutea*			T
Rose pogonia	*Pogonia ophioglossoides*			T
Hooded pitcher plant	*Sarracenia minor*			T
Common wild pine	*Tillandsia fasiculata*			E
Giant wild pine	*Tillandsia utriculata*			E

Note: USFWS = U.S. Fish and Wildlife Service.
E = endangered.
T = threatened.
SSC = species of special concern.
C = commercially exploited.

Sources: http://northflorida.fws.gov/CountyList/Orange.
Regulated Plant Index, Chapter 5B-40.0055, F.A.C.
ECT, 2005.

Lily

The pine or Catesby's lily (*Lilium catesbaei*), a true lily, is listed as threatened by FDACS. Catesby's lily is a perennial herb with alternate leaves and orange-pink flowers with darker freckles. This lily grows in wet flatwoods and bogs. A couple populations of Catesby's lily were seen growing in hydric pine savanna within the vicinity of the proposed transmission line corridor (i.e., one to two plants each). Catesby's lily could potentially persist in the transmission line easement in areas where native shrub layers are not disturbed.

Insectivorous Plants

Listed species of insectivorous plants such as butterworts and pitcher plants occur along the proposed transmission line corridor. Yellowflower butterwort (*Pinguicula lutea*) is listed as threatened by FDACS. Yellowflower butterwort is a terrestrial plant with a basal rosette of yellowish-green leaves and yellow flowers. It occurs in flatwoods and bogs. Hooded pitcherplant (*Sarracenia minor*) is also listed as a threatened species by FDACS. Hooded pitcherplant is a perennial herb with erect leaves up to 1 meter tall. It has a green pitcher, which turns reddish in the sun and is marked with white spots. The pitcher also has a broad arching hood over the mouth. The flowers are yellow and odorless. It occurs in flatwoods, bogs, and ditches. Only one population of approximately 25 plants of yellowflower butterwort was discovered in hydric pine savanna along the proposed transmission line corridor. However, the hydric pine savanna was observed to support several populations of hooded pitcherplant throughout. These insectivorous species could potentially persist along the new transmission line right-of-way within undisturbed areas.

Fauna

During site-specific wildlife surveys on all the corridor options, wildlife usage was documented and is shown in Table 6.1-3. Listed species potentially occurring on the Stanton property, as well as their likelihood for occurrence on the corridor, are listed in Table 6.1-4.

Table 6.1-3. Wildlife Species Observed in the Transmission Corridor Vicinity—November 2005

Common Name	Scientific Name
<u>Reptiles</u>	
Gopher tortoise	*Gopherus polyphemus*
<u>Birds</u>	
Great blue heron	*Ardea herodias*
Great egret	*Casmerodius albus*
Snowy egret	*Egretta thula*
Turkey vulture	*Cathartes aura*
Red-tailed hawk	*Buteo jamaicensis*
Florida sandhill crane	*Grus canadensis pratensis*
Killdeer	*Charadrius vociferous*
Belted kingfisher	*Ceryle alcyon*
Hairy woodpecker	*Picoides villosus*
Marsh wren	*Cistothorus palustris*
Catbird	*Dumetella carolinensis*
Northern mockingbird	*Mimus polyglottos*
Yellow-rumped warbler	*Dendroica coronata*
Palm warbler	*Dendroica palmarum*
Pine warbler	*Dendroica pinus*
Eastern meadowlark	*Sturnella magna*
Towhee	*Pipilo erythrophthalmus*
Cardinal	*Cardinalis cardinalis*
<u>Mammals</u>	
White-tailed deer	*Odocoileus virginianus*

Source: ECT, 2005.

Table 6.1-4. State- or Federally Listed Wildlife Species Potentially Occurring on the Stanton Site and Likelihood of Occurrence Within the Transmission Corridor

Common Name *Scientific Name*	Status* USFWS	 FWC	Likelihood of Occurrence Within Unit B Transmission Corridor
Amphibians			
Gopher frog *Rana capito*	—	SSC	Low—suitable habitat and gopher tortoise densities minimal
Reptiles			
American alligator *Alligator mississippiensis*	T(S/A)	SSC	Low—open water habitats minimal on the corridor
Eastern indigo snake *Drymarchon corais couperi*	T	T	Low—suitable habitat and gopher tortoise densities minimal
Gopher tortoise *Gopherus polyphemus*	—	SSC	Low—on the corridor, although one active and one inactive burrow observed along access road to existing Unit A transmission line
Florida pine snake *Pituophis melanoleucus migitus*	—	SSC	Low—habitat minimal
Short-tailed snake *Stilosoma extenuatum*	—	T	Low—habitat minimal
Birds			
Florida scrub jay *Aphelocoma c. coerulescens*	T	T	Low—habitat absent
Limpkin *Aramus guarauna*	—	SSC	Low—habitat absent
Florida burrowing owl *Athene cunicularia*	—	SSC	Low—habitat minimal
Little blue heron *Egretta caerulea*	—	SSC	Moderate—could forage in corridor wetlands
Snowy agret *Egretta thula*	—	SSC	Present—observed foraging in corridor
Tricolored heron *Egretta tricolor*	—	SSC	Moderate—could forage in corridor wetlands
White ibis *Eudocumus albus*	—	SSC	Moderate—could forage in corridor wetlands
Peregrine falcon *Falco peregrinus*	—	E	Low—possible migrant over the site; may forage along Orange County landfill or onsite ponds
Southeastern American kestrel *Falco sparverius paulus*	—	T	Moderate—may be expected on the pine flatwoods/open areas of the Stanton property
Florida sandhill crane *Grus canadensis pratensis*	—	T	Present—commonly observed on the grassed areas near the power block
Bale eagle *Haliaeetus leucocephalus*	T	T	Present—over the power block area and landfill; no known nesting within 0.5 mile of corridor
Wood stork *Mycteria americana*	E	E	Moderate—could forage in wetlands along the corridor; no known nests within 1 mile
Red-cockaded woodpecker *Picoides borealis*	E	SSC	Moderate—birds could forage in flatwoods and cypress wetlands along corridor; present on Stanton property, but nearest known colony is nearly 5,000 ft away
Kirtland's warbler *Dendroica kirtlandii*	—	E	Low—only occurs as a migrant, usually along coastal areas of Florida
Mammals			
Florida mouse *Podomys floridanus*	—	SSC	Low—habitat minimal and low density of gopher tortoises
Sherman's fox squirrel *Sciurus niger shermani*	—	SSC	Low—habitat absent
Florida black bear *Ursus americanus floridanus*	—	T	Low—habitat absent

* E = endangered.
T = threatened.
T(S/A) = threatened due to similarity of appearance.
SSC = species of special concern.

Source: ECT, 2005.

No bald eagle nests, wading bird colonies, or red-cockaded woodpecker colonies were found or known to occur in the corridor vicinity. These birds could all possibly forage in or around the corridor's habitats, however.

Other listed species, such as gopher tortoises and commensals, have a low likelihood of occurrence on the corridor due to the predominance of wetlands and saturated soils.

6.1.7.4 Other Environmental Features

There are no other environmental features found along the corridor, other than what has already been presented in this SCA.

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 line. These will include surveying, clearing, road construction, foundation construction, structure assembly and erection, conductor and shield wire installation, and cleanup. The tasks will occur in the following sequence and will be separated, in time, by several days to several months.

The right-of-way center line and edges and structures sites are established prior to construction. This task is usually performed by three- to five-person survey teams and requires minimum clearing for a line of sight. Clearing and road construction usually run concurrently because of similar requirements for heavy equipment. Road construction is necessary where the structure site would otherwise be under water or the terrain will not support the heavy equipment to be used in subsequent phases of work.

In wetlands connected to waters-of-the-state, chain saws and/or light, tracked shear machines will be used for clearing. Clean fill material will be hauled in for the construction of access roads. Stumps and root mat will be left in place except at structure foundation locations. There will be no need to demuck.

In areas outside of wetlands, the right-of-way will be cleared by heavy tracked machines, usually bulldozers, and dressed to facilitate future maintenance using wheeled tractors with bush-hog mowers. Stumps and cuttings will be piled and burned. The disposal method will depend on OUC preferences, requirements of the Division of Forestry, and other conditions at the time.

Fill material for access roads and key hole fills will be hauled in by truck and spread with bulldozers to obtain suitable compaction. Culverts, if required, will be installed as the road construction progresses to maintain drainage and water flow.

Construction of concrete foundations occurs during the second phase of construction. Equipment required for foundation construction consists of an augering machine mounted on tracked or all-wheel-drive vehicles, ready-mix concrete trucks, water trucks, pile driving equipment, and medium-sized (25- to 75-ton) tracked cranes. Each work group will have a bulldozer available to assist in the installation. Tractors, trailers, and light vehicles are used to transport material and personnel.

The next series of tasks consists of hauling material, 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, then offloaded with medium-sized truck cranes or all-wheeled cranes. Medium-sized (1.5- to 2-ton) all-wheel-drive trucks are used to transport personnel and tools. Medium-sized truck or all-wheel-drive cranes are required to move structure components and place the structure for erection. The most common method of erecting the structure is with 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 is 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 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 three- or four-drum winch is ordinarily used at the receiving ends 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 in order to electrically connect the conductors. Structures, fences, and gates are grounded during this phase of construction and before the line is energized.

Each contractor will be required to have sufficient equipment and personnel to maintain roads and to keep the right-of-way clear of debris and waste materials. Roads will be constructed with slight crowns and slopes. In addition, culverts, if required, will be placed at necessary locations to allow for proper sheet flow and prevent road washouts. Turbidity screens will be used as required to maintain water quality. 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.

6.1.8.2 <u>Impacts on Water Bodies and Uses</u>

As described previously in Section 6.1.7.2, the proposed transmission line interconnect easement will be crossing approximately 0.12 acre of cypress strand, 3.83 acres of hydric pine savanna, and 0.02 acre of roadside ditch (i.e., a combined wetland area of 3.97 acres; see Figure 6.1-6). The roadside ditch will not be affected by transmission line construction. However, within the corridor, all of the trees occurring within the forested wetlands will be cleared prior to construction. In addition, approximately 0.06 acre and 0.98 acre of cypress strand and hydric pine savanna are proposed to be filled during transmission line construction for the installation of keyhole pads with structures and the 15-ft-wide access road, respectively. The estimate for wetland impacts associated with access road construction is considered to be worst case (i.e., 0.01 acre of cypress strand and 0.67 acre of hydric pine savanna). If practical, other options other than construction of an access road along the entire length of the easement will be reviewed prior to construction. In any event, all wetland impacts will be mitigated through the joint ERP application process.

6.1.8.3 Solid Wastes

Any solid waste generated from right-of-way preparation and line construction generally consist of cleared vegetation and construction-related debris. It is expected most solid waste will be disposed in compliance with local landfill regulations and OUC's current operating protocol. Any onsite chipping or burning will be performed in compliance with all state and local regulations.

6.1.8.4 Changes to Vegetation, Wildlife, and Aquatic Life

There will be an alteration of vegetation communities within the transmission corridor. Tall-growing vegetation will be cut and kept at a height so as to not interfere with the conductors and to comply with the NESC. This will mean a reduction in forest cover habitats. The change will result in shrub or other low-growing vegetation dominating the corridor.

Wetlands impacts will occur in the form of vegetation clearing and fill for access roads/tower pads. Net wetland impacts due to fill is estimated to be 1.04 acres, while clearing will occur in 3.95 acres of wetlands. Construction is not expected to significantly affect hydroperiod due to minimization of road and pad fill and proper culverting where necessary.

No aquatic systems are present within the corridor, so there should be no impacts to these resources.

The net effect of clearing 3.95 acres for the transmission line will alter wildlife habitats, but not significantly. Other transmission line rights-of-way in the vicinity exhibited similar wildlife species utilizing those habitats. It is not expected any significant impacts will occur to any state or federal listed wildlife species.

6.1.8.5 Impact on Human Populations

The transmission line will be built entirely on property dedicated to electric power generation. No residences occur within the Stanton property, so, therefore, typical construction impacts such as noise, dust, traffic, etc., will not occur to people. No displacement of homes or taking of property will occur.

Offsite transportation of equipment, materials, and workers will occur along local roadways as described in Section 4.6. However, those impacts specific to transmission line construction will be an insignificant proportion of the Unit B construction impacts.

6.1.8.6 Impact on Regional Scenic, Cultural, and Natural Landmarks

No impacts will occur to any of these resources from construction of the transmission line.

6.1.8.7 Impact on Archaeological and Historic Sites

The transmission corridor contains no known archaeological sites and no obvious historic sites.

If unforeseen archaeological finds are discovered during construction, DHR will be notified. Following a determination of the importance of such finds, OUC/SPC-OG will work with DHR to assess any necessary mitigation measures

6.1.9 POSTCONSTRUCTION IMPACTS AND EFFECTS OF MAINTENANCE

6.1.9.1 Maintenance Techniques

OUC will inspect and maintain the transmission line and right-of-way by the following activities:

- Emergency patrol by vehicle and/or aerial survey in the event of damage to the line by severe weather, etc.

- Use of farm-type tractors with mowing and brush-cutting attachment to maintain the initial clearing of vegetation at intervals of 1, 2, or more years, as necessary.
- Application of herbicides, as required, in areas where the soil remains too wet for vegetation to be maintained by mechanical means.

Herbicides may be used throughout the right-of-way. Applications will include only those registered by EPA and that have the required state approval. Application rates and concentrations will be in accordance with the label directions. In most cases, the frequency of application will be one treatment every 3 to 5 years. Only in a very unusual situation would treatment be required more frequently.

Burning is not normally required for maintenance of the transmission line right-of-way. When extensive reclearing of the right-of-way is necessary, as during construction, limited burning of cleared vegetation may occur. Since the cleared right-of-way itself acts as a fire lane, no fire lanes are anticipated to be necessary.

6.1.9.2 Multiple Uses

Since the corridor occurs on Stanton property, no other uses are anticipated or would be allowed within the corridor.

6.1.9.3 Changes in Species Populations

The removal of tall-growing vegetation along the corridor will potentially reduce use by forest-dwelling/foraging birds. However, the acreage affected along this 3,200-ft corridor is insignificant compared to the acreage of forested habitats on the Stanton property and vicinity. Therefore, no significant impacts to regional populations of any species are expected.

6.1.9.4 Effects of Public Access

The Stanton site is a gated and fenced, controlled-access property. There will be no effects to or from public access.

6.1.10 OTHER POSTCONSTRUCTION EFFECTS

Other postconstruction effects include impacts from electric and magnetic fields, audible noise, radio and television interference, and ozone. However, since the proposed line will be constructed entirely on Stanton property, an analysis of these effects is not required as no offsite transmission facilities are required.

6.2 ASSOCIATED LINEAR FACILITIES

The Stanton Unit B project will require no linear facilities other than the onsite transmission line.

REFERENCES

Florida Division of Historical Resources (FDHR). 2006. Letter from Frederick P. Gaske, Director and State Historic Preservation Officer (SHPO), to Darren Stowe, ECT. January 24.

Florida Department of Transportation (FDOT). 1999. Florida Land Use, Cover and Forms Classification System (FLUCFCS). Handbook, 3rd Edition. Surveying and Mapping Geographic Mapping Section

7.0

ECONOMIC AND SOCIAL EFFECTS OF PLANT CONSTRUCTION AND OPERATION

Construction and operation of Unit B at the Stanton Energy Center will result in some economic and social effects. These effects will largely be beneficial. This chapter describes the socioeconomic benefits and costs.

7.1 SOCIO-ECONOMIC BENEFITS

The primary benefit to the region as a result of the project will be provision to the public of a new, clean, and reliable energy source using abundant, low-cost United States fuels. OUC rate payers will benefit directly from construction and operation of Unit B, which the Need for Power application demonstrates as the lowest-cost option for future electric generation.

The project will also provide other benefits to Orlando, Orange County, and the State of Florida in terms of employment and revenues. Major positive impacts will result from increases in the local economy to support project construction and operation. The addition of new jobs, increased property tax base, and the purchase of various goods and services will all provide the opportunity for significant positive benefits within the local community. (Note that all monetary figures in the following are in 2004 dollars.)

7.1.1 TAX REVENUES

The construction and operation of Unit B will create both direct and indirect tax benefits. Local revenues will be generated from property taxes levied on the plant site and facilities owned by SPC-OG. State taxes will be generated through sales taxes on all nonexempt construction materials and supplies required for the construction and operation of the plant.

Property taxes will be a primary revenue benefit for Orange County. Significant revenues are also expected to be generated through sales tax assessments on goods purchased directly for the plant or indirectly from purchase of goods and services by workers/employees

Construction workers can be expected to purchase goods and services, particularly from local retail businesses and restaurants. Where applicable, such sales will result in increased retail sales tax collection. Retail sales taxes will also apply to purchases of materials, supplies, and selected services required during operation.

7.1.2 WASTEWATER USAGE FEES

The Unit B project's operation will use an additional 2.6 MGD (on average) of reclaimed water supplied by the nearby Eastern Water Reclamation Facility (primarily for combined-cycle facility cooling tower makeup). Usage fees for this treated effluent are based on Orange County's published reclaimed water rate schedule for interruptible users with onsite storage.

7.1.3 INDIRECT REVENUES

Indirect benefits such as increased levels of spending in the site area by both the construction and operational workforce will also benefit the state and local economies. The proposed project is expected to have a significant, positive impact on local businesses and the local economy as a whole during construction. Numerous local businesses will benefit by servicing the project needs and the needs of its contractors and workers during construction. Purchases of a wide variety of services and supplies such as concrete, aggregate, lumber, conduit, cable, building supplies, office supplies, and tools are likely to be made locally, whenever available. Local restaurants and retail businesses will also benefit. Additional indirect state and local revenues will be generated from the purchases previously described through corporate income taxes, as well as retail sales taxes paid by the businesses and their employees.

7.1.4 TEMPORARY AND PERMANENT NEW JOBS

7.1.4.1 Construction Employment

Additional employment, even though temporary, will be a positive socioeconomic benefit to the area. As previously discussed in Section 4.6.2, total construction employment will average approximately 350 workers for the overall 28-month construction period. The average workers needed for the gasification island make up approximately 150 of the total, while those for the combined-cycle facility contribute the remaining approximately 200. As shown in Figure 4.6-1, the more labor-intensive period of construction will last between about 20 and 24 months. A peak of approximately 600 to 700 workers will be needed onsite for approximately 9 months. The construction workforce for the gasification island will peak at approximately 300, while the combined-cycle workforce will peak at slightly less than 500; the two peaks will not coincide in time, as shown in Figure 4.6-1.

Construction payroll for the overall project will total approximately $64 million. It is likely that a majority of the construction wages will be generated for Orange County residents. Another economic benefit from construction will be the use of local subcontractors and vendors to provide labor and goods. Although included in the construction workforce estimates, use of local subcontractors and vendors will contribute to the local economy.

To analyze the wider economic benefits of the construction of the proposed IGCC unit in the region, the Regional Input-Output Modeling System (RIMS II) developed by the U.S. Department of Commerce Bureau of Economic Analysis was used. RIMS II is widely used in both the public and private sectors to estimate regional impacts of a variety of projects. The modeling system accounts for the interindustry relationships within a region (Orange County) because these relationships largely determine how regional economics are likely to respond to project development. The outputs of RIMS II are region-specific multipliers that can be used to estimate the total impact of a project on earnings and jobs.

Table 7.1-1 shows the estimates of the regional impacts of construction based on:

- Construction payroll: $64,000,000
- Average number of workers: 350

- Direct-effect multiplier for construction earnings: 1.7723
- Direct-effect multiplier for construction employment: 1.8597

Table 7.1-1. RIMS II Impact Based on Initial Changes in Earnings and Employment

Initial Change	
• Earnings	$64,000,000
• Employment	350
Direct-Effect Multiplier	
• Earnings	1.7723
• Employment	1.8597
Impact on	
• Earnings	$113,427,000
• Employment	650

Source: U.S. Department of Commerce, Bureau of Economic Analysis, 2006.

RIMS II estimates that the impact in Orange County to construction of the IGCC unit is an additional $49,427,000 and 300 jobs.

7.1.4.2 Operation Employment

The Unit B IGCC facility overall will employ approximately 72 fulltime employees during the federal demonstration period and 53 thereafter. Most of these employees will likely reside in Orange County. Annual operations labor payroll will total approximately $6 million at the start of operations. Since it is presumed that the operations work force will reside locally, they will pay taxes and purchase housing and/or other goods and services locally, providing further positive benefits to the local economy.

Table 7.1-2 presents the RIMS II estimate for the regional impact of the IGCC unit during the initial phase of operation and for continuing operation based on the regional multiplier for power generation and supply. The multiplier for this industry has been able to be calculated because of the existing OUC units.

Table 7.1-2. RIMS II Operation Impacts

Operation	Demonstration Period	Continuing Operation
• Earnings	$6,000,000	$4,417,000
• Employment	72	53
Direct Effect Multiplier		
• Earnings	1.7025	
• Employment	2.8815	
Impact on		
• Earnings	$10,215,000	$7,520,000
• Employment	207	152

Source: U.S. Department of Commerce, Bureau of Economic Analysis, 2006.

RIMS II estimates that the impact to Orange County during the demonstration period is an additional $4,215,000 in earnings per year and a yearly increase of 135 jobs. For the remaining years of operation, the yearly additional earnings are estimated to be $3,103,000, and 99 additional jobs are projected.

7.1.4.3 Indirect Employment

Based on estimates prepared by SPC-OG, approximately 140 secondary positions could be created during the Unit B construction period. An additional 3,420 secondary positions will be beneficially impacted by the purchase of manufactured good/products. SPC-OG estimates that additional employment/secondary positions during the federal demonstration phase will be 37 and during the remainder of the long-term operation will be 20.

7.1.5 INCREASED KNOWLEDGE OF THE ENVIRONMENT

As discussed elsewhere, one of the goals of the Unit B project—and the major reason behind the project's significant federal funding—is to demonstrate at a commercial scale a power generation technology that will efficiently make use of an abundant domestic fuel in an environmentally acceptable way. Extensive monitoring of Unit B's processes and pollution control equipment will provide a large amount of data with which to assess the unit's performance, including its effects on the environment.

7.2 SOCIOECONOMIC COSTS

Socioeconomic impacts to the area, including impacts on community services, associated with Unit B construction and operation are expected to be minimal. Construction and operation of the proposed IGCC unit will not negatively affect essential community services or facilities, which in the Orlando metropolitan area are significant. Since, in all likelihood, the projected workforce will primarily commute from existing residences or temporary housing such as motels and apartments (with few permanent relocations anticipated), project-associated increases in spending are expected to benefit the local and regional economies, while not creating new demands on public services and facilities or housing.

7.2.1 TEMPORARY EXTERNAL COSTS

The temporary external costs associated with this project deal primarily with short-term traffic impacts due to construction. Construction traffic may result in increased wear on existing roadways and cause some traffic congestion along Alafaya Trail and Avalon Park Boulevard during morning or evening hours when workers are arriving or departing. Traffic congestion will be greatly alleviated by the completion of the Innovation Way connection to the BeeLine expressway, which is expected to be completed by mid-2008, before the construction workforce reaches its peak. Section 4.6.3.3 contains a more detailed discussion of traffic impacts during construction.

Residential areas are expected to experience no impacts from this project due to distance from the site and adequacy of existing forested vegetation to screen plant facilities. Most onsite activities will not be visible to residences in the area.

As discussed in Section 4.6, noise during construction will be masked by distance and the buffer area that separates the construction site from the surrounding residential communities. Given the extensive community service infrastructure in the area and the likelihood that much of the construction workforce will come from the local area, facilities such as schools and hospitals are not likely to experience stress during construction. The same can be said of housing resources.

Construction of Unit B is expected to generate some construction debris and municipal solid waste during construction. However, the project will attempt to minimize the amount of construction waste generated and will seek to segregate and recycle as much waste material as possible. Certain construction wastes, such as scrap steel, aluminum, copper, lumber, paper, and cardboard, etc., may be segregated for recycling, providing there is sufficient interest from local recycling firms. An authorized and licensed waste-handling contractor will remove all other construction waste materials from the site for proper disposal at the nearby county landfill. Given the size, capacity, and life expectancy of the county landfill, the wastes generated temporarily during construction will not tax that facility.

7.2.2 LONG-TERM EXTERNAL COSTS

The socioeconomic costs resulting from the long-term operation of Unit B are expected to be minimal and localized. The following summarizes some of these potential impacts.

7.2.2.1 Land Use

Unit B will be constructed on a site that has long been used for power generation. Furthermore, the surrounding area lands are either: (a) already developed (e.g., Avalon Park, county landfill, corrections center); (b) planned for development that is compatible with (or not affected by) the presence of the Stanton Energy Center (e.g., proposed industrial park); or (c) prohibited from any development (Hal Scott Preserve and Park). (All of the mentioned land use features or developments were previously described in Section 2.2.) As it represents a modest addition to the Stanton Energy Center, relative to the existing power generating units and associated facilities, Unit B will not affect any existing or planned land uses or zoning designations.

The long-term utility use of the site will mean that the IGCC project will not cause a negative land use conversion in the vicinity. No residents will be displaced or caused an economic loss as a result of the proposed facilities being constructed. The project's use of an existing power plant site will result in no displacement of any scenic or recreational lands, nor cause conversion of agricultural lands to non-agricultural uses. As discussed in Section 2.2.2, the construction and operation of Unit B is consistent with the current zoning.

The development of the project will use an existing, approved power plant site, and will cause no hardship that can sometimes be associated with the conversion of land use. The utilization of the Stanton power plant site will not displace any human populations. The development of the project at this site will not displace or significantly impact any recreational or other public lands. Based on its existing power plant use, existing vegetative buffers, and current setback distances, the addition of the proposed IGCC unit is not expected to cause detrimental impacts to real estate values to areas surrounding the site. In fact, that additional residential development is ongoing and/or approved in the vicinity of the Stanton Energy Center is evidence of the compatibility of the existing and proposed electrical generation use.

7.2.2.2 Aesthetics

The project location is not near any scenic viewsheds. Although the IGCC unit's tallest structure (stack) will be 205 ft tall, the buffer and lack of scenic viewsheds provided by existing plant facilities and surrounding vegetation, will minimize aesthetic impacts. The unit's tallest structures will be visible from selected area vantage points, but the view will not be incongruous with the existing Stanton power plant facilities. Therefore, impacts to aesthetic quality of the vicinity resulting from new structures will be negligible.

Also, as described in Chapter 3.0, the operation of the gasification island's ground flare will produce no visible flame during daylight hours. However, when operated at night the approximately 40-ft tall purple/blue flames may be visible from some distance from locations where there are lines of site to the plant.

7.2.2.3 Public Services/Facilities

Operation of the proposed generating unit will not negatively affect essential services or facilities. While it will rely on local police and fire protection, the existing Stanton plant site is already equipped with its own fire protection and other safety-related systems, and the site is secured with controlled, fenced access. Thus, any impacts on these community services will be minimal. A maximum of 72 employees will work at the IGCC unit when it becomes operational. This low number of employees will not materially affect provision of any local services. The significant medical facilities in the Orlando metropolitan area are sufficient to handle most emergencies involving either the larger construction workforce or the relatively few permanent facility staff for operations.

REFERENCES

U.S. Department of Commerce, Bureau of Economic Analysis (BEA). 2006. BEA's 1997 National Benchmark Input-Output Accounts and BEA's 2002 Regional Economic Accounts.

8.0

SITE AND PLANT DESIGN ALTERNATIVES

This chapter is optional for any project but is appropriate for the Stanton Unit B project as a place to summarize the review of alternatives prepared under the National Environmental Policy Act (NEPA). Alternatives analyses are also presented in this chapter to highlight the efforts of OUC and SPC-OG to minimize or mitigate environmental impacts during both the construction and operation phases of the Unit B project. Indeed, the whole project development effort, from site selection to conceptual design, has addressed environmental protection at every step. Some of the alternatives that were considered by OUC/ SPC-OG are presented in this chapter.

8.1 ALTERNATIVE SITES

The Stanton Energy Center site was the only site given detailed consideration or evaluation for this project. As a certified power plant site, with existing infrastructure, including coal delivery infrastructure, and because the private partners already enjoyed a business relationship at the site, Stanton was the only location identified in the team's proposal to DOE for federal funding support. During the process of developing previous proposals for similar efforts to commercialize this technology, other sites would have been under initial consideration. Such sites would have included co-location with existing power plants and greenfield sites in Alabama, New Mexico, Florida, North Dakota, and Pennsylvania. However, in support of the Unit B project no detailed site selection process was performed on any other individual location besides Stanton.

8.2 PROPOSED SITE DESIGN ALTERNATIVES

8.2.1 TECHNOLOGY SELECTION

As stated in Section 3.1, a primary objective of the Unit B project is to design, construct, and operate a transport gasifier that uses Unites States coal to generate syngas fuel for a commercial-scale, IGCC power plant. Although other gasifier technologies exist (e.g., oxygen-blown systems), and other coal-based fueling options exist (e.g., fluidized bed combustion), only the technology selected can meet the purpose and need for the action (i.e., demonstrating the commercial application of the technology itself). Accordingly, no other technologies were given detailed consideration or evaluation.

8.2.2 UNIT CONFIGURATION

The purpose of Unit B is to integrate the gasifier with a new combined-cycle unit. Consideration was given to integrating the gasifier instead with the existing Stanton A combined-cycle unit, which would require retrofitting Stanton A to combust syngas. Under this scenario, a new combined-cycle unit (i.e., Unit B) would still be built, but most likely as a natural gas-fired unit. This alternative was ultimately rejected because integrating the new combined-cycle unit would avoid retrofitting issues and promote design efficiencies. However, the impacts of this alternative are essentially indistinguishable from the preferred alternative. Integrating the gasification facilities with the existing Stanton A would have resulted in the construction of the same gasifier and support facilities in the same basic location while the independent construction of the same new planned combined-cycle went forward in essentially the same location on essentially the same schedule. After construction, the Stanton Energy Center would host one natural gas-fired combined-cycle and one IGCC under either scenario.

8.2.3 OTHER DESIGN ALTERNATIVES

Unit B will take full advantage of existing power generation infrastructure and facilities at Stanton. These include fuel delivery and handling, water supply (primarily treated effluent) and wastewater treatment and reuse, solid waste disposal, and electrical transmission. In terms of all but solid waste disposal, any alternatives would clearly involve greater environmental and other (e.g., cost) impacts. No advantages would be gained by other means of fuel delivery and handling, water supply and wastewater treatment, and electrical transmission.

Regarding solid waste/byproduct disposal, alternatives will be explored as part of Unit B operations. Alternatives to disposing the gasification ash in the onsite landfill include reburning in the existing coal-fired units at Stanton and beneficial reuses, such as activated carbon or cement kiln fuel. Similarly, alternatives to onsite landfilling will be investigated for the elemental sulfur produced as a byproduct of gas cleanup. The sulfur byproduct is expected to be of marketable grade quality and have commercial uses that would allow it to be sold offsite.

9.0

COORDINATION

The OUC/SPC-OG environmental team contacted various federal, state, regional, and local agencies and other individuals to provide inputs and information for use in the environmental documentation prepared under NEPA as well as this Supplemental SCA. Through these contacts, the team obtained comments and inputs on the environmental and socioeconomic conditions of the Stanton site area, the applicable regulatory requirements of various agencies, information related to the proper procedures with which to evaluate the project's potential impacts, and key issues or concerns to be addressed in the evaluation program. These agency and other contacts occurred beginning in March 2005, carrying on through February 2006. Table 9.0-1 presents a comprehensive listing of the agencies and individuals that were contacted regarding this project.

Table 9.0-1. List of Agency and Individual Contacts

Date	Agency	Person(s) Contacted	Type of Contact: Meeting with	Telecon with	Letter/ E-mail to	Letter/ E-mail from	Subject
03/31/05	FEMA	Map specialist			✓		Floodplain
04/05/05	Orange County Planning Department	Judy Stewart			✓		Planning, zoning requirements
04/06/05	FEMA	Map specialist				✓	Floodplain
04/06/05	FDOS, DHR	Web request					Cultural resources
04/11/05	FDOS, DHR	Lauren E. Kasak				✓	Cultural resources
04/27/05	FDEP, Bureau of Air Resources	Cleve Holladay			✓		Emissions inventories
05/02/05	Orange County Planning Department	Ian McDonald				✓	Planning, zoning requirements
05/05/05	USFWS	Dave Hankla			✓		Threatened/endangered species
05/10/05	FDEP, Bureau of Air Resources	Yi Zhu				✓	Emissions inventories
05/16/05	Orange County Health Department	Joyce Bittle		✓			Location of water wells in the site vicinity
05/16/05	FDEP, Drinking Water Compliance/Enforcement	Manuel Cardona		✓		✓	Water wells within a 3-mile radius of site
05/16/05	SJRWMD	Helen Cleveland		✓			Location of water wells in the site vicinity
05/25/05	Orange County Planning Department	Mike Rigby		✓			Tribal lands
07/07/05	FDEP, Bureau of Air Resources	Cleve Holladay			✓		PSD sources
07/15/05	USFWS	Dave Hankla			✓		Threatened/endangered species

Table 9.0-1. List of Agency and Individual Contacts (Continued, Page 2 of 3)

Date	Agency	Person(s) Contacted	Type of Contact: Meeting with	Type of Contact: Telecon with	Type of Contact: Letter/ E-mail to	Type of Contact: Letter/ E-mail from	Subject
07/18/05	Orange County Public Works Department, Engineering Division	Ghulam Qadir	✓	✓			Avalon Parkway extension
07/18/05	Orange County Public Works Department, Engineering Division	Jonathan J. Fong	✓	✓			Avalon Parkway extension
07/25/05	Lochrane Consulting Engineers, Surveyors	William E. Wythe	✓	✓			Avalon Parkway extension
07/27/05	FDOS, DHR	Michelle Cremer				✓	Cultural resources, Site No. 254
07/28/05	SJRWMD	Barbara Clark		✓			Mercury data for Econlockhatchee River
07/29/05	FDEP	Deborah Nelson			✓	✓	Meteorological data
07/29/05	SJRWMD	Carol Lippincott		✓			Mercury data for Econlockhatchee River
07/29/05	FDEP	Pat O'Connor		✓			Mercury data for Econlockhatchee River
08/01/05	EPA	Christian Fellner			✓		NSPS applicability
08/02/05	FDEP	Carrie Christmas		✓			Mercury data for Econlockhatchee River
08/02/05	Orange County EPD	Julie Bortles		✓			Mercury data for Econlockhatchee River
08/02/05	Seminole County	Gloria Eby		✓			Mercury data for Econlockhatchee River
08/04/05	Orange County EPD	Julie Bortles				✓	Mercury data for Econlockhatchee River
08/08/05	SJRWMD	John Huynh		✓			Mercury data for Econlockhatchee River
08/12/05	FDEP, Bureau of Air Resources	Deborah Nelson			✓		PSD sources

Table 9.0-1. List of Agency and Individual Contacts (Continued, Page 3 of 3)

Date	Agency	Person(s) Contacted	Type of Contact: Meeting with	Type of Contact: Telecon with	Type of Contact: Letter/ E-mail to	Type of Contact: Letter/ E-mail from	Subject
08/12/05	EPA	Christian Fellner		✓			NSPS applicability
08/14/05	EPA	Christian Fellner			✓		NSPS applicability
08/15/05	FDEP	Deborah Nelson				✓	PSD sources
08/22/05	EPA	Christian Fellner				✓	NSPS applicability
10/26/05	Orange County Public Works	Various	✓				Status of road improvement projects
12/16/05	FDEP	Buck Oven and others	✓				Introduction to project and status of pending application
01/13/06	FDEP	Deborah Nelson			✓	✓	Dispersion Modeling Protocol
01/18/06	FDEP, SJRWMD, Orange County (various departments)	Various	✓				Introduction to project, site tour, and status of pending application
01/18/06	FDEP	Deborah Nelson				✓	Dispersion Modeling Protocol
01/19/06	U.S. Army Corps of Engineers	Jeff Collins	✓				Introduction to project, site tour, and status of pending application
01/24/06	FDOS, DHR	Frederick Gaske				✓	Cultural resources—transmission line area
02/06/06	FDEP	Al Linero and others	✓				Description of technology
02/09/06	International Corporate Park	spokesperson		✓			Status of road improvement projects

Source: ECT, 2006.