

ORLANDO UTILITIES COMMISSION

**CURTIS H. STANTON ENERGY CENTER
UNIT 1**

SITE CERTIFICATION APPLICATION

VOLUME 1

**SITE CERTIFICATION
APPLICATION**

**ORLANDO UTILITIES COMMISSION
CURTIS H. STANTON ENERGY CENTER
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VOLUME 1

REQUEST FOR MODIFICATION OF CERTIFICATION 1
SUMMARY DESCRIPTION OF CHANGES TO APPLICATION

On December 14, 1982, the Honorable Bob Graham, Governor, signed the Certification Order granting certification pursuant to Chapter 403, Part II, Florida Statutes, for the location, construction, and operation of the Curtis H. Stanton Energy Center, Unit 1, its associated facilities, and its directly associated transmission lines as proposed in the amended application and evidence of record, subject to the Conditions of Certification attached to the Order.

The design concepts for several features of the project have been changed. In accordance with Section 17-17.211 F.A.C. adopted 5/9/83, a Request for Modification of Certification is submitted. This request is a result of changes in six components of the certified facility. The related substantive revisions of the Site Certification Application for the Curtis H. Stanton Energy Center Unit 1 are summarized in the following paragraphs.

- Railroad Corridor. A small portion of the railroad corridor has been changed to accommodate realignment of the railroad spur to avoid newly planned residential developments. Section 2.3 of the application has been revised to demonstrate that the Florida Department of State has reviewed the modification and has found that no archaeological or historic sites have been recorded within the added corridor area. A new Exhibit 2.3-2 has been added to demonstrate these findings. Section 2.7 has been modified to incorporate the results of field surveys of affected terrestrial ecosystems, wetlands, and endangered or threatened species. A new Figure 2.7-7a has been added to illustrate the vegetative communities of the modified railroad corridor. Section 3.9, Subsection 3.9.1, has been revised to describe the railroad corridor as modified. Figure 3.9-1 has also been revised to show the extent and nature of the corridor modification.
- Fugitive Dust Control. Section 3.2, Subsection 3.2.4, has been revised to more accurately describe the measures to be installed

or used to reduce fugitive coal dust emission levels. Table 3.2-2 has been revised to correspond with planned coal dust control facilities. Section 3.7, Subsection 3.7.2.1, has been changed to correspond to facilities for fugitive dust control to be installed. Subsection 3.9.4 and Table 3.9-1 have been revised to correspond to those specific measures currently planned for fugitive dust control for limestone handling facilities. Section 5.5, Subsection 5.5.1, has been revised to include all fugitive dust control references in the application.

- Radioactive Level Detectors. Section 3.9 has been revised by the addition of Subsection 3.9.7 to include the planned installation and use of a number of devices based on emission and interception of radioactivity to detect levels of fluids, bulk materials, or waste products in various plant systems. Appendix 3.9A has been added to provide completed application forms for radioactive materials licenses as they would be submitted to the Florida Department of Health and Rehabilitative Services, Radiation Control.
- Main Plant Access Road. Section 2.2, Subsection 2.2.2.1, has been modified to express correct relationships between the transmission lines and a new Orange County road and the modified pipeline route.

Section 3.9, Subsection 3.9.2, has been changed to reflect that vehicular access to the Stanton Energy Center will be provided by a new Orange County road. The main plant access road shown in the amended application will not be constructed. Figure 3.9-6 has been revised to illustrate the route of the new Orange County road.

- Water Supply Source. Chapters 2.0 and 3.0 have been revised in several sections to reflect that makeup cooling water supply will be obtained from the Orange County Easterly Subregional Wastewater Treatment Plant instead of from the Iron Bridge Road Regional

Water Pollution Control Facility in Seminole County. Subsection 3.1.3 has been changed to indicate that the Orange County Plant will receive and treat cooling tower blowdown and plant drainage in excess of power plant needs. Sections 2.2 and 3.3, Subsections 2.2.3, 3.3.1, and 3.3.2 have been revised to reflect the change in the source of makeup cooling water. Table 3.3-2 and Figure 3.3-1 have also been changed to reflect this change. Section 3.4 has been revised to account for the change in cooling water supply source and quality. Table 3.4-1 has been changed to provide an estimate of the chemical analysis of the Orange County Plant effluent. Table 3.4-2 has been revised to reflect the chemical analysis of the circulating cooling water based on the Orange County Plant effluent as makeup. Section 3.5, Subsection 3.5.1, has been revised to recognize the Orange County Plant as the source of makeup water and to provide a revised estimate of chemical treatment requirements.

Section 5.1, Subsection 5.1.7.3, has been revised in view of the changes in the quality of the cooling water makeup supply. The Orange County Plant effluent contains lower concentrations of dissolved solids than the Iron Bridge Facility effluent and will undergo complete advanced treatment including nitrate removal. Based on this improved quality, the circulating water analysis shows lower total dissolved solids which reduces deposition of salts by cooling tower drift. Figures 5.1-1 and 5.1-2 have been revised to show lower contour values for the salt deposition isopleths. Section 5.9 has been modified to delete the request for a variance or exemption from the ground water standard for nitrate nitrogen.

- Makeup and Return Water Pipelines. Section 2.2, Subsection 2.2.2.1, Section 2.5, Subsection 2.5.16, and Section 3.9, Subsection 3.9.1, have been modified to show a new and shorter pipeline route which is a result of the new Orange County road and the change in the source of cooling water makeup. Figure 3.9-6 has been revised to

show the modified pipeline route in relation to the new Orange County road and the Orange County Plant. Section 2.7, Subsections 2.7.7.7, 2.7.7.8, and 2.7.7.9 have been deleted and Figure 2.7-9 has been deleted. Subsection 2.7.8 has been revised to delete references to Figure 2.7-9.

INTRODUCTION

This Site Certification Application is being submitted by Orlando Utilities Commission for the Curtis H. Stanton Energy Center. It is intended to serve the following purposes.

- Site Certification Application for Unit 1 of the Curtis H. Stanton Energy Center.
- Site Certification Application for Ultimate Site Development of the Curtis H. Stanton Energy Center.
- Application for a Prevention of Significant Deterioration (PSD) permit for Units 1 and 2 of the Curtis H. Stanton Energy Center as required by the Clean Air Act.
- Joint Application (U.S. Army Corps of Engineers and Florida Department of Environmental Regulation) for dredge and fill permit for site development and construction of all associated facilities for Unit 1 of the Curtis H. Stanton Energy Center as may be required by the Clean Water Act.

For purposes of the PSD permit, the two-unit application is for phased construction. The applicant understands that construction of Unit 1 must commence within 18 months after receiving PSD approval and that Unit 2 construction must commence within 18 months of the scheduled commence construction date. The Unit 2 scheduled commence construction date for purposes of this PSD phased construction permit application is July 1, 1990.

Best Available Control Technology (BACT) has been demonstrated by the applicant in this Site Certification Application for Unit 1. The BACT for Unit 2 is currently proposed as identical to Unit 1. However, the applicant understands that the PSD permit for Unit 2 will be reopened for a new determination of BACT prior to the commencement of Unit 2 construction.

As provided for under recent amendments to the Florida Electrical Power Plant Siting Act, a separate Need for Power document has been submitted to the Florida Public Service Commission. That document is intended to establish the need for Unit 1 only of Curtis H. Stanton Energy Center.

The need for Unit 2 and subsequent units will be demonstrated when required for their construction. Information previously requested by the Florida Department of Environmental Regulation in Sections 1.0 and 8.2 of the Site Certification Application have been omitted from this document since it is contained in the separate Need for Power document.

The pertinent applicant information is provided in the following pages.

PERTINENT APPLICANT INFORMATION

Legal Name

Orlando Utilities Commission

Mailing Address

P. O. Box 3193
Orlando, Florida 32802

Address of Official Headquarters

500 S. Orange Avenue
Orlando, Florida 32801

Business Entity

The applicant is an independent authority engaged in the generation and distribution of electric power to persons within the service area.

Name and Title of Chief Executive Officers

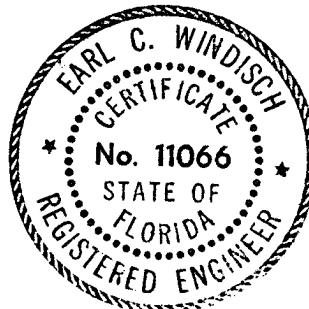
Grace C. Lindblom	- President
H. E. Johnson	- First Vice-President
W. M. Sanderlin	- Second Vice-President
William D. Frederick, Jr.	- Mayor
Charles J. Hawkins	- Immediate Past President
C. H. Stanton	- Executive Vice-President and General Manager

Name, Title, Address, and Phone Number of Official Representative Responsible For Obtaining Certification and To Whom Questions Concerning the Application Should Be Addressed

B. E. Shoup, Director, Environmental Divisions
500 S. Orange Avenue
Orlando, Florida 32801

Professional Engineer Submitting Application

Earl C. Windisch, Florida Registration Number 11066



Site Location

The preferred site for Curtis H. Stanton Energy Center is located in Orange County, Florida.

Nearest Incorporated City

Orlando, Florida

Latitude and Longitude

The preferred site is located at 28°28'50"N latitude and 81°09'40"W longitude.

Coordinates

The Universal Transverse Mercator (UTM) coordinates are:

3150500 North
484000 East

Proposed Nameplate Generating Capacity

Curtis H. Stanton Energy Center Unit 1 turbine will have a nameplate generating capacity of 425 megawatts (MW), and is scheduled for commercial operation in November 1986. Unit No. 2 turbine will have an approximate nameplate generating capacity of 425 MW, and is tentatively scheduled for commercial operation in January 1994. Units 3 and 4 have not been sized or scheduled at this time. Ultimate site development is planned to be around 2,000 MW.

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AMENDMENT 4--SUMMARY DESCRIPTION OF CHANGES

Amendment 4 provides revisions, corrections, and additions of information for the Curtis H. Stanton Energy Center--Unit 1 Site Certification Application submitted to the Florida Department of Environmental Regulation by the Orlando Utilities Commission. Some of the changes have resulted from the normal evolution of engineering design details, while others are the direct result of Florida Department of Environmental Regulation comments of July 23, 1981. Amendment 4 makes several editorial corrections and the following substantive revisions.

- (1) Revised acreage numbers for onsite facilities.
- (2) Revised discussion of plant service water use and pumpage of the Floridan aquifer.
- (3) Revised pond and basin sizes and seepage rates as shown in Figure 5.3-2.
- (4) Added a "worst case" unwashed Illinois Basin coal to BACT analysis.
- (5) Revised air emissions and air quality impact numbers to reflect "worst case" unwashed Illinois Basin coal.
- (6) Revised description of bottom ash handling.
- (7) Revised description of railroad spur crossing of Boggy Creek Road.
- (8) Revised size of makeup water supply pond and estimated liner costs in Section 5.9, Variance Request.
- (9) Revised lists of parameters to be used in ground water quality monitoring programs.

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1.0 PURPOSE OF PROPOSED FACILITY AND ASSOCIATED TRANSMISSION

Recent amendments to the Florida Electrical Power Plant Siting Act require a separate Need for Power Document to be submitted to the Florida Public Service Commission. This new document contains the materials previously required in Section 1.0 and 8.2 of a site certification application. Since this separate document has been prepared and submitted for the Curtis H. Stanton Energy Center Unit 1 project, the information formerly included in this section has not been repeated here.

2.0 THE SITE

2.1 SITE LOCATION AND LAYOUT

This section of Chapter 2.0 provides information concerning the geographic location of the proposed site, pertinent published maps which include the area, communities in the vicinity, adjacent properties, anticipated uses of the site in comparison to existing uses, modifications expected, and special environmental features.

2.1.1 Site Location

The Stanton Energy Center site is located in Orange County, Florida. The geographic coordinates of the center of the site are 28° 29' north latitude and 81° 10' west longitude. According to the U.S. Geological Survey topographic survey, the site consists of sections 13 and 24 and the E 1/2 of sections 14 and 23, R31E, T23S and sections 18 and 19, R32E, T23S. These sections all are shown on the USGS 7-1/2' Narcoosee NW Quadrangle. The site location relative to the Orlando, Florida area is shown on Figure 2.1-1. Site railroad and road access are also shown on Figure 2.1-1. The site location relative to adjacent properties is shown on Figure 2.1-2.

2.1.2 Site Modification

The site consists of 3,280 acres. The initial development of the site will involve the use of approximately 960 acres with the ultimate development utilizing approximately 1,100 acres. The arrangement of the plant on the site and the area to be modified by development of the site are shown on Figures 2.1-3 and 2.1-4.

2.1.3 Existing and Proposed Uses

Presently, the site primarily is used as a livestock range with most of the site also leased for hunting. A half section and an adjacent quarter section on the western edge of the site have been plotted into residential lots. The plotting has not been recorded. No developments exist on the

lots or any other portions of the site. Several hunter stands have been found on site.

Once the site is developed, approximately 1,100 acres of the site will be used or occupied by the plant facilities. The remaining acreage may be leased for livestock grazing.

Several trees on site have nest cavities of the red-cockaded woodpecker. The developed area of the site will include some of these trees, but no active trees will be removed for Unit 1 development and one active tree removed for ultimate site development. The ultimate site development with respect to cavity trees and wetlands is shown on Figure 2.1-5.

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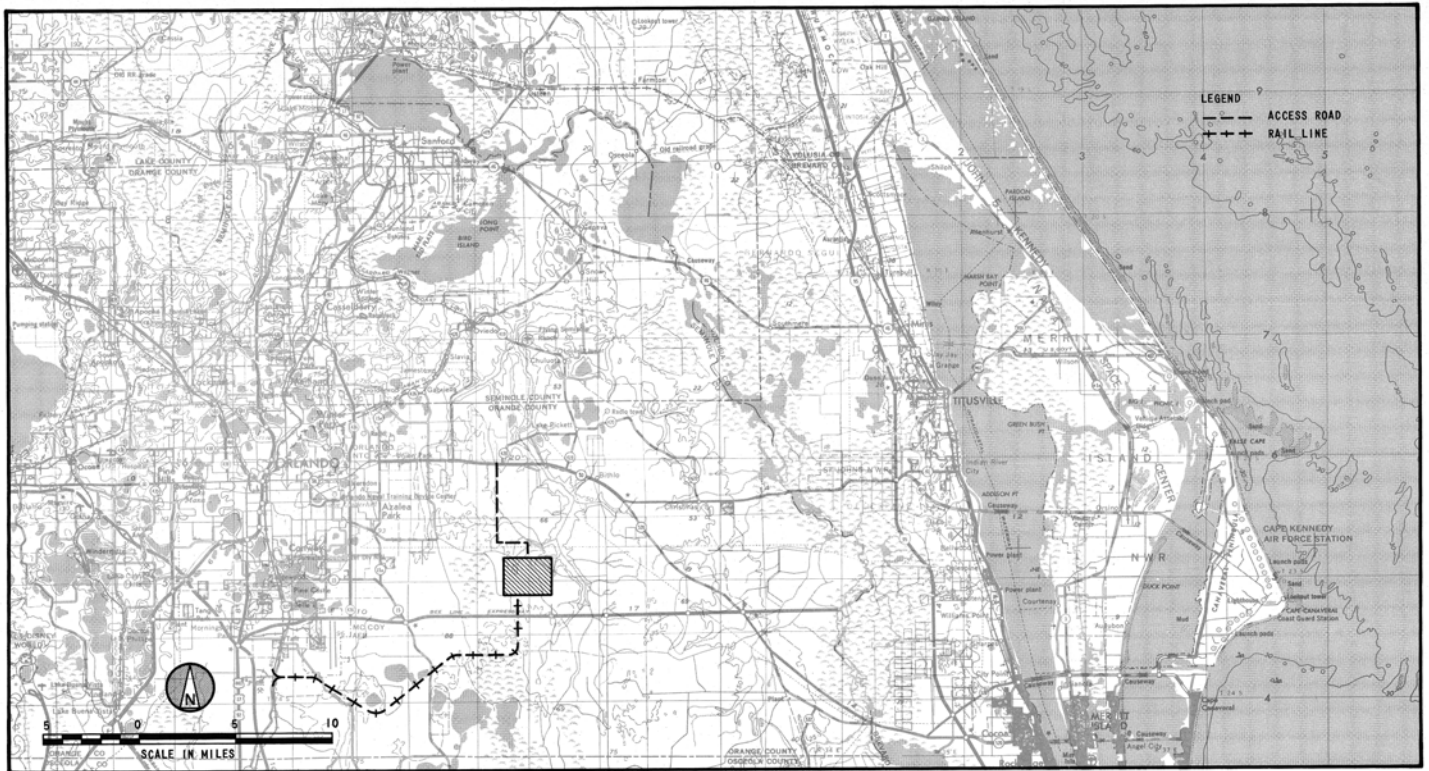


FIGURE 2.1-1. SITE LOCATION

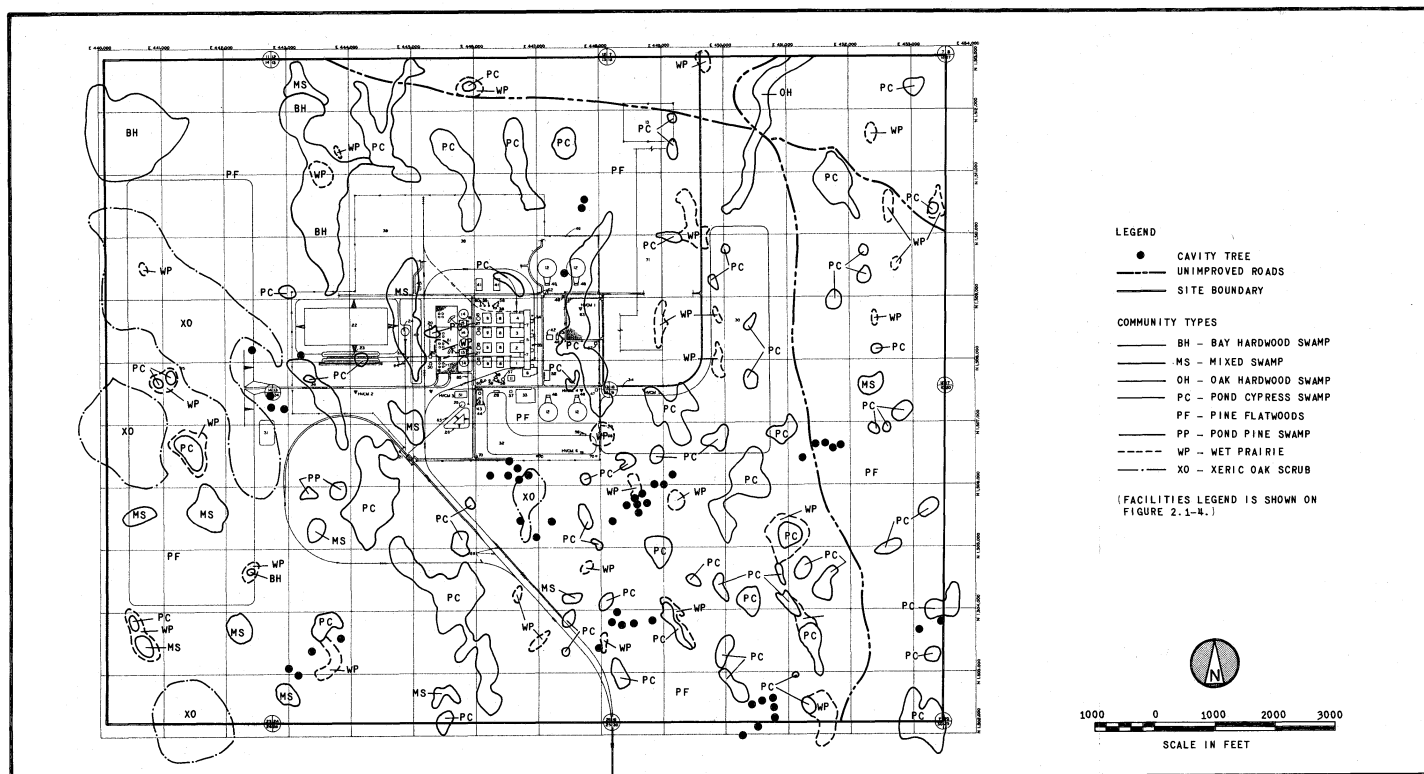


FIGURE 2.1-5. SITE ARRANGEMENT
IN RELATION TO
RED-COCKADED WOODPECKER
CAVITY TREES AND
WETLANDS OF THE SITE

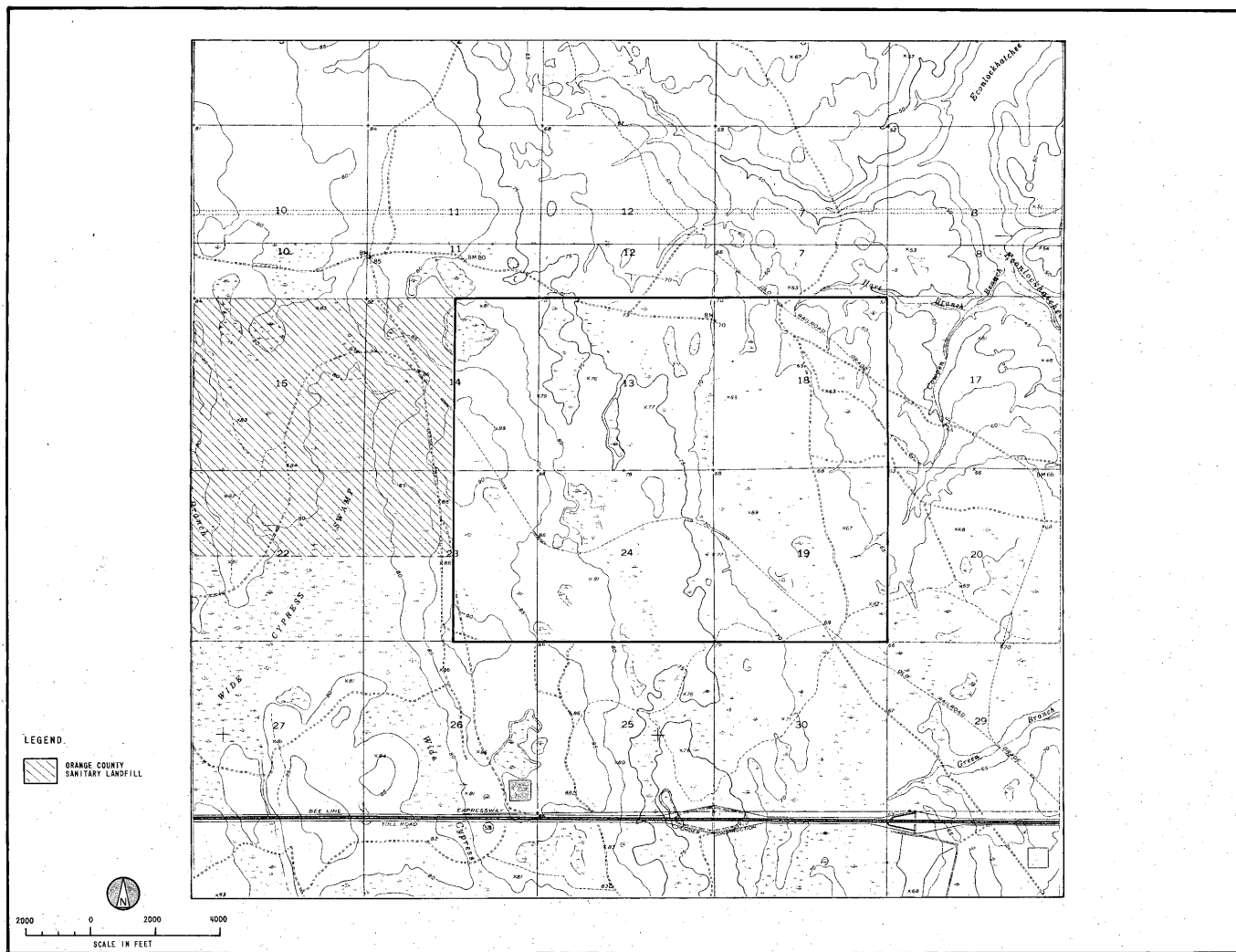
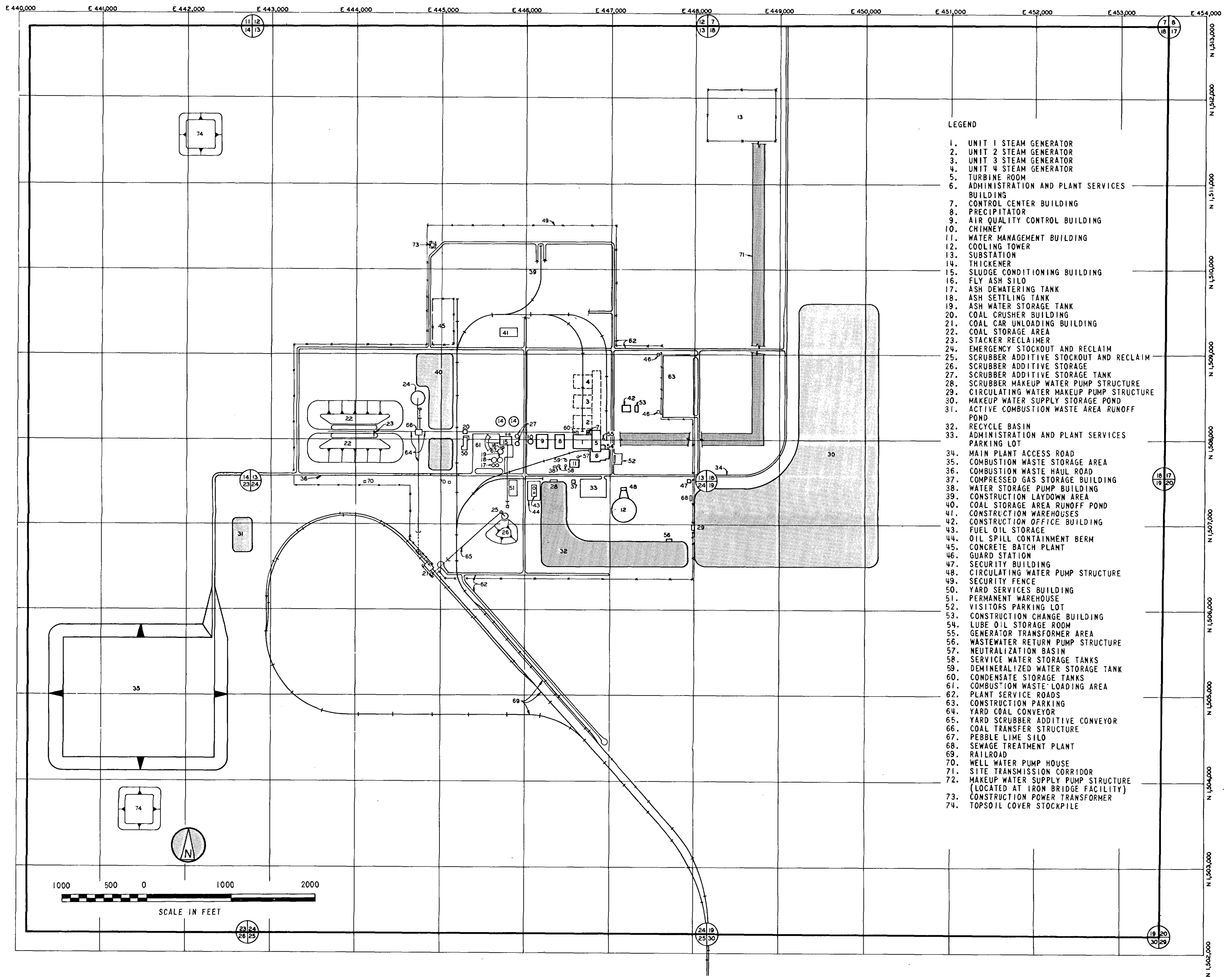
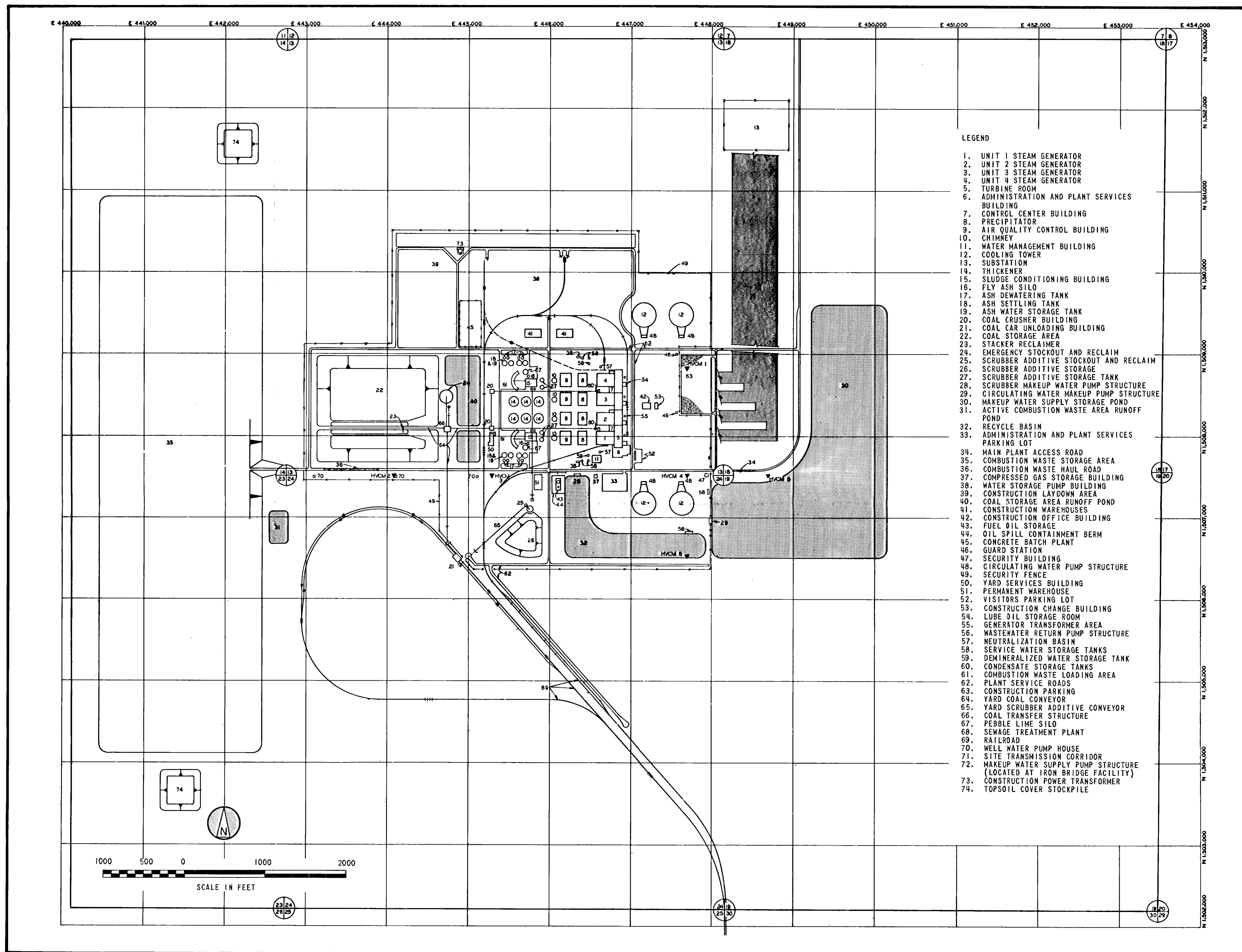


FIGURE 2.1-2. CURTIS H. STANTON ENERGY
CENTER AND ADJACENT TERRAIN

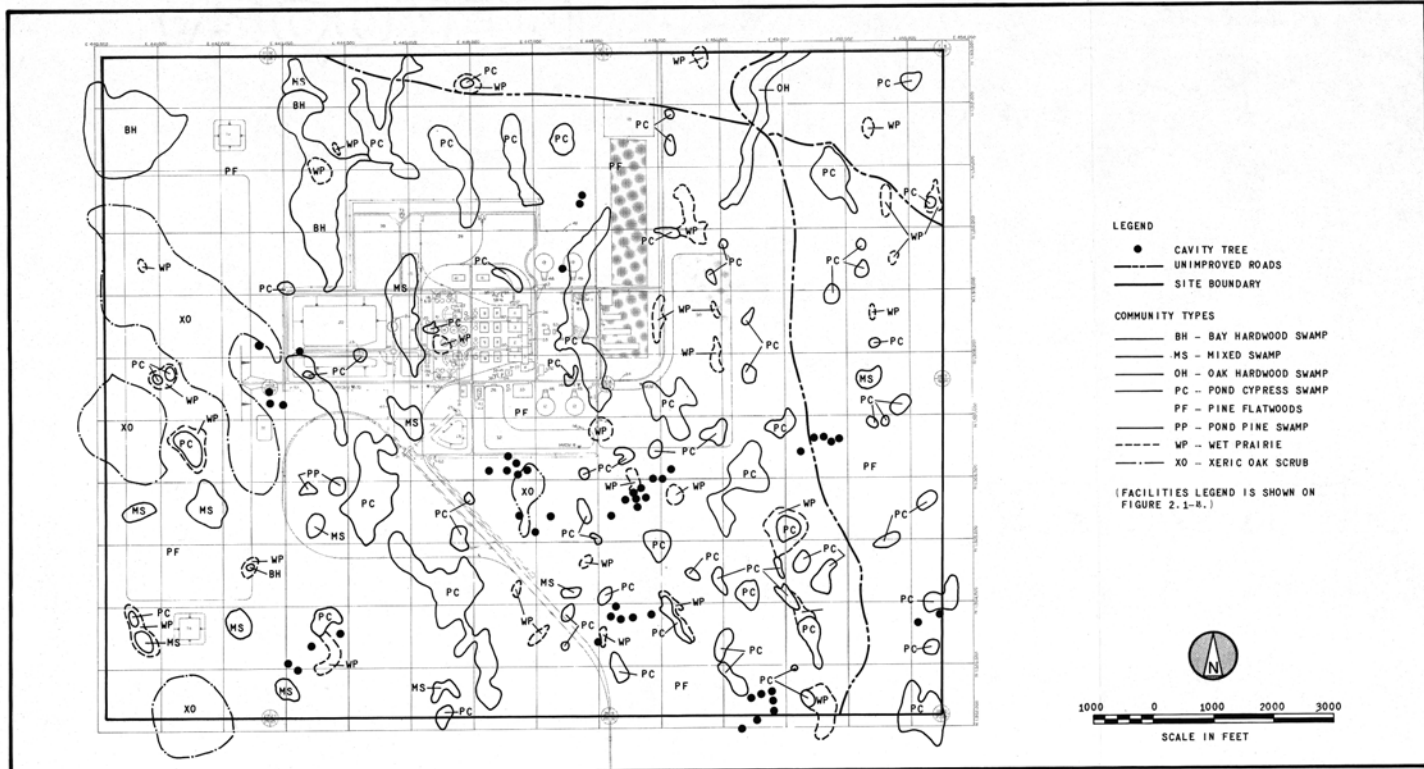




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FIGURE 2.1-4. CURTIS H. STANTON ENERGY CENTER
FACILITIES ARRANGEMENT-4 UNITS



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FIGURE 2.1-5. SITE ARRANGEMENT
IN RELATION TO
RED-COCKADED WOODPECKER
CAVITY TREES AND
WETLANDS OF THE SITE

2.2 REGIONAL DEMOGRAPHY, LAND AND WATER USE

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2.2.1 Demography

There are no existing residences on the proposed plant site. Therefore, no relocation or displacement of people will be involved.

According to the Orange County Planning Department, in 1980 there were 447 dwelling units within an approximate 5-mile radius of the proposed stack location. The 1980 population within that 5-mile radius was estimated at 783.⁽¹⁾ There are no incorporated communities within the area.

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2.2.2 Land Use

2.2.2.1 Site and Corridors. Under natural and undisturbed conditions, the site and transmission line, access road, railroad and water supply pipeline. corridor lands are suitable for native or improved pasture and forest. These natural conditions are referred to as flatwoods. Wetlands, serving as drainageways to larger swamp or lake areas or isolated and poorly drained areas, are frequently encountered in the flatwoods. A detailed discussion of the existing vegetation is presented in Section 2.7.

The site has been used for the grazing of livestock. There are scattered wooded and wet areas on the site. The east half of Sections 13 and 14 and the northeast quarter of Section 23 have been under lease for hunting purposes. There are no residences on the site. There are some wooded areas on the site. While lumbering activities have been occurring near the site, no lumbering activities have been observed on the site.

Approximately 960 acres of the site will be occupied or modified by the plant construction. The proposed site layout is shown on Figures 2.1-3 and 2.1-4. As a result of the presence of "endangered" Red Cockaded Woodpeckers on the site, considerations in modification of the site are to

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minimize any adverse effect on this species' habitat as well as to minimize wetland impacts.

The railroad access route will cross approximately 2.5 miles of wetlands, comprising 14 per cent of the total route length. Trestle construction across some of the wetlands would reduce the extent of disturbance of these areas. Details of this construction is presented in Subsection 4.1.2 The remaining 86 per cent of the route length is comprised of more typical, better drained, flatwoods. The route will not traverse any prime or unique farmlands identified by the U.S. Department of Agriculture Soil Conservation Service. The transmission line will span a small existing citrus grove.

Approximately 3.5 miles of the railroad access route will parallel existing road right-of-way (ROW), which represents 20 per cent of the total route length.

There are 21 residences or other structures located within 1,320 feet of the route centerline. Seventeen of the structures, or 81 per cent, are located within 4.5 miles of the intertie with the railroad mainline. These structures are located in Sections 17 and 21 of Township 24 South, Range 31 East.

The modified water supply pipeline route is presented in Section 3.9. It will be approximately 4 miles long immediately adjacent to and parallel to the new Orange County road between the Stanton Energy Center and the Orange County Easterly Subregional Wastewater Treatment Plant. The entire 4 miles of pipeline will be installed on land previously disturbed by the road construction. The pipeline will not traverse any prime or unique farmlands identified by the U.S. Department of Agriculture Soil Conservation Service. The pipeline route will not disturb any existing citrus groves.

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The new transmission corridor will parallel the existing transmission line corridor for 5.5 miles of its total 6-mile route. The new transmission corridor will parallel the new Orange County road and pipeline corridor for about one-half mile.

The new transmission corridor will traverse approximately 1.5 miles of wetlands, comprising 25 per cent of the total route length. The remaining 75 per cent of the route length is comprised of more typical, better drained, flatwoods and a small citrus grove. The transmission lines will not traverse any prime or unique farmlands identified by the U.S. Department of Agriculture Soil Conservation Service. The transmission lines will span the small existing citrus grove.

There are two residences adjacent to the south side of the existing transmission corridor. Since corridor expansion is to the north, these residences will not be disturbed.

2.2.2.2 Regional Land Uses. The site is located four and three-fourths miles south of Highway 50 and one mile north of Bee Line Highway in eastern Orange County, Florida. The Econlockhatchee River is about three-fourths mile east of the northeast corner of the site boundary. The Orange County Solid Waste Disposal facility is adjacent to the site along the west boundary.

There are no incorporated areas within five miles of the plant. The community of Bithlo, near the five-mile periphery, was incorporated from about 1920 to 1977. In 1977, the incorporation was dissolved and the area reverted back to Orange County, which now provides the zoning and services for the area.

Figure 2.2-1 shows the site area with one mile increment circles drawn from the center of the plant site. The one-mile radius from the plant is almost entirely within the plant site boundaries. No existing or currently proposed development within three miles of the plant is known to occur.

Existing ordinances provide approval for the development of four new residential areas to the northwest of the site. Included in these developments are High Point Road, Dean Road Condominiums, Gulf Stream and, Colony East. Construction is currently underway on Phase I of the High Point Road development and Gulf stream. Housing units nearest the site are proposed in the Dean Road development three miles north-northwest of the plant. The other three developments will extend northwesterly past the four-mile radius.

Existing development in the Bithlo area begins about three and one half miles north-northeast of the plant. The density of residential development increases between the four- and five-mile radii. About four and one-fourth miles to the east of the plant, is a residential development tract identified as Cape Orlando which has been plotted and approved by the County, and consists of nearly 10 full sections of land. Some building sites have been sold, but not much actual development has occurred. Most of this tract is outside the five-mile radius of the plant, however, some of the tract is within the east-northeast to east-southeast direction between the four- and five-mile radii. To the south and west of the plant, there is no residential development within five miles of the plant.

The Orange County Planning Department estimates future dwelling units within 5-miles of the plant to total 469 in 1985 and 537 in 1990, with population increasing to 930 in 1985 and 1,261 in 1990.⁽¹⁾

There are some logging activities in areas near the plant site. These logging operations are rather limited.

Current zoning of the plant site and within a five-mile radius of the plant is mostly classified as "A-2," which is defined as a Ranch and Farmland Rural District with one-half acre lot size. Exceptions are the Bithlo area northeast of the plant, the Cape Orlando area east and southeast of the plant, and the proposed development area northwest of the plant. The Bithlo and Cape Orlando areas are predominately classified as "R-1A" which is defined as a Single Family Residential District with 7,500 square feet lot size. A portion of the Cape Orlando area is zoned R-1AA which is Single Family Residential with 10,000 square feet lot size. The area of

Larry Allen

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proposed development to the northwest of the plant is classified "P-D" which is defined as a Planned Development District.

The zoning within the railroad corridor, located south and west of the plant site and beyond the five-mile radius, is mostly classified as "A-2." However, at the junction of the Seaboard Coast Line mainline and the plant rail line, there is a small segment of "I-4," which is defined as General Industrial District. Adjoining the "I-4" classification and the Orlando International Airport is an area classified as "I-5," which is defined as Airport Industrial District.

The zoning within the pipeline corridor, located north and west of the plant site and beyond the five-mile radius is multi-classification. These classifications include "R-1" (Single Family Residential with a minimum 6,000 square feet lot size) and "C-1" (Neighborhood Retail Commercial District) south of Highway 50. The two one-mile sections south of the Orange/Seminole County boundary are "R-3" classification which is defined as a Multiple Family Residential District. In Seminole County, north of the county boundary, there is a combination of "U-C," "R-M-Z," and "A-1" districts. The "U-C" classification is defined as a University Community; "R-M-Z" as a Residential Mobile Home District; and "A-1" as a Citrus Rural District, with minimum one-half acre lot size.

Zoning along the transmission line corridor, which is located north of the plant site going east and west, is mostly "A-2" within the five-mile radius. There is a small segment of "P-D" classification adjacent to the five-mile radius northwest of the plant site. The remainder of the corridor to the substation is predominately "R-1A."

An application for a special exception for a utility plant will be filed and pursued later with the County Zoning Board of Adjusters and County Commissioners. This application will include all offsite facilities as appropriate.

There is an existing 220 foot-wide transmission line corridor one-fourth mile north of the plant site boundary. This corridor contains two

2.2-4a

sets of transmission lines which connect Indian River Power Plant, near Titusville, Florida, and Pershing Substation at Orlando, Florida. One set of lines consists of two 115 kV lines on wooden structures and the other set is a 230 kV line on steel structures. The corridor extends beyond the five-mile radius both east and west. It is proposed that power from this plant will be transmitted to Pershing Substation via this corridor. There are no other existing nor proposed corridors within the five-mile radius.

Citrus groves occur between the four- and five-mile radii to the northeast, southeast, and northwest of the plant site. There are no citrus groves located within four miles of the plant location. There are no prime or unique farmlands, as identified by the U.S. Department of Agriculture Soil Conservation Service, within five miles of the plant site.

There are no state or federally owned lands within five miles of the plant site.

2.2.3 Water Use

Water resources in the site vicinity (5 mile radius) include the Econlockhatchee and Little Econlockhatchee Rivers and the Floridan aquifer. These resources are east and west of the site, respectively, while the Floridan aquifer underlies all of Orange County. See Figure 2.2-1 for the location of surface waters within the site vicinity. No major streams are on the plant site. A small segment of the Hart Branch of the Econlockhatchee River extends into the northeast portion of the site which will not be disturbed by construction or operational activities. The Floridan aquifer will supply plant service and potable water, and the Orange County Easterly Subregional Wastewater Treatment Plant will supply cooling tower makeup.

RFM-1

Major water uses onsite, and in the site vicinity, are for agricultural purposes such as irrigation, livestock watering, and various rural domestic uses. No irrigated lands are onsite, and only a very few are present in the site vicinity. Most irrigated lands are found in the western portion of the county, where specialty citrus and vegetable crops are grown. Although no data exist on agricultural water uses for the site vicinity specifically, historical data are available on a county-wide

basis.⁽²⁾ Over 46,300 acres in Orange County were irrigated in 1977, using over 68,900 acre-feet of water. Rural domestic and livestock uses were 9.3 mgd for the same year. More than 80 per cent of the water used for agricultural purposes in 1977 came from ground water sources.

No known industrial water users are onsite, or in the site vicinity. One major water user in the county is the citrus processing industry. This industry used an average of 5.2 million gallons per day (mgd) in 1977, self-supplied from deep wells into the Floridan aquifer.⁽²⁾ The space industry and related activities, although located out of the county, used over 1 mgd, partially obtained from within Orange County.⁽³⁾ Another major industrial water user in the county is the Lake Highland power plant. This power plant used Lake Highland as a source of once-through cooling water. This plant is scheduled for retirement in 1982.

No municipal water supply or wastewater facilities are located onsite. One municipal water supply facility is within the site vicinity, the Cocoa well field area.⁽⁴⁾ This well field, located south and southeast of the site, is owned and operated by the city of Cocoa, and supplies about 15.5 mgd to central Brevard County. In 1977, municipalities within Orange County withdrew 67 mgd from the Floridan aquifer for water supply.⁽²⁾

Recreational opportunities on surface waters within 10 miles of the site are primarily of local importance. Lake Hart, Lake Mary Jane, and the numerous smaller lakes in that area, provide ample opportunities for recreational activities. The Econlockhatchee and Little Econlockhatchee River receive limited use, primarily by local residents.

No reservoirs or natural lakes are onsite, or within the 5-mile site vicinity, but many natural lakes exist just outside the vicinity. Numerous small lakes to the west and south of the site are used for recreation and irrigation water supply. The Disston Canal is located beyond the site vicinity, but diverts water from Lake Hart and Lake Mary Jane in the Kissimmee River Basin, into the Econlockhatchee River.

No transportation activities are known to occur on surface waters of the site vicinity.

2.2.4 References

- (1) Memorandum dated July 1, 1981, Tracy Watson, Planning Director, Orange County Planning Department, to Board of Zoning Adjustment, Orange County, Florida.
- (2) Estimated Water Use in Florida, 1977. S. D. Leach and H. G. Healy. USGS Water Resources-Investigations 79-112. January 1980.
- (3) Florida Water and Related Land Resources in the St. Johns River Basin; Florida Dept. Nat. Res., 1970.
- (4) Ground Water Hydrology of the Cocoa Well-Field Area, Orange County, Florida; USGS and City of Cocoa, 1976.

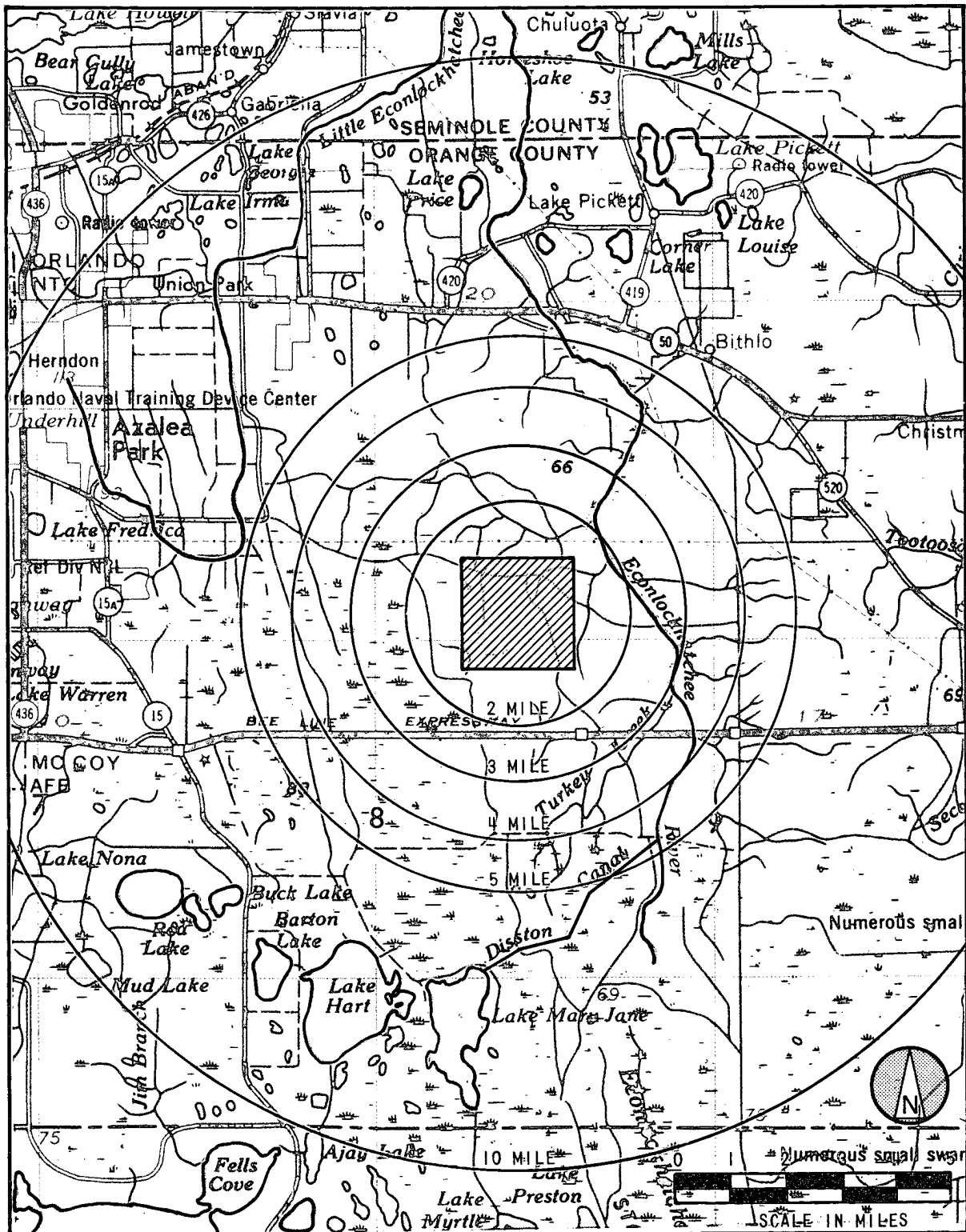


FIGURE 2.2-1. MAJOR WATER BODIES AT THE SITE AND SURROUNDING AREA

2.3 REGIONAL HISTORIC, SCENIC, CULTURAL AND NATURAL LANDMARKS

There are no recorded historic, scenic, cultural or natural landmarks located on the plant site. The nearest recognized sites are located in or near Orlando. The National Register of Historic Places currently lists the following sites located in Orange County, Florida.

- (1) Orlando--Old Orlando Railroad Depot.
- (2) Orlando--First Church of Christ Scientist.
- (3) Orlando--The Tinker Building.
- (4) Winter Park--The Parsonage.

The National Registry of Natural Landmarks does not include any sites for Orange County, Florida.

An archaeological and historic survey of the Stanton Energy Center site was conducted in two stages. Sections 13 and 24, and the eastern halves of Sections 14 and 23 of Township 23 South, Range 31 East, initially were surveyed. When access later became available, the remainder of the site also was examined for the presence of archaeological and cultural resources. The site survey was conducted by personnel from the Florida Secretary of State, Division of Archives, History, and Records Management.

Four sites were found during the surveys. Three were prehistoric archaeological sites, and one was an historic hunting lodge from about the early 20th century. This lodge is located just off the site near the southwest corner of the proposed property line. The Division of Archives, History and Records Management concluded that the sites did not represent significant archaeological or historical resources. A copy of a letter from Mr. L. Ross Morrell, Director, Division of Archives, History and Records Management concerning the initial survey is presented as Exhibit 2.3-1.

The railroad corridor has been modified to include additional area southeast of Mud Lake, Lake Nona, and Red Lake. The Florida Department of State has reviewed the modification and has determined that no archaeological or historic sites have been recorded within the corridor modification. The Department of State also has concluded that the probability for significant, unrecorded sites to be present is low and that the project may proceed

2.3-1

without further involvement of the Department of State. Exhibit 2.3-2 presents the pertinent documentation of this investigation.

RFM-1

2.3-1a

Request for Modification-1
092383

2.3 REGIONAL HISTORIC, SCENIC, CULTURAL AND NATURAL LANDMARKS

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Secretary of State

STATE OF FLORIDA
THE CAPITOL
TALLAHASSEE 32304

GEORGE FIRESTONE
SECRETARY OF STATE

DIVISION OF ARCHIVES, HISTORY
AND RECORDS MANAGEMENT
L. Ross Morrell, Director
(904) 488-1480

March 13, 1981

In reply refer to:

Mr. John Scarry
Archaeology Supervisor
(904) 487-2333

Mr. George R. Savage
Black & Veatch Consulting Engineers
P. O. Box 8405
Kansas City, Missouri 64114

Re: Archaeological and Historical Survey
Econlockhatchee South Tract - Staunton Energy Center
Orange County, Florida

Dear Mr. Savage:

This agency recently surveyed those portions of the Econlockhatchee South Tract (The Staunton Energy Center property) which were accessible to the Orlando Utilities Commission. Specifically, we surveyed Sections 13 and 24 and the eastern halves of Sections 14 and 23 of Township 23 South, Range 31 East. We were unable to survey the remainder of the tract, i.e. that portion included in Sections 18 and 19 of Township 23 South, Range 32 East.

Four sites were located during the survey. Three of these were prehistoric archaeological sites; the final site is an historic hunting lodge dating to the first part of the 20th century. Based on the physical remains which constitute these sites, it is our opinion that they do not represent significant archaeological or historical resources. Therefore, construction of the proposed Staunton Energy Center will not adversely impact any significant archaeological or historical resources.

FLORIDA - STATE OF THE ARTS

EXHIBIT 2.3-1. LETTER FROM L. ROSS MORRELL

Letter to Mr. Savage
March 13, 1981
Page Two

In accordance with the agreement between this agency and Black & Veatch, we will survey the remaining portions of the survey area as the Orlando Utilities Commission acquires access to them. Until that time, however, we cannot make an assessment of the archaeological and historical resources of that area.

Secretary of State George Firestone and I thank you for your cooperation in protecting the irreplaceable historic resources of Florida.

Sincerely,

A handwritten signature in dark ink, appearing to read "L. Ross Morrell", written in a cursive style.

L. Ross Morrell, Director
Division of Archives, History
and Records Management

LRM/JFS/hs

EXHIBIT 2.3-1. LETTER FROM L. ROSS MORRELL

RECEIVED
BLACK & VEATCH



SEP 1 1982 FLORIDA DEPARTMENT OF STATE
George Firestone
Secretary of State
SYSTEMS ENG. DEPT.
LEGAL-ENV. GROUP
August 20, 1982

5111
ORLANDO UTILITIES COMMISSION
STANTON ENERGY CENTER - PROJECT 1
G.A. Armbruster E.A. Pretz
E.C. Buckheit D.D. Schultz
F.P. Chael R.I. Unruh
S.F. Danner K.E. Weiss
S.H. Day E.C. Windisch
C.K. Graham P.H. Woodard
G.J. Moore G. Savage
Received 8-31-82 File 12.1203
In Reply Refer to:

Ms. Juanita W. Crudele
Historic Sites Specialist
(904) 487-2333

Mr. E. C. Windisch
Black and Veatch Consulting Engineers
Post Office Box 8405
Kansas City, Missouri 64114

Re: Your Letter of August 4, 1982
Cultural Resource Assessment Request
Survey of Railroad Realignment, Stanton Energy Center
Unit 1, Orlando Utilities Commission, Orange County,
Florida

Dear Mr. Windisch:

As per your request we have reviewed the proposed realigned rail corridor to the Stanton Energy Center. A review of the Florida Master Site File indicates that no archaeological or historical sites are recorded within the project study area. Furthermore, a review of the information contained in the 1981 archaeological and historic site report by Randy Daniel and Paco de la Fuente for the originally proposed railroad corridor indicates that construction within the proposed realignment area - 300 feet on either side of the surveyed corridor - will have no impact on any significant archaeological resources and the project may proceed without further involvement with this agency.

If you have any questions concerning this matter, please do not hesitate to contact us.

Sincerely,

George W. Percy, Chief
Bureau of Historic Sites
and Properties

GWP:Ceb

cc: H. S. Oven

FLORIDA-State of the Arts

RFM-1

2.4 GEOLOGY

A description of the site geology is presented in this section. The description is based on information from published literature, open-file data, a preliminary subsurface site investigation, aerial photographs, and visual observations on the site. The description includes the topography, geomorphology, stratigraphy, structure and earthquake history of the site. The subsurface investigation for the plant access road, railroad line, makeup and return water pipelines and transmission lines has not been completed at this date. The general subsurface conditions for these outside facilities are anticipated to be similar to those at the site. A detailed subsurface investigation will be performed onsite at the locations of structures and auxiliary facilities.

2.4.1 Topography

The topography of the site is shown on Figure 2.4-1. The elevation on the site varies from approximately 92 feet mean sea level (MSL) in the southwest to approximately 52 feet MSL in the northeast. The terrain is generally level with gradients of 15 feet per mile to the northeast.

2.4.2 Geomorphology

The site is located within the Florida section of the Coastal Plain geomorphic province.⁽¹⁾ The Florida section is a youthful, recently emergent, terraced coastal plain. Karst features are extensively developed.

The Florida section is further subdivided by the Florida Bureau of Geology into northern, central, and southern geomorphic zones. The central zone, in which the site is located, is "... characterized by highlands in the form of subparallel ridges separated by broad valleys".⁽²⁾ The ridges are above the piezometric surface of the surficial aquifer, and the valley floors are below it. Broad shallow lakes are common on the valley floors.

Numerous depressions are present within the site boundaries with the major ones shown on Figure 2.4-2. The depressions tend to have an alignment and elongation along azimuths north 40° west, north 15° west, north 30°

east, and north 50° east. 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.

There are two minor asymmetric ridges that extend north-south across the central and western portions of the site and that are roughly parallel. The steep slopes on these ridges face approximately east. These ridges can be seen on Figure 2.4-1.

2.4.3 Stratigraphy

The stratigraphy beneath the site was determined from published literature, open-file data, and a preliminary subsurface investigation. The subsurface investigation consisted of 11 widely-spaced borings at various locations across the site. The boring logs and laboratory test results are presented as Exhibits 2.4-1 and 2.4-2, respectively. Most borings were drilled to 50 feet below ground surface. Two borings extended to 209 feet below the ground surface. Laboratory tests were completed on selected samples of soil and rock from these borings. The locations of the borings are shown on Figure 2.4-2.

The strata beneath the site to a depth of 209 feet are divided into five stratigraphic layers: a surficial sand layer, an intermediate cohesive layer, a lower sand layer, a lower cohesive layer, and limestone bedrock. A detailed description of each of these units is included below. Stratigraphic cross-sections are shown on Figures 2.4-3 and 2.4-4.

The surficial sand layer consists of a heterogeneous arrangement of loose to dense sand, silty sand, and clayey sand with an intermittent thin clay layer. At the boring locations, this surficial layer varies in thickness from 32 feet in Boring 3 to 71 feet in Boring 6. The granular soil is generally fine grained above elevation 45± feet MSL, grading to medium and coarse grained with occasional shell fragments below that elevation. An intermittent cohesive layer of soft to stiff highly plastic clay and sandy clay, less than 4 feet thick, was encountered at depths between 32 and 35 feet in Boring 7. The limestone was cored for 12 feet in Boring 6 and 10 feet in Boring 7. The limestone is white to olive gray in color and is medium to thin bedded. It is argillaceous, fossiliferous, and fresh to

slightly weathered. The limestone has voids between elevations -126 feet and -129 feet in Boring 6, and between elevations -130 feet and -131 feet in Boring 7.

2.4.4 Structure

The site is located on the east flank of the Peninsula arch.⁽⁴⁾ As mentioned in Section 2.4.2, numerous surface depressions and small ponds are anticipated to be indications of sinkholes and joint systems within and surrounding the site. Prominent indications of possible sinkholes at the site are found in the northwest corner and the north-central area. The ground depressions and shallow lakes within and surrounding the site appear to be positioned above suspected joints in the limestone. An analysis of surface expressions of suspected sinkholes and joint patterns within and around the site is illustrated in Figure 2.4-5. The orientations of joints appear to be N 40° W, N 15° W, N 30° E, and N 50° E. |4

2.4.5 Earthquake History

Florida is an area which has experienced little historic seismic activity. Eleven earthquake epicenters with Modified Mercalli intensities of from I to VII have been located in Florida as of mid-1980. Eighteen earthquakes outside of the state have had shocks great enough to be felt in Florida. A list of earthquakes that have affected Florida is given in Table 2.4-1 and epicentral locations for those located in and near the state are presented in Figure 2.4-6.

The largest recorded earthquake in Florida occurred in 1879, north of Ocala with an intensity of VII. The largest earthquake near the site was an intensity V event in 1973 south of Orlando. The eighteen earthquakes with epicenters located outside of the state have resulted in isoseismal projections of intensities of less than V in central Florida.

Historic evidence indicates that the Stanton Energy Center site has been exposed to only small seismically induced ground motions due to earthquakes originating in Florida or adjacent regions.

slightly weathered. The limestone has voids between elevations -126 feet and -129 feet in Boring 6, and between elevations -130 feet and -131 feet in Boring 7.

2.4.4 Structure

The site is located on the east flank of the Peninsula arch.⁴ As mentioned in Section 2.4.2 there are numerous surface depressions present on the site. In addition to these surface depressions, there are many lineaments which cross the site in a generally northwest and northeast direction (Figure 2.4-5). Based on the subsurface data collected during the site investigation, these on-site lineaments are the result of variations in overburden material, changes in underlying rock texture, and/or variations in primary porosity. Their minimal impact on the site is expressed by their lack of correspondence with the longitudinal axes of the on-site depressions and the lack of hydrologic data from the subsurface investigation showing any kind of water table depressions.

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Historic evidence indicates that the Stanton Energy Center site has been exposed to only small seismically induced ground motions due to earthquakes originating in Florida or adjacent regions.

TABLE 2.4-1. LIST OF EARTHQUAKES AFFECTING FLORIDA

Date	Location	Modified Mercalli Intensity	Comments (Ref.)
10-29-1727	--	--	Severe Earthquake felt in St. Augustine, Florida (5)
10-29-1727	New England	--	Severe shock about 10:40 a.m. (5)
10-29-1727	Martinique	VI	Reported (1, 5)
12-16-1811	New Madrid, Mo.	XII	(6)
1-23, 2-7, 1812	New Madrid, Mo.	XII	(6)
2-8-1843	West Indies (N Lat. 16, W Long. 62)	VII	Felt in U.S. (2, 5)
1-12-1879	Northern Florida (N Lat. 29.5 W Long. 82.0)	VII	Felt from line drawn from Punta Rassa to Daytona on the south to line drawn from Tallahassee to Savannah on the north (1, 5)
1-22, 23-1880	Vuelto Abajo, Cuba (N Lat. 22.8 W Long. 80.8)	VIII	Felt in Florida (2, 5)
1-27-1880	Vuelto Abajo, Cuba	VII to VIII	Several shocks felt in Key West, Florida (1, 5)
8-31-1886	Charleston, South Carolina	X	Severe shocks felt along Florida NE coast; bells rang in St. Augustine; felt as far south as Tampa; MM V to VI in North Florida (1, 5)
9-1, 3, 5, 8, 9-1886	Charleston, South Carolina	--	Jacksonville, Florida tremors MM IV (1, 5)
10-22-1886	Charleston, South Carolina	--	Jacksonville, Florida tremor MM V (1, 5)
10-31-1900	Jacksonville, Florida	V	USC and G.S. record (1, 5)
1-23-1903	Tybee Island, Georgia	VI	(2, 5)
6-12-1912	Savannah, Georgia	--	Felt strongly
6-20-1920	Savannah, Georgia	V	(2, 5)

TABLE 2.4-1 (Continued). LIST OF EARTHQUAKES AFFECTING FLORIDA

<u>Date</u>	<u>Location</u>	<u>Modified Mercalli Intensity</u>	<u>Comments (Ref.)</u>
7-14-1930	--	V	Felt over wide area near Labell, Fort Meyers, and Marco Island. May have been explosions (1, 5)
7-19-1930	Ft. Myers-Everglades	IV	(6)
11-13-1935	Palatka, Florida	IV or V	Two tremors. Second also felt at St. Augustine and Anastacia Island (1, 5)
1-19-1942	Near Lake Okeechobee	IV	Several tremors felt at Miami, Everglades, and For Meyers (1, 5)
12-22-1945	Miami Beach, Hollywood	I - III	(3, 5)
11-8-1948	Captiva, Florida	IV	Doors and windows rattled (4)
11-18-1952	Quincy, Florida	IV	Windows and dishes rattled (4)
10-27-73	Orlando, Florida	V	Windows cracked in Cocoa Beach, Dundee and Osteeni sheetrock cracked at Winter Springs (7)
12-4-75	Near Daytona Beach	III - IV	(7)

Fig 2.4-1

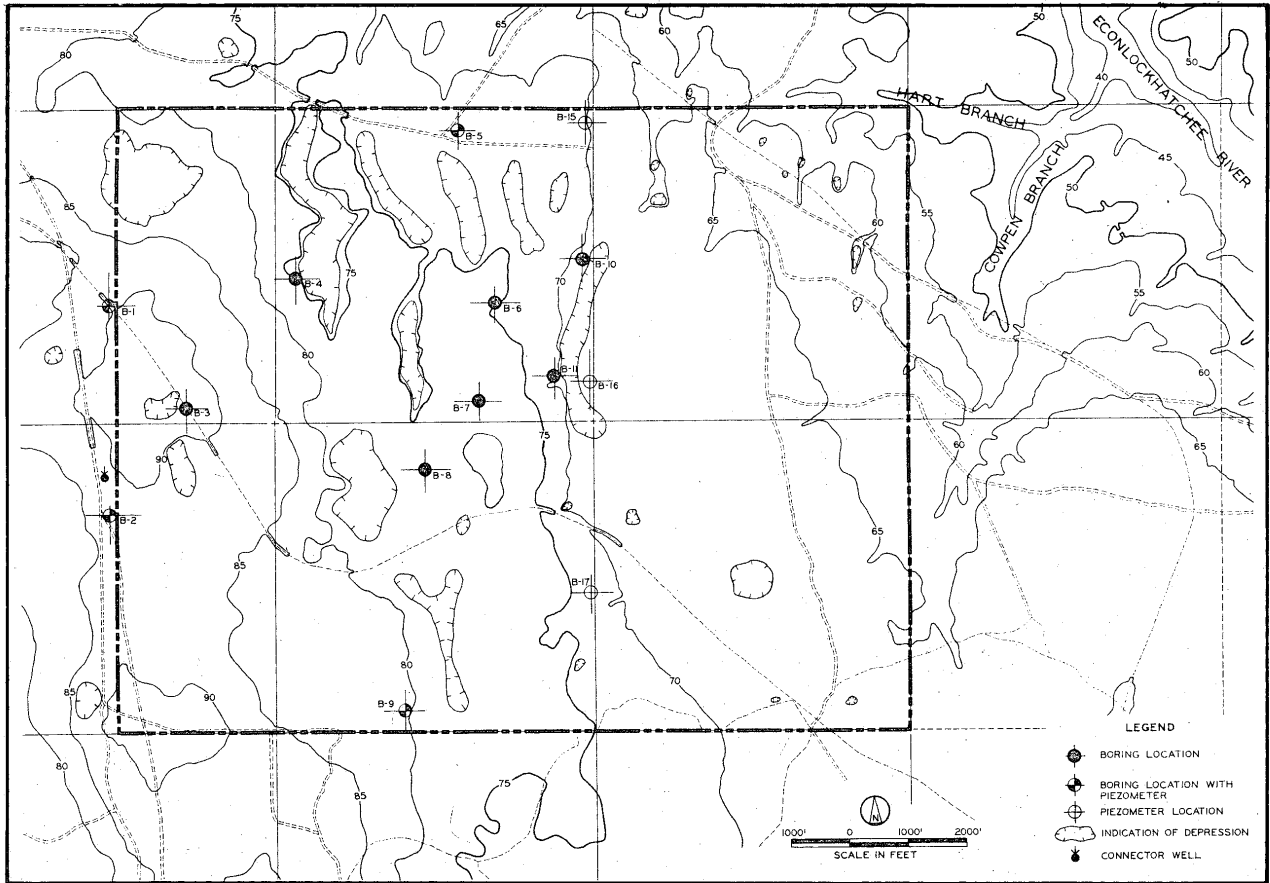


FIGURE 2.4-2. MAJOR DEPRESSIONS WITHIN THE SITE BOUNDARY

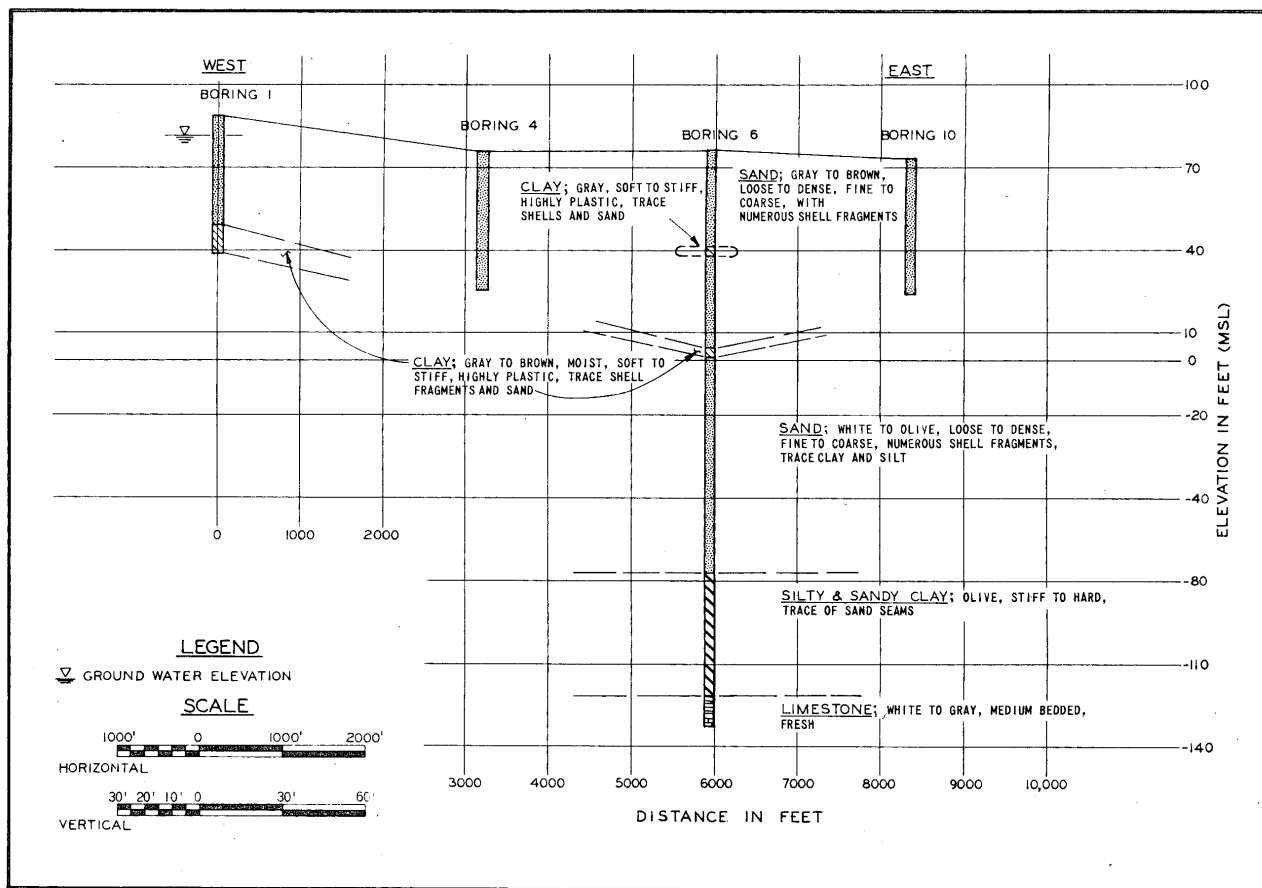


FIGURE 2.4-3. STRATIGRAPHIC PROFILE BENEATH THE SITE

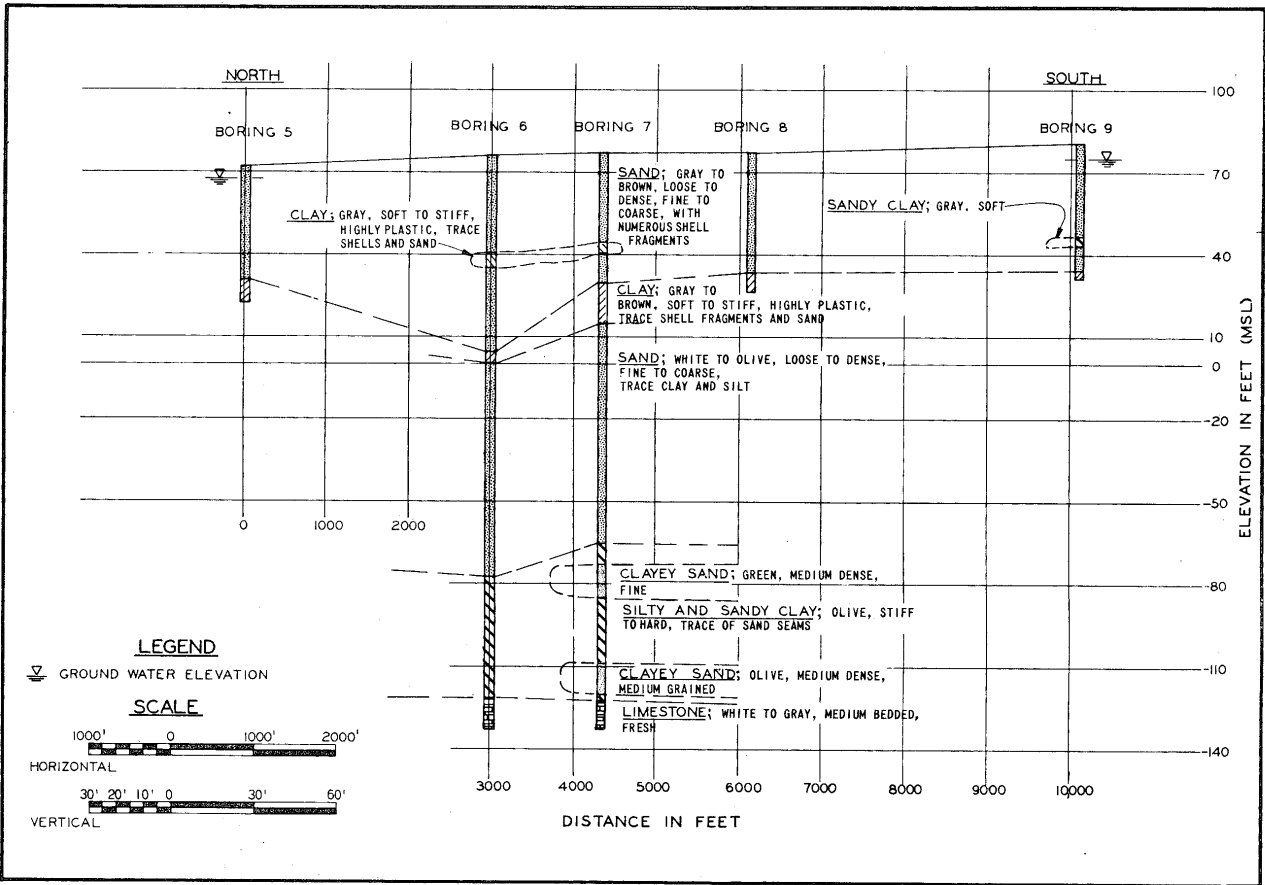
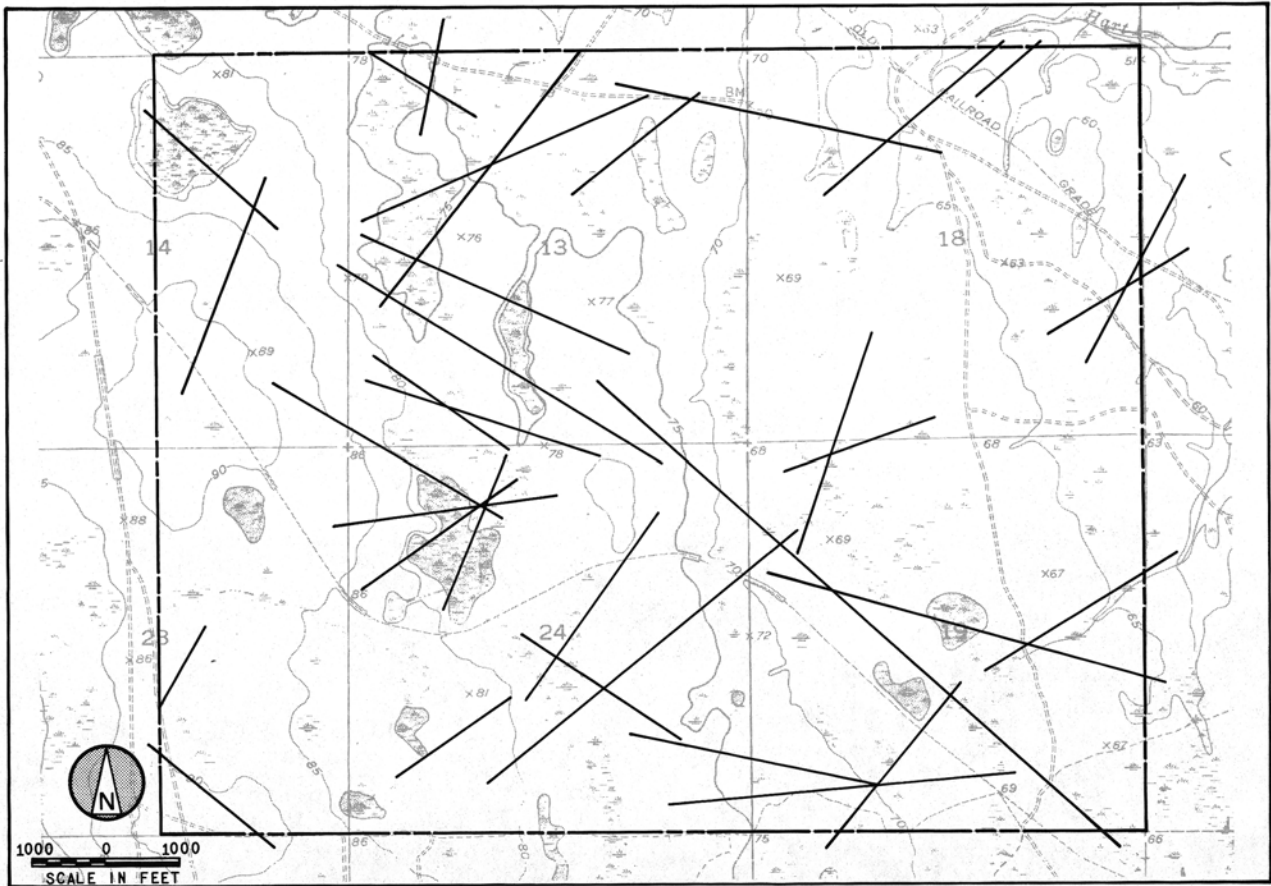


FIGURE 2.4-4. STRATIGRAPHIC PROFILE BENEATH THE SITE



SOURCE: SINKHOLE EVALUATION POTENTIAL
JAMMAL & ASSOCIATES, INC.

FIGURE 2.4-5. LINEAMENTS IN THE SITE AREA

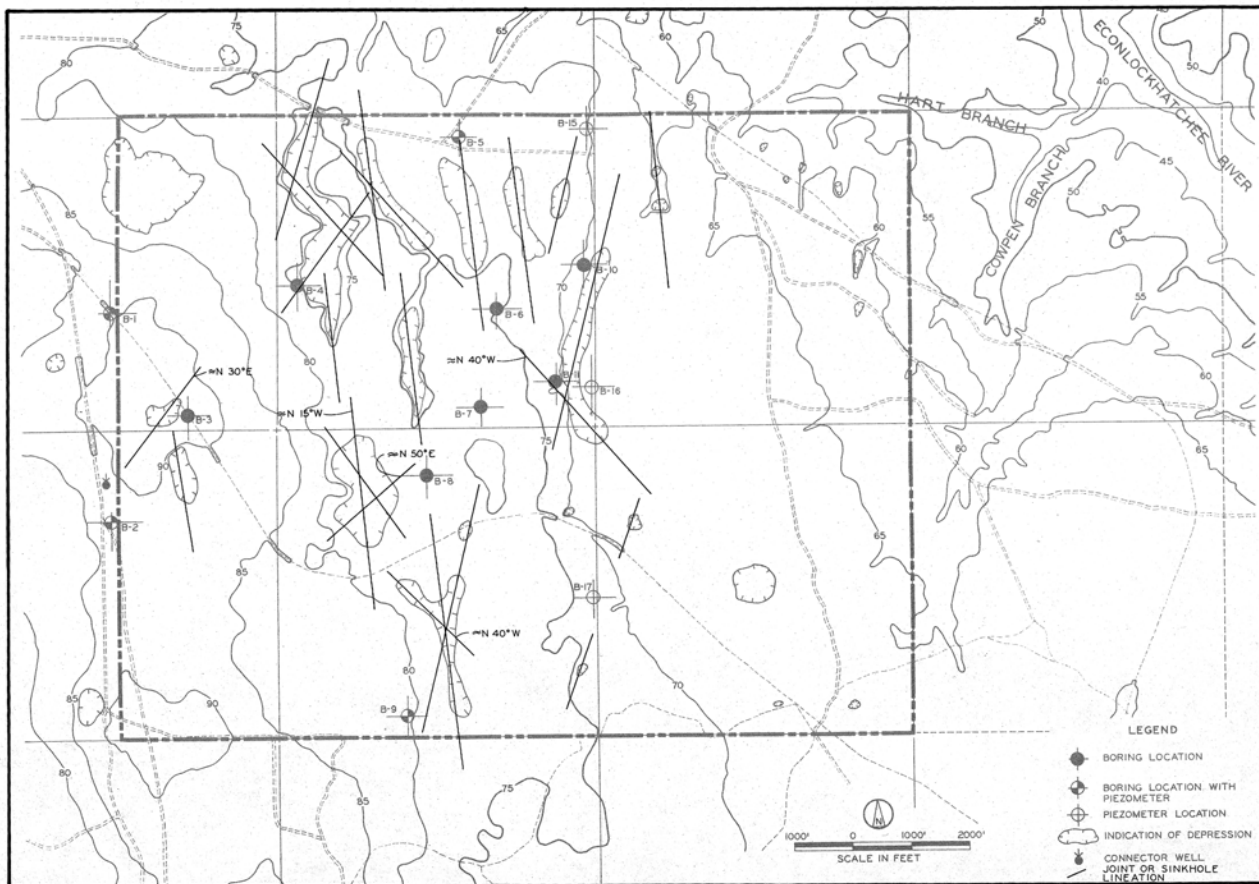


FIGURE 2.4-5. JOINT OR SINKHOLE LINEATIONS IN THE SITE AREA

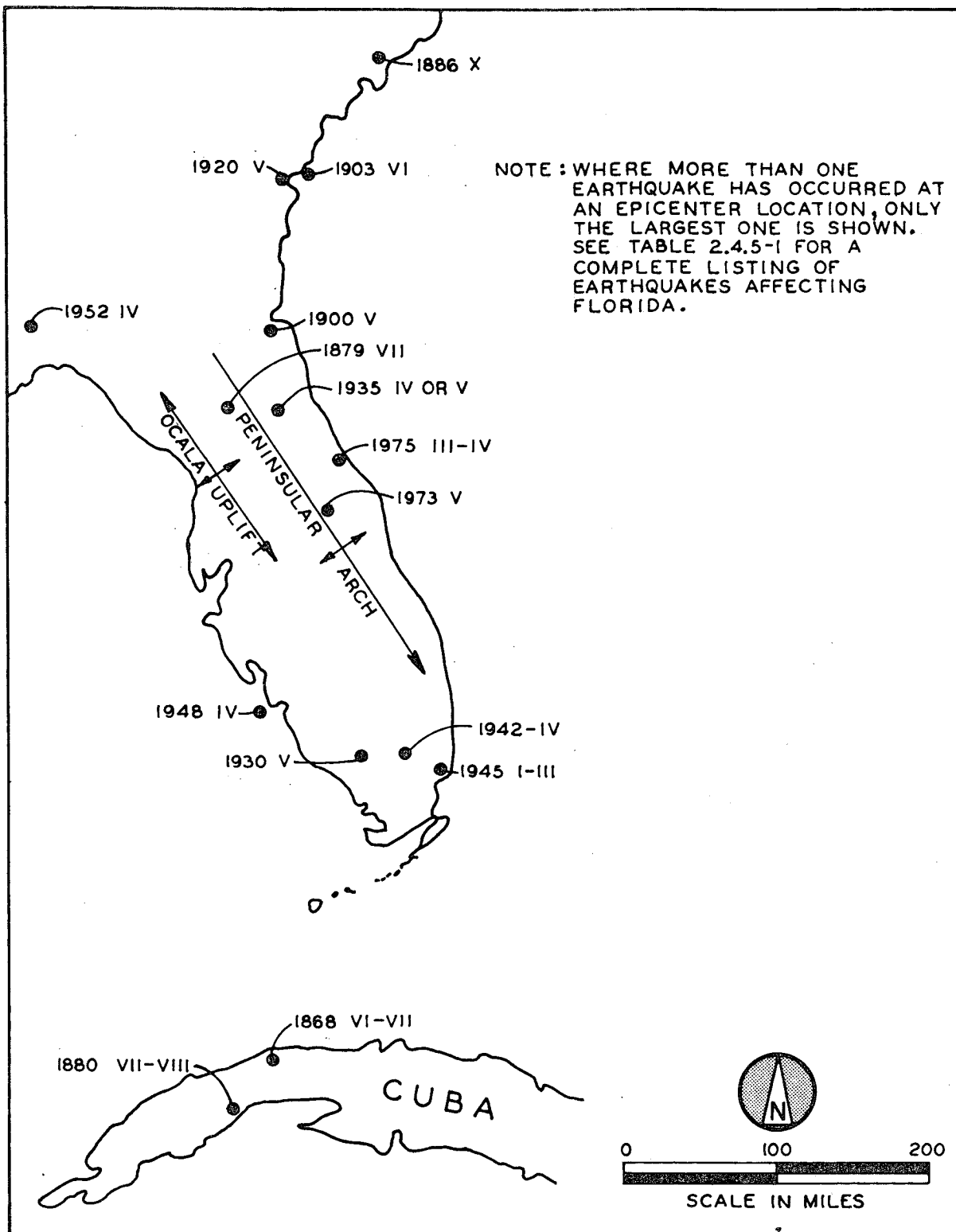


FIGURE 2.4-6. HISTORIC EARTHQUAKE OCCURRENCE

EXPLANATION OF BORING LOG TERMINOLOGY

GENERAL

PP	- COMPRESSIVE STRENGTH AS DETERMINED BY PENETROMETER
TV	- COMPRESSIVE STRENGTH AS DETERMINED BY TORVANE
GRAVEL	- UP TO 3 INCHES IN DIAMETER
COBBLE	- 3 INCHES TO 12 INCHES IN DIAMETER
BOULDER	- GREATER THAN 12 INCHES IN DIAMETER
60°	- REPRESENTS 60 DEGREES MEASURED FROM A PLANE PERPENDICULAR TO THE LONGITUDINAL AXIS OF THE CORE
TRACE	- REPRESENTS 0 TO 5 PER CENT BY VOLUME
OCCASIONAL OR SOME	- REPRESENTS 5 TO 10 PER CENT BY VOLUME
NUMEROUS	- REPRESENTS 10 TO 50 PER CENT BY VOLUME
N VALUE	- INDICATES THE NUMBER OF BLOWS REQUIRED TO DRIVE A STANDARD SPLIT SPOON SAMPLER 12" WITH A 140-POUND WEIGHT FALLING 30 INCHES
REC	- RECOVERY INDICATES TOTAL AMOUNT OF CORE RECOVERED FOR EACH RUN, EXPRESSED AS A PERCENTAGE OF THE TOTAL LENGTH OF THE CORE RUN
RQD	- A MODIFIED CORE RECOVERY IN WHICH ALL PIECES OF SOUND CORE OVER 4 INCHES IN LENGTH ARE COUNTED AS RECOVERY. THE MODIFIED SUM OF CORE RECOVERED IS THEN EXPRESSED AS A PERCENTAGE OF THE TOTAL LENGTH OF THE CORE RUN
---	- DASHED LINE IN CLASSIFICATION COLUMN INDICATES APPROXIMATE OR GRADATIONAL CHANGE

WEATHERING

FRESH	- THE ROCK SHOWS NO DISCOLORATION, LOSS OF STRENGTH, OR ANY OTHER EFFECT DUE TO WEATHERING (UNWEATHERED ROCK)
SLIGHTLY WEATHERED	- ROCK IS SLIGHTLY DISCOLORED WITH A SLIGHTLY LOWER STRENGTH THAN UNWEATHERED ROCK
MODERATELY WEATHERED	- ROCK IS CONSIDERABLY DISCOLORED WITH A SIGNIFICANTLY LOWER STRENGTH THAN UNWEATHERED ROCK
HIGHLY WEATHERED	- ROCK IS DISCOLORED AND WEAKENED SO INTENSELY THAT 2-INCH DIAMETER ROCK CORES CAN BE BROKEN READILY BY HAND. WET STRENGTH IS USUALLY MUCH LOWER THAN DRY STRENGTH

BEDDING

LAMINATED	- LESS THAN 0.001 FOOT TO 0.01 FOOT (.1 INCH)
THIN BEDDED	- 0.01 FOOT TO 0.1 FOOT (.1 TO 1.2 INCH)
MEDIUM BEDDED	- 0.1 FOOT TO 1.0 FOOT (1.2 TO 12 INCH)
THICK BEDDED	- GREATER THAN 1.0 FOOT
MASSIVE	- DENOTES NO DISCERNIBLE INTERNAL BEDDING STRUCTURE

ABBREVIATIONS

s - sand	matl - material
br - brown	mod - moderately
calc - calcareous	occ - occasional
Cl - Clay	org - organics
Cob - Cobble	PP - pocket penetrometer
xln - crystalline	Sa - Sand
Dol - Dolomite	Ss - Sandstone
ft - fest	sat - saturated
Gr - Gravel	Sh - shale
gr - gray	Sl - Silt
grn - green	TV - torvane
lam - laminated	w/ - with
Ls - Limestone	yel - yellow

SAMPLE SYMBOLS

Bag or Grab Sample 	California 	Piston 
Pitcher 	Split Barrel 	Thin Wall 

FIGURE 1

EXHIBIT 2.4-1. SOIL BORING LOGS



BLACK & VEATCH
CONSULTING ENGINEERS

LOG OF BORING

BORING NO. B-1

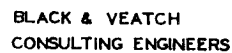
CLIENT				PROJECT NO.		ELEVATION	SHEET OF	
Orlando Utilities Commission				8927		88.9	1 2	
PROJECT				LOCATION		DATE: START FINISH		
Stanton Energy Center				N-1,509,544.5E-439,960.5		6-11-80 6-11-80		
DEPTH (FEET)	PERCENT RECOVERY	RQD	SPT N VALUE	SAMPLE LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS
0					Sand; light brownish-gray; loose;			Boring drilled w/3-7/8" di- ameter tricone roller bit using bentonite mud as drilling fluid Water encoun- tered @ 4.5'
1			6		fine grained; moist; w/numerous roots			
2								
3								
4			9		grading brown; wet; w/some roots		SP	
5								
6			9		grading dark brown			
7								
8								
9			8		grading very dark grayish-brown; w/trace roots	78.4		
10								
11			11		Sand; black; medium dense; fine grained; wet; w/trace silt			
12								
13								
14			37		grading dense; w/some silt		SP	
15								
16			39		grading dark reddish-brown; moist			
17								
18								
19			46					
20						67.6		
21								
22			28		Sand; dark yellowish-brown; medium dense; fine grained; wet			
23								
24								
25			25					
26								
27								
28								
29			13		grading yellowish-brown		SP	
30								
31								
32								
33								
34			31		grading dense			
35								
36								
37								
38								
39			12		Sand; gray; medium dense; fine grained; wet	50.2	SP	
40								
					Continued on next page			

P-ST-036A

FIGURE 2

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS

(2 OF 41)

BORING NO. B-1FIGURE 3

(3 OF 41)



BLACK & VEATCH
CONSULTING ENGINEERS

LOG OF BORING

BORING NO. B-2

CLIENT				PROJECT NO.		ELEVATION		SHEET OF	
Orlando Utilities Commission				8927		87.8		1 2	
PROJECT				LOCATION		DATE: START FINISH			
Stanton Energy Center				N-1,506,051.5E-439,908.0		6-10-80 6-10-80			
DEPTH (FEET)	PERCENT RECOVERY	RQD	SPT N VALUE	SAMPLE LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS	
0									
1									
2			7		Sand; grayish-brown; loose; fine grained; moist; w/some roots		SP	Boring drilled w/3-7/8" di- ameter tricone roller bit	
3									
4			27		Sand; dark brown; medium dense; fine grained; wet; w/trace roots	84.3		using bentonite	
5								mud as drilling	
6			19		& silt grading very dark brown; roots grade out	79.8	SP	fluid	
7									
8			9		Sand; dark gray; loose; fine grained; wet; w/trace silt			Water encoun- tered @ 3.6'	
9									
10									
11			12		grading black; medium dense				
12									
13			13		grading w/more silt		SP		
14									
15			10						
16									
17			18						
18									
19									
20						68.2			
21			13		Sand; very dark brown; medium dense; fine grained; moist; w/ trace silt		SP		
22					grading wet; silt grades out				
23			30		Sand; black; dense; fine grained; moist; w/trace silt	64.3	SP		
24									
25					Clayey Sand; yellowish-brown; medium dense; fine grained; wet	61.3	SC		
26									
27			23		Sand; pale yellow; medium dense; fine grained; wet; w/trace clay	59.0	SP		
28									
29									
30									
31									
32						55.3			
33			53		Sand; light gray; very dense; fine grained; wet		SP		
34									
35									
36						52.3			
37					Sand; pale green; loose; fine grained; moist; calcareous; occa- sionally clayey; occasionally cemented		SP		
38									
39			10						
40									
Continued on next page									

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FIGURE 4

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS



BLACK & VEATCH
CONSULTING ENGINEERS

LOG OF BORING

BORING NO. B-2

CLIENT Orlando Utilities Commission				PROJECT NO. 8927		ELEVATION 87.8		SHEET OF 2 2	
PROJECT Stanton Energy Center				LOCATION N-1,506,051.5E-439,908.0		DATE: START FINISH 6-10-80 6-10-80			
DEPTH (FEET)	PERCENT RECOVERY	RQD	SPT N VALUE	SAMPLE LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS	
40 1 2 3 4 5 6 7 8 9 50			14		grading light gray; medium dense; clay grades out grading w/some shell fragments		SP		
			6		Clay; green; firm; moist; cal- careous; occasionally sandy	39.0 37.8	CH		
1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0								Bottom of boring @ 50.0' Water level @ 5.9' on 6-13-80	

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FIGURE 5

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS



BLACK & VEATCH
CONSULTING ENGINEERS

LOG OF BORING

BORING NO. B-3

CLIENT				PROJECT NO.		ELEVATION	SHEET OF		
Orlando Utilities Commission				8927		90.8	1 2		
PROJECT				LOCATION		DATE: START FINISH			
Stanton Energy Center				N-1,507,822.0E-441,280.5		6-9-80 6-9-80			
DEPTH (FEET)	PERCENT RECOVERY	RQD	SPT N VALUE	SAMPLE	LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS
0						Sand; dark gray; loose; fine	89.3	SP	Boring drilled
1						grained; wet; w/numerous organics			w/3-7/8" di-
2			6			& roots			ameter tricone
3						Sand; pinkish-gray; loose; fine	87.8	SP	roller bit
4						grained; moist; w/some roots			using bentonite
5			13			Sand; dark brown; medium dense;			mud as drilling
6						Fine grained; moist; w/trace silt		SP	fluid
7			10			& roots			
8						grading wet; silt grades out	82.8		Water encoun-
9			9			Sand; very dark gray; loose; fine			tered @ 4.6'
10						grained; wet; w/trace silt			
11									
12			14			grading black; medium dense			
13									
14			28						
15									
16			32			grading dense		SP	
17									
18			55			grading very dense			
19									
20									
21			34			grading w/some dark brown; dense	67.8		
22									
23			44			Sand; dark yellowish-brown;			
24						dense; fine grained; wet			
25									
26									
27								SP	
28									
29			32			grading brownish-yellow			
30									
31									
32									
33							58.3		
34			12			Clay; gray; stiff; moist; sandy			
35						in part; calcareous			
36								CH	
37									
38									
39			3			grading soft; sand grades out			
40									
Continued on next page									

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FIGURE 6

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS



BLACK & VEATCH
CONSULTING ENGINEERS

LOG OF BORING

BORING NO. B-3

CLIENT Orlando Utilities Commission				PROJECT NO. 8927		ELEVATION 90.8		SHEET OF 2 2	
PROJECT Stanton Energy Center				LOCATION N-1,507,822.0E-441,280.5		DATE: START FINISH 6-9-80 6-9-80			
DEPTH (FEET)	PERCENT RECOVERY	RQD	SPT N VALUE	SAMPLE LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS	
4 1 2 3 4 5 6 7 8 9 50			10	                                    					



BLACK & VEATCH
CONSULTING ENGINEERS

LOG OF BORING

BORING NO. B-4

CLIENT				PROJECT NO.		ELEVATION		SHEET OF					
Orlando Utilities Commission				8927		77.7		1 2					
PROJECT				LOCATION		DATE:		START FINISH					
Stanton Energy Center				N-1,510,005.2E-443,136.8		6-12-80		6-12-80					
DEPTH (FEET)	PERCENT RECOVERY	RQD	SPT N VALUE	SAMPLE LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS					
0					Sand; dark gray; loose; fine	76.0	SP	Boring drilled w/3-7/8" di- ameter tricone roller bit using bentonite mud as drilling fluid					
1			6		grained; wet; w/numerous roots								
2					Sand; black; medium dense; fine								
3					grained; wet; w/some silt; trace								
4			12		roots								
5													
6													
7			13		grading very dark gray mottled								
8													
9			1		grading gray; very loose; roots								
10					grade out	57.2	SP- SM						
11			7		grading very dark brown; loose								
12													
13													
14			15		grading black; medium dense								
15													
16													
17			33		grading dense								
18													
19			18		grading dark reddish-brown; med- ium dense; silt grades out					45.7	SP		
20													
21			18		Sand; dark yellowish-brown; medium dense; fine grained; wet								
22													
23													
24			21		grading yellowish-brown								
25													
26													
27													
28						45.7	SP						
29													
30													
31													
32													
33			20		Sand; light gray; medium dense; fine grained; wet								
34													
35													
36													
37										45.7	SP		
38													
39													
40			21		grading light brownish-gray								
						Continued on next page							

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FIGURE 8

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS



BLACK & VEATCH
CONSULTING ENGINEERS

LOG OF BORING

BORING NO. B-4

CLIENT Orlando Utilities Commission				PROJECT NO. 8927		ELEVATION 77.7		SHEET OF 2 2	
PROJECT Stanton Energy Center				LOCATION N-1,510,005.2E-443,136.8		DATE: START FINISH 6-12-80 6-12-80			
DEPTH (FEET)	PERCENT RECOVERY	RQD	SPT N VALUE	SAMPLE LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS	
4 1 2 3 4 5 6 7 8 9 50			28		grading dark gray		SP		
1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0			6		grading dark grayish-brown; loose	27.7		Bottom of boring @ 50.0' Water level not recorded	

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FIGURE 9

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS

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BLACK & VEATCH
CONSULTING ENGINEERS

LOG OF BORING

BORING NO. B-5

CLIENT			PROJECT NO.		ELEVATION	SHEET OF		
Orlando Utilities Commission			8927		72.1	1 2		
PROJECT			LOCATION		DATE: START FINISH			
Stanton Energy Center			N-1,512,483.5E-445,792.0		6-9-80 6-9-80			
DEPTH (FEET)	PERCENT RECOVERY	RQD	SPT N VALUE	SAMPLE LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS
0					Sand; gray; loose; fine grained; wet; w/some roots	70.6	SP	Boring drilled
1			4		Sand; black; loose; fine grained; wet; w/trace silt & roots	69.1	SP	w/3-7/8" di- ameter tricone
2					Sand; dark brown; very loose; fine grained; wet; w/trace silt & roots		SP	roller bit using bentonite
3			3		grading very dark brown; loose	65.3		mud as drilling fluid
4			5		Sand; light brownish-gray; loose; fine grained; moist; w/trace clay		SP	Water encoun- tered @ 3.3'
5			15		grading medium dense	60.8		
6					Sand; white to light gray; medium dense; fine grained; wet			
7			18		grading light brownish-gray; fine grained; moist			
8			11		grading pale olive; wet		SP	
9			14		grading light gray			
10			16					
11			19					
12			16					
13					Sand; gray; medium dense; fine grained; wet; calcareous	45.1		
14			20		grading light gray; moist; partially cemented		SP	
15			20		Shelly Sand; light gray; medium dense; fine to coarse grained; wet; calcareous	35.1	SP	
16			19					
17								
18								
19								
20								
Continued on next page								

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FIGURE 10

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS



BLACK & VEATCH
CONSULTING ENGINEERS

LOG OF BORING

BORING NO. B-5

CLIENT Orlando Utilities Commission				PROJECT NO. 8927		ELEVATION 72.1		SHEET OF 2 2	
PROJECT Stanton Energy Center				LOCATION N-1,512,483.5E-445,792.0		DATE: START FINISH 6-9-80 6-9-80			
DEPTH (FEET)	PERCENT RECOVERY	RQD	SPT N VALUE	SAMPLE LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS	
4 1 2 3 4 5 6 7 8 9 50			4		Clay; dark gray; soft; moist; calcareous grading silty	31.1 22.1	CH		
1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0								Bottom of boring @ 50.0' Water level @ 4.0' on 6-13-80	

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FIGURE 11

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS



BLACK & VEATCH
CONSULTING ENGINEERS

LOG OF BORING

BORING NO. B-6

CLIENT				PROJECT NO.		ELEVATION		SHEET OF	
Orlando Utilities Commission				8927		74.4		1 6	
PROJECT				LOCATION		DATE:		START FINISH	
Stanton Energy Center				N-1,509,586.0E-446,508.0		5-20-80		5-28-80	
DEPTH (FEET)	PERCENT RECOVERY	RQD	SPT N VALUE	SAMPLE LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS	
0					Sand; light gray; loose; fine grained; moist; slightly calcareous	73.1	SP	Boring drilled w/5-1/8" di- ameter tricone roller bit using bentonite mud as drilling fluid	
1			7		Sand; dark brown; loose; fine grained; moist; w/some silt; trace organics & wood fibers				
2									
3			8				SP- SM		
4					grading dense; wood grades out				
5									
6									
7									
8									
9			16		Sand; dark yellowish-brown; medium dense; fine grained; wet	65.4			
10					grading light yellowish-brown; w/occasional light gray sand pockets; w/some clay			SP	
11			14		grading yellowish-brown				
12					grading light yellowish-brown; loose; wet; light gray sand pock- ets grade out				
13			10		grading moist; w/light gray sand pockets				
14			9		grading light gray; medium dense; wet				
15					grading light brownish-gray				
16			17		grading light gray; loose				
17			5						
18									
19									
20								PP = 2.8 tsf	
21									
22			3		Sand; olive gray; very loose; fine grained; wet; w/trace clay	44.4	SP		
23					grading cemented				
24									
25									
26			4		Clay; olive gray; soft; occa- sionally sandy	39.2	CH		
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40					Shelly Sand; olive gray; loose; coarse grained; wet; highly calcareous; w/some silt	35.7			
					Continued on next page				

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FIGURE 12

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS



BLACK & VEATCH
CONSULTING ENGINEERS

LOG OF BORING

BORING NO. B-6

CLIENT				PROJECT NO.		ELEVATION		SHEET OF	
Orlando Utilities Commission				8927		74.4		2 6	
PROJECT				LOCATION		DATE: START FINISH			
Stanton Energy Center				N-1,509,586.0E-446,508.0		5-20-80 5-28-80			
DEPTH (FEET)	PERCENT RECOVERY	RQD	SPT N VALUE	SAMPLE	LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS
40									
1									
2									
3			12			grading medium dense		SP-SM	
4									
5									
6									
7							27.9		
8			100			Sand; gray; very dense; fine grained; moist; calcareous; w/num erous shell fragments			
9									
50			67			grading light brownish-gray; med- ium grained; highly calcareous		SP	
1									
2									
3									
4									
5									
6			90			grading coarse grained	18.4		
7									
8						Sand; gray; very dense; fine grained; moist; calcareous; w/trace shell fragments			
9									
60			26			grading medium dense		SP	
1									
2									
3									
4									
5							9.4		
6			9			Clayey Sand; gray; loose; fine to coarse grained; moist; calcareous; w/numerous shell fragments; trace silt		SC	
7									
8									
9						grading fine grained; w/trace shell fragments			
70			10						
1						Clay; gray; stiff; moist; calcareous	3.2	CH	
2									
3						Sandy Clay; gray; stiff; calcareous; w/numerous shell fragments	1.4	CL	PP = 1.5 tsf
4									
5							-0.6		
6						Sand; gray; medium dense; fine to coarse grained; wet; calcareous; partially cemented; w/numerous shell fragments; trace clay		SP	
7			21						
8									
9									
80							-5.1		
Continued on next page									

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FIGURE 13

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS



BLACK & VEATCH
CONSULTING ENGINEERS

LOG OF BORING

BORING NO. B-6

CLIENT		PROJECT NO.	ELEVATION	SHEET OF				
Orlando Utilities Commission		8927	74.4	3	6			
PROJECT		LOCATION	DATE: START FINISH					
Stanton Energy Center		N-1,509,586.0E-446,508.0	5-20-80 5-28-80					
DEPTH (FEET)	PERCENT RECOVERY	RQD	SPT N VALUE	SAMPLE LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS
80			10		Silty Sand; olive gray; loose; fine to coarse grained; moist; calcareous; w/numerous shell fragments			
1								
2			22		grading gray; medium dense			
3								
4								
5								
6								
7								
8								
9							SM	
90			*		grading loose; fine grained			*sample pushed
1								
2					shell fragments grade out			
3								
4								
5								
6								
7								
8			74		Sand; olive; very dense; fine grained; moist; calcareous; w/some shell fragments	-23.1		
9								
100			119		grading w/trace shell fragments			
1								
2								
3								
4								
5								
6			61		grading slightly calcareous			
7								
8								
9								
110							SP	
1			64		grading wet			
2								
3								
4								
5								
6			63		grading calcareous; w/some shell fragments			
7								
8								
9								
120								
Continued on next page								

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FIGURE 14

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS



BLACK & VEATCH
CONSULTING ENGINEERS

LOG OF BORING

BORING NO. B-6

CLIENT		PROJECT NO.		ELEVATION		SHEET OF		
Orlando Utilities Commission		8927		74.4		4 6		
PROJECT		LOCATION		DATE: START FINISH				
Stanton Energy Center		N-1,509,586.0E-446,508.0		5-20-80 5-28-80				
DEPTH (FEET)	PERCENT RECOVERY	RQD	SPT N VALUE	SAMPLE LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS
12 0			53		grading w/trace shell fragments			
1 1								
2 2								
3 3								
4 4								
5 5			32		grading dense; w/some silt; shell fragments & calcareousness grade out		SP	
6 6								
7 7								
8 8								
9 9								
13 0			60		grading very dense; w/trace phosphate & silt			
1 1								
2 2								
3 3								
4 4								
5 5			83		Sand; pale olive; very dense; medium to coarse grained; wet; calcareous w/numerous shell fragments; some silt	-60.9	SP	
6 6						-61.4		
7 7					Sand; white; very dense; medium grained; wet; calcareous; partially cemented; w/trace phosphate			
8 8								
9 9								
14 0			314/105'		grading light gray			
1 1								
2 2								
3 3								
4 4								
5 5			207/7.5'				SP	
6 6								
7 7								
8 8								
9 9								
15 0			261					
1 1								
2 2								
3 3								
4 4								
5 5			18		Sandy Clay; olive green; very stiff; moist; calcareous	-78.6	CL	
6 6								
7 7								
8 8								
9 9								
16 0					hard @ 159.0'			

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Continued on next page

FIGURE 15

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS



BLACK & VEATCH
CONSULTING ENGINEERS

LOG OF BORING

BORING NO. B-6

CLIENT				PROJECT NO.		ELEVATION		SHEET OF	
Orlando Utilities Commission				8927		74.4		5 6	
PROJECT				LOCATION		DATE: START FINISH			
Stanton Energy Center				N-1,509,586.0E-446,508.0		5-20-80 5-20-80			
DEPTH (FEET)	PERCENT RECOVERY	RQD	SPT N VALUE	SAMPLE LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS	
160					grading w/trace phosphate			PP = 3.75 tsf	
1									
2									
3									
4									
5									
6			33		grading hard; w/some phosphate		CL		
7									
8									
9									
170									
1									
2						-97.6			
3					Silty Clay; olive; hard; dry; w/trace phosphate				
4					extremely hard from 172.0'-174.0'				
5			73				CL		
6									
7									
8									
9									
180									
1									
2									
3						-108.6			
4					Sandy Clay; olive; hard; moist; calcareous; interlayered w/Clayey				
5					Sand; olive; very dense; medium		CL& SC		
6			54		grained; moist; calcareous				
7									
8									
9									
190									
1									
2						-116.0			
3					Silty Clay; olive; hard; dry; calcareous; w/trace fine grained		CL		
4					sand seams & phosphates				
5					extremely hard @ 194.0'				
6					grading sandy; w/numerous				
7					phosphates				
8						-121.7			
9	42	35			Limestone; sandy; light gray; medium to thick bedded; fine			Set 4" diameter	
200					grained; vugs to 0.05'; fresh			steel casing to 198.5'	
Continued on next page									

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FIGURE 16

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS

(16 OF 41)



BLACK & VEATCH
CONSULTING ENGINEERS

LOG OF BORING

BORING NO. B-6

CLIENT Orlando Utilities Commission				PROJECT NO. 8927		ELEVATION 74.4		SHEET OF 6 6	
PROJECT Stanton Energy Center				LOCATION N-1,509,586.0E-446,508.0		DATE: START FINISH 5-20-80 5-28-80			
DEPTH (FEET)	PERCENT RECOVERY	RQD	SPT N VALUE	SAMPLE LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS	
200									
1						-126.1			
2					Void from 200.5'-203.5'			Boring contin-	
3								ued w/NX double	
4						-128.6		tube core bar-	
5					Limestone; argillaceous; fossiliferous; white; medium bedded;			rel w/diamond	
6	100	70			granular; w/vugs to 0.01'; fresh			bit using water	
7					30° joints @ 204.9', 205.3',			as drilling	
8					205.5', & 207.5'			fluid	
9						-134.1		Losing water @	
210								200.5'	
1								Bottom of	
2								boring @ 208.5'	
3								Water level	
4								not recorded	
5									
6									
7									
8									
9									
220									
1									
2									
3									
4									
5									
6									
7									
8									
9									
230									
1									
2									
3									
4									
5									
6									
7									
8									
9									
0									

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FIGURE 17

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS

(17 OF 41)



BLACK & VEATCH
CONSULTING ENGINEERS

LOG OF BORING

BORING NO. B-7

CLIENT				PROJECT NO.		ELEVATION		SHEET OF	
Orlando Utilities Commission				8927		78.4		1 6	
PROJECT				LOCATION		DATE: START FINISH			
Stanton Energy Center				N-1,507,918.0E-446,265.0		5-29-80 6-5-80			
DEPTH (FEET)	PERCENT RECOVERY	RQD	SPT N VALUE	SAMPLE LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS	
0					Sand; light gray; medium dense; fine grained; moist; w/trace roots	75.4	SP	Boring drilled w/5-1/8" di- ameter tricone roller bit using bentonite mud as drilling fluid Water encoun- tered @ 3.7'	
1			11						
2									
3									
4			12		Sand; dark reddish-brown; medium dense; fine grained; moist; w/trace silt & wood fibers				
5					grading very dense				
6			70						
7									
8									
9			86		grading strong brown; wood & silt grade out		SP		
10									
11									
12			65						
13						65.4			
14					Sand; dark yellowish-brown; very dense; fine grained; wet; w/trace silt		SP		
15			62			62.9			
16					Sand; light yellowish-brown; med- ium dense; fine grained; wet		SP		
17			20			60.4			
18					Sand; white; medium dense; fine grained; wet				
19			25						
20									
21					grading w/some light gray				
22			24						
23									
24					light gray grades out		SP		
25			23						
26									
27									
28									
29			14			48.4			
30					Sand; dark gray; loose; fine grained; wet; very slightly calcareous; w/trace clay		SP		
31			9		0.05' calcite layer @ 32.45'	45.4			
32					Clay; gray; stiff; moist; occa- sionally sandy; w/some sand; trace shell fragments		CH		
33									
34			9			41.7			
35					Shelly Sand; olive gray; medium dense; coarse grained; wet; highly calcareous; w/some clay		SP		
36									
37									
38									
39									
40									

Continued on next page

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Continued on next page

FIGURE 18

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS

(18 OF 41)

LOG OF BORING

BORING NO. B-7

CLIENT		PROJECT NO.		ELEVATION		SHEET OF		
Orlando Utilities Commission		8927		78.4		2 6		
PROJECT			LOCATION		DATE: START FINISH			
Stanton Energy Center			N-1,507,918.0E-446,265.0		5-29-80 6-5-80			
DEPTH (FEET)	PERCENT RECOVERY	RQD	SPT N VALUE	SAMPLE LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS
40			28		Sand; pale olive; medium dense; fine grained; moist; highly calcareous; partially cemented	37.6	SP	
1								
2								
3								
4								
5			5		Silty Sand; gray; loose; fine grained; moist; highly calcareous; w/some clay	33.4	SM	
6								
7						31.4		
8					Clay; gray; firm; moist; calcareous			PP = 1.0 tsf
9								
50			8		grading interlayered w/fine silty sand		CH	
1								
2								
3								
4								
5								
6					sand grades out			
7								
8								
9								
60								
1								PP = 1.2 tsf
2					Silty Sand; gray; medium dense; fine grained; moist; calcareous; w/numerous shell fragments; some clay	16.9	SM	
3								
4						14.4		
5								
6			12		Shelly Sand; gray; fine to coarse grained; medium dense; moist; calcareous; w/some silt			
7								
8								
9								
70			30		grading dense; medium to coarse grained		SP- SM	
1								
2								
3								
4								
5						4.9		
6			31		Sand; gray; very dense; fine grained; moist; calcareous; w/some shell fragments		SP	
7								
8								
9								
80					Clayey Sand; gray; medium dense; fine to coarse grained; moist; calcareous; w/numerous shell fragments	0.4	SC	
					Continued on next page			

FIGURE 19



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LOG OF BORING

BORING NO. B-7

CLIENT Orlando Utilities Commission		PROJECT NO. 8927	ELEVATION 78.4	SHEET OF 3 6				
PROJECT Stanton Energy Center		LOCATION N-1,507,918.0E-446,265.0	DATE: START FINISH 5-29-80 6-5-80					
DEPTH (FEET)	PERCENT RECOVERY	RQD	SPT N VALUE	SAMPLE LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS
80 1 2 3 4 5 6 7 8 9 90 1 2 3 4 5 6 7 8 9 100 1 2 3 4 5 6 7 8 9 110 1 2 3 4 5 6 7 8 9 120			29 41 26 20 19 14 61 54		Sand; gray; very dense; fine to coarse grained; moist; calcareous; w/numerous shell fragments; trace clay grading medium dense; wet; clay grades out Sand; gray; medium dense; fine grained; wet; calcareous; w/some shell fragments Clayey Sand; gray; medium dense; fine to coarse grained; wet; calcareous; w/numerous shell fragments grading w/trace phosphate Sand; olive; very dense; fine grained; wet; calcareous; w/some shell fragments; trace phosphate shell fragments grade out	-4.6 -14.6 -19.6 -30.6	 SP SP SC SP	
Continued on next page								

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FIGURE 20

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS



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LOG OF BORING

BORING NO. B-7

CLIENT	PROJECT NO.	ELEVATION	SHEET OF
Orlando Utilities Commission	8927	78.4	4 6
PROJECT	LOCATION	DATE: START FINISH	
Stanton Energy Center	N-1,507,918.0E-446,265.0	5-29-80 6-5-80	

DEPTH (FEET)	PERCENT RECOVERY	ROD	SPT N VALUE	SAMPLE LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS
120			52		grading slightly calcareous; w/trace silt			
1								
2								
3								
4								
5			37		grading w/trace shell fragments			
6								
7								
8								
9								
130			41		calcareousness & shell fragments grade out			
1								
2								
3								
4								
5			14		Clayey Sand; olive; medium dense; fine grained; moist	-56.1		
6								
7								
8								
9					hard from 138.0'-138.5'		SC	
140			22					
1								
2								
3								
4								
5			25		Sandy Clay; olive green; very stiff; dry; w/trace fine sand pockets	-63.6		
6								
7							CL	
8								
9								
150			22		Clayey Sand; olive green; medium dense; fine grained; dry; w/trace phosphate	-71.6		
1								
2								
3								
4								
5			24		grading interlayered w/Sandy Clay; olive green; very stiff;			
6			26		moist; calcareous		SC	
7								
8								
9					grading w/numerous phosphates			
160					0.1' limestone layer @ 160.3'			
					Continued on next page			

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FIGURE 21

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS



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LOG OF BORING

BORING NO. B-7

CLIENT				PROJECT NO.		ELEVATION	SHEET OF	
Orlando Utilities Commission				8927		78.4	5 6	
PROJECT				LOCATION		DATE: START FINISH		
Stanton Energy Center				N-1,507,918.0E-446,265.0		5-29-80 6-5-80		
DEPTH (FEET)	PERCENT RECOVERY	RQD	SPT N VALUE	SAMPLE LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS
160			20		Silty Clay; olive green; very stiff; moist; w/some phosphate	-82.3		
1								
2								
3								
4								
5								
6			35		grading hard; slightly calcareous; w/numerous phosphate			
7								
8								
9								
170			25		grading dark gray; very stiff; dry; sandy w/phosphates			
1								
2								
3								
4								
5								
6			37		grading olive; partially cemented		CL	
7					hard from 178.0'-180.0'			
8								
9								
180			54		grading hard; moist; w/numerous sand pockets; sandiness, calcareousness grade out			
1								
2								
3								
4								
5								
6			40		grading occasionally sandy; very slightly calcareous			
7								
8								
9						-109.6		
190			25		Clayey Sand; olive; medium dense; medium grained; moist; very slightly calcareous			
1								
2							SC	
3								
4					extremely hard @ 194.0'			
5								
6			33		Sandy Clay; olive; hard; dry; slightly calcareous; w/trace phosphate	-117.0		
7							CL	
8								
9					0.05' limestone layer @ 196.2'	-121.1		
200					numerous thin hard layers from 196.5'-199.5'			
Continued on next page								

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FIGURE 22

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS



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LOG OF BORING

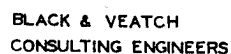
BORING NO. B-7

CLIENT				PROJECT NO.	ELEVATION	SHEET OF		
Orlando Utilities Commission				8927	78.4	6	6	
PROJECT				LOCATION	DATE: START FINISH			
Stanton Energy Center				N-1,507,918.0E-446,265.0	5-29-80 6-5-80			
DEPTH (FEET)	PERCENT RECOVERY	RQD	SPT N VALUE	SAMPLE LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS
200					Limestone; sandy; highly fossiliferous; light olive gray to light gray; medium bedded; >10% vugs from pinpoint to 0.1'; slightly weathered			Boring continued w/NX double tube core barrel w/diamond bit using water as drilling fluid
1	55	17						
2								
3								
4					vertical fracture 199.9'-201.4'			
5					grading w/0.2' layers of Limestone;			
6	38	18			light gray; medium bedded; fine grained; w/10% vugs pinpoint to 0.05' @ 199.5' & 201.2'	-129.4		Losing some water throughout Run 2
7						-130.3		
8						-130.8		
9					Limestone; sandy; light gray; medium bedded; fine grained; >30% vugs pinpoint to 0.05'; fresh			
210					Void from 208.7' to 209.2' w/rock @ 209.2'			Bottom of boring @ 209.2'
1								Water level not recorded
2								
3								
4								
5								
6								
7								
8								
9								
0								
1								
2								
3								
4								
5								
6								
7								
8								
9								
0								

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FIGURE 23

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS



BORING NO. B-8

FIGURE 24

(24 OF 41)



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LOG OF BORING

BORING NO. B-8

CLIENT Orlando Utilities Commission				PROJECT NO. 8927		ELEVATION 77.4		SHEET OF 2 2	
PROJECT Stanton Energy Center				LOCATION N-1,506,756.0E-445.310.0		DATE: START FINISH 6-12-80 6-12-80			
DEPTH (FEET)	PERCENT RECOVERY	RQD	SPT N VALUE	SAMPLE LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS	
40 1 2 3 4 5 6 7 8 9 50					Clay; gray; soft; moist; calcar- eous; w/numerous large (>0.1') shells	34.9	CH		
			5		grading dry; shells grade out	27.4		Bottom of boring @ 50.0' Water level not recorded	
1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0									

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FIGURE 25

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS

(25 OF 41)



BORING NO. B-9

FIGURE 26

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS



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LOG OF BORING

BORING NO. B-9

CLIENT Orlando Utilities Commission				PROJECT NO. 8927		ELEVATION 8.0		SHEET OF 2 2	
PROJECT Stanton Energy Center				LOCATION N-1,502,640.2E-444,961.7		DATE: START FINISH 6-13-80 6-13-80			
DEPTH (FEET)	PERCENT RECOVERY	RQD	SPT N VALUE	SAMPLE	LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS
40									
1									
2									
3									
4			66			Shelly Sand; light gray; very dense; fine to coarse grained; wet; calcareous	38.0	SP	
5									
6									
7									
8						Clay; dark gray; firm; moist; calcareous; w/trace shell fragments	34.0	CH	
9			5						
50							31.0		Bottom of boring @ 50.0'
1									Water level not recorded
2									
3									
4									
5									
6									
7									
8									
9									
60									
1									
2									
3									
4									
5									
6									
7									
8									
9									
0									

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FIGURE 27

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS



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LOG OF BORING

BORING NO. B-10

CLIENT				PROJECT NO.		ELEVATION		SHEET OF	
Orlando Utilities Commission				8927		69.5		1 2	
PROJECT				LOCATION		DATE: START FINISH			
Stanton Energy Center				N-1,510,342.0E-448,020.0		6-6-80 6-6-80			
DEPTH (FEET)	PERCENT RECOVERY	RQD	SPT N VALUE	SAMPLE LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS	
0					Sand; grayish-brown; loose; fine grained; wet; w/trace roots	68.0	SP	Boring drilled w/3-7/8" diameter tricone roller bit using bentonite mud as drilling fluid	
1			5		Sand; dark brownish-gray to very dark grayish-brown; loose; fine grained; moist; w/trace roots		SP		
2					grading dark brown; very loose; wet				
3			2		grading black	62.9			
4					Sand; pinkish-gray; loose; fine grained; moist; w/trace clay			Water encountered @ 3.0'	
5			7		grading medium dense; wet; clay grades out				
6					grading light gray; moist;w/trace roots				
7			13		grading wet; roots grade out		SP		
8			12						
9									
10			10						
11			18						
12					grading grayish-brown mottled	49.0			
13			3		Sand; dark gray to light gray; very loose; fine grained; wet		SP		
14						46.5			
15			6		Sand; gray; loose; fine to medium grained; wet; calcareous; w/numerous shell fragments; some silt		SP-SM		
16						41.0		losing drilling fluid @ 28.5'	
17			12		Gravel; gray; medium dense; wet; calcareous; w/some shell fragments				
18									
19			19		grading w/light olive gray clayey sand		GP		
20									
21									
22									
23									
24									
25									
26									
27									
28					Sand; gray; loose; fine grained; wet; calcareous; w/some shell fragments & silt	32.0	SP		
29			9						
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									
Continued on next page									

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Continued on next page

FIGURE 28

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS



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LOG OF BORING

BORING NO. B-10

CLIENT Orlando Utilities Commission				PROJECT NO. 8927		ELEVATION 69.5		SHEET OF 2 2	
PROJECT Stanton Energy Center				LOCATION N-1,510,342.0E-448,020.0		DATE: START FINISH 6-6-80 6-6-80			
DEPTH (FEET)	PERCENT RECOVERY	RQD	SPT N VALUE	SAMPLE	LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS
40 1 2 3 4 5 6 7 8 9 50			9 21			grading medium dense; w/more shell fragments	19.5	SP	
1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0									Bottom of boring @ 50.0' Water level not recorded

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FIGURE 29

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS



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LOG OF BORING

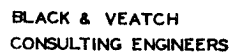
BORING NO. B-11

CLIENT				PROJECT NO.		ELEVATION		SHEET OF	
Orlando Utilities Commission				8927		69.5		1 2	
PROJECT				LOCATION		DATE: START FINISH			
Stanton Energy Center				N-1,508,352.5E-447,512.0		6-5-80 6-6-80			
DEPTH (FEET)	PERCENT RECOVERY	RQD	SPT N VALUE	SAMPLE	LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS
0						Sand; very dark grayish-brown; loose; fine grained; wet; w/some silt; trace roots & organics		SP	Boring drilled w/3-7/8" di- ameter tricone roller bit using bentonite mud as drilling fluid Water encoun- tered @ 2.5'
1			5				66.5		
2									
3									
4			26			Sand; grayish-brown; medium dense; fine grained; moist; w/trace roots	66.5	SP	
5									
6							64.0		
7			13			Sand; dark grayish-brown & light olive gray; medium dense; fine grained; moist; w/some clay; trace roots			
8								SP	
9			18			grading very dark grayish-brown; w/trace silt; clay grades out			
10							59.0		
11			11			Sand; light gray; medium dense; fine grained; moist; w/trace clay		SP	
12									
13			11			Sand; very dark grayish-brown; medium dense; fine grained; wet; w/trace silt	56.5	SP	
14									
15			4			Sand; gray; loose; fine grained; moist	54.0		
16								SP	
17			2			grading very loose; calcareous			
20							49.0		
1									
2			7			Sand; olive gray; loose; fine grained; wet; calcareous; w/num- erous shell fragments; trace silt		SP	
3							46.5		
4			7			Sand; olive gray; loose; fine grained; wet; calcareous; cemented; w/some olive gray clayey sand			
5								SP	
6			14			grading medium dense			
7							41.5		
8									
9									
30									
1			6			Sand; olive gray; loose; fine grained; wet; calcareous; w/num- erous shell fragments; some clay		SP	
2									
3									
4									
5									
6			18			Sand; light olive gray; medium dense; fine grained; wet; cal- careous; partially cemented; w/some shell fragments	35.5		
7								SP	
8									
9							31.5		
40						Silty Sand; gray; loose; fine grained; wet; calcareous		SM	
Continued on next page									

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FIGURE 30

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS



BORING NO. B-11

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FIGURE 31

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS

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PIEZOMETERS

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS

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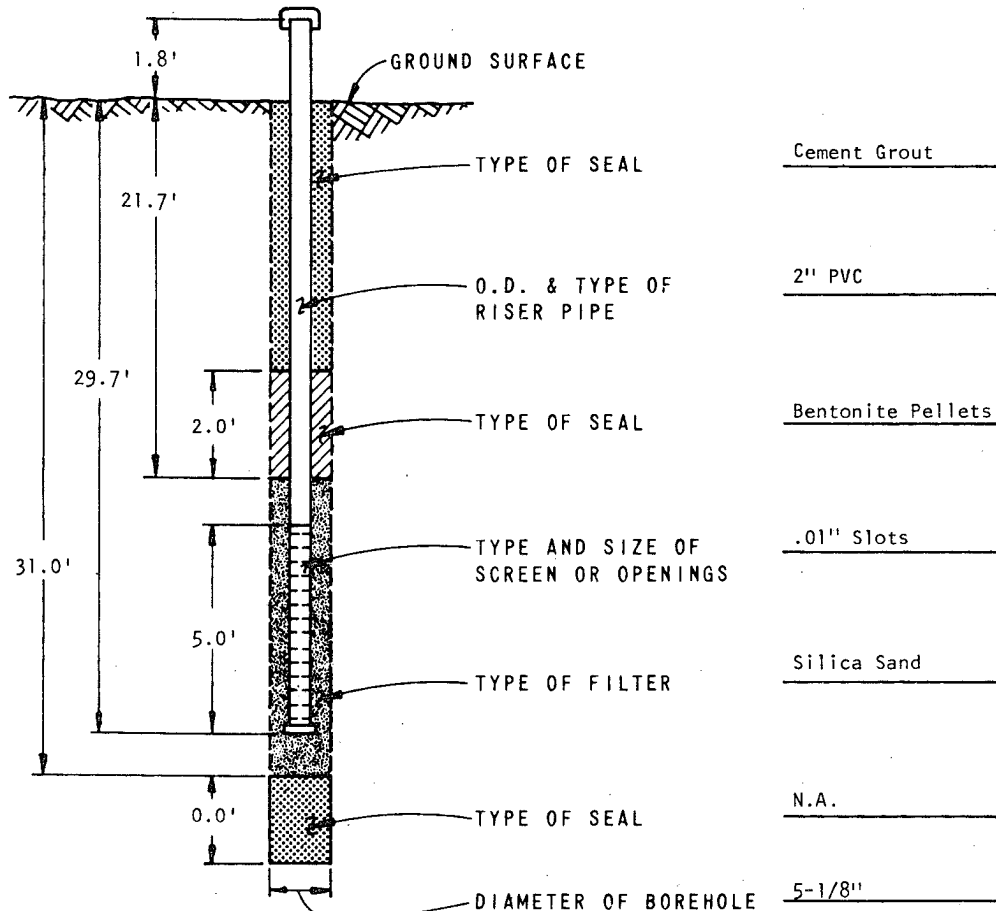


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PIEZOMETER INSTALLATION LOG

PIEZOMETER NO. B-1

CLIENT Orlando Utilities Commission		PROJECT Stanton Energy Center		PROJECT NO. 8927
PROJECT LOCATION Orlando, Florida		COORDINATES N-1,509,545 E-439,961	GROUND ELEVATION 88.9	DATE 6-11-80
STRATUM MONITORED Sand			INSPECTOR S. J. Casey	
CHECKED BY S. J. Casey		APPROVED BY R. H. Herzog		



METHOD OF INSTALLATION:
Boring advanced to completion with 5-1/8" diameter tricone roller bit using Revert as drilling fluid; set piezometer; placed filter and seal; grouted to ground surface.

REMARKS:

P-ST-021B

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS

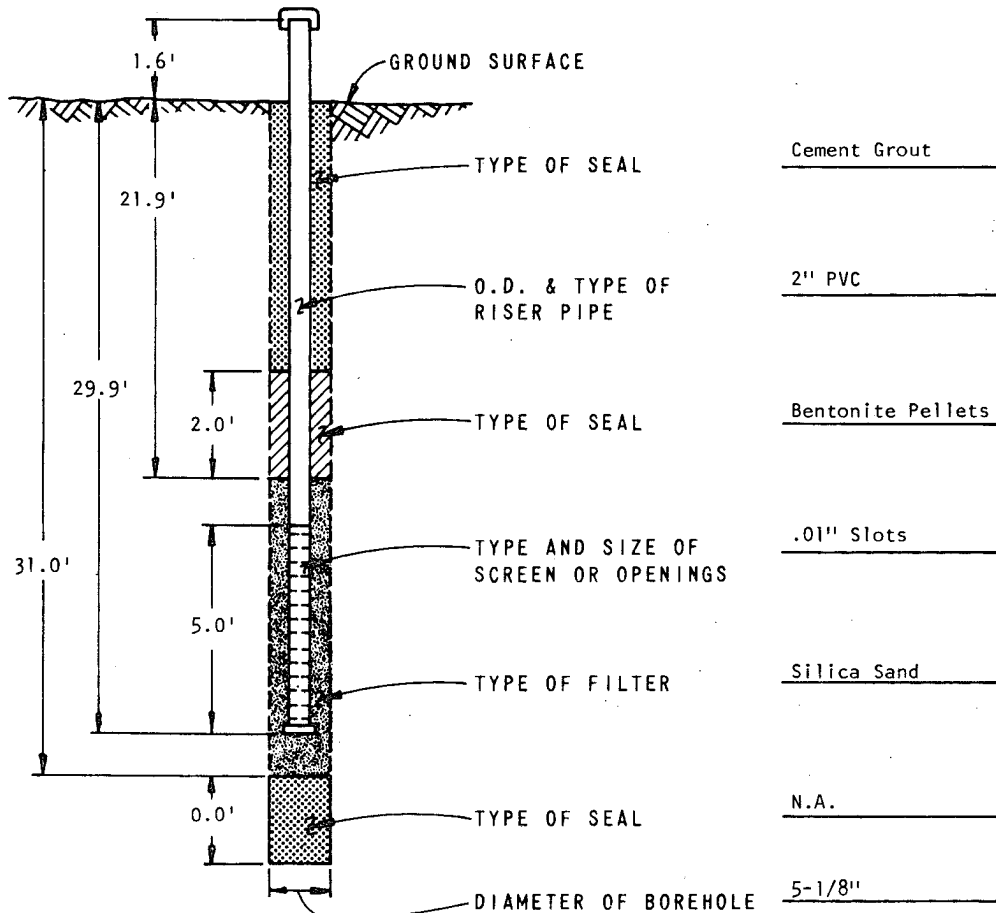


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PIEZOMETER INSTALLATION LOG

PIEZOMETER NO. B-2

CLIENT Orlando Utilities Commission		PROJECT Stanton Energy Center		PROJECT NO. 8927
PROJECT LOCATION Orlando, Florida	COORDINATES N-1,506,052 E-439,908	GROUND ELEVATION 87.8		DATE 6-10-80
STRATUM MONITORED Sand		INSPECTOR S. J. Casey		
CHECKED BY S. J. Casey		APPROVED BY R. H. Herzog		



METHOD OF INSTALLATION:

Boring advanced to completion with 5-1/8" diameter tricone roller bit using Revert as drilling fluid; set piezometer; placed filter and seal; grouted to ground surface.

REMARKS:

P-ST-021B

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS

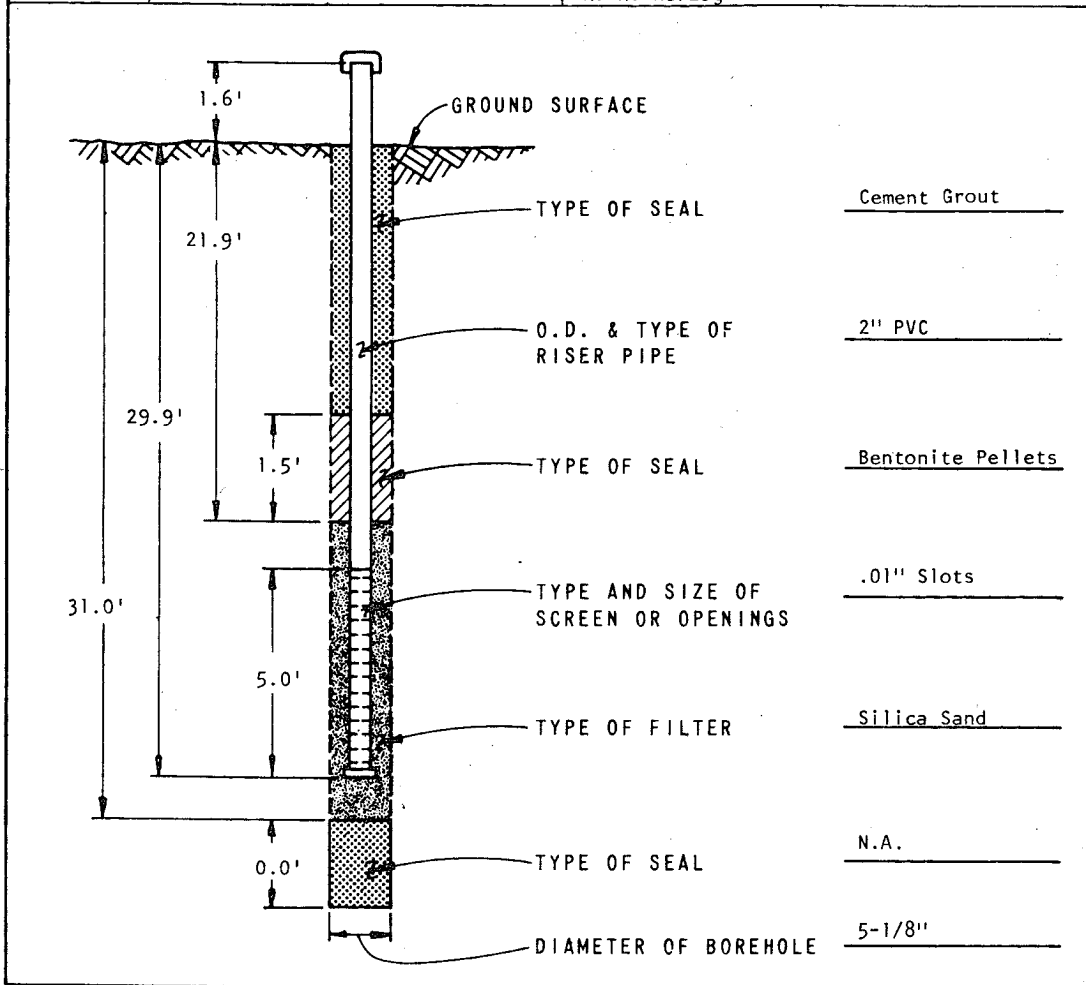


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PIEZOMETER INSTALLATION LOG

PIEZOMETER NO. B-5

CLIENT Orlando Utilities Commission		PROJECT Stanton Energy Center		PROJECT NO. 8927
PROJECT LOCATION Orlando, Florida	COORDINATES N-1,512,484 E-445,792	GROUND ELEVATION 72.1	DATE 6-10-80	
STRATUM MONITORED Sand		INSPECTOR S. J. Casey		
CHECKED BY S. J. Casey		APPROVED BY R. H. Herzog		



METHOD OF INSTALLATION:
Boring advanced to completion with 5-1/8" diameter tricone roller bit using Revert as drilling fluid; set piezometer; placed filter and seal; grouted to ground surface.

REMARKS:

P-ST-021B

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS

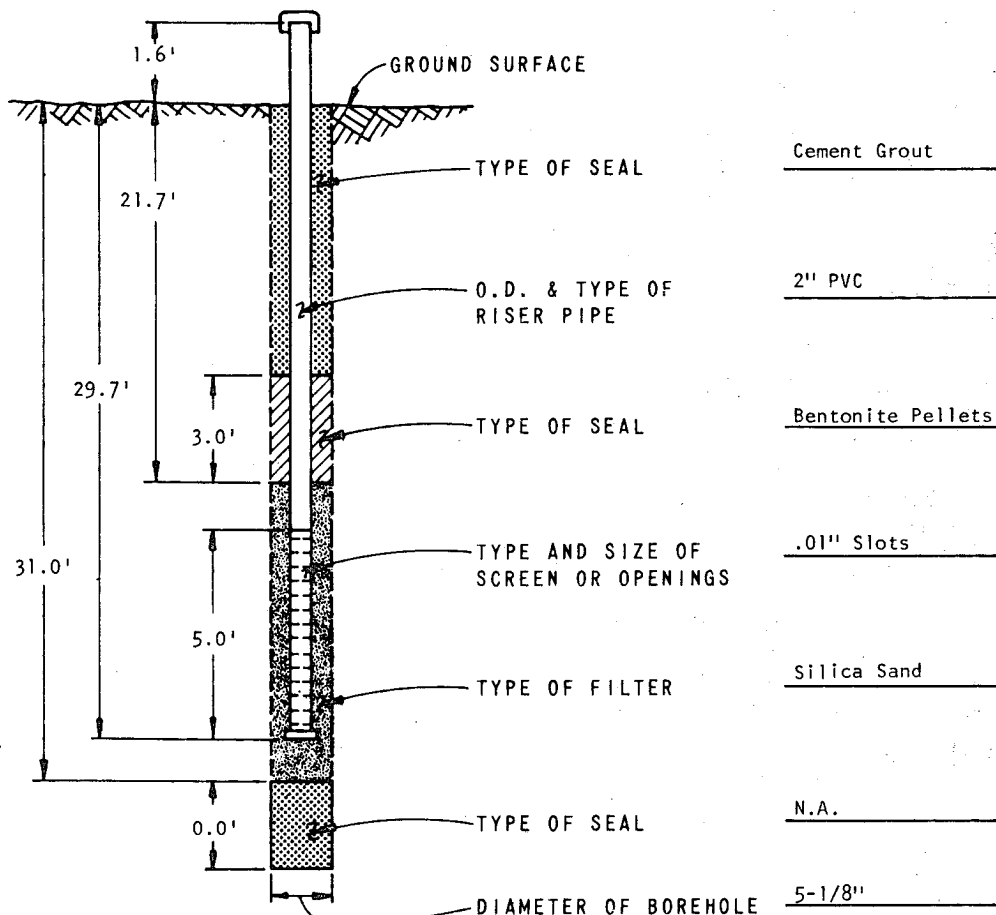


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PIEZOMETER INSTALLATION LOG

PIEZOMETER NO. B-9

CLIENT Orlando Utilities Commission		PROJECT Stanton Energy Center		PROJECT NO. 8927
PROJECT LOCATION Orlando, Florida		COORDINATES N-1,502,640 E-444,962	GROUND ELEVATION 81.0'	DATE 6-13-80
STRATUM MONITORED Sand			INSPECTOR S. J. Casey	
CHECKED BY S. J. Casey		APPROVED BY R. H. Herzog		



METHOD OF INSTALLATION:
Boring advanced to completion with 5-1/8" diameter tricone roller bit using Revert as drilling fluid; set piezometer; placed filter and seal; grouted to ground surface.

REMARKS:

P-ST-021B

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS

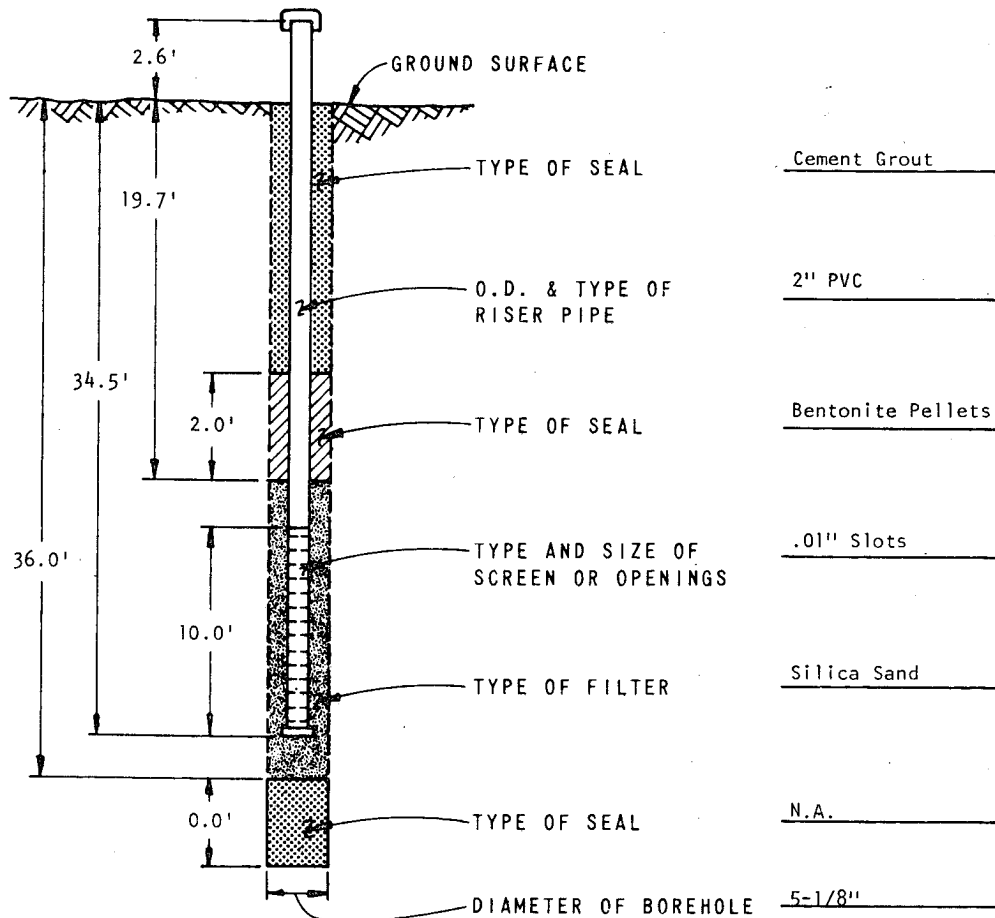


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PIEZOMETER INSTALLATION LOG

PIEZOMETER NO. B-13

CLIENT Orlando Utilities Commission		PROJECT Stanton Energy Center		PROJECT NO. 8927
PROJECT LOCATION Orlando, Florida		COORDINATES N-1,515,420 E-451,310	GROUND ELEVATION 50.6'	DATE 1-29-81
STRATUM MONITORED Sand with shell fragments			INSPECTOR R. W. Pinker	
CHECKED BY S. J. Casey		APPROVED BY R. H. Herzog		



METHOD OF INSTALLATION:
Boring advanced to completion with 5-1/8" diameter tricone roller bit using Revert as drilling fluid; set piezometer; placed filter and seal; grouted to ground surface.

REMARKS:

P-ST-021B

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS

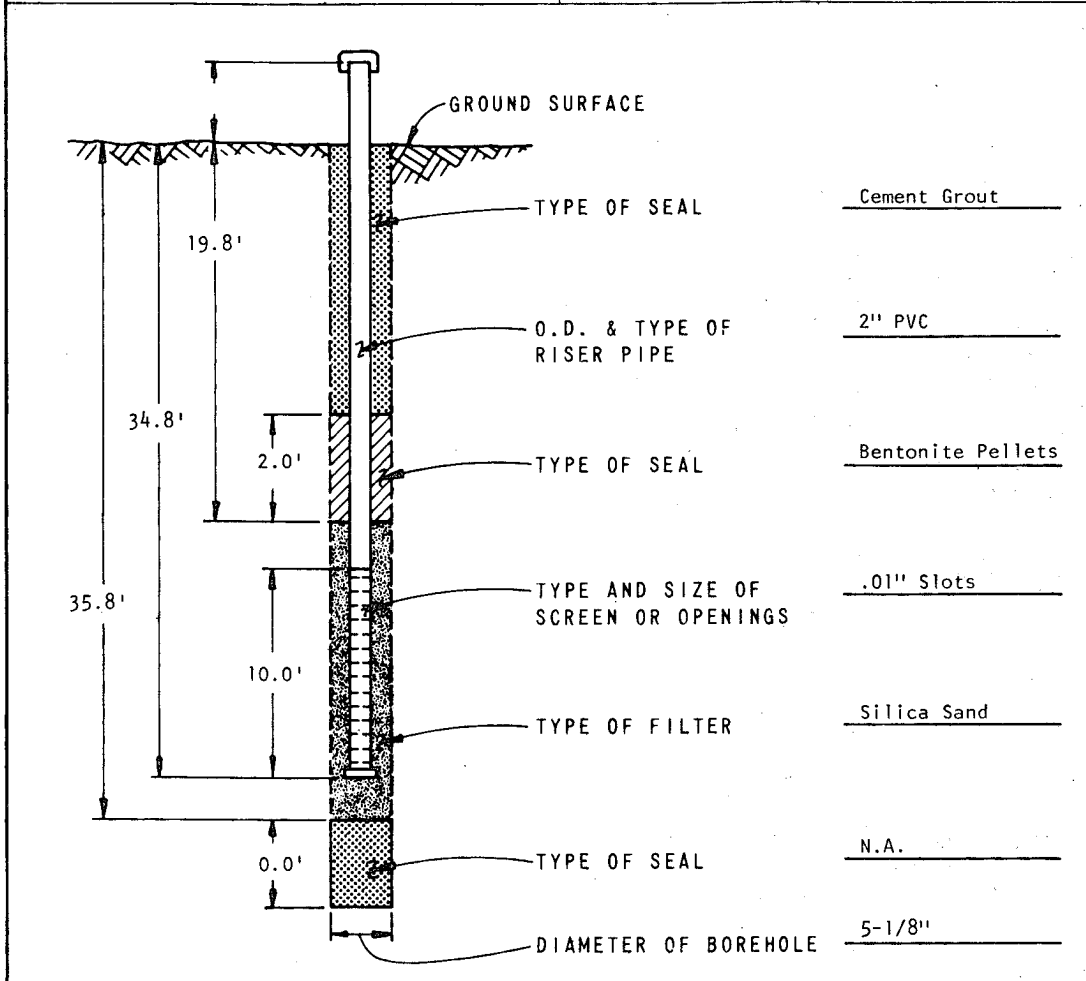


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CONSULTING ENGINEERS

PIEZOMETER INSTALLATION LOG

PIEZOMETER NO. B-14

CLIENT Orlando Utilities Commission		PROJECT Stanton Energy Center		PROJECT NO. 8927
PROJECT LOCATION Orlando, Florida		COORDINATES N-1,515,425 E-453,425	GROUND ELEVATION 55.2	DATE 1-28-81
STRATUM MONITORED Sand			INSPECTOR R. W. Pinker	
CHECKED BY S. J. Casey		APPROVED BY R. H. Herzog		



METHOD OF INSTALLATION:
Boring advanced to completion with 5-1/8" diameter tricone roller bit using Revert as drilling fluid; set piezometer; placed filter and seal

REMARKS:
Boring blocked off with bentonite pellets at depth 11.8' then grouted to ground surface.

P-ST-021B

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS

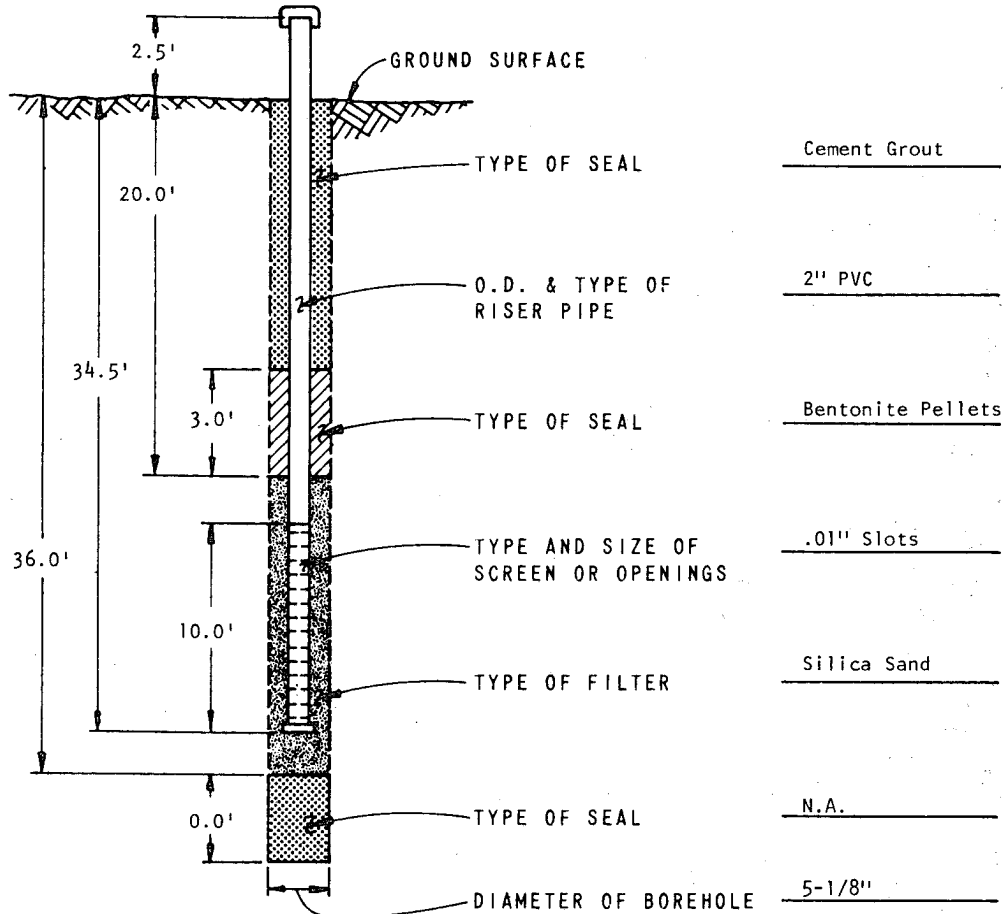


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PIEZOMETER INSTALLATION LOG

PIEZOMETER NO. B-15.

CLIENT Orlando Utilities Commission		PROJECT Stanton Energy Center		PROJECT NO. 8927
PROJECT LOCATION Orlando, Florida		COORDINATES N-1,512,690 E-448,070	GROUND ELEVATION 69.5	DATE 1-29-81
STRATUM MONITORED Sandy clay, cemented sand and clay w/shell fragments			INSPECTOR R. W. Pinker	
CHECKED BY S. J. Casey		APPROVED BY R. H. Herzog		



METHOD OF INSTALLATION:

Boring advanced to completion with 5-1/8" diameter tricone roller bit using Revert as drilling fluid; set piezometer; placed filter and seal; grouted to ground surface.

REMARKS:

P-ST-021B

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS

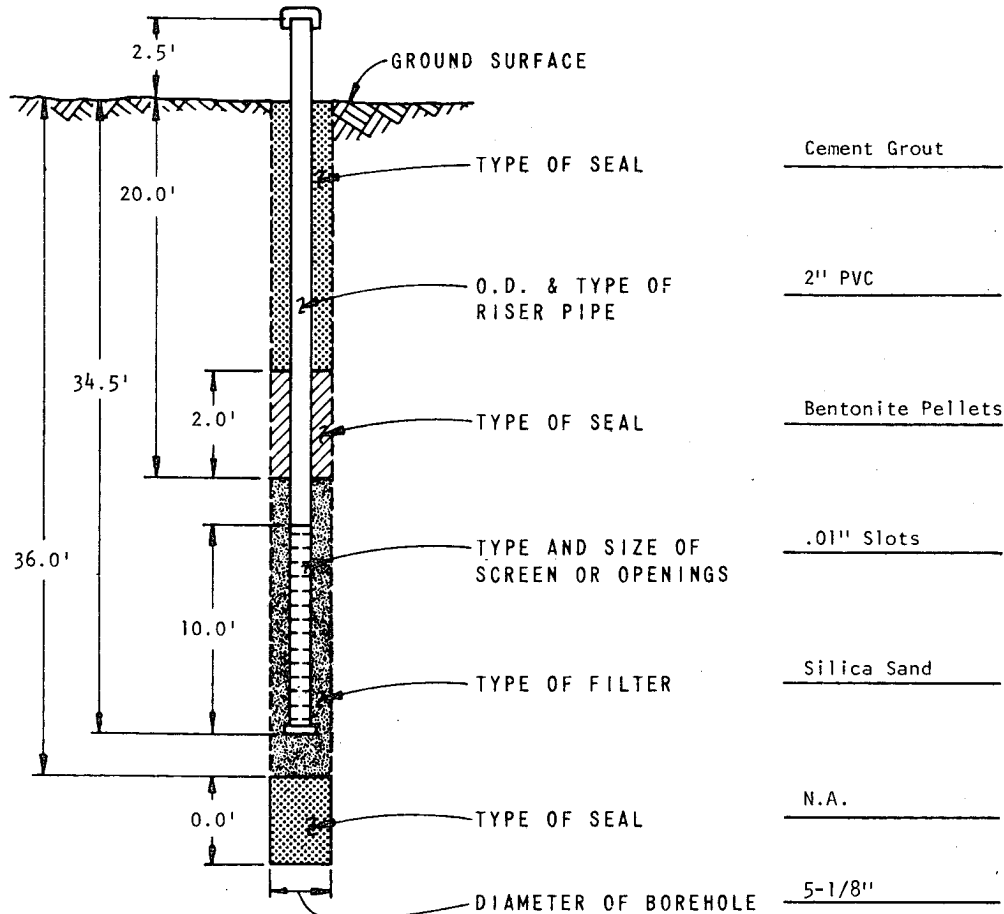


BLACK & VEATCH
CONSULTING ENGINEERS

PIEZOMETER INSTALLATION LOG

PIEZOMETER NO. B-16

CLIENT Orlando Utilities Commission		PROJECT Stanton Energy Center		PROJECT NO 8927
PROJECT LOCATION Orlando, Florida		COORDINATES N-1,508,265 E-448,020	GROUND ELEVATION 69.4	DATE 1-29-81
STRATUM MONITORED Cemented sand w/shell fragments			INSPECTOR R. W. Pinker	
CHECKED BY S. J. Casey			APPROVED BY R. H. Herzog	



METHOD OF INSTALLATION:

Boring advanced to completion with 5-1/8" diameter tricone roller bit using Revert as drilling fluid; set piezometer; placed filter and seal; grouted to ground surface.

REMARKS:

P-ST-021B

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS

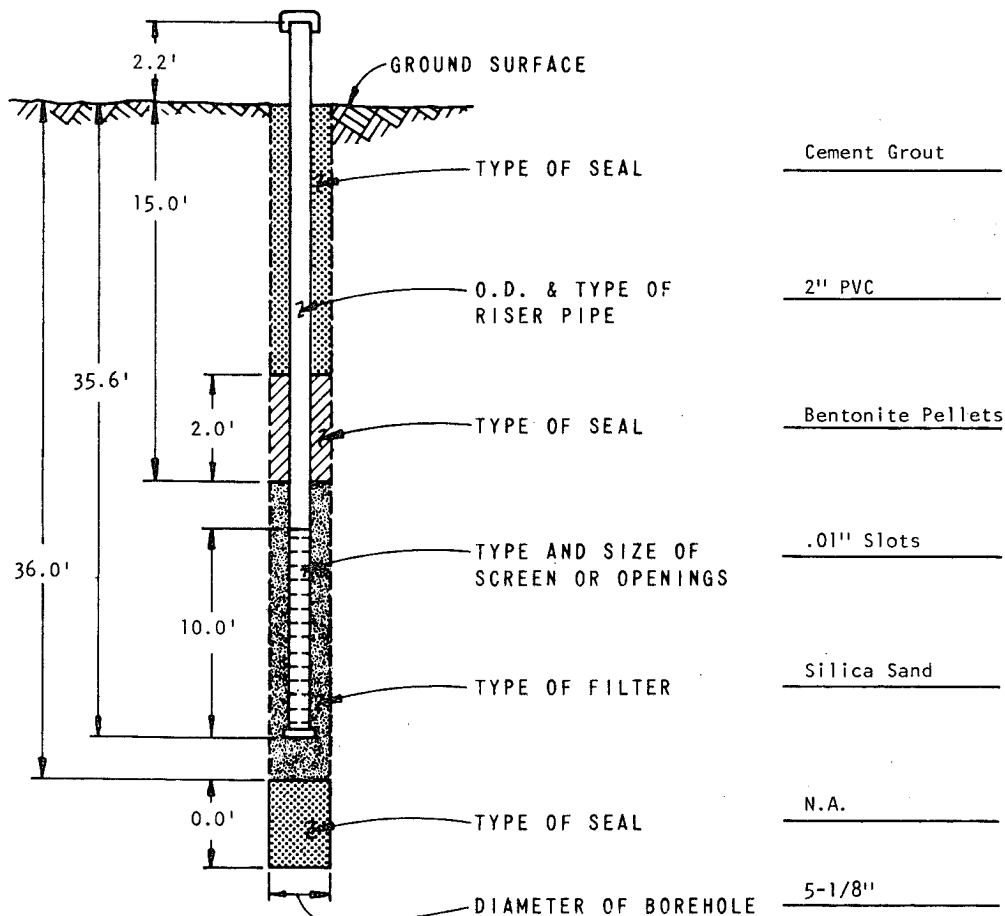


BLACK & VEATCH
CONSULTING ENGINEERS

PIEZOMETER INSTALLATION LOG

PIEZOMETER NO. B-17

CLIENT Orlando Utilities Commission		PROJECT Stanton Energy Center		PROJECT NO. 8927
PROJECT LOCATION Orlando, Florida		COORDINATES N-1,504,630 E-448,050	GROUND ELEVATION 72.9	DATE 1-29-81
STRATUM MONITORED Sand and Cemented Sand			INSPECTOR R. W. Pinker	
CHECKED BY S. J. Casey				



METHOD OF INSTALLATION

Boring advanced to completion with 5-1/8" diameter tricone roller bit using Revert as drilling fluid; set piezometer; placed filter and seal; grouted to ground surface.

REMARKS

Bottom 5' of piezometer is not slotted; slotted interval is from depth 20.5' to 30.5'.

P-ST-021B

EXHIBIT 2.4-1 (CONTINUED). SOIL BORING LOGS

LABORATORY TESTING
ORLANDO UTILITIES COMMISSION
CURTIS H. STANTON PLANT
ORLANDO, FLORIDA

SEPTEMBER 10, 1980



Ardaman & Associates, Inc.

OFFICES

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MEMBERS:

American Concrete Institute
American Society for Testing and Materials
American Consulting Engineers Council
Association of Soil and Foundation Engineers
Florida Institute of Consulting Engineers
Professional Engineers in Private Practice

**EXHIBIT 2.4-2. SOIL BORING LABORATORY
TEST REPORTS**

(1 OF 34)

TABLE OF CONTENTS

Boring Number	Sample Type	Depth of Sample (Ft)	Type of Test*	Section of Report
B-1	TW	48.5-50.5	W, Att, γ_d UC	Table I Table II
B-3	TW	41.0-43.0	W, γ_d SA Perm	Table I Figures 1-1 & 1-2 Table III
B-4	SPT	6.0-7.5	SA	Figure 1-3
B-6	TW	6.0-8.0	W, γ_d SA Perm	Table I Figures 1-4 & 1-5 Table III
B-6	TW	13.5-15.5	W, γ_d SA Perm	Table I Figure 1-6 Table III
B-6	TW	37.0-39.0	W, γ_d , Att UU Consol	Table I Figure 1-6 Figures 3-1-A&B
B-6	SPT	42.0-43.5	SA	Figure 1-7
B-6	TW	72.0-74.0	W, γ_d UU	Table I Figure 2-1
B-6	SPT	80.0-81.5	SA	Figure 1-8
B-6	TW	160.0-161.9	W, γ_d UU	Table I Figure 2-2
B-6	NX	198.5-203.5	UC	Table II
B-6	NX	203.5-208.5	UC	Table II
B-7	TW	47.0-49.0	W, γ_d , Att UU Consol	Table I Figure 2-3 Figures 1-9, 3-2-A&B
B-7	TW	60.0-62.0	W, γ_d , Att UU	Table I Figure 2-4

EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY TEST REPORTS

TABLE OF CONTENTS (Continued)

Boring Number	Sample Type	Depth of Sample (Ft)	Type of Test*	Section of Report
B-7	SPT	65.0-66.5	SA	Figure 1-10
B-7	SPT	70.0-71.5	SA	Figure 1-11
B-7	SPT	80.0-81.5	SA	Figure 1-12
B-7	SPT	100.0-101.5	SA	Figure 1-13
B-7	NX	199.5-204.5	UC	Table II
B-8	SPT	33.5-35.0	SA	Figure 1-14
B-8	SPT	38.5-40.0	SA	Figure 1-15
B-8	TW	43.5-45.5	W, γ_d , Att UU	Table I Figure 2-5
B-10	SPT	23.5-25.0	SA	Figure 1-16
B-10	SPT	28.5-30.0	SA	Figure 1-17
B-11	TW	48.0-50.0	W, γ_d , Att UC	Table I Table II

Legend:

γ_d	=	Dry density
Consol	=	Consolidation test
Perm	=	Permeability Test (Constant Head)
SA	=	Sieve Analysis
W	=	Natural Moisture Content
Att	=	Atterberg Limits (LL, PL, PI)
UC	=	Unconfined Compressive Strength Test
UU	=	Triaxial Shear Test (Unconsolidated-Undrained)

EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY
TEST REPORTS

ATTERBERG LIMITS

Boring Number	Depth (Ft.)	Unified Class.	Natural Moisture Content	Plastic Limit	Liquid Limit	Plasticity Index	d ³ Lbs/ft ³
B-1	48.5-50.5	--	45.5	--	--	--	--
B-1	48.5-50.5	--	42.9	--	--	--	--
B-1	48.5-50.5	--	34.4	--	--	--	--
B-1	48.5-50.5	--	38.4	--	--	--	--
B-1	48.5-50.5	CH	32.8	19.6	51.0	31	80.9
B-3	41.0-43.0	--	33.2	--	--	--	92.0
B-3	41.0-43.0	--	29.5	--	--	--	--
B-3	41.0-43.0	--	25.9	--	--	--	--
B-3	41.0-43.0	--	27.4	--	--	--	--
B-6	6.0-8.0	--	25.3	--	--	--	95.4
B-6	6.0-8.0	--	24.1	--	--	--	--
B-6	6.0-8.0	--	25.6	--	--	--	--
B-6	6.0-8.0	--	26.3	--	--	--	--
B-6	13.5-15.5	--	20.7	--	--	--	105.9
B-6	13.5-15.5	--	20.2	--	--	--	--
B-6	13.5-15.5	--	18.3	--	--	--	--
B-6	13.5-15.5	--	19.6	--	--	--	--
B-6	37.0-39.0	--	46.0	--	--	--	--
B-6	37.0-39.0	--	43.7	--	--	--	--
B-6	37.0-39.0	--	30.9	--	--	--	--
B-6	37.0-39.0	--	36.9	--	--	--	--
B-6	37.0-39.0	CH	43.9	16.2	55.2	39	84.4
B-6	72.0-74.0	--	45.3	--	--	--	77.5
B-6	72.0-74.0	--	41.6	--	--	--	--
B-6	72.0-74.0	--	45.1	--	--	--	--
B-6	72.0-74.0	--	37.5	--	--	--	--
B-6	160.0-161.0	--	28.7	--	--	--	87.9
B-6	160.0-161.0	--	31.2	--	--	--	--
B-6	160.0-161.0	--	37.6	--	--	--	--
B-6	160.0-161.0	--	41.7	--	--	--	--

File Number 80-6072

Table I-1

EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY TEST REPORTS

ATTERBERG LIMITS

Boring Number	Depth (Ft.)	Unified Class.	Natural Moisture Content	Plastic Limit	Liquid Limit	Plasticity Index	d Lbs/ft ³
B-7	47.0-49.0	--	38.8	--	--	--	--
B-7	47.0-49.0	--	40.1	--	--	--	--
B-7	47.0-49.0	--	47.0	--	--	--	--
B-7	47.0-49.0	--	44.1	--	--	--	--
B-7	47.0-49.0	CH	50.8	20.8	61.1	40	76.1
B-7	60.0-62.0	--	97.9	--	--	--	--
B-7	60.0-62.0	--	82.4	--	--	--	--
B-7	60.0-62.0	--	42.8	--	--	--	--
B-7	60.0-62.0	CH	73.6	30.9	104.5	74	55.8
B-8	43.5-45.0	--	57.1	--	--	--	--
B-8	43.5-45.0	--	45.8	--	--	--	--
B-8	43.5-45.0	--	44.0	--	--	--	--
B-8	43.5-45.0	--	47.9	--	--	--	--
B-8	43.5-45.0	CH	56.0	18.8	77.0	58	71.4
B-11	48.0-50.0	--	55.5	--	--	--	--
B-11	48.0-50.0	--	84.7	--	--	--	--
B-11	48.0-50.0	--	88.8	--	--	--	--
B-11	48.0-50.0	--	90.1	--	--	--	--
B-11	48.0-50.0	CH	88.0	28.8	107.0	78	57.1

File Number 80-6072

Table I-2

EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY
TEST REPORTS

UNCONFINED COMPRESSIVE STRENGTH TEST

<u>Boring Number</u>	<u>Depth of Sample (Ft.)</u>	<u>Diameter (In.)</u>	<u>Length After Capping (In.)</u>	<u>Load (Lbs)</u>	<u>Compressive Strength (psi)</u>
B-1	48.5-50.5	1.5	3.1	16.48	9.32 (0.67 tsf)
B-6	199	2	5.25	3,110	990
B-6	205	2	4.75	2,100	668
B-7	207	2	4.56	23,300	7414
B-11	48.0-50.0	1.5	3.2	8.91	5.04 (0.363 tsf)

File Number 80-6072

Table II

EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY
TEST REPORTS

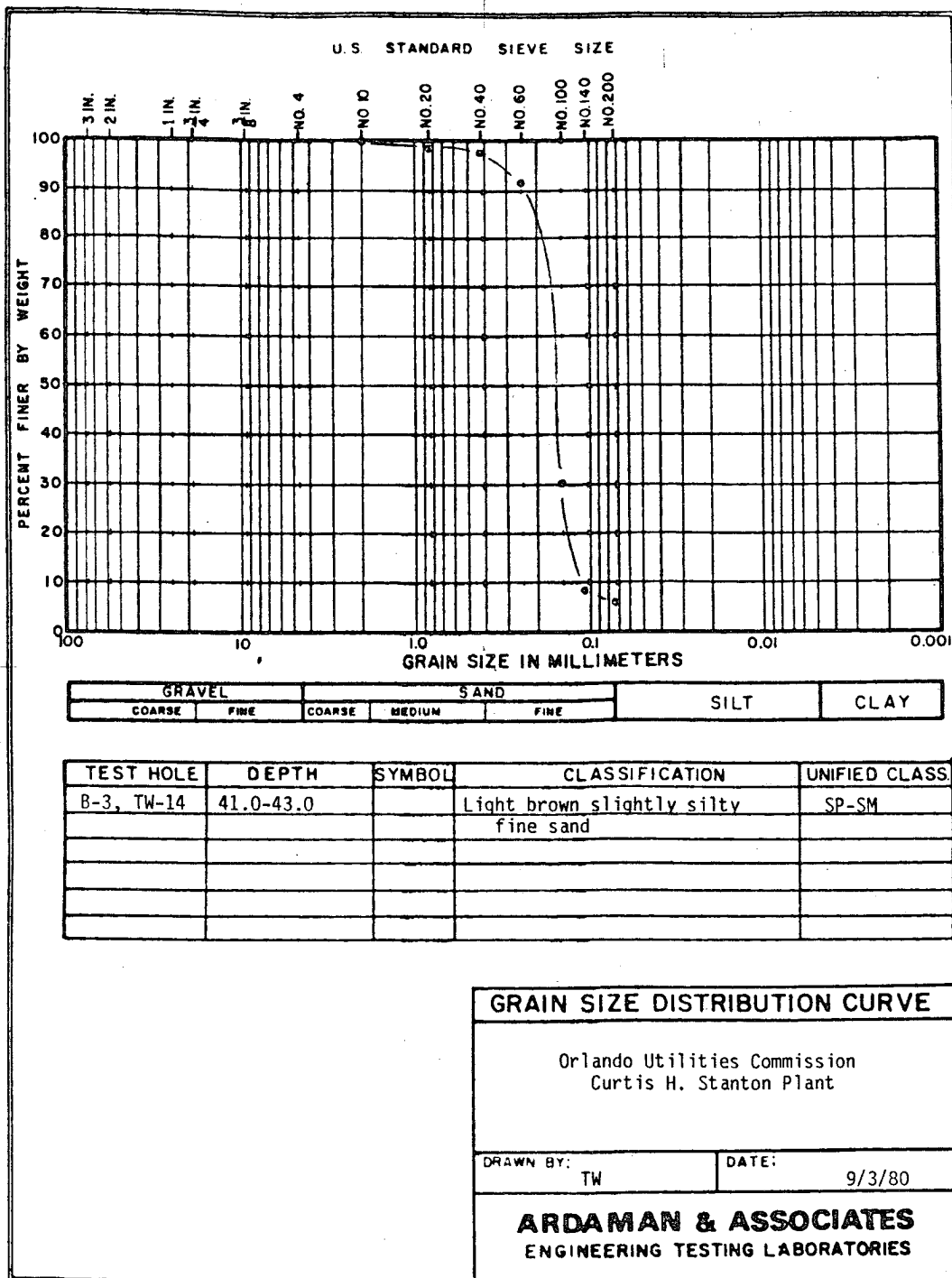
CONSTANT HEAD PERMEABILITY TEST

Boring Number	Depth of Sample (Ft.)	K, cm/sec
B-3	41.0-43.0	2.6×10^{-5}
B-6	6.0-8.0	1.1×10^{-3}
B-6	13.5-15.5	1.2×10^{-4}

File Number 80-6072

Table III

EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY
TEST REPORTS



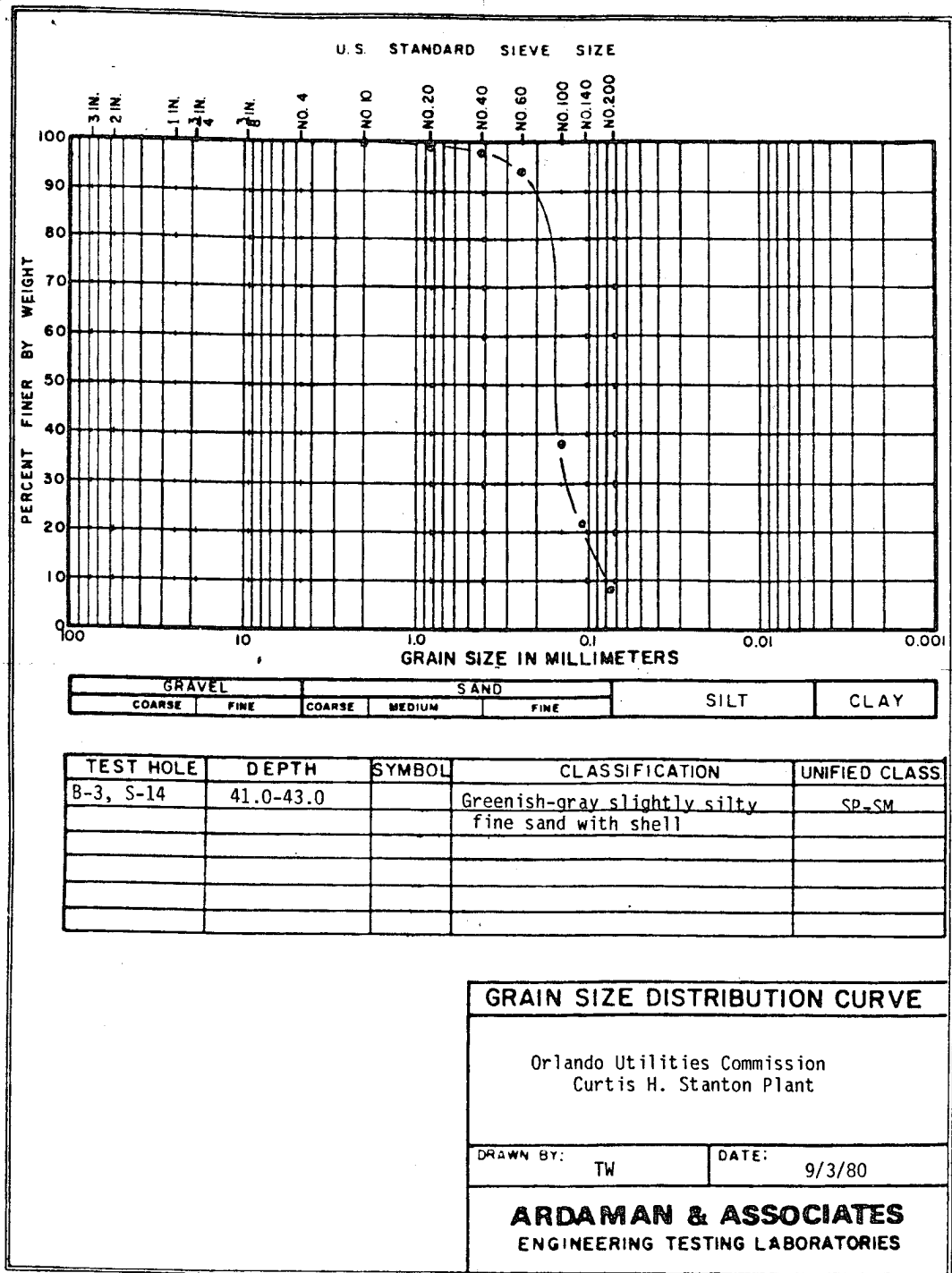
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1-1

Ardaman & Associates, Inc.

EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY
TEST REPORTS

(8 OF 34)

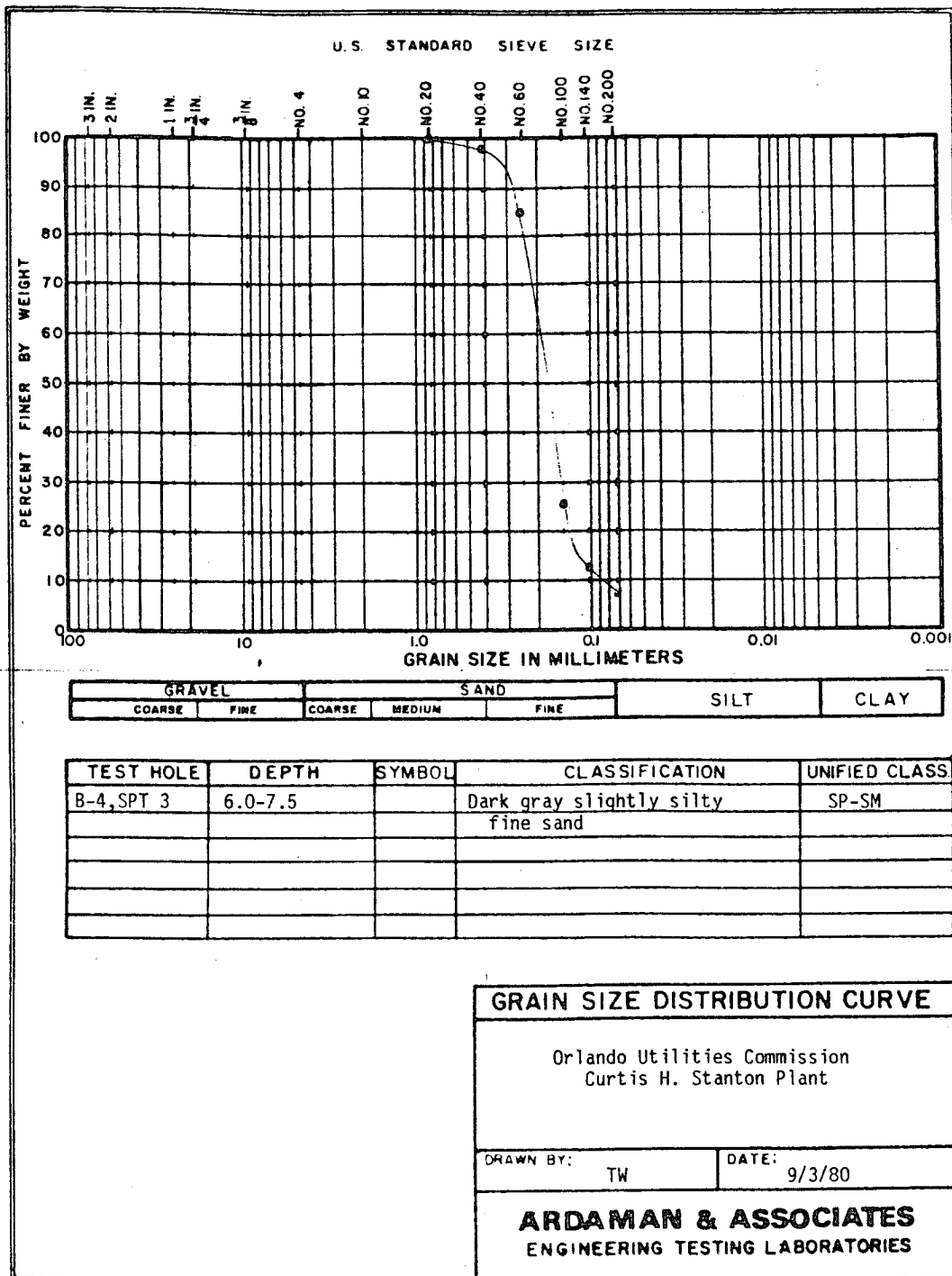


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1-2

Ardaman & Associates, Inc.

EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY
TEST REPORTS



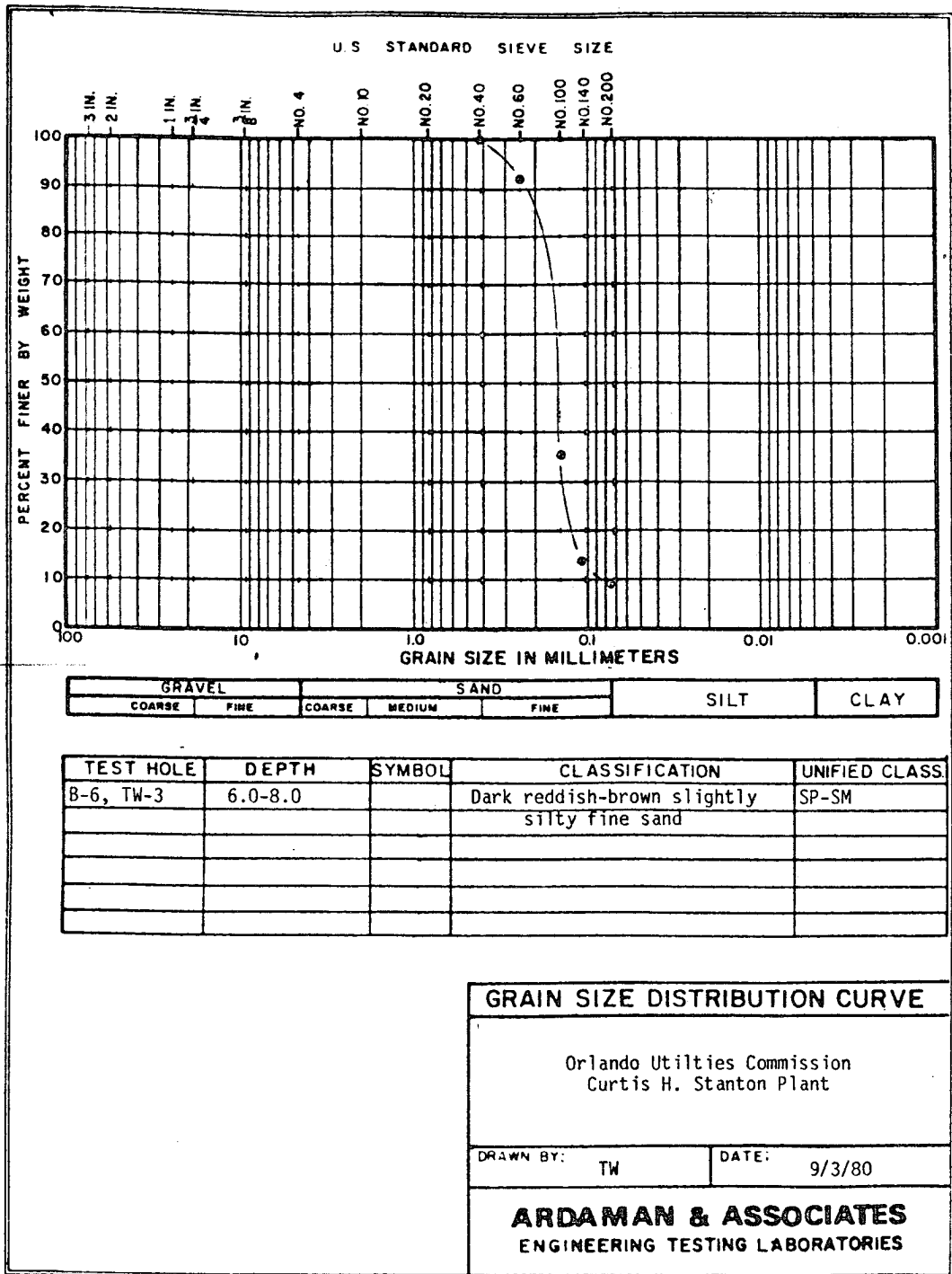
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Ardaman & Associates, Inc.

EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY
TEST REPORTS

(10 OF 34)

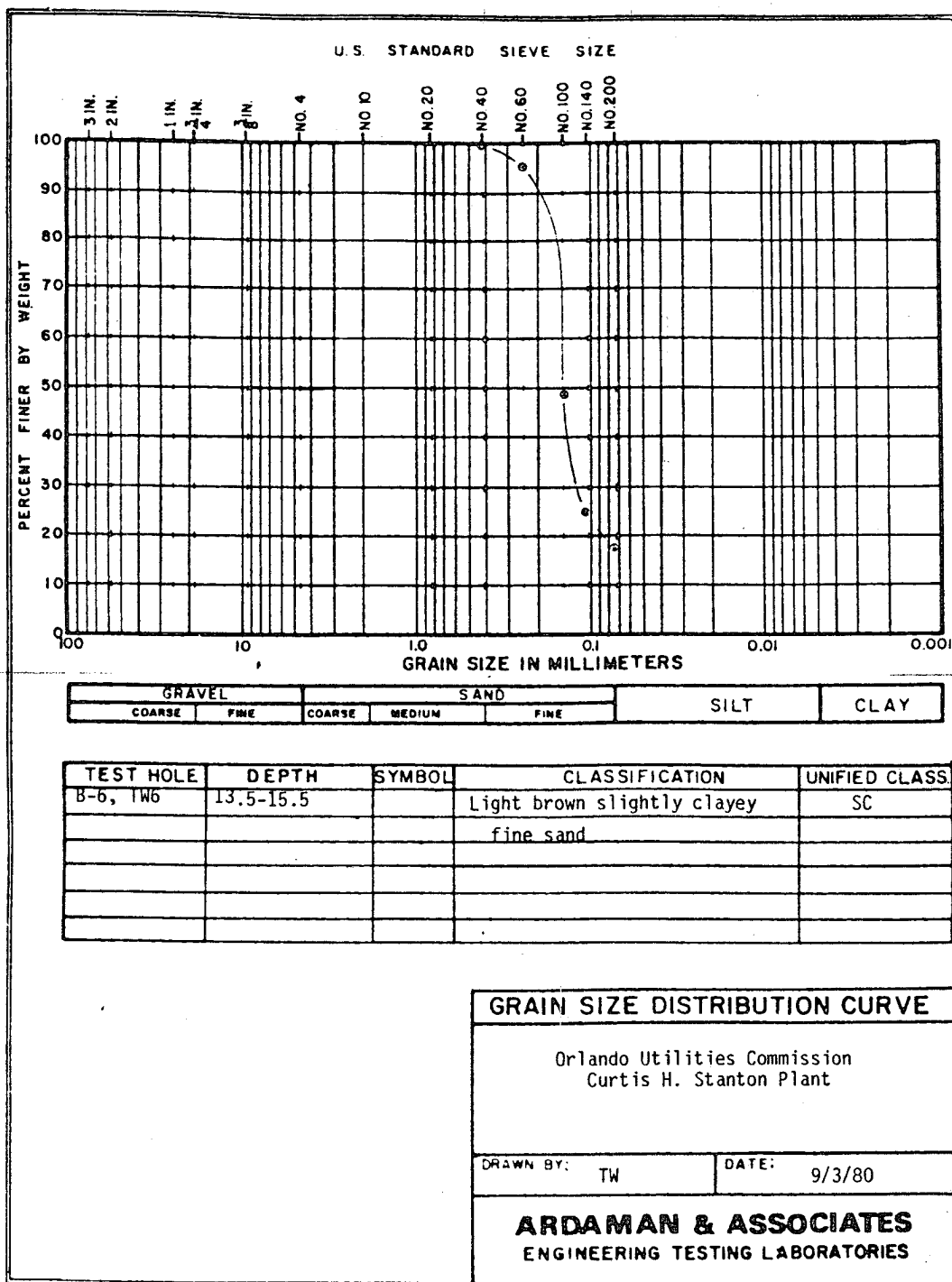


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Ardaman & Associates, Inc.

EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY
TEST REPORTS

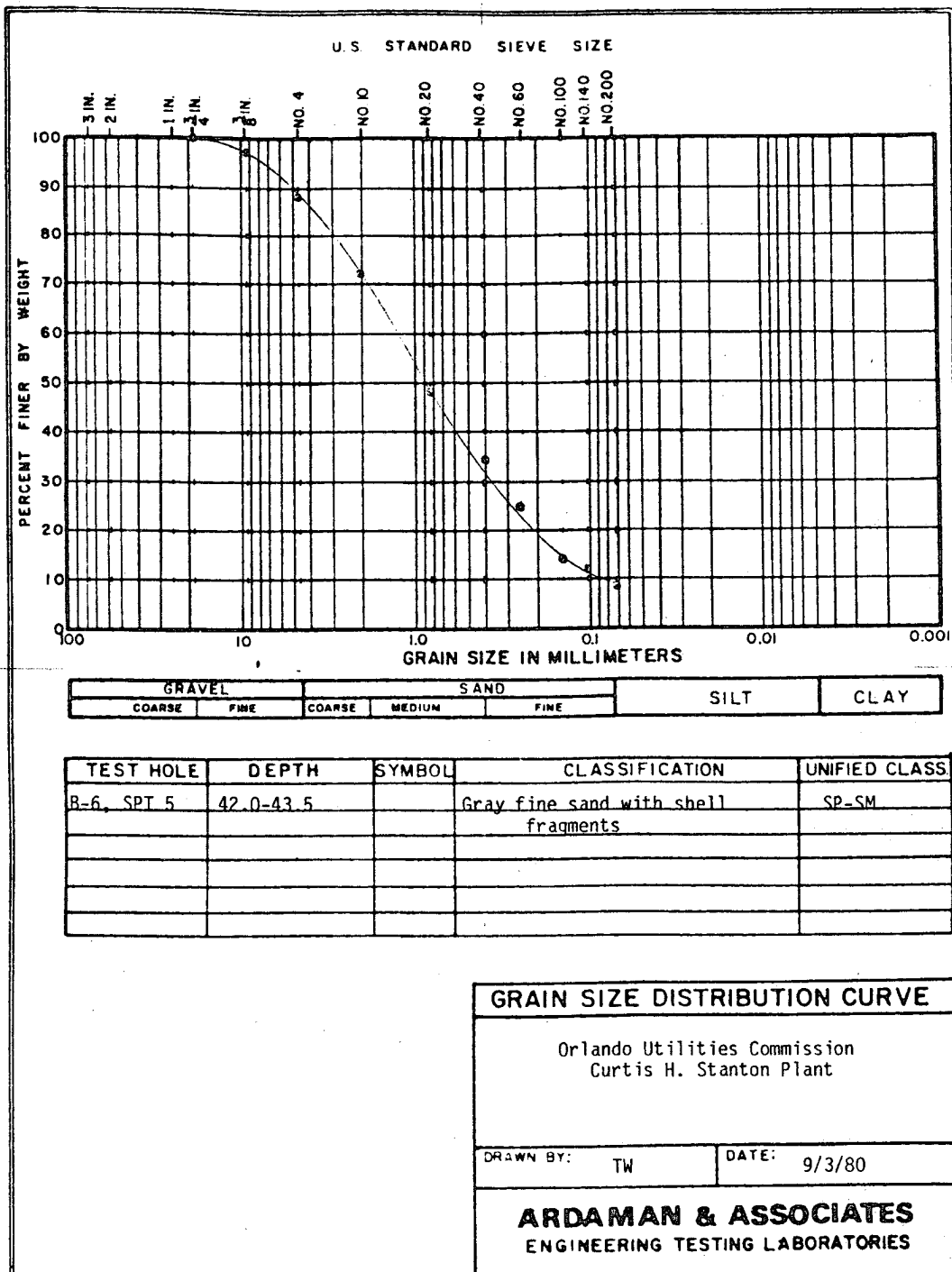


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EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY
TEST REPORTS



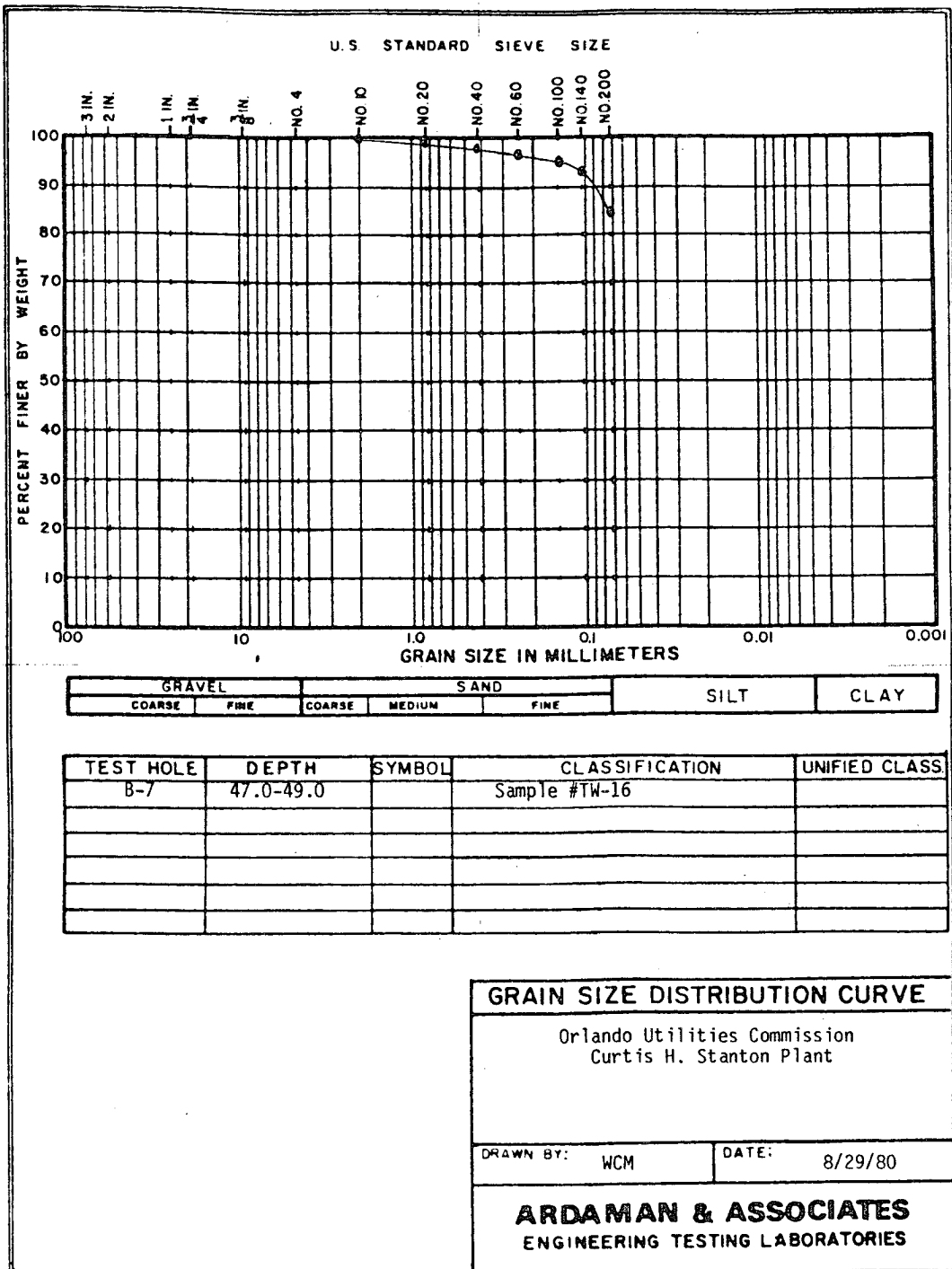
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 Ardaman & Associates, Inc.

EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY
TEST REPORTS

(14 OF 34)



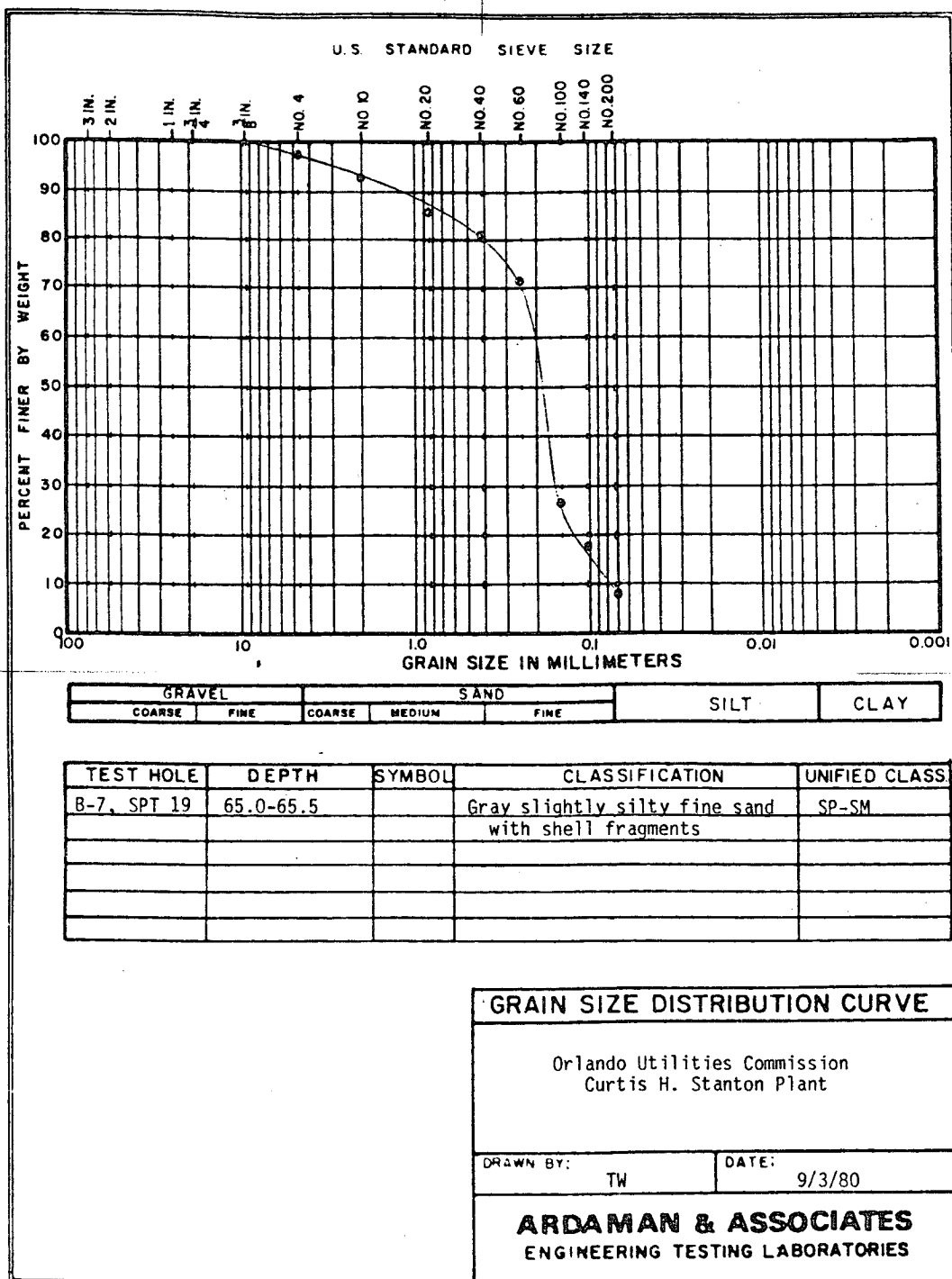
File Number 80-6072

1-9

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EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY
TEST REPORTS

(16 OF 34)



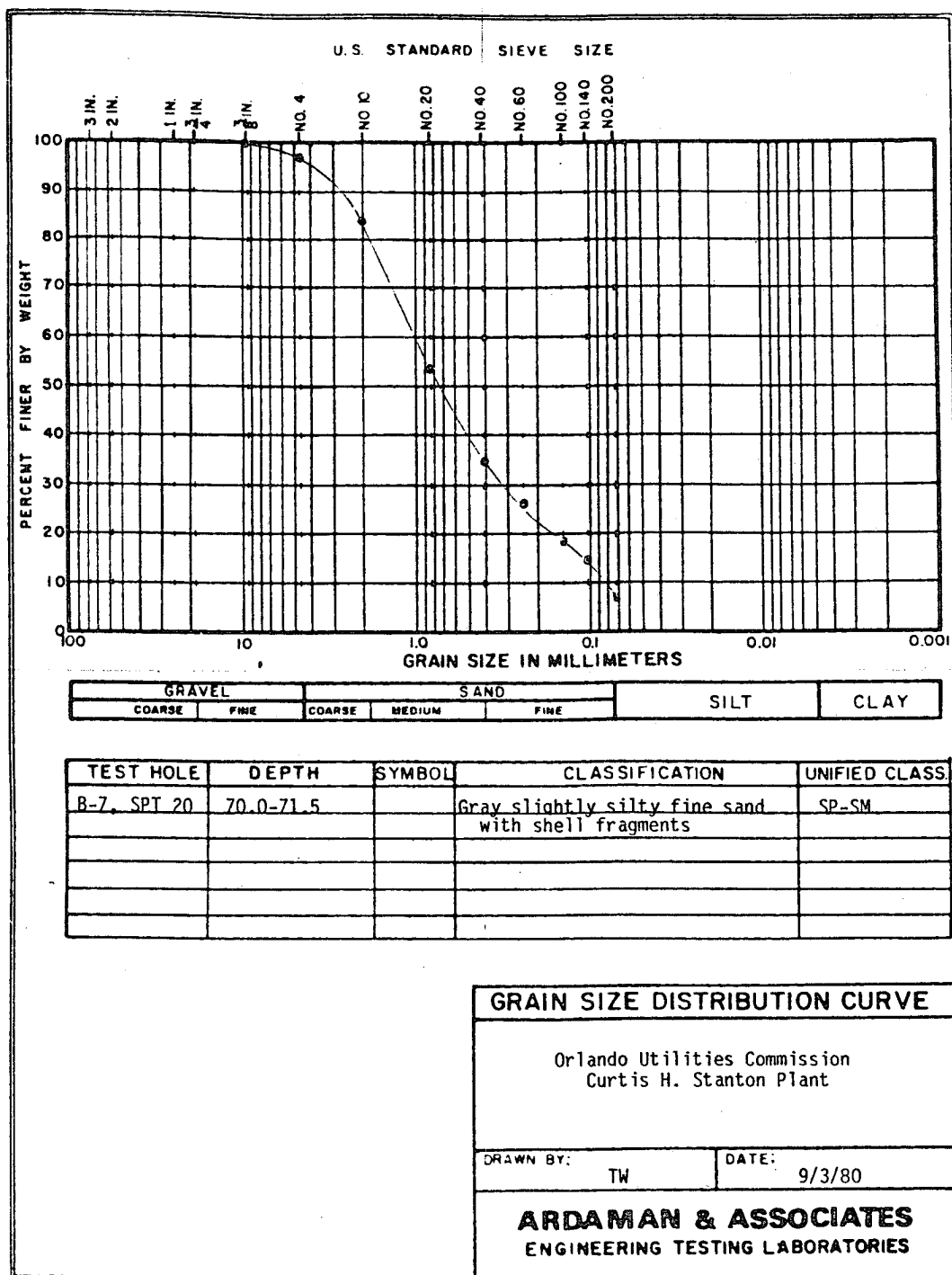
File Number 80-6072

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EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY
TEST REPORTS

(17 OF 34)



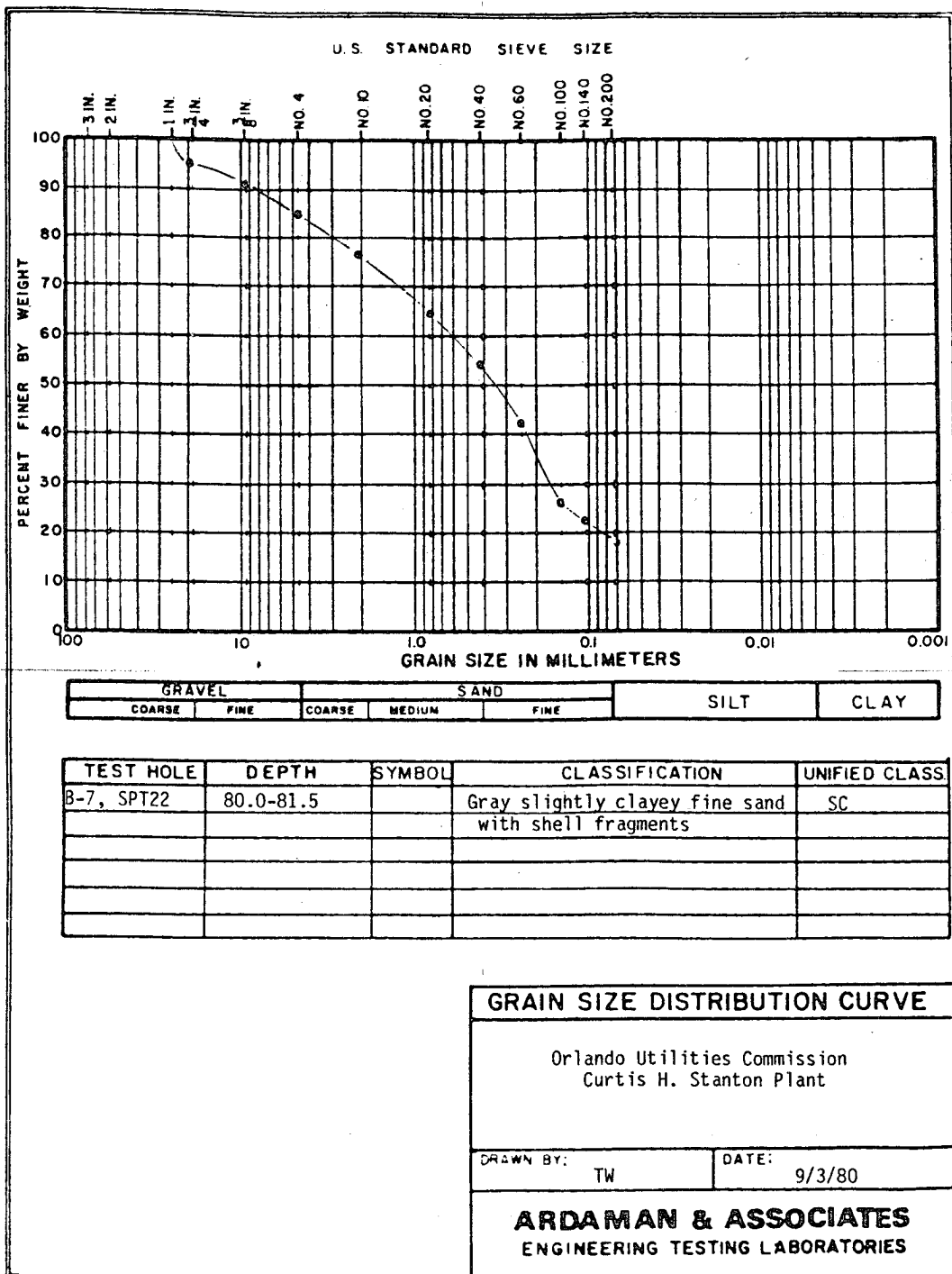
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EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY TEST REPORTS

(18 OF 34)



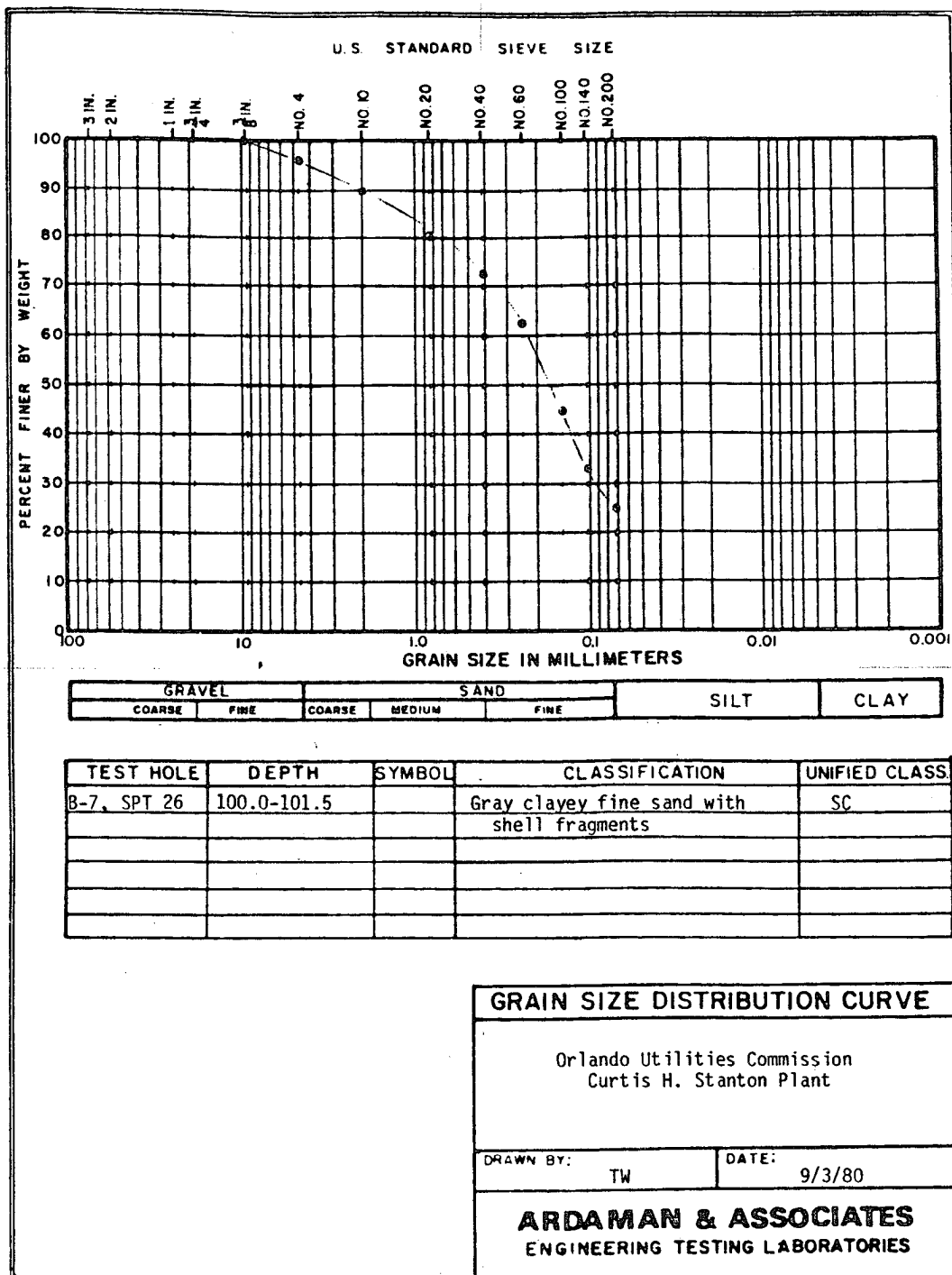
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 Ardaman & Associates, Inc.

EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY
TEST REPORTS

(19 OF 34)



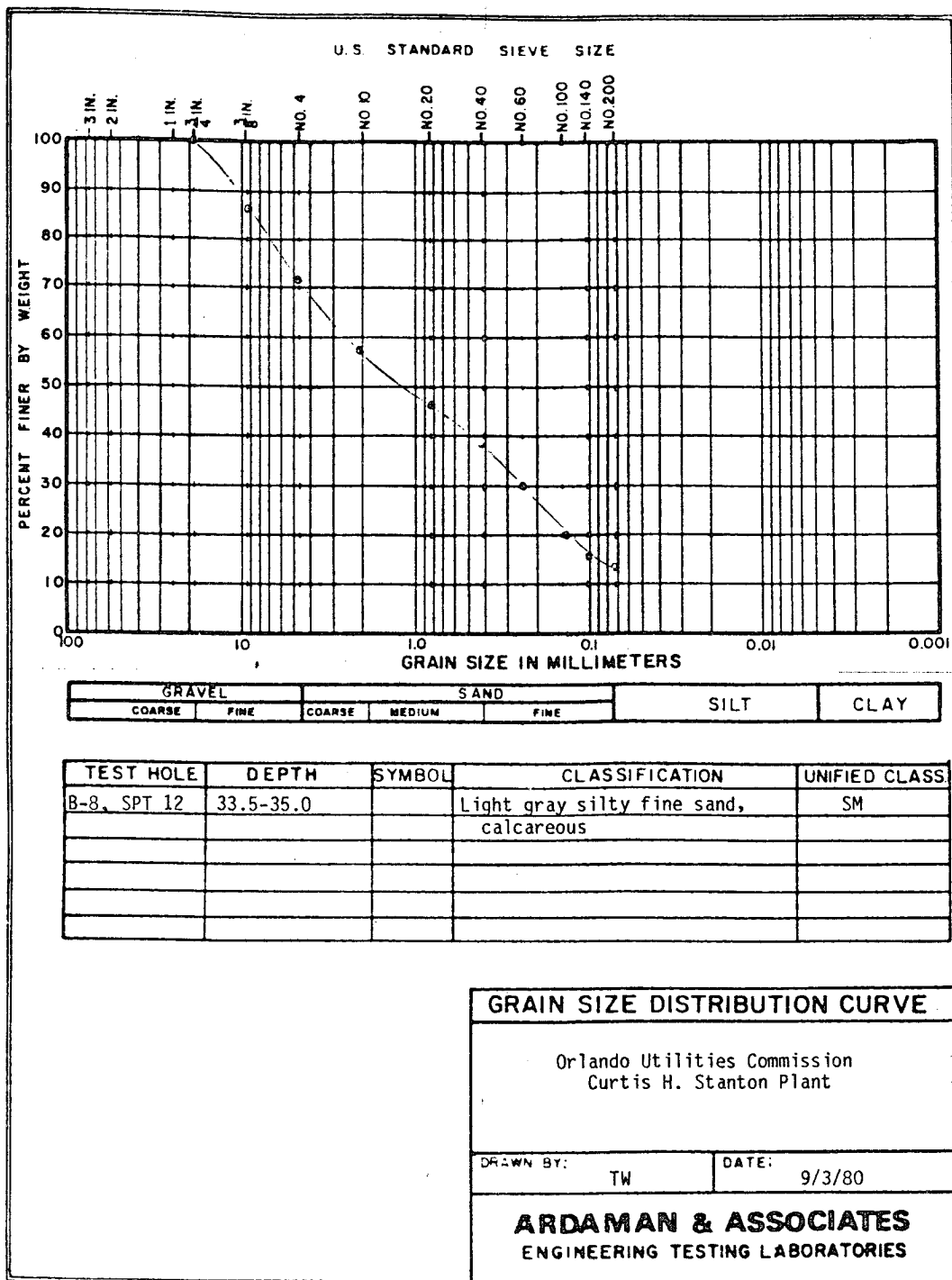
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1-13

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EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY
TEST REPORTS

(20 OF 34)



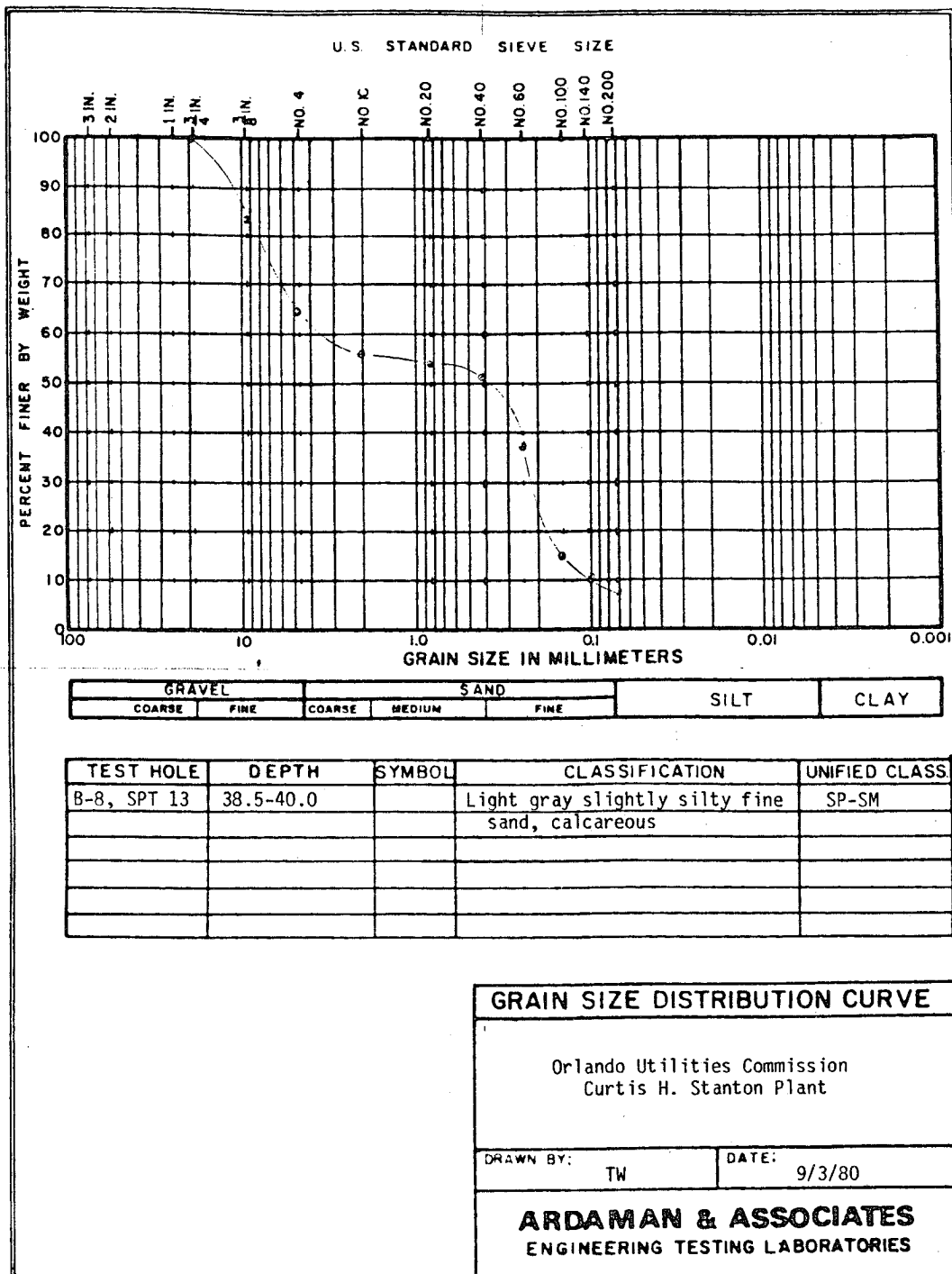
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EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY
TEST REPORTS

(21 OF 34)



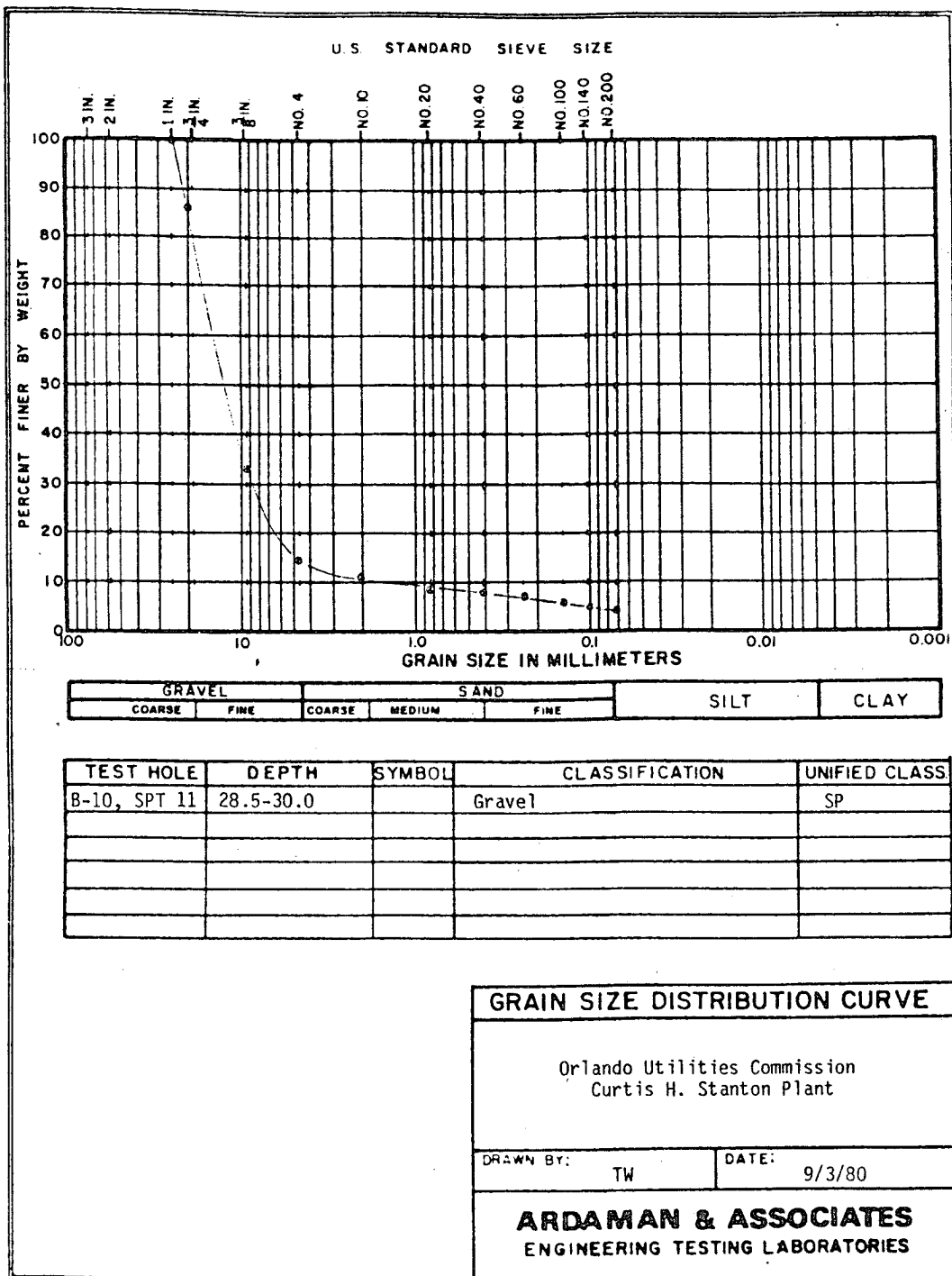
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1-15

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EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY
TEST REPORTS

(22 OF 34)

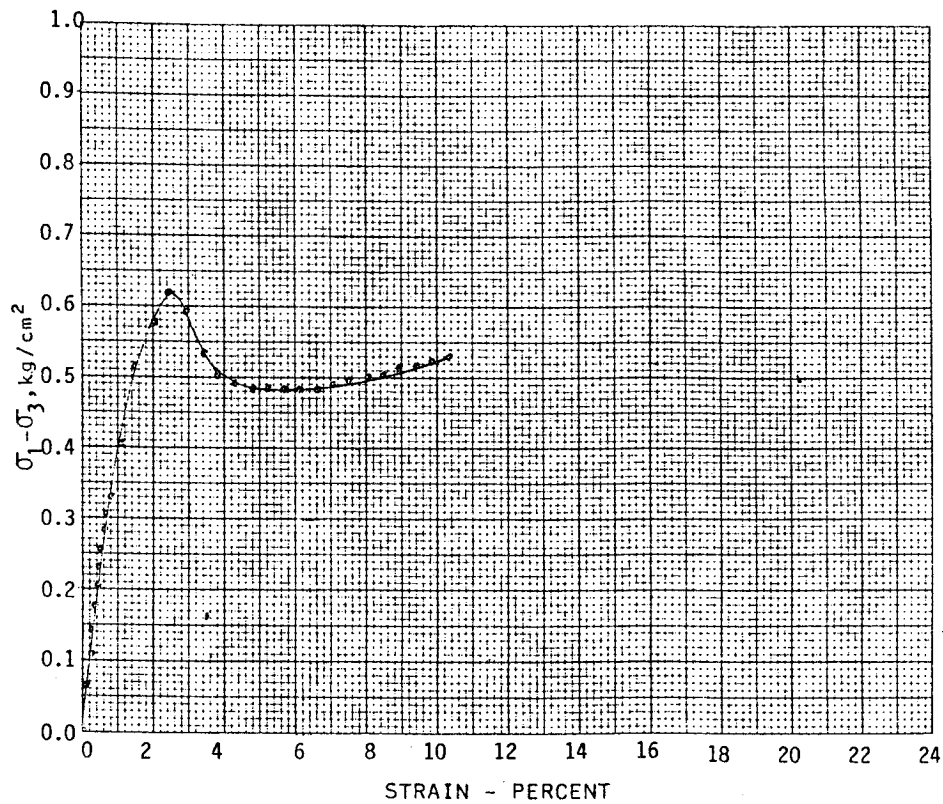


File Number 80-6072

1-17

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EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY
TEST REPORTS



TEST NUMBER _____ σ_c 2.11 kg/cm²
 BORING NUMBER B-6 $\dot{\epsilon}$ 1.0 % /min.
 SAMPLE NUMBER TW-22
 DEPTH (FEET) 72.0-74.0
 CLASSIFICATION _____

INITIAL
 $\gamma_d =$ 72.7 lb/ft³
 M.C. = 46.7 %
 SAT. = 94.8 %
 B = N/A

NOTES: Extruded into
1.4" SS tube



TYPE OF FAILURE _____

Orlando Utilities Commission
 Curtis H. Stanton Plant

UNCONSOLIDATED - UNDRAINED
 TRIAXIAL COMPRESSION TEST

TESTED BY: _____ DATE _____ FILE NO _____

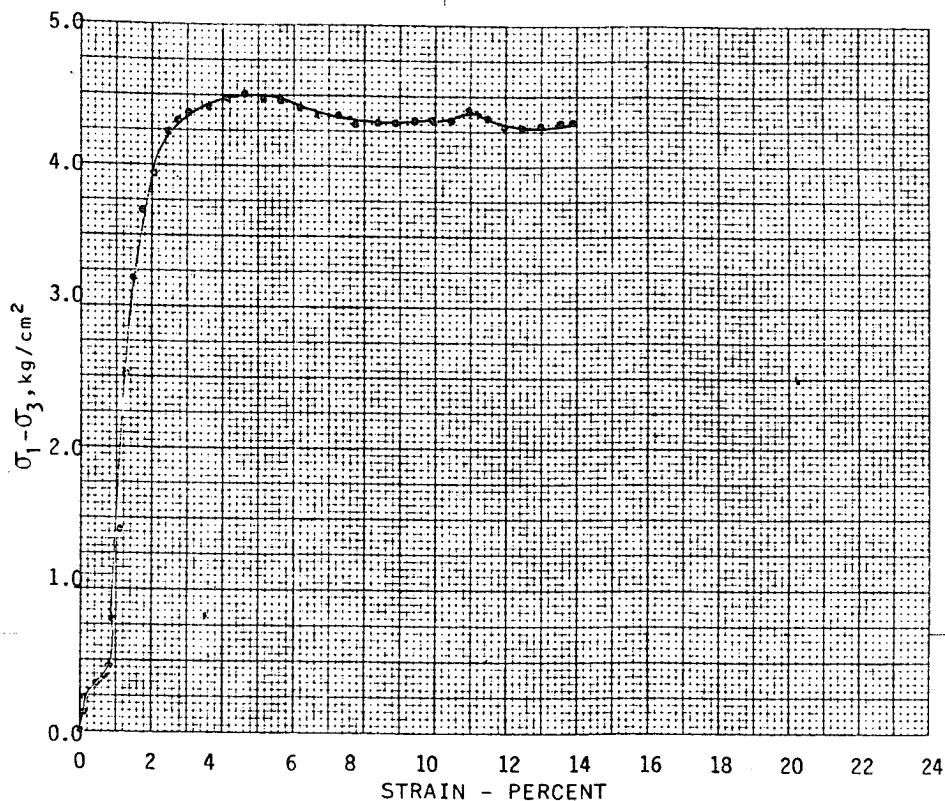
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 ENGINEERING, TESTING & SURVEYING

2-1

AS
ETC ARDAMAN & ASSOCIATES

EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY
 TEST REPORTS

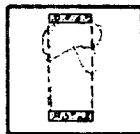
(25 OF 34)



TEST NUMBER _____ σ_c 4.57 kg/cm^2
 BORING NUMBER B-6 $\dot{\epsilon}$ 1.0 % /min.
 SAMPLE NUMBER TW-41
 DEPTH (FEET) 160.0-164.8
 CLASSIFICATION _____

INITIAL
 $\gamma_d =$ 88.1 lb/ft^3
 M.C. = 33.4 %
 SAT. = 97.6 %
 B = N/A %

NOTES: Extruded into 1.4"
SS tube; top of sample
matrix, bottom clay



TYPE OF FAILURE

Orlando Utilities Commission
 Curtis H. Stanton Plant

UNCONSOLIDATED - UNDRAINED
 TRIAXIAL COMPRESSION TEST

TESTED BY: P.E. DATE 8/11/80 FILE NO. 80-6072

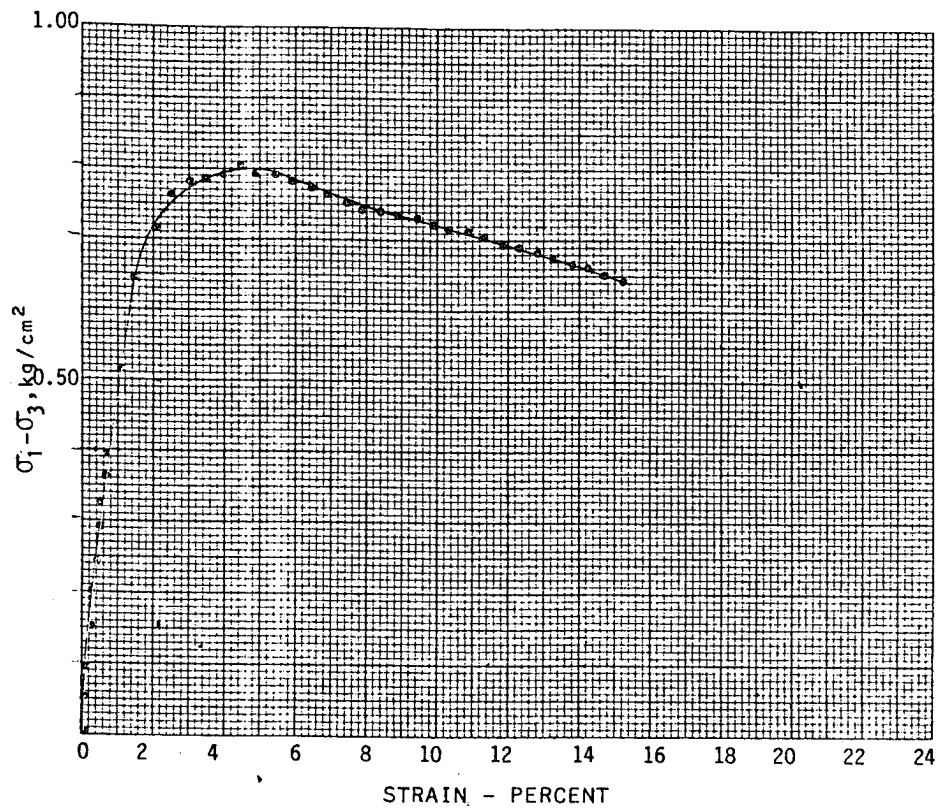
ARDAMAN & ASSOCIATES

ARDAMAN & ASSOCIATES

2-2

EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY
 TEST REPORTS

(26 OF 34)



TEST NUMBER _____ σ_c 1.406 kg/cm^2
 BORING NUMBER B-7 $\dot{\epsilon}$ 1.0 % /min.
 SAMPLE NUMBER TW-16
 DEPTH (FEET) 47.0-49.0
 CLASSIFICATION _____

INITIAL
 $\rho_d =$ 61.1 lb/ft^3
 M.C. = 63.0 %
 SAT. = 96.4 %
 B = N/A %

NOTES: Extruded into
1.4" SS tube



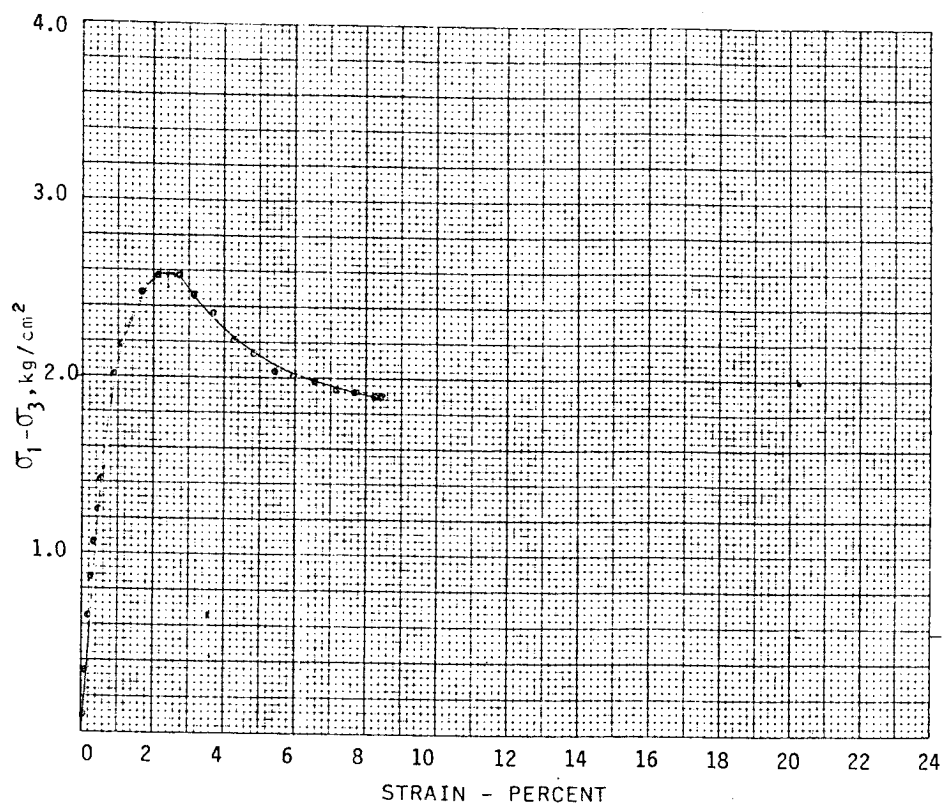
TYPE OF FAILURE

Orlando Utilities Commission
 Curtis H. Stanton Plant

UNCONSOLIDATED - UNDRAINED
 TRIAXIAL COMPRESSION TEST

TESTED BY: P.E. DATE 8/29/80 FILE NO. 80-6072

ARDAMAN & ASSOCIATES
 ENGINEERING TESTING LABORATORIES



TEST NUMBER _____ σ_c 1.76 kg/cm^2
 BORING NUMBER B-7 $\dot{\epsilon}$ 1.0 % /min.
 SAMPLE NUMBER TW-18
 DEPTH (FEET) 60.0-62.0
 CLASSIFICATION _____

INITIAL
 $\gamma_d =$ 50.5 lb/ft^3
 M.C. = 89.8 %
 SAT. = 99.5 %
 B = N/A %

NOTES: Trimmed from _____
 tube sample section



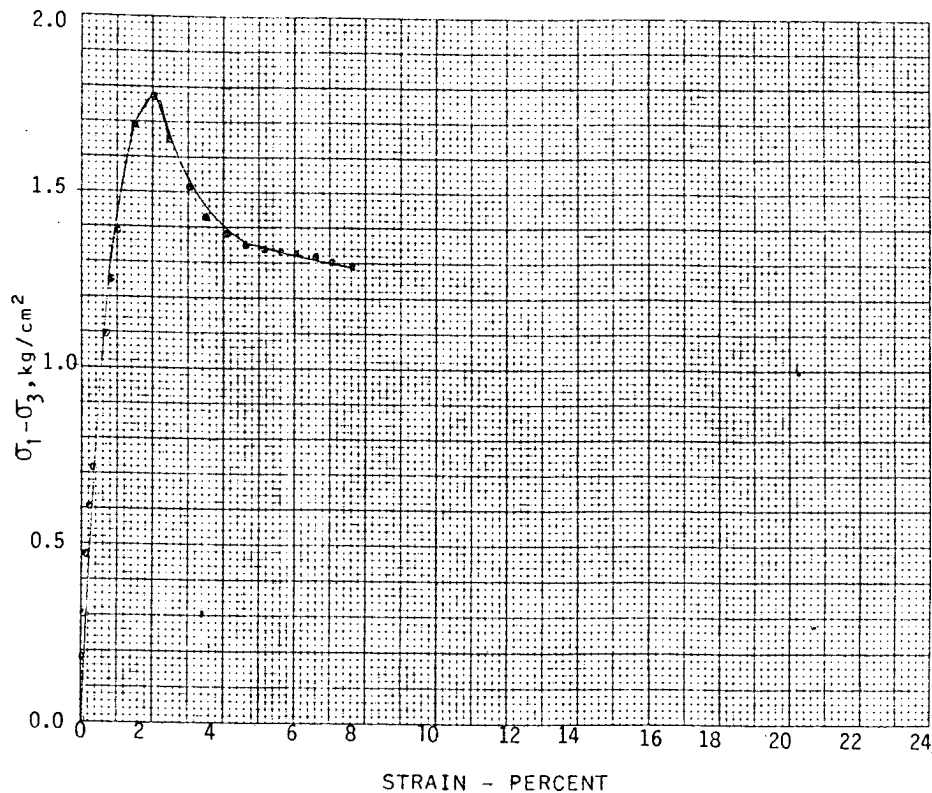
TYPE OF FAILURE

Orlando Utilities Commission
 Curtis H. Stanton Plant

UNCONSOLIDATED - UNDRAINED
 TRIAXIAL COMPRESSION TEST

TESTED BY:	DATE	FILE NO.
P.E.	8/11/80	60-6072

ARDAMAN & ASSOCIATES



TEST NUMBER _____ σ_c 1.05 kg/cm²
 BORING NUMBER B-8 $\dot{\epsilon}$ 1.0 % /min.
 SAMPLE NUMBER TW-14
 DEPTH (FEET) 43.5-45.0
 CLASSIFICATION _____

INITIAL
 $\rho_d =$ 65.0 lb/ft³
 M.C. = 58.8 %
 SAT. = 98.7 %
 B = N/A %

NOTES: Trimmed from
tube sample section TYPE OF FAILURE _____

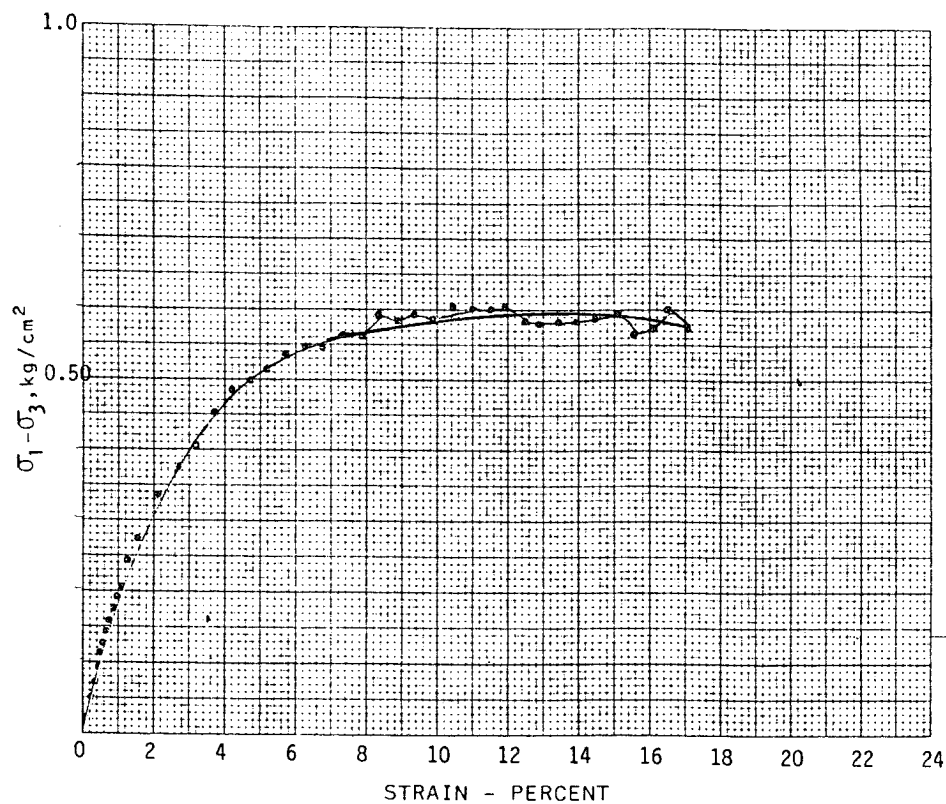


Orlando Utilities Commission
 Curtis H. Stanton Plant

UNCONSOLIDATED - UNDRAINED
 TRIAXIAL COMPRESSION TEST

TESTED BY:	DATE	FILE NO.
P.E.	8/11/80	80-6072

ARDAMAN & ASSOCIATES



TEST NUMBER _____ σ_c .703 kg/cm²
 BORING NUMBER B-6 $\dot{\epsilon}$ 1.0 % /min.
 SAMPLE NUMBER TW-14
 DEPTH (FEET) 37.0-39.0
 CLASSIFICATION _____

INITIAL
 $\rho_d = 83.5$ lb/ft³
 M.C. = 36.3 %
 SAT. = 96.4 %
 B = N/A %

NOTES: Extruded into 1.4" tube; heavy shell are at failure zone; fissured.



TYPE OF FAILURE

Orlando Utilities Commission
 Curtis H. Stanton Plant

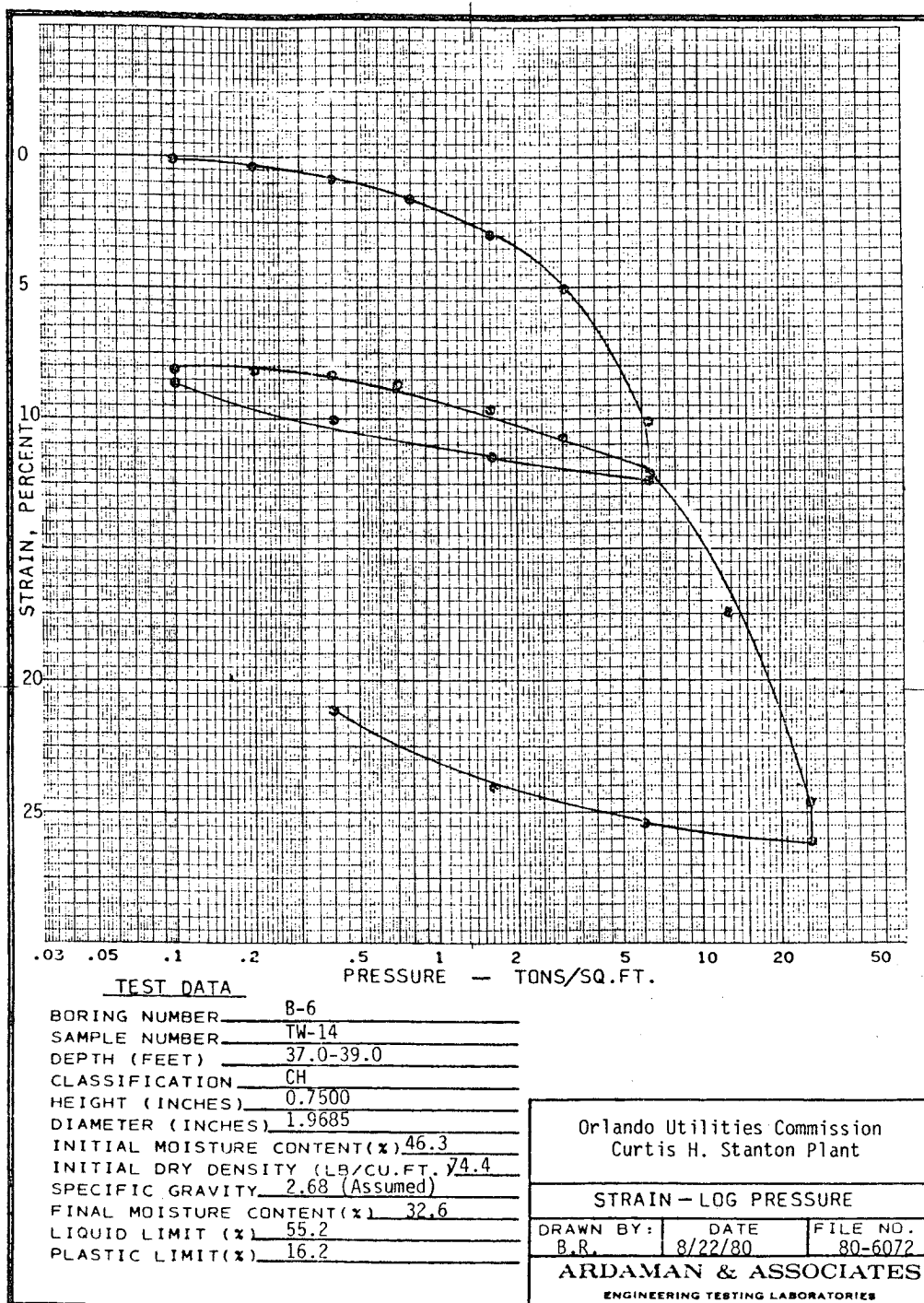
UNCONSOLIDATED - UNDRAINED
 TRIAXIAL COMPRESSION TEST

TESTED BY:	DATE	FILE NO.
P.E.	8/29/80	80-6072

ARDAMAN & ASSOCIATES

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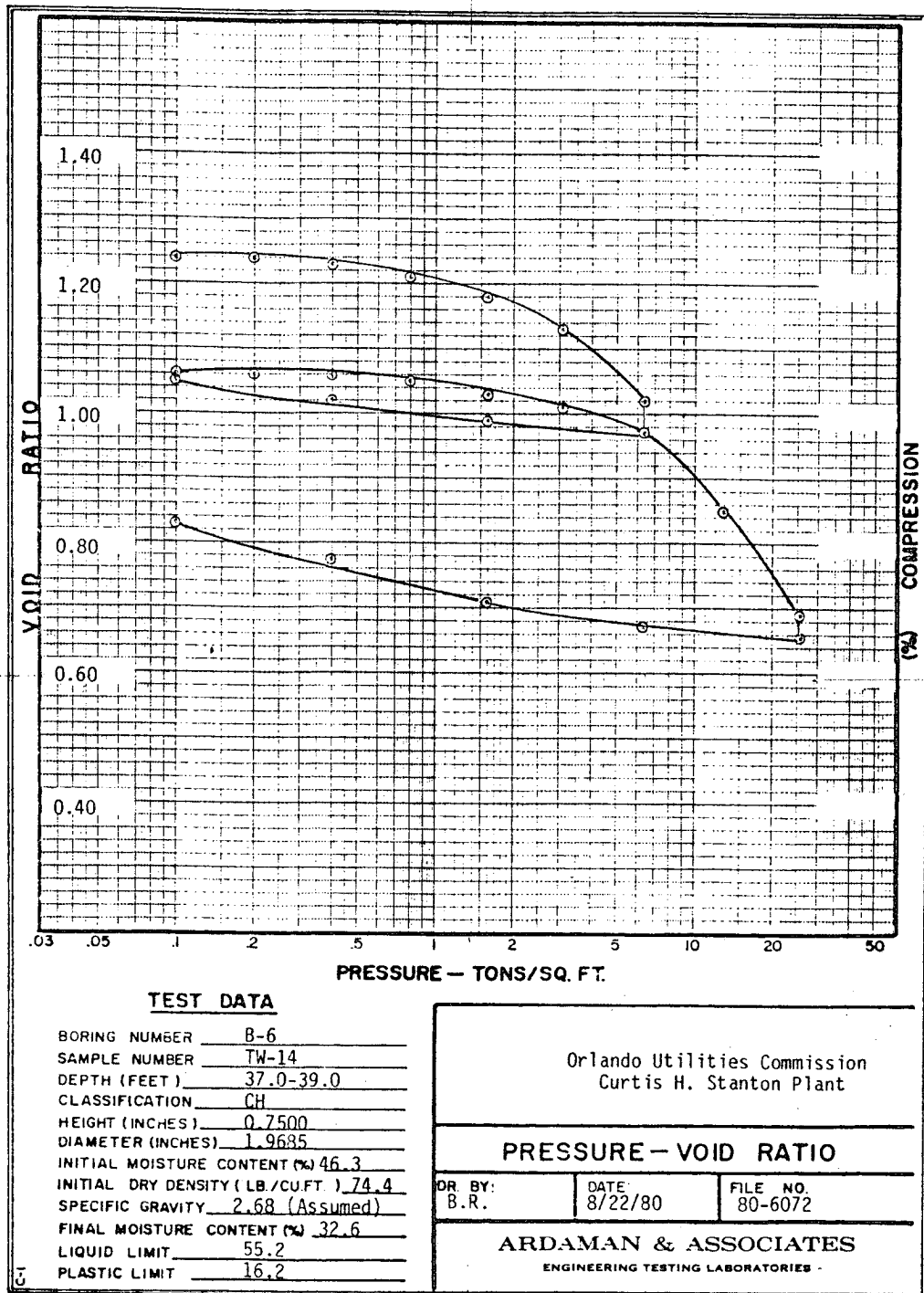


FILE NUMBER

3-1-A

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ENGINEERING TESTING LABORATORIES

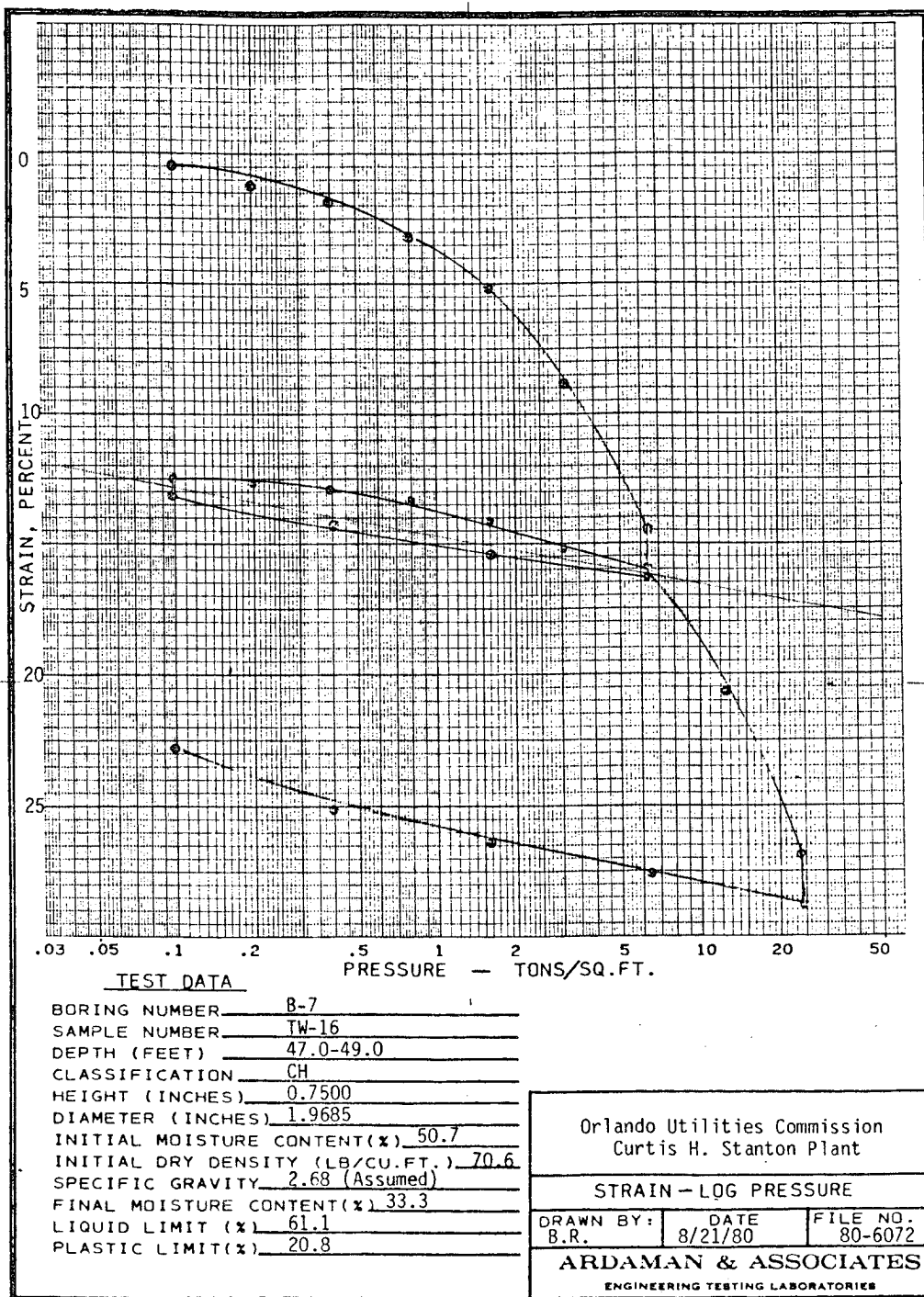
EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY
TEST REPORTS



3-1-B

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EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY TEST REPORTS

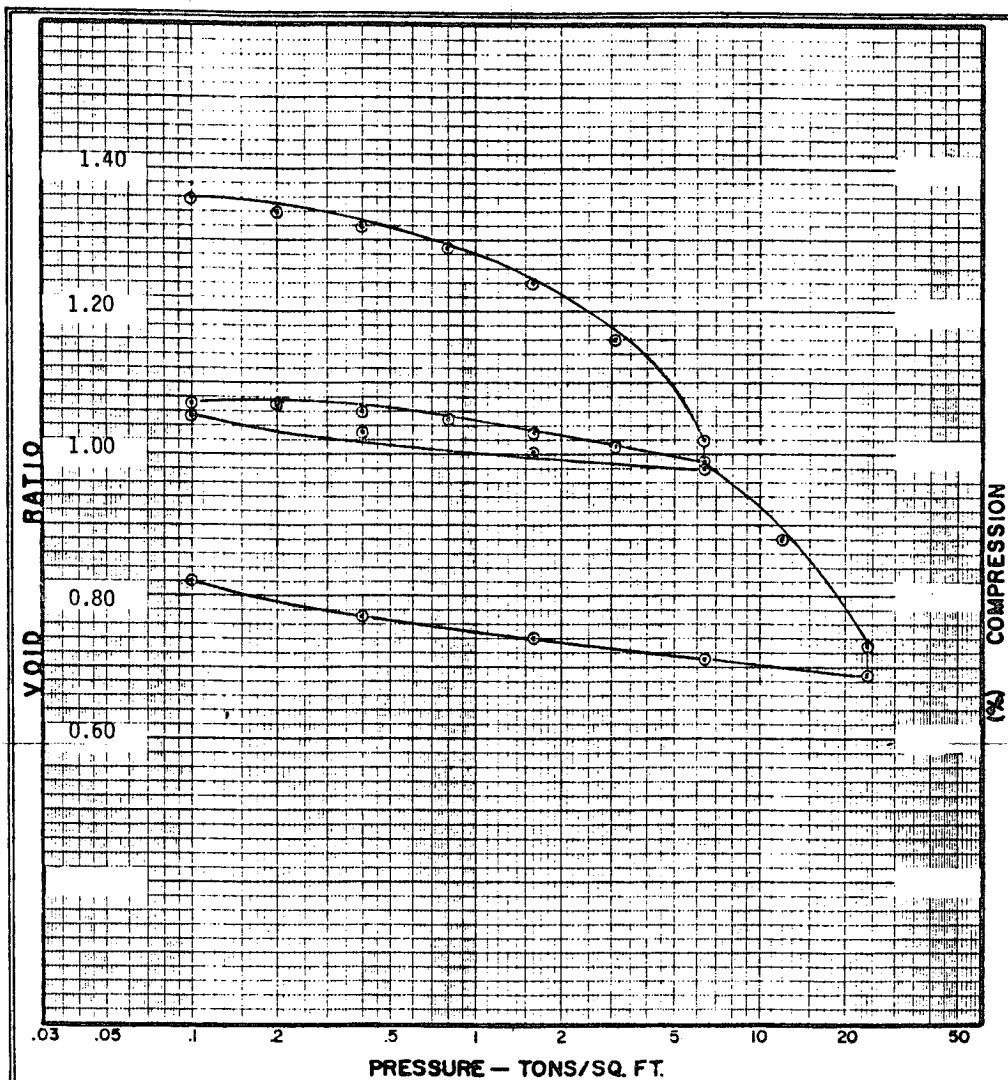


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3-2-A

ARDAMAN & ASSOCIATES
ENGINEERING TESTING LABORATORIES

EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY
TEST REPORTS



TEST DATA

BORING NUMBER B-7
 SAMPLE NUMBER TW-16
 DEPTH (FEET) 47.0-49.0
 CLASSIFICATION CH
 HEIGHT (INCHES) 0.7500
 DIAMETER (INCHES) 1.9685
 INITIAL MOISTURE CONTENT (%) 50.7
 INITIAL DRY DENSITY (LB./CU.FT.) 70.6
 Specific gravity 2.68 (Assumed)
 FINAL MOISTURE CONTENT (%) 33.3
 LIQUID LIMIT 61.1
 PLASTIC LIMIT 20.8

Orlando Utilities Commission
Curtis H. Stanton Plant

PRESSURE-VOID RATIO

DR. BY:
B.R.

DATE:
8/21/80

FILE NO.
80-6072

ARDAMAN & ASSOCIATES

ENGINEERING TESTING LABORATORIES

3-2-B

 ARDAMAN & ASSOCIATES

EXHIBIT 2.4-2 (CONTINUED). SOIL BORING LABORATORY
TEST REPORTS

2.5 HYDROLOGY

The information requested in DER Form 17-1.122 Sections 2.5.1 through 2.5.6 is contained entirely within the following two sections entitled 2.5.1 Surface Water and 2.5.2 Ground Water.

2.5.1 Surface Water

2.5.1.1 Regional Hydrology. The proposed plant site, railroad, access road, and makeup and return water pipelines are located within the St. Johns River and the South Florida Water Management Districts as shown on Figure 2.5-1. Within the St. Johns River Water Management District, project facilities are located within the Econlockhatchee and Little Econlockhatchee River basins. The railroad spur is located within the Boggy Creek and Ajay-East Tohopekaliga Canal basins in the South Florida Water Management District. Figures 2.5-2 to 2.5-4 indicate the locations of the proposed plant site, railroad, access road, and makeup and return water pipelines with respect to these drainage basins. Numerous small ponds and wet depressions, as well as several small unnamed intermittent streams are located throughout the region.

Precipitation within the region averages about 51 inches annually and varies throughout the year. A detailed discussion of rainfall patterns is presented in Section 2.6. Annual runoff within the region varies from a basin average of 7.7 inches within Boggy Creek basin to 15.8 inches within the Econlockhatchee River basin.⁽¹⁾ Average annual runoff within each drainage basin could vary significantly due to differences in areal topography and geology.

The United States Geological Survey (USGS) maintains several lake stage and stream gaging stations within the region. The major characteristics of the gaged streams and lakes within the vicinity of the proposed plant site and access corridors are summarized in Tables 2.5-1 and 2.5-2 respectively.

2.5.1.2 Boggy Creek Drainage Basin. The Boggy Creek drainage basin is part of the Kissimme River Basin and includes approximately 85 square miles of Orange and Osceola Counties in and south of Orlando. An area of about 11 square miles in the upper portion of the basin has no surface outlet and drains underground.⁽²⁾ The extreme southern portion of the basin is located within Osceola County, where Boggy Creek drains into East Lake Tohopekaliga. Periodic discharge measurements of Boggy Creek near Kissimmee were made from January, 1955 to September, 1959. Since September, 1959 continuous records of discharge have been obtained near Taft (USGS 02262900). The drainage area above this station is 83.6 square miles and the average discharge for the period of record (20 years) is 47.6 cubic feet per second (cfs) or 0.6 cubic feet per second per square mile (cfsm). The maximum and minimum recorded flowrates are 3,680 cfs (44.0 cfsm) and 0.1 cfs.

Altitudes within the basin range from about 60 feet, mean sea level (msl) at East Lake Tohopekaliga to 125 feet, msl in the upper basin. The lower portion of the basin is flat and contains many swamps and marshes, but relatively few lakes. The upper portion contains rolling hills with many lakes.

2.1.5.3 Ajay-East Tohopekaliga Canal Drainage Basin. This canal drains approximately 171 square miles, of which 54.5 square miles are in Orange County and 116.5 square miles are in Osceola County. Altitudes within Orange County range from 60 to 90 feet, msl. The topography is fairly flat and is characterized by swamps in the northern part and by lakes in the southern part.

Periodic flow measurements were made from November, 1942 to May, 1961 for the Ajay-East Tohopekaliga Canal near Narcoossee. The maximum recorded discharge within the canal was 1,420 cfs. A reverse flow of 0.25 cfs was measured in February, 1946. The average discharge, based on average unit runoff characteristics at several points on the Kissimmee River, is estimated to be about 170 cfs or 1.0 cfsm.

The flow into Orange County from Osceola County was measured in the Myrtle-Mary Jane Canal near Narcoossee (USGS 02261500) from October, 1949

to January, 1968. The maximum flow into Orange County through this canal was 990 cfs. In September, 1956 the flow reversed for two days and flowed to Osceola County at the rate of 17 cfs. The average discharge for the period of record was 105 cfs or 0.95 cfs. Average annual runoff is approximately 13.5 inches and is fairly uniform throughout the basin.

2.5.1.4 Little Econlockhatchee River Drainage Basin. The Little Econlockhatchee River drains approximately 71 square miles of Orange County east of Orlando. The river is formed near the center of Orange County and flows generally northward through the County. The lower portion of the basin lies within Seminole County, where the Little Econlockhatchee River joins the Econlockhatchee River near Chuluota. Altitudes in the basin range from about 35 feet, msl near the county line to 127 feet, msl at the eastern edge of Orlando. Many swamps and marshes temporarily store runoff within the basin, thereby reducing the magnitude of peak flows in the river.

A gaging station exists on the Little Econlockhatchee River near Union Park (USGS 02233200). Streamflow data has been collected at this location since October, 1959. The drainage area at this location is 27.1 square miles and the average discharge is 25.1 cfs or 0.9 cfs. The maximum and minimum flowrates recorded at this station are 1,640 cfs (60.5 cfs) and 0.1 cfs.

2.5.1.5 Econlockhatchee River Drainage Basin. The Econlockhatchee River drains approximately 260 square miles of the western slope of the St. Johns River basin between Orlando and Bithlo. The headwaters are an elongated swamp within Orange and Osceola Counties from which drainage is slow and evapotranspiration losses are high.⁽³⁾ From its headwaters, the Econlockhatchee River flows in a generally northward direction through Orange County and into Seminole County where it is joined by its largest tributary, the Little Econlockhatchee River. Thereafter, the river flows in an easterly direction to its confluence with the St. Johns River.

Two streamflow gaging stations are currently maintained along the Econlockhatchee River. The most upstream gaging station is located approximately six river miles upstream from the proposed plant site at Magnolia

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Ranch 7 miles south of Bithlo (USGS 02233001). Streamflow records have been obtained since October, 1972. The drainage area above this station is 32.9 square miles and the average discharge for the period of record (7 years) is 18.4 cfs or 0.6 cfs. The maximum recorded discharge is 281 cfs (8.5 cfs). The river experiences no flow at this station many days each year. The other existing gaging station is located downstream from the confluence of the Econlockhatchee and Little Econlockhatchee Rivers near Chuluota (USGS 02233500). Streamflow records have been obtained since October, 1935. The drainage area above this station is 241 square miles and the average discharge for the period of record (44 years) is 266 cfs or 1.1 cfs. The maximum recorded streamflow is 11,000 cfs (45.6 cfs) and the minimum flow is 6.7 cfs.

In addition to the two existing gaging stations, a partial record station was located near Bithlo (USGS 02233100) from September, 1959 to May, 1965. This partial record station was located approximately six miles downstream from the proposed plant site with a drainage area of 119 square miles. Based on available records, the estimated average flow at this station is 88 cfs or 0.74 cfs.⁽²⁾ The maximum recorded discharge was 7,840 cfs (65.9 cfs) and the river experiences zero flow at this station in most dry years.

The channel of the Econlockhatchee River is well developed in its lower reach. In this reach, the channel is incised into the water-table aquifer so that the river derives some base flow from the shallow aquifer during even the most severe droughts. In addition, streamflows are augmented by effluent from the Orlando sewage plant and flows diverted from Lake Mary Jane in the Kissimmee River Basin through Disston Canal.

2.5.1.6 Local Hydrology.

Proposed Plant Site

The proposed plant site will be located approximately 3,500 feet southwest of the Econlockhatchee River, about ten miles southeast of Orlando and five miles southwest of Bithlo. The majority of the plant site lies within the Econlockhatchee River Basin. A portion of the site along the west site boundary lies within the Ajay-East Tohopekaliga Canal Basin.

Predominant surface hydrologic features in the vicinity of the general site area include Wide Cypress Swamp to the west, an unnamed tributary of the Econlockhatchee River to the north, Hart Branch and Cowpen Branch to the east, and Green Branch to the southeast. Hart, Cowpen, and Green Branch are tributaries of the Econlockhatchee River for which discharge records are not available. Wide Cypress Swamp lies within the Ajay-East Tohopekaliga Canal drainage basin. Approximate drainage areas of the above mentioned tributaries of the Econlockhatchee River are summarized in Table 2.5-3. The location of the proposed plant site with respect to local surface hydrologic features is shown on Figure 2.5-5.

Site elevations vary from approximately 54 feet at the northeastern corner to 92 feet near the west site boundary. Soils are composed of fine sands with variable organic content. Surface runoff from approximately 257 acres in the northwest corner of the site is directed in a northeasterly direction to an unnamed tributary of the Econlockhatchee River (Figure 2.5-5). Runoff from approximately 984 acres within the north central portion of the site flows in a northeasterly direction to Hart Branch. Approximately 1,305 acres comprising the central and eastern portions of the site are drained in a predominantly easterly direction to Cowpen Branch. Runoff from approximately 695 acres within the southwest portion of the site flows in a southeasterly direction to Green Branch. Surface runoff from about 39 acres along the western site boundary flows in a westerly direction to the Green Cypress Swamp area of the Ajay-East Tohopekaliga Canal drainage basin. Many areas characterized as swamps or wooded marshes are located throughout the area.

The maximum recorded flows for the Econlockhatchee River occurred in March, 1960. Peak flows of 11,000 cfs and 7,840 cfs were observed at the USGS gaging stations near Chuluota and Bithlo, respectively. The area drained at the Bithlo station is 119 square miles, while it is estimated that the Econlockhatchee River drains 74 square miles just above its confluence with Cowpen Branch, northeast of the site. The Bithlo gaging station was the nearest operating station in 1960 and was located approximately six miles downstream from the proposed site. If it is assumed that the unit runoff (65.9 cfs/mi) observed at the Bithlo station during the peak

flood of record is representative of the basin hydrologic conditions for the Econlockhatchee River above Cowpen Branch during the same period of time, then a peak discharge of about 4,875 cfs would have occurred within the Econlockhatchee River near the site. The predominant type of flooding that may occur at the proposed plant site is known as sheet flooding. United States Geological Survey Flood-Prone Area Maps indicate inundated areas during a flood having a 100-year recurrence interval. These flood-prone areas are shown for the proposed site in Figure 2.5-6.

The nearest existing gaging station is located approximately six river miles upstream from the proposed site on the Econlockhatchee River at Magnolia Ranch (USGS 02233001). Periods of zero flow have been recorded at this station as well as the discontinued station near Bithlo, located approximately six river miles downstream from the site. This indicates that periods of zero flow can be expected within the Econlockhatchee River, as well as within the local tributaries near the site during drought conditions.

The majority of precipitation experienced within the area is lost through the process of evapotranspiration. The remaining available moisture either runs off or percolates to the underlying water table aquifer. Average annual runoff from the entire Econlockhatchee River basin above the gaging station near Chuluota is approximately 15 inches. A portion of this runoff results from ground water recharge to the Econlockhatchee River throughout the lower reaches. Within the lower portions of the basin, the Econlockhatchee River is incised into the nonartesian aquifer and the actual direct surface runoff would be less than that computed from stream flow measurements. It has been estimated⁽²⁾ that average annual runoff is ten inches per year within the Econlockhatchee River basin above the gaging station at Magnolia Ranch. Knochenmus⁽⁴⁾ indicates an average annual water loss by runoff to be between 10 and 25 per cent of average annual precipitation for the general site area. Evapotranspiration is estimated to be between 72 and 87 per cent of average precipitation. Knochenmus states that the average annual water loss from evapotranspiration plus surface runoff is probably nearly uniform throughout the region: areas having lower rates of surface runoff have higher rates of evapotranspiration. The total of

these two losses is estimated to be about 97 per cent of precipitation, leaving three per cent, or about 1.5 inches available for percolation.

Continuous streamflow records for the Econlockhatchee River near the site are available for the gaging station at Magnolia Ranch only since 1972. Longer records are available for the Econlockhatchee River near Chuluota (1935-present) and for the Little Econlockhatchee River near Union Park (1959-present). Average annual runoff will vary throughout a drainage basin due to variations in precipitation, topography, and water table conditions. Table 2.5-4 indicates total runoff (surface and ground water recharge) computed at the three existing gaging stations within the Econlockhatchee River Basin. The relatively large amounts of total runoff measured at Chuluota and Union Park are due in part to ground water recharge during low flow periods. Also contributing to larger values of runoff is the fact that average precipitation was greater during the periods of record for these two stations. The role of ground water recharge can be seen by noting the characteristics of the flow-duration curves for the Econlockhatchee River near Bithlo and Chuluota, Figure 2.5-7. The flow-duration curve for the station near Chuluota is based on the period 1935-1962 while that for the partial record station near Bithlo is estimated based on available records. The shape of the flow-duration curve is determined by the hydrologic and geologic characteristics of a drainage area.⁽⁵⁾ The flat slope of the lower end of the curve representing the drainage area above Chuluota indicates the availability of perennial ground water storage within the lower portion of the basin. In contrast, the relatively steep slope of the lower end of the curve representing the basin above Bithlo indicates a negligible amount of ground water storage that contributes to streamflow during low flow periods.

As previously mentioned, average annual runoff is in part a function of average annual precipitation. Figure 2.5-8 shows the variation in total annual runoff (surface and ground water recharge) at selected stations within the Econlockhatchee River basin in comparison with total annual precipitation at Orlando for water years 1973 through 1979. During this time period, three continuous gaging stations were in operation within the

basin. With the exception of 1974, average annual runoff is seen to follow the same general trend as average annual precipitation at all three gaging stations. An increase in runoff along with a decrease in precipitation during water year 1974 could be the result of carryover ground water storage produced by above average precipitation during water year 1973. The proposed site lies approximately six river miles downstream from the gaging station at Magnolia Ranch. As a result, the rainfall-runoff relationship for this station is considered to be the most representative for that at the site. The average annual runoff at this station for the period of record is 7.6 inches corresponding to an average annual precipitation of 48 inches at Orlando. Based on this fact, and the above mentioned considerations dealing with the rainfall-runoff relationships within the area, it is estimated 10 inches of direct surface runoff will be experienced at the proposed site location during a year having an average annual amount of precipitation (about 51 inches). It is further estimated that during average conditions about 39.5 inches of moisture is lost through evapotranspiration and slightly more than 1.5 inches percolates to the underlying nonartesian aquifer.

Proposed Access Corridors

The proposed routing of the plant railroad, plant access road, power transmission lines, and makeup and return water pipelines are shown in Figures 2.5-2 through 2.5-4. The plant railroad extends south from the site approximately two miles within the Econlockhatchee River drainage basin through several areas of wooded marsh. Surface runoff within the area flows in an easterly direction to Green Branch and Turkey Creek. The railroad then turns to a southwesterly direction through the Ajay-East Tohopekaliga Canal drainage basin. The railroad crosses Hart Branch (a small tributary of Lake Hart) approximately 1-1/2 miles north of Lake Hart and then passes between Barton Lake and Buck and Red Lakes near the drainage basin divide. The majority of runoff within the area flows in a southerly direction to Crosby Island Marsh, Barton Lake, Lake Hart, and Lake Mary Jane. Approximately one mile south of Lake Nona, the railroad passes into

Boggy Creek drainage basin just north of its divide with Jim Branch drainage basin. Approximately 3/4 mile south of Mud Lake, the railroad turns to a northwesterly direction for approximately 3-1/2 miles. Thereafter, the railroad heads west to a turnout at the Seaboard Coast Line Railroad. Within Boggy Creek drainage basin, the railroad crosses Boggy Creek as well as several unnamed tributaries. It also crosses a drainage canal serving the Orlando International Airport and northern portions of the drainage basin.

The new Orange County road and makeup and return pipelines extend north from the proposed site approximately one-half mile to a point within an existing transmission line right-of-way. The facilities then turn northwest for approximately 4,100 feet to a point on the east-west section line between Sections 1 and 12, T23S, R31E. The county road and pipelines follow the section line west for about one mile to a point near the half section of Sections 2 and 11. The road and pipelines then turn north-northwest for slightly more than one mile to the northwest corner of Section 2 where they turn west and extend to the site of the new Orange County Plant. The county road turns northerly and extends to State Highway 50. The pipeline turns south near the Orange County Plant for about 450 feet where it terminates at the plant facilities. All of the modified pipeline route is within the Econlockhatchee River drainage basin and is parallel to the county road. The road will be constructed prior to the pipelines, therefore the pipelines will be installed on previously disturbed land.

RFM-1

2.5.1.7 Surface Water Quality. The chemical character of the surface water throughout the region differs from stream to stream and varies seasonally and daily in individual streams due to natural causes and development. Suspended sediment is not a serious problem in peninsular Florida. Dissolved minerals, water temperature, and color are the natural and man-influenced water quality phenomena significant to water use within the proposed site area. Surface water is generally low in mineral content if it is direct runoff or seepage from nonartesian aquifers and generally high in dissolved minerals if it was derived from the artesian aquifer⁽⁶⁾. Color of the surface water is extremely variable throughout the region and normally ranges from zero to about 200 Hazen units. After heavy rainfall, when highly colored water is flushed into small streams from swampy areas, the color may reach 300 to 600 units. Table 2.5-5 indicates the observed extremes in quality of surface water at selected stations within the vicinity of the proposed plant site and access corridors.

A continuous record of conductivity from October, 1959 to June, 1962 and analysis of water collected periodically to July, 1963 from the Econlockhatchee River near Bithlo (USGS 02233100) show the water to be high in color, soft, and low in mineral content. The color is always greatest during the early part of high-flow periods. The pH of the water was as low as 5.7 during high-flow periods, indicating that the water would be slightly corrosive. Analyses of water collected from the Little Econlockhatchee River near Union Park indicate that the quality is similar to the Econlockhatchee River.

The water in Boggy Creek is soft, low in mineral content, and high in color. Analytical data on water from the station near Taft indicates that most of the streamflow is direct surface runoff. Water from Lake Hart has high color, low pH values, and low dissolved mineral content. Lake Hart is in a swampy area containing a large amount of decaying organic material which causes the high color in the water. Decaying organic material usually contains weak organic acids which cause low pH. The mineral content of the water within Lake Hart is low because the soil in the area is relatively insoluble.

2.5.2 Ground Water

This section describes the ground water aquifers beneath the site. The description is based on published data and data from piezometers installed at various locations on and around the site. Effects on the aquifers from construction and plant operation are discussed in Section 5.0, monitoring systems are discussed in Section 6.0.

The three aquifers present beneath the site are the upper non-artesian aquifer, the intermediate secondary artesian aquifer, and the lower Floridan artesian aquifer. The secondary artesian aquifer is limited in continuity and is contained within the confining layer between the non-artesian aquifer and the artesian Floridan aquifer. Interconnection between the three aquifers is minimal.

Figure 2.5-9 illustrates the different patterns of water-level fluctuations and hydraulic interrelationships of the three aquifers. The top sawtooth pattern indicates rapid water level fluctuations in the non-artesian aquifer in response to direct infiltration of local rainfall. The secondary artesian sinusoidal pattern indicates gradual long-term declines and rises of the potentiometric surface, corresponding in general to dry and wet periods. This pattern also indicates that water enters and leaves the aquifer slowly and that the hydraulic connections to the overlying and underlying aquifers are very poor. The lower artesian sinusoidal pattern displays small sawtooth fluctuations of the potentiometric surface superimposed on a sequence of gradual long-term declines and rises. The small fluctuations indicate response to recharge by rainfall over distant areas; the gradual fluctuations indicate response to seasonal rainfall trends (Tibbals & Frazee, 1976).

The non-artesian aquifer is an unconfined water table aquifer occurring throughout the site area. The aquifer consists of fine sand and varies in thickness from 32 to 71 feet. In eastern Orange County, the stratum is generally 40 to 80 feet thick (Bush, 1979). This aquifer is referred to as the "shallow aquifer," the "unconfined aquifer" or the non-artesian aquifer" in literature.

The non-artesian aquifer is recharged from direct infiltration of precipitation. Water levels in the surface 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. Piezometer data indicate the water table is generally within five feet of the surface. The piezometric surface as interpolated from site piezometers is shown on Figure 2.5-10. The contours on the piezometric surface indicate a ground water divide exists near the western margin of the site. A connector well adjacent to the west-central site boundary, and the topography are anticipated to cause the westward slope of the piezometric surface of approximately 10.6 feet per mile. East of the divide and at the center of the site the water table generally slopes eastward at a gradient of approximately 13.8 feet per mile. At the eastern side of the site the general water table slopes northeastward at approximately 11.6 feet per mile. The aquifer discharges to intermittent streams within and around the site, including Cowpen and Hart Branches of the Econlockhatchee River.

Data on the hydraulic properties of the non-artesian aquifer is available from a U.S. Geological Survey connector well located immediately west of the site (Bush, 1979, P. 32). According to Bush, the unconfined aquifer has a transmissivity of approximately 590 ft²/day, a storage coefficient of 0.01, a vertical coefficient of permeability (K_v) of 0.4 foot per day and a horizontal coefficient of permeability (K_h) of 15.7 feet per day. The vertical coefficient of permeability has been confirmed to be representative by laboratory tests performed in conjunction with the preliminary subsurface investigation.

Available water-analysis data for the Floridan aquifer beneath the Orange County Landfill at the western perimeter of the site are presented in Exhibit 2.5-1. Chemical analyses of ground water samples from the shallow aquifer beneath the site are given in Exhibits 2.5-2 and 2.5-3. The water classification of the ground water as designated

The non-artesian aquifer is recharged from direct infiltration of precipitation. Water levels in the surface 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. Piezometer data indicate the water table is generally within five feet of the surface. The piezometric surface as interpolated from site piezometers is shown on Figure 2.5-10. The contours on the piezometric surface indicate a ground water divide exists near the western margin of the site. A connector well adjacent to the west-central site boundary, a suspected sinkhole in the northwest portion of the site and the topography are anticipated to cause the westward slope of the piezometric surface of approximately 10.6 feet per mile. East of the divide and at the center of the site the water table generally slopes eastward at a gradient of approximately 13.8 feet per mile. At the eastern side of the site the general water table slopes northeastward at approximately 11.6 feet per mile. The aquifer discharges to intermittent streams within and around the site, including Cowpen and Hart Branches of the Econlockhatchee River.

Data on the hydraulic properties of the non-artesian aquifer is available from a U.S. Geological Survey connector well located immediately west of the site (Bush, 1979, P. 32). According to Bush, the unconfined aquifer has a transmissivity of approximately $590 \text{ ft}^2/\text{day}$, a storage coefficient of 0.01, a vertical coefficient of permeability (K_v) of 0.4 foot per day and a horizontal coefficient of permeability (K_H) of 15.7 feet per day. The vertical coefficient of permeability has been confirmed to be representative by laboratory tests performed in conjunction with the preliminary subsurface investigation.

Available water-analysis data for the ground water in the shallow aquifer beneath the Orange County Landfill at the western perimeter of the site are presented in Exhibit 2.5-1. Total dissolved-solids average concentrations are less than 340 milligrams per liter. Chemical analyses of ground water samples from the shallow aquifer beneath the site are given in Exhibits 2.5-2 and 2.5-3. The water classification of the ground water as designated

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in the Florida Administrative Code, Chapter 17.3, is Class I-B. This classification is applied to ground water with levels of total dissolved solids less than 10,000 milligrams per liter.

The secondary artesian aquifer is limited in continuity and is contained within the confining layer between the non-artesian aquifer and the Floridan artesian aquifer. The confining layer ranges in thickness from 125 feet to 156 feet beneath the site. It is composed of interbedded and interfingered sand, clayey sand, silty and sandy clay and clay units. Where the sand units are extensive, they can be secondary artesian aquifers (Knochenmus, 1975, p. 8).

As shown in Figure 2.5-9, the secondary artesian aquifer acts as an aquitard. Ground water moves into and out of this aquifer at a very slow rate. Knochenmus, 1975, pp. 8-10, indicates..."The finer grained strata of the confining layer and of the material above it retard the downward movement of water from the non-artesian aquifer to the Floridan." Tibbals and Frazee, 1976, pp. 13, indicate the "Secondary artesian aquifers are recharged by leakage from above, and they discharge by leakage downward to the Floridan aquifer, and where tapped by wells."

Tibbals and Frazee, 1976, p. 22, indicate the secondary artesian aquifer can yield up to 700 gallons per minute to properly constructed wells. Chemical analyses of water from the secondary artesian aquifer at locations surrounding the site are given in Table 2.5-6. The maximum dissolved solids concentration is 400 milligrams per liter.

The principal aquifer beneath the site is the Floridan artesian aquifer which consists of approximately 2,000 feet of limestone and dolomitic limestone (Lichtler and others, 1968). The limestone is extensively solutioned increasing the secondary porosity. The solution channels are interconnected providing increased secondary permeability. Voids or solution cavities were encountered in Boring 6 and 7. The top of the Floridan aquifer at the site is at 196 feet of depth in Boring 6 and 199 feet of depth in Boring 7. A confining layer, containing the secondary artesian aquifers discussed above, overlies the Floridan aquifer.

The Floridan aquifer is recharged primarily from infiltration of precipitation in its outcrop area. 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 non-artesian aquifer and the Floridan aquifer.

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The artesian pressure in the Floridan aquifer is created by 1) the difference in elevation between the surface of the Floridan aquifer in its primary recharge area and at the site and 2) the presence of the confining layer above the Floridan aquifer at the site. Although the top of the Floridan aquifer is at elevation -121 feet MSL, the pressure or potentiometric surface of the Floridan aquifer is approximately 45 feet MSL. Contours of this surface as of 1980 are shown on Figure 2.5-11. Contours of this surface in 1961 are shown on Figure 2.5-12. Comparison of these figures indicates the contour of the potentiometric surface in southern Orange County has been influenced by the Cocoa well field which was constructed from 1957 through 1968. The gradient of the potentiometric surface is to the northeast at approximately 2 feet/mile. The aquifer discharges to the St. John's River located about 18 miles east of the site where the potentiometric surface is above the ground surface, and artesian wells flow at the surface (Lichtler and others, 1968).

Pump tests at the Cocoa well field indicate the Floridan aquifer has a transmissivity ranging from 29,000 to 750,000 ft²/day and a storage coefficient of 0.0003 to 0.00007 (Tibbals and Frazee, 1976).

Chemical quality of the ground water in the Floridan aquifer in the area surrounding the site is given in Table 2.5-6. The chemical quality for the ground water in the Floridan aquifer beneath the Orange County Landfill is presented in Exhibit 2.5-1; the location of "Landfill Well A" is shown on Figure 2.5-10a. The chemical quality of the ground water in the Floridan aquifer is better in the western than in the eastern part of Orange County. The concentration of dissolved solids near the St. John's River is greater than 2,000 mg/l. The concentration of dissolved solids in the Floridan aquifer beneath Orange County is shown on Figure 2.5-13.

5

The Floridan aquifer is recharged primarily from infiltration of precipitation in its outcrop area. Minor amounts of recharge are also provided from leakage through the overlying confining layer, through sink-holes penetrating the confining layer, and via connector wells constructed through the confining layer that hydraulically join the non-artesian aquifer and the Floridan aquifer.

The artesian pressure in the Floridan aquifer is created by 1) the difference in elevation between the surface of the Floridan aquifer in its primary recharge area and at the site and 2) the presence of the confining layer above the Floridan aquifer at the site. Although the top of the Floridan aquifer is at elevation -121 feet MSL, the pressure or potentiometric surface of the Floridan aquifer is approximately 45 feet MSL. Contours of this surface as of 1980 are shown on Figure 2.5-11. Contours of this surface in 1961 are shown on Figure 2.5-12. Comparison of these figures indicates the contour of the potentiometric surface in southern Orange County has been influenced by the Cocoa well field which was constructed from 1957 through 1968. The gradient of the potentiometric surface is to the northeast at approximately 2 feet/mile. The aquifer discharges to the St. John's River located about 18 miles east of the site where the potentiometric surface is above the ground surface, and artesian wells flow at the surface (Lichtler and others, 1968).

Pump tests at the Cocoa well field indicate the Floridan aquifer has a transmissivity ranging from 29,000 to 750,000 ft²/day and a storage coefficient of 0.0003 to 0.00007 (Tibbals and Frazee, 1976).

Chemical quality of the ground water in the Floridan aquifer in the area surrounding the site is given in Table 2.5-6. The chemical quality of the ground water in the Floridan aquifer is better in the western than in the eastern part of Orange County. The concentration of dissolved solids near the St. John's River is greater than 2,000 mg/l. The concentration of dissolved solids in the Floridan aquifer beneath Orange County is shown on Figure 2.5-13.

2.5.3 References.

- (1) Lichter, W. F., Appraisal of Water Resources in the East Central Florida Region, Florida Bureau of Geology Report of Investigations No. 61, 1972.
- (2) Lichter, W. F., Anderson, W., and B. F. Joyner, Water Resources of Orange County, Florida, Florida Division of Geology Report of Investigations No. 50, 1968.
- (3) Snell, L. J., and W. Anderson, Water Resources of Northeast Florida, Florida Bureau of Geology Report of Investigations No. 54, 1970.
- (4) Knochenmus, D. D., Hydrologic Concepts of Artificially Recharging the Floridan Aquifer in Eastern Orange County, Florida - A Feasibility Study, Florida Bureau of Geology Report of Investigations No. 72, 1975.
- (5) Searcy, J. K., Flow Duration Curves, Manual of Hydrology: Part 2. Low-Flow Techniques, Geological Survey Water-Supply Paper 1542-A, 1959.
- (6) Florida Department of Natural Resources, Florida Water and Related Land Resources, St. Johns River Basin, 1970.

2.5.4 Bibliography.

- Anderson, W., and B. F. Joyner, "Availability and Quality of Surface Water in Orange County, Florida," Map Series No. 24, Florida Board of Conservation, Division of Geology, September, 1966.
- Barnes, Jr., H. H. and H. G. Golden, Magnitude and Frequency of Floods in the United States, Part 2-B. South Atlantic Slope and Eastern Gulf of Mexico Basins, Ogeechee River to Pearl River, Geological Survey Water-Supply Paper 1674, 1966.
- Bush, P. W., "Connector Well Experiment to Recharge the Floridan Aquifer, East Orange County, Florida," U.S. Geological Survey Water-Resources Investigations 78-73, 1979.
- Florida Department of Natural Resources, Florida Water and Related Land Resources, St. Johns River Basin, 1970.
- Florida Department of State, "Florida Administrative Code Chapter 17.3," Tallahassee, 1977.
- Heath, R. C., and E. T. Wimberly, Selected Flow Characteristics of Florida Streams and Canals: Summaries of Flow Duration and of Low and High Flows at Gaging Stations, Florida Department of Natural Resources, Bureau of Geology Information Circular No. 69, 1971.
- Hely, A. G., "Areal Variations of Mean Annual Runoff," Proceedings of the American Society of Civil Engineers, Journal of the Hydraulic Division, Vol. 90, No. HY5, September, 1964, pp. 61-68.

- Kenner, W. E., "Seasonal Variation of Streamflow in Florida," Map Series No. 31, Florida Department of Natural Resources, Bureau of Geology, 1969, updated 1975.
- Knochenmus, Darwin D., "Hydrologic Concepts of Artificially Recharging the Floridan Aquifer in Eastern Orange County, Florida - A Feasibility Study," Florida Bureau of Geology Report of Investigations No. 72, 1975.
- Langbein, W. B., and others, "Annual Runoff in the United States," United States Geological Survey, June 1949, reprinted 1959.
- Lichtler, W. F., et. al, "Water Resources of Orange County Florida," Florida Division of Geology Report of Investigations No. 50, 1968.
- Stone, R. B., "Low Streamflow in Florida-Magnitude and Frequency," Map Series No. 64, Florida Department of Natural Resources, Bureau of Geology, 1974.
- Tibbals, B. H. and J. M. Frazee, Jr., "Ground-Water Hydrology of the Cocoa Well-Field Area, Orange County, Florida," U.S. Geological Survey Open-File Report FL 75-676, 1976.
- United States Geological Survey, Compilation of Records of Surface Waters of the United States, October 1950 to September 1960, Part 2-B. South Atlantic Slope and Eastern Gulf of Mexico Basins, Ogeechee River to Pearl River, Water Supply Paper 1724, 1963.
- United States Geological Survey, Surface Water Supply of the United States, 1961-1965, Part 2. South Atlantic Slope and Eastern Gulf of Mexico Basins, Volume 2. Basins from Ogeechee River to Carrabelle River, Water Supply Paper 1905, 1970.
- United States Geological Survey, Water Resources Data for Florida, Volume 1: Northeast Florida, various issues.
- United States Geological Survey, Water Resources Data for Florida, Volume 2A: South Florida Surface Water, various issues.
- United States Geological Survey, Wells Within 284100812200-281900805800 + for M. Blume (Computer Print Out), April 17, 1981.
- United States Soil Conservation Service, Soil Interpretations for Urban and Recreational Uses, Supplement to the Soil Survey, Orange County, Florida, July, 1973.

TABLE 2.5-1. USGS STREAM DATA IN VICINITY OF PROPOSED PLANT SITE AND ACCESS CORRIDORS

<u>Station Name</u>	<u>USGS ID Number</u>	<u>Period of Record</u>	<u>Max. Flow (cfs)</u>	<u>Avg. Flow (cfs)</u>	<u>Avg. Flow (in/yr)</u>	<u>Min. Flow (cfs)</u>
Econlockhatchee River at Magnolia Ranch near Bithlo, Florida	02233001	10/72 to Present	281	18.4	7.6	0
Econlockhatchee River near Bithlo, Florida (partial record station)	02233100	9/59 to 5/65	7,840	88 ⁽¹⁾	10.0	0
Little Econlockhatchee River near Union Park, Florida	02233200	10/59 to Present	1,640	25.1	12.6	0.1
Econlockhatchee River near Chuluota, Florida	02233500	10/35 to Present	11,000	266	15.0	6.7
Myrtle-Mary Jane Canal near Narcoossee, Florida	02261500	10/49 to 1/68	990	105	12.8	-17 ⁽²⁾
Boggy Creek near Taft, Florida	02262900	10/59 to Present	3,680	47.6	7.7	0.10
Ajay-East Tohopekaliga Canal near Narcoossee (partial record station)		11/42 to 5/61	1,420	170 ⁽¹⁾	13.5	-0.25

(1) Estimated.

(2) Negative value indicates reverse flow.

TABLE 2.5-2. LAKE STAGES IN VICINITY OF PROPOSED PLANT SITE AND ACCESS CORRIDORS.*

<u>Station Name</u>	<u>USGS ID Number</u>	<u>Drainage₂ Area (mi²)</u>	<u>Surface Area (acres)</u>	<u>Period of Record</u>	<u>Maximum Elevation (ft)</u>	<u>Minimum Elevation (ft)</u>
Lake Mary Jane near Narcoossee, Florida	02261900	124	1,161	11/49 to Present	64.81	57.64
Lake Hart near Narcoossee, Florida	02262200	166	1,841	11/41 to 9/69	64.87	56.45

*Subsequent to 1962, lake stages have been partially regulated.

TABLE 2.5-3. DRAINAGE AREAS OF ECONLOCKHATCHEE RIVER TRIBUTARIES WITHIN VICINITY OF PROPOSED SITE

<u>Tributary</u>	<u>Drainage Area (square miles)</u>
Unnamed tributary north of site	7.8
Hart Branch (Econlockhatchee River tributary)	2.0
Cowpen Branch	2.8
Green Branch	4.2

TABLE 2.5-4. AVERAGE TOTAL RUNOFF AT EXISTING GAGING STATIONS WITHIN THE ECONLOCKHATCHEE RIVER BASIN*

<u>Gaging Station Name</u>	<u>Period of Record</u>	<u>Average Precipitation for Period of Record inches/water year</u>	<u>Drainage Area square miles</u>	<u>Average Runoff for Period of Record inches/water year</u>
Econlockhatchee River at Magnolia Ranch near Bithlo, Florida	10/72 to 9/79	48.0	32.9	7.60
Econlockhatchee River near Chuluota, Florida	10/35 to 9/79	51.2	241	14.99
Little Econlockhatchee River near Union Park, Florida	10/59 to 9/79	49.2	27.1	12.58

*Precipitation recorded at Orlando, Florida.

TABLE 2.5-5. OBSERVED EXTREMES IN SURFACE WATER QUALITY WITHIN VICINITY OF PROPOSED SITE, PERIOD 1952-1965*

Source	Silica (SiO ₂)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Dissolved Solids		Hardness as CaCO ₃		Specific Conductance micromhos at 25 C)	ph	Color
												Calculated	Residue	Calcium, Magnesium	Non- Carbonate			
Econlockhatchee River near Bithlo	.0-8.9	.02-.50	2.6-26	.2-2.7	1.8-15	.2-1.6	8-83	0-6.4	3.0-23	.0-.8	.0-1.3	16-108	32-163	8-74	0-19	24-197	5.7-7.8	35-400
Econlockhatchee River near Chuloota	1.7-12	.00-.60	3.6-51	1.0-14		.7-112**	10-112	1.0-58	8.0-179	.2-.6	.0-14	31-468	--	13-162	5-74	55-873	6.2-7.6	40-600
Little Econlockhatchee River near Union Park	.3-11	.01-.77	5.4-16	.6-4.8	5.2-16	.2-2.4	9-51	1.2-6.8	9.5-20	.0-.4	.0-.8	35-75	69-146	16-48	4-20	58-146	5.6-8.0	20-400
Rogey Creek near Taft	.8-10	.01-.33	3.8-8.8	0.7-4.3	5.5-14	0.8-2.3	9-34	1.2-6.4	9-18	.1-.7	.0-.9	29-73	59-134	13-30	0-14	55-121	6.2-8.0	4-210
Hart Lake near Narcoossee	.5-4.1	.00-.31	1.7-8.8	.5-2.9		.9-11**	3-13	.2-16	7.5-16	--	.0-1.4	20-52	--	9-31	6-20	38-110	5.4-6.3	30-170

*Chemical constituents in milligrams per liter.

**Combined Sodium and Potassium.

TABLE 2.5-6. CHEMICAL ANALYSES OF WATER FROM AQUIFERS IN EASTERN ORANGE COUNTY

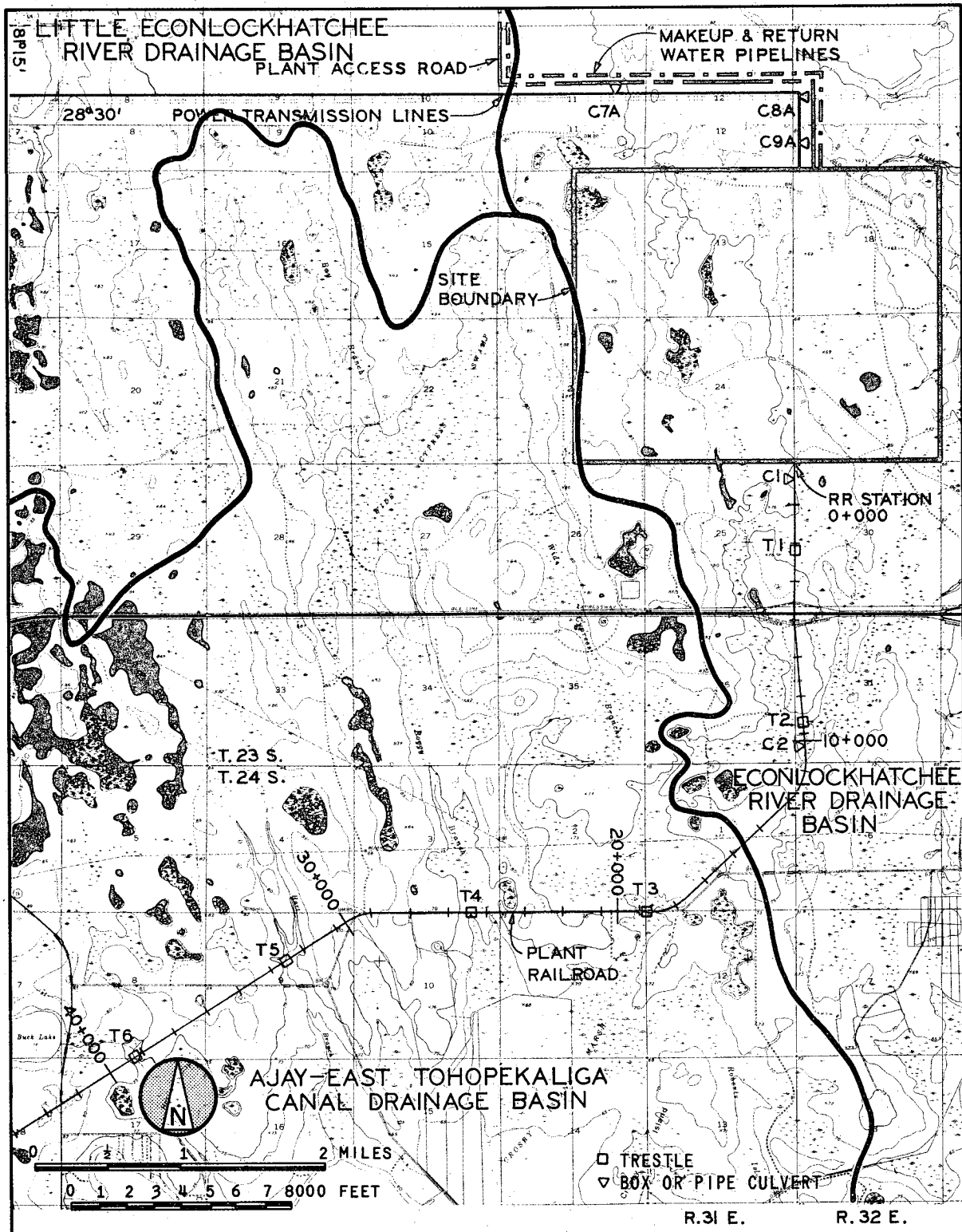
Name or Well No.	Sample Date	(SiO ₂)	(Fe)	(Ca)	(Mg)	(Na)	(K)	(HCO ₃)	(SO ₄)	(Cl)	(F)	(NO ₃)	Dissolved Solids	Hardness	Specific Conductance (micromhos at 26 C)	pH	Color	Well Depth (feet)
Non-artesian aquifer																		
283353N0811042.1	7/1/71	6.9	.72	9.4	2.3	7.8	.9	48	10	12	.1	.0	95	33	138	6.0	80	22
283249N0810532.3	10/63-4/70 (6 analyses)	3.1-4.2	.00-.71	23-50	1.1-1.8	5.0-8.0	.1-.5	96-164	.0-1.6	8.0-11	.0-.1	.0-1.0	107-157	84-132	202-288	6.9-7.9	5-10	15
283212N0810107.1	12/20/63	9.9	4.5	26	.7	7.4	1.2	78	.6	15	.0	.2	98	68	175	7.0	5	24
283126N0811436.1	9/10/62	7.0	2.0	6.4	.2	6.0	1.4	17	2.4	12	.1	.0	54	.7	74	6.6	50	8
283127N0811439.1	9/10/62	20	.79	70	1.8	9.2	.7	218	.0	12	.4	.0	252	182	366	7.8	45	19
282019N0811042.1	7/1/71	3.8	1.5	.6	1.0	11	.2	45	.0	18	.1	.0	85	6	127	5.9	50	17
282952N0815952.1	12/20/63	2.5	.00	.4	1.0	4.3	.6	5	.0	8.0	.1	.0	26	5	39	6.9	5	22
282531N0810822.2	7/1/71	7.1	11	85	7.8	31	2.0	238	59	43	.1	.0	380	245	612	6.9	160	8
282510N0810545.4	7/1/71	3.0	26	16	7.0	38	9.6	40	83	29	.1	.0	225	69	377	6.1	5	40
282336N0810143.1	7/1/71	9.7	1.2	9.8	2.5	24	1.3	48	.8	44	.1	.0	146	35	230	6.1	5	20
Secondary Artesian Aquifer																		
283249N0810532.2	10/63-4/70 (5 analyses)	12-18	.00-.47	107-120	1.1-2.9	8.4-13	.9-2.7	352-382	.0-7.2	9.0-22	.2-.6	.0-1.6	321-400	279-316	550-620	7.5-8.2	0-20	75
282530N0810542.3	1/69-4/70 (6 analyses)	18-20	--	63-112	3.4-3.7	15-16	1.0-4.1	--368	.0-.4	15-18	.1-.2	.0-.7	237-360	172-296	386-602	7.9-8.4	0-10	172
Floridan Aquifer																		
283407N0811341.1	4/27/70	13	--	36	7.2	7.4	1.0	120	8.8	10	.2	.0	153	120	275	7.3	0	434
283249N0810532.1	4/21/70	19	--	62	15	35	1.9	194	46	63	.3	.0	353	218	592	7.1	5	492
283214N0805835.1	5/12/69	20	.09	155	55	350	13	218	268	660	.4	2.0	1,640	619	2,810	7.9	0	200
282847N0810137.4	4/21/70	25	--	58	33	45	2.1	218	69	90	.6	.0	419	283	765	7.5	0	495
282623N0811438.1	4/20/70	32	--	61	8.8	16	1.3	236	.4	21	.5	.0	267	189	423	7.7	5	435
282531N0810756.1	5/15/69	22	.10	108	5.6	33	2.1	299	50	54	.3	.0	422	294	720	7.8	10	509
282348N0805647.1	4/27/70	27	--	93	27	162	3.0	204	51	348	.9	.0	995	345	1,500	7.6	5	390

¹ Sample taken from water tap, maybe contaminated from plumbing.

Table modified from Knochenmous (1975).

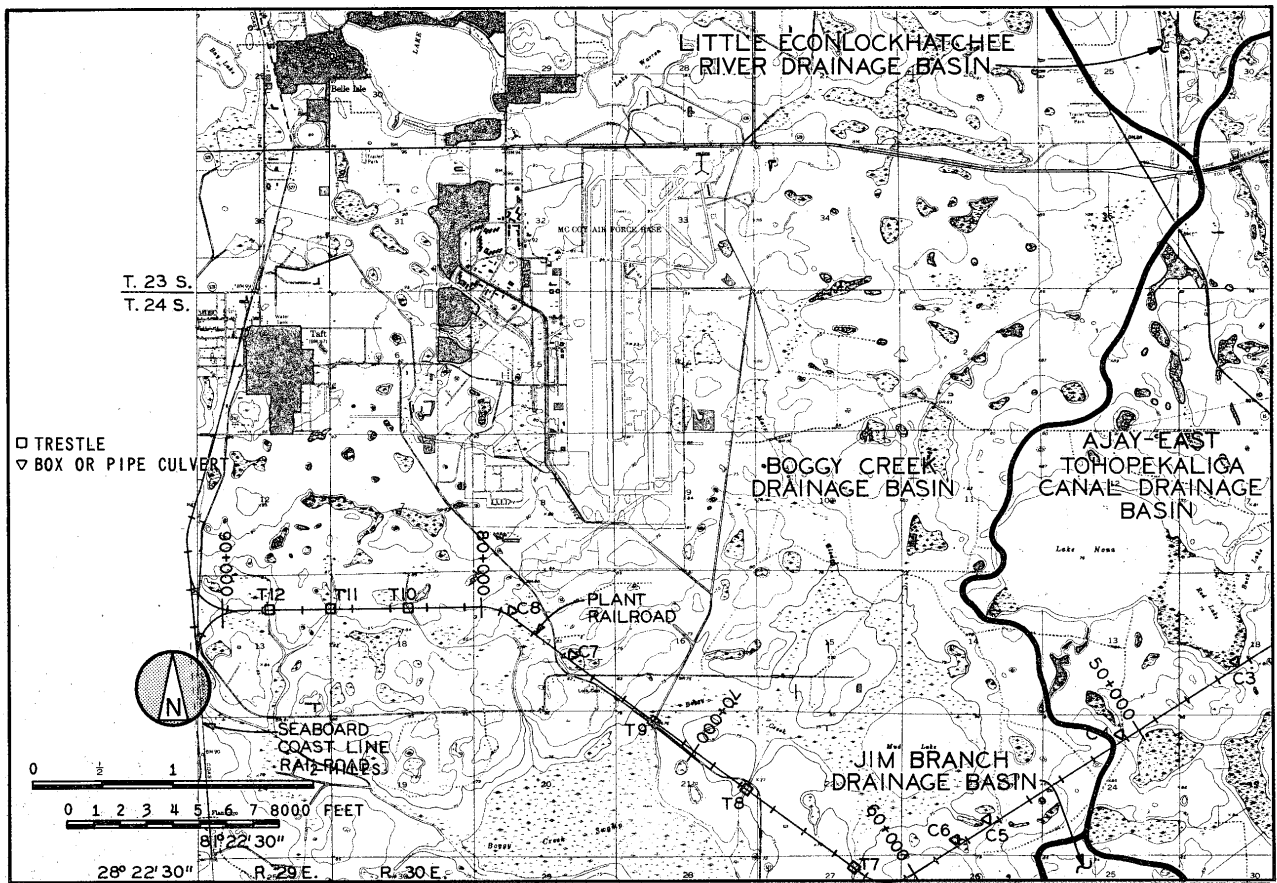
NOTE:

SiO ₂ - Silica	HCO ₃ - Bicarbonate
Fe - Iron	SO ₄ - Sulfate
Ca - Calcium	Cl - Chloride
Mg - Magnesium	F - Fluoride
Na - Sodium	NO ₃ - Nitrate
K - Potassium	



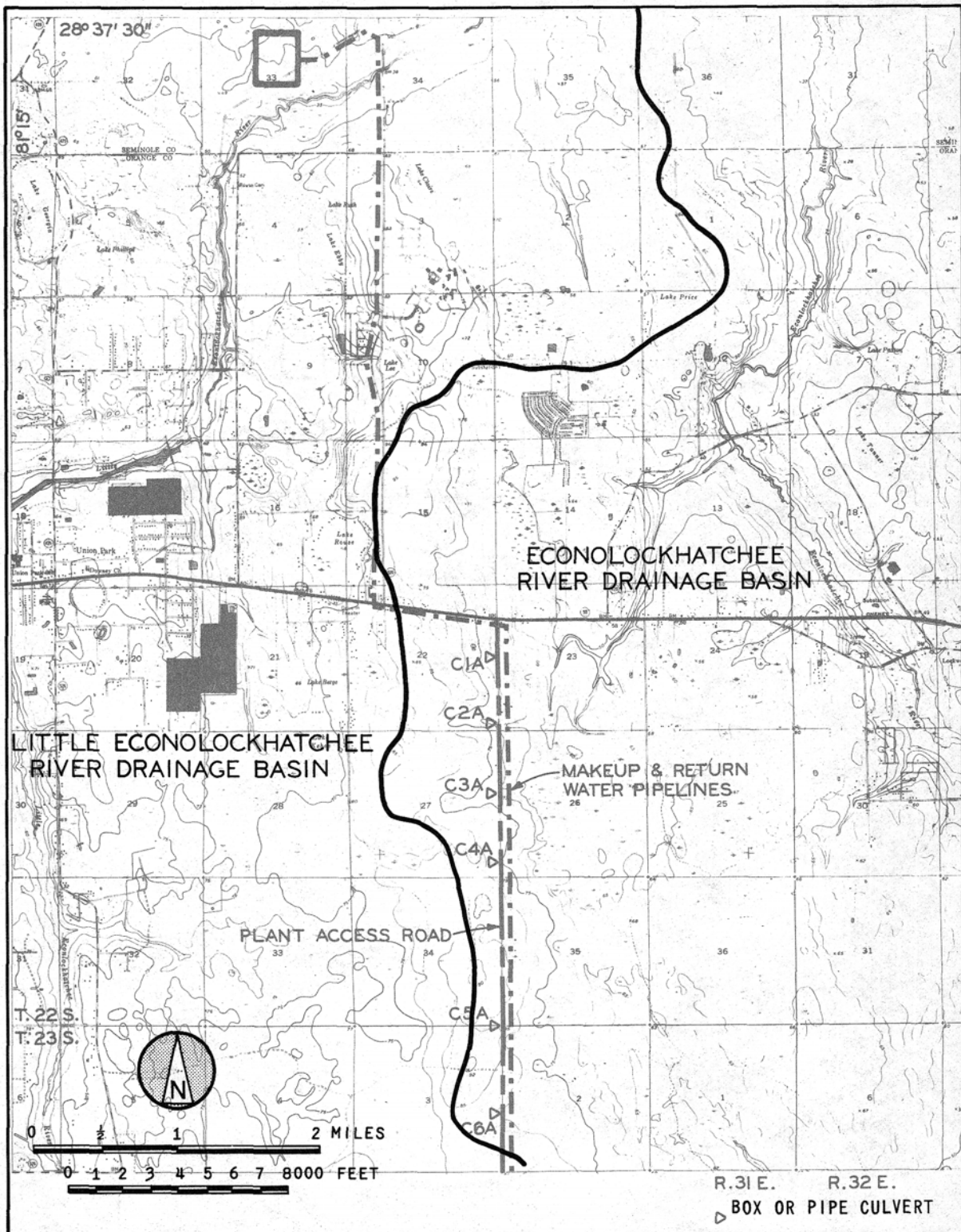
NARCOOSSEE NW QUADRANGLE
FLORIDA-ORANGE CO.
7.5 MINUTE SERIES

FIGURE 2.5-2. DRAINAGE BASINS OF THE PLANT SITE VICINITY



PINE CASTLE QUADRANGLE
 FLORIDA-ORANGE CO.
 7.5 MINUTE SERIES

FIGURE 2.5-3. DRAINAGE BASINS OF THE RAIL SPUR CORRIDOR



OVIEDO SW QUADRANGLE
FLORIDA
7.5 MINUTE SERIES

FIGURE 2.5-4. DRAINAGE BASINS OF
THE WATER SUPPLY PIPELINE

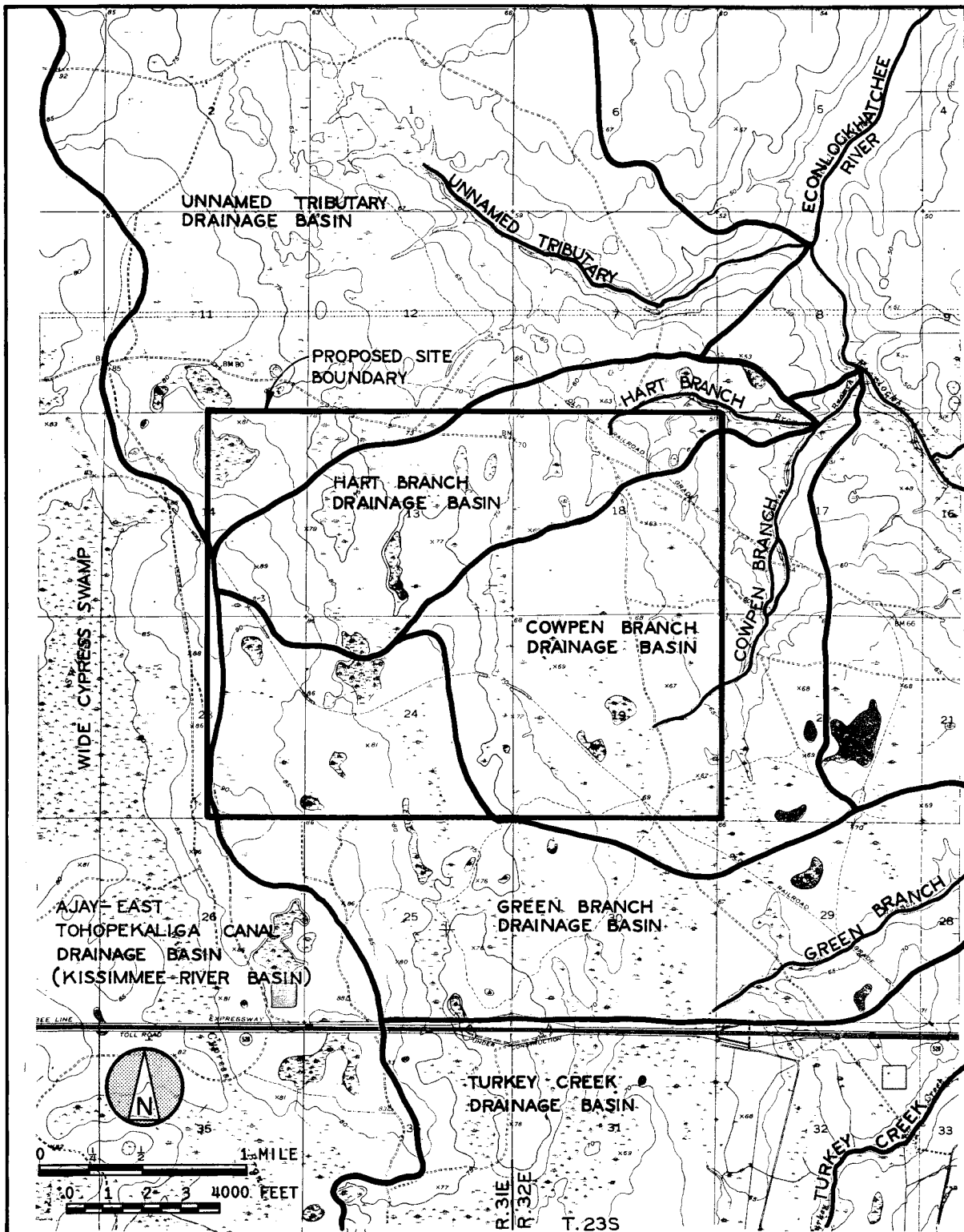


FIGURE 2.5-5. LOCAL SURFACE HYDROLOGIC FEATURES WITHIN THE VICINITY OF THE PROPOSED SITE

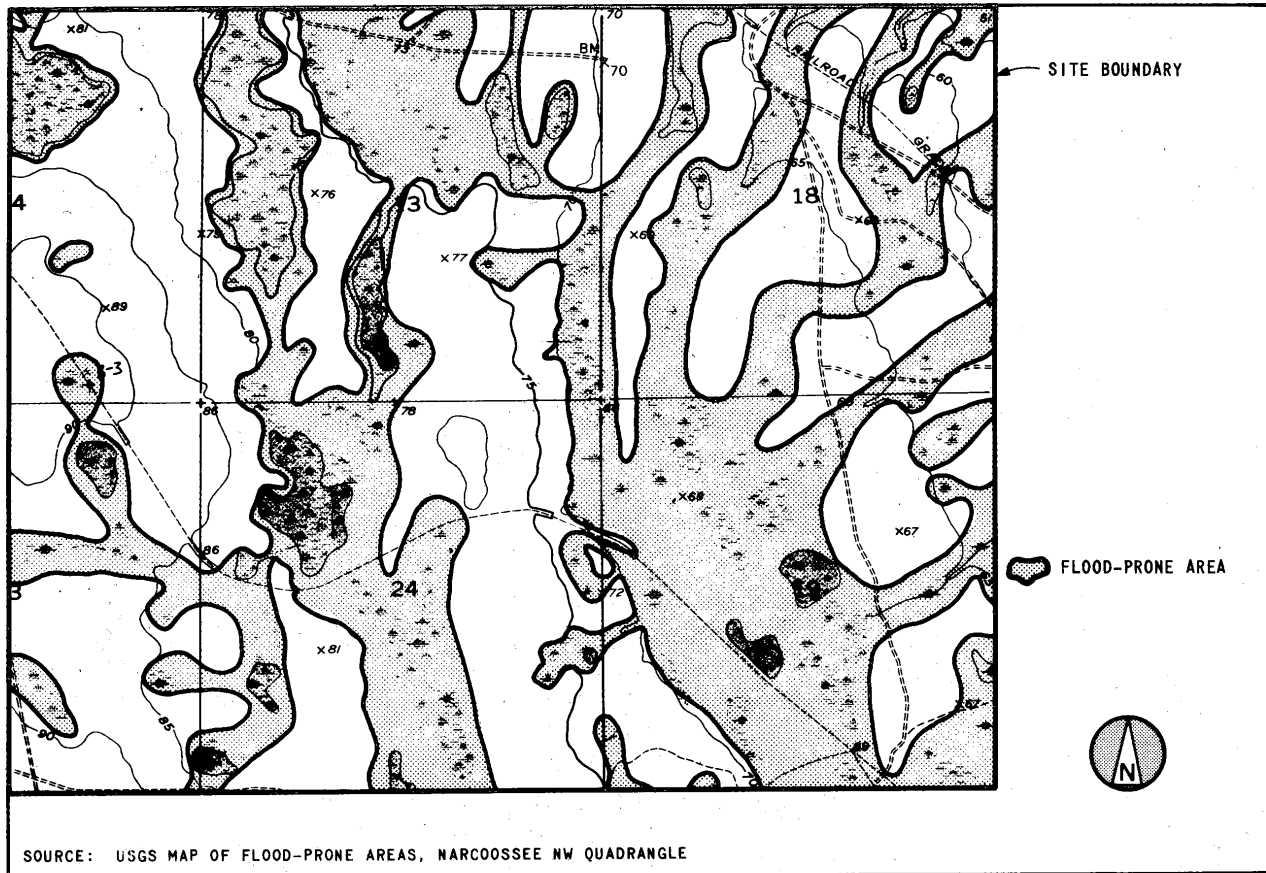


FIGURE 2.5-6. 100 YEAR FLOOD-PRONE AREAS
AT THE PROPOSED SITE

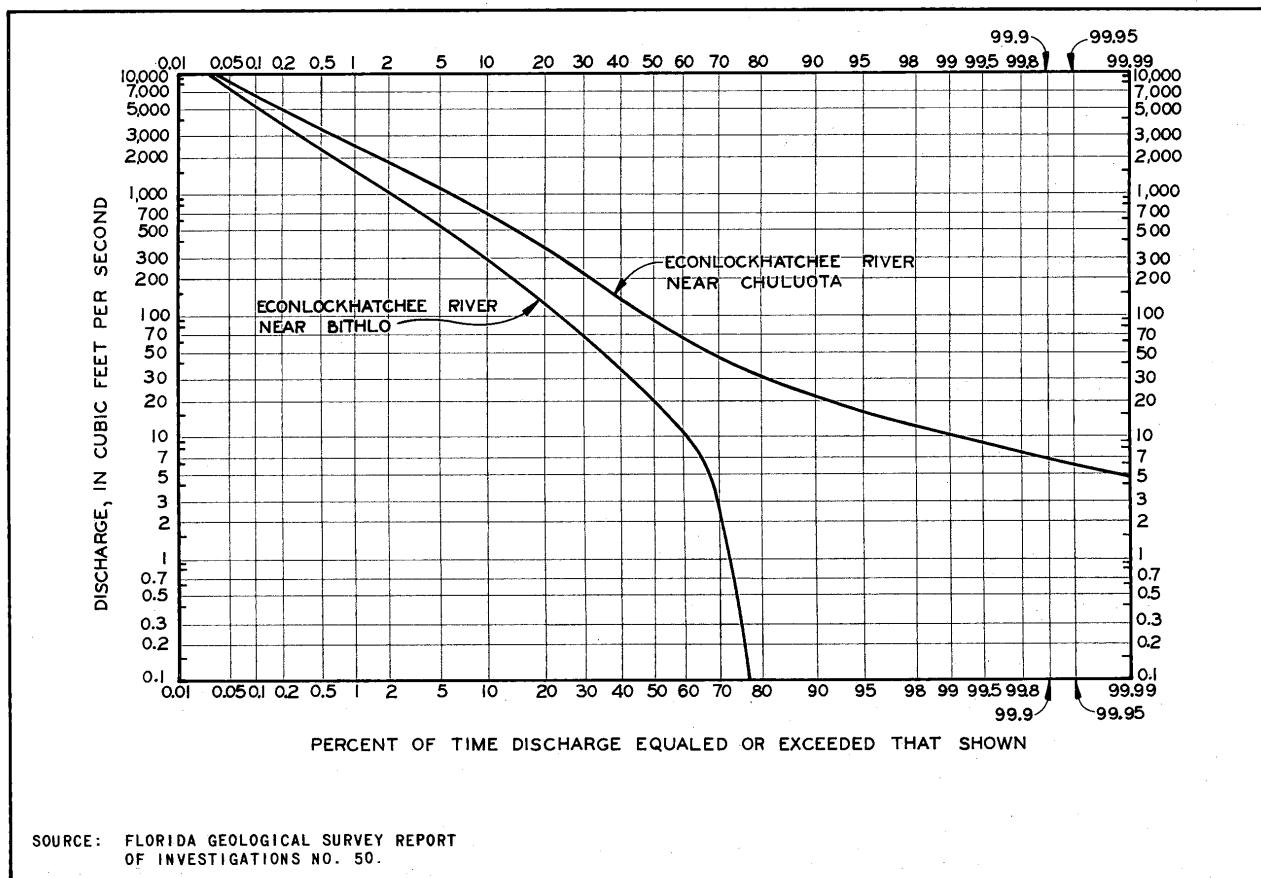
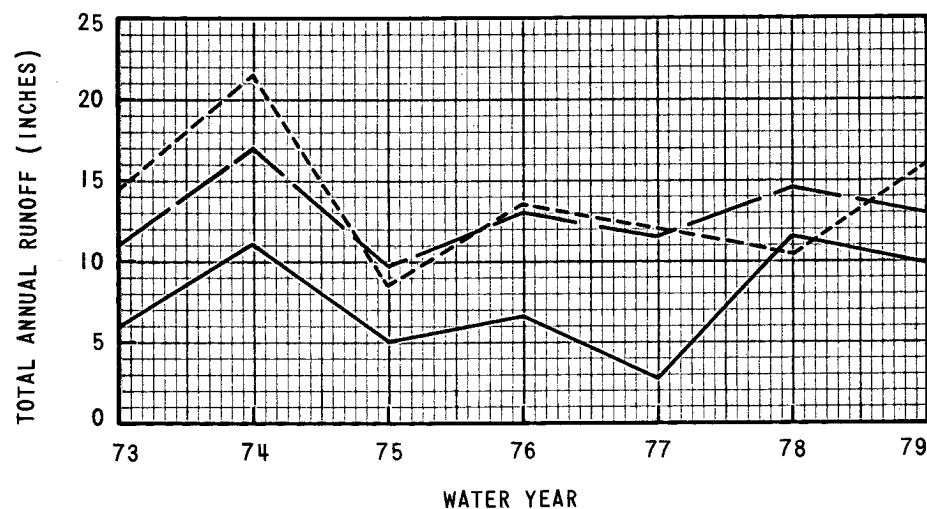
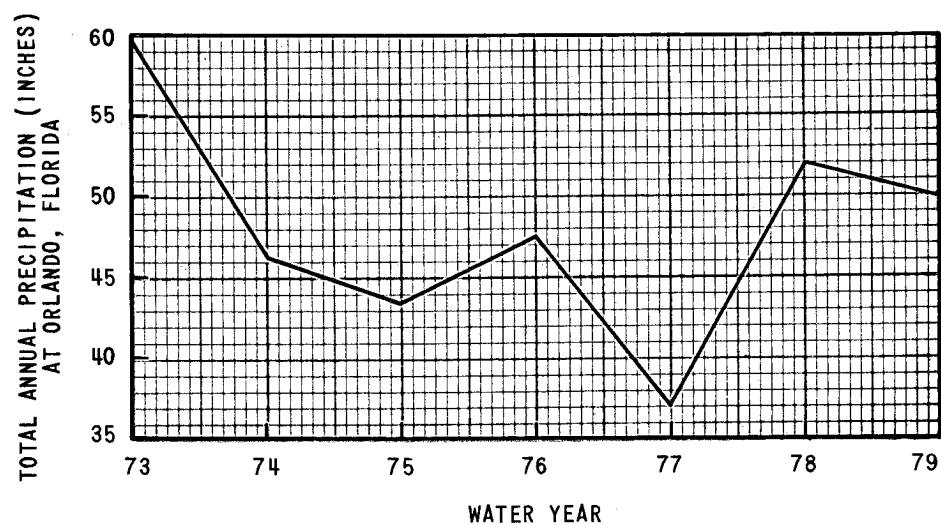


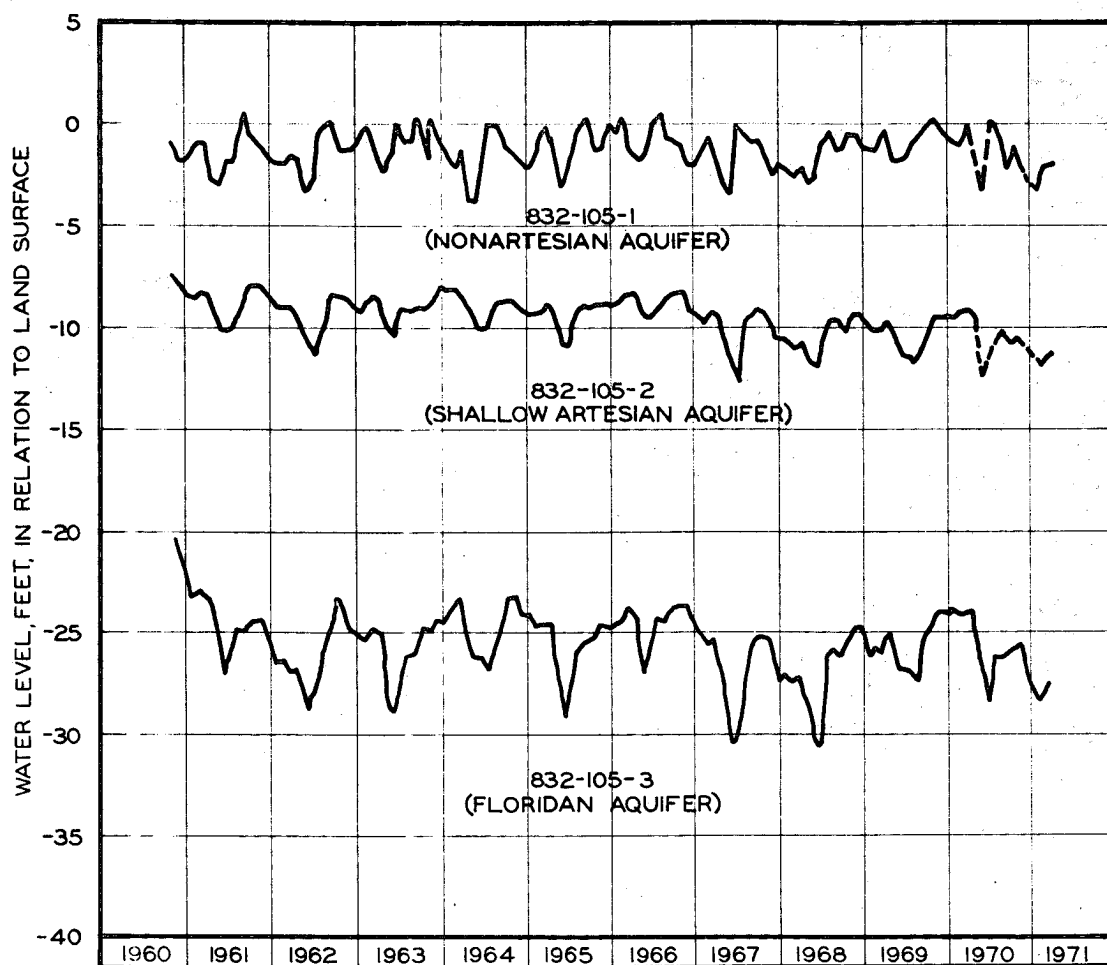
FIGURE 2.5-7. FLOW DURATION CURVES FOR GAGING STATIONS ALONG THE ECONLOCKHATCHEE RIVER



LEGEND (TOTAL ANNUAL RUNOFF)

- LITTLE ECONLOCKHATCHEE RIVER NEAR UNION PARK
- ECONLOCKHATCHEE RIVER NEAR CHULUOTA
- ECONLOCKHATCHEE RIVER AT MAGNOLIA RANCH NEAR BITHLO

FIGURE 2.5-8. TOTAL ANNUAL RUNOFF AND PRECIPITATION WITHIN THE ECONLOCKHATCHEE RIVER BASIN WATER YEARS 1973-1979



WELL HYDROGRAPH

SOURCE: KNOCHENMUS, 1975

FIGURE 2.5-9. HYDROGRAPHS OF WELLS
TAPPING THE NONARTESIAN,
SHALLOW ARTESIAN AND
FLORIDAN AQUIFER NEAR
BITHLO, FLORIDA

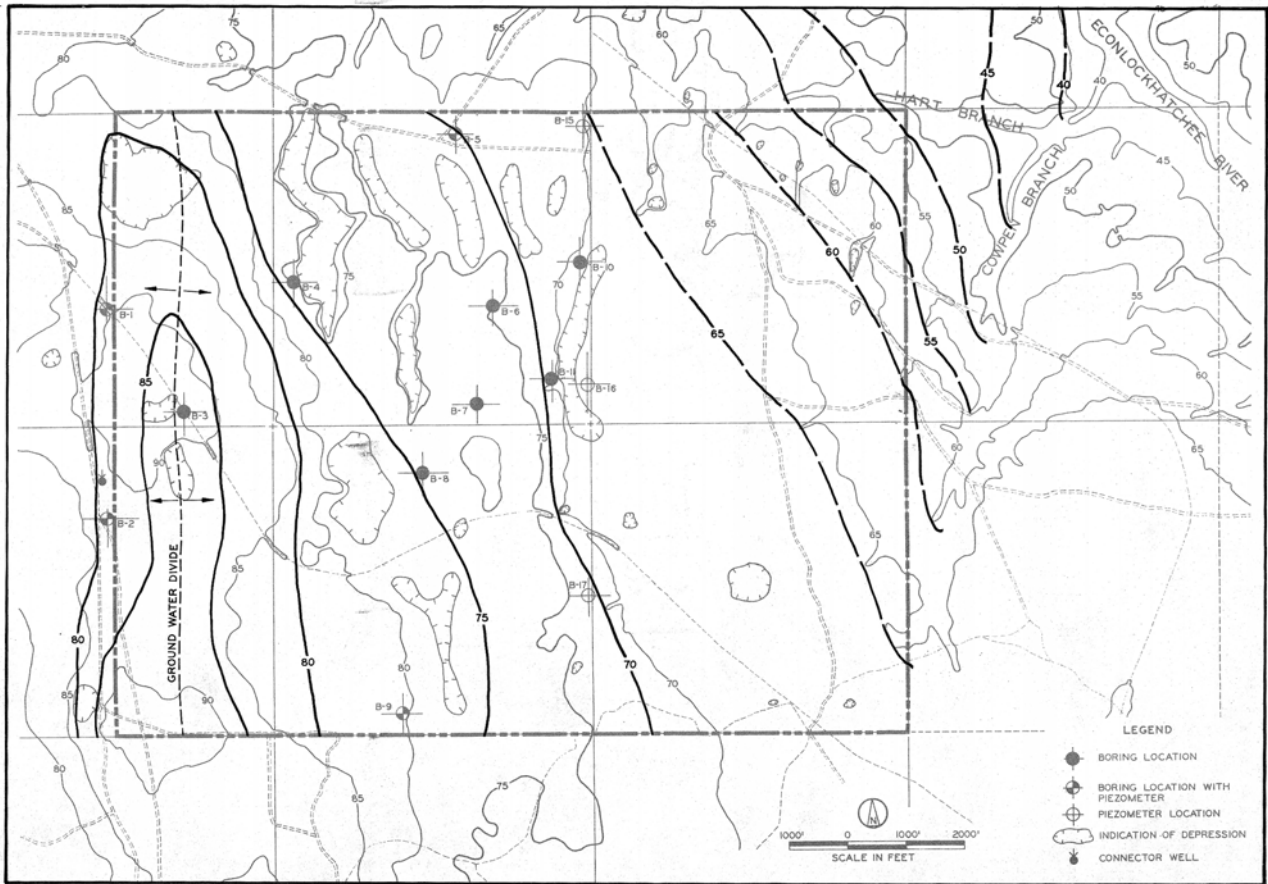
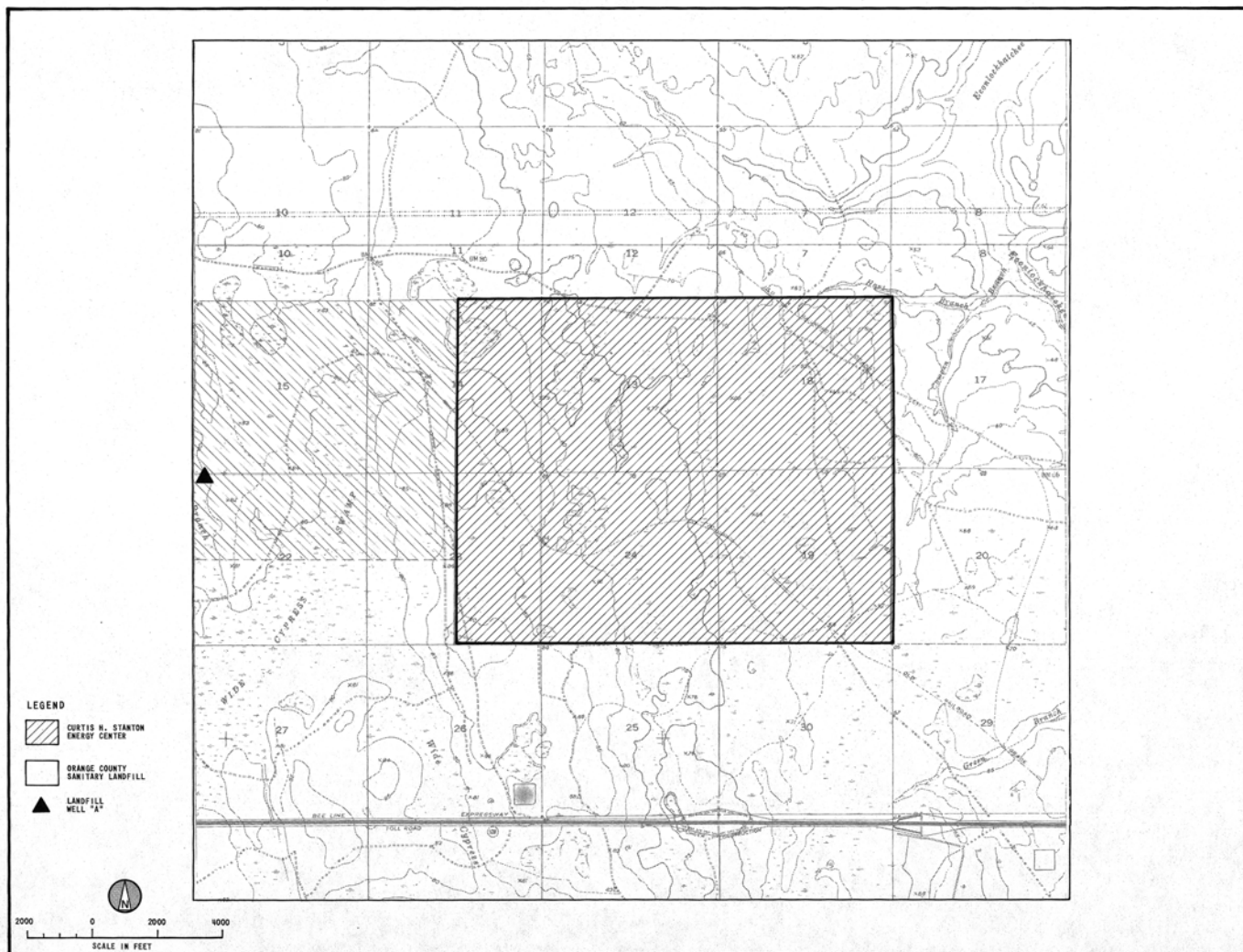
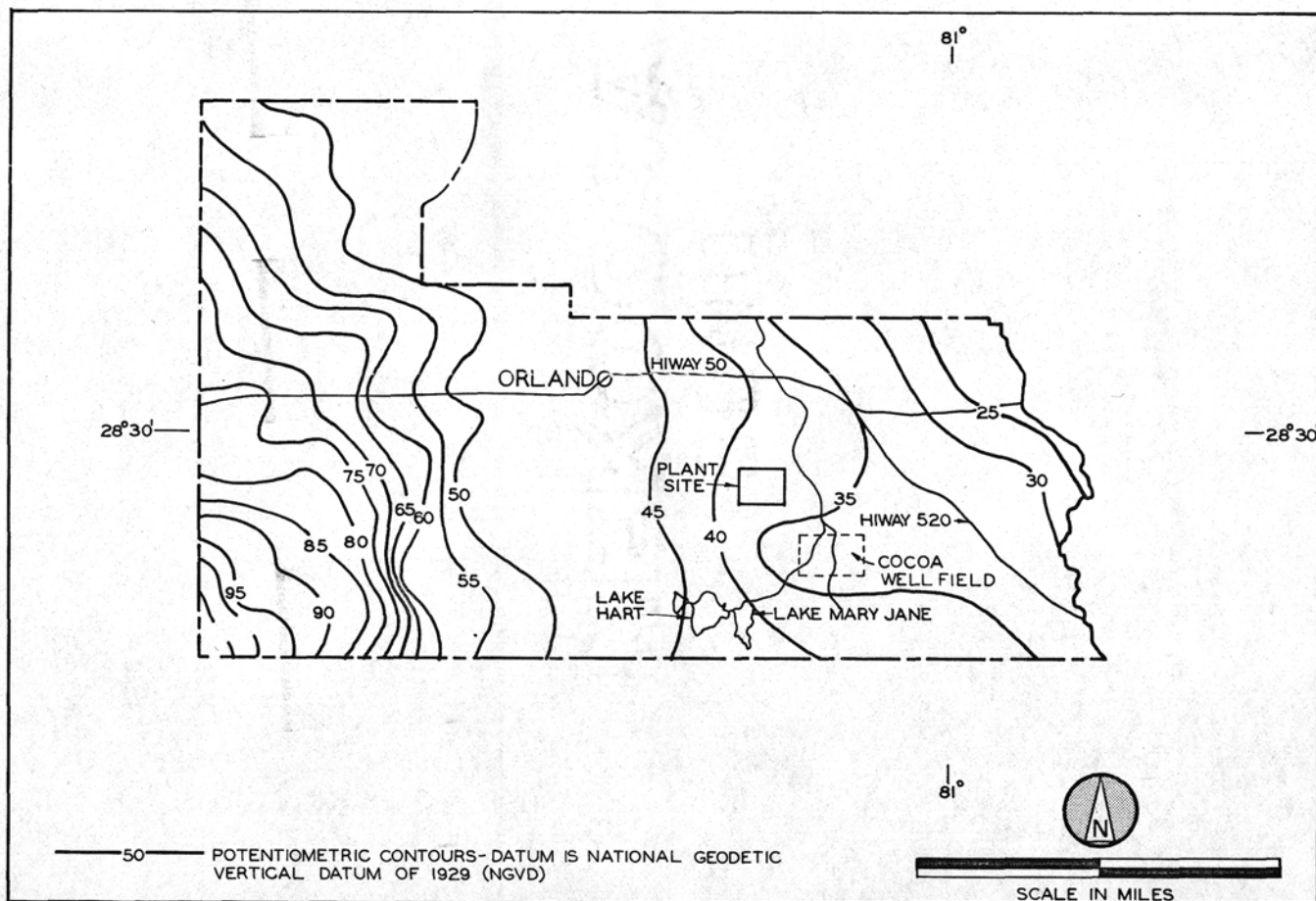


FIGURE 2.5-10. PIEZOMETRIC CONTOURS OF THE NON-ARTESIAN AQUIFER



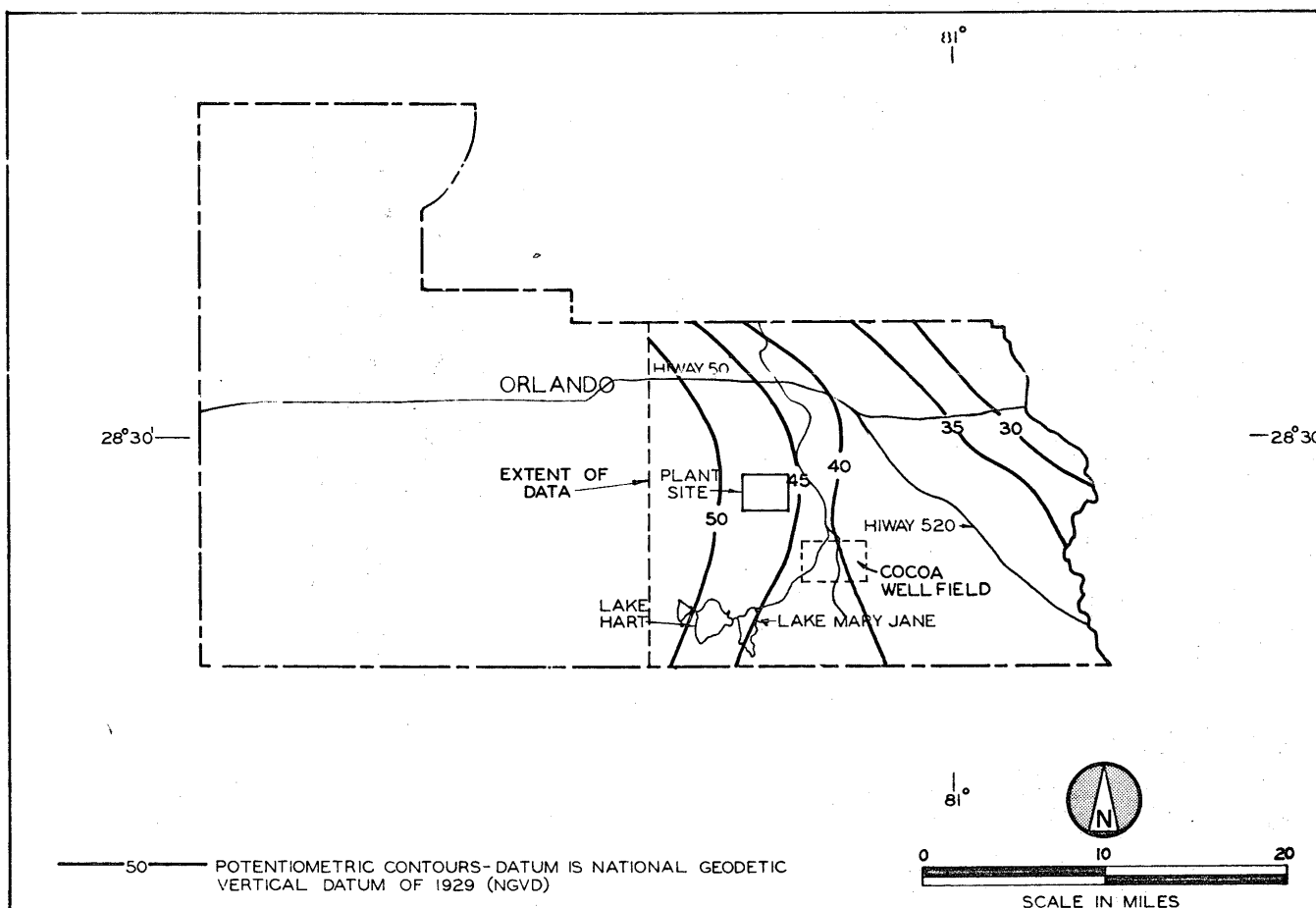
AMENDMENT 5
000362

FIGURE 2.5-10a. LOCATION OF ORANGE COUNTY
LANDFILL WELL "A"



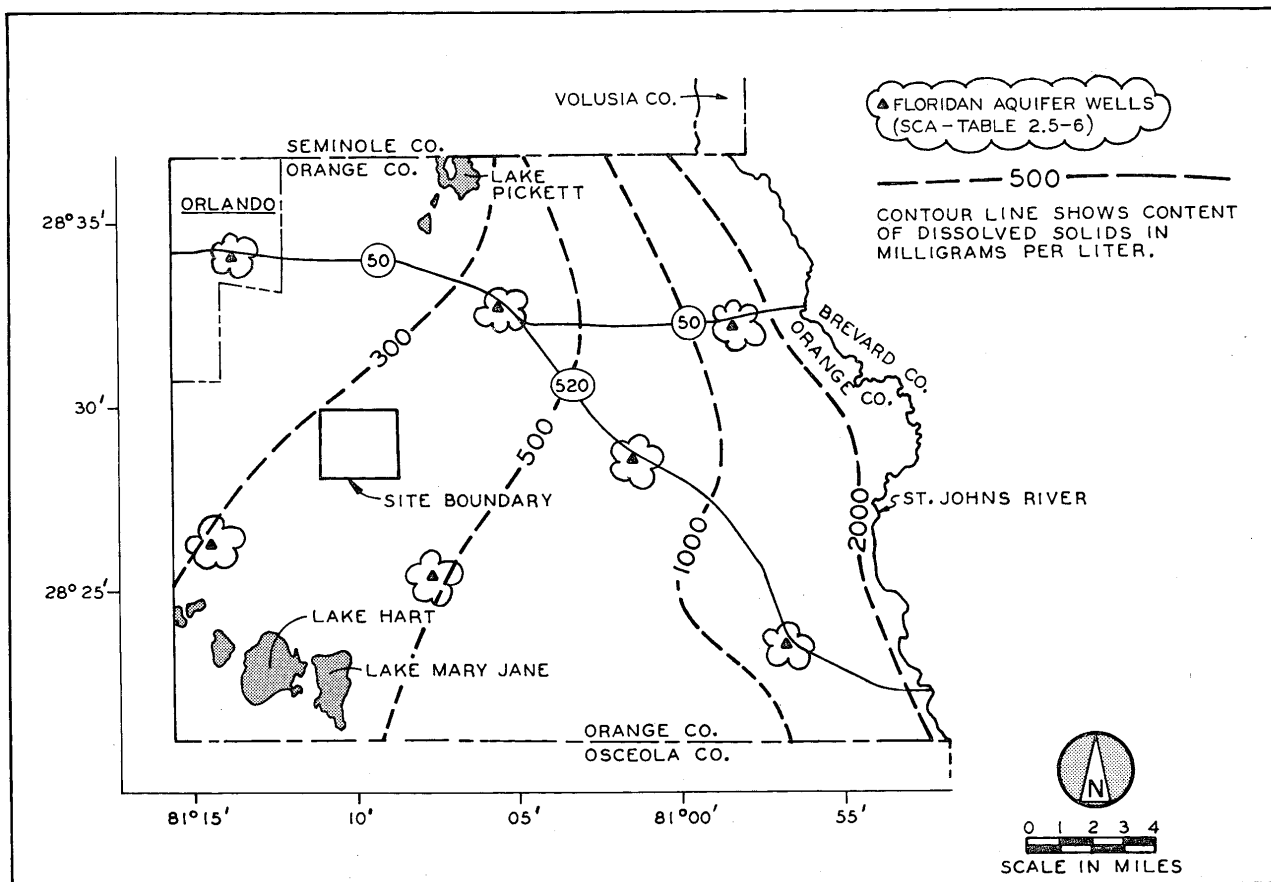
SOURCE: FROM USGS OPEN-FILE
REPORT 81-136, 1980

FIGURE 2.5-11. POTENTIOMETRIC SURFACE MAP OF THE
FLORIDAN AQUIFER, ORANGE COUNTY,
FLORIDA SEPTEMBER 1980



SOURCE: KNOCHENMUS, 1975

FIGURE 2.5-12. POTENTIOMETRIC SURFACE MAP OF THE FLORIDAN AQUIFER, ORANGE COUNTY, FLORIDA JULY 1961



SOURCE: FROM KNOCHENMUS, 1975

FIGURE 2.5-13. EASTERN ORANGE COUNTY WELLS AND DISSOLVED SOLIDS CONCENTRATION IN THE UPPER PART OF THE FLORIDAN AQUIFER 1960-1962

COLLECTED BY: Richard Dunham		SOURCE: 1 Orange County Sanitary	
DATE COLLECTED: 8-18-80		2 Landfill Well "A"	
SET UP BY: ANALYZED BY: 10:22 A		4	
		5	

	1	2	3	4	5
	AS SUCH	AS CaCO ₃	AS SUCH	AS CaCO ₃	AS SUCH
✓ Ca (2.50) mg/l	111.8				
✓ Mg (4.11) "	2.6				
✓ Na (2.17) "	8.6				
✓ K (1.28) "	0.6				
TOTAL CATIONS					
✓ M Alk mg/l	286				
✓ SO ₄ (1.04) "	1.0				
✓ Cl (1.41) "	13.0				
✓ NO ₃ (0.81) "	0.01				
CO ₂ (1.14)*					
✓ SiO ₂ (0.835)**	14.3				
TOTAL ANIONS					
HCO ₃					
CO ₃					
OH					
✓ P Alk mg/l	0				
✓ H Total "	294				
✓ Fe "	1.7				
✓ Mn "	0.1				
✓ pH	6.90				
✓ SPEC. COND. μS	515				
✓ TDS mg/l	332				
✓ TURBIDITY N.T.U.	5.4				
✓ COLOR Pt-Co	28				
ORTHO PHOS					
TOTAL PHOS					
Al					
✓ F mg/l	.18				
REMARKS					
*CO₂ - Conversion bicarbonate to CaCO₃ equivalent. **SiO₂ - Conversion bisilicate to CaCO₃ equivalent.					
BLACK & VEATCH CONSULTING ENGINEERS 		<i>Richard A. Dunham</i> Richard A. Dunham		Orlando Utilities	
		DATE 8-27-80!			
PROJECT		WATER ANALYSIS			

EXHIBIT 2.5-1. GROUND WATER QUALITY NEAR PROPOSED PLANT SITE

COLLECTED BY: <u>R. Dunham</u>		SOURCE: 1 <u>Orange County Sanitary</u>	
DATE COLLECTED: <u>9-30-80</u>		DATE ANALYZED: <u>9/24-9/30/80</u>	
SET UP BY: _____		ANALYZED BY: _____ 9:55 A	

	1	2	3	4	5
	AS SUCH	AS CaCO ₃	AS SUCH	AS CaCO ₃	AS SUCH
✓ Ca (2.50) mg/l	87.4				
✓ Mg (4.11) "	5.5				
✓ Na (2.17) "	9.2				
✓ K (1.28) "	0.9				
TOTAL CATIONS					
✓ M Alk mg/l	235				
✓ SO ₄ (1.04) "	5.0				
✓ Cl (1.41) "	14.3				
✓ NO ₃ (0.81) "	0.01				
CO ₂ (1.14)*					
✓ SiO ₂ (0.835)** "	14.0				
TOTAL ANIONS					
HCO ₃					
CO ₃					
OH					
✓ P Alk mg/l	0				
✓ H Total "	243				
✓ Fe "	1.2				
✓ Mn "	0.08				
✓ pH	7.0				
✓ SPEC. COND. μS	525				
✓ TDS mg/l	325				
✓ TURBIDITY NTU	2.8				
✓ COLOR Pt-Co	18				
ORTHO PHOS					
TOTAL PHOS					
Al					
✓ F mg/l	0.23				

REMARKS

RECEIVED
BLACK & VEATCH
 OCT 04 1980
 SYSTEMS ENG. DEPT.
 LEGAL-ENV. GROUP

*CO₂ - Conversion bicarbonate to CaCO₃ equivalent. **SiO₂ - Conversion bisilicate to CaCO₃ equivalent.	BLACK & VEATCH CONSULTING ENGINEERS PROJECT	<i>Richard A. Dunham</i> Richard A. Dunham, Chemist Orlando Utilities Commission WATER ANALYSIS	DATE 10-1-80
--	--	---	---------------------

EXHIBIT 2.5-1 (CONTINUED). GROUND WATER QUALITY NEAR PROPOSED PLANT SITE

COLLECTED BY: <u>R. Dunham</u>		SOURCE: <u>1 Orange County Sanitary</u>	
DATE COLLECTED: <u>10/21/80</u>		DATE ANALYZED: <u>10/21-10/28/80</u>	
SET UP BY: _____		ANALYZED BY: _____ 1:00 P	

	1	2	3	4	5	
	AS SUCH	AS CaCO ₃	AS SUCH	AS CaCO ₃	AS SUCH	AS CaCO ₃
✓ Ca (2.50) mg/l	78.9					
✓ Mg (4.11) "	5.7					
✓ Na (2.17) "	9.4					
✓ K (1.28) "	0.9					
TOTAL CATIONS						
✓ M Alk mg/l	208					
✓ SO ₄ (1.04) "	6.5					
✓ Cl (1.41) "	5.7					
✓ HCO ₃ (0.81) "	0.01					
CO ₂ (1.14)*						
✓ SiO ₂ (0.835)** "	10.5					
TOTAL ANIONS						
HCO ₃						
CO ₃						
OH						
✓ P Alk mg/l	0					
✓ H Total "	236					
✓ Fe "	0.84					
✓ Mn "	0.03					
✓ pH	6.98					
✓ SPEC. COND. μS	450					
✓ TDS mg/l	310					
✓ TURBIDITY NTU	8.3					
✓ COLOR Pt-Co	12					
ORTHO PHOS						
TOTAL PHOS						
Al						
✓ F mg/l	0.17					
REMARKS						
*CO ₂ - Conversion bicarbonate to CaCO ₃ equivalent. **SiO ₂ - Conversion bisilicate to CaCO ₃ equivalent.						

BLACK & VEATCH CONSULTING ENGINEERS 	 Richard A. Dunham, Chemist Orlando Utilities Commission WATER ANALYSIS	DATE 10-28-80

EXHIBIT 2.5-1 (CONTINUED). GROUND WATER QUALITY NEAR PROPOSED PLANT SITE

Image Quality

As you review the next group of images, Please note that the original documents were of poor quality.

COLLECTED BY: <u>R. Dunham</u>		SOURCE: <u>Orange County Sanitary</u>	
DATE COLLECTED: <u>11-25-80</u>		ANALYZED <u>11/26-12/11</u>	
SET UP BY: _____		ANALYZED BY: _____ 9:35 A	

	AS SUCH	AS CaCO ₃	AS SUCH	AS CaCO ₃	AS SUCH	AS CaCO ₃	AS SUCH	AS CaCO ₃	AS SUCH	AS CaCO ₃
✓ Ca (2.50)	105.4									
✓ Mg (4.11)	3.0									
✓ Na (2.17)	8.8									
✓ K (1.28)	1.0									
TOTAL CATIONS										
✓ MALK	245									
✓ SO ₄ (1.04)	< 1.0									
✓ Cl (1.24)	13.6									
✓ CO ₃ (1.1)	0.01									
✓ SiO ₂ (0.005)**	14.0									
TOTAL ANIONS										
✓ P (0.001)	0									
✓ Fe (0.001)	271									
✓ Fe	2.4									
✓ Mn	< 0.05									
✓	6.56									
✓ SPEC. CONC.	AS 550									
✓ TDS	332									
✓ TUB. DITY	6.7									
✓ COLOR	30									
✓ ORTHO PHOS										
✓ TOTAL PHOS										
✓ F	0.20									

REMARKS:

*CO₂ - Conversion bicarbonate to CaCO₃ equivalent.
 **SiO₂ - Conversion bicarbonate to CaCO₃ equivalent.

ANALYST: Richard A. Dunham
 Richard A. Dunham, Chemist
 DATE 12-11-80

PROJECT: WATER ANALYSIS
 Orlando Utilities Commission

EXHIBIT 2.5-1 (CONTINUED). GROUND WATER QUALITY NEAR PROPOSED PLANT SITE

COLLECTED BY: <u>R. Dunham</u>		SOURCE: 1 <u>Orange County Sanitary</u>	
DATE COLLECTED: <u>12-17-80</u>		2 <u>Landfill Well "A"</u>	
SET UP BY: _____		3 _____	
ANALYZED BY: _____		4 <u>9:25 A</u>	
5 _____			

	1	2	3	4	5
	AS SUCH	AS CaCO ₃	AS SUCH	AS CaCO ₃	AS SUCH
✓ Ca (2.50) <i>mg/l</i>	107.4				
✓ Mg (4.11) "	2.7				
✓ Na (2.17) "	8.5				
✓ K (1.28) "	0.6				
TOTAL CATIONS					
✓ H Alk <i>mg/l</i>	271				
✓ SO ₄ (1.04) "	<1.0				
✓ Cl (1.41) "	13.8				
✓ NO ₃ (0.81) "	-				
CO ₂ (1.14)*					
✓ SiO ₂ (0.835)**	13.3				
TOTAL ANIONS					
HCO ₃					
CO ₃					
OH					
✓ P Alk <i>mg/l</i>	0				
✓ H Total	292				
✓ Fe "	1.7				
✓ Mn "	<0.05				
✓ pH	6.70				
✓ SPEC. COND. <i>µS</i>	500				
✓ TDS <i>mg/l</i>	317				
✓ TURBIDITY <i>NTU</i>	7.1				
✓ COLOR <i>Pt-Co</i>	27				
ORTHO PHOS					
TOTAL PHOS					
Al					
✓ F <i>mg/l</i>	0.16				

REMARKS

*CO₂ - Conversion bicarbonate to CaCO₃ equivalent.

**SiO₂ - Conversion bisilicate to CaCO₃ equivalent.

BLACK & VEATCH
 CONSULTING ENGINEERS

Richard A. Dunham
 Richard A. Dunham, Chemist

PROJECT
 WATER ANALYSIS
 Orlando Utilities Commission

DATE 1-8-81.

EXHIBIT 2.5-1 (CONTINUED). GROUND WATER QUALITY NEAR PROPOSED PLANT SITE

COLLECTED BY: <u>R. Dunham</u>		SOURCE: 1 <u>Orange County Sanitary</u>	
DATE COLLECTED: <u>1-20-81</u> DATE ANALYZED: _____		2 <u>Landfill Well "A"</u>	
SET UP BY: _____ ANALYZED BY: _____		3 _____	
		4 _____	
		5 _____	

	1	2	3	4	5
	AS SUCH	AS CaCO ₃	AS SUCH	AS CaCO ₃	AS SUCH
✓ Ca (2.50) mg/l	106.9				
✓ Mg (4.11) "	3.2				
✓ Na (2.17) "	8.8				
✓ K (1.28) "	0.6				
TOTAL CATIONS					
✓ M Atk mg/l	267				
✓ SO ₄ (1.04) "	<1.0				
✓ Cl (1.41) "	12.7				
✓ NO ₃ (0.81) "	<0.02				
CO ₂ (1.14)*					
✓ SiO ₂ (0.835)** "	15.1				
TOTAL ANIONS					
HCO ₃					
CO ₃					
OH					
✓ P Atk mg/l	0				
✓ H Total "	328				
✓ Fe "	1.5				
✓ Mn "	<0.02				
✓ pH	6.88				
✓ SPEC. COND. μS	550				
✓ TDS mg/l	326				
✓ TURBIDITY NTU	8.0				
✓ COLOR Pt-Co	15.				
ORTHO PHOS					
TOTAL PHOS					
Al					
✓ F mg/l	0.16				
REMARKS					
*CO ₂ - Conversion bicarbonate to CaCO ₃ equivalent. **SiO ₂ - Conversion bisilicate to CaCO ₃ equivalent.					

BLACK & VEATCH CONSULTING ENGINEERS 	<i>Richard A. Dunham</i> Richard A. Dunham, Chemist	DATE 1-30-81
	Orlando Utilities Commission WATER ANALYSIS	

EXHIBIT 2.5-1 (CONTINUED). GROUND WATER QUALITY NEAR PROPOSED PLANT SITE

COLLECTED BY: <u>R. Dunham</u>		SOURCE: 1 <u>Orange County Sanitary</u>	
DATE COLLECTED: <u>2-24-81</u>		2 <u>Landfill Well "A"</u>	
DATE ANALYZED: _____		3 _____	
SET UP BY: _____		4 _____	
ANALYZED BY: _____		5 _____	
		1:55 P	

	1	2	3	4	5
	AS SUCH	AS CaCO ₃	AS SUCH	AS CaCO ₃	AS SUCH
✓ Ca (2.50) mg/l	84.6				
✓ Mg (4.11) "	4.0				
✓ Na (2.17) "	9.5				
✓ K (1.28) "	0.8				
TOTAL CATIONS					
✓ M Alk mg/l		225			
✓ SO ₄ (1.04) "	1.0				
✓ Cl (1.41) "	16.0				
✓ NO ₃ (0.81) "	2.01				
CO ₂ (1.14)*					
✓ SiO ₂ (0.835)**	14.5				
TOTAL ANIONS					
HCO ₃					
CO ₃					
OH					
✓ P Alk mg/l		0			
✓ H Total "		234			
✓ Fe "	2.3				
✓ Mn "	0.02				
✓ pH	6.95				
✓ SPEC. COND. μ S	495				
✓ TDS mg/l	270				
✓ TURBIDITY NTU	9.6				
✓ COLOR Pt-Co	32				
ORTHO PHOS					
TOTAL PHOS					
Al					
✓ F	0.20				

REMARKS

*CO₂ - Conversion bicarbonate to CaCO₃ equivalent.
 **SiO₂ - Conversion bisilicate to CaCO₃ equivalent.

BLACK & VEATCH CONSULTING ENGINEERS 	 Richard A. Dunham, Chemist	DATE 3-13-81
	PROJECT Orlando Utilities Commission WATER ANALYSIS	

EXHIBIT 2.5-1 (CONTINUED). GROUND WATER QUALITY NEAR PROPOSED PLANT SITE

COLLECTED BY: <u>R. Dunham</u>		SOURCE: 1 <u>Orange County Sanitary</u>	
DATE COLLECTED: <u>3-24-81</u> DATE ANALYZED: _____		2 <u>Landfill Well "A"</u>	
SET UP BY: _____ ANALYZED BY: _____		3 _____	
		4 _____	
		5 _____	

	1		2		3		4		5	
	AS SUCH	AS CaCO ₃	AS SUCH	AS CaCO ₃	AS SUCH	AS CaCO ₃	AS SUCH	AS CaCO ₃	AS SUCH	AS CaCO ₃
✓ Ca (2.50)	103.4									
✓ Mg (4.11)	3.0									
✓ Na (2.17)	8.4									
✓ K (1.28)	0.6									
TOTAL CATIONS										
✓ M Alk		275								
✓ SO ₄ (1.04)	<1.0									
✓ Cl (1.41)	11.0									
✓ NO ₃ (0.81)	<.02									
✓ CO ₂ (1.14)*										
✓ SiO ₂ (0.835)**	14.0									
TOTAL ANIONS										
HCO ₃										
CO ₃										
OH										
✓ P Alk		0								
✓ H Total		291								
✓ Fe	2.0									
✓ Mn	<0.02									
✓ pH	6.95									
✓ SPEC. COND. μS	535									
✓ TDS	316									
✓ TURBIDITY	12									
✓ COLOR	35									
ORTHO PHOS										
TOTAL PHOS										
Al										
✓ F	0.24									
REMARKS										
*CO ₂ - Conversion bicarbonate to CaCO ₃ equivalent. **SiO ₂ - Conversion bisilicate to CaCO ₃ equivalent.										
BLACK & VEATCH CONSULTING ENGINEERS 		<i>Richard A. Dunham</i> Richard A. Dunham, Chemist					DATE 4-7-81			
		Orlando Utilities Commission WATER ANALYSIS								

EXHIBIT 2.5-1 (CONTINUED). GROUND WATER QUALITY NEAR
PROPOSED PLANT SITE

ORLANDO UTILITIES COMMISSION WATER ANALYSIS

RESULTS IN Mg/L

CURTIS H. STANTON ENERGY CENTER
GROUNDWATER MONITORING PROGRAM

DATE: August 26, 1980

PARAMETER	B-1	B-2	B-5	B-9
TIME SAMPLED	11:00 A	12:05 A	1:30 P	2:30 P
TEMPERATURE, °C	21.0	22.0	22.0	23.0
WATER ELEVATION	7'0"	6'8"	4'5"	6'0"
SATURATION INDEX	+2.88	+2.09	-0.57	-3.57
CONDUCTIVITY, μ S	25	45	490	105
pH	4.92	4.13	6.90	5.61
TOTAL ALKALINITY	0	0	240	34
P-ALKALINITY	0	0	0	0
TOTAL HARDNESS	10	6	249	35
CHLORIDE	4.6	11.8	23.7	13.0
FLUORIDE	0.10	0.10	0.16	0.14
H ₂ S FIELD/LAB	0.2/-	0.3/-	0.2/-	0.1/-
NITROGEN, NH ₃ -N	0.76	0.69	0.85	0.82
NITROGEN, NO ₃ -N	0.036	0.036	0.039	0.041
NITROGEN, TOTAL KjEL.	1.2	1.1	1.2	1.3
OXYGEN DEMAND, CHEMICAL	168	544	100	288
PO ₄ TOTAL FILTERABLE	0.10	0.20	0.35	0.14
PO ₄ TOTAL NONFILTERABLE	0.10	0.20	0.22	0.23
SILICA	4.2	3.2	3.6	8.0
SOLIDS, TOTAL	25.0	61.0	255.0	201.0
SOLIDS, TOTAL SUSPENDED	1.0	34.0	24.0	57.6
SULFATE	<1.0	<1.0	<1.0	<1.0
ALUMINUM	0.7	1.0	11.6	26.5
ARSENIC	0.003	0.021	0.050	0.150
BARIUM	<0.5	<0.5	<0.5	<0.5
BERYLLIUM	<0.05	<0.05	<0.05	<0.05
CADMIUM	<0.001	<0.001	<0.001	<0.001
CALCIUM	<1.0	<1.0	47.0	5.7
CHROMIUM, TOTAL	<0.001	<0.001	0.003	0.006
COBALT	<0.05	<0.05	<0.05	<0.05
COPPER	<0.10	<0.10	<0.10	<0.10
IRON, FIELD/LAB	0.3/0.2	0.8/0.7	1.3/1.6	1.0/1.3
MAGNESIUM	0.8	0.8	2.8	0.8
MANGANESE, FIELD/LAB	<0.5/0.05	<0.5/0.05	<0.5/0.05	<0.5/0.05
LEAD	0.002	0.002	0.002	0.004
MERCURY	<0.0005	<0.0005	<0.0005	<0.0005
MOLYBDENUM	<0.2	<0.2	<0.2	<0.2
NICKEL	<0.3	<0.3	<0.3	<0.3
POTASSIUM	0.1	0.2	2.0	0.7
SELENIUM	0.001	0.007	0.030	0.060
SILVER	<0.001	<0.001	<0.001	<0.001
SODIUM	2.6	3.6	14.6	6.4
VANADIUM	<0.6	<0.6	<0.6	0.8
ZINC	<0.05	<0.05	<0.05	<0.05
COLIFORM, FECAL	none	none	none	none
COLIFORM, TOTAL	-1	-1	-1	-1

Richard A. Dunham
Richard A. Dunham, Chemist

EXHIBIT 2.5-2. GROUND WATER QUALITY
ON PROPOSED PLANT SITE

ORLANDO UTILITIES COMMISSION WATER ANALYSIS

RESULTS IN Mg/L

CURTIS H. STANTON ENERGY CENTER
GROUNDWATER MONITORING PROGRAM

DATE: October 13, 1980

PARAMETER	B-1	B-2	B-5	B-9
TIME SAMPLED	11:00 A	12:00 P	1:45 P	2:50 P
TEMPERATURE, °C	22.0	23.5	22.0	23.0
WATER ELEVATION	6'6"	6'5"	5'5"	4'1"
SATURATION INDEX	-1.61	-5.93	-0.32	-3.41
CONDUCTIVITY, uS	25	35	600	110
pH	5.14	5.56	6.91	5.57
TOTAL ALKALINITY	0.4	1.0	237	30
P-ALKALINITY	0	0	0	0
TOTAL HARDNESS	0.5	0.5	240	32
CHLORIDE	5.3	6.5	20.3	13.4
FLUORIDE	<0.1	<0.1	<0.1	<0.1
H ₂ S FIELD/LAB	0.2/<0.1	0.3/0.2	0.1/<0.1	0.1/<0.1
NITROGEN, NH ₃ -N	0.59	0.61	0.58	0.58
NITROGEN, NO ₃ -N	<0.01	0.01	<0.01	<0.01
NITROGEN, TOTAL K ₂ Cr ₂ O ₇	0.79	1.15	0.89	0.82
OXYGEN DEMAND, CHEMICAL	25	35	15	35
PO ₄ TOTAL FILTERABLE	.077	.065	.102	.072
PO ₄ TOTAL NONFILTERABLE	.112	.230	.130	.285
SILICA	3.0	4.0	13.2	4.4
SOLIDS, TOTAL	38.0	94.0	365.0	240.0
SOLIDS, TOTAL SUSPENDED	2.8	28.8	44.4	84.8
SULFATE	<1.0	<1.0	<1.0	<1.0
ALUMINUM	1.2	5.3	6.6	14.0
ARSENIC	0.002	0.042	0.044	0.132
BARIUM	<0.5	<0.5	0.7	0.7
BERYLLIUM	<0.05	<0.05	<0.05	<0.05
CADMIUM	<0.001	<0.001	<0.001	<0.001
CALCIUM	<1.0	<1.0	91.4	10.4
CHROMIUM, TOTAL	<0.001	0.004	<0.001	<0.001
COBALT	<0.25	<0.25	<0.25	<0.25
COPPER	<0.1	<0.1	0.1	<0.1
IRON, FIELD/LAB	0.7/0.6	1.5/1.7	1.4/1.9	1.0/1.5
MAGNESIUM	0.8	0.7	3.2	0.8
MANGANESE, FIELD/LAB	<0.5/<0.05	<0.5/<0.05	<0.5/0.05	<0.5/<0.05
LEAD	0.002	0.001	0.002	0.002
MERCURY	<0.0005	<0.0005	<0.0005	<0.0005
MOLYBDENUM	<0.2	<0.2	<0.2	<0.2
NICKEL	<0.3	<0.3	<0.3	<0.3
POTASSIUM	0.2	0.3	2.2	0.7
SELENIUM	<0.002	0.010	0.012	0.038
SILVER	<0.001	<0.001	<0.001	<0.001
SODIUM	2.4	4.2	14.6	6.7
VANADIUM	0.9	1.2	0.9	1.1
ZINC	<0.05	0.05	<0.05	<0.05
COLIFORM, FECAL	none	none	none	none
COLIFORM, TOTAL	-1	-1	-1	-1

Richard A. Dunham
Richard A. Dunham, Chemist

EXHIBIT 2.5-2 (CONTINUED). GROUND WATER QUALITY
ON PROPOSED PLANT SITE

ORLANDO UTILITIES COMMISSION WATER ANALYSIS

RESULTS IN Mg/L

CURTIS H. STANTON ENERGY CENTER
GROUNDWATER MONITORING PROGRAM

DATE: Oct. 21, 1980

PARAMETER	B-1	B-2	B-5	B-9
TIME SAMPLED	1:45 p	2:20 p	12:10p	10:30 a
TEMPERATURE, °C	21.5	24.0	22.0	22.5
WATER ELEVATION	7'0"	7'4"	5'4"	5'0"
SATURATION INDEX	+2.50	-2.22	-0.48	-3.17
CONDUCTIVITY, uS	25	100	495	100
pH	4.53	4.02	6.80	5.58
TOTAL ALKALINITY	0	0	222	24
P-ALKALINITY	0	0	0	0
TOTAL HARDNESS	0	3.5	241	32
CHLORIDE	23.7	162.5	22.8	13.2
FLUORIDE	<.10	<.10	0.16	0.11
H ₂ S FIELD/LAB	0.2/-	0.3/-	0.1/-	0.1/-
NITROGEN, NH ₃ -N	0.50	0.47	0.48	0.48
NITROGEN, NO ₃ -N	<0.01	<0.01	0.020	0.015
NITROGEN, TOTAL KJEL.	0.61	0.61	0.62	0.63
OXYGEN DEMAND, CHEMICAL	19	10	19	25
PO ₄ TOTAL FILTERABLE	0.170	0.180	0.570	0.180
PO ₄ TOTAL NONFILTERABLE	0.102	0.46	0.039	0.049
SILICA	0.3	3.5	8.3	3.3
SOLIDS, TOTAL	25.0	73.0	389.0	214.0
SOLIDS, TOTAL SUSPENDED	4.4	9.2	68.4	37.6
SULFATE	<1.0	<1.0	<1.0	<1.0
ALUMINUM	2.3	4.3	4.3	2.9
ARSENIC	<0.002	0.004	0.006	0.004
BARIUM	<0.5	<0.5	<0.5	<0.5
BERYLLIUM	<0.05	<0.05	<0.05	<0.05
CADMIUM	<0.001	<0.001	<0.001	<0.001
CALCIUM	<1.0	3.0	220	23
CHROMIUM, TOTAL	<0.001	<0.001	<0.001	<0.001
COBALT	<0.25	<0.25	<0.25	<0.25
COPPER	<0.05	<0.05	<0.05	<0.05
IRON, FIELD/LAB	0.5/0.46	1.4/1.35	1.8/2.24	1.1/1.25
MAGNESIUM	1.0	1.1	3.5	1.4
MANGANESE, FIELD/LAB	<0.5/<0.05	<0.5/<0.05	<0.5/<0.05	<0.5/<0.05
LEAD	<0.001	<0.001	0.002	<0.001
MERCURY	<0.0005	<0.0005	<0.0005	<0.0005
MOLYBDENUM	<0.2	<0.2	<0.2	<0.2
NICKEL	<0.3	<0.3	<0.3	<0.3
POTASSIUM	0.2	0.2	2.0	0.5
SELENIUM	<0.002	<0.002	0.005	0.003
SILVER	<0.001	<0.001	<0.001	<0.001
SODIUM	2.6	3.9	13.2	6.2
VANADIUM	<0.6	<0.6	<0.6	<0.6
ZINC	<0.05	<0.05	<0.05	<0.05
* COLIFORM, FECAL	none	none	none	none
* COLIFORM, TOTAL	-1	-1	-1	-1

1:10 Dilution

Richard A. Dunham
Richard A. Dunham, Chemist

EXHIBIT 2.5-2 (CONTINUED): GROUND WATER QUALITY
ON PROPOSED PLANT SITE

ORLANDO UTILITIES COMMISSION WATER ANALYSIS

RESULTS IN Mg/L

CURTIS H. STANTON ENERGY CENTER
GROUNDWATER MONITORING PROGRAM

Would
not pump

DATE: 11-25-80

PARAMETER	B-1	B-2	B-5	B-9	
TIME SAMPLED			12:00 N	1:10 P	
TEMPERATURE, °C			23.0	23.0	
WATER ELEVATION	6'8"	6'11"	4'4"	3'6"	
SATURATION INDEX					
CONDUCTIVITY, uS			500	100	
pH			6.42	5.21	
TOTAL ALKALINITY			222	18.1	
P-ALKALINITY			0	0	
TOTAL HARDNESS			271	260	
CHLORIDE			22.5	13.8	
FLUORIDE			0.18	0.15	
H ₂ S FIELD/LAB			0.1/-	0.1/-	
NITROGEN, NH ₃ -N			0.18	0.16	
NITROGEN, NO ₃ -N			0.029	0.026	
NITROGEN, TOTAL KJEL.			0.20	0.19	
OXYGEN DEMAND, CHEMICAL			< 10	< 10	
PO ₄ TOTAL FILTERABLE			0.200	0.060	
PO ₄ TOTAL NONFILTERABLE			.005	.075	
SILICA			12.8	7.5	
SOLIDS, TOTAL			341.2	156.2	
SOLIDS, TOTAL SUSPENDED			29.2	21.2	
SULFATE			< 1.0	< 1.0	
ALUMINUM			1.7	2.9	
ARSENIC			0.005	0.004	
BARIUM			< 0.5	< 0.5	
BERYLLIUM			< 0.05	< 0.05	
CADMIUM			< 0.001	< 0.001	
CALCIUM			26.3	22.3	
CHROMIUM, TOTAL			< 0.001	< 0.001	
COBALT			< 0.25	< 0.25	
COPPER			< 0.05	< 0.05	
IRON, FIELD/LAB			0.8/1.8	0.6/1.0	
MAGNESIUM			3.4	2.1	
MANGANESE, FIELD/LAB			< 0.5/0.05	< 0.5/0.05	
LEAD			0.003	0.001	
MERCURY			< 0.0005	< 0.0005	
MOLYBDENUM			< 0.2	< 0.2	
NICKEL			< 0.3	< 0.3	
POTASSIUM			1.1	0.7	
SELENIUM			0.006	0.004	
SILVER			< 0.001	< 0.001	
SODIUM			14.8	6.2	
VANADIUM			< 0.6	< 0.6	
ZINC			< 0.05	< 0.05	
COLIFORM, FECAL			none	none	
COLIFORM, TOTAL			-1	-1	

Richard A. Dunham
Richard A. Dunham, Chemist

EXHIBIT 2.5-2 (CONTINUED). GROUND WATER QUALITY
ON PROPOSED PLANT SITE

ORLANDO UTILITIES COMMISSION WATER ANALYSIS

RESULTS IN Mg/L

CURTIS H. STANTON ENERGY CENTER
GROUNDWATER MONITORING PROGRAM

DATE: Dec. 17, 1980

PARAMETER	B-1	B-2	B-5	B-9
TIME SAMPLED	10:15 A	11:00 A	12:30 P	1:16 P
TEMPERATURE, °C	22.5	22.5	22.5	23.0
WATER ELEVATION	6'3"	6'3"	4'0"	3'10"
SATURATION INDEX	2.36	2.71	-0.53	-1.63
CONDUCTIVITY, µS	25	25	475	100
pH	4.40	4.75	6.70	5.60
TOTAL ALKALINITY	0	0	236	24
P-ALKALINITY	0	0	0	0
TOTAL HARDNESS	0	0	245	62
CHLORIDE	5.7	6.6	21.8	12.7
FLUORIDE	< 0.1	< 0.1	0.13	< 0.1
H ₂ S FIELD/LAB	0.2/-	0.5/-	0.1/-	0.2/-
NITROGEN, NH ₃ -N	0.44	0.34	0.48	0.60
NITROGEN, NO ₃ -N	< 0.01	< 0.01	< 0.01	0.01
NITROGEN, TOTAL KJEL.	< 0.05	< 0.05	< 0.05	< 0.05
OXYGEN DEMAND, CHEMICAL	< 10	< 10	< 10	25
PO ₄ TOTAL FILTERABLE	< 0.01	0.068	0.468	0.040
PO ₄ TOTAL NONFILTERABLE	< 0.01	0.204	< 0.01	0.295
SILICA	2.5	3.8	10.0	5.5
SOLIDS, TOTAL	29	28	340	320
SOLIDS, TOTAL SUSPENDED	< 1	< 1	4.4	46.8
SULFATE	< 1.0	< 1.0	< 1.0	< 1.0
ALUMINUM	0.6	0.6	0.8	0.9
ARSENIC	< 0.002	< 0.002	0.003	0.004
BARIUM	< 0.2	< 0.2	< 0.2	< 0.2
BERYLLIUM	< 0.05	< 0.05	< 0.05	< 0.05
CADMIUM	< 0.001	< 0.001	< 0.001	< 0.001
CALCIUM	< 1.0	< 1.0	92.2	11.2
CHROMIUM, TOTAL	< 0.001	< 0.001	< 0.001	< 0.001
COBALT	< 0.05	< 0.05	< 0.05	< 0.05
COPPER	< 0.05	< 0.05	< 0.05	< 0.05
IRON, FIELD/LAB	0.8/0.43	1.2/0.59	1.8/1.4	1.3/1.4
MAGNESIUM	0.6	0.8	3.2	0.7
MANGANESE, FIELD/LAB	< 0.5/0.02	< 0.5/0.02	< 0.5/0.02	< 0.5/0.02
LEAD	< 0.001	< 0.001	0.003	0.001
MERCURY	< 0.0005	< 0.0005	< 0.0005	< 0.0005
MOLYBDENUM	< 0.2	< 0.2	< 0.2	< 0.2
NICKEL	< 0.3	< 0.3	< 0.3	< 0.3
POTASSIUM	0.1	0.1	1.7	0.5
SELENIUM	< 0.002	< 0.002	0.002	0.002
SILVER	< 0.001	< 0.001	< 0.001	< 0.001
SODIUM	2.2	3.0	12.9	6.3
STRONTIUM	< 0.6	< 0.6	< 0.6	< 0.6
TUNG	< 0.02	< 0.02	< 0.02	< 0.02
COLIFORM, FECAL	< 1	NO GROWTH	< 1	< 1
COLIFORM, TOTAL	-1	-1	-1	-1

Richard A. Dunham
Richard A. Dunham

EXHIBIT 2.5-2 (CONTINUED). GROUND WATER QUALITY
ON PROPOSED PLANT SITE

ORLANDO UTILITIES COMMISSION WATER ANALYSIS

RESULTS IN Mg/L

CURTIS H. STANTON ENERGY CENTER
GROUNDWATER MONITORING PROGRAM

DATE: Jan. 20, 1981

PARAMETER	B-1	B-2	B-5	B-9
TIME SAMPLED	9:52 A	10:40 A	12:00 P	12:52 P
TEMPERATURE, °C	22.0	22.0	22.0	22.5
WATER ELEVATION	6'11"	6'11"	4'4"	4'6"
SATURATION INDEX	-2.10	-6.28	-0.42	-3.31
CONDUCTIVITY, uS	25	25	525	95
pH	4.51	4.90	6.80	5.71
TOTAL ALKALINITY	0	2	234	28
P-ALKALINITY	0	0	0	0
TOTAL HARDNESS	0	0	280	26
CHLORIDE	4.1	5.4	20.9	11.3
FLUORIDE	<0.10	<0.10	0.16	<0.10
H ₂ S FIELD/LAB	0.3/-	0.5/-	<0.1/-	0.3/-
NITROGEN, NH ₃ -N	0.9	0.2	0.4	<0.1
NITROGEN, NO ₃ -N	<.02	<.02	<.02	<.02
NITROGEN, TOTAL KJEL	<0.10	0.10	<0.10	0.34
OXYGEN DEMAND, CHEMICAL	<10	<10	<10	<10
PO ₄ TOTAL FILTERABLE	.390	.402	.362	.045
PO ₄ TOTAL NONFILTERABLE	.299	.287	.270	.110
SILICA	4.0	5.3	13.9	10.3
SOLIDS, TOTAL	59	58	331	138
SOLIDS, TOTAL SUSPENDED	2	7	17	17
SULFATE	<1.0	<1.0	<1.0	<1.0
ALUMINUM	0.6	0.6	0.8	0.9
ARSENIC	<0.002	<0.002	<0.002	<0.002
BARIUM	<0.1	<0.1	<0.1	<0.1
BERYLLIUM	<0.05	<0.05	<0.05	<0.05
CADMIUM	<0.001	<0.001	<0.001	<0.001
CALCIUM	1.2	0.8	95.5	9.7
CHROMIUM, TOTAL	<0.001	<0.001	<0.001	0.003
COBALT	<0.05	<0.05	<0.05	<0.05
COPPER	<0.05	<0.05	<0.05	<0.05
IRON, FIELD/LAB	0.5/0.3	0.7/0.6	1.5/1.1	0.8/0.6
MAGNESIUM	0.6	0.8	3.0	1.1
MANGANESE, FIELD/LAB	<0.5/0.02	<0.5/0.02	<0.5/0.02	<0.5/0.02
LEAD	<0.001	<0.001	0.001	0.001
MERCURY	<0.0005	<0.0005	<0.0005	<0.0005
MOLYBDENUM	<0.2	<0.2	<0.2	<0.2
NICKEL	<0.3	<0.3	<0.3	<0.3
POTASSIUM	0.1	0.1	1.7	0.6
SELENIUM	<0.002	<0.002	<0.002	<0.002
SILVER	<0.001	<0.001	<0.001	<0.001
SODIUM	2.2	3.0	12.3	5.8
VANADIUM	<0.6	<0.6	<0.6	<0.6
ZINC	<0.02	<0.02	<0.02	<0.02
COLIFORM, FECAL	NO GROWTH*			
COLIFORM, TOTAL	-1	-1	-1*	-1*

*1:10 dilution

Richard Dunham, Chemist

EXHIBIT 2.5-2 (CONTINUED). GROUND WATER QUALITY
ON PROPOSED PLANT SITE

ORLANDO UTILITIES COMMISSION WATER ANALYSIS

RESULTS IN Mg/L

CURTIS H. STANTON ENERGY CENTER
GROUNDWATER MONITORING PROGRAM

DATE: 2-24-81

PARAMETER	B-1	B-2	B-5	B-9 (2/17)
TIME SAMPLED	2:11 P	2:19 P	1:00 P	11:06 A
TEMPERATURE, °C				
WATER ELEVATION	6'6"	6'1"	1'7"	2'2"
SATURATION INDEX				
CONDUCTIVITY, uS				
pH				
TOTAL ALKALINITY				
P-ALKALINITY				
TOTAL HARDNESS				
CHLORIDE				
FLUORIDE				
H ₂ S FIELD/LAB				
NITROGEN, NH ₃ -N				
NITROGEN, NO ₃ -N				
NITROGEN, TOTAL KJEL.				
OXYGEN DEMAND, CHEMICAL				
PO ₄ TOTAL FILTERABLE				
PO ₄ TOTAL NONFILTERABLE				
SILICA				
SOLIDS, TOTAL				
SOLIDS, TOTAL SUSPENDED				
SULFATE				
ALUMINUM				
ARSENIC				
BARIUM				
BERYLLIUM				
CADMIUM				
CALCIUM				
CHROMIUM, TOTAL				
COBALT				
COPPER				
IRON, FIELD/LAB				
MAGNESIUM				
MANGANESE, FIELD/LAB				
LEAD				
MERCURY				
MOLYBDENUM				
NICKEL				
POTASSIUM				
SELENIUM				
SILVER				
SODIUM				
VANADIUM				
ZINC				
COLIFORM, FECAL				
COLIFORM, TOTAL				

EXHIBIT 2.5-2 (CONTINUED). GROUND WATER QUALITY
ON PROPOSED PLANT SITE

ORLANDO UTILITIES COMMISSION WATER ANALYSIS

RESULTS IN Mg/L

CURTIS H. STANTON ENERGY CENTER
GROUNDWATER MONITORING PROGRAM

2-17-81

DATE: 2-23-81

PARAMETER	B-15	B-16	B-17	B-13	B-14
TIME SAMPLED	1:52 P	10:30 A	12:30 P	1:35 P	1:20 P
TEMPERATURE, °C	23.0	23.0	22.0		
WATER ELEVATION	3'3"	1'6"	1'8"	22"	5'5"
SATURATION INDEX	+0.02	+0.18	-0.57	above	
CONDUCTIVITY, uS	540	500	525	ground	
pH	7.15	7.45	6.71		
TOTAL ALKALINITY	270	218	218		
P-ALKALINITY	0	0	0		
TOTAL HARDNESS	275	228	230		
CHLORIDE	11.8	11.8	15.1		
FLUORIDE	0.20	0.25	0.13		
H ₂ S FIELD/LAB	0.5/-	0.3/-	0.1/-		
NITROGEN, NH ₃ -N	0.50	0.48	0.54		
NITROGEN, NO ₃ -N	0.017	<0.01	.016		
NITROGEN, TOTAL KJEL.	<0.02	0.02	0.04		
OXYGEN DEMAND, CHEMICAL	50	25	10		
PO ₄ TOTAL FILTERABLE	0.59	0.14	0.21		
PO ₄ TOTAL NONFILTERABLE	0.22	<0.01	0.01		
SILICA	13.7	22.4	14.9		
SOLIDS, TOTAL	375	316	348		
SOLIDS, TOTAL SUSPENDED	28	26	35		
SULFATE	<1.0	<1.0	<1.0		
ALUMINUM	0.5	0.8	0.8		
ARSENIC	0.005	0.006	0.006		
BARIUM	<0.1	<0.1	<0.1		
BERYLLIUM	<0.05	<0.05	<0.05		
CADMIUM	<0.001	<0.001	<0.001		
CALCIUM	106.2	89.0	88.1		
CHROMIUM, TOTAL	0.001	<0.001	<0.001		
COBALT	<0.05	<0.05	<0.05		
COPPER	<0.05	<0.05	<0.05		
IRON, FIELD/LAB	2.0/2.0	0.7/0.7	1.4/1.2		
MAGNESIUM	2.0	1.7	1.6		
MANGANESE, FIELD/LAB	<0.5/0.02	<0.5/0.02	<0.5/0.02		
LEAD	0.001	0.002	0.002		
MERCURY	<0.0005	<0.0005	<0.0005		
MOLYBDENUM	<0.2	<0.2	<0.2		
NICKEL	<0.3	<0.3	<0.3		
POTASSIUM	1.7	1.3	1.3		
SELENIUM	0.002	0.003	0.003		
SILVER	<0.001	<0.001	<0.001		
SODIUM	12.1	8.2	6.9		
VANADIUM	<0.6	<0.6	<0.6		
ZINC	<0.02	<0.02	<0.02		
COLIFORM, FECAL	ND	ND	ND		
COLIFORM, TOTAL	*-H	*-H	*-H		

(50 ml sample)

Richard A. Dunham
Richard A. Dunham, Chemist

EXHIBIT 2.5-2 (CONTINUED). GROUND WATER QUALITY
ON PROPOSED PLANT SITE

ORLANDO UTILITIES COMMISSION WATER ANALYSIS

RESULTS IN Mg/L

CURTIS H. STANTON ENERGY CENTER
GROUNDWATER MONITORING PROGRAM

DATE: 3-24-81

PARAMETER	B-1	B-2	B-5	B-9
TIME SAMPLED	9:10 A	9:45 A	10:45 A	11:30 A
TEMPERATURE, °C	22.0	22.0	22.5	22.5
WATER ELEVATION	6'10"	6'9"	3'0"	2'8"
SATURATION INDEX	-2.44	-1.32	-0.57	+3.81
CONDUCTIVITY, uS	20	25	485	75
pH	4.61	4.80	6.65	5.55
TOTAL ALKALINITY	0	0	233	16
P-ALKALINITY	0	0	0	0
TOTAL HARDNESS	6	4	251	25
FLUORIDE	5.4	6.2	22.0	12.2
FLUORIDE	<0.10	<0.10	0.18	<0.10
H ₂ S FIELD/LAB	1.0/-	0.4/-	<0.1/-	<0.1/-
NITROGEN, NH ₃ -N	0.2	0.1	0.3	0.20
NITROGEN, NO ₃ -N	<0.2	<0.2	0.3	0.2
NITROGEN, TOTAL KJEL.	0.06	0.11	0.06	0.13
OXYGEN DEMAND, CHEMICAL	<10	<10	10	33
PO ₄ TOTAL FILTERABLE	0.19	0.04	0.40	0.12
PO ₄ TOTAL NONFILTERABLE	0.02	<0.01	<0.01	0.03
SILICA	3.8	4.8	12.5	6.5
SOLIDS, TOTAL	33	24	319	212
SOLIDS, TOTAL SUSPENDED	<1	<1	12	57
SULFATE	<1.0	<1.0	<1.0	<1.0
ALUMINUM	<0.4	<0.4	<0.4	1.0
ARSENIC	<0.002	<0.002	0.004	0.007
BARIUM	<0.1	<0.1	<0.1	<0.1
BERYLLIUM	<0.05	<0.05	<0.05	<0.05
CADMIUM	<0.001	<0.001	<0.001	<0.001
CALCIUM	<1	3.2	93.0	8.0
CHROMIUM, TOTAL	<0.001	<0.001	<0.001	<0.001
COBALT	<0.05	<0.05	<0.05	<0.05
COPPER	<0.05	<0.05	<0.05	<0.05
IRON, FIELD/LAB	0.8/0.5	0.8/0.6	1.5/1.4	1.2/0.9
MAGNESIUM	0.6	0.7	3.2	1.3
MANGANESE, FIELD/LAB	<0.5/<0.02	<0.5/<0.02	<0.5/<0.02	<0.5/<0.02
LEAD	<0.001	<0.001	0.001	0.001
MERCURY	<0.0005	<0.0005	<0.0005	<0.0005
MOLYBDENUM	<0.2	<0.2	<0.2	<0.2
NICKEL	<0.3	<0.3	<0.3	<0.3
POTASSIUM	0.1	0.1	1.8	0.5
SELENIUM	<0.002	<0.002	0.002	<0.002
SILVER	<0.001	<0.001	<0.001	<0.001
SODIUM	2.2	3.1	13.0	6.2
VANADIUM	<0.6	<0.6	<0.6	<0.6
ZINC	<0.02	<0.02	<0.02	<0.02
COLIFORM, FECAL	NO GROWTH			
COLIFORM, TOTAL	-1	-1	-1	-1

Richard A. Dunham

EXHIBIT 2.5-2 (CONTINUED). GROUND WATER QUALITY
ON PROPOSED PLANT SITE

ORLANDO UTILITIES COMMISSION WATER ANALYSIS

RESULTS IN Mg/L

CURTIS H. STANTON ENERGY CENTER
GROUNDWATER MONITORING PROGRAM

DATE: 3-24-81

PARAMETER	B-13	B-14	B-15	B-16	B-17
TIME SAMPLED			2:00 P	1:15 P	12:15 P
TEMPERATURE, °C			22.5	22.5	21.5
WATER ELEVATION	above	6'4"	3'6"	1'9"	1'8"
SATURATION INDEX	ground		+0.26	+0.32	-0.82
CONDUCTIVITY, uS			450	525	450
pH			7.05	7.21	6.68
TOTAL ALKALINITY			238	271	222
P-ALKALINITY			0	0	0
TOTAL HARDNESS			252	295	236
CHLORIDE			9.2	10.5	11.8
FLUORIDE			0.29	0.23	0.17
H ₂ S FIELD/LAB			0.5/-	0.2/-	40.1/-
NITROGEN, NH ₃ -N			0.1	0.26	0.44
NITROGEN, NO ₃ -N			.03	.03	.03
NITROGEN, TOTAL KJEL.			0.28	0.03	0.02
OXYGEN DEMAND, CHEMICAL			<10	13	13
PO ₄ TOTAL FILTERABLE			0.61	0.29	0.29
PO ₄ TOTAL NONFILTERABLE			<.01	<.01	<.01
SILICA			14.8	22.5	14.0
SOLIDS, TOTAL			290	236	271
SOLIDS, TOTAL SUSPENDED			19	38	20
SULFATE			<1.0	<1.0	<1.0
ALUMINUM			0.6	0.8	0.9
ARSENIC			0.002	0.003	0.003
BARIUM			<0.1	<0.1	<0.1
BERYLLIUM			<0.05	<0.05	<0.05
CADMIUM			<0.001	<0.001	<0.001
CALCIUM			71.3	34.5	48.1
CHROMIUM, TOTAL			<0.001	<0.001	<0.001
COBALT			<0.05	<0.05	<0.05
COPPER			<0.05	<0.05	<0.05
IRON, FIELD/LAB			1.8/1.8	1.2/1.2	1.0/0.9
MAGNESIUM			2.1	3.1	2.1
MANGANESE, FIELD/LAB			<0.5/0.02	<0.5/0.02	<0.5/0.02
LEAD			0.002	0.002	0.002
MERCURY			<0.0005	<0.0005	<0.0005
MOLYBDENUM			<0.2	<0.2	<0.2
NICKEL			<0.3	<0.3	<0.3
POTASSIUM			1.2	1.5	1.3
SELENIUM			<0.002	<0.002	<0.002
SILVER			<0.001	<0.001	<0.001
SODIUM			8.1	6.9	6.6
VANADIUM			<0.6	<0.6	<0.6
ZINC			<0.02	<0.02	<0.02
COLIFORM, FECAL			NO GROWTH		
COLIFORM, TOTAL			*/H	*/H	*/H

Richard A. Dunham
Richard A. Dunham, Chemist

EXHIBIT 2.5-2 (CONTINUED). GROUND WATER QUALITY
ON PROPOSED PLANT SITE

ORLANDO UTILITIES COMMISSION WATER ANALYSIS

RESULTS IN Mg/L

CURTIS H. STANTON ENERGY CENTER
GROUNDWATER MONITORING PROGRAM

DATE: April 21, 1981

PARAMETER	B-1	B-2	B-5	B-9	B-13
TIME SAMPLED	9:53 A	11:00 A	12:10 P	12:35 P	11:45 A
TEMPERATURE, °C					
WATER ELEVATION	7'3"	6'11"	4'4"	4'0"	Ground level
SATURATION INDEX					
CONDUCTIVITY, uS					
pH					
TOTAL ALKALINITY					
P-ALKALINITY					
TOTAL HARDNESS					
CHLORIDE					
FLUORIDE					
H ₂ S FIELD/LAB					
NITROGEN, NH ₃ -N					
NITROGEN, NO ₃ -N					
NITROGEN, TOTAL KJEL.					
OXYGEN DEMAND, CHEMICAL					
PO ₄ TOTAL FILTERABLE					
PO ₄ TOTAL NONFILTERABLE					
SILICA					
SOLIDS, TOTAL					
SOLIDS, TOTAL SUSPENDED					
SULFATE					
ALUMINUM					
ARSENIC					
BARIUM					
BERYLLIUM					
CADMIUM					
CALCIUM					
CHROMIUM, TOTAL					
COBALT					
COPPER					
IRON, FIELD/LAB					
MAGNESIUM					
MANGANESE, FIELD/LAB					
LEAD					
MERCURY					
MOLYBDENUM					
NICKEL					
POTASSIUM					
SELENIUM					
SILVER					
SODIUM					
VANADIUM					
ZINC					
COLIFORM, FECAL					
COLIFORM, TOTAL					

EXHIBIT 2.5-3. SUPPLEMENTAL GROUND
WATER QUALITY ON
PROPOSED PLANT SITE

(1 OF 8)

ORLANDO UTILITIES COMMISSION WATER ANALYSIS

RESULTS IN Mg/l

CURTIS H. STANTON ENERGY CENTER
GROUNDWATER MONITORING PROGRAM

DATE: April 21, 1981

PARAMETER	B-14	B-15	B-16	B-17
TIME SAMPLED	11:52A	3:31 P	2:45 P	1:30 P
TEMPERATURE, °C		21.5°	21.5°	20.0
WATER ELEVATION	7'6"	4'11"	3'3"1	3'7"
SATURATION INDEX		-0.10	+0.08	+0.35
CONDUCTIVITY, uS		460	540	480
pH		7.10	7.18	6.82
TOTAL ALKALINITY		242	278	239
P-ALKALINITY		0	0	0
TOTAL HARDNESS		250	292	252
CHLORIDE		7.8	9.2	9.9
FLUORIDE		0.30	0.20	0.16
H ₂ S FIELD/LAB		0.3/-	0.2/-	0.1/-
NITROGEN, NH ₃ -N		0.32	0.40	0.36
NITROGEN, NO ₃ -N		.02	.05	.11
NITROGEN, TOTAL KJEL.		0.03	<0.02	0.08
OXYGEN DEMAND, CHEMICAL		20.9	20.1	22.8
PO ₄ TOTAL FILTERABLE		.67	.13	.38
PO ₄ TOTAL NONFILTERABLE		<.01	<.01	<.01
SILICA		13.1	18.9	11.7
SOLIDS, TOTAL		303	344	281
SOLIDS, TOTAL SUSPENDED		20	15	7
SULFATE		<1.0	<1.0	<1.0
ALUMINUM		<0.4	<0.4	<0.4
ARSENIC		0.003	0.003	0.003
BARIUM		<0.1	<0.1	<0.1
BERYLLIUM		<0.05	<0.05	<0.05
CADMIUM		<0.001	<0.001	0.001
CALCIUM		94.9	104.5	98.5
CHROMIUM, TOTAL		<0.001	<0.001	<0.001
COBALT		<0.05	<0.05	<0.05
COPPER		<0.05	<0.05	<0.05
IRON, FIELD/LAB		1.5/1.6	1.2/1.2	0.9/0.9
MAGNESIUM		2.0	3.0	2.3
MANGANESE, FIELD/LAB		<0.5/<0.02	<0.5/<0.02	<0.5/<0.02
LEAD		0.001	0.001	0.001
MERCURY		<0.0005	<0.0005	<0.0005
MOLYBDENUM		<0.2	<0.2	<0.2
NICKEL		<0.3	<0.3	<0.3
POTASSIUM		1.1	1.4	1.3
SELENIUM		<0.002	<0.002	<0.002
SILVER		<0.001	<0.001	<0.001
SODIUM		7.5	7.3	7.3
VANADIUM		<0.6	<0.6	<0.6
ZINC		<0.05	<0.05	<0.05
COLIFORM, FECAL		-1	-1	-1
COLIFORM, TOTAL		*,H	*,H	*,H

Richard A. Dunham, Chemist
Richard A. Dunham

EXHIBIT 2.5-3. SUPPLEMENTAL GROUND
WATER QUALITY ON
PROPOSED PLANT SITE

(2 OF 8)

ORLANDO UTILITIES COMMISSION WATER ANALYSIS

RESULTS IN Mg/L

CURTIS H. STANTON ENERGY CENTER
GROUNDWATER MONITORING PROGRAM

DATE: May 26, 1981

PARAMETER	B-1	B-2	B-5	B-9
TIME SAMPLED	8:34 A	9:07 A	10:07 A	10:51 A
TEMPERATURE, °C	21°	22°	22°	23°
WATER ELEVATION	7'9"	7'11"	4'9"	5'3"
SATURATION INDEX	+2.73	+1.0	-0.03	-3.49
CONDUCTIVITY, uS	20	20	490	50
pH	4.80	5.12	6.95	5.78
TOTAL ALKALINITY	0	4	235	21
P-ALKALINITY	0	0	0	0
TOTAL HARDNESS	3	5	247	36
CHLORIDE	3.3	4.1	20.0	11.3
FLUORIDE	<0.10	0.13	0.20	0.13
H ₂ S FIELD/LAB	0.2/-	0.7/-	0.1/-	0.2/0
NITROGEN, NH ₃ -N	0.10	0.06	0.50	0.68
NITROGEN, NO ₃ -N	.042	.038	.037	.048
NITROGEN, TOTAL KJEL.	0.28	0.24	<0.02	<0.02
OXYGEN DEMAND, CHEMICAL	<10	<10	<10	<10
PO ₄ TOTAL FILTERABLE	.06	.14	.44	.20
PO ₄ TOTAL NONFILTERABLE	.02	.02	.05	.12
SILICA	2.8	4.1	10.5	13.3
SOLIDS, TOTAL	46	32	41	207
SOLIDS, TOTAL SUSPENDED	2	<1	24	25
SULFATE	<1.0	<1.0	<1.0	<1.0
ALUMINUM	<0.4	<0.4	<0.4	<0.4
ARSENIC	<0.002	<0.002	0.003	0.004
BARIUM	<0.1	<0.1	<0.1	<0.1
BERYLLIUM	<0.05	<0.05	<0.05	<0.05
CADMIUM	<0.001	<0.001	<0.001	<0.001
CALCIUM	<5	<5	92.8	7.1
CHROMIUM, TOTAL	<0.001	<0.001	<0.001	<0.001
COBALT	<0.05	<0.05	<0.05	<0.05
COPPER	<0.05	<0.05	<0.05	<0.05
IRON, FIELD/LAB	0.4/0.23	0.7/0.40	1.5/1.2	0.9/0.56
MAGNESIUM	0.7	0.7	3.3	1.2
MANGANESE, FIELD/LAB	<0.5/0.02	<0.5/0.02	<0.5/0.02	<0.5/0.02
LEAD	0.003	0.002	0.003	0.002
MERCURY	<0.0005	<0.0005	<0.0005	<0.0005
MOLYBDENUM	<0.2	<0.2	<0.2	<0.2
NICKEL	<0.3	<0.3	<0.3	<0.3
POTASSIUM	0.1	0.1	1.7	0.4
SELENIUM	<0.002	<0.002	<0.002	<0.002
SILVER	<0.001	<0.001	<0.001	<0.001
SODIUM	2.5	3.6	14.1	7.6
VANADIUM	<0.6	<0.6	<0.6	<0.6
ZINC	<0.05	<0.05	<0.05	<0.05
COLIFORM, FECAL	no growth			
COLIFORM, TOTAL	-1	-1	-1	-1

EXHIBIT 2.5-3. SUPPLEMENTAL GROUND
WATER QUALITY ON
PROPOSED PLANT SITE

(3 OF 8)

ORLANDO UTILITIES COMMISSION WATER ANALYSIS

RESULTS IN Mg/L

CURTIS H. STANTON ENERGY CENTER
GROUNDWATER MONITORING PROGRAM

DATE: May 26, 1981

PARAMETER	B-13	B-14	B-15	B-16	B-17
TIME SAMPLED	1:31 P	1:37 P	1:05 P	12:23 P	11:36 A
TEMPERATURE, °C			22.0	23.0	21.0
WATER ELEVATION	2'0"	9'0"	6'2"	4'8"	4'8"
SATURATION INDEX			-0.20	+0.21	-0.31
CONDUCTIVITY, uS			450	525	450
pH			6.95	7.30	6.92
TOTAL ALKALINITY			241	283	234
P-ALKALINITY			0	0	0
TOTAL HARDNESS			278	296	244
CHLORIDE			6.9	7.8	10.0
FLUORIDE			0.33	0.20	0.18
H ₂ S FIELD/LAB			0.2/-	0.1/-	<0.1/-
NITROGEN, NH ₃ -N			0.30	0.20	0.48
NITROGEN, NO ₃ -N			.037	.031	.031
NITROGEN, TOTAL KJEL.			0.03	<0.02	<0.02
OXYGEN DEMAND, CHEMICAL			<10	<10	<10
PO ₄ TOTAL FILTERABLE			.74	.21	.29
PO ₄ TOTAL NONFILTERABLE			.02	.03	.03
SILICA			12.8	17.5	12.0
SOLIDS, TOTAL			313	364	309
SOLIDS, TOTAL SUSPENDED			21	19	13
SULFATE			<1.0	<1.0	<1.0
ALUMINUM			<0.4	<0.4	<0.4
ARSENIC			<0.002	0.003	<0.002
BARIUM			<0.1	<0.1	<0.1
BERYLLIUM			<0.05	<0.05	<0.05
CADMIUM			<0.001	<0.001	<0.001
CALCIUM			94.4	111.1	91.3
CHROMIUM, TOTAL			<0.001	<0.001	<0.001
COBALT			<0.05	<0.05	<0.05
COPPER			<0.05	<0.05	<0.05
IRON, FIELD/LAB			1.5/1.4	0.9/0.32	0.7/0.56
MAGNESIUM			2.0	2.8	2.1
MANGANESE, FIELD/LAB			<0.5/<0.02	<0.5/<0.02	<0.5/<0.02
LEAD			<0.001	<0.001	0.001
MERCURY			<0.0005	<0.0005	<0.0005
MOLYBDENUM			<0.2	<0.2	<0.2
NICKEL			<0.3	<0.3	<0.3
POTASSIUM			0.9	1.3	1.1
SELENIUM			<0.002	0.002	<0.002
SILVER			<0.001	<0.001	<0.001
SODIUM			9.3	8.9	9.0
VANADIUM			<0.6	<0.6	<0.6
ZINC			<0.05	<0.05	<0.05
COLIFORM, FECAL			no growth		
COLIFORM, TOTAL			-1	-1	-1

Richard A. Dunham, Chemist

Richard A. Dunham

EXHIBIT 2.5-3. SUPPLEMENTAL GROUND
WATER QUALITY ON
PROPOSED PLANT SITE

(4 OF 8)

ORLANDO UTILITIES COMMISSION WATER ANALYSIS

RESULTS IN Mg/L

CURTIS H. STANTON ENERGY CENTER
GROUNDWATER MONITORING PROGRAM

DATE: 6-23-81

PARAMETER	B-1	B-2	B-5	B-9	
TIME SAMPLED	10:20 A	10:38 A	11:15 A	11:35 A	
TEMPERATURE, °C					
WATER ELEVATION	6'11"	7'3"	4'7"	4'4"	
SATURATION INDEX					
CONDUCTIVITY, uS					
PH					
TOTAL ALKALINITY					
P-ALKALINITY					
TOTAL HARDNESS					
CHLORIDE					
FLUORIDE					
H ₂ S FIELD/LAB					
NITROGEN, NH ₃ -N					
NITROGEN, NO ₃ -N					
NITROGEN, TOTAL KJEL.					
OXYGEN DEMAND, CHEMICAL					
PO ₄ TOTAL FILTERABLE					
PO ₄ TOTAL NONFILTERABLE					
SILICA					
SOLIDS, TOTAL					
SOLIDS, TOTAL SUSPENDED					
SULFATE					
ALUMINUM					
ARSENIC					
BARIUM					
BERYLLIUM					
CADMIUM					
CALCIUM					
CHROMIUM, TOTAL					
COBALT					
COPPER					
IRON, FIELD/LAB					
MAGNESIUM					
MANGANESE, FIELD/LAB					
LEAD					
MERCURY					
MOLYBDENUM					
NICKEL					
POTASSIUM					
SELENIUM					
SILVER					
SODIUM					
VANADIUM					
ZINC					
COLIFORM, FECAL					
COLIFORM, TOTAL					

EXHIBIT 2.5-3. SUPPLEMENTAL GROUND
WATER QUALITY ON
PROPOSED PLANT SITE

(5 OF 8)

ORLANDO UTILITIES COMMISSION WATER ANALYSIS

RESULTS IN Mg/l

CURTIS H. STANTON ENERGY CENTER
GROUNDWATER MONITORING PROGRAM

DATE: 6-23-81

PARAMETER	B-13	B-14	B-15	B-16	B-17
TIME SAMPLED			2:00 P	1:15 P	12:00 P
TEMPERATURE, °C			22.0	23.0	21.0
WATER ELEVATION			4'11"	3'5"	3'6"
SATURATION INDEX			-0.03	-0.08	-0.53
CONDUCTIVITY, uS			460	530	460
pH			7.15	6.98	6.68
TOTAL ALKALINITY			240	293	235
P-ALKALINITY			0	0	0
TOTAL HARDNESS			250	255	244
CHLORIDE			12.0	6.8	9.2
FLUORIDE			0.26	0.18	0.16
H ₂ S FIELD/LAB			0.3/-	0.1/-	0.1/-
NITROGEN, NH ₃ -N			0.30	0.26	0.32
NITROGEN, NO ₃ -N			.060	.047	.043
NITROGEN, TOTAL KjEL			0.21	0.26	0.27
OXYGEN DEMAND, CHEMICAL			< 10	< 10	< 10
PO ₄ TOTAL FILTERABLE			.722	.268	.505
PO ₄ TOTAL NONFILTERABLE			< .01	< .01	< .01
SILICA			14.0	20.0	13.3
SOLIDS, TOTAL			280	351	283
SOLIDS, TOTAL SUSPENDED			2	10	6
SULFATE			< 1	< 1	< 1
ALUMINUM			< 0.4	< 0.4	< 0.4
ARSENIC			0.004	0.003	0.002
BARIUM			0.20	0.24	0.11
BERYLLIUM			< 0.05	< 0.05	< 0.05
CADMIUM			< 0.001	< 0.001	< 0.001
CALCIUM			98.6	110.6	94.6
CHROMIUM, TOTAL			< 0.001	< 0.001	< 0.001
COBALT			< 0.05	< 0.05	< 0.05
COPPER			< 0.05	< 0.05	< 0.05
IRON, FIELD/LAB			1.5/1.5	1.0/1.1	0.8/0.8
MAGNESIUM			1.5	2.5	1.8
MANGANESE, FIELD/LAB			< 0.5/< 0.02	< 0.5/< 0.02	< 0.5/< 0.02
LEAD			0.002	0.001	0.001
MERCURY			< 0.0005	< 0.0005	< 0.0005
MOLYBDENUM			< 0.2	< 0.2	< 0.2
NICKEL			< 0.3	< 0.3	< 0.3
POTASSIUM			1.0	1.4	1.3
SELENIUM			< 0.002	< 0.002	< 0.002
SILVER			< 0.001	< 0.001	< 0.001
SODIUM			9.6	9.1	9.4
VANADIUM			< 0.6	< 0.6	< 0.6
ZINC			< 0.05	< 0.05	< 0.05
COLIFORM, FECAL			Not determined		
COLIFORM, TOTAL			Not determined		

Richard A. Dunham, Chemist

EXHIBIT 2.5-3. SUPPLEMENTAL GROUND
WATER QUALITY ON
PROPOSED PLANT SITE

(6 OF 8)

ORLANDO UTILITIES COMMISSION WATER ANALYSIS

RESULTS IN Mg/L

CURTIS H. STANTON ENERGY CENTER
GROUNDWATER MONITORING PROGRAM

DATE: July 21, 1981

PARAMETER	B-1	B-2	B-5	B-9
TIME SAMPLED	9:52 A	10:51 A	11:31 A	12:23 P
TEMPERATURE, °C	21.5	21.5	21.5	22.0
WATER ELEVATION	7'5"	7'4"	5'6"	5'0"
SATURATION INDEX	+0.33	+0.32	+0.78	+3.08
CONDUCTIVITY, uS	30	30	520	100
pH	5.29	5.41	6.41	5.92
TOTAL ALKALINITY	13	10	247	31
P-ALKALINITY	0	0	0	0
TOTAL HARDNESS	5	4	250	30
CHLORIDE	5.0	12.5	16.3	15.0
FLUORIDE	<0.10	<0.10	0.14	<0.10
H ₂ S FIELD/LAB	<0.1/ -	0.2/ -	<0.1/ -	0.1/ -
NITROGEN, NH ₃ -N	<0.1	<0.1	0.44	<0.1
NITROGEN, NO ₃ -N	.025	.021	.095	.030
NITROGEN, TOTAL KJEL.	0.41	0.32	0.39	0.44
OXYGEN DEMAND, CHEMICAL	12	<10	18	34
PO ₄ TOTAL FILTERABLE	.08	.07	.30	.10
PO ₄ TOTAL NONFILTERABLE	.03	.03	.06	.07
SILICA	<0.5	<0.5	4.5	<0.5
SOLIDS, TOTAL	24	23	293	169
SOLIDS, TOTAL SUSPENDED	<1	<1	16	20
SULFATE	<1.0	<1.0	<1.0	<1.0
ALUMINUM	<0.4	<0.4	<0.4	<0.4
ARSENIC	<0.002	<0.002	0.003	0.003
BARIUM	<0.1	<0.1	<0.1	<0.1
BERYLLIUM	<0.05	<0.05	<0.05	<0.05
CADMIUM				
CALCIUM	0	0	93.6	9.5
CHROMIUM, TOTAL	<0.001	<0.001	<0.001	<0.001
COBALT	<0.05	<0.05	<0.05	<0.05
COPPER	<0.05	<0.05	<0.05	<0.05
IRON, FIELD/LAB	0.5/0.4	0.5/0.4	1.3/1.2	0.8/0.6
MAGNESIUM	0.7	0.7	1.2	0.6
MANGANESE, FIELD/LAB	<0.5/<0.02	<0.5/<0.02	<0.5/<0.02	<0.5/<0.02
LEAD	0.001	0.001	0.001	0.002
MERCURY	<0.0005	<0.0005	<0.0005	<0.0005
MOLYBDENUM	<0.2	<0.2	<0.2	<0.2
NICKEL	<0.3	<0.3	<0.3	<0.3
POTASSIUM	0.2	0.2	1.6	0.5
SELENIUM	<0.002	<0.002	0.002	0.002
SILVER	<0.001	<0.001	<0.001	<0.001
SODIUM	2.7	3.7	15.7	8.3
VANADIUM	<0.6	<0.6	<0.6	<0.6
ZINC	<0.05	<0.05	<0.05	<0.05
COLIFORM, FECAL	NO GROWTH			
COLIFORM, TOTAL	*-H	*-H	*-H	*-H

Richard A. Dunham
Richard A. Dunham, Chemist

EXHIBIT 2.5-3. SUPPLEMENTAL GROUND
WATER QUALITY ON
PROPOSED PLANT SITE

(7 OF 8)

ORLANDO UTILITIES COMMISSION WATER ANALYSIS

RESULTS IN Mg/L

CURTIS H. STANTON ENERGY CENTER
GROUNDWATER MONITORING PROGRAM

DATE: July 21, 1981

PARAMETER	B-15	B-16	B-17		
TIME SAMPLED		1:45 P	1:01 P		
TEMPERATURE, °C		22.0	21.0		
WATER ELEVATION	6'1"	4'6"	4'4"		
SATURATION INDEX	WOULD	+0.25	+0.49		
CONDUCTIVITY, uS	NOT	625	525		
pH	PUMP	6.75	6.70		
TOTAL ALKALINITY		306	250		
P-ALKALINITY		0	0		
TOTAL HARDNESS		305	254		
CHLORIDE		14.5	22.5		
FLUORIDE		0.13	0.12		
H ₂ S FIELD/LAB		0.1/-	0.1/-		
NITROGEN, NH ₃ -N		0.28	0.24		
NITROGEN, NO ₃ -N		.054	.080		
NITROGEN, TOTAL KjEL.		0.33	0.32		
OXYGEN DEMAND, CHEMICAL		10	10		
PO ₄ TOTAL FILTERABLE		.26	.27		
PO ₄ TOTAL NONFILTERABLE		.07	.06		
SILICA		11.8	6.3		
SOLIDS, TOTAL		328	293		
SOLIDS, TOTAL SUSPENDED		21	7		
SULFATE		1.0	1.0		
ALUMINUM		0.4	0.4		
ARSENIC		0.002	0.002		
BARIUM		0.2	0.1		
BERYLLIUM		0.05	0.05		
CADMIUM		0.001	0.001		
CALCIUM		119.0	96.0		
CHROMIUM, TOTAL		0.001	0.001		
COBALT		0.05	0.05		
COPPER		0.05	0.05		
IRON, FIELD/LAB		1.0/0.9	0.7/0.6		
MAGNESIUM		2.5	1.9		
MANGANESE, FIELD/LAB		0.5/0.02	0.5/0.02		
LEAD		0.001	0.001		
MERCURY		0.0005	0.0005		
MOLYBDENUM		0.2	0.2		
NICKEL		0.3	0.3		
POTASSIUM		1.4	1.3		
SELENIUM		0.002	0.002		
SILVER		0.001	0.001		
SODIUM		8.6	8.9		
VANADIUM		0.6	0.6		
ZINC		0.05	0.05		
COLIFORM, FECAL		NO GROWTH			
COLIFORM, TOTAL		*-H	*-H		

Richard A. Dunham
Richard A. Dunham, Chemist

EXHIBIT 2.5-3. SUPPLEMENTAL GROUND
WATER QUALITY ON
PROPOSED PLANT SITE

(8 OF 8)

2.6 METEOROLOGY

2.6.1 General Climate

The prevailing subtropical marine climate of the central Florida region results from the influence of the Atlantic Ocean and the Bermuda high pressure system. Long, warm, humid summers and short, mild winters prevail. Because of the southerly location and marine influences, this area has a notably equable climate, evidenced by small annual and diurnal temperature variations. Rainfall is moderate to heavy during the summer and light during the winter. Well developed extratropical migratory high and low pressure centers usually travel north of the region.

Winds are of moderate speed, and blow from the southeast to southwest during the warmer half of the year (May through October). During the cooler months, the predominant directions are north and north-northeast. Along the coastal areas of east central Florida, local land-sea breeze circulations modify regional wind patterns by superimposing an easterly wind component during the daytime hours and a westerly component at night.

The average annual rainfall in this region is over 51 inches. Summer precipitation due to frequent afternoon thundershowers exceeds winter precipitation due to frontal systems, pre-frontal squall lines, and wave disturbances along fronts stalled over the Florida peninsula. Summer precipitation is mostly of the convective types, resulting in frequent summertime afternoon thundershowers in this region. Tropical disturbances periodically cause significant precipitation during the summer and fall seasons.

Extremely hot weather is rare because of the ocean influence; maximum temperatures over a summer usually do not exceed the middle 90's. Winter temperatures are mild, interrupted only a few times per season by northerly or northwesterly advection of polar air. Inland locations generally display a greater range of temperatures due to the rapid heating and cooling of ground surfaces as compared with water bodies.

The dispersion characteristics of the region are generally good because of sea breeze circulations, good ventilation, and flat terrain. This is

especially true for coastal areas due to higher wind speeds and infrequent ground level inversions.

2.6.2 Site Climatology

Weather patterns for locations not directly on the coastline are generally similar throughout central Florida. There are no existing local meteorological data with long periods of record for the immediate area of the Stanton Energy Center site. However, the Stanton Energy Center site is approximately 10 miles east-northeast of the Orlando/McCoy International (Jetport) Airport and 10 miles east-southeast of Herndon Field. The official National Weather Service (NWS) weather station was moved from Herndon Field to Orlando/McCoy Jetport on January 31, 1974. Thus, the long term meteorological data base has data from both locations. The meteorological data for these two NWS stations are considered representative of the Stanton Energy Center site and are used to describe the local site climatology. Lisbon, Florida is the closest location which has evaporation data that were considered representative of the Stanton Energy Center. Lisbon is approximately 40 miles northwest of the proposed site area.

Meteorological measurements are currently being made as part of the onsite air monitoring program. This program began on May 1, 1980. Wind speed, dry-bulb temperature, and humidity data have been collected and reduced for the period from May 1, 1980 to April 30, 1981; however, the wind direction and precipitation instruments were out of service for several months due to a series of problems that developed after a direct lightning strike on September 9, 1980. Because of the short period (i.e., one year) covered by the onsite data, primary emphasis for the characterization of the site area climate is placed on the NWS data from Orlando. However, onsite data are included for comparison in some discussions within this section.

2.6.2.1 Temperature and Humidity. Table 2.6-1 presents average monthly dry-bulb and wet-bulb temperatures for a 19-year period(1) as well as the 30-year dry-bulb temperature normals and extremes(2) for Orlando, Florida. For comparison, the temperature data from the onsite air monitoring program

have also been included. Typically, the maximum temperatures for the Orlando area exceed 90 F about two days in three during the summer months. The hottest month is August with an average temperature of 81.8 F. The extreme highest temperature for the period from 1941 to 1979 was 102 F. January is the coldest month with an average temperature of 60.3 F. Average monthly wet-bulb temperatures range from 74.8 F in August to 53.8 F in January. The 1 per cent wet-bulb temperature is defined as the temperature which is only exceeded 1 per cent of the time and similarly, the 5 per cent wet-bulb temperature is exceeded 5 per cent of the time. The 1 per cent and 5 per cent wet-bulb temperatures for the Stanton Energy Center site, based on the average summer season (June through September), are 79 F and 78 F, respectively.(3) The 1 per cent and 5 per cent dry-bulb temperatures are 93 F and 90 F, respectively.(3)

The atmosphere in central Florida is moist, with an average relative humidity of about 75 per cent. Table 2.6-2 presents monthly and annual averages of relative humidity observed at the Orlando NWS station for the hours 0100, 0700, 1300, and 1900 local time.(4) Although not directly comparable, the average monthly relative humidity data from the onsite monitoring program have been included. The mean number of days per month with heavy fog (visibility less than 1/4 mile) are also included.(4) Relative humidities are generally highest during the early morning hours, typically ranging between 80 and 90 per cent, compared to about 50 or 60 per cent during the afternoon. Mean relative humidities tend to be lowest in the spring months and highest in the summer months; however, the seasonal differences are small.

2.6.2.2 Precipitation and Evaporation. Average monthly precipitation totals for Orlando are shown on Table 2.6-3(4) and in Figure 2.6-1. The average number of days with thunderstorm occurrences and measurable precipitation are also included.(4) Annual precipitation averages 51.21 inches with the majority of the precipitation falling during thunderstorms in June through September. Thunderstorms occur almost every afternoon during the summer but only last an hour or two.

Weather conditions have been dry over much of Florida during the past year. Precipitation totals during the first year of operation of the onsite measurement program were significantly less than normal values. Rainfall at the Orlando NWS station during the period May 1, 1980 through March 31, 1981 (April data were not yet available) was 37.96 inches, more than 10 inches below the normal amount for the same 11-month period.

1

2.6-3a

Amendment 1
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Table 2.6-4 shows the maximum 24-hour precipitation amounts for return periods of 2, 5, 10, 25, 50, and 100 years for the site area. These vary from 4.80 inches for a two-year return period to 10.90 inches for a 100-year return period.(5) Mean annual gross lake evaporation is estimated to be 47 inches based on the period 1946 through 1955.(6) Table 2.6-5 presents an estimated monthly distribution of evaporation data for Lisbon, Florida. This distribution is considered representative of the Stanton Energy Center Site.

2.6.2.3 Wind, Stability, and Dispersion Characteristics. Seasonal and annual wind roses for the period 1948 to 1978 at Orlando are presented in Figures 2.6-2 through 2.6-6. These wind roses are considered appropriate in describing the general wind flow at the Stanton Energy Center site. Predominant wind directions are southerly and easterly in the summer and northerly during the winter. Mean wind speeds for each direction are shown on the wind roses. For regional comparison, the monthly and annual prevailing wind patterns for various Florida National Weather Service locations are presented in Figures 2.6-7 and 2.6-8.(7)

A general comparison was made of the meteorological data collected during the onsite ambient air monitoring period and data for the same period from the National Weather Service office at Orlando. Various equipment problems limited the onsite wind data collection to the periods May 1 through September 8, 1980 and January 25 through April 30, 1981. The onsite equipment problems are summarized in Subsection 2.8.2.1.

The onsite wind data for May 1 through September 8, 1980 and January 25 through April 30, 1981 and Orlando data for the same periods except for April (not yet available) are presented in Figures 2.6-9 and 2.6-10, respectively. The two wind roses have general similarities. The onsite wind rose and the Orlando wind rose show a high occurrence of westerly and easterly wind directions. The directions with the higher average wind speeds are west, west-northwest, and east for the onsite location and west and west-southwest for Orlando. The occurrence of calm winds for the onsite and Orlando data is 5.0 and 4.4 per cent, respectively. The data similarities are expected since the two locations are only 10 miles apart

and there are no complex topographic features in between. Differences in the data can be attributed to the fact that the Orlando wind rose consists of data collected at 3-hour intervals while the onsite wind rose is developed using hourly averages.

Atmospheric Dispersion

Atmospheric dispersion depends primarily on four meteorological parameters, as follows.

- (1) Mixing height.
- (2) Wind speed within the mixed layer.
- (3) Frequency of low level inversions.
- (4) Atmospheric stability.

Holzworth has estimated mean mixing depths and average wind speed within the mixed layer for 62 National Weather Service radiosonde stations within the 48 contiguous states.(8) The morning and afternoon mixing depths are calculated from the twice daily vertical temperature profiles and the morning and afternoon surface temperatures. Below this level, relatively vigorous mixing occurs. Diffusion above this height is inhibited due to thermal buoyancy considerations. The worst dispersion conditions occur when both the mixing depth and wind speed are low. In general, Florida has the best atmospheric dispersion conditions of any area in the 48 contiguous states. The area typically has greater mixing depths and higher wind speeds than other areas. Table 2.6-6 presents values of seasonal and annual morning and afternoon mixing depths and wind speed for the central Florida region.

Hosler has determined the frequency of inversions with bases below 500 feet for National Weather Service upper air stations in the contiguous United States.(9) Table 2.6-5 lists inversion frequency data for central Florida as interpolated from Hosler's work.

Atmospheric stability, in conjunction with general wind patterns, indicates the potential of the atmosphere to disperse airborne pollutants. Atmospheric conditions are typically categorized as unstable, neutral, or stable. An unstable atmosphere is one in which rapid diffusion takes place

in both the horizontal and vertical direction. Viewed in terms of changes in temperature with height, an unstable atmosphere is characterized by a sharp decrease in temperature with height. Neutral conditions are common in the atmosphere and are associated with moderate diffusion rates. Temperatures also decrease with height in a neutral atmosphere but not as rapidly as under unstable conditions (in accordance with the adiabatic lapse rate). A stable atmosphere is characterized by slight decreases, or even increases of temperature with height, and greatly reduced diffusion rates in comparison with unstable or neutral atmospheres.

The stability classifications presented in this section are based on the well-known Turner or STAR method, which assigns a stability on the basis of surface wind speed, cloud cover, and solar altitude. The joint frequency distribution wind speed, wind direction, and stability for 1970 at Orlando is summarized in Table 2.6-8.(10)

For general comparison, stabilities were determined for the limited onsite data (May 1 through September 8, 1980 and January 25 through April 30, 1981). The onsite stability classifications are based on a method which utilizes wind direction fluctuations (σ_θ) as described in the Nuclear Regulatory Commission (NRC) Regulatory Guide 1.23.(11) A joint frequency distribution of wind speed, wind direction, and stability derived from the data measured onsite is presented in Table 2.6-9.

2.6.2.4 Severe Weather.

Thunderstorms and Hail

Thunderstorms normally occur every month. Based on a 35-year period of observation at Orlando, thunderstorms can be expected to occur on about 82 days a year in the vicinity of the site. About 90 per cent of this thunderstorm activity occurs in the warmest six months of the year and is usually associated with summertime land mass heating and low level convergence of moist air by sea-breeze effects. Also, thunderstorms are produced by tropical storms as they approach the Florida coast.

Hail is occasionally present during thunderstorms but is not considered a significant hazard. There were only 14 reports of hail 3/4 inch or greater in diameter in the 1-degree longitude-latitude square containing the Stanton Energy Center site during the period 1955 through 1967.(12)

Windstorms

Strong, gusty surface winds often occur in association with severe thunderstorm activity, well-developed cold fronts, and tropical cyclones. Winds in excess of 40 mph have been recorded in every month of the year at Orlando. The fastest mile of wind on record at Orlando is 64 mph.(7)

2.6.3 References

- (1) United States Air Force, Air Weather Service, Revised Uniform Summary of Surface Weather Observations Parts A-F, Orlando, Florida/McCoy AFB, National Climatic Center, Asheville, North Carolina, October 1968.
- (2) United States Department of Commerce, Monthly Normals of Temperature, Precipitation, and Cooling Degree Days 1941-1970, Comparative Climatic Data through 1977, National Climatic Center, Asheville, North Carolina, May 1978.
- (3) The Marley Company, Cooling Tower Fundamentals and Application Principles, Kansas City, Missouri, 1967, 74 pp.
- (4) United States Department of Commerce, Local Climatological Data 1979 Orlando, Florida, Annual Summary With Comparative Data, National Climatic Center, Asheville, North Carolina.
- (5) United States Weather Bureau, Rainfall Frequency Atlas of the United States for Durations from 30 Minutes to 24-Hour and Return Periods from 1 to 100 Years, Technical Paper No. 40, Washington, D.C., May 1961, 71 pp.
- (6) United States Department of Commerce NOAA, Climatic Atlas of the United States, National Climatic Center, Asheville, North Carolina, June 1968, 1974, 80 pp.
- (7) James T. Bradley, "The Climate of Florida," in Climates of the States, U.S. Department of Commerce, Washington, D.C., 1974, pp. 45-70.
- (8) George C. Holzworth, Mixing Heights, Wind Speeds, and Potential for Urban Air Pollution Throughout the Contiguous United States, Publication No. AP-101, USEPA, Office of Air Programs, Research Triangle Park, NC, January 1972.
- (9) Charles R. Hosler, Low-Level Inversion Frequency in the Contiguous United States, Monthly Weather Review, 319-339, September 1961.

- (10) United States Department of Commerce, Wind Distribution by Pasquill Stability Classes(5)-STAR Program, Orlando/McCoy, Florida, Station 12815, 1970.
- (11) U.S. Atomic Energy Commission, "Onsite Meteorological Programs," Safety Guide 1.23, USAEC, Washington, D.C., February 1972.
- (12) Environmental Science Services Administration, "Severe-Local Storm Occurrence, 1955-1967," Technical Memorandum WBTM FCST 12, United States Department of Commerce, Silver Springs, Maryland, September 1969.

DIRECTIONS FOR INSERTING AMENDMENT 6, NOVEMBER 30, 1984

Remove

Insert

Volume I

No Changes

Volume II

Figure 3.10-1

Figure 3.10-1

Volume III

No Changes

Amendment 6
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TABLE 2.6-1. MONTHLY TEMPERATURES FOR THE ORLANDO, FLORIDA AREA

Month	NWS 30-Year "Normal" Data*			Onsite Mean** Dry-Bulb	NWS Mean*** Dry-Bulb	NWS Mean*** Wet-Bulb
	Normal F	Highest F	Lowest F			
January	60.3	87	20	50.7	58.8	53.8
February	61.5	90	28	61.5	62.0	56.5
March	65.9	92	31	62.4	65.9	59.5
April	71.3	96	39	72.0	71.1	63.7
May	76.4	102	49	73.6	75.7	68.1
June	80.2	100	60	77.2	78.8	72.6
July	81.4	100	66	79.9	79.9	74.2
August	81.8	99	64	79.3	79.9	74.8
September	80.1	97	56	81.3	78.6	73.5
October	74.3	95	43	73.2	72.6	67.0
November	66.6	89	29	65.5	66.0	60.5
December	61.3	90	20	58.5	59.6	54.7
Annual	71.8	102	20	69.6	70.9	65.1
1 Per Cent	--	--	--	--	93	79
5 Per Cent	--	--	--	--	90	78

*Based on the years 1941-1970.

**Based on the period May 1, 1980 - April 30, 1981.

***Based on the years 1944-1946, 1952-1967.

TABLE 2.6-2. MEAN RELATIVE HUMIDITY AND OCCURRENCES OF HEAVY FOG*

Month	Relative Humidity, Per Cent NWS Orlando Hourly Average**				Onsite Monthly Average***	Mean Number of Days With Heavy Fog**
	Local Time					
	0100	0700	1300	1900		
January	85	88	57	69	51.6	6
February	81	85	52	62	57.6	3
March	83	86	50	60	48.9	3
April	82	87	46	57	55.9	1
May	84	87	49	62	63.3	2
June	87	88	57	71	64.8	1
July	88	89	59	74	67.7	1
August	90	91	60	77	M	1
September	89	90	60	76	M	1
October	85	86	56	73	62.2	2
November	84	87	54	70	61.9	3
December	85	86	56	71	60.9	5
Annual	85	88	54	69	59.5	29

*Defined as visibility 1/4 mile or less.

**Based on the years 1941-1970.

***Based on the period May 1, 1980 - April 30, 1981.

NOTE: M = Missing monitoring data.

TABLE 2.6-3. MONTHLY AVERAGED PRECIPITATION FOR ORLANDO, FLORIDA*

<u>Month</u>	<u>Precipitation Total inches</u>	<u>Thunderstorms no. of days</u>	<u>Precipitation 0.01 Inch or More no. of days</u>
January	2.28	1	6
February	2.95	1	7
March	3.46	3	8
April	2.72	3	5
May	2.94	8	9
June	7.11	14	14
July	8.29	20	18
August	6.73	17	16
September	7.20	10	14
October	4.07	3	9
November	1.56	1	5
December	1.90	1	6
Annual	51.21	82	116

*Based on the years 1941-1970.

TABLE 2.6-4. MAXIMUM 24-HOUR PRECIPITATION AMOUNTS FOR SELECTED RETURN PERIODS

<u>Return Period</u> years	<u>Precipitation</u> inches
2	4.80
5	6.50
10	7.50
25	8.50
50	9.60
100	10.80

TABLE 2.6-5. AVERAGE MONTHLY SHALLOW LAKE EVAPORATION AT LISBON STATION, FLORIDA*

<u>Month</u>	<u>Monthly Evaporation, inches</u>
January	2.51
February	2.43
March	3.89
April	4.86
May	5.40
June	5.07
July	5.36
August	5.36
September	3.88
October	3.82
November	2.57
December	<u>1.85</u>
Annual	47.00

*Derived from 20-year annual average and distributed based on 1960 monthly evaporation data.

TABLE 2.6-6. MIXING DEPTHS AND AVERAGE WIND SPEEDS THROUGH THE MIXED LAYER

<u>Season</u>	<u>Morning</u>		<u>Afternoon</u>	
	<u>Mixed Depth</u> feet	<u>Wind Speed</u> mph	<u>Mixed Depth</u> feet	<u>Wind Speed</u> mph
Winter	1,804	13.4	3,609	15.7
Spring	2,133	12.3	4,921	15.7
Summer	2,297	11.2	5,249	12.3
Fall	1,640	13.4	4,593	14.6
Annual	1,968	13.4	4,593	14.6

TABLE 2.6-7. INVERSION FREQUENCY IN CENTRAL FLORIDA

<u>Season</u>	<u>Per Cent of Total Hours</u>	<u>Per Cent of Days With Inversion Occuring</u>
Winter	37	70
Spring	30	62
Summer	25	60
Fall	40	75
Annual	33	65

TABLE 2.6-8. FREQUENCY DISTRIBUTION OF WIND SPEED, WIND DIRECTION, AND STABILITY (ORLANDO/McCOY, FLORIDA 1970)

Direction	Speed (Knots)						Average Speed	Total
	1-3	4-6	7-10	11-16	17-21	Greater Than 21		
N	9	8	0	0	0	0	3.5	17
NNE	2	3	0	0	0	0	3.4	5
NE	0	2	0	0	0	0	4.5	2
ENE	5	3	0	0	0	0	3.3	8
E	3	9	0	0	0	0	3.9	12
ESE	5	10	0	0	0	0	3.9	15
SE	4	9	0	0	0	0	3.7	13
SSE	5	9	0	0	0	0	3.7	14
S	12	12	0	0	0	0	3.5	24
SSW	10	11	0	0	0	0	3.5	21
SW	3	2	0	0	0	0	3.4	5
WSW	6	5	0	0	0	0	3.6	11
W	5	6	0	0	0	0	3.6	11
WNW	2	4	0	0	0	0	3.8	6
NW	4	1	0	0	0	0	3.2	5
NNW	6	7	0	0	0	0	3.6	13
Average Speed	2.6	4.4	0.0	0.0	0.0	0.0	2.8	
Total	81	101	0	0	0	0		

Number of Occurrences of A Stability = 236

Number of Calms with A Stability = 54

TABLE 2.6-8 (Continued). FREQUENCY DISTRIBUTION OF WIND SPEED, WIND DIRECTION, AND STABILITY
(ORLANDO/McCOY, FLORIDA 1970)

Direction	Speed (Knots)						Average Speed	Total
	1-3	4-6	7-10	11-16	17-21	Greater Than 21		
N	33	46	20	0	0	0	4.7	99
NNE	17	18	10	0	0	0	4.6	45
NE	15	8	6	0	0	0	4.1	29
ENE	35	16	16	0	0	0	4.3	67
E	20	31	34	0	0	0	5.5	85
ESE	22	25	25	0	0	0	5.2	72
SE	9	19	12	0	0	0	5.3	40
SSE	16	16	8	0	0	0	4.6	40
S	21	31	22	0	0	0	5.1	74
SSW	15	31	19	0	0	0	5.2	65
SW	9	15	9	0	0	0	5.1	33
WSW	8	20	16	0	0	0	5.6	44
W	23	21	16	0	0	0	4.8	60
WNW	16	10	7	0	0	0	4.3	33
NW	15	12	4	0	0	0	4.2	31
NNW	15	17	10	0	0	0	4.7	42
Average Speed	2.5	5.2	7.4	0.0	0.0	0.0	4.4	
Total	289	336	234	0	0	0		

Number of Occurrences of B Stability = 964

Number of Calms with B Stability = 105

TABLE 2.6-8 (Continued). FREQUENCY DISTRIBUTION OF WIND SPEED, WIND DIRECTION, AND STABILITY
(ORLANDO/MCCOY, FLORIDA 1970)

Direction	Speed (Knots)						Average Speed	Total
	1-3	4-6	7-10	11-16	17-21	Greater Than 21		
N	33	46	20	0	0	0	4.7	99
NNE	17	18	10	0	0	0	4.6	45
NE	15	8	6	0	0	0	4.1	29
ENE	35	16	16	0	0	0	4.3	67
E	20	31	34	0	0	0	5.5	85
ESE	22	25	25	0	0	0	5.2	72
SE	9	19	12	0	0	0	5.3	40
SSE	16	16	8	0	0	0	4.6	40
S	21	31	22	0	0	0	5.1	74
SSW	15	31	19	0	0	0	5.2	65
SW	9	15	9	0	0	0	5.1	33
WSW	8	20	16	0	0	0	5.6	44
W	23	21	16	0	0	0	4.8	60
WNW	16	10	7	0	0	0	4.3	33
NW	15	12	4	0	0	0	4.2	31
NNW	15	17	10	0	0	0	4.7	42
Average Speed	2.5	5.2	7.4	0.0	0.0	0.0	4.4	
Total	289	336	234	0	0	0		

Number of Occurrences of B Stability = 964

Number of Calms with B Stability = 105

TABLE 2.6-8 (Continued). FREQUENCY DISTRIBUTION OF WIND SPEED, WIND DIRECTION, AND STABILITY
(ORLANDO/McCOY, FLORIDA 1970)

Direction	Speed (Knots)						Average Speed	Total
	1-3	4-6	7-10	11-16	17-21	Greater Than 21		
N	10	32	63	5	0	0	7.1	110
NNE	5	23	37	0	0	0	6.9	65
NE	4	18	21	3	0	0	6.6	46
ENE	7	40	57	6	0	0	7.1	110
E	9	37	120	14	0	0	7.8	180
ESE	7	23	64	3	0	0	7.5	97
SE	4	14	32	1	0	0	7.3	51
SSE	5	15	15	2	0	0	6.6	37
S	4	33	38	3	0	0	7.0	78
SSW	5	35	44	6	0	0	7.1	90
SW	4	12	21	3	1	0	7.6	41
WSW	4	13	25	1	0	0	7.0	43
W	2	23	45	6	0	0	7.6	76
WNW	2	11	20	1	0	0	7.2	34
NW	0	7	27	1	0	0	7.7	35
NNW	4	22	37	2	0	0	7.2	65
Average Speed	2.5	5.1	8.6	11.6	18.0	0.0	6.8	
Total	76	358	666	57	1	0		

Number of Occurrences of C Stability = 1,227

Number of Calms with C Stability = 69

TABLE 2.6-8 (Continued). FREQUENCY DISTRIBUTION OF WIND SPEED, WIND DIRECTION, AND STABILITY
(ORLANDO/McCOY, FLORIDA 1970)

Direction	Speed (Knots)						Average Speed	Total
	1-3	4-6	7-10	11-16	17-21	Greater Than 21		
N	10	32	122	105	4	0	9.8	273
NNE	5	27	63	43	0	0	9.0	138
NE	6	18	33	20	0	0	8.5	77
ENE	5	34	60	36	0	0	8.5	135
E	6	41	97	50	0	0	8.7	194
ESE	4	26	82	35	0	0	8.8	147
SE	4	21	43	26	1	0	8.6	95
SSE	5	15	35	24	2	1	9.0	82
S	7	32	73	65	11	2	10.0	190
SSW	4	20	33	38	2	0	9.4	97
SW	4	15	36	28	1	0	9.4	84
WSW	8	19	46	28	4	0	9.0	105
W	6	34	64	67	6	0	9.8	177
WNW	5	21	35	55	5	0	10.3	121
NW	8	13	31	24	5	0	9.5	81
NNW	2	15	34	58	4	0	10.7	113
Average Speed	2.6	5.1	8.7	12.8	18.2	28.7	9.1	
Total	89	383	887	702	45	3		

Number of Occurrences of D Stability = 2,179

Number of Calms with D Stability = 70

TABLE 2.6-8 (Continued). FREQUENCY DISTRIBUTION OF WIND SPEED, WIND DIRECTION, AND STABILITY
(ORLANDO/MCCOY, FLORIDA 1970)

Direction	Speed (Knots)					Greater Than 21	Average Speed	Total
	1-3	4-6	7-10	11-16	17-21			
N	92	126	77	0	0	0	5.0	295
NNE	112	78	20	0	0	0	3.8	210
NE	106	76	14	0	0	0	3.6	196
ENE	131	91	5	0	0	0	3.4	227
E	139	113	20	0	0	0	3.8	272
ESE	81	72	21	0	0	0	4.0	174
SE	53	61	14	0	0	0	4.2	128
SSE	55	58	8	0	0	0	3.8	121
S	102	76	18	0	0	0	3.7	196
SSW	38	43	8	0	0	0	4.0	89
SW	27	56	3	0	0	0	4.1	86
WSW	38	39	6	0	0	0	3.8	83
W	68	94	17	0	0	0	4.2	179
WNW	45	42	17	0	0	0	4.3	104
NW	32	43	20	0	0	0	4.8	95
NNW	19	22	30	0	0	0	5.8	71
Average Speed	2.4	4.7	8.1	0.0	0.0	0.0	2.5	
Total	1,138	1,090	298	0	0	0		
Number of Occurrences of E Stability = 4,141								
Number of Calms with E Stability = 1,615								

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TABLE 2.6-9. FREQUENCY DISTRIBUTION OF WIND SPEED, WIND DIRECTION, AND STABILITY (ONSITE DATA MAY 1 - SEPTEMBER 8, 1980 AND JANUARY 25 - APRIL 30, 1981)

Direction	Speed (Knots)						Average Speed	Total
	1-3	4-6	7-10	11-16	17-21	Greater Than 21		
N	36	26	13	1	0	0	4.0	76
NNE	17	14	0	0	0	0	2.9	31
NE	15	7	0	0	0	0	2.6	22
ENE	10	6	0	0	0	0	2.8	16
E	14	10	0	0	0	0	2.7	24
ESE	13	9	0	0	0	0	2.8	22
SE	24	8	0	0	0	0	2.6	32
SSE	17	11	0	0	0	0	2.9	28
S	16	12	0	0	0	0	2.9	28
SSW	8	9	0	0	0	0	3.6	17
SW	15	8	1	0	0	0	3.2	24
WSW	20	9	0	0	0	0	2.9	29
W	16	14	0	0	0	0	3.1	30
WNW	16	9	1	0	0	0	3.3	26
NW	11	9	0	0	0	0	3.0	20
NNW	21	16	5	0	0	0	3.6	42
Total	269	177	20	1	0	0		

Number of Occurrences of A Stability = 519

Number of Calms with A Stability = 52

TABLE 2.6-9 (Continued). FREQUENCY DISTRIBUTION OF WIND SPEED, WIND DIRECTION, AND STABILITY
(ONSITE DATA MAY 1 - SEPTEMBER 8, 1980 AND JANUARY 25 - APRIL 30, 1981)

Direction	Speed (Knots)						Average Speed	Total
	1-3	4-6	7-10	11-16	17-21	Greater Than 21		
N	18	29	34	6	0	0	5.9	87
NNE	10	12	12	0	0	0	5.0	34
NE	8	11	3	0	0	0	4.1	22
ENE	9	15	5	0	0	0	4.4	29
E	12	9	8	0	0	0	3.9	29
ESE	10	13	3	0	0	0	4.1	26
SE	10	15	8	0	0	0	4.4	33
SSE	7	12	1	0	0	0	3.8	20
S	3	10	0	0	0	0	4.4	13
SSW	12	8	4	0	0	0	3.8	24
SW	12	11	3	0	0	0	3.8	26
WSW	12	23	6	0	0	0	4.4	41
W	8	11	8	0	0	0	4.4	27
WNW	9	7	6	0	0	0	4.2	22
NW	7	7	4	0	0	0	3.9	18
NNW	21	12	23	0	0	0	5.0	56
Total	168	205	128	6	0	0		

Number of Occurrences of B Stability = 536

Number of Calms with B Stability = 29

TABLE 2.6-9 (Continued). FREQUENCY DISTRIBUTION OF WIND SPEED, WIND DIRECTION, AND STABILITY
(ONSITE DATA MAY 1 - SEPTEMBER 8, 1980 AND JANUARY 25 - APRIL 30, 1981)

Direction	Speed (Knots)						Average Speed	Total
	1-3	4-6	7-10	11-16	17-21	Greater Than 21		
N	41	21	7	5	0	0	4.0	74
NNE	17	13	13	6	0	0	5.5	49
NE	18	18	35	1	0	0	5.9	72
ENE	17	21	59	13	0	0	6.9	110
E	26	36	118	14	0	0	6.9	194
ESE	21	41	75	8	0	0	6.5	145
SE	18	27	37	7	0	0	6.2	89
SSE	25	16	15	0	0	0	4.4	56
S	18	12	13	5	0	0	5.3	48
SSW	25	27	28	9	0	0	5.9	89
SW	39	51	35	8	1	0	5.3	134
WSW	29	37	43	5	2	0	5.8	116
W	21	24	55	30	3	0	7.8	133
WNW	14	12	37	18	1	0	7.5	82
NW	16	12	23	2	0	0	5.4	53
NNW	37	29	24	3	0	0	4.6	93
Total	382	397	617	134	7	0		

Number of Occurrences of C Stability = 1,612

Number of Calms with C Stability = 75

TABLE 2.6-9 (Continued). FREQUENCY DISTRIBUTION OF WIND SPEED, WIND DIRECTION, AND STABILITY
(ONSITE DATA MAY 1 - SEPTEMBER 8, 1980 AND JANUARY 25 - APRIL 30, 1981)

Direction	Speed (Knots)						Average Speed	Total
	1-3	4-6	7-10	11-16	17-21	Greater Than 21		
N	64	5	0	1	0	0	2.1	70
NNE	50	10	76	12	0	0	4.5	88
NE	52	30	41	21	0	0	5.9	144
ENE	81	62	38	10	0	0	4.7	191
E	55	39	27	1	0	0	4.2	122
ESE	48	41	25	0	0	0	4.3	114
SE	65	39	18	0	0	0	3.8	122
SSE	76	21	15	6	0	0	3.7	118
S	74	19	8	8	1	0	3.8	110
SSW	83	17	1	1	0	0	2.6	102
SW	113	30	0	0	0	0	2.7	143
WSW	87	63	19	4	0	0	3.9	173
W	54	66	42	16	2	0	5.5	180
WNW	36	25	48	7	1	0	5.8	117
NW	70	37	10	4	0	0	3.6	121
NNW	59	25	21	2	0	0	3.8	107
Total	1,067	529	329	93	4	0		

Number of Occurrences of D Stability = 2,077

Number of Calms with D Stability = 55

TABLE 2.6-9 (Continued). FREQUENCY DISTRIBUTION OF WIND SPEED, WIND DIRECTION, AND STABILITY
(ONSITE DATA MAY 1 - SEPTEMBER 8, 1980 AND JANUARY 25 - APRIL 30, 1981)

Direction	Speed (Knots)						Average Speed	Total
	1-3	4-6	7-10	11-16	17-21	Greater Than 21		
N	20	0	0	0	0	0	1.9	20
NNE	37	10	2	0	0	0	2.8	49
NE	33	5	0	0	0	0	2.4	38
ENE	9	1	0	0	0	0	2.0	10
E	5	0	0	0	0	0	1.9	5
ESE	2	0	0	0	0	0	1.5	2
SE	3	0	0	0	0	0	1.0	3
SSE	7	0	0	0	0	0	1.5	7
S	17	1	0	0	0	0	2.1	18
SSW	6	1	0	0	0	0	2.4	7
SW	4	0	0	0	0	0	1.9	4
WSW	25	8	0	0	0	0	3.0	33
W	24	14	0	0	0	0	3.0	38
WNW	28	12	1	0	0	0	2.7	41
NW	28	5	0	0	0	0	2.5	33
NNW	26	2	0	0	0	0	1.7	28
Total	274	59	3	0	0	0		

Number of Occurrences of E Stability = 350

Number of Calms with E Stability = 14

TABLE 2.6-9 (Continued). FREQUENCY DISTRIBUTION OF WIND SPEED, WIND DIRECTION, AND STABILITY
(ONSITE DATA MAY 1 - SEPTEMBER 8, 1980 AND JANUARY 25 - APRIL 30, 1981)

Direction	Speed (Knots)						Average Speed	Total
	1-3	4-6	7-10	11-16	17-21	Greater Than 21		
N	1	0	0	0	0	0	0.7	1
NNE	2	0	0	0	0	0	1.8	2
NE	3	0	0	0	0	0	2.2	3
ENE	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0	0
S	1	0	0	0	0	0	1.4	1
SSW	0	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0	0
WNW	2	0	0	0	0	0	2.5	2
NW	0	0	0	0	0	0	0	0
NNW	1	0	0	0	0	0	1.1	1
Total	10							

Number of Occurrences of F Stability = 12

Number of Calms with F Stability = 2

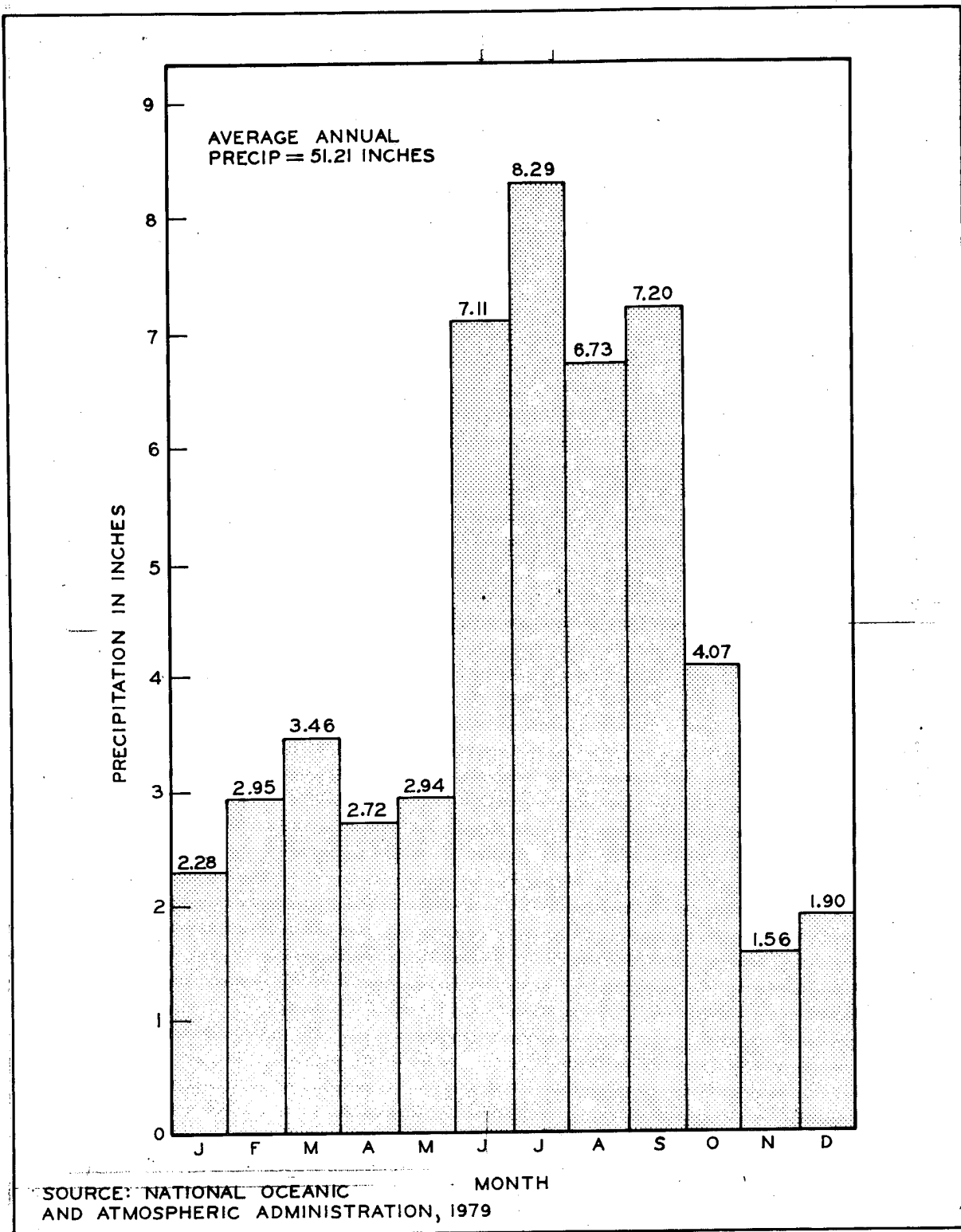


FIGURE 2.6-1. AVERAGE MONTHLY PRECIPITATION
AT ORLANDO, FLORIDA

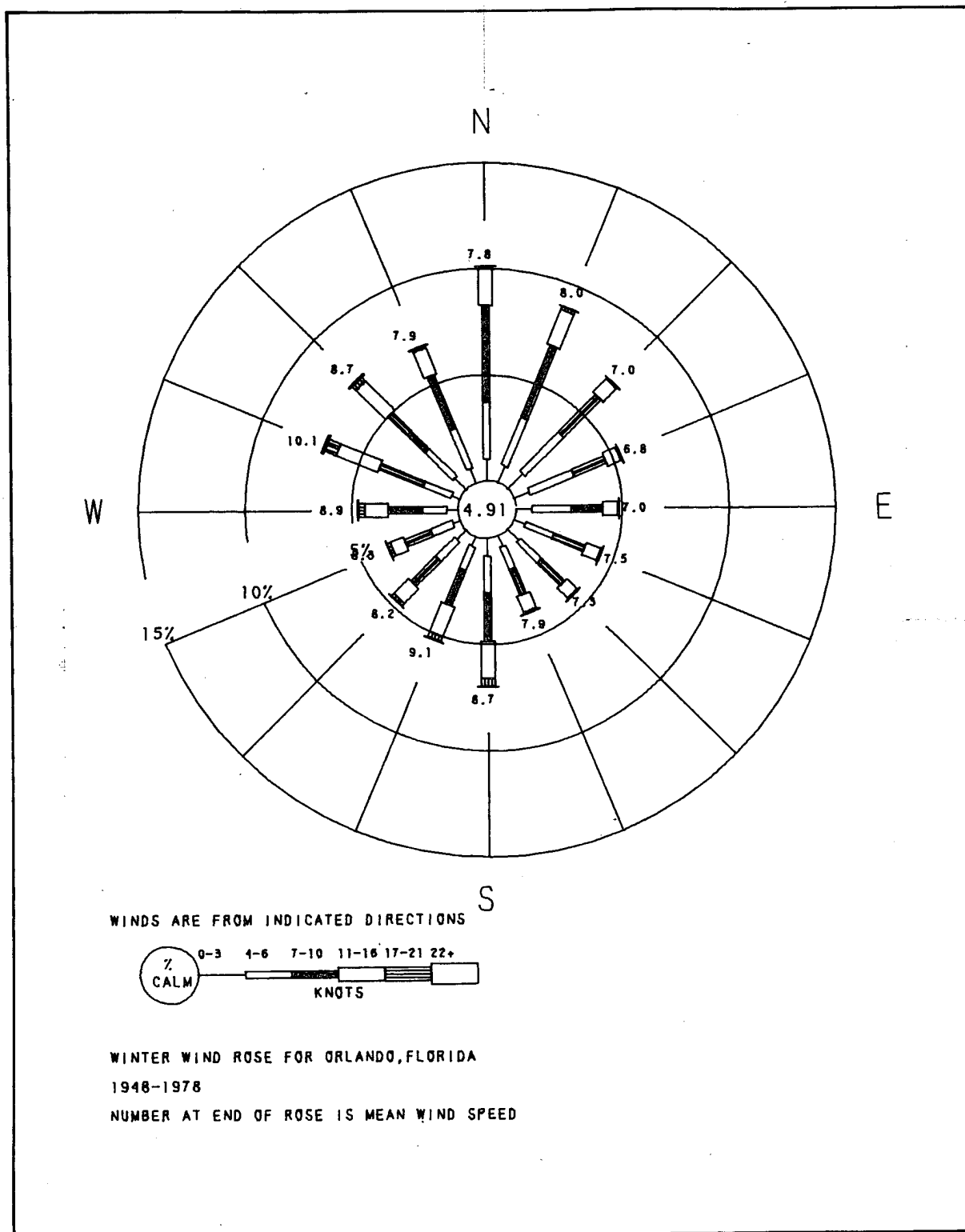


FIGURE 2.6-2. WINTER WIND ROSE
ORLANDO, FLORIDA

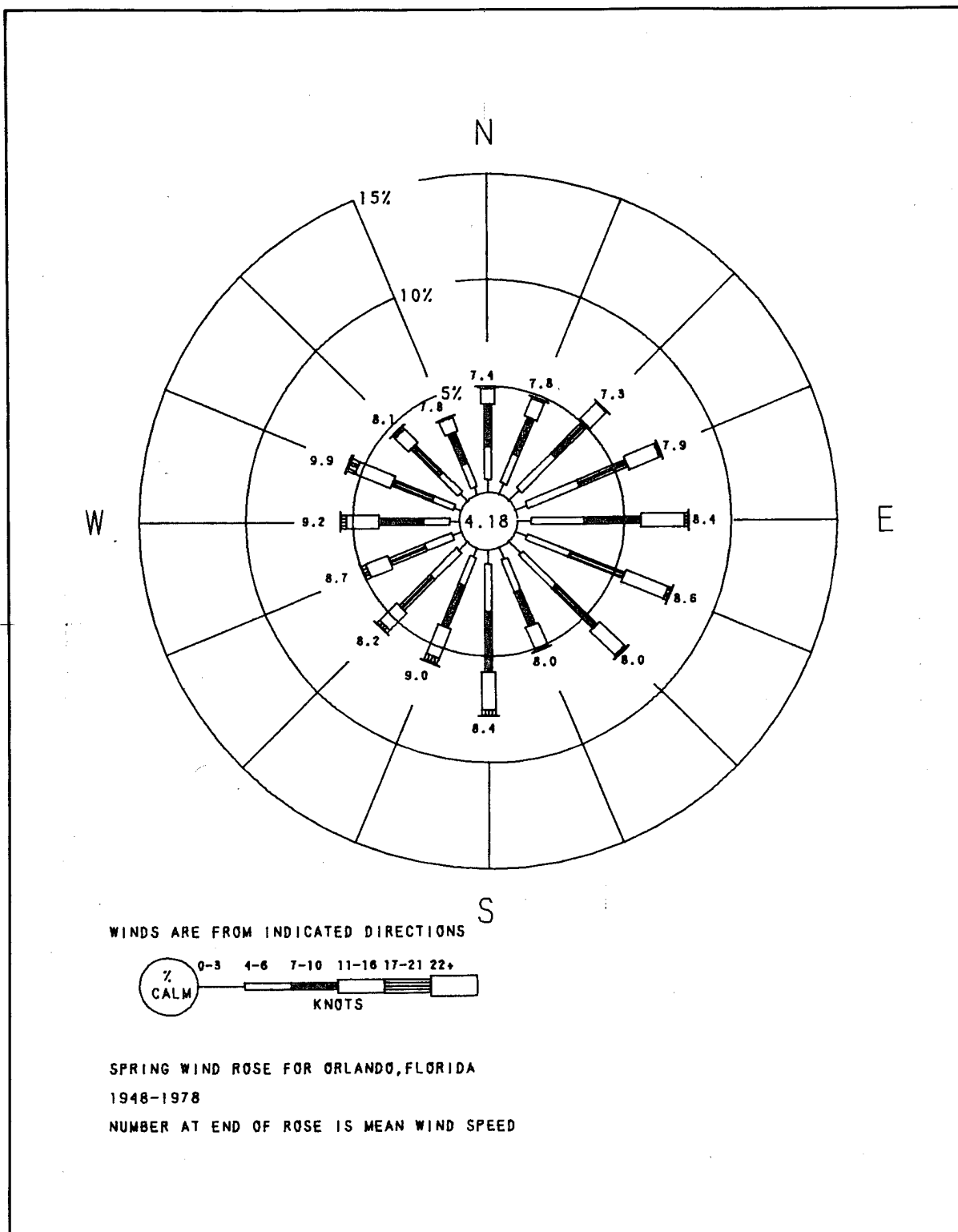


FIGURE 2.6-3: SPRING WIND ROSE
ORLANDO, FLORIDA

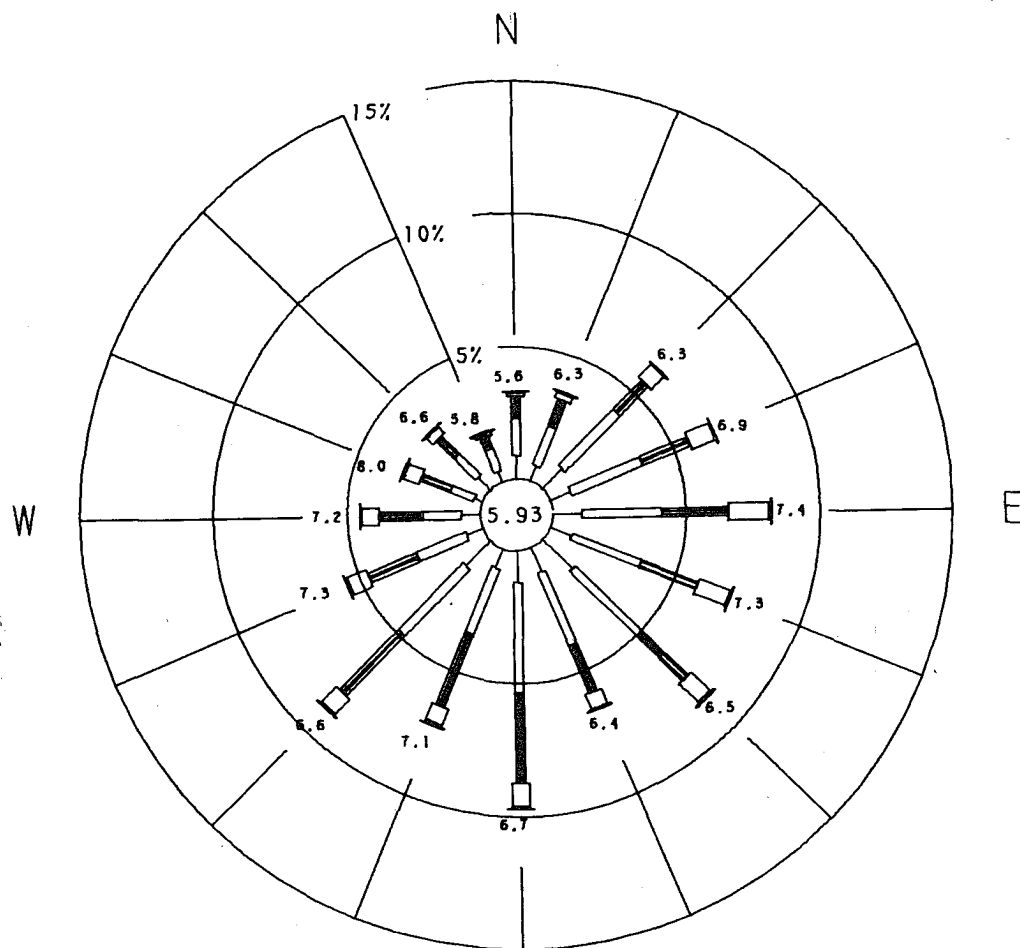
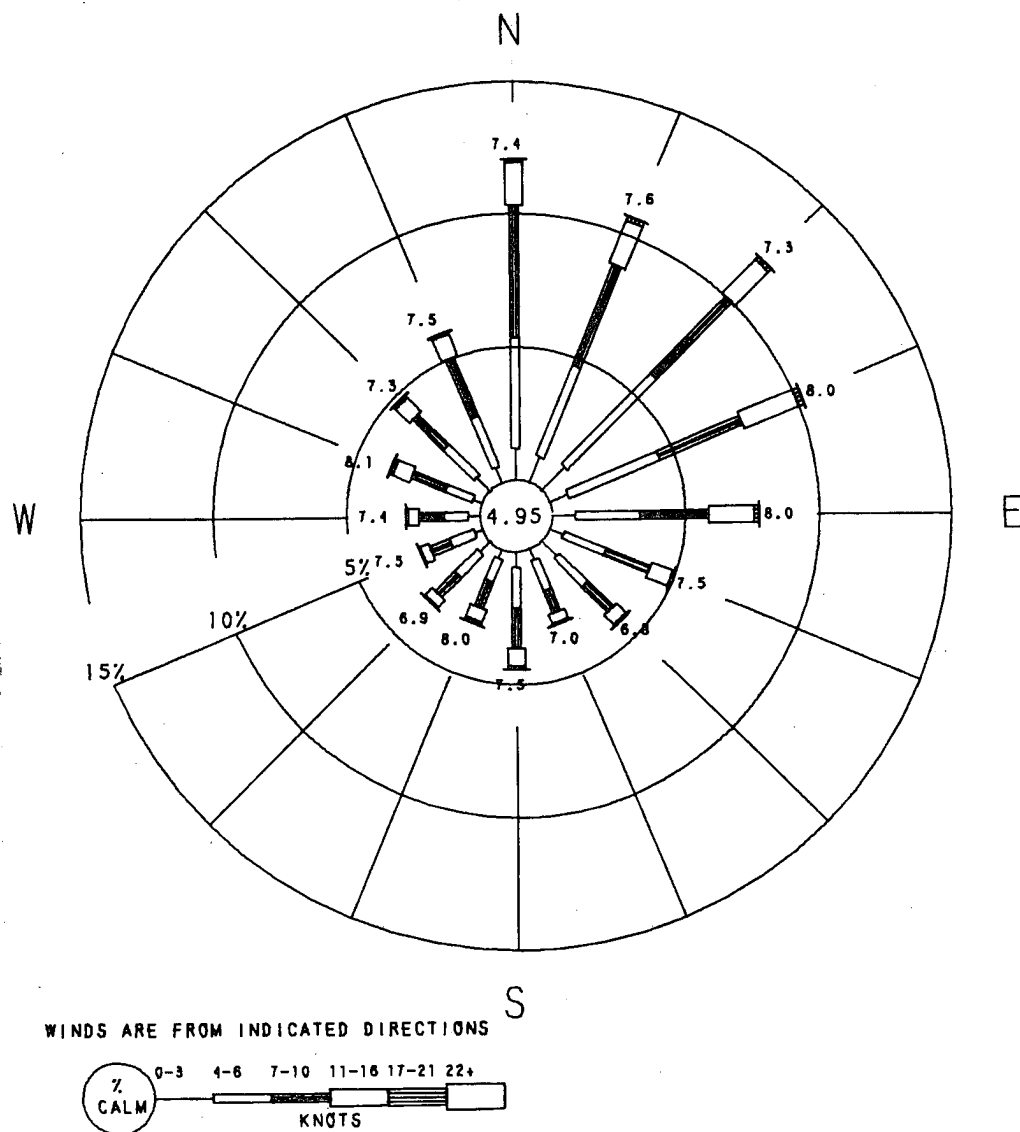


FIGURE 2.6-4. SUMMER WIND ROSE
ORLANDO, FLORIDA



FALL WIND ROSE FOR ORLANDO, FLORIDA
 1948-1978
 NUMBER AT END OF ROSE IS MEAN WIND SPEED

FIGURE 2.6-5. FALL WIND ROSE
 ORLANDO, FLORIDA

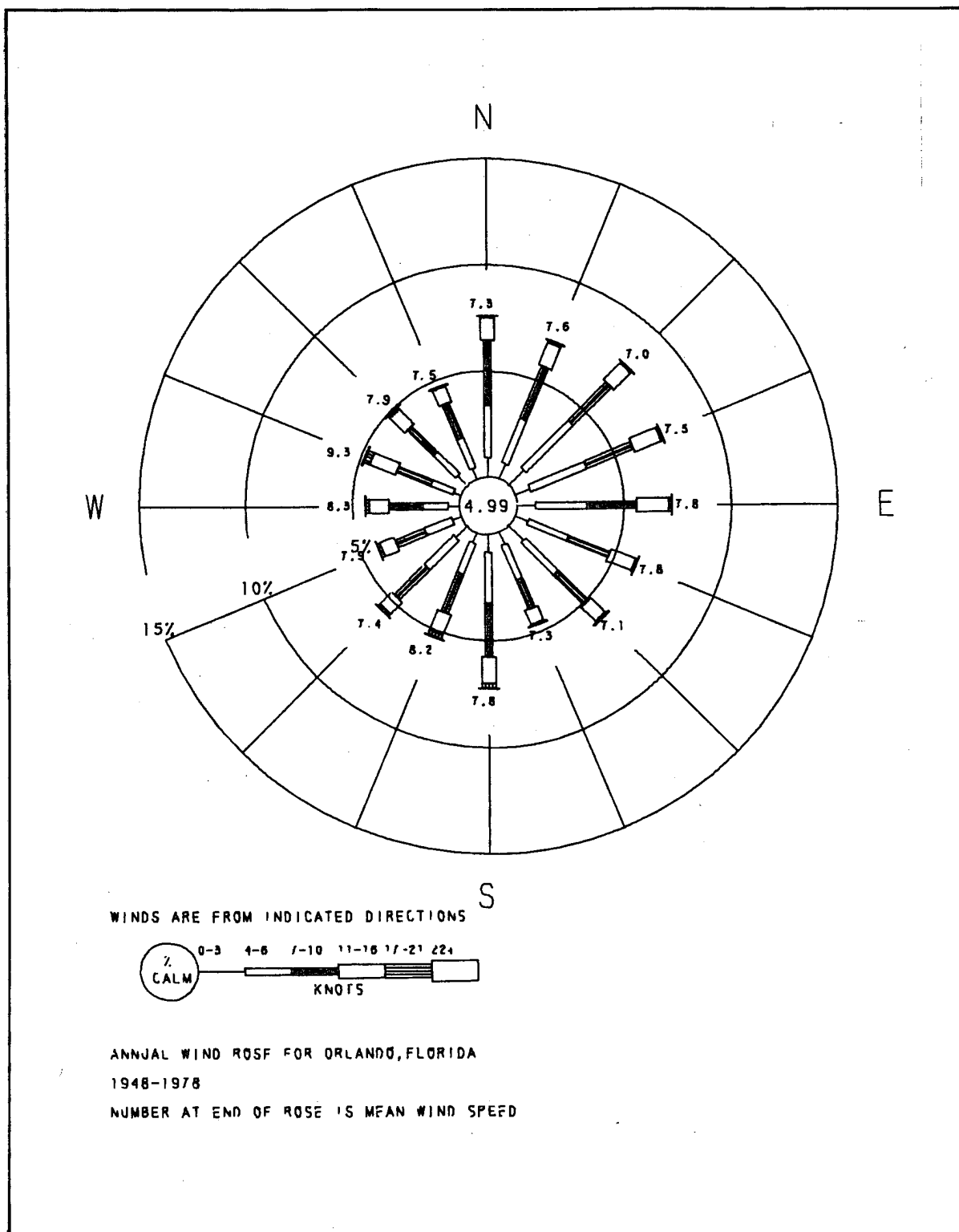
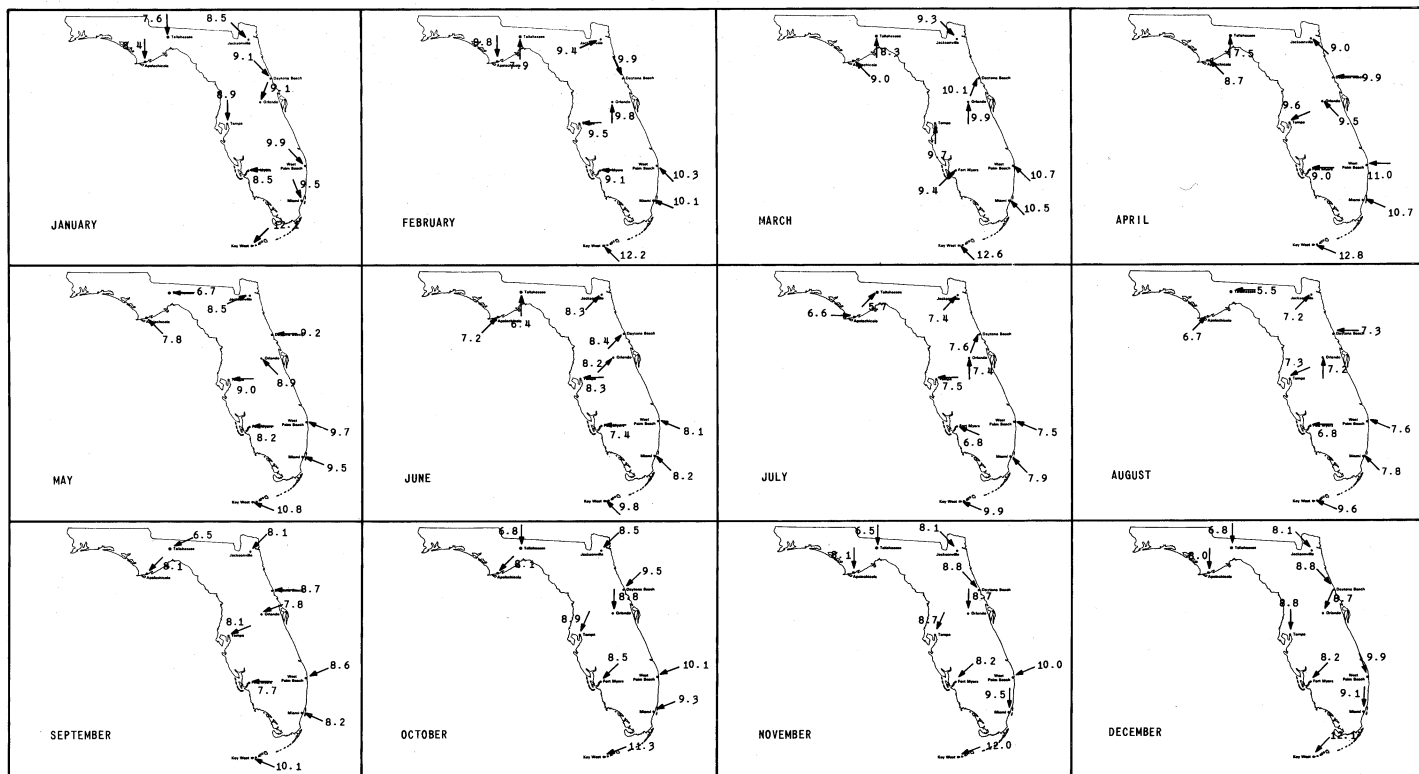


FIGURE 2.6-6. ANNUAL WIND ROSE
ORLANDO, FLORIDA



NOTE: NUMBERS GIVEN ARE SCALAR AVERAGE WIND SPEED IN MILES PER HOUR. ARROWS FLY WITH WIND.

FIGURE 2.6-7. MONTHLY AVERAGE WIND SPEED AND PREVAILING DIRECTION FOR SELECTED FLORIDA CITIES

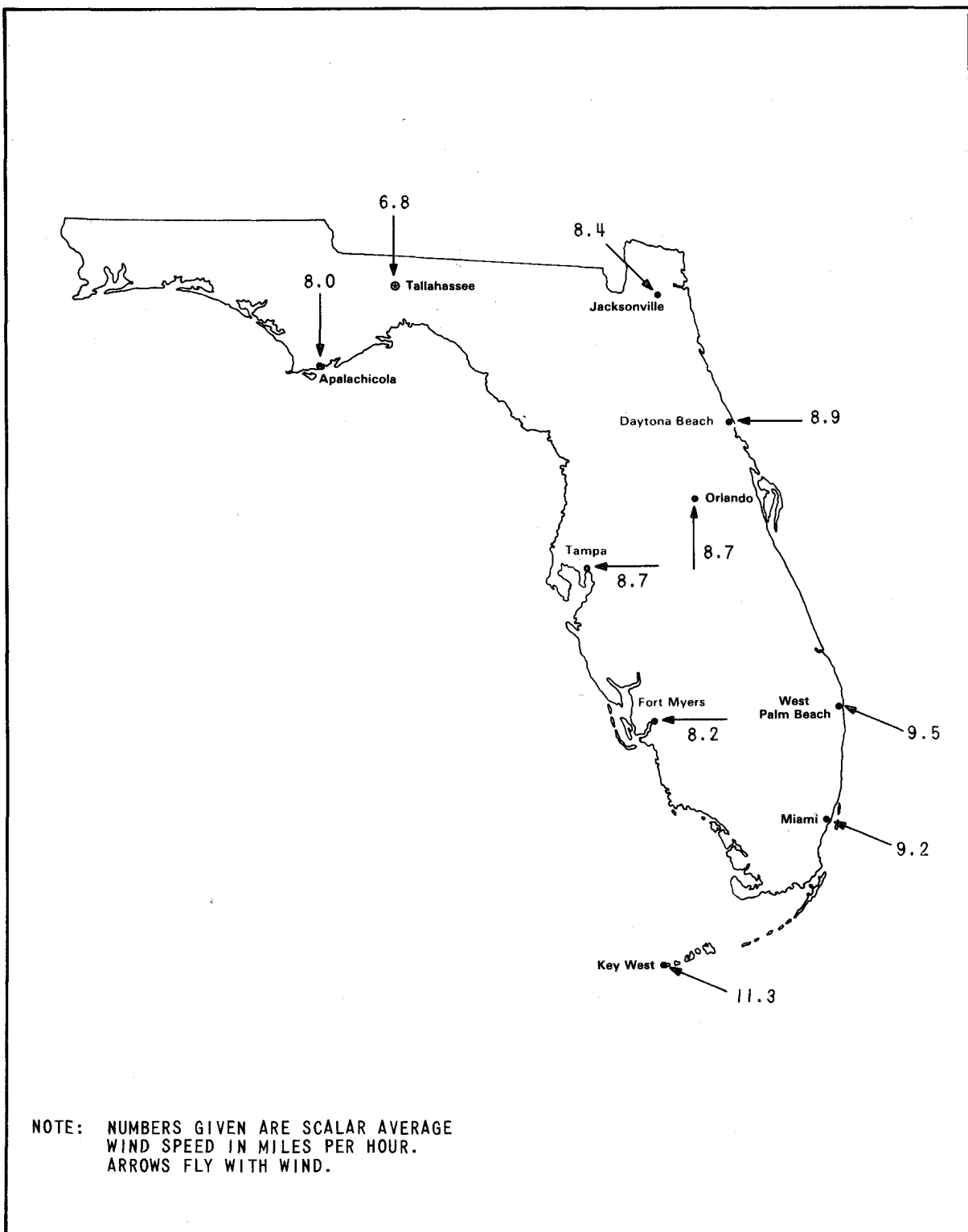
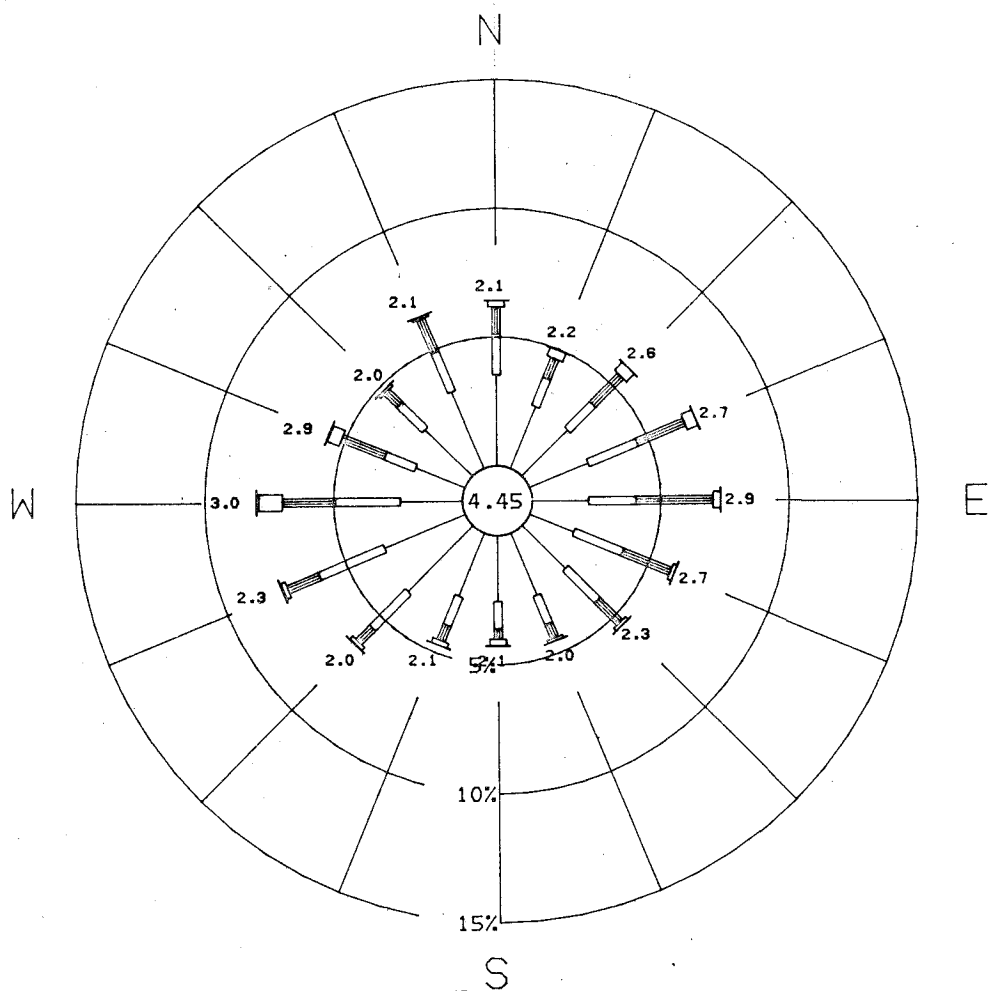
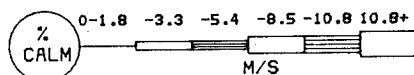


FIGURE 2.6-8. ANNUAL AVERAGE WIND SPEED AND PREVAILING DIRECTION FOR SELECTED FLORIDA CITIES



WINDS ARE FROM INDICATED DIRECTIONS

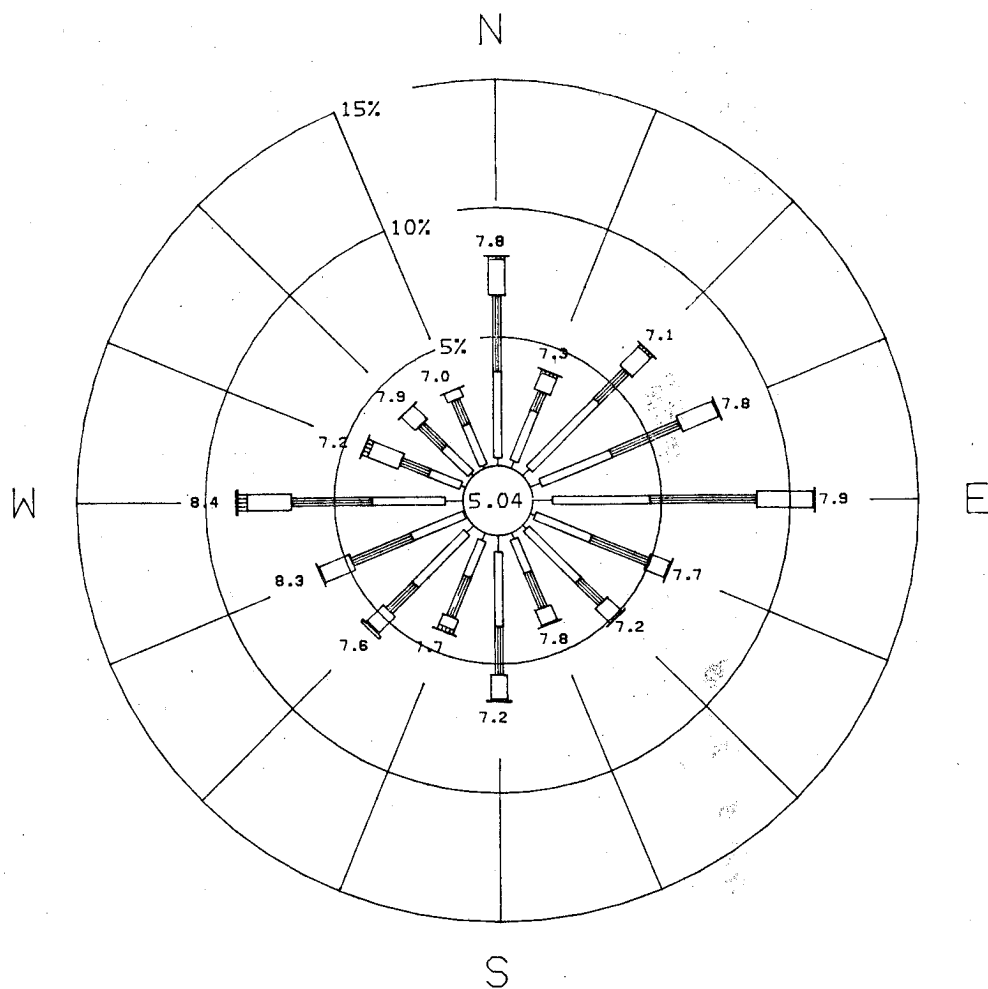


ANNUAL SUMMARY OF PSD AMBIENT AIR MONITORING

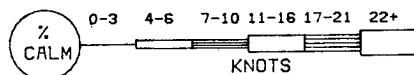
SUMMARY OF DATA FROM 1 MAY - 8 SEP 80 AND 25 JAN - 30 APR 81

AVERAGE SPEEDS (METERS/SECOND) SHOWN AT THE END OF EACH DIRECTION BAR

ALL STABILITY CLASSES INCLUDED



WINDS ARE FROM INDICATED DIRECTIONS



ANNUAL SUMMARY OF ORLANDO/MCCOY WIND DATA

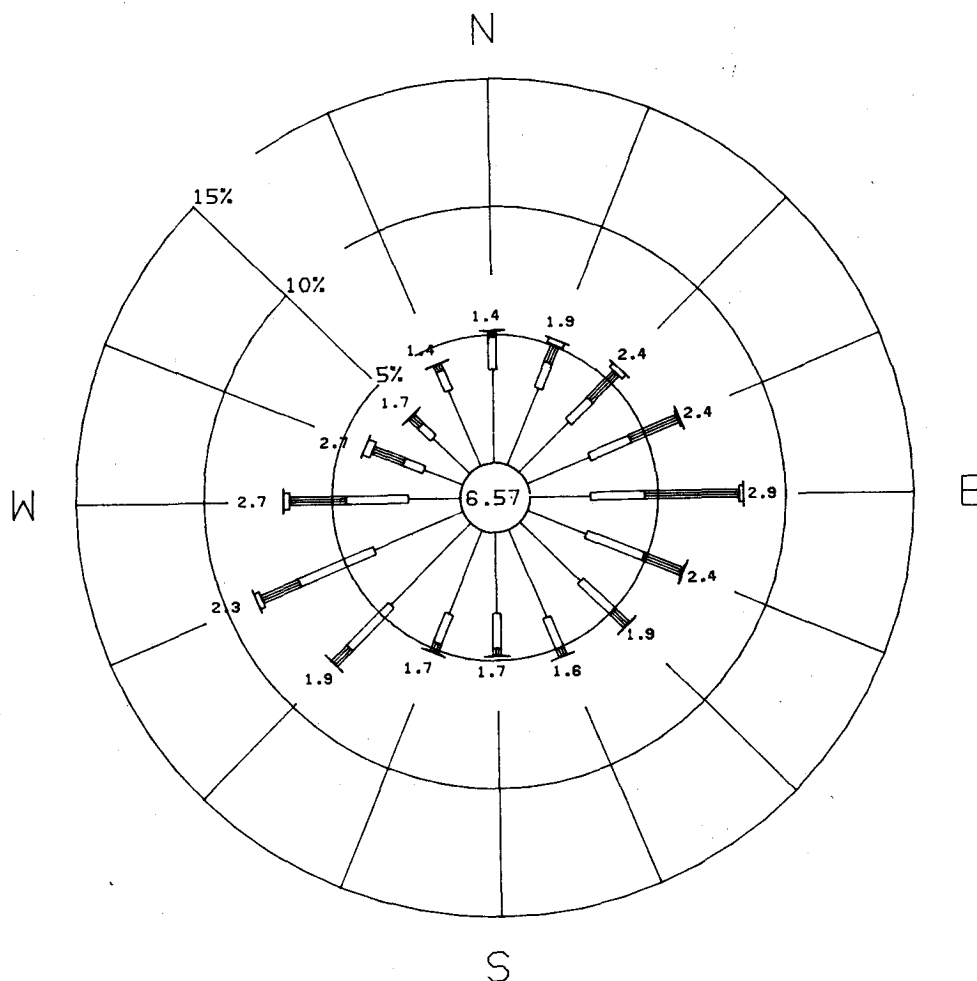
SUMMARY OF DATA FROM 1 MAY - 8 SEP 80 AND 25 JAN - 30 APR 81

AVERAGE SPEEDS ARE SHOWN AT THE END OF EACH DIRECTION BAR

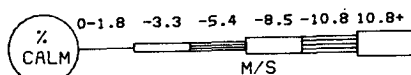
ALL STABILITY CLASSES INCLUDED

AMENDMENT I
060581

FIGURE 2.6-10. ORLANDO/MC COY
ANNUAL WIND ROSE



WINDS ARE FROM INDICATED DIRECTIONS

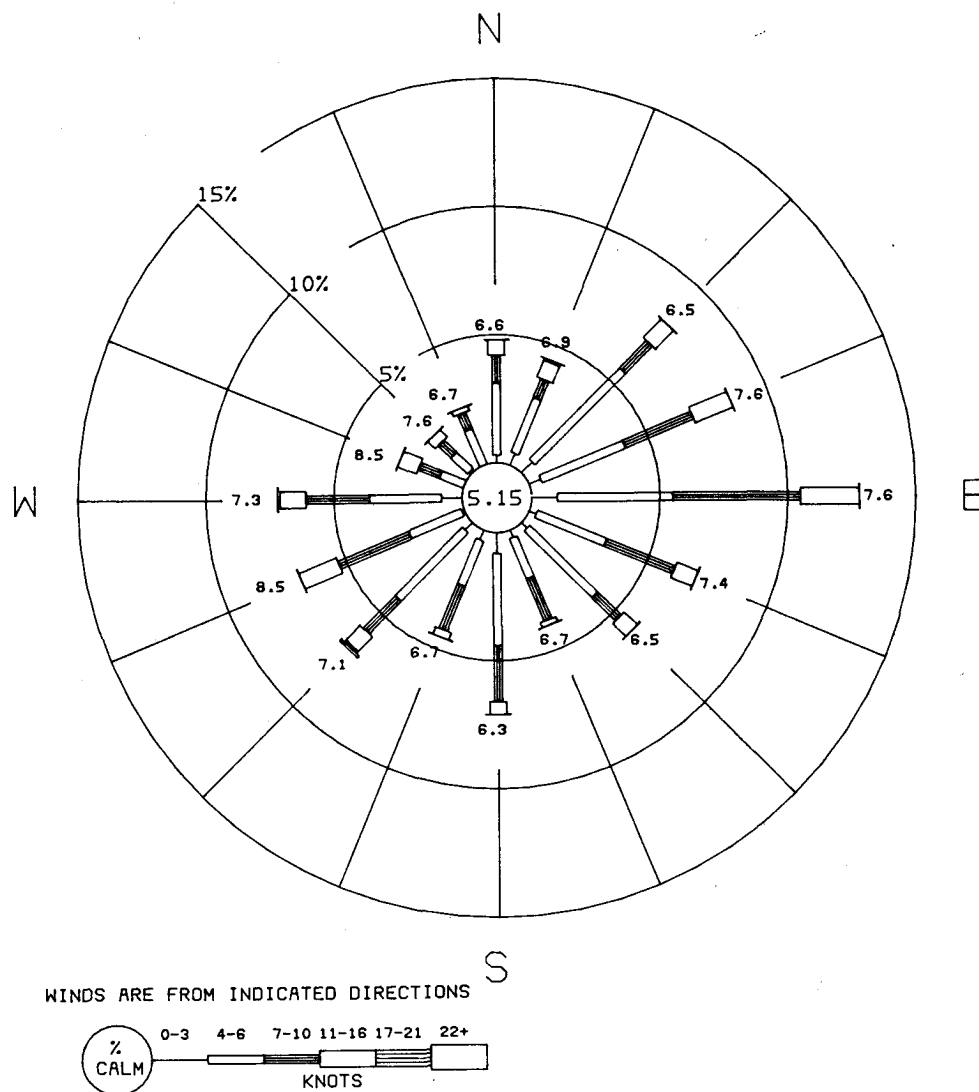


FIRST FOUR MONTHS (MAY THRU SEPT 8, 1980): PSD AMBIENT AIR MONITORING

AVERAGE SPEEDS (METERS/SECOND) SHOWN AT THE END OF EACH DIRECTION BAR

ALL STABILITY CLASSES INCLUDED

FIGURE 2.6-9. STANTON ENERGY CENTER
WIND ROSE FOR THE
PERIOD MAY 1 THROUGH
SEPTEMBER 8, 1980



AVERAGE WIND SPEEDS ARE SHOWN AT THE END OF EACH BAR

SUMMARY OF ORLANDO/MCCOY WIND DATA

PERIOD: MAY 1 THROUGH SEP 8 1980

FIGURE 2.6-10. ORLANDO/MC COY WIND
ROSE FOR THE PERIOD
MAY 1 THROUGH
SEPTEMBER 8, 1980

2.7 TERRESTRIAL ECOLOGY

2.7.1 Introduction and Definitions

To highlight the important ecological and environmental elements, the baseline terrestrial environmental analysis of the proposed plant site and associated facilities is divided into "Ecosystem Analysis" and "Important Species Analysis."

"Ecosystem Analysis" describes the structure of the site ecosystems in terms of community types, species present, and current environmental conditions, as well as the ecological forces and trends which determine present and future ecological conditions. The plant communities present are categorized in the report according to the Florida Land Use and Cover Classification, Level III, a system developed by eight state agencies to standardize terminology in environmental reports and permit applications.(1) Additional descriptions have been included in some categories to more specifically describe the communities. The natural values and values to man of these on-site ecosystem components are also discussed. Information developed from an ecological survey during 1980-1981 is used to describe the predicted future environment without the proposed facility.

"Important Species Analysis" describes state- or federally-recognized, commercially and recreationally valuable or endangered and threatened species.

2.7.2 Ecosystem Analysis--Plant Communities

2.7.2.1 Introduction. The proposed site is located within the Floridian section of the Atlantic Coastal Plain. This section consists of a series of old marine terraces, the result of at least four inundations by the ocean during the Pleistocene. To the west, the limit of the Atlantic Coastal Plain is defined by the Lake Wales Ridge, a unique series of high subparallel ancient dunes and valleys.(2) The dominant drainage in the

area is provided by the Econlockhatchee River, which flows in a northerly direction and terminates in the St. Johns River. Drainage from the site flows to this river via the Hart Branch and Cowpen Branch.

The soils on site have developed from sandy deposits exposed as the ocean receded. The 51-inch annual mean rainfall, characteristic of central Florida's humid subtropical climate, leaches plant nutrients from the soil. The high sand content of the soil provides it with little capacity for nutrient or water retention. Consequently, the soils are strongly acid and low in available nutrients; water drains rapidly except where organic pans occur under the surface. The pans are consolidated layers in which organic matter and minerals have accumulated. They usually occur from 14 to 60 inches below the surface. The degree of permeability varies, but water often moves through these pans much more slowly than it moves above and below the pan.(3)

" The natural communities on site are typical of the region. Nearly level flatwoods predominate, with scattered wetlands and low ridges on the western portion and in the center of the site. The wetlands, aligned in a north-south direction, are isolated; most of the surface flow is in a northeast direction toward the Econlockhatchee River. The low ridges, which support oak scrub, are also aligned in a north-south direction. Intermediate between these low ridges and wetlands (cypress stands) are longleaf pine flatwoods. A schematic cross section of the site illustrates how the communities are distributed (Figure 2.7-1).

" The plant community types are listed and described below. The area occupied by each community is shown in Table 2.7-1. Table 2.7A-1 in Appendix 2.7A presents the species composition of the various vegetative communities on the proposed site. Figure 2.7-2 graphically depicts the vegetative communities of the proposed site. A discussion of the interaction between successional processes and existing stresses which determine current and potential species composition and structure follows the descriptions.

COMMUNITY TYPES:

Forested Uplands

Pine Flatwoods

Xeric Oak Scrub

Wetlands (Forested Stands)

Pond Cypress

Pond Pine

Bay Hardwood

Oak Hardwood

Mixed

Wetlands (Nonforested)

Wet Prairie

2.7.2.2 Pine Flatwoods. "Longleaf pine (Pinus palustris) is the characteristic tree species in the flatwoods. The mean density was 18 trees per acre; the range was 9 to 25 trees per acre in twelve 3.7-acre sample plots. Basal areas ranged from 5 feet to 40 feet per acre. The extremely open canopy permits development of a rich understory of shrubs and herbaceous species. Saw palmetto (Serenoa repens) was the most abundant shrub in the flatwoods, with an importance value of 42 (Appendix 2.7A, Table 2.7A-2). Lyonia fruticosa and Lyonia lucida were also common, with importance values of 16.3 and 12.2, respectively. Wiregrass (Aristida stricta) dominated the herbaceous layer, but was accompanied by a very diverse array of forbs (see Appendix 2.7A, Table 2.7A-1).

The flatwoods occur on Leon soils, which have a fine, sandy, gray surface soil and a dark brown to black organic pan beginning at a depth of 14 to 30 inches. Leon soils have developed under conditions of poor to very poor drainage conditions from thick unconsolidated beds of sand.(4)

" Flat topography, the relatively impermeable pan, and sandy soil cause the flatwoods to flood from June through September, when the monthly rainfall averages 7.3 inches, and cause extreme dryness in winter and spring when the amount of precipitation is low (average monthly rainfall is 2.7 inches from October through May). The extreme dryness of the flatwoods and the easily flammable litter create a condition conducive to frequent fires.(5) Fire and cattle grazing have maintained the species composition and open structure of the flatwoods on site. If either cattle or fire were excluded for several years, hardwoods would invade, and the canopy would begin to close."

2.7.2.3 Xeric Oak Scrub.¹¹ A large area of oak scrub occurs on the western edge of the site; a smaller area is present on the central ridge (Figure 2.7-1). A total of 166 acres of this community is found on the site.¹¹ No tree layer occurred in the scrub, and wiregrass and lichens (Cladonia spp.) comprised the less than 1 per cent total herbaceous cover.

Most of the species present were shrubs less than 6 feet tall. Saw palmetto (with an importance value of 23.9), four species of oak (with importance values ranging from 7.8 to 23), and a variety of herbaceous shrubs characterized this community (Appendix 2.7A, Table 2.7A-3). Total shrub cover was 64.6 per cent.

¹¹ The oak scrub occurs on Pomello fine sand, a loose, white, fine, very porous sand low in organic matter. Nutrients and water drain readily through it.(6) ¹¹

2.7.2.4 Forested Wetlands.¹¹ These communities occur in poorly drained depressions which receive runoff, but have no natural outlet. The underlying soils are Plummer fine sand, Rutledge fine sand, and Rutledge mucky fine sand.¹¹ These soils occupy lower, wetter topographic positions than the Leon soils of the flatwoods. The Plummer soil has a gray to dark gray sandy surface, 2 to 6 inches deep, with lower gray horizons. The Rutledge series has a very dark gray to black fine sand, loamy fine sand, or mucky fine sand which may be from 8 to 15 inches deep. These acidic soils are often flooded in summer months and contain a variable amount of organic matter in the surface layer. The Rutledge mucky fine sand is in the lowest part, usually the center of the wetland.(7)

¹¹ Trees and shrubs in the wetlands form a denser canopy layer than in the flatlands. Species composition and abundance are influenced by past logging, moderate to heavy cattle grazing, and shallow drainage ditches which surround many of the wetland systems on the site; however, frequency of fire is the most important factor in determining the dominant tree species present.¹¹

2.7.2.5 Pond Cypress Stands.["] These domes or stands dominated by pond cypress (Taxodium ascendens) represented the most abundant wetland type. They ranged in size from 0.3 to 19.5 acres and comprised 55 per cent of the total wetland area described.["]

Pond cypress had an importance value of 72 in the overstory (Appendix 2.7A, Table 2.7A-4). Other trees present in much fewer numbers were pond pine (Pinus serotina), swamp tupelo (Nyssa biflora), and sweetbay magnolia (Magnolia virginiana). Pond pine was mostly on the edges.

["] Pond cypress trees were generally taller in the center of the stands and shortest at the edges. Possible reasons for the short trees on the edge are greater contact with flatwood fires, drier soil conditions, more intense competition with other species, and better physical conditions for seedling establishment.⁽⁸⁾["]

Large cypress trees were logged in this area, probably in the 1930s. Old rotting trunks 30 to 40 inches in diameter still remain in some of the domes, but the largest living trees had trunk diameters of about 8 to 12 inches. Average tree size and density varied between domes, and two distinct types of understory were found, depending on the degree of disturbance to which the system was subject.

Domes with a more shallow profile, affected by more frequent fires and/or heavy grazing, had a very sparse shrub cover, usually a few wax myrtles (Myrica cerifera) and Hypericum fasciculatum. Herbaceous cover was dense, homogeneous, and dominated by broomsedge (Andropogon virginicus), chain fern (Woodwardia virginica), and Rhynchospora fascicularis. Many species in these domes are associated with disturbed or mesic rather than hydric conditions: e.g., plume grass (Erianthus giganteus), gallberry (Ilex glabra), Solidago microcephala, dog fennel (Eupatorium capillifolium), and rayless goldenrod (Bigelovia nudata spp. australis). Two thirds of the cypress systems observed were of this type. They were found throughout the site, but were more concentrated in the eastern half.

The other domes had taller, more closed cypress canopies. They often included swamp tupelo (Nyssa biflora), sweetbay magnolia (Magnolia virginiana), and on the border, pond pine (Pinus serotina). Three domes near the eastern

boundary of the site contained oaks (Quercus nigra, Quercus virginiana, and Quercus alurifolia). No domes in any other section of the site had oaks.

Shrub cover was dense and species rich: Shiny lyonia (Lyonia lucida), wax myrtle, and Serenoa repens had the highest importance values (30.2, 25.2, and 19.3, respectively (see Appendix 2.7A, Table 2.7A-4). Dahoon (Ilex cassine), swamp bay (Persea palustris), blackberry (Rubus betulifolius), gallberry (Ilex glabra), Virginia willow (Itea virginica), and swamp blueberry (Vaccinium corymbosum) were commonly present. Vines were numerous and included grape (Vitis rotundifolia), greenbrier, (Smilax spp.), and climbing hempweed (Mikania scandens).

Leaf litter was thick, and ground cover, although patchy, was more diverse and more restricted to zones along the moisture gradient than the homogeneous cover in the disturbed domes. Characteristic species were Sphagnum spp., Blechnum serrulatum, sawgrass (Cladium jamaicense), Eriocaulon decangulare, pickerelweed (Pontederia cordata), Triadenum virginicum, several beak rushes (Rhynchospora spp.), camphorweed (Pluchea camphorata), and Lycopus rubellus (Appendix 2.7A, Table 2.7A-4). Some domes had herbaceous central zones. Bacopa caroliniana and Juncus repens occurred in the zones. Fire more severely injures trees in dome centers, often resulting in open herbaceous cover.(9)

Three domes sampled to provide the data summarized in Appendix 2.7A, Table 2.7A-4 represented the more diverse systems. Wildfire, which swept the site in December 1980, burned all the drier domes to which there was access and precluded plans to sample these communities.

2.7.2.6 Pond Pine Stands.¹¹ Four wetlands were dominated by pond pine. They ranged from 0.5 to 8.5 acres and comprised 2.8 per cent of the total wetland area. They occurred on the western section of the site. Most of the pond pines on site are concentrated in the west either within the canopy or scattered along the borders of other wetland types.¹¹ They were not quantitatively sampled because of their small total area and the very low species diversity of the stands. Gallberry and saw palmetto (Serenoa repens) were found in the shrub layer. Ground cover was very sparse,

except for sphagnum moss, because of the dense shrub and tree canopies. Pond pines, the largest of all the wetland trees on site, dominate wetter flats with low pH values; their mean basal area was 59.8 square inches.

2.7.2.7 Bay Hardwood Stands.["] Three bay-dominated wetlands of 33.5 acres, 7.6 acres, and 1.3 acres occurred in the western section of the site. They comprised 10.5 per cent of the total wetland area. Soils of bay hardwood stands are generally higher in organic matter than those of cypress stands. The water table does not fluctuate as widely because of the high moisture-holding capacity of these soils.["] The 7.6-acre stand was sampled quantitatively. The tree canopy was dominated by sweetbay magnolia with an importance value of 76.4 and loblolly bay (Gordonia lasianthus), having an importance value of 13.2 (Appendix 2.7A, Table 2.7A-5). Tree density (685 trees per acre) was higher than that in the cypress stands, which had a density of 460 trees per acre; however, the mean basal area of the trees was about half that in the cypress stands (Appendix 2.7A, Tables 2.7A-4 and 2.7A-5). Shrubs and herbaceous plants present in the bay stands were similar to those in the cypress except for bay species (magnolia, loblolly bay, and red bay) present in the shrub layer of the bay stand.

2.7.2.8 Oak Hardwood Stands.["] One oak hardwood stand, 12.2 acres, occurred in the southeastern section of the site. A channel in its center drained into Hart Branch. The channel was dry when observed.["]

The dominant tree was water oak (Quercus nigra), with an importance value of 64.8 (Appendix 2.7A, Table 2.7A-6). Other trees present were red maple (Acer rubrum), cabbage palm (Sabal palmetto), sweetbay magnolia, and live oak (Quercus virginiana).

Wax myrtle was dominant in the shrub layer with an importance value of 55.9. Persimmon (Diospyros virginiana), saw palmetto, and viburnum (Viburnum obovatum) were also present in the shrub layer.

Panicum lancearium was the dominant herb. Its importance value in the oak stand was 26.2; it was not observed elsewhere on the site.

Several other wetlands in this area of the site, although dominated by cypress, contained oaks (Quercus virginiana, Quercus laurifolia, Quercus nigra). Viburnum, cabbage palm, and red maple were also found in one of these wetlands. The latter three species were rare, and the oaks did not occur at all in wetlands in the rest of the site. These species do occur, however, in the floodplains of the Econlockhatchee and Little Econlockhatchee Rivers. These species are also associated with low fire frequency.(10) The soils underlying the communities with oaks are Rutledge fine sands, which also underlie wetlands containing only cypress and bays.

2.7.2.9 Mixed Forested Wetlands. "The canopy in these wetlands is a mixture of cypress, hardwoods, and pond pine, such that no one type dominates. Mixed forests comprised 17.8 per cent of the total wetland area and ranged in size from 0.3 to 31.6 acres. The shrub and herbaceous layers were similar to those of the undisturbed cypress domes and were the most species rich of any of the systems." Sagittaria lancifolia and the rare spoon flower (Peltandra sagittata) occurred in the largest mixed wetland. Most of these mixed communities were in the western half of the site.

2.7.2.10 Nonforested Wetlands. "These nonforested wetlands occurred on small, poorly drained depressions. They totaled 10.9 per cent of the wetland area, but they were scattered throughout the site, ranging in size from 0.2 to 3.1 acres." They were dominated by the low shrub (Hypericum fasciculatum) and had a dense cover of mesic herbaceous species such as broomsedge and Aristida spiciformis. A typical prairie of 1.5 acres had a mean Hypericum fasciculatum per cent cover of 39. A wax myrtle also was present. "There were often several trees, swamp gum or sometimes pond pine, in the midst of these prairies. These areas appear to be favored cattle grazing sites. This vegetation type occurred not only as separate islands in the flatwoods, but also formed a border or transition zone 10 to 50 yards wide around many of the forested wetlands." In these cases, they have been considered a part of the enclosed wetland. The December 1980 wildfire burned through the Hypericum bordering many wetlands, but stopped at the

edge of some of the circular prairies with high water tables. The prairies appear to be maintained by very high water tables, frequent fires, and grazing.

2.7.3 Ecosystem Analysis--Animal Communities

2.7.3.1 Introduction. "The distribution of animal communities on site also reflects the range of conditions described in Paragraph 2.7.2.1. Species found on the site, such as the Florida scrub jay and the red-cockaded woodpecker, are restricted primarily to the scrub oak and pine flatwood habitats, respectively. Other species, such as the rufous-sided towhee, while not confined to one habitat type, are more abundant in the dryer situations (xeric oak scrub). No unique species were found in the cypress stands; however, a greater number and variety of wildlife species were observed in these wetlands than in the pine flatwoods and oak scrub."

"During the 1980-81 field surveys, 16 species of mammals, 68 species of birds, 15 species of reptiles, and 9 species of amphibians were observed in the area of concern." The preferred habitat and relative abundance of mammals, reptiles, and amphibians are listed in Appendix 2.7A, Tables 2.7A-7 and 2.7A-8. Bird species encountered are listed in the following section under each of the wildlife habitat discussions. Common and scientific names for species are listed in the appropriate tables.

2.7.3.2 Pine Flatwoods. "Although logging activity has occurred in most on-site flatwoods, this disturbance has not drastically affected the diversity of wildlife present. Some sections, particularly those on the southern portion of the site, are dominated by relatively old-aged (80 years or more) pines. The presence of these older stands has provided habitat for the red-cockaded woodpecker and other species. Other typical flatwoods species included Bachman's sparrow, pine warbler, brown-headed nuthatch, and Sherman's fox squirrel. The central and northern portions of the site have been logged more intensively and are characterized by more open areas and younger stands. In these areas, there were fewer animal species."

" In pine flatwoods, breeding bird populations are dominated by eastern meadowlark, bobwhite, red-winged blackbird, mourning dove, rufous-sided towhee, and Bachman's sparrow.(11) Seasonal changes in species abundance and species richness (number of species) were apparent. Brown-headed nuthatcher, common yellowthroat, and red-winged blackbird were more abundant in the winter than in the late summer avifauna. With the arrival of winter residents (including palm warblers, yellow-rumped warblers, and yellow-bellied sapsuckers), species richness increased from 19 species in the late summer to 39 species in the winter. Correspondingly, estimated density increased from 135 birds per 100 acres in the late summer to 422 birds per 100 acres in the winter (Appendix 2.7A, Table 2.7A-9).

"The most commonly encountered herptiles were six-lined racerunner, green anole, oak toad, black racer, and gopher tortoise. The hispid cotton rat, a common mammal species, was observed during the study. Other mammals frequently encountered were nine-banded armadillo, cotton mouse, raccoon, and eastern cottontail. Larger mammals included all the wide ranging forms such as white-tailed deer, gray fox, bobcat, and raccoon.

2.7.3.3 Xeric Oak Scrub. " Conditions of the xeric oak scrub communities are extremely dry because of the absence of overstory vegetation and the presence of porous, well-drained sands. Oaks are the main source of food for wildlife. Functionally, the den of the gopher tortoise is extremely important to other animals as a retreat or hibernaculum. If this refuge were not present, many animals could not survive in these xeric communities during the dry, hot conditions of summer. "

The bird species observed in xeric oak scrub are listed in Appendix 2.7A, Table 2.7A-10. Species requiring a dense ground cover or a distinct under-story layer are likely to be found in this habitat. Species normally associated with full overstory canopy were generally not observed in such vegetation. Species richness and abundance observed along transects in this habitat were lower than other habitats of the proposed site. There was, however, a substantial increase in the number of species and abundance of birds from late summer to winter (Table 2.7A-10). " Generally, bird

species observed in the xeric oak scrub were the same as those occurring in pine flatwoods. The Florida scrub jay, the only characteristic bird of oak scrub, was encountered on site as well as on surrounding scrub areas."

" Breeding birds of this habitat include Florida scrub jay, rufous-sided towhee, great crested flycatcher, blue jay, and Carolina wren.(12) Common winter residents include yellow-rumped warbler, blue jay, and common yellow-throat.

" Amphibians and reptiles encountered were gopher tortoise, six-lined racerunner, black racer, and oak toad. Mammals observed were white-tailed deer, Virginia opossum, cotton rat, raccoon, and gray fox."

2.7.3.4 Forested Wetlands. " Forested wetlands (bayheads and cypress domes) on site are generally three-layered systems consisting of relatively open canopy, sparse understory, and ground cover. Because of the vegetation diversity and alteration of dry and wet habitats, this forested community offers a greater diversity of microhabitats than most other systems in the study area. The fauna of this habitat is generally a combination of species of aquatic habitats as well as species of the more upland habitats."

" Although isolated bayheads and cypress swamps on site are not generally inhabited by a diversity of wildlife, they are, nevertheless, important as feeding and watering sites. These wet areas serve as reserves for many animals during critical periods such as fire and drought." Wharton, et al.(13), characterized these types of systems as having extensive pulses in animal activity depending on reproduction and larval development, predation, and the flow of animals between adjoining swamps and associated upland habitats." Many of the species (tree frogs, leopard frogs, and newts) typically occur as adults in adjacent habitats (i.e., flatwoods). Some of these animals may be particularly important as a food source for many higher vertebrates."

" The avifauna of these communities consisted primarily of those species occurring in surrounding habitats (Appendix 2.7A, Table 2.7A-11). Thus, birds encountered consisted primarily of flatwoods species. Generally, the

number of birds and species in such forests was somewhat greater than that of surrounding flatwoods.

" The avian community of this habitat was characterized by a seasonal rise in species richness in the winter with a subsequent decline in the summer. Species richness in the winter was nearly twice that of the summer community and was dominated by blue-gray gnatcatcher, yellow-rumped warbler, palm warbler, and eastern bluebird. Compared to the other habitats, more species of warblers and other perching birds were sighted in these forests. " Density of birds increased from 113 per 100 acres in the later summer to 485 per 100 acres in the winter (Table 2.7A-11).

" An assortment of mammals was observed in these swamps, particularly along the edge. These species included many small rodents as well as fox squirrel, raccoon, deer, wild hog, opossum, and gray fox. Deer populations on the property use these areas as denning areas while foraging in associated flatwoods and other upland areas. "

" Few species of herptiles occur exclusively in these habitats although the indigo snake is considered an important species.(14) Some of the most common animals included southern leopard frog, five-lined skink, green tree frog, and squirrel tree frog. "

2.7.4 Interactions Between Successional Processes and Existing Stresses

2.7.4.1 Introduction. " The structure and composition of existing plant communities are a result of the interactions between successional processes and existing disturbances, particularly fire frequency and intensity.

" Almost all the communities on site, except the oak hardwood stands, are maintained by periodic fires. The plant populations comprising these communities have numerous adaptations for surviving fire, including:

- (1) Underground stems--Sawgrass, pickerelweed, saw palmetto;
- (2) Adventitious buds or root sprouts--Pond cypress, pond pine;
- (3) Thick bark--Longleaf pine, pond cypress; and
- (4) Cones which require heat to open--Pond pine.

These species are light demanding, often require a mineral soil for germination, and can tolerate low nutrient soil. Flatwoods and wetlands species are adapted to extreme water level fluctuations, and oak scrub species can tolerate the extreme dryness of the sands on which they occur."

If fire is excluded for 10 years or more, litter and humus accumulate, soil nutrients increase, and species more vulnerable to fire injury invade.(15) The changes that occur are illustrated in Figure 2.7-3. Some features and species of wetlands with frequent fires begin to decline several years after fire exclusion. These are represented by Curve A of Figure 2.7-3. Other species increase rapidly in response to absence of fire. These are illustrated by Curve B and include shrubs in the flatwoods, which gain in height and density, and bay species and deciduous hardwoods in the wetlands. These decline as improved fertility and water retention, which develop in the absence of fire, allow shade-tolerant oaks to dominate. As the canopy closes and becomes more dense, shrub and herbaceous species decrease in number and richness. Species and features that increase to a steady state with fire exclusion are represented by Curve C. Comparison of the cypress, bay, and oak communities on site agrees with Edmisten's findings (Table 2.7-2). Shrub and herbaceous cover in the oak stand were lower than in the cypress and bay stands. Basal area of canopy trees in the oak stand was higher and their density lower than in the other two communities.

Observation reveals that the site has been subjected to numerous fires, both deliberate (to improve grazing) and accidental. Wildfire burned about 75 per cent of the site in December 1980. Grazing maintains low shrub and woody seedling cover due to ingestion and trampling. Past logging and traffic on the numerous dirt roads throughout the site have also been factors in keeping the flatwoods open.

The xeric oak scrub does not appear subject to grazing or deliberate burning. Succession of this community to oak forest could take 100 to 200 years of fire exclusion because of the droughty substrate on which it occurs.(16) Fire exclusion for this long a period is unlikely even in the pristine state. However, Veno reported a trend toward more mesic vegetation in oak scrub communities after 20 years of fire exclusion.(17)

" The wetlands on site vary in shrub density, frequency of bays and oaks, and presence of peat which, while not measured, was apparent by its soft sponginess underfoot. More bay and shrub species were present in the wetter and larger systems which, because of their size, may be better protected from fire. Most of the domes in the eastern section were smaller, less diverse, and showed high tree mortality. The presence of oaks in a few domes in the east would not appear to be due to fire exclusion, because fires have obviously occurred there. This section drains directly to Hart Branch and Cowpen Creek and may be influenced both by greater surface flow and seed source from the oaks in the Hart Branch floodplain. Unfortunately, the 1980 summer season was exceptionally dry, and standing water was absent in most systems; therefore, relative differences in water depth between communities or between seasons could not be measured."

2.7.4.2 Value and Service-Forest Products. Large cypress trees were logged in the 1930s, and longleaf pine forests in the area have been thinned as recently as 1980. Although these species are abundant on the site, they are of poor value for commercial purposes. Proper management could increase the value of the trees, but since the site is currently managed for cattle grazing, forest products are currently of low value.

2.7.4.3 Value and Service--Cattle Grazing. Grasses and low shrubs on most of the site serve as unimproved pasture for beef cattle. This native vegetation furnishes poor to fair forage.(18)

2.7.4.4 Value and Service-Soil and Water Conservation. Vegetative cover provides important services of soil retention and erosion control. During the wet season, a sheet flow of water spreads in a thin layer over the soil-vegetation surface. The plants and organic matter accumulation filter suspended material, absorb water, and retard water flow. The forested wetlands serve as a reservoir system for runoff and direct precipitation by retaining water in peat and litter during the rainy season and slowly releasing stored waters through the organic pan into underlying sands in areas where ground water is in short supply (Figure 2.7-4).

These features have allowed cypress wetlands to be used for wastewater treatment both for storm runoff (19) and sewage wastewater.(20)

Plant communities are also important in nutrient retention through storage in biomass and humus layers accumulated from plant litter. When fire destroys biomass and humus, the species on site are particularly adapted for quick regrowth to take up the resulting available nutrients before excessive leaching occurs. This is particularly important in the sandy coastal plain soils which occur on site, since they lack nutrient-absorbing clays.(21)

2.7.4.5 The Future Environment Without the Proposed Facility. The natural communities on the site are in a dynamic equilibrium considering the nature of the stresses to which they are subject. Fire and, to a lesser extent, grazing have interacted with soil texture and drainage to shape the species composition and structure of the existing communities. Some of the very small, shallow, grass-dominated cypress stands may be invaded by flatwoods; on the other hand, wet prairies, which presently have a few cypress or Nyssa trees in their center, may show an increase in the number of trees. Forested stands in areas less subject to fires would show an increase in bay and shrub species; areas with greater fire frequency will be dominated by cypress, Xeric oak communities would remain as they are at present.

Pine density of the flatwoods may increase temporarily since many currently marketable trees already have been logged. In time, the currently unmarketable trees would be logged as they attained harvest size. Overall, pine density and size ranges would remain similar to those existing today.

Barring unforeseen changes in land use or fire frequency, the future environment without the proposed facility would be essentially the same as it is at present. Based on these assumptions, it is unlikely that most of the fauna in the area would change significantly in the near future. The only exception to this might be the status of the red-cockaded woodpecker. It seems unlikely that current forestry practices would eliminate this species. Surveys conducted in surrounding areas revealed fewer cavity trees, smaller populations of red-cockaded woodpeckers, and reduced foraging

habitat as compared to the site and the lands immediately south of the proposed project.

2.7.5 Important Species Analysis--Vegetation

2.7.5.1 Introduction. Two categories of important species are grouped in this section under the following headings: Commercially and Recreationally Important Species and Threatened and Endangered Species.

2.7.5.2 Commercially and Recreationally Important Species. The tree species historically or currently harvested in this area for forest products are longleaf pine and pond cypress. Although other species may be considered to have a monetary value in terms of the value of storm protection or natural water purification, these values have been discussed previously and are not covered here."

2.7.5.3 Endangered and Threatened Species. The Endangered Species Act of 1973 (PL 93-205), as amended, provides for the protection of endangered and threatened species. Under the rules and regulations of the Florida Game and Freshwater Fish Commission, the Commission must preserve and protect endangered and threatened species. This section (2.7) of the Florida Power Plant Site Certification Application must contain a report on the status of any endangered or threatened species which may be affected by the proposed action.

" Two plants native to Florida are on the most recent federal list of threatened and endangered species.(22) Neither of these species occurs on habitat types found in Orange County. The U.S. Fish and Wildlife Service has prepared a new proposed list of plant species.(23) The proposed list contains candidates currently being considered for inclusion in the final list. Approximately 200 plants that occur in Florida are on the proposed list, but none of these species were observed on the site.

" Nine plant species listed as rare, threatened, or endangered by the Florida Committee on Rare and Endangered Plants and Animals (FCREPA) (24)

are known to exist in Orange County (Table 2.7-3). The FCREPA list was prepared by conservation groups in cooperation with the Florida Game and Freshwater Fish Commission; however, it offers no legal protection for the plants listed. Habitat types on site likely to support threatened and endangered species have been systematically explored at each quarterly survey.

" Spoonflower (Peltandra sagittifolia), listed as rare, was observed in a hardwood bay stand in summer. A search will be made for other locations on site and other listed species in the spring."

2.7.6 Important Species Analysis--Wildlife

2.7.6.1 Introduction. Two categories of important species are grouped in this section under the following headings: Commercially and Recreationally Important Species, and Threatened and Endangered Species.

2.7.6.2 Commercially and Recreationally Important Species. " Important animal species of the proposed power plant site includes game animals and resident fur-producing species. Common small game species of wildlife consist of bobwhite quail, mourning dove, cottontail rabbit, marsh rabbit, and gray squirrel. Populations of white-tailed deer and feral swine are present in much of the area and some adjoining lands. The land seasonally attracts a few migratory species such as woodcock and common snipe. A wide variety of fur-bearing mammals occurs on the site. Apparently the white-tailed deer is the only species that is harvested significantly in the area, although limited harvesting of bobwhite quail occurs.

- (1) " Fur-Bearing Mammals. Fur-bearing mammals on the site include opossum, raccoon, gray fox, and bobcat. The opossum is common in nearly all wooded habitats on site." In mixed woodlands, raccoons prefer bottomlands for denning while foraging over uplands and aquatic systems. The gray fox is more often found in lowlands adjacent to bottom land forest. The bobcat is primarily found in hardwood bottomlands and swamps as well as forested

areas adjacent to these systems. Based on signs and sightings, these animals are fairly abundant in appropriate habitat types of the property. Table 2.7-4 lists some estimated densities for some of the mammals as well as other animals of the property as reported by various authors.

- (2) Large Mammals. Large game mammals consist of white-tailed deer and wild hogs. Current conditions in the area are conducive to supporting large populations of white-tailed deer. Although deer were sighted in a number of different habitats, concentrations appeared greater along various forested wetlands. In central Florida, Marchington and Jeter (25) estimated one deer per 17 acres in a mixture of longleaf pine/oak sandhill association. It would appear that deer populations on the proposed site approach this estimated population density. Because of a regular burning program for the flatwoods, it appears there is an abundant food supply in the form of forbs, grasses, and browse. The home range for most southeastern deer varies roughly from 150 to 250 acres.(26,27) The production of fawns per adult doe usually runs from 1.5 to 2.0 in a healthy herd. Nightlighting surveys on site revealed an average of 2.5 deer per mile of survey. Evening surveys along the existing transmission line averaged four deer per mile of transect. Annual harvest of deer (bucks only) for five sections (10, 11, 12, 13, and 14) in the area is near nine deer per season. During the 1980-81 season, 21 bucks were harvested from these five sections.(30)

The wild hog is primarily an inhabitant of hardwood swamps and marshes, although it also ranges into mixed hardwoods and pinelands.(28) Except for old boars traveling alone, feral hogs usually travel in small bands of eight or less. Of the habitats on the property, wild hogs or rootings were sighted more frequently in cypress domes or adjacent habitats. Based on rooting activity, there are no more than two to three bands of hogs on the property.

- (3) ^u Birds. Although there are some numbers of turkey in the area, population levels are not high enough to support significant hunting. The turkey population may be reduced due to the rather limited distribution of mixed hardwood forest.^u Willis (29) states that forests with less than 50 per cent deciduous trees will support few turkey. It is likely that other factors are involved, however, because turkey populations were reportedly moderately high in the area prior to the mid-1970s when the number observed drastically declined.(30) Powell (31) listed Orange County as having between 5,000 to 9,000 turkeys. The state-wide trend for turkey populations has been downward since the late-1960s.(32)

The bobwhite quail occurs throughout Florida around cut-over country, forest fringes, and old fields. Quail populations in this area of Florida are fragmented because of insufficient acreage of quality habitat. There is, however, fairly good habitat on the proposed site. Within these areas a fairly good blend of escape, nest, brood, and forage cover exists. In the Cecil Webb Wildlife Management Area (Charlotte County, Florida), densities are reported at two to six bobwhites per acre.(33) During the present study, two coveys (8 to 12 birds each) were sighted on the proposed site.

^u
2.7.6.3 Endangered and Threatened Species. The Endangered Species Act of 1973 (PL 93-205), as amended, provides for the protection of endangered and threatened species. Under the rules and regulations of the Florida Game and Freshwater Fish Commission, the commission must preserve and protect endangered and threatened species. Part 2.7 of the Florida Power Plant Site Certification Application requires the applicant to report on the status of any endangered or threatened species which might be affected by the proposed action.

Endangered and threatened animal species were identified from both state listings (34) and federal listings. Table 2.7-5 shows those animal

species which may occur in the area and their status. The following narrative describes the range, some life history, and occurrence on site. No critical habitat for federally listed species occurs within the proposed power plant site.

"There are several animal species which have ranges that include the proposed site that are not discussed in the following sections. None of these species were observed on site. It is unlikely that most of these animals would occur on the property because of lack of preferred habitat. Among this group are several wetland species (i.e., snowy egret, Louisiana heron). During the entire sampling program, there was little standing water in on-site wetlands. [Even during typical rainfall years it is doubtful that these species would occur other than as transient individuals.]

- (1) Florida Panther. The Florida panther is now primarily restricted to Florida with other small populations occurring along some large swamp-river systems in various parts of the Southeast.¹¹ In Florida, Layne (35) included the following counties as having valid reports: Dade, Broward, Palm Beach, Collier, Glades, Hendry, Highlands, Manatee, Pinellas, Martin, St. Lucie, Brevard, Polk, Levy, Alachua, Duval, Walton, and Sarasota.

According to Belden (36), resident populations of panthers in south Florida are centered in the Fakahatchee Strand and a portion of the Big Cypress Preserve. Records of sightings outside these areas, including the proposed site, probably consist of transient panthers. (37)

During terrestrial surveys, no sightings or tracks of the Florida panther were observed. The nearest confirmed sightings were from the Ocala National Forest and the areas west of Lake Okeechobee. Because of habitat disturbance and the lack of remoteness of the area, it is unlikely there would be resident panthers in this region.

- (2)¹¹ Wood Stork. The wood stork, the only American representative of the stork family (Ciconiidae), is a large white bird locally common in southern swamps, freshwater marshes, and ponds. Its

primary foods are fish, frogs, young alligators, and other aquatic animals. The current population appears to be declining throughout south Florida.(38) "

No wood stork were observed on site, and because of the lack of large freshwater marshes, streams, sloughs, or lakes, this species is not likely to occur in significant numbers on the property.

- (3) Red-Cockaded Woodpecker. The following list is a glossary of terms used in association with the red-cockaded woodpecker.(39)
- (a) Cavity. An excavation used by red-cockaded woodpeckers for roosting or nesting at some time during the life of the colony.
 - (b) Cavity Tree. A tree containing one or more red-cockaded woodpecker cavities.
 - (c) Clan. All the red-cockaded woodpeckers that inhabit a colony at a given point in time; generally a mated pair of red-cockaded woodpeckers, their offspring, and their associated helpers.
 - (d) Colony. The area prescribed by an aggregation of start holes and roost, nest, and old cavities habitually used by a clan.
 - (e) Glaze. The covering of resin surrounding a red-cockaded woodpecker cavity entrance or on an adjacent tree facing a cavity; results from deliberate excavation of resin wells by the birds.
 - (f) Nest Cavity. A cavity used by a pair of red-cockaded woodpeckers as a place in which to raise their young, usually the roosting cavity of a male.
 - (g) Nest Tree. A tree containing a nesting cavity.
 - (h) Old Cavity. An enlarged cavity with deteriorating glaze receiving little or no current use.
 - (i) Plate. The exposed wood surrounding a red-cockaded woodpecker cavity entrance.

- (j) Range. The area surrounding a nest cavity required by a clan to fulfill life-cycle requirements. This may include the colony, support stand, breeding territory, seasonal foraging area, or other definable units.
- (k) Resin Well. A hole, generally circular, in the bark of a cavity tree or a tree adjacent to a cavity tree from which resin extends.
- (l) Roost Cavity. A cavity used by a red-cockaded woodpecker only as a shelter, particularly at night and during inclement weather.
- (m) Start Hole. The beginning of a cavity; may never be finished, but if completed, excavation is usually over a period of several months.
- (n) Support Stand. The stand of timber in the immediate vicinity of a colony which may be ecologically definable on the basis of topography, vegetative types, land use patterns, stand conditions, or other logical entities.

Red-cockaded woodpeckers are characterized as inhabiting mature, open pine forests. However, this species will often occur in younger stands if good foraging habitat and a few old, relict trees are available.(40) This bird lives in southern pine forests throughout many of the southern Atlantic and Gulf states, including most of Florida. The decline of this species is due to its specialized habitat requirements, which conflict with the widespread forestry practices of intensive even-aged management in pine forests and culling of substandard trees. If the cavity trees are left undisturbed and if sufficient replacement cavity trees and suitable foraging habitat are available, survival of this species may continue."

Currently, there are 943 red-cockaded woodpecker colonies known to exist in Florida.(41) Of this total, seven colonies were known to occur in Orange County. Five of these colonies are located in the southwestern portion of the county and two in the

eastern. None of these colonies were previously known to occur on site. However, during this study, 19 unreported colonies were located on site or in the immediate vicinity of the project area.

The red-cockaded woodpecker is a non-migratory species. Clans (mated pair plus associated helpers) have been reported to exist through several generations in the same locale for as long as 30 or 40 years. Apparently they exist within a fairly well-defined home range, provided major habitat alterations do not occur within their range.

The home range consists of two aspects--the colony and the foraging habitat. The colony consists of stands of trees containing cavity trees as well as those trees immediately surrounding them. Although cavities may be located in a variety of pine species(42), those on site are located exclusively in longleaf pine. Colonies usually occur in mature (75 years or older), open stands of pines with 50 to 80 square feet of basal area per acre. Most cavities in longleaf pine occur in trees from 63 to 126 years old, usually infected with red heart disease.(43) Understory vegetation is generally less than 15 feet tall.

Most cavities are constructed facing in a westerly direction in living pines. Near the cavity, the birds flake away all bark forming the plate. Small holes (resin wells) are drilled above and below the cavity. Extensive pitch flows from both the plate and resin wells, giving the tree a white glazed appearance. Bark from the entire trunk is continually flaked away, giving the trunk a reddish appearance.

Red-cockaded woodpeckers are insectivorous, feeding mainly on ants, cockroaches, centipedes, spiders, and various insect eggs and larvae. Foraging is concentrated on trunks and limbs of living pine trees. Food is obtained by scaling bark and digging into dead limbs.

Foraging habitat may be over 200 acres in size.(44) Quality of the pine stand will influence the acreage of forage habitat

needed; however, in good stands consisting of pine trees 9 inches and larger in diameter at breast height (DBH), foraging habitat may be as small as 100 acres. Pole-size stands with trees 4 to 9 inches in diameter (DBH) may also be utilized. Sapling stands of pines or dense hardwood stands are seldom utilized by the woodpecker.

During surveys throughout the area, a total of 45 active cavity trees and 35 red-cockaded woodpeckers was observed in the vicinity of the proposed project. Twenty-five of these active cavity trees occur on site and represent nine colonies (see Figure 2.7-5). These nine colonies were visited during seasonal surveys. The number of birds observed per clan is listed in Table 2.7-6. Few red-cockaded woodpeckers were sighted in off-site colony areas; however, each of these identified colonies contained at least one active cavity tree. Four of these off-site clans occur between the southern boundary of the proposed site and the Bee Line Expressway.

Investigation of home range for on-site clans was initiated during the fall survey. As part of this investigation, the Florida Game and Freshwater Fish Commission assisted in banding 18 members of on-site clans. Estimated mean home range during the winter sampling period was 200 acres, with ranges from 126 acres to 380 acres. Home range for Clans A and G included both on-site and off-site lands, whereas the home range of Clans C and D is confined entirely to the site. The quality of habitat [based on basal area (BA) per acre] is variable among the clans, ranging from a BA of 20 (Clans D and G) to a BA of 10 (Clan A). Correspondingly, the home range of Clan A was significantly larger than the home ranges of Clans C, D, and G. Obviously, other factors (such as interclan pressure, individual clan variation, and the amount of preferred habitat) can affect home range size.

Birds were observed to forage in both pine flatwoods and cypress domes. During October and November 1980, approximately 75 per cent of foraging time was spent in pine flatwoods, the remainder in cypress domes. Surveys conducted in February 1981 revealed that approximately 94 per cent of foraging time was spent in pine flatwoods.

All cavities located to date occur exclusively in longleaf pine. Mean age of these trees is 115 years with a diameter (DBH) of 12 inches and a total height of 37 feet (Table 2.7-7). Mean basal area of all colony sites is 20 square feet per acre; the range was 5 to 40 square feet per acre. Basal area in pine flatwoods for the entire site is approximately 15 square feet per acre. For a more complete discussion of these and other parameters concerning red-cockaded woodpeckers, see the results section of the Management Plan for the red-cockaded woodpecker.

- (4) Southern Bald Eagle. In the Southeast, the Southern bald eagle nests primarily in estuaries, along large rivers, and around lakes. In Florida, nest sites are usually located in large pines; however, cypress and mangrove are also utilized. Although the eagle is very adaptable in its food habits, fish seem to be the preferred food.(45) Aside from requiring open water areas with an adequate supply of fish, the bald eagle also requires suitable nest trees close to water. There are currently about 500 pairs of breeding eagles in Florida. There is no known nesting activity in proximity to the proposed development. There have been two recent nesting locations in the eastern portion of Orange County. The Southern bald eagle was sighted on four occasions, just east of the property and along the existing transmission corridor. All four sightings were of adult birds. It is likely that these were transient birds since no other sightings were recorded, and no nests were found on the property.
- (5) Bachman's Warbler. The Bachman's warbler occurs erratically in the river swamps of the southeastern United States. Nesting

sites are usually heavily timbered swamps with dense undergrowth, including cane and palmetto." Because of the scarcity of this animal, it is unlikely that it would occur in the project area. Reasons for decline of this species are obscure, but may include extensive lumbering of bottomland swamps.

- (6) "Kirtland's Warbler. Kirtland's warbler may occur as a rare spring or fall transient throughout the southeastern United States. This warbler apparently breeds only in a restricted area of jack pine forest in southern Michigan." (46) Winter habitat is confined to pinewoods, broadleafed scrub, and Australian pine. This species might occur in the area occasionally during spring and fall migration.
- (7) "Florida Black Bear. Originally, the Florida Black bear ranged throughout Florida. Current populations are mainly centered in Apalachicola, Osceola, and Ocala National Forests, with remnant populations occurring in various parts of the state." According to Hamilton (47), secluded swamps and forests are areas of preferred habitation for bears. Major areas of occupied habitat within the region are located to the east along the St. Johns River and to the north along the Wekiva River. No sightings of bear or bear tracks were observed in the area. The habitat in this area does appear suitable for bears.
- (8) "Florida Scrub Jay. The Florida scrub jay is characteristic of oak scrub communities and is confined mainly to such habitats. The range of this subspecies is restricted to peninsular Florida, primarily along the east coast with scattered populations in the central portion and western coastline of Florida. No populations of Florida scrub jays were previously known to occur close to the proposed site. Because of the sedentary nature of this bird and continued encroachment into its habitat, populations of this subspecies have undergone a decline in recent times."

Surveys for this bird have been conducted in scrub oak communities within the project boundaries as well as some surrounding areas. During these surveys, the estimated number of family units encountered was from four to eight. Scrub jays were sighted on site and in adjacent areas. Several of the birds were observed in the west central and southwestern sections of the property. Since these areas contain discrete scrub oak communities, it is likely that they are occupied by at least two different family units and possibly four. Sightings off site also occurred in several different scrub communities. Thus, it seems that there are at least two different family units in surrounding scrub oak communities. Because of the relatively large amount of scrub oak communities in the area, it is very likely that a significant population of scrub jays exists throughout the region.

(9) American Alligator. The American alligator inhabits marshes and swamps throughout the southeastern United States and occurs regularly in central Florida. No alligators were found on site. In addition, it is unlikely that any significant numbers of alligators occur on site due to the relatively shallow nature of most wetlands and lack of lakes, ponds, or permanent streams. Although alligator populations originally declined due to heavy poaching and habitat destruction, populations in most of the southeastern United States have done well in recent years. Recently, the U.S. Fish and Wildlife Service (48) reclassified the alligator as threatened in all of Florida.

(10) Eastern Indigo Snake. The eastern indigo snake occurs in peninsular Florida, in a few widely scattered areas of the Georgia Coastal Plain, and in parts of the Florida Panhandle. This snake occupies a wide variety of habitat types. In xeric habitats, the shelter provided by gopher tortoise burrows apparently is a critical factor for the survival of this snake. No indigo snakes were observed on site, although one was sighted along the existing

transmission corridor. As with other animals associated with tortoise burrows, the snake collectors' practice of pouring gasoline into these burrows may have deleterious effects on this snake.

- (11) "Short-Tailed Snake. The range of the short-tailed snake is confined entirely to peninsular Florida from Highlands to Columbia Counties. This species occurs chiefly in longleaf pine/turkey oak associations and infrequently in upland oaks proximal to the former. The short-tailed snake is a burrowing animal, seldom occurring above ground except during the spring and fall. Encroachment by man into preferred habitat is the greatest threat to this species." In some instances, thermal stress caused by removal of overstory in sandhills communities has extirpated certain populations of this snake.(49) The forest association (mainly longleaf pine/turkey oak) inhabited by this species are not currently present on the proposed site.
- (12) "Sherman's Fox Squirrel. The range of the Sherman's fox squirrel is limited to peninsular Florida and, perhaps, southeastern Georgia. Longleaf pine/turkey oak forests seem to be the most frequently used habitat, but sand scrub, bayheads, pine flatwoods, and borders of cypress swamps are also used."

Although optimum habitat is not found on site, fox squirrels do inhabit some pine flatwoods and various flatwood-wetland ecotones. Too few fox squirrels were sighted to estimate population levels, but two were sighted along the transmission line and four were observed on the property, two in pine flatwoods and two in cypress domes.

- (13) "Gopher Tortoise. The gopher tortoise is locally distributed in the Coastal Plain from South Carolina and Florida to eastern Louisiana. In Florida, it may be encountered widely in northern sections with relict, scattered populations occurring in suitable habitats in the south. Preferred habitat consists of old field areas, longleaf pine sandhill, live oak hammock, and beach scrub,

usually with abundant herbaceous cover of several types.^h A few burrows may occur in maintained pastures, mixed swamp, and hydric hammock, but generally these habitats are not utilized. Some important burrow symbionts, which may occur in these same habitats, include the pine snake, indigo snake, Florida mouse, and Florida gopher frog. Other commensals include a large number of invertebrates, eastern diamondback rattlesnake, and various mammals. In xeric habitats (e.g., scrub, xeric hammock, and sandhills), the loss of gopher tortoise burrows as a refuge and hibernacula could adversely affect commensal organisms. Reasons for decline include destruction of habitat, fire prevention, unfavorable alteration of habitat by forestry, collection for food or for pet trade, and possibly the practice of introducing gasoline into gopher burrows to drive out snakes.

On-site populations of gopher tortoise are centered mainly on the higher elevation in the western and south-central portion of the property. In these areas, an average of seven active burrows was recorded per mile of survey.

2.7.7 Preferred Corridors--Plant Communities

Figure 2.7-6 shows an overview of the proposed railroad, transmission line, and pipeline corridors in relation to the plant site and surrounding lands. For purposes of this discussion, each corridor has been divided into sections (see Figures 2.7-7, 2.7-8, and 2.7-9). The following discussion on vegetative communities occurring in these corridors is presented in relation to the depicted sections.

2.7.7.1 Railroad Corridor--Section I. A vegetation map of the railroad corridor is shown on Figure 2.7-7. In this section, longleaf pine flatwoods (411) or isolated stands of swamp forest (611) alternate with cattle pasture (210). The swamp forest is dominated by pond cypress (Taxodium ascendens), with scattered slash pine (Pinus elliottii) and bays (Persea palustris, Gordonia lasianthus, Magnolia virginiana). Many of the domes have an open

usually with abundant herbaceous cover of several types. A few burrows may occur in maintained pastures, mixed swamp, and hydric hammock, but generally these habitats are not utilized. Some important burrow symbionts, which may occur in these same habitats, include the pine snake, indigo snake, Florida mouse, and Florida gopher frog. Other commensals include a large number of invertebrates, eastern diamondback rattlesnake, and various mammals. In xeric habitats (e.g., scrub, xeric hammock, and sandhills), the loss of gopher tortoise burrows as a refuge and hibernacula could adversely affect commensal organisms. Reasons for decline include destruction of habitat, fire prevention, unfavorable alteration of habitat by forestry, collection for food or for pet trade, and possibly the practice of introducing gasoline into gopher burrows to drive out snakes.

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depauperate grass understory, severely impacted by cattle. Six domes, scattered among the others, are more diverse and undisturbed. They contain red maple (Acer rubrum), bays, epiphytes (primarily Tillandsia spp.), toothed mid-sorus fern (Blechnum serrulatum), royal fern (Osmunda regalis), cinnamon fern (Osmunda cinnamomea), and other herbaceous species. Shrub cover is dense and consists of Lyonia lucida, dahoon (Ilex cassine), gallberry (Ilex glabra), wax myrtle (Myrica cerifera), and young bays.

Several small wet areas, about 90 to 150 feet in diameter, and dominated by Juncus sp., also occur in the pasture. They are not shown in Figure 2.7-7.

A few oak groves which occur within the flatwoods do not appear in Figure 2.7-7. Water oak (Quercus nigra), laurel oak (Quercus laurifolia), and large individuals of sand-live oak (Quercus geminata) with trunk diameters of 12 to 30 inches formed these groves. Saw palmetto (Serenoa repens) occurs in the understory as in the flatwoods.

2.7.7.2 Railroad Corridor--Section II. Much of the section is interspersed with pasture. The airport is north of the western boundary of the section. Boggy Creek, also in the west, is channelized here. It is clogged with water hyacinth (Eichornia crassipes) and bordered by Carolina willow (Salix caroliniana), groundsel-bush (Baccharis halimifolia), primrose willow (Ludwigia peruviana), and elderberry (Sambucus simpsonii), all indicator species of disturbed conditions. Near the Boggy Creek Road bridge, east of the juncture of Boggy Creek with a very large wetland, in Boggy Creek Swamp, the aquatic vegetation in the channel is more diverse. In addition to water hyacinth, the following species are common: marsh fern (Thelypteris paulstris), marsh pennywort (Hydrocotyle sp.), pellitory (Parietaria floridiana), false nettle (Bohmeria cylindrica), water fern (Salvenia rotundifolia), arrow arum (Peltandra sp.), and Begonia sp. Boggy Creek Swamp appears diverse and undisturbed. It is dominated by cypress and bays.

The western side is predominantly pasture with several small isolated cypress stands. The eastern side is pasture and xeric scrub oak, and also

contains several small cypress stands. Common scrub oak species are Chapman's oak (Quercus chapmanii) and myrtle oak (Quercus myrtifolia).

The railroad corridor has been modified in the eastern portion of Section II to deviate from the original corridor slightly more than 2,000 feet to the southeast. The modified portion lies between State Route 15 and the southernmost bend in the corridor south of Mud Lake. This added corridor area has been surveyed to identify terrestrial communities.

Plant communities in the area of the corridor modification are shown in Figure 2.7-7a. South of Mud Lake, the corridor consists primarily of pasture. Several scattered live oak (Quercus virginiana) and a small stand of longleaf pine (Pinus palustris) are present in the pasture. The central section of the modified corridor crosses longleaf pine flatwoods, a transmission line right-of-way, and xeric oak scrub. Common scrub oak species are Chapman's oak (Quercus chapmanii) and myrtle oak (Quercus myrtifolia). Turkey oak (Quercus laevis) occurs on the ecotone between pine flatwoods and xeric oak scrub. Scattered cypress (Taxodium ascendens) domes and sedge-Hypericum wet prairies occur within the oak scrub and pine communities.

The eastern section of the modified corridor bends northward to join the presently proposed route described in the SCA. Plant communities in this section of the modification are citrus groves, including an area of newly planted trees; longleaf pine flatwoods; and portions of three large cypress or mixed cypress-bay wetlands. Two large wetlands west of the citrus groves experienced a severe fire within the past year, as evidenced by charred cypress and longleaf pine trunks. The southern system has been more adversely affected by the fire. In many areas, 50 per cent of the cypress trees are dead, and shrubs are absent from the ground cover. Dense shrub cover has regrown in the burned portion of the northern wetland. Gallberry and pond pine fringe the northern mixed cypress-bay wetland.

The large mixed cypress-bay wetland in the middle of the citrus groves is surrounded by a canal. The citrus area has been drained, and most of the excess water is routed to this wetland. There are two isolated cypress domes just west of the point where the alternate route rejoins the presently proposed route.

RFM-1

Wildlife habitats occurring along the modified corridor reflect the plant communities present in the area. These habitats include pasture and other disturbed areas, longleaf pine flatwoods, xeric oak scrub, cypress wetlands, and wet prairies. The wildlife of these habitats (excluding pasture) are described in Section 2.7.7. The types of animals using pasture and other disturbed lands in this area often include many species which occur in surrounding habitats, such as longleaf pine flatwoods and xeric oak scrub. Generally, species diversity indices and abundance of wildlife in these disturbed habitats are lower than in surrounding natural communities.

Endangered and threatened plant species for Orange County are listed in Table 2.7-3. None of these listed species were observed during the survey. Plants listed as threatened that could potentially occur in the mixed cypress-bay wetlands are:

Spoon flower (Peltandra sagittifolia)

Florida willow (Salix floridana)

Fall-flowering ixia (Nemastylis floridana)

Hand fern (Opioglossum palmatum)

RFM-1

A survey of federal- and state-protected animal species lists showed a number of threatened and endangered species occurring or potentially occurring in the vicinity of the proposed route. These species and their status are listed in Section 2.7.7 of the SCA document.

The Southern bald eagle (Haliaeetus leucocephalus) was the only observed representative of the listed species, but no eagle nests were found. No red-cockaded woodpeckers (Picoides borealis) were sighted in this area. The relatively young age of most pine stands in this area precludes use of these trees for cavities. There were, however, a few scattered trees old enough to be used by red-cockaded woodpeckers. No cavities or other evidence of use by these woodpeckers were observed.

No evidence of nesting herons, egrets, ibis, or wood storks was observed in surveyed wetlands.

2.7.7.3 Railroad Corridor--Section III. This area is predominantly pasture with scattered cypress and bay stands. Near the western boundary of the section, the corridor intersects a large, mixed-species swamp (631) which borders Red Lake. | 5

2.7.7.4 Railroad Corridor-Section IV. The dominant cover in this portion of the corridor includes flatwoods (411) and pasture (210). Two cypress strands drain into a series of canals intersecting the pasture south of the corridor. Two sand pine communities (413), dominated by Pinus clausa and scrub oaks occur, as well as several isolated domes and wet prairies north of the Bee Line Expressway. | 5

2.7.7.5 Railroad Corridor--Section V. This section extends north of Section IV. It is primarily flatwoods with some xeric scrub oak areas. Several cypress domes are intersected by the corridor.

2.7.7.6 Transmission Line Corridor. The proposed transmission line corridor follows the existing corridor from the substation near Briar Bay Park to the proposed site. The corridor is bordered by pasture, generally too narrow to be shown on the map. The western portion near the substation is urbanized. As shown in Figure 2.7-8, isolated cypress domes (many too small to show on the map), and larger mixed-species swamps alternate with pasture, xeric oak scrub, and one citrus grove which is west of the Little Econlockhatchee River. The Little Econlockhatchee is channelized; high spoil banks covered with dog fennel and other weeds border the channel.

Red maple is the dominant woody plant. Water hyacinths and duckweed (Lemna) are the most abundant aquatic plants. Natural streams or sloughs occur east and west of the channel. Red maple, cypress, elm, and water oak dominate the stream floodplains. Thick leaf litter covers the ground. Wax myrtle is common in the shrub layer. A few tangerine trees, isolated from the citrus orchard west of the stream, are also present.

2.7-31b

The remaining part of the corridor, up to the Econlockhatchee River, consists of longleaf pine flatwoods alternating with cypress, mixed cypress-bay stands, and xeric scrub oak. Cattle graze on either side of the corridor.

2.7.7.7 Pipeline Corridor--Section I. (Deleted)

2.7.7.8 Pipeline Corridor--Section II. (Deleted)

2.7.7.9 Pipeline Corridor--Section III. (Deleted).

RFM-1

2.7.8 Preferred Corridors--Animal Communities

The following narrative describes the occurrence of threatened and endangered species along the railroad, transmission, and pipeline corridors. Figures 2.7-7 and 2.7-8 depict endangered and threatened species observed within these corridors.

All corridors were surveyed for the presence of threatened and endangered species (see Table 2.7-5 for listed species). Endangered species observed along the corridors include the southern bald eagle and red-cockaded woodpecker. Two bald eagles were observed near the existing transmission line corridor (see Figure 2.7-8). These areas were surveyed for nests, and none were observed. The occurrence of red-cockaded woodpecker colonies is indicated on Figures 2.7-7 and 2.7-8. Each colony contained at least one active cavity tree. Red-cockaded woodpeckers were observed in the two colonies depicted on the railroad corridor. None were observed in the colonies within the pipeline corridor.

Threatened species observed within these corridors include the indigo snake and Florida sandhill crane. Although the corridor has several areas of good foraging habitat for sandhill cranes, none contained preferred nesting habitat.

Wetlands within each corridor were also surveyed for nesting egrets, herons, wood storks, and ibis. None were observed.

Saw palmetto, gallberry, wax myrtle, and Lyonia lucida are common understory shrubs in the swamp forests. Saw palmetto is also frequent in the flatwoods. Violets (Viola affinis, Viola septemloba, Viola lanceolata) and sun bonnets (Chaptalia tomentosa) are also present in the flatwoods.

The most sensitive area of the corridor is the Little Econlockhatchee River which would have to be crossed by the pipeline.

Plants listed as threatened by FCREPA (50) that could occur in the area are:

Sandpine scrub	Curtiss milkweed (<u>Asclepias curtissii</u>), Florida bonamia (<u>Bonamia grandiflora</u>).
Longleaf pine flatwoods	
Wetland	Scrub buckwheat (<u>Eriogonum floridanum</u>) Spoon flower (<u>Peltandra sagittifolia</u>) Florida willow (<u>Salix floridana</u>) Fall-flowering ixia (<u>Nemastylis floridana</u>) Hand fern (<u>Ophioglossom palmatum</u>)

These species were not observed during the survey.

2.7.7.9 Pipeline Corridor--Section III. Pastures (210) form the primary land cover along Woodbury Road. Several bayheads (621) are present in the northern portion. Canopy species in the bayheads are pond pine (Pinus serotina), loblolly bay (Gordonia lasianthus), red maple (Acer rubrum), sweet bay (Magnolia virginiana), red bay (Persea palustris), and scattered cabbage palm (Sabal palmetto). Lyonia lucida, dahoon (Ilex cassine), saw palmetto, gallberry, and wax myrtle (Myrica cerifera) form a tall, dense understory. Sphagnum mats cover much of the ground. Drainage ditches border some of the pasture, young pickerelweed (Pontederia cordata) and Ludwigia sp. are present in the ditches. Wet prairies dominated by Hypericum fasciculatum also occur in the pastures.

South of Woodbury Road to the transmission corridor, little evidence of cattle grazing was observed. Xeric oak scrub (421), dominated by myrtle oak, Chapman's oak and sand live oak, alternate with swamp forest and

longleaf pine flatwoods (411). Cypress (611) and pondpine (612) or cypress (611) alone are dominant in the swamp forests.

A creek in this area has been dredged and as a result, the banks are disturbed and weedy. Dominant trees are live oak (Quercus virginiana), cabbage palm (Sabal palmetto), and water ash (Traxinus caroliniana). Bald cypress (Taxodium distichum), sweetbay (Magnolia virginiana), and sweet gum (Liquidambar styraciflua) are also present.

Common shrubs are jessamine (Gelsemium sempervirens), elderberry (Sambucus simpsonii), and viburnum (Viburnum obovatum).

2.7.8 Preferred Corridors--Animal Communities

The following narrative describes the occurrence of threatened and endangered species along the railroad, transmission, and pipeline corridors. Figures 2.7-7, 2.7-8, and 2.7-9 depict endangered and threatened species observed within these corridors.

All corridors were surveyed for the presence of threatened and endangered species (see Table 2.7-5 for listed species). Endangered species observed along the corridors include the southern bald eagle and red-cockaded woodpecker. Two bald eagles were observed near the existing transmission line corridor (see Figure 2.7-8). These areas were surveyed for nests, and none were observed. The occurrence of red-cockaded woodpecker colonies is indicated on Figures 2.7-7, 2.7-8, and 2.7-9. Each colony contained at least one active cavity tree. Red-cockaded woodpeckers were observed in the two colonies depicted on the railroad corridor. None were observed in the colonies within the pipeline corridor.

Threatened species observed within these corridors include the indigo snake and Florida sandhill crane. Although the corridor has several areas of good foraging habitat for sandhill cranes, none contained preferred nesting habitat.

Wetlands within each corridor were also surveyed for nesting egrets, herons, wood storks, and ibis. None were observed. ¹¹

2.7.9 References

- (1) Division of State Planning, The Florida Land Use and Cover Classification System: A Technical Report, State of Florida, Department of Administration, Tallahassee, Florida, 1976.
- (2) W. A. White, Some Geomorphic Features of Central Peninsular Florida, Bulletin No. 41, Florida Geological Survey, 1958, p. 92.
- (3) R. G. Leighty, et al., Soil Survey of Orange County, Florida, Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C., 1960.
- (4) Leighty, et al., p. 21.
- (5) J. A. Edmisten, The Ecology of the Florida Pine Flatwoods, Ph.D. Dissertation, University of Florida, Gainesville, Florida, 1963.
- (6) Leighty, et al., p. 27.
- (7) Leighty, et al., p. 29.
- (8) C. H. Wharton, H. T. Odum, K. Ewel, M. Dueuer, A. Lugo, R. Boyt, J. Bartholomew, E. DeBelleriue, S. Brown, M. Brown, and L. Deuner, Forested Wetlands--Their Management and Use, Florida Division of State Planning, Tallahassee, Florida, 1977, p. 14.
- (9) K. C. Ewel and W. J. Mitsch, "The Effects of Fire on Species Composition in Cypress Dome Ecosystems," The Florida Scientist, 41, (1978), pp. 24-31.
- (10) Edmisten, pp. 52-72.
- (11) D. H. Hirth and W. R. Marion, "Bird Communities of a South Florida Flatwoods," Florida Scientist, 42, 3, (1979), pp. 142-151.
- (12) G. E. Woolfenden, "Breeding Birds of Three Scrub Habitats in Florida," Audubon Field Notes, 23, (1969), pp. 732-738.
- (13) C. H. Wharton, et al., p. 26.
- (14) Florida Game and Freshwater Fish Commission, Endangered and Threatened Species Included in the Wildlife Code, Tallahassee, Florida, 1974.
- (15) Edmisten, pp. 52-72.
- (16) A. M. Laessle, "The Origin and Successional Relationship of Sandhill Vegetation and Sand-Pine Scrub," Ecological Monographs, 28, (1958), pp. 361-387.
- (17) P. A. Veno, "Successful Relationships of Five Florida Plant Communities," Ecology, 57, (1976), pp. 498-508.
- (18) Leighty, et al., p. 61.
- (19) R. E. Peters and C. R. Lee, "The Potential of Overload Flow to Treat Runoff Water in the Kissimmee River Valley and Taylor Creek-Nubbin Slough Watersheds," in Environmental Quality Through

Wetlands Utilizations, M. A. Drew, ed., Coordinating Council on the Restoration of the Kissimmee River Valley and Taylor Creek-Nubbin Slough Basin, Tallahassee, Florida, 1978.

- (20) G. S. Deghi, K. C. Ewel, and W. J. Mitsch, "Effects of Sewage Effluent Application on Litter Fall and Litter Decomposition in Cypress Swamps," Journal of Applied Ecology, 17, (1980), pp. 397-408.
- (21) C. F. Jordan and R. Herrera, "Tropical Rain Forests: Are Nutrients Really Critical?" The American Naturalist, 117, (1981), pp. 167-180.
- (22) U.S. Fish and Wildlife Service, "Republication of List of Endangered and Threatened Plants," Federal Register, 45 (May 20, 1980), pp. 33780-33781.
- (23) U.S. Fish and Wildlife Service, "Endangered and Threatened Plants: Review of Plant Taxa for Listing as Endangered and Threatened Species," Federal Register, 45, 242 (December 15, 1980), pp. 82480-82569.
- (24) Florida Committee on Rare and Endangered Plants and Animals, Plants, Volume 5, University Presses of Florida, Gainesville, Florida, 1978.
- (25) R. L. Marchinton and L. K. Jeter, "Telemetric Study of Deer Movement-Ecology in the Southeast," Proceedings of the Southeastern Association of Game and Fish Commissioners, 20, (1966), pp. 189-206.
- (26) R. L. Marchington, "Telemetrically Determined Movement and Activity Parameters of White-Tailed Deer (*Odocoileus virginianus*) in the Southeastern United States," Bulletin of the Ecological Society of America, 49, (1968), pp. 66-67.
- (27) J. L. Byford, Movements and Ecology of White-Tailed Deer in a Logged Floodplain Habitat, M. S. Thesis, Auburn University, Auburn, Alabama, 1970.
- (28) F. B. Golley, Mammals of Georgia, University of Georgia Press, Athens, Georgia, 1962.
- (29) R. Willis, A Technique for Estimating Potential Wildlife Populations Through Habitat Evaluations, Pittman-Robertson Game Management Technical Series No. 23, Kentucky Department of Fish and Wildlife Resources, Lexington, Kentucky, 1975.
- (30) Personal Communication, C. Riddick, Manager of Local Hunting Club, 1981.
- (31) J. A. Powell, The Florida Wild Turkey, Technical Bulletin No. 8, Florida Game and Freshwater Fish Commission, Tallahassee, Florida, 1965, p. 28.

- (32) L. Williams, "Talk About Turkeys," Florida Wildlife, 26, 5, (1972), pp. 24-29.
- (33) C. M. Loveless, The Mobility and Composition of Bobwhite Quail Populations in South Florida, Technical Bulletin No. 4, Florida Game and Freshwater Fish Commission, Tallahassee, Florida, 1958.
- (34) Florida Game and Freshwater Fish Commission, Endangered and Threatened Species Included in the Wildlife Code, Tallahassee, Florida, 1979.
- (35) Y. N. Layne, J. A. Stallup, G. E. Woolfender, M. N. McCauley, and D. Y. Worley, Archbold Biological Station, Fish and Wildlife Inventory of the Central Florida Phosphate Industry Areawide Environmental Impact Study, prepared for U.S. Fish and Wildlife Service.
- (36) Personal Communication, R. C. Beldon, Wildlife Research Laboratory, Florida Game and Fish Commission, Gainesville, Florida, 1979.
- (37) R. C. Beldon, Florida Panther Investigation--A 1978 Progress Report, Wildlife Symposium, University of Georgia, Center for Continuing Education, Athens, Georgia, 1978.
- (38) J. A. Kushlan and D. A. White, "Nesting and Wading Bird Populations in Southern Florida," Florida Scientist, 40, 1 (1977), pp. 65-72.
- (39) W. W. Baker, R. L. Thompson, and R. T. Engstrom, "The Distribution and Status of Red-Cockaded Woodpecker Colonies in Florida: 1969-1978," Florida Field Naturalist, 8, 2 (1980), pp. 41-45.
- (40) R. G. Hooper, A. F. Robinson, Jr., and J. A. Jackson, The Red-Cockaded Woodpecker: Notes on Life History and Management, General Report SA-GR-9, U.S. Department of Agriculture, Forest Service, Atlanta, Georgia, 1980, p. 8.
- (41) Baker, et al., pp. 41-45.
- (42) Hooper, et al., p. 8.
- (43) Hooper, et al., p. 8.
- (44) U.S. Fish and Wildlife Service, 1979 Red-Cockaded Woodpecker Recovery Plan, U.S. Fish and Wildlife Service in Cooperation with the Recovery Team, 1979.
- (45) C. Snow, Habitat Management Series for Endangered Species: Southern Bald Eagle and Northern Bald Eagle, Report No. 5, U.S. Bureau of Land Management, 1973.
- (46) H. Mayfield, The Kirtland's Warbler, Cranbrook Institute of Science, Bloomfield Hills, Michigan, 1960.
- (47) W. J. Hamilton, Jr., The Mammals of Eastern United States: An Account of Recent Land Mammals Occurring East of the Mississippi, Comstock Press, Ithaca, New York, 1943.

- (48) U.S. Fish and Wildlife Service, "Endangered and Threatened Wildlife and Plants: Reclassification of an American Alligator to Threatened Status in Certain Parts of Its Range," Federal Register, 42, 6 (1977), pp. 2071-2077.
- (49) H. W. Campbell, "Short-Tailed Snake," in Inventory of Rare and Endangered Biota of Florida (Interim Microfiche Edition), Florida Audubon Society and Florida Defenders of the Environment, Gainesville, Florida, 1976.
- (50) Florida Committee on Rare and Endangered Plants and Animals, pp. 1-176.

TABLE 2.7-1. PLANT COMMUNITIES ON THE PROPOSED CURTIS H. STANTON ENERGY CENTER SITE

<u>Community</u>	<u>Acres</u>	<u>Per Cent of Total Area</u>
Uplands		
Pine Flatwoods (411)*	2,631	82
Xeric Oak Scrub (421)	<u>166</u>	<u>5</u>
Total Uplands	2,797	87
Wetlands		
Pond Cypress (611)	221	7
Pond Pine (612)	12	<1
Bay Hardwood (621)	42	1
Oak Hardwood (621)	12	<1
Mixed Species (631)	72	2
Wet Prairie (641)	<u>44</u>	<u>1</u>
Total Wetlands	403	12

*Florida Land Use and Cover Classification designation in parentheses.

SOURCE: ESE, 1981.

TABLE 2.7-2. COMPARISON OF MAJOR FORESTED WETLAND COMMUNITIES

<u>Characteristic</u>	<u>Cypress Stand</u>	<u>Bay Stand</u>	<u>Oak Hardwood Stand</u>
Trees per acre	460	685	284
Mean basal area of two most dominant trees (in ²)	42,600	24,160	91,720
Number of tree species	5	5	10
Shrub percent cover	40	50	13
Number of shrub species	11	12	7
Herbaceous percent cover	52.7	34.3	15.4
Number of herbaceous species	26	19	18

SOURCE: ESE, 1981.

TABLE 2.7-3. RARE, THREATENED, AND ENDANGERED PLANT SPECIES KNOWN TO OCCUR IN ORANGE COUNTY

<u>Species</u>	<u>Family</u>	<u>Common Name</u>	<u>Favored Habitat</u>	<u>Status</u>
<u>Ophioglossum palmatum</u>	Ophioglossaceae	Hand Fern	Inside base of <u>Sabal palmetto</u> in moist, very shaded hammocks	Endangered
<u>Rhapidophyllum hystrix</u>	Palmae	Needle Palm	On limestone in deep hammocks or bottom of spring-fed stream bottoms	Threatened
<u>Peltandra sagittifolia</u>	Araceae	Spoonflower	Variety of wet areas	Rare
<u>Nemastylis florida</u>	Iridaceae	Full-flowering Ixia	Variety of wet habitats: hammocks, marshes, low flatwoods	Threatened
<u>Eriogonum floridanum</u>	Polygonaceae	Scrub Buckwheat	In association with longleaf pine on well-drained sandy soils	Threatened
<u>Salix floridana</u>	Salicaceae	Florida Willow	Very wet soils in dense, swampy woods	Rare
<u>Drosera intermedia</u>	Droseraceae	Water Sundew	Clear streams or ponds and bogs	Rare
<u>Asclepias curtissii</u>	Asclepiadaceae	Curtiss Milkweed	In scrub on leached white sand	Threatened
<u>Bonamia grandiflora</u>	Convolvulaceae	Florida Bonamia	In scrub on leached white sand	Threatened

SOURCES: Florida Committee on Rare and Endangered Plants and Animals, 1978.
ESE, 1981.

TABLE 2.7-4. COMMON MAMMALS ON THE PROPOSED CURTIS H. STANTON ENERGY CENTER SITE

<u>Species</u>	<u>Estimated Density</u>	<u>Habitat</u>
Opossum	0-2 per acre	Pine flatwoods
Raccoon	1 per 20 acres	Mixed habitat
Striped skunk	0-1 per acre	Pine flatwoods
Gray squirrel	6 per acre	Floodplain forest
Fox squirrel	2 per acre	Pine flatwoods
Cottontail rabbit	0-2 per acre	Old field/flatwoods
Marsh rabbit	1 per acre	Pine flatwoods
White-tailed deer	1 per 17 acres	Mixed habitat

SOURCE: ESE, 1981.

TABLE 2.7-5. STATUS OF ENDANGERED AND THREATENED SPECIES AND SPECIES OF SPECIAL CONCERN WHOSE RANGES INCLUDE THE PROPOSED SITE

Common Name	Scientific Name	Status*		Comments
		Federal	State	
REPTILES				
Gopher tortoise	<u>Gopherus polyphemus</u>	-	S	Occupies dry sandy soils; Habitat--flatwoods; Oak scrub--present.
American alligator	<u>Alligator mississippiensis</u>	T	S	Habitat--marsh, stream, pond--none observed.
Eastern indigo snake	<u>Drymarchon corais couperi</u>	T	T	Varied habitat--sighted on corridor.
BIRDS				
Wood stork	<u>Mycteria americana</u>	-	E	Wetlands---none observed.
Red-cockaded woodpecker	<u>Picoides borealis</u>	E	T	Restricted primarily to mature pine flatwoods; Present.
Bachman's warbler	<u>Vermivora bachmanii</u>	E	E	Possible only as a very rare migrant.
Kirtland's warbler	<u>Dendroica kirtlandii</u>	E	E	Possible only as a very rare migrant.
Southern bald eagle	<u>Haliaeetus l. leucocephalus</u>	E	T	No known nesting on site, but seen in area.
Southeastern American kestrel	<u>Falco sparverius paulus</u>	-	T	Site is within breeding range.
Florida sandhill crane	<u>Grus canadensis pratensis</u>	-	T	Nests in shallow emergent fresh marsh vegetation; Present.

(1 of 2)

TABLE 2.7-5 (Continued). STATUS OF ENDANGERED AND THREATENED SPECIES AND SPECIES OF SPECIAL CONCERN
WHOSE RANGES INCLUDE THE PROPOSED SITE

Common Name	Scientific Name	Status*		Comments
		Federal	State	
BIRDS (Continued)				
Florida scrub jay	<u>Aphelocoma c. coerulescens</u>	-	T	Restricted to xeric oak scrubs. Present.
Little blue heron	<u>Florida caerulea</u>	-	S	Wetlands, mainly marshes--none observed.
Great egret	<u>Casmerodius albus</u>	-	S	Wetlands, mainly marshes--none observed.
Snowy egret	<u>Egretta thula</u>	-	S	Wetlands, mainly marshes--none observed.
Louisiana heron	<u>Hydranassa tricolor</u>	-	S	Wetlands, mainly marshes--none observed.
Florida burrowing owl	<u>Athene cunicularia floridana</u>	-	S	None observed.
MAMMALS				
Florida panther	<u>Felis concolor coryi</u>	E	E	Varied habitat, no recent confirmed sightings.
Florida black bear	<u>Ursus americanus floridanus</u>	-	T	Preferred habitat is thick swamps. None observed.
Sherman's fox squirrel	<u>Sciurus niger shermani</u>	-	S	Flatwoods. Present.

*E = Endangered; S = Special concern; and T = Threatened.

SOURCES: Florida Game and Freshwater Fish Commission, 1979; U.S. Fish and Wildlife Service, 1980; and ESE, 1981.

TABLE 2.7-6. DATA DESCRIPTION OF RED-COCKADED WOODPECKER ON THE PROPOSED SITE

Clan	Number of Birds	Number of Cavity Trees		Area acres	Basal Area** ft ² /acre	Home Range	
		Active	Abandoned*			Pine Flatwoods %	Wetlands %
A	2	2	4	380	10	78	22
B	2	2	4	NA	NA	NA	NA
C	3	2	9	127	15	97	3
D	3	4	8	138	20	83	17
E	4	4	2	NA	NA	NA	NA
F	3	3	3	NA	NA	NA	NA
G	2	3	4	172	20	91	9
H	5	4	3	NA	NA	NA	NA
I	2	2	1	NA	NA	NA	NA
TOTAL	26	26	38	--	--	--	--
AVERAGE	3	2.9	4.2	204	--	87	13

*Abandoned and start hole cavity trees.

**Basal Area (BA) = Cross-sectional area of trees at breast height.

NOTE: NA = Not determined.

SOURCE: ESE, 1981.

TABLE 2.7-7. CHARACTERISTICS OF RED-COCKADED WOODPECKER COLONIES ON THE PROPOSED CURTIS H. STANTON ENERGY CENTER SITE

<u>Colony</u>	<u>No. of Cavity Trees*</u>	<u>Tree Diameter**</u>		<u>Average Tree Age years</u>	<u>Basal Area ft²/acre</u>
		<u>Average inches</u>	<u>Range inches</u>		
A	6	12.1	10.4-13.1	135	40
B	6	11.2	11.2	NA	5
C	11	11.0	9.7-13.6	88.5	15
D	12	14.6	11.4-16.9	135	25
E	6	10.5	8.7-11.5	108.5	15
F	6	9.9	7.9-11.4	120	5
G	7	15.4	14.6-16.6	125.5	30
H	7	10.9	10.0-11.3	NA	15
I	3	10.7	10.4-11.0	NA	15

*Includes active, inactive, and start hole cavity trees.

**Diameter at breast height.

NOTE: NA = Not determined.

SOURCE: ESE, 1981.

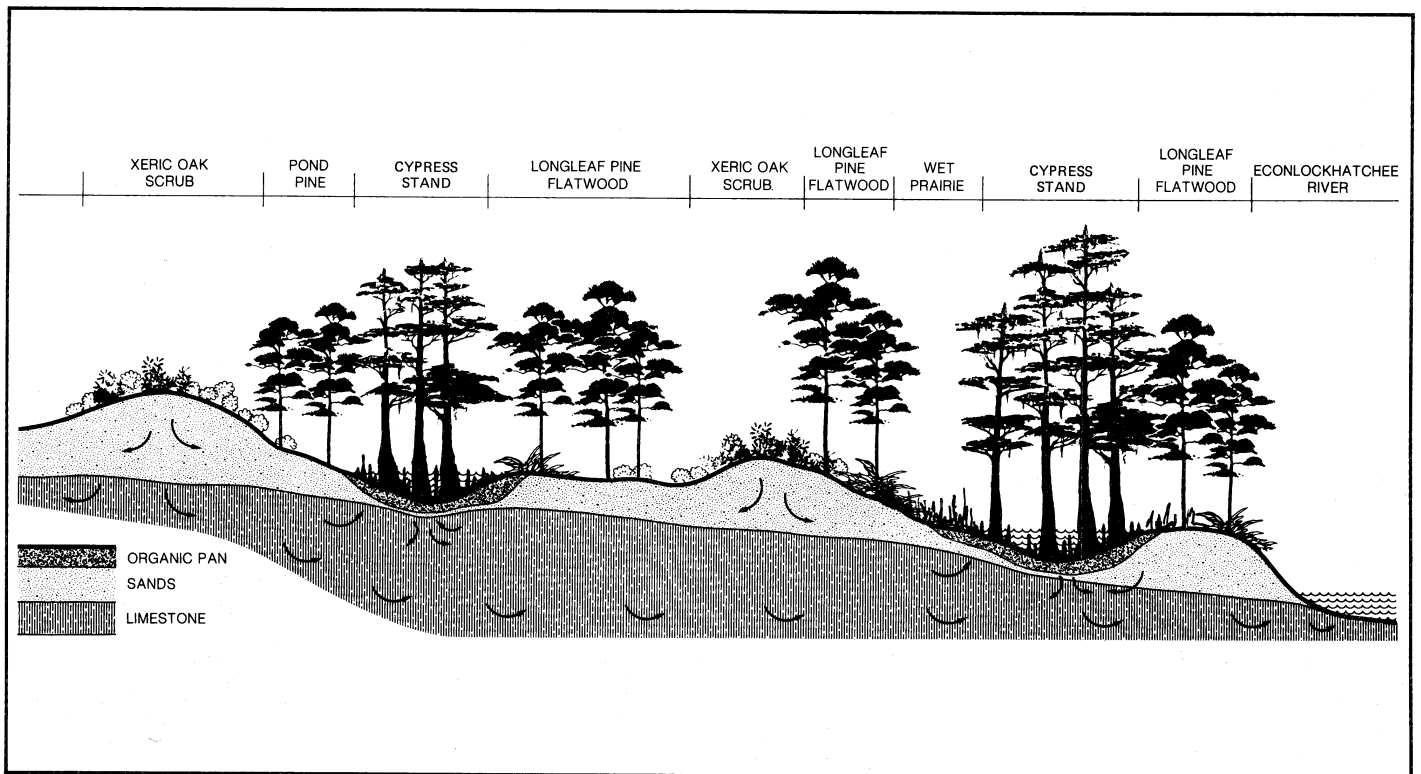


Figure 2.7-1 CROSS SECTION OF THE PROPOSED SITE-CONCEPTUALIZED PLANT/SOIL/WATER RELATIONSHIPS

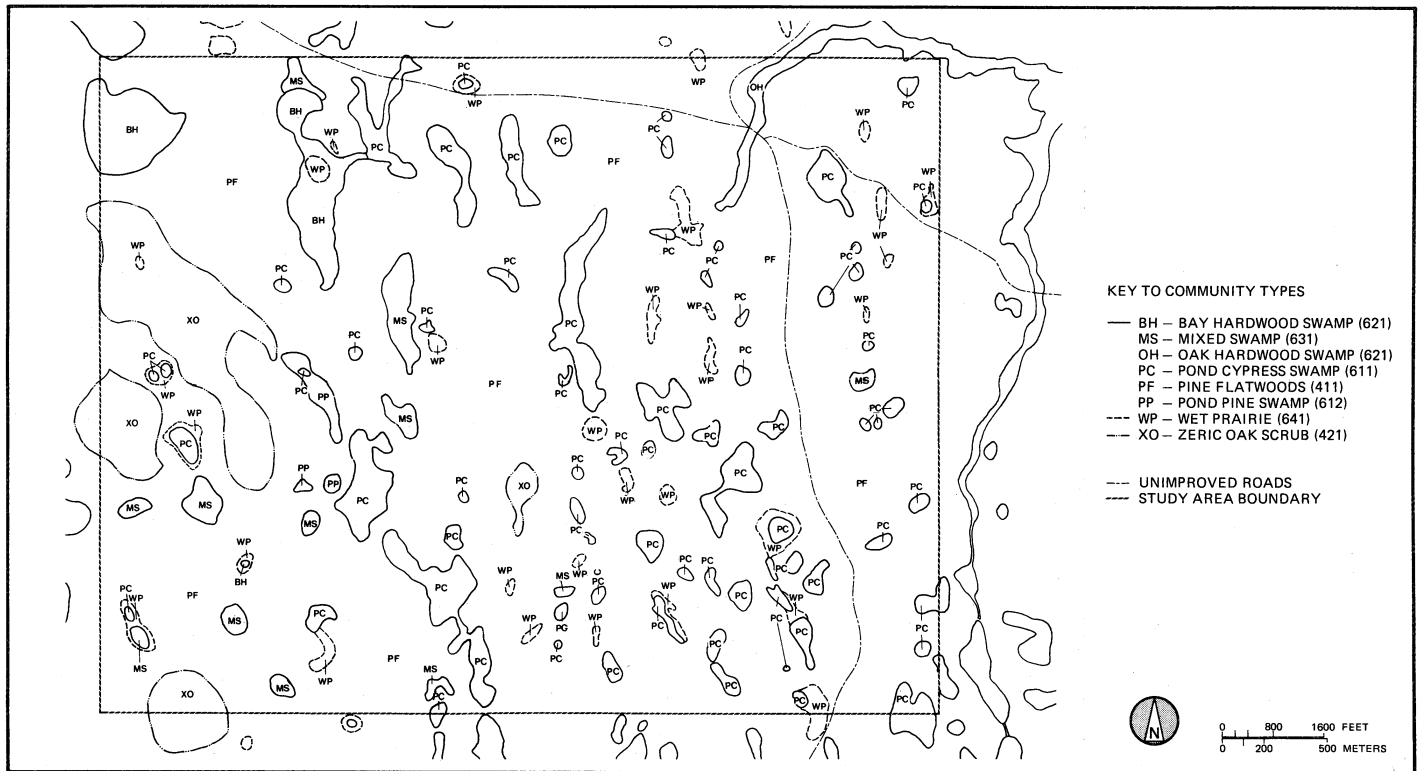
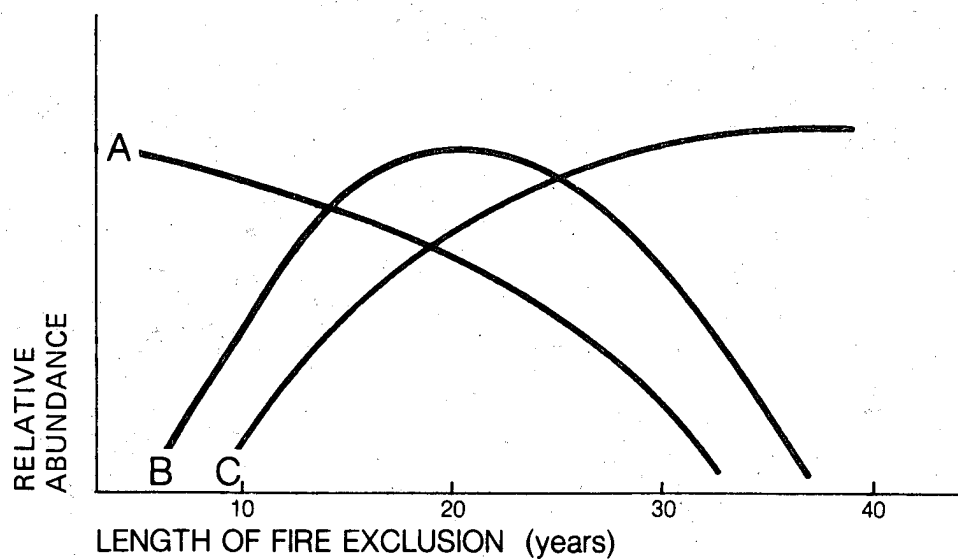
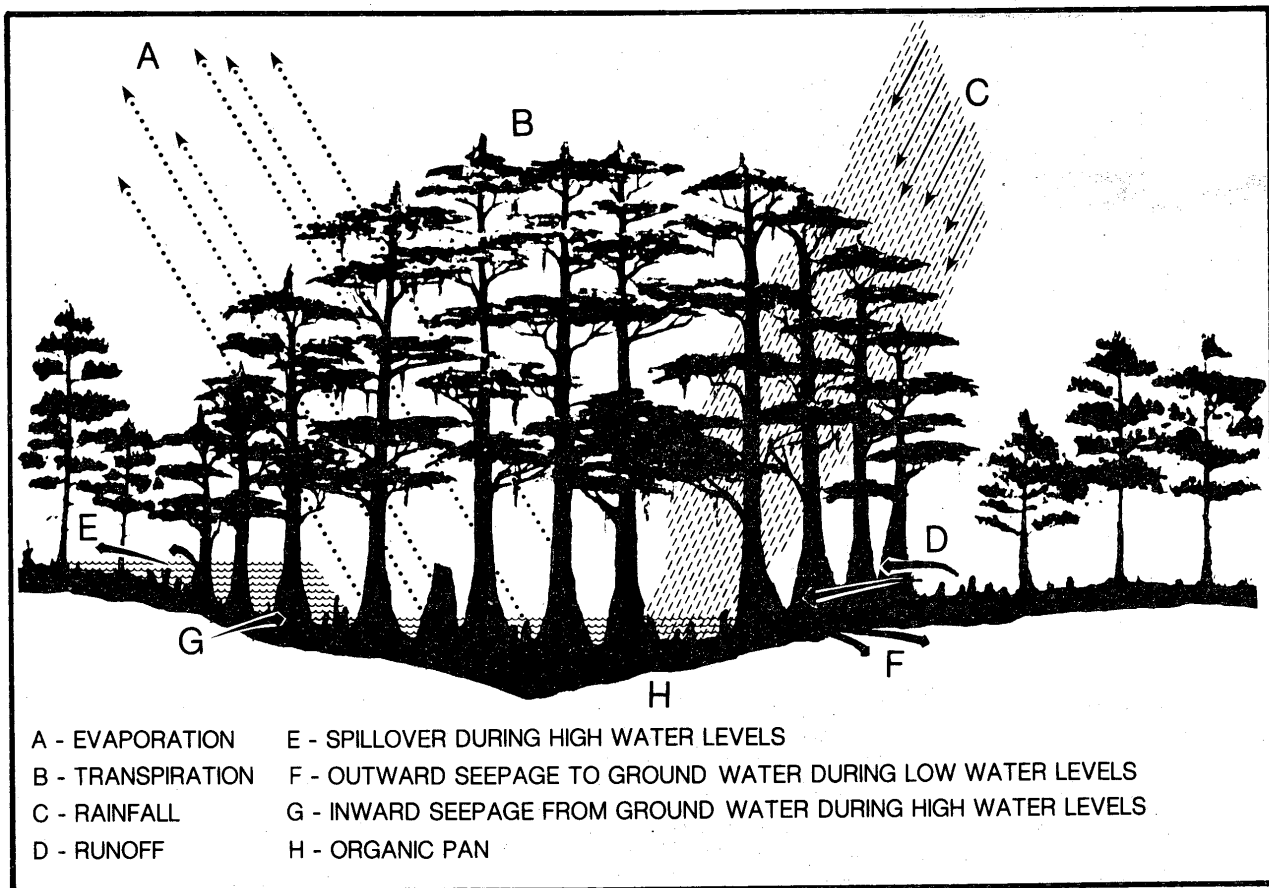


Figure 2.7-2 VEGETATIVE COMMUNITIES OF THE PROPOSED SITE



	A	B	C
FLATWOODS	Characteristic grasses and forbs Longleaf pine Pond pine (slower rate of decline than longleaf) Density of organic pan Extreme water level fluctuations	Sweet gum Saw palmetto Gallberry Lyonia Vaccinium Gaylussacia Species richness	Live oak Wax myrtle Laurel oak Soil organic matter Soil nitrate Soil calcium Total canopy cover Water retention capacity Microorganisms
WETLANDS	Cypress Pond pine	Bay species Swamp tupelo Red maple	Water oak Peat Laurel oak Live oak Persimmon
OAK SCRUB	Scrub oak species Lyonia		Live oak and other evergreen hardwoods

Figure 2.7-3 SUCCESSIONAL CHANGES IN THE ABSENCE OF FIRE



SOURCE: WHARTON et al , 1976.

Figure 2.7-4 WATER MOVEMENT THROUGH A CYPRESS DOME

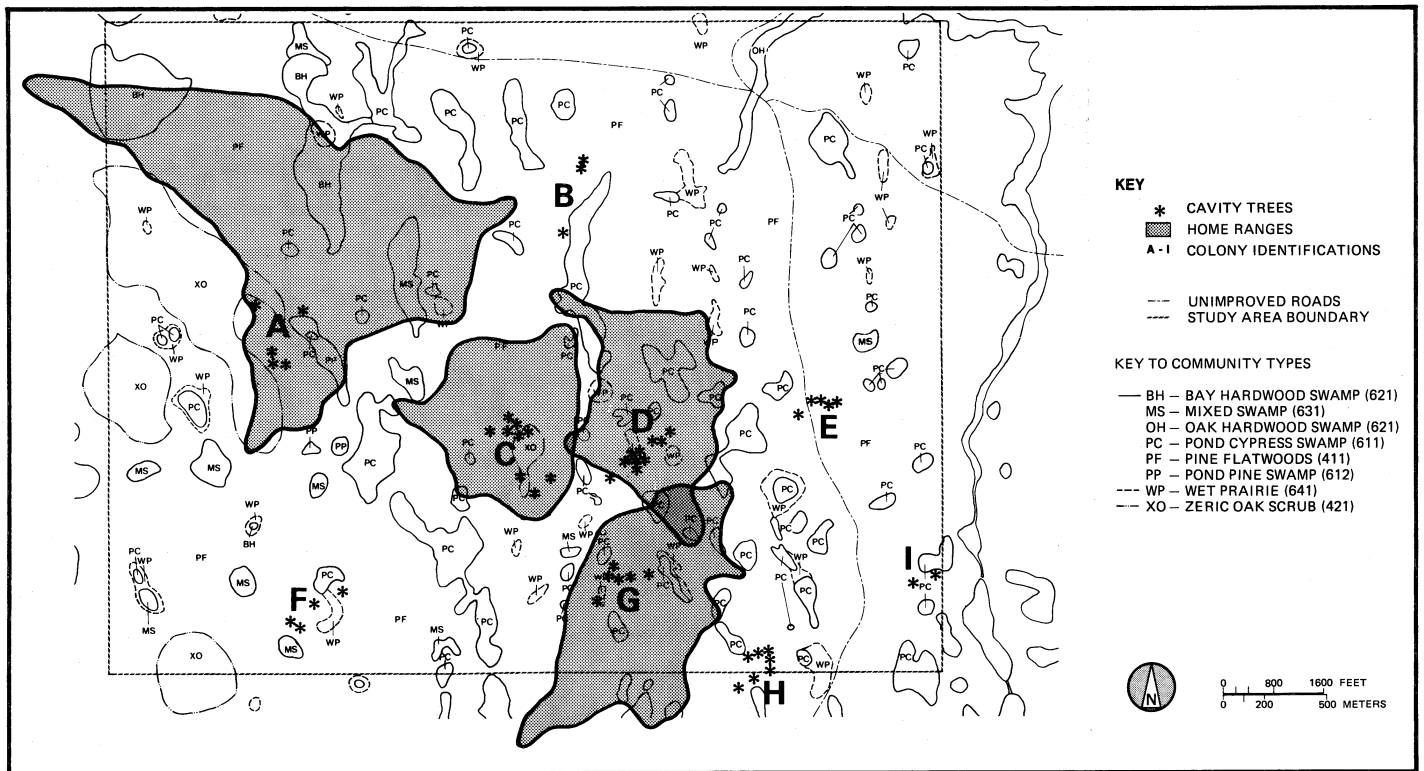


Figure 2.7-5 RED-CKADEED WOODPECKER COLONY SITES AND HOME RANGES ON THE PROPOSED SITE

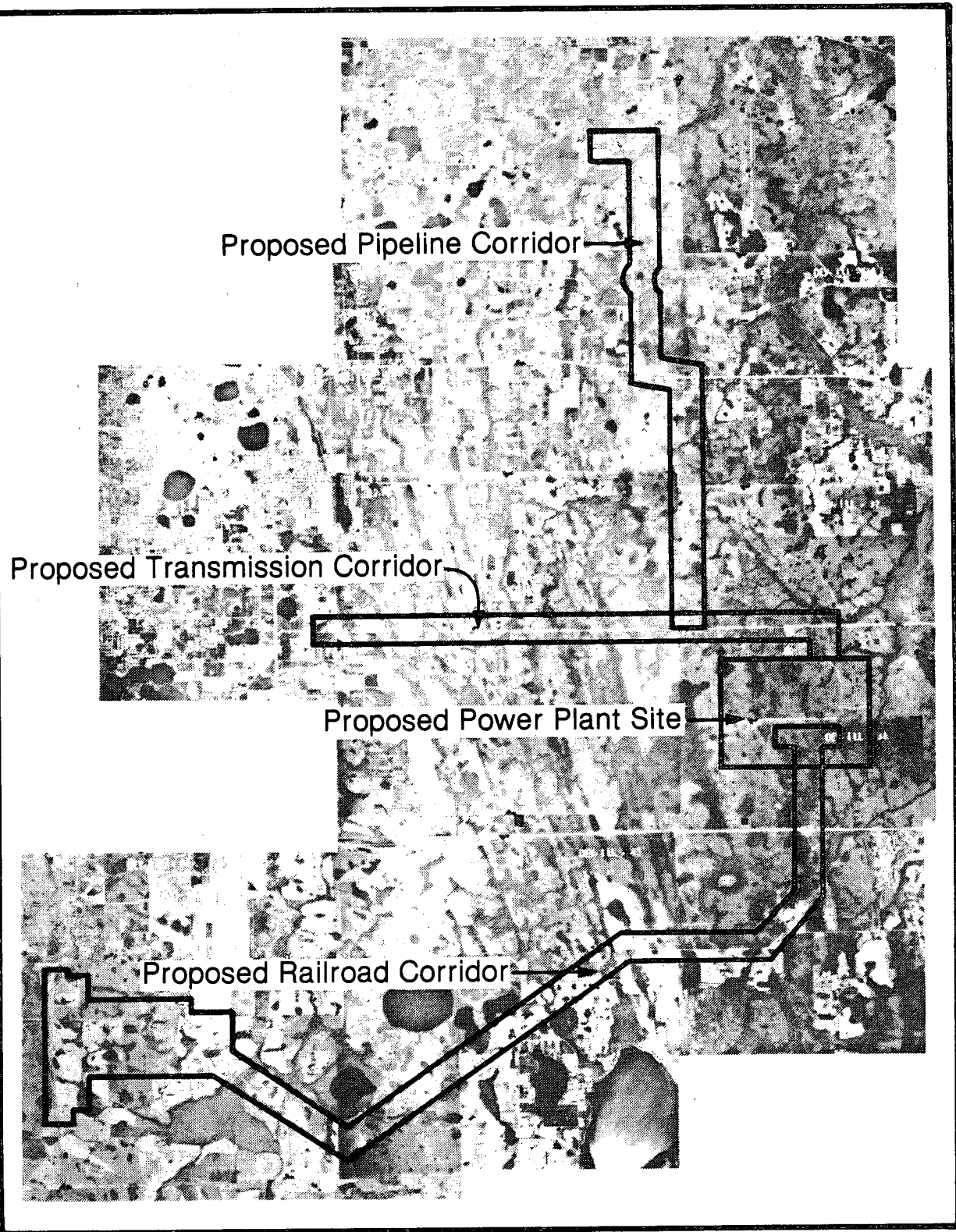


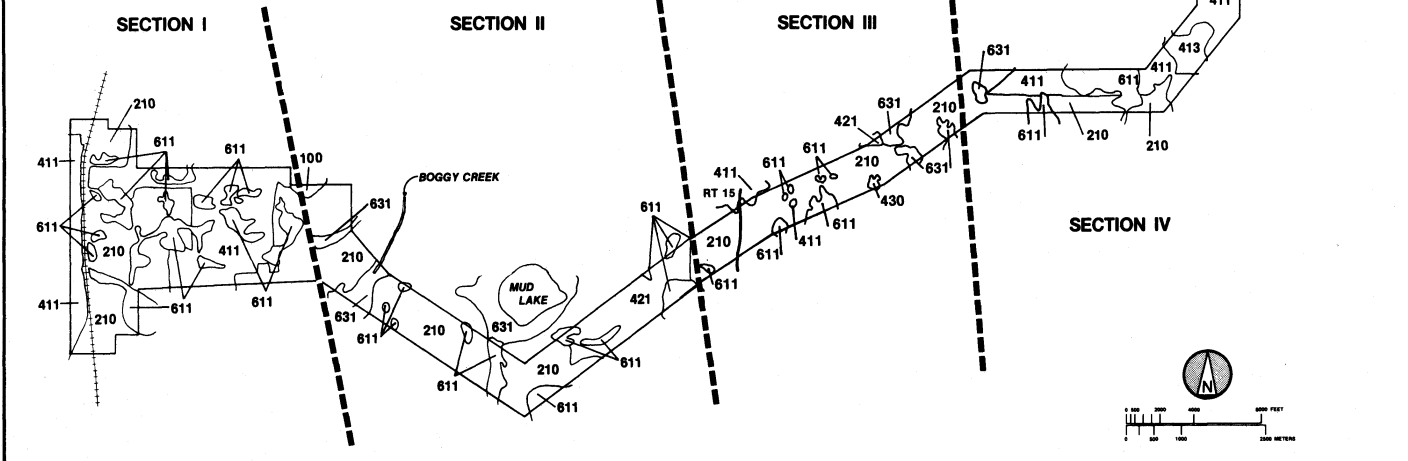
Figure 2.7-6. AERIAL PHOTO SHOWING LOCATIONS
OF PROPOSED CORRIDORS AND PRO-
POSED POWER PLANT SITE

KEY TO COMMUNITY TYPES

- 100 - URBAN
- 210 - PASTURE OR CROPLAND
- 230 - CITRUS GROVES
- 411 - PINE FLATWOODS
- 412 - LONGLEAF PINE
- 413 - SAND PINE SCRUB
- 421 - XERIC OAK
- 563 - OTHER WATER AREAS
- 611 - CYPRESS
- 612 - POND PINE
- 621 - HARDWOOD FRESHWATER SWAMP
- 631 - MIXED FOREST
- 641 - FRESHWATER MARSH
- 430 - MIXED UPLAND FOREST

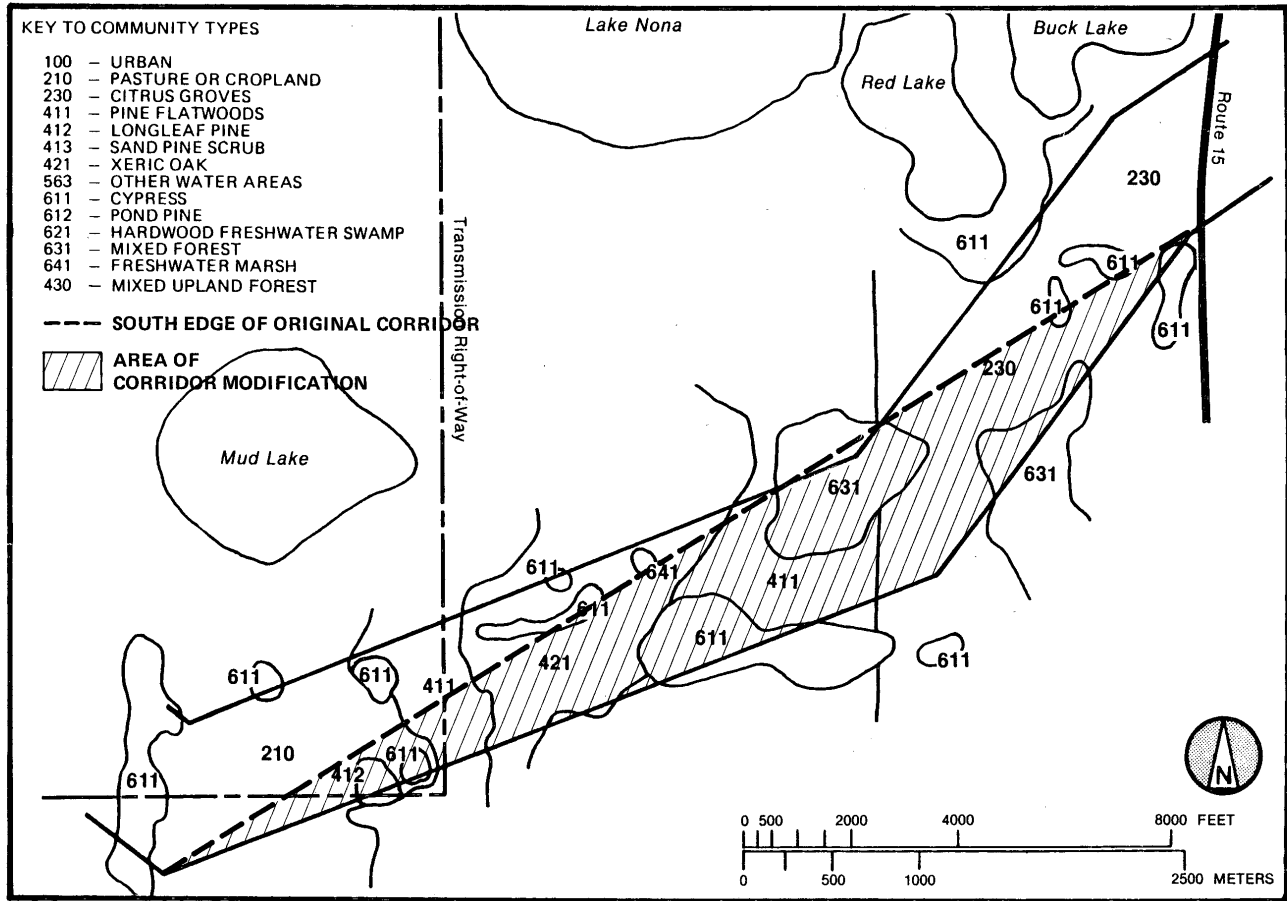
KEY TO OCCURRENCE OF ENDANGERED SPECIES

- ★ BALD EAGLE
- INDIGO SNAKE
- * RED COCKADED WOODPECKER COLONY



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Figure 2.7-7 VEGETATIVE COMMUNITIES AND OCCURRENCE OF ENDANGERED SPECIES WITHIN THE PROPOSED RAILROAD CORRIDOR



RFM-1

FIGURE 2.7-7a. VEGETATIVE COMMUNITIES WITHIN THE MODIFIED RAILROAD CORRIDOR

KEY TO COMMUNITY TYPES

- 100 - URBAN
- 210 - PASTURE OR CROPLAND
- 230 - CITRUS GROVES
- 411 - PINE FLATWOODS
- 412 - LONGLEAF PINE
- 413 - SAND PINE SCRUB
- 421 - XERIC OAK
- 563 - OTHER WATER AREAS
- 611 - CYPRESS
- 612 - POND PINE
- 621 - HARDWOOD FRESHWATER SWAMP
- 631 - MIXED FOREST
- 641 - FRESHWATER MARSH

KEY TO OCCURRENCE OF ENDANGERED SPECIES

- ★ BALD EAGLE
- INDIGO SNAKE
- * RED-COCKADED WOODPECKER COLONY

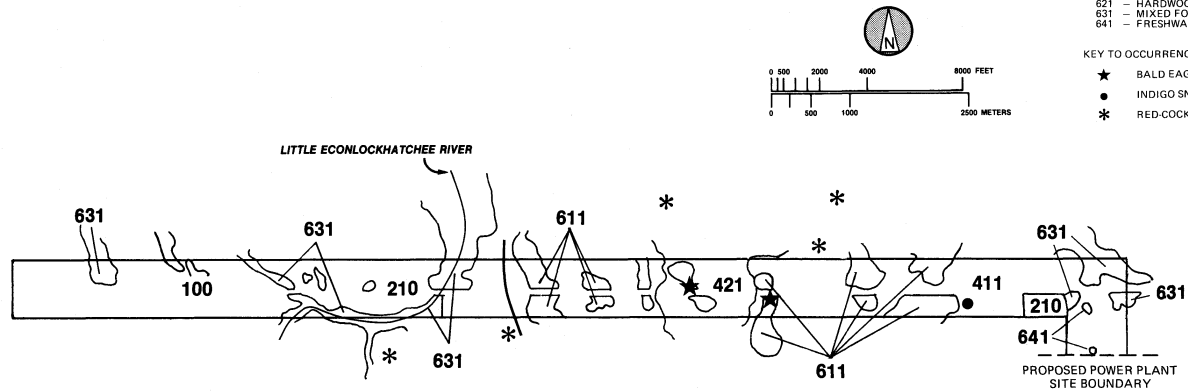
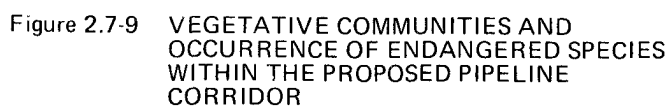


Figure 2.7-8 VEGETATIVE COMMUNITIES AND OCCURRENCE OF ENDANGERED SPECIES WITHIN THE PROPOSED TRANSMISSION LINE CORRIDOR



APPENDIX 2.7A
SPECIES LISTS

TABLE 2.7A-1. SPECIES COMPOSITION OF VEGETATION COMMUNITIES ON THE PROPOSED SITE

Scientific Name	Common Name	Vegetation Communities					
		Pine Flatwoods	Xeric Oak	Pond Cypress Swamp	Pond Pine Swamp	Bay Hardwood Swamp	Oak Hardwood Swamp
TREES							
<u>Acer rubrum</u> var. <u>trilobum</u>	Red maple						X
<u>Broussonetia papyrifera</u>	Paper mulberry						X
<u>Cornus foemina</u>	Stiff cornel dogwood						X
<u>Diospyros virginiana</u>	Persimmon						X
<u>Gordonia lasianthus</u>	Loblolly bay					X	
<u>Ilex cassine</u>	Dahoon holly			X	X	X	
<u>Magnolia virginiana</u>	Sweet bay magnolia			X		X	X
<u>Nyssa biflora</u>	Black gum			X		X	
<u>Persea palustris</u>	Swamp red bay					X	
<u>Pinus palustris</u>	Long-leaf pine	X					
<u>P. serotina</u>	Pond pine	X		X	X	X	
<u>Q. geminata</u>	Sand live oak		X				
<u>Q. laevis</u>	Turkey oak		X				
<u>Q. laurifolia</u>	Laurel oak						X
<u>Q. nigra</u>	Water oak						X
<u>Q. virginiana</u>	Live oak						X
<u>Sabal palmetto</u>	Cabbage palm	X					X
<u>Taxodium ascendens</u>	Pond cypress			X		X	

(1 of 12)

TABLE 2.7A-1 (Continued). SPECIES COMPOSITION OF VEGETATION COMMUNITIES ON THE PROPOSED SITE

Scientific Name	Common Name	Vegetation Communities					
		Pine Flatwoods	Xeric Oak	Pond Cypress Swamp	Pond Pine Swamp	Bay Hardwood Swamp	Oak Hardwood Swamp
SHRUBS							
<u>Asimina reticulata</u>	Pawpaw	X					
<u>Baccharis halimifolia</u>	Groundsel bush			X			
<u>Befaria racemosa</u>	Tar flower	X	X				
<u>Callicarpa americana</u>	Beauty bush						X
<u>Cephalanthus occidentalis</u>	Button bush					X	
<u>Gaylussacia dumosa</u>	Dwarf huckleberry			X			
<u>G. frondosa</u>	Huckleberry	X					
<u>Hypericum cistifolium</u>	St. John's-wort	X		X			
<u>H. fasciculatum</u>	St. John's-wort	X		X		X	
<u>H. hypericoides</u>	St. John's-wort	X					X
<u>H. reductum</u>	St. John's-wort	X					
<u>H. tetrapetalum</u>	St. John's-wort	X					
<u>Ilex glabra</u>	Gallberry	X	X	X	X		
<u>Itea virginica</u>	Virginia willow			X		X	
<u>Licania michauxii</u>	Gopher apple		X				
<u>Lyonia ferruginea</u>	Rusty lyonia	X	X				
<u>L. fruticosa</u>	Staggerbush	X	X				
<u>L. lucida</u>	Shiny lyonia	X	X	X	X	X	

TABLE 2.7A-1 (Continued). SPECIES COMPOSITION OF VEGETATION COMMUNITIES ON THE PROPOSED SITE

Scientific Name	Common Name	Vegetation Communities					
		Pine Flatwoods	Xeric Oak	Pond Cypress Swamp	Pond Pine Swamp	Bay Hardwood Swamp	Oak Hardwood Swamp
SHRUBS (Continued)							
<u>Myrica cerifera</u>	Wax myrtle			X		X	X
<u>M. pusilla</u>	Dwarf wax myrtle		X				
<u>Parthenocissus quinquefolia</u>	Virginia creeper						X
<u>Quercus chapmanii</u>	Chapman's oak		X				
<u>Q. minima</u>	Dwarf live oak	X	X				
<u>Q. myrtifolia</u>	Myrtle oak		X				
<u>Rhus copallina</u>	Southern sumac	X					
<u>Rubus betulifolius</u>	Swamp blackberry			X		X	
<u>Serenoa repens</u>	Saw palmetto	X	X	X	X	X	
<u>Smilax auriculata</u>	Greenbrier					X	
<u>S. bona-nox</u>	Catbrier						X
<u>S. laurifolia</u>	Bamboo-brier			X		X	
<u>S. walteri</u>	Coral greenbrier			X			
<u>Toxicodendron radicans</u>	Poison ivy					X	X
<u>Vaccinium corymbosum</u>	Swamp blueberry			X		X	
<u>V. darrowii</u>	Shiny blueberry	X					
<u>V. myrsinites</u>	Blueberry	X	X	X			

TABLE 2.7A-1 (Continued). SPECIES COMPOSITION OF VEGETATION COMMUNITIES ON THE PROPOSED SITE

Scientific Name	Common Name	Vegetation Communities					
		Pine Flatwoods	Xeric Oak	Pond Cypress Swamp	Pond Pine Swamp	Bay Hardwood Swamp	Oak Hardwood Swamp
SHRUBS (Continued)							
<u>Viburnum obovatum</u>	Black haw						X
<u>Vitis rotundifolia</u>	Muscadine grape					X	X
HERBS							
<u>Aletris lutea</u>	Colic root	X					
<u>Ambrosia artemisiifolia</u>	Common ragweed	X					
<u>Amphicarpum muhlenbergianum</u>	Blue maidencane			X		X	
<u>Andropogon elliottii</u>	Broom-straw			X			
<u>A. virginicus</u> var. <u>glaucopsis</u>	Silver beardgrass			X			
<u>A. virginicus</u> var. <u>virginicus</u>	Beardgrass	X		X			
<u>Aristida spiciformis</u>	Wiregrass	X		X			
<u>A. stricta</u>	Wiregrass	X					
<u>Axonopus furcatus</u>	Carpet grass	X					X
<u>Bartonia virginica</u>	Bartonia	X					
<u>Bigelowia nudata</u> spp. <u>australis</u>	Bigelowia	X		X			

TABLE 2.7A-1 (Continued). SPECIES COMPOSITION OF VEGETATION COMMUNITIES ON THE PROPOSED SITE

Scientific Name	Common Name	Vegetation Communities					
		Pine Flatwoods	Xeric Oak	Pond Cypress Swamp	Pond Pine Swamp	Bay Hardwood Swamp	Oak Hardwood Swamp
HERBS (Continued)							
<u>Blechnum serrulatum</u>	Toothed mid-sorus fern			X		X	
<u>Bulbostylis warei</u>	Bulbostylis		X				
<u>Calopogon tuberosa</u>	Grass pink	X					
<u>Carex glaucescens</u>	Sedge			X			
<u>Carpephorus odoratissimus</u>	Carpephorus	X					
<u>C. paniculata</u>	Carpephorus	X					
<u>Cassia fasciculata</u>	Partridge pea	X					
<u>Cenchrus incertus</u>	Sand spur	X					
<u>Centella asiatica</u>	Coinwort	X					X
<u>Chenopodium ambrosioides</u>	Mexican tea	X					
<u>Chrysopsis gossypina</u>	Golden Aster	X					
<u>Cirsium horridulum</u>	Purple thistle	X					
<u>Cladium jamaicense</u>	Sawgrass			X		X	
<u>Conyza canadensis</u> var. <u>pusilla</u>	Horseweed	X					
<u>Ctenium aromaticum</u>	Toothache grass	X					
<u>Cyperus haspan</u>	Galingale			X			

TABLE 2.7A-1 (Continued). SPECIES COMPOSITION OF VEGETATION COMMUNITIES ON THE PROPOSED SITE

Scientific Name	Common Name	Vegetation Communities					
		Pine Flatwoods	Xeric Oak	Pond Cypress Swamp	Pond Pine Swamp	Bay Hardwood Swamp	Oak Hardwood Swamp
HERBS (Continued)							
<u>Dichanthelium aciculare</u>	Dichanthelium grass	X					
<u>D. dichotomum</u> var. <u>breve</u>	Dichanthelium grass	X					
<u>D. laxiflorum</u>	Dichanthelium grass	X					
<u>D. sabulorum</u> var. <u>patulum</u>	Dichanthelium grass	X					
<u>Dichromena latifolia</u>	Whitetop sedge					X	
<u>Diodia teres</u>	Buttonweed	X					
<u>D. virginiana</u>	Buttonweed	X					
<u>Drosera capillaris</u>	Pink sundew	X					
<u>Dulichium arundinaceum</u>	Dulichium						X
<u>Eleocharis baldwinii</u>	Clubrush			X			
<u>Encyclia tapensis</u>	Green-fly orchid					X	
<u>Eragrostis refracta</u>	Love grass	X					
<u>E. spectabilis</u>	Love grass	X					
<u>Erechtites hieracifolia</u>	Fireweed					X	
<u>Erianthus giganteus</u>	Beard grass			X			
<u>Erigeron quercifolius</u>	Fleabane	X					
<u>E. vernus</u>	Fleabane			X			
<u>Eriocaulon decangulare</u>	Greater pipewort	X		X			

TABLE 2.7A-1 (Continued). SPECIES COMPOSITION OF VEGETATION COMMUNITIES ON THE PROPOSED SITE

Scientific Name	Common Name	Vegetation Communities					
		Pine Flatwoods	Xeric Oak	Pond Cypress Swamp	Pond Pine Swamp	Bay Hardwood Swamp	Oak Hardwood Swamp
HERBS (Continued)							
<u>Eryngium baldwinnii</u>	Eryngium	X					X
<u>Eupatorium aromaticum</u>	Thoroughwort	X					
<u>E. capillifolium</u>	Dog fennel			X			
<u>E. compositifolium</u>	Dog fennel	X					
<u>E. recurvans</u>	Thoroughwort	X					
<u>Fimbristylis caroliniana</u>	Fimbristylis	X					
<u>Fuirena brevisita</u>	Umbrella grass			X			
<u>Galactia</u> sp.	Milkpea	X					
<u>Gratiola subulata</u>	Hedge hyssop	X					
<u>Habenaria cristata</u>	Fringed orchid			X		X	
<u>Helianthus radula</u>	Sunflower	X					
<u>Hieracium gronovii</u>	Hawkweed	X					
<u>Hydrocotyle umbellata</u>	Pennywort			X		X	
<u>Hypoxis juncea</u>	Stargrass	X					
<u>Iris hexagona</u> var. <u>savannarum</u>	Blue flag			X			
<u>Juncus effusus</u> var. <u>solutus</u>	Soft rush			X		X	

TABLE 2.7A-1 (Continued). SPECIES COMPOSITION OF VEGETATION COMMUNITIES ON THE PROPOSED SITE

Scientific Name	Common Name	Vegetation Communities					
		Pine Flatwoods	Xeric Oak	Pond Cypress Swamp	Pond Pine Swamp	Bay Hardwood Swamp	Oak Hardwood Swamp
HERBS (Continued)							
<u>J. repens</u>	Black rush			X			
<u>Lachnanthes caroliniana</u>	Red root			X		X	
<u>Lachnocaulon anceps</u>	Bog buttons	X					
<u>Lechea villosa</u>	Pinweed		X				
<u>Liatris tenuifolia</u>	Liatris	X					
<u>Lilium catesbaei</u>	Pine lily						
<u>Linum texanum</u> var. <u>medium</u>	Yellow flat	X					
<u>Ludwigia maritima</u>	Ludwigia	X					
<u>L. repens</u>	Lugwigia			X			
<u>Lycopodium alopecoroides</u>	Foxtail club moss	X					
<u>Lycopus rubellus</u> var. <u>americanus</u>	Lycopus			X		X	
<u>Mikania scandens</u>	Climbing hempweed					X	
<u>Mitreola sessilifolium</u>	Miterwort	X		X		X	
<u>Oplismenus setarius</u>	Woodgrass						X
<u>Osmunda cinnamomea</u>	Cinnamon fern			X		X	
<u>O. regalis</u> var. <u>spectabilis</u>	Royal fern			X		X	

TABLE 2.7A-1 (Continued). SPECIES COMPOSITION OF VEGETATION COMMUNITIES ON THE PROPOSED SITE

Scientific Name	Common Name	Vegetation Communities					
		Pine Flatwoods	Xeric Oak	Pond Cypress Swamp	Pond Pine Swamp	Bay Hardwood Swamp	Oak Hardwood Swamp
HERBS (Continued)							
<u>Oxypolis filiformis</u>	Oxypolis			X			
<u>Panicum albo marginatum</u>	Panic grass	X					
<u>P. hemitomon</u>	Maidencane			X			
<u>P. lancearium</u>	Panic grass						X
<u>P. purpurascens</u>	Panic grass						
<u>Paspalum laeve</u>	Paspalum grass	X					
<u>P. notatum</u>	Bahia grass	X					
<u>P. setaceum</u>	Paspalum grass	X					
<u>Peltandra sagittifolia</u>	Spoon flower						
<u>P. virginica</u>	Arrow arum			X		X	
<u>Petalostemum carneum</u>	Prairie clover	X					
<u>Phobanthus grandiflora</u>	Phobanthus	X					
<u>Piloblephis rigida</u>	Savory pennyroyal		X				
<u>Pinguicula lutea</u>	Butterwort	X					
<u>P. pumila</u>	Butterwort	X					
<u>Pluchea foetida</u>	Camphorweed			X		X	
<u>P. rosea</u>	Marsh fleabane			X		X	X
<u>Pogonia ophioglossoides</u>	Rose pogonia	X					

TABLE 2.7A-1 (Continued). SPECIES COMPOSITION OF VEGETATION COMMUNITIES ON THE PROPOSED SITE

Scientific Name	Common Name	Vegetation Communities					
		Pine Flatwoods	Xeric Oak	Pond Cypress Swamp	Pond Pine Swamp	Bay Hardwood Swamp	Oak Hardwood Swamp
HERBS (Continued)							
<u>Polygala cruciata</u>	Milkwort	X					
<u>P. cymosa</u>	Milkwort	X					
<u>P. lutea</u>	Milkwort	X					
<u>P. rugellii</u>	Milkwort	X					
<u>P. setacea</u>	Milkwort	X					
<u>Polypodium polypodioides</u>	Resurrection fern						X
<u>Pontederia cordata</u>	Pickernelweed						
<u>Proserpinaca pectinata</u>	Mermaid fern			X		X	
<u>Pteridium aquilinum</u>	Bracken fern	X					
<u>Pterocaulon virgatum</u>	Blackroot	X					
<u>Rhexia alifanus</u>	Meadow beauty	X					
<u>R. mariana</u> var. <u>mariana</u>	Meadow beauty	X					
<u>R. nashii</u>	Meadow beauty	X					
<u>R. nutallii</u>	Meadow beauty	X					
<u>R. petiolata</u>	Meadow beauty	X					
<u>Rhynchospora corniculata</u>	Beakrush			X		X	
<u>R. divergens</u>	Beakrush	X					
<u>R. fascicularis</u>	Beakrush	X		X			

TABLE 2.7A-1 (Continued). SPECIES COMPOSITION OF VEGETATION COMMUNITIES ON THE PROPOSED SITE

Scientific Name	Common Name	Vegetation Communities					
		Pine Flatwoods	Xeric Oak	Pond Cypress Swamp	Pond Pine Swamp	Bay Hardwood Swamp	Oak Hardwood Swamp
HERBS (Continued)							
<u>R. miliacea</u>	Beakrush	X		X		X	
<u>Rudbeckia hirta</u>	Coneflower	X					
<u>Sabatia brevifolia</u>	Marsh pink	X					
<u>S. grandiflora</u>	Marsh pink	X					
<u>Sagittaria graminea</u>	Arrowhead	X					
<u>S. lancifolia</u>	Arrowhead					X	
<u>Sarracenia minor</u>	Pitcher plant	X					
<u>Saururus cernuus</u>	Lizard's tail			X		X	
<u>Scleria hirtella</u>	Nut rush	X					
<u>S. reticularis</u>	Nut rush	X					
<u>Sesbania vesicaria</u>	Bladderpod	X					
<u>Setaria geniculata</u>	Foxtail grass	X					
<u>Solidago microcephala</u>	Bush goldenrod	X					
<u>Sphagnum sp.</u>	Peatmoss			X	X	X	
<u>Stillingia sylvatica</u>	Queen Anne's delight	X					
<u>Sygonanthus flavidulus</u>	Bantam buttons	X					
<u>Tillandsia bartramii</u>	Airplant			X		X	
<u>T. fasciculata</u>	Cardinal air plant			X		X	

(11 of 12)

TABLE 2.7A-1 (Continued). SPECIES COMPOSITION OF VEGETATION COMMUNITIES ON THE PROPOSED SITE

Scientific Name	Common Name	Vegetation Communities					
		Pine Flatwoods	Xeric Oak	Pond Cypress Swamp	Pond Pine Swamp	Bay Hardwood Swamp	Oak Hardwood Swamp
HERBS (Continued)							
<u>T. usneoides</u>	Spanish moss			X		X	X
<u>T. utriculata</u>	Wild pine			X			
<u>Triadenum virginicum</u>	Pink St. John's-wort			X		X	
<u>Viola affinis</u>	Violet	X					X
<u>V. lanceolata</u>	Violet	X					
<u>V. septemloba</u>	Violet	X					
<u>Woodwardia areolata</u>	Net-veined chain						
	fern			X		X	
<u>W. virginica</u>	Marsh fern			X		X	
<u>Xyris ambigua</u>	Yellow-eyed grass	X					
<u>X. brevifolia</u>	Yellow-eyed grass	X					
<u>X. caroliniana</u>	Yellow-eyed grass	X					
<u>X. jupicai</u>	Yellow-eyed grass			X		X	

SOURCE: ESE, 1981.

TABLE 2.7A-2. PLANT SPECIES IN PINE FLATWOODS OF THE PROPOSED SITE

<u>Species</u>	<u>Importance Value</u> %	<u>Frequency</u> %	<u>Mean Percent Cover</u> %
Shrub Layer			
<u>Serenoa repens</u>	42.0	95.0	39.2
<u>Lyonia fruticosa</u>	16.3	87.5	6.9
<u>Lyonia lucida</u>	12.2	40.0	9.3
<u>Gaylussacia dumosa</u>	7.3	45.0	2.1
<u>Quercus minima</u>	7.1	10.7	3.5
<u>Hypericum reductum</u>	6.7	47.5	0.9
<u>Ilex glabra</u>	5.8	30.0	2.6
<u>Vaccinium myrsinites</u>	1.6	2.3	1.7
<u>Befaria racemosa</u>	0.4	0.6	0.2
<u>Myrica cerifera</u>	0.4	0.6	0.1
<u>Quercus chapmanii</u>	0.4	0.6	0.2
Total Percent Cover: 65.3			
Number of Species: 11			

SOURCE: ESE, 1981.

TABLE 2.7A-3. PLANT SPECIES IN XERIC OAK SCRUB OF THE PROPOSED SITE

<u>Species</u>	<u>Importance Value</u> %	<u>Frequency</u> %	<u>Mean Percent Cover</u> %
Shrub Layer			
<u>Serenoa repens</u>	23.9	85	17.5
<u>Quercus myrtifolia</u>	23.0	60	20.3
<u>Quercus minima</u>	11.8	70	4.1
<u>Quercus geminata</u>	10.0	15	10.5
<u>Quercus chapmanii</u>	7.8	35	4.5
<u>Lyonia lucida</u>	4.6	20	2.8
<u>Befaria racemosa</u>	4.4	30	0.9
<u>Gaylussacia dumosa</u>	3.5	25	0.6
<u>Licania michauxii</u>	2.9	15	1.3
<u>Myrica pumila</u>	2.1	15	0.3
<u>Lyonia fruticosa</u>	1.8	10	0.8
<u>Lyonia ferruginea</u>	1.6	10	0.5
<u>Ilex glabra</u>	1.5	10	0.3
<u>Piloblephis rigida</u>	0.7	5	0.1
<u>Vaccinium myrsinites</u>	0.7	5	0.1
Total Percent Cover: 64.6			
Number of Species: 15			

SOURCE: ESE, 1981.

TABLE 2.7A-4. PLANT SPECIES IN CYPRESS STANDS OF THE PROPOSED SITE

<u>Species</u>	<u>Importance</u> <u>Value</u> %	<u>Density</u> <u>Per</u> <u>Acre</u>	<u>Mean</u> <u>Basal</u> <u>Area</u> <u>in²</u>	<u>Frequency</u> %	<u>Mean</u> <u>Percent</u> <u>Cover</u> %
Overstory Layer					
<u>Taxodium ascendens</u>	71.9	328.74	42.2	—	—
<u>Pinus serotina</u>	18.5	70.04	59.8	—	—
<u>Nyssa sylvatica</u>	5.6	28.74	31.9	—	—
<u>Myrica cerifera</u>	2.5	20.64	4.7	—	—
<u>Magnolia virginiana</u>	1.7	12.14	10.1	—	—
Total Trees Per Acre: 460					
Number of Species: 5					
Shrub Layer					
<u>Lyonia lucida</u>	30.2	—	—	56.7	10.8
<u>Myrica cerifera</u>	25.2	—	—	50.0	8.4
<u>Serenoa repens</u>	19.3	—	—	20.0	10.7
<u>Ilex glabra</u>	8.9	—	—	6.7	5.5
<u>Hypericum fasciculatum</u>	5.0	—	—	10.0	1.6
<u>Itea virginica</u>	3.9	—	—	6.7	1.5
<u>Vaccinium corymbosum</u>	2.6	—	—	6.7	0.5
<u>Ilex cassine</u>	1.6	—	—	3.3	0.5
<u>Pinus palustris</u>	1.4	—	—	3.3	0.3
<u>Smilax laurifolia</u>	1.1	—	—	3.3	0.1
<u>Smilax walterii</u>	1.1	—	—	3.3	0.1
Total Percent Cover: 40.0					
Number of Species: 11					
Herbaceous Layer					
<u>Blechnum serrulatum</u>	17.9	—	—	53.3	10.3
<u>Sphagnum sp.</u>	13.4	—	—	30.0	9.2
<u>Woodwardia virginica</u>	12.5	—	—	43.3	6.1

TABLE 2.7A-4 (Continued). PLANT SPECIES IN CYPRESS STANDS OF THE PROPOSED SITE

Species	Importance Value %	Density Per Acre	Mean Basal Area in ²	Frequency %	Mean Percent Cover %
Herbaceous Layer (Continued)					
<u>Eriocaulon decangulare</u>	11.1	—	—	26.7	7.3
<u>Cladium jamaicense</u>	8.0	—	—	23.3	4.7
<u>Rhynchospora</u> spp.	5.6	—	—	16.7	3.2
<u>Aristida</u> spp. (<u>stricta</u> and <u>spiciformis</u>)	4.9	—	—	6.7	4.0
<u>Hypericum fasciculatum</u>	3.1	—	—	16.7	0.6
<u>Panicum purpurascens</u>	3.1	—	—	6.7	2.1
<u>Lycopus rubellus</u>	2.9	—	—	16.7	0.3
<u>Pontederia cordata</u>	2.7	—	—	6.7	1.4
<u>Woodwardia areolata</u>	2.6	—	—	13.3	0.6
<u>Pluchea rosea</u>	1.8	—	—	10.0	0.2
<u>Panicum hermitomum</u>	1.5	—	—	6.7	0.4
<u>Eragrostis spectabilis</u>	0.8	—	—	3.3	0.3
<u>Eupatorium recurvans</u>	0.8	—	—	3.3	0.3
<u>Hypericum cistoides</u>	0.8	—	—	3.3	0.3
<u>Eleocharis baldwinii</u>	0.7	—	—	3.3	0.2
<u>Rhexia mariana</u>	0.7	—	—	3.3	0.2
<u>Eupatorium capillifolium</u>	0.7	—	—	3.3	0.3
<u>Iris hexagona</u> var. <u>austrina</u>	0.6	—	—	3.3	0.1
<u>Juncus repens</u>	0.6	—	—	3.3	0.1
<u>Lacnathes caroliniana</u>	0.6	—	—	3.3	0.1
<u>Xyris ambigua</u>	0.6	—	—	3.3	0.1
<u>Panicum</u> sp.	0.5	—	—	3.3	0.0

Total Percent Cover: 52.7

Number of Species: 26

SOURCE: ESE, 1981.

TABLE 2.7A-5. PLANT SPECIES IN BAY STANDS OF THE PROPOSED SITE

<u>Species</u>	<u>Importance</u> <u>Value</u> %	<u>Density</u> <u>Per</u> <u>Acre</u>	<u>Mean</u> <u>Basal</u> <u>Area</u> in ²	<u>Frequency</u> %	<u>Mean</u> <u>Percent</u> <u>Cover</u> %
Overstory Layer					
<u>Magnolia virginiana</u>	76.4	496.76	23.9	—	—
<u>Gordonia lasianthus</u>	13.2	102.83	16.4	—	—
<u>Myrica cerifera</u>	4.5	51.41	4.0	—	—
<u>Persea palustris</u>	4.0	17.00	46.3 (1 tree)	—	—
<u>Ilex cassine</u>	2.1	17.00	13.4 (1 tree)	—	—

Total Trees Per Acre: 685

Number of Species: 5

Shrub Layer

<u>Lyonia lucida</u>	29.7	—	—	80.0	22.0
<u>Myrica cerifera</u>	23.8	—	—	80.0	16.0
<u>Vitis rotundifolia</u>	9.1	—	—	70.0	2.2
<u>Magnolia virginiana</u>	9.0	—	—	60.0	3.1
<u>Gordonia lasianthus</u>	6.6	—	—	40.0	2.7
<u>Smilax laurifolia</u>	5.9	—	—	50.0	1.0
<u>Cephalanthus occidentalis</u>	3.9	—	—	30.0	0.9
<u>Persea palustris</u>	3.6	—	—	30.0	0.6
<u>Toxicodendron radicans</u>	2.6	—	—	20.0	0.6
<u>Vaccinium corymbosum</u>	2.6	—	—	20.0	0.6
<u>Rubus betulifolius</u>	2.4	—	—	20.0	0.4
<u>Itea virginica</u>	1.2	—	—	10.0	0.2

Total Percent Cover: 50.3

Number of Species: 12

TABLE 2.7A-5 (Continued). PLANT SPECIES IN BAY STANDS OF THE PROPOSED SITE

<u>Species</u>	<u>Importance</u> <u>Value</u> %	<u>Density</u> <u>Per</u> <u>Acre</u>	<u>Mean</u> <u>Basal</u> <u>Area</u> <u>in²</u>	<u>Frequency</u> <u>%</u>	<u>Mean</u> <u>Percent</u> <u>Cover</u> <u>%</u>
Herbaceous Layer					
<u>Woodwardia virginica</u>	38.3	—	—	90.0	19.4
<u>Panicum sp.</u>	9.8	—	—	20.0	5.2
<u>Triadenum virginicum</u>	9.1	—	—	50.0	2.4
<u>Lyonia lucida</u>	7.5	—	—	50.0	1.3
<u>Osmonda cinnamomea</u>	6.1	—	—	40.0	1.1
<u>Peltandra sagittata</u>	5.1	—	—	30.0	1.2
<u>Woodwardia areolata</u>	4.3	—	—	30.0	0.6
<u>Cephalanthus occidentalis</u>	2.8	—	—	20.0	0.4
<u>Pluchea rosea</u>	2.8	—	—	20.0	0.4
<u>Lachnanthes caroliniana</u>	1.9	—	—	10.0	0.5
<u>Ilex cassine</u>	1.4	—	—	10.0	0.2
<u>Lycopus rubellus</u>	1.4	—	—	10.0	0.2
<u>Lycopus virginicus</u>	1.4	—	—	10.0	0.2
<u>Pontederia cordata</u>	1.4	—	—	10.0	0.2
<u>Rubus betulifolius</u>	1.4	—	—	10.0	0.2
<u>Toxicodendron radicans</u>	1.4	—	—	10.0	0.2
Unidentified (<u>Lamiaceae</u> family)	1.4	—	—	10.0	0.2
<u>Vaccinium corymbosum</u>	1.4	—	—	10.0	0.2
<u>Vitis rotundifolia</u>	1.4	—	—	10.0	0.2

Total Percent Cover: 34.3

Number of Species: 19

SOURCE: ESE, 1981.

TABLE 2.7A-6. PLANT SPECIES IN OAK HARDWOOD STANDS OF THE PROPOSED SITE

<u>Species</u>	<u>Importance</u> <u>Value</u> %	<u>Density</u> <u>Per</u> <u>Acre</u>	<u>Mean</u> <u>Basal</u> <u>Area</u> <u>in²</u>	<u>Frequency</u> <u>%</u>	<u>Mean</u> <u>Percent</u> <u>Cover</u> <u>%</u>
Overstory Layer					
<u>Quercus nigra</u>	64.8	439	177.73	91.0	—
<u>Acer rubrum</u>	10.4	79	31.98	71.5	—
<u>Sabal palmetto</u>	6.5	17	6.88	353.4	—
<u>Magnolia virginiana</u>	5.7	62	25.10	24.5	—
<u>Quercus virginiana</u>	5.6	17	6.88	293.1	—
<u>Cornus foemina</u>	2.7	35	14.17	5.2	—
<u>Nyssa sylvatica</u>	2.4	26	10.52	20.0	—
<u>Diospyros virginiana</u>	0.9	9	3.64	24.6	—
<u>Myrica cerifera</u>	0.8	9	3.64	20.6	—
<u>Broussonetia papyrifera</u>	0.7	9	3.64	7.0	—

Total Trees Per Acre: 284

Number of Species: 10

Shrub Layer

<u>Myrica cerifera</u>	55.9	—	—	65.0	7.6
<u>Diospyros virginiana</u>	14.3	—	—	20.0	1.6
<u>Serenoa repens</u>	8.4	—	—	10.0	1.1
<u>Viburnum obovatum</u>	7.6	—	—	10.0	0.9
<u>Cornus foemina</u>	5.2	—	—	5.0	0.8
<u>Callicarpa americana</u>	4.8	—	—	10.0	0.2
<u>Magnolia virginiana</u>	4.0	—	—	5.0	0.5

Total Percent Cover: 12.7

Number of Species: 7

TABLE 2.7A-6 (Continued). PLANT SPECIES IN OAK HARDWOOD STANDS OF THE PROPOSED SITE

Species	Importance Value %	Density Per Acre	Mean Basal Area in ²	Frequency %	Mean Percent Cover %
Herbaceous Layer					
<u>Panicum lancearium</u>	26.2	—	—	80.0	4.7
Sedge	24.2	—	—	65.0	4.7
<u>Quercus nigra</u>	7.1	—	—	35.0	0.7
<u>Acer rubrum</u>	7.1	—	—	35.0	0.7
<u>Axonopus furcatus</u>	5.8	—	—	25.0	0.7
<u>Myrica cerifera</u>	4.9	—	—	5.0	1.3
<u>Smilax bona-nox</u>	4.1	—	—	20.0	0.4
<u>Oplismenus setarius</u>	3.1	—	—	15.0	0.3
<u>Viburnum obovatum</u>	3.1	—	—	15.0	0.3
<u>Toxicodendron radicans</u>	2.0	—	—	10.0	0.2
<u>Pluchea rosea</u>	2.0	—	—	10.0	0.2
<u>Viola affinis</u>	2.0	—	—	10.0	0.2
<u>Centella asiatica</u>	2.0	—	—	10.0	0.2
<u>Woodwardia virginica</u>	2.0	—	—	10.0	0.2
<u>Diospyros virginiana</u>	1.7	—	—	5.0	0.3
<u>Parthenocissus quinquefolia</u>	1.1	—	—	5.0	0.1
<u>Hypericum hypericoides</u>	1.1	—	—	5.0	0.1
<u>Vitis rotundifolia</u>	1.1	—	—	5.0	0.1

Total Percent Cover: 15.4

Number of Species: 18

SOURCE: ESE, 1981.

TABLE 2.7A-7. MAMMALIAN SPECIES IN VARIOUS HABITATS OF THE PROPOSED SITE

<u>Species</u>	<u>Common Name</u>	<u>Xeric Oak Scrub</u>	<u>Bayhead Cypress Dome</u>	<u>Pine Flat- woods</u>
<u>Didelphis virginiana</u>	Virginia opossum	C		C
<u>Cryptotis parva</u>	Least shrew		R	R
<u>Scalopus aquaticus</u>	Eastern mole		C	R
<u>Pipistrellus subflavus</u>	Eastern pipistrelle	U	U	U
<u>Eptesicus fuscus</u>	Big brown bat	U	U	U
<u>Lasiurus borealis</u>	Red bat	U	U	U
<u>Lasiurus seminolus</u>	Seminole bat	U	U	U
<u>Lasiurus intermedius</u>	Northern yellow bat	U	U	U
<u>Nycticeius humeralis</u>	Evening bat	U	U	U
<u>Plecotus rafinesquii</u>	Rafinesque's big-eared bat	U	U	U
<u>Tadarida brasiliensis</u>	Brazilian free-tailed bat	U	U	U
<u>Dasypus novemcinctus</u>	Nine-banded armadillo	A	A	A
<u>Sylvilagus floridanus</u>	Eastern cottontail	C		C
<u>Sylvilagus palustris</u>	Marsh rabbit	C		C
<u>Oryzomys palustris</u>	Rice rat		R	R
<u>Reithrodontomys humulis</u>	Harvest mouse			R
<u>Peromyscus polionotus</u>	Old-field mouse			R
<u>Peromyscus gossypinus</u>	Cotton mouse	A	A	C
<u>Peromyscus nuttalli</u>	Golden mouse		R	R
<u>Sigmodon hispidus</u>	Cotton rat	A	R	A
<u>Neotoma floridana</u>	Eastern woodrat		R	
<u>Sciurus carolinensis</u>	Gray squirrel		O	
<u>Sciurus niger</u>	Fox squirrel		R	R
<u>Glaucomys volans</u>	Southern flying squirrel			C
<u>Vulpes vulpes</u>	Red fox			O
<u>Urocyon cinereoargenteus</u>	Gray fox	O	C	C
<u>Procyon lotor</u>	Raccoon	A	A	A

TABLE 2.7A-7 (Continued). MAMMALIAN SPECIES IN VARIOUS HABITATS OF THE PROPOSED SITE

<u>Species</u>	<u>Common Name</u>	<u>Xeric Oak Scrub</u>	<u>Bayhead Cypress Dome</u>	<u>Pine Flat- woods</u>
<u>Spilogale putorius</u>	Eastern spotted skunk	A	A	A
<u>Mephitis mephitis</u>	Striped skunk	A	A	A
<u>Lynx rufus</u>	Bobcat	O	O	O
<u>Sus scrofa</u>	Wild hog		O	O
<u>Odocoileus virginianus</u>	White-tailed deer	A	A	A

KEY: A = Abundant
 C = Common
 O = Occasional
 R = Rare
 U = Undetermined

SOURCE: ESE, 1981.

TABLE 2.7A-8. AMPHIBIAN AND REPTILIAN SPECIES IN VARIOUS HABITATS OF THE PROPOSED SITE

<u>Species</u>	<u>Common Name</u>	<u>Xeric Oak Scrub</u>	<u>Bayhead Cypress Dome</u>	<u>Pine Flat- woods</u>
<u>Notophthalmus viridescens</u>	Peninsula newt	X	X	X
<u>Scaphiopus holbrooki</u>	Eastern spadefoot toad	X		X
<u>Rana areolata</u>	Gopher frog	X		
<u>Rana grylio</u>	Pig frog		X	
<u>Rana utricularia</u>	Southern leopard frog		X	X
<u>Gastrophryne carolinensis</u>	Eastern narrow-mouth toad	X	X	X
<u>Bufo querecius</u>	Oak toad	X		X
<u>Bufo terrestris terrestris</u>	Southern toad	X	X	X
<u>Acris gryllus dorsalis</u>	Florida cricket frog	X	X	X
<u>Hyla cinerea cinerea</u>	Green treefrog	X	X	X
<u>Hyla femoralis</u>	Pine woods treefrog	X	X	X
<u>Hyla gratiosa</u>	Barking treefrog		X	X
<u>Hyla squirella</u>	Squirrel treefrog	X	X	X
<u>Pseudacris nigrita</u>	Chorus frog			X
<u>Limnaeodius ocularis</u>	Little grass frog		X	X
<u>Terrapene carolina bauri</u>	Florida box turtle	X		X
<u>Gopherus polyphemus</u>	Gopher tortoise	X		X
<u>Anolis sagrei</u>	Brown anole	X		
<u>Anolis carolinensis</u>	Green anole	X	X	X
<u>Sceloporus undulatus</u>	Fence lizard	X		
<u>Sceloporus woodi</u>	Florida scrub lizard	X		
<u>Leiopeltis lateralis</u>	Ground skink	X	X	X
<u>Eumeces inexpectatus</u>	Southeastern five-lined skink	X	X	
<u>Cnemidophorus sexlineatus</u>	Six-lined racerunner	X		
<u>Ophisaurus ventralis</u>	Eastern glass lizard			X
<u>Ophisaurus longicauda</u>	Slender glass lizard	X		X

TABLE 2.7A-8 (Continued). AMPHIBIAN AND REPTILIAN SPECIES IN VARIOUS HABITATS OF THE PROPOSED SITE

<u>Species</u>	<u>Common Name</u>	<u>Xeric Oak Scrub</u>	<u>Bayhead Cypress Dome</u>	<u>Pine Flat- woods</u>
<u>Nerodia sipedon</u>	Banded water snake		X	
<u>Virginia stripula</u>	Rough earth snake		X	X
<u>Storeria occipitomaculata</u>	Red-bellied snake	X		X
<u>Storeria dekayi</u>	Brown snake			X
<u>Heterodon platyrhinos</u>	Eastern hognose snake	X		
<u>Heterodon sinus</u>	Southern hognose snake	X		
<u>Diadophis punctatus</u>	Ringneck snake	X	X	X
<u>Farancia abacura</u>	Mud snake		X	
<u>Coluber constrictor</u>	Black racer	X	X	X
<u>Pituophis melanoleucus</u>	Pine snake		X	X
<u>Masticophis flagellum</u>	Eastern coachwhip	X		X
<u>Opheodrys aestivus</u>	Rough green snake	X	X	
<u>Elaphe obsoleta</u>	Rat snake		X	
<u>Drymarchon corais couperi</u>	Indigo snake	X	X	X
<u>Lampropeltis elapsoides</u>	Scarlet kingsnake	X	X	X
<u>Lampropeltis getulus getulus</u>	Eastern kingsnake		X	X
<u>Cemophora coccinea</u>	Scarlet snake	X		
<u>Tantilla relicta relicta</u>	Peninsula crowned snake	X		
<u>Micrurus fulvius fulvius</u>	Eastern coral snake	X		
<u>Agkistrodon piscivorus conanti</u>	Florida cottonmouth		X	
<u>Sistrurus miliarius barbouri</u>	Dusky pigmy rattlesnake	X	X	X
<u>Crotalus adamanteus</u>	Eastern diamondback rattlesnake	X		X

SOURCE: ESE, 1981.

TABLE 2.7A-9. SEASONAL OCCURRENCE OF BIRDS IN PINE FLATWOODS OF THE PROPOSED SITE

<u>Species</u>	<u>Common Name</u>	<u>Seasonal Status*</u>	<u>Season</u>		
			<u>Summer 1980</u>	<u>Winter 1980-81</u>	<u>Spring 1981</u>
<u>Bubulcus ibis</u>	Cattle egret	P	**	**	
<u>Cathartes aura</u>	Turkey vulture	P	**	**	
<u>Coragyps atratus</u>	Black vulture	P	**	**	
<u>Accipiter striatus</u>	Sharp-shinned hawk	P		**	
<u>Buteo jamaicensis</u>	Red-tailed hawk	P		1	
<u>Buteo lineatus</u>	Red-shouldered hawk	P	**	1	
<u>Circus cyaneus</u>	Marsh hawk	W		1	
<u>Pandion haliaetus</u>	Osprey	P		**	
<u>Falco sparverius</u>	American kestrel	W		**	
<u>Colinus virginianus</u>	Bobwhite	P	2	**	
<u>Charadrius vociferus</u>	Killdeer	P		3	
<u>Zenaida macroura</u>	Mourning dove	P	1		
<u>Columbina passerina</u>	Ground dove	P			
<u>Caprimulgus carolinensis</u>	Chuck-will's widow	S			
<u>Chordeiles minor</u>	Common nighthawk	S			
<u>Colaptes auratus</u>	Common flicker	P	2	1	
<u>Dryocopus pileatus</u>	Pileated woodpecker	P	2		
<u>Centurus carolinus</u>	Red-bellied woodpecker	P	12	7	
<u>Melanerpes erythrocephalus</u>	Red-headed woodpecker	P		1	
<u>Sphyrapicus varius</u>	Yellow-bellied sapsucker	W		1	
<u>Picoides villosus</u>	Hairy woodpecker	P		1	
<u>Picoides pubescens</u>	Downy woodpecker	P		1	
<u>Picoides borealis</u>	Red-cockaded woodpecker	P		4	
<u>Tyrannus tyrannus</u>	Eastern kingbird	S			
<u>Myiarchus crinitus</u>	Great crested flycatcher	S			
<u>Sayornis phoebe</u>	Eastern phoebe	W			
<u>Iridoprocne bicolor</u>	Tree swallow	W		**	

TABLE 2.7A-9 (Continued). SEASONAL OCCURRENCE OF BIRDS IN PINE FLATWOODS OF THE PROPOSED SITE

<u>Species</u>	<u>Common Name</u>	<u>Seasonal Status*</u>	<u>Season</u>		
			<u>Summer 1980</u>	<u>Winter 1980-81</u>	<u>Spring 1981</u>
<u>Cyanocitta cristata</u>	Blue jay	P		5	
<u>Corvus brachyrhynchos</u>	Common crow	P	5		
<u>Corvus ossifragus</u>	Fish crow	P			
<u>Parus carolinensis</u>	Carolina chickadee	W		2	
<u>Parus bicolor</u>	Tufted titmouse	P	2	2	
<u>Sitta pusilla</u>	Brown-headed nuthatch	P		3	
<u>Regulus calendula</u>	Ruby-crowned kinglet	W		1	
<u>Troglodytes aedon</u>	House wren	W		1	
<u>Thryothorus ludovicianus</u>	Carolina wren	P		2	
<u>Mimus polyglottos</u>	Mockingbird	P	3	3	
<u>Dumetella carolinensis</u>	Gray catbird	W			
<u>Turdus migratorius</u>	American robin	W		12	
<u>Sialia sialis</u>	Eastern bluebird	P	2	5	
<u>Polioptila caerulea</u>	Blue-gray gnatcatcher	P	1	1	
<u>Lanius ludovicianus</u>	Loggerhead shrike	P		1	
<u>Vireo griseus</u>	White-eyed vireo	P			
<u>Dendroica coronata</u>	Yellow-rumped warbler	W		41	
<u>Dendroica pinus</u>	Pine warbler	P	7	6	
<u>Dendroica discolor</u>	Prairie warbler	W		1	
<u>Dendroica palmarum</u>	Palm warbler	W		12	
<u>Geothlypis trichas</u>	Common yellowthroat	P	1	9	
<u>Sturnella magna</u>	Eastern meadowlark	P		5	
<u>Agelaius phoeniceus</u>	Red-winged blackbird	P		30	
<u>Quiscalus major</u>	Boat-tailed grackle	P			
<u>Quiscalus quiscula</u>	Common grackle	P			
<u>Piranga rubra</u>	Summer tanager	S			
<u>Cardinalis cardinalis</u>	Cardinal	P	4	1	

TABLE 2.7A-9 (Continued). SEASONAL OCCURRENCE OF BIRDS IN PINE FLATWOODS OF THE PROPOSED SITE

Species	Common Name	Seasonal Status*	Season		
			Summer 1980	Winter 1980-81	Spring 1981
<u>Carduelis tristis</u>	American goldfinch	W			
<u>Pipilo erythrophthalmus</u>	Rufous-sided towhee	P	9	6	
<u>Passerculus sandvicensis</u> <u>sandvicensis</u>	Savannah sparrow	W			
<u>Aimophila aestivalis</u>	Bachman's sparrow	P	1	2	
Density per 100 Acres			135	422	
Number of Species			19	39	

*Seasonal Status: P = Permanent resident
W = Winter resident
S = Summer resident
T = Transient

**Observed on site but not during quantitative surveys.

SOURCE: ESE, 1981.

TABLE 2.7A-10. SEASONAL OCCURRENCE OF BIRDS IN XERIC SCRUB OAK OF THE PROPOSED SITE

Species	Common Name	Seasonal Status*	Season		
			Summer 1980	Winter 1980-81	Spring 1981
<u>Cathartes aura</u>	Turkey vulture	P			
<u>Coragyps atratus</u>	Black vulture	P			
<u>Accipiter striatus</u>	Sharp-shinned hawk	P		1	
<u>Buteo jamaicensis</u>	Red-tailed hawk	P		1	
<u>Buteo lineatus</u>	Red-shouldered hawk	P			
<u>Falco sparverius</u>	American kestrel	P			
<u>Colinus virginianus</u>	Bobwhite	P			
<u>Charadrius vociferus</u>	Killdeer	P		1	
<u>Zenaida macroura</u>	Mourning dove	P			
<u>Columbina passerina</u>	Ground dove	P			
<u>Chordeiles minor</u>	Common nighthawk	S			
<u>Colaptes auratus</u>	Common flicker	P	3		
<u>Centurus carolinus</u>	Red-bellied woodpecker	P	4	3	
<u>Picoides villous</u>	Hairy woodpecker	P			
<u>Picoides pubescens</u>	Downy woodpecker	P			
<u>Picoides borealis</u>	Red-cockaded woodpecker	P			
<u>Tyrannus tyrannus</u>	Eastern kingbird	S			
<u>Myiarchus crinitus</u>	Great crested flycatcher	S			
<u>Sayornis phoebe</u>	Eastern phoebe	W			
<u>Iridoprocne bicolor</u>	Tree swallow	W			
<u>Cyanocitta cristata</u>	Blue jay	P	4	11	
<u>Aphelocoma coerulescens</u>	Florida scrub jay	P	5	9	
<u>Corvus brachyrhynchos</u>	Common crow	P		2	
<u>Parus carolinensis</u>	Carolina chickadee	W			
<u>Parus bicolor</u>	Tufted titmouse	P			
<u>Sitta pusilla</u>	Brown-headed nuthatch	P			
<u>Regulus calendula</u>	Ruby-crowned kinglet	W		2	

TABLE 2.7A-10 (Continued). SEASONAL OCCURRENCE OF BIRDS IN XERIC SCRUB OAK OF THE PROPOSED SITE

Species	Common Name	Seasonal Status*	Season		
			Summer 1980	Winter 1980-81	Spring 1981
<u>Troglodytes aedon</u>	House wren	W			
<u>Thryothorus ludovicianus</u>	Carolina wren	P	3	1	
<u>Mimus polyglottos</u>	Mockingbird	P	2	1	
<u>Dumetella carolinensis</u>	Gray catbird	W			
<u>Toxostoma rufum</u>	Brown thrasher	P	1	5	
<u>Turdus migratorius</u>	American robin	W		2	
<u>Sialia sialis</u>	Eastern bluebird	P			
<u>Poliophtila caerulea</u>	Blue-gray gnatcatcher	P		1	
<u>Lanius ludovicianus</u>	Loggerhead shrike	P	1	1	
<u>Vireo griseus</u>	White-eyed vireo	P	2	1	
<u>Dendroica coronata</u>	Yellow-rumped warbler	W		25	
<u>Dendroica discolor</u>	Prairie warbler	W			
<u>Dendroica palmarum</u>	Palm warbler	W		3	
<u>Geothlypis trichas</u>	Common yellowthroat	P	1	8	
<u>Sturnella magna</u>	Eastern meadowlark	P	1		
<u>Agelaius phoeniceus</u>	Red-winged blackbird	P	7		
<u>Quiscalus quiscula</u>	Common grackle	P			
<u>Cardinalis cardinalis</u>	Cardinal	P	2		
<u>Pipilo erythrophthalmus</u>	Rufous-sided towhee	P	15	21	
<u>Aimophila aestivalis</u>	Bachman's sparrow	P			
Density of Birds per 100 Acres			128	248	
Number of Species			13	19	

*Seasonal Status: P = Permanent resident
W = Winter resident
S = Summer resident
T = Transient

SOURCE: ESE, 1981.

TABLE 2.7A-11. SEASONAL OCCURRENCE OF BIRDS IN FORESTED WETLANDS OF THE PROPOSED SITE

<u>Species</u>	<u>Common Name</u>	<u>Seasonal Status*</u>	<u>Season</u>		
			<u>Summer 1980</u>	<u>Winter 1980-81</u>	<u>Spring 1981</u>
<u>Cathartes aura</u>	Turkey vulture	P			
<u>Coragyps atratus</u>	Black vulture	P			
<u>Accipiter cooperii</u>	Cooper's hawk	P			
<u>Buteo lineatus</u>	Red-shouldered hawk	P		1	
<u>Colinus virginianus</u>	Bobwhite	P			
<u>Meleagris gallopavo</u>	Turkey	P			
<u>Philohela minor</u>	American woodcock	W			
<u>Coccyzus americanus</u>	Yellow-billed cuckoo	S			
<u>Otus asio</u>	Screech owl	P			
<u>Bubo virginianus</u>	Great horned owl	P			
<u>Strix varia</u>	Barred owl	P			
<u>Caprimulgus carolinensis</u>	Chuck-will's widow	S			
<u>Caprimulgus vociferus</u>	Whip-poor-will	W			
<u>Archilochus colubris</u>	Ruby-throated hummingbird	S			
<u>Colaptes auratus</u>	Common flicker	P	1		
<u>Dryocopus pileatus</u>	Pileated woodpecker	P	1	2	
<u>Centurus carolinus</u>	Red-bellied woodpecker	P	9	4	
<u>Sphyrapicus varius</u>	Yellow-bellied sapsucker	W		1	
<u>Picoides pubescens</u>	Downy woodpecker	P	1	1	
<u>Myiarchus crinitus</u>	Great crested flycatcher	S	1		
<u>Tyrannus tyrannus</u>	Eastern kingbird	S	2		
<u>Sayornis phoebe</u>	Eastern phoebe	W		1	
<u>Iridoprocne bicolor</u>	Tree swallow	W			
<u>Cyanocitta cristata</u>	Blue jay	P	1	1	
<u>Corvus brachyrhynchos</u>	Common crow	P			
<u>Corvus ossifragus</u>	Fish crow	P			
<u>Parus carolinensis</u>	Carolina chickadee	W		2	

TABLE 2.7A-11 (Continued) SEASONAL OCCURRENCE OF BIRDS IN FORESTED WETLANDS OF THE PROPOSED SITE

<u>Species</u>	<u>Common Name</u>	<u>Seasonal Status*</u>	<u>Season</u>		
			<u>Summer 1980</u>	<u>Winter 1980-81</u>	<u>Spring 1981</u>
<u>Parus bicolor</u>	Tufted titmouse	P	4	5	
<u>Sitta pusilla</u>	Brown-headed nuthatch	P		4	
<u>Troglodytes aedon</u>	House wren	W		2	
<u>Thryothorus ludovicianus</u>	Carolina wren	P	2	3	
<u>Toxostoma rufum</u>	Brown thrasher	P			
<u>Turdus migratorius</u>	American robin	W		2	
<u>Sialia sialis</u>	Eastern bluebird	P	2	26	
<u>Catharus guttatus</u>	Hermit thrush	W			
<u>Catharus fuscescens</u>	Veery	T			
<u>Polioptila caerulea</u>	Blue-gray gnatcatcher	P	2		
<u>Regulus calendula</u>	Ruby-crowned kinglet	W		4	
<u>Vireo griseus</u>	White-eyed vireo	P	4	1	
<u>Vireo flavifrons</u>	Yellow-throat vireo	W			
<u>Vireo solitarius</u>	Solitary vireo	W			
<u>Vireo olivaceus</u>	Red-eyed vireo	T			
<u>Mniotilta varia</u>	Black and white warbler	W		1	
<u>Protonotaria citrea</u>	Prothonotary warbler	W			
<u>Parula americana</u>	Northern parula	T			
<u>Dendroica coronata</u>	Yellow-rumped warbler	W		101	
<u>Dendroica dominica</u>	Yellow-throated warbler	W		1	
<u>Dendroica palmarum</u>	Palm warbler	W		25	
<u>Geothlypis trichas</u>	Common yellowthroat	P	1	1	
<u>Setophaga ruticilla</u>	American redstart	T	1		
<u>Piranga rubra</u>	Summer tanager	S			
<u>Cardinalis cardinalis</u>	Cardinal	P	9	3	
<u>Carduelis tristis</u>	American goldfinch	W			
<u>Pipilo erythrophthalmus</u>	Rufous-sided towhee	P	9	1	

TABLE 2.7A-11 (Continued) SEASONAL OCCURRENCE OF BIRDS IN FORESTED WETLANDS
OF THE PROPOSED SITE

Species	Common Name	Seasonal Status*	Season		
			Summer 1980	Winter 1980-81	Spring 1981
<u>Aimophila aestivalis</u>	Bachman's sparrow	P	3		
<u>Melospiza georgiana</u>	Swamp sparrow	W		1	
Density of Birds per 100 Acres			133	485	
Number of Species			17	24	

*Seasonal Status: P = Permanent resident
W = Winter resident
S = Summer resident
T = Transient

SOURCE: ESE, 1981.

2.8 AMBIENT AIR QUALITY

One requirement in obtaining site certification and applicable air quality licenses is to demonstrate that the operation of the proposed facility will not cause Federal nor State ambient air quality standards to be violated. In addition, impacts of the plant operation must not exceed remaining allowable air quality increments dependent upon the existing air quality status. The existing air quality in the vicinity of the Stanton Energy Center is described in this section along with applicable standards and allowable incremental effects. The impact predictions resulting from the addition of the proposed source emissions are described in Section 5.5.

The onsite air quality measurements began on May 1, 1980. Twelve months of onsite data (through April 30, 1981) have been utilized to define baseline air quality levels. Applicable PSD monitoring guidelines were followed in the establishment and operation of the monitoring program. (1)(2)(3)

2.8.1 Air Quality Standards

Ambient air quality standards (AAQS) have been set to protect public health (primary standards) and public welfare (secondary standards). The Federal and State AAQS are given in Table 2.8-1.

In addition to ambient standards, the operation of the proposed units must not cause air quality impacts beyond those specified by Prevention of Significant Deterioration (PSD) criteria. The site area is classified as PSD Class II. No Class I areas exist within 100 kilometres of the site. Therefore, PSD Class II increments apply. These increments are given in Table 2.8-2. None of the increment has been consumed previously, as is described in Section 5.5.

2.8.2 Existing Air Quality

Background air quality conditions have been measured at a site representative of the vicinity of the proposed unit. The remote nature of the

site area, meaning that it is not close to any significant urban nor industrial sources of pollutants, allows the baseline air quality assessment to be made using data collected at one air monitoring site. Figure 2.8-1 shows the remote nature of the site vicinity. Florida DER and the onsite air monitoring stations are shown in this figure as triangles. Table 2.8-3 gives the locations and air quality parameters measured.

The topography in the immediate vicinity of the site is shown in Figure 2.8-2. Terrain in the area is noticeably flat, contributing to the representativeness of the one air quality monitoring site.

Based on the assumption of a homogenous distribution of pollutants, the actual monitoring site location was chosen to be near the location of maximum short-term impacts predicted by preliminary dispersion model analyses. The site is shown in Figures 2.8-1 and 2.8-2.

Seminole County, 15 km north of the project site, has been designated as nonattainment for particulate matter by the Environmental Protection Agency (EPA). Orange County, which includes the city of Orlando and the project site area, is designated nonattainment for ozone by EPA. These nonattainment status conditions are addressed in Section 5.5.

2.8.2.1 Description of Onsite Measurements. Air quality and meteorological parameters have been monitored continuously at the air monitoring site since May 1, 1980.

Sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), and total suspended particulate matter (TSP) are the primary pollutants measured at the site because these are the criteria pollutants which may be emitted in significant amounts and for which impact assessments have been made. Additional air quality parameters measured and reported are nitric oxide (NO), the combined oxides of nitrogen (NO_x), and the inhalable and respirable portion of particulate matter (IP). While not directly used in the modeling of impact assessments, supplementary meteorological data have also been collected. These consist of wind data (at 10 metres), temperature,

dewpoint, and precipitation. Table 2.8-4 is a listing of parameters measured, the corresponding instruments utilized, and the data recovery rates for the first 12-month period of operation.

A complete description of the onsite air monitoring program is given in reports of the first four quarters of operation, (4)(5)(6)(6a) and in Section 6.2.1 of this Application. A description of the quality assurance aspects of the monitoring program are included in the Quality Assurance Plan.(7)

Data recovery rates of 80 per cent for air quality data and 90 per cent for meteorological data are required by PSD criteria according to EPA monitoring guidelines. Recovery rates for all air quality parameters except IP were over 80 per cent. An assembly error in manufacturing on the dichotomous sampler, which measures IP, went undetected until October, 1980, thereby, adversely affecting the data recovery.

Data recovery percentages for all meteorological parameters except temperature were less than 90 per cent. A direct lightning strike on September 9 was the beginning of a series of problems with the vector wind and precipitation data. Thus, these data recoveries are well below the guideline criteria. The meteorological data are supplementary and are not used as a basis for impact assessment. Therefore, the low data recovery rates do not adversely affect total acceptability of the data reporting results.

2.8.2.2 Air Quality Measurement Results. Air quality data taken at the ambient air monitoring site on the property of the proposed Stanton Energy Center Unit 1 are summarized in this section. The highest and "second highest" (according to the EPA definition) are reported in Table 2.8-5 for each measured pollutant and averaging time for which there is an applicable ambient air quality standard (AAQS). For purposes of determining compliance with the AAQS, the highest measured concentrations in Table 2.8-5 are used as background or "baseline" values. The results for each parameter in Table 2.8-5 are described below.

Sulfur Dioxide (SO₂). Highest and second highest 3-hour SO₂ averages in the 12-month reporting period were 124 and 115 µg/m³. Both occurred in

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January, 1981. The $124 \mu\text{g}/\text{m}^3$ was from hours 0900 through 1100, inclusive, on January 18, while the $115 \mu\text{g}/\text{m}^3$ is composed of the 2100 to 2300 period, inclusive, on January 7. The highest 3-hour average is less than 10 per cent of any applicable ambient air quality standard.

The two highest 24-hour averages were 44 and $41 \mu\text{g}/\text{m}^3$. The $44 \mu\text{g}/\text{m}^3$ value came from the period of hour 1300 on January 17 through hour 1200 on January 18, inclusive, while $41 \mu\text{g}/\text{m}^3$ is the average of hours 2100 on January 7 through hour 2000 on January 8, inclusive. The highest 24-hour average is only 17 per cent of the Florida AAQS, and only 12 per cent of the Federal Primary Standard.

Finally, there are two annual AAQS, 80 and $60 \mu\text{g}/\text{m}^3$ based on Federal and Florida regulations, respectively. The 12-month average concentration was computed to be $14.4 \mu\text{g}/\text{m}^3$. This concentration is heavily weighted by numerous $13 \mu\text{g}/\text{m}^3$ values which correspond to the 5 ppb value which was substituted for measured values below the 10 ppb instrument threshold. A vast majority of the data were from hours for which this substitution was made because of low ambient concentrations (less than instrument threshold). Nevertheless, the computed average is less than 25 per cent of the annual standard.

Nitrogen Dioxide (NO_2). No short term standards apply for NO_2 ; both the Federal and Florida AAQS are an annual arithmetic mean of $100 \mu\text{g}/\text{m}^3$. The measured 12-month average is $10.7 \mu\text{g}/\text{m}^3$, which is approximately 10 per cent of the standard. This computation has also been made with many of the values being substituted data because of measurements below the instrument threshold.

Carbon Monoxide (CO). The two highest 1-hour average CO concentrations were 10.6 and $10.5 \text{ mg}/\text{m}^3$. These values were associated with range fires near the monitoring site. Both concentrations are approximately 25 per cent of the applicable standards.

The two highest 8-hour average concentrations were 5.2 and $4.6 \text{ mg}/\text{m}^3$. Again, both cases occurred during periods with range fires in the area. These CO levels are approximately 50 per cent of the applicable ambient air quality standards.

Total Suspended Particulate Matter (TSP). Measurements of 24-hour average concentrations of TSP were taken during the 12 months of operation every third day. The highest and second highest values which are used as baseline air quality levels in air quality impact calculations are 105 and 90 $\mu\text{g}/\text{m}^3$. These occurred on March 5 and March 17, 1981, respectively. Both are well below the 150 $\mu\text{g}/\text{m}^3$ standard. Atmospheric conditions on the above two days were such that higher particulate levels would not be unexpected, as is shown below. The 12-month geometric mean was 34 $\mu\text{g}/\text{m}^3$ as compared to the Florida and Federal secondary annual standard of 60 $\mu\text{g}/\text{m}^3$, geometric mean.

While the highest reported measurement for TSP occurred on March 5, 1981, gaseous air quality measurements on the same day were quite low, indicating fugitive dust sources rather than industrial pollution. Winds were generally from the southwest. Hourly average wind speeds ranged from approximately 3 to 10 metres per second (m/s), the 24-hour average wind speed was 6.1 m/s, and relative humidity averaged 50 per cent. Similar air quality measurements were recorded on March 17, the date of the second highest TSP concentration reported. However on this date, winds were 2 to 3 metres per second from the northwest through southwest directions. The average relative humidity was 25 per cent.

Precipitation was below normal in Orlando during the entire year as is discussed in Section 2.6. The dry conditions coupled with the winds result in relatively dry soil conditions. Thus, fugitive dust levels slightly higher than normal would be expected.

There were two 24-hour TSP concentrations which were not reported in the background measurements because they were known to have occurred during periods of marked local influence. These TSP values were 150 and 112 $\mu\text{g}/\text{m}^3$ and were measured on October 15 and November 5, 1980, respectively. On October 15, 1980, a range fire burned to a location within approximately 50 metres of the monitoring site. The smoke plume was observed to drift across the air monitoring station for a few hours. Peak hourly concentrations of the continuously monitored gases occurred about 1500 EST. SO_2

concentrations reached $93 \mu\text{g}/\text{m}^3$, NO_2 was $91 \mu\text{g}/\text{m}^3$, and CO was $7.5 \text{ mg}/\text{m}^3$.

The particulate matter on the sample filter was analyzed using optical microscopy. This analysis showed that 55 per cent (by weight) of the material was burned wood and plant tissue; another 30 per cent was pollen, spores and miscellaneous plant tissue. Soot accounted for 5 per cent of this filter and the one discussed following also.

Range fires also occurred nearby on November 5, 1980. Peak hourly concentrations on that day occurred near 2100 EST. SO_2 concentrations reached $30 \mu\text{g}/\text{m}^3$, NO_2 reached $43 \mu\text{g}/\text{m}^3$, and CO was $5.2 \text{ mg}/\text{m}^3$. In addition, the grass field immediately north of the monitoring site was harvested on that same day. The optical microscopy analyses showed that 40 per cent of the filter material was burned wood and plant tissue and another 45 per cent was pollen, spores and miscellaneous plant tissue. Because of the noted fires and agricultural activities on October 15 and November 5, 1980, the measured values for TSP for those days are not included in the reported air quality data summary.

2.8.2.3 Other Air Quality Data. Air quality data collected at the onsite ambient air monitoring station have been compared in this section with data collected at Florida DER stations in the Orlando area with sufficient data for comparisons. Florida DER data from January through December, 1980 have been used for this comparison of TSP, but only through September, 1980 for the continuously collected parameters.

TSP. TSP data are the most plentiful and thus provide the most complete comparison. Three nearby DER sites are used in comparison with the OUC site. The site identifiers are 0001, 0003 and 0004 which correspond to numbers (4), (8) and (9) in Table 2.8-3, the list of DER sites. Monthly maximum 24-hour average concentrations and the monthly arithmetic means of the 24-hour values are given in Table 2.8-6.

Monthly maximum 24-hour average and monthly averages of 24-hour average TSP concentrations are usually lower at the onsite station than at the DER sites. Also, the trend of the changes from month to month are very similar.

The relationships between the data sets are more easily seen by comparing the monthly mean values, as this parameter is less susceptible to unusual occurrences at a given site. Figure 2.8-3 shows a plot of the monthly arithmetic mean values at the four sites given in Table 2.8-6.

Sulfur Dioxide. One DER station, Winter Park, has a continuous sulfur dioxide (SO_2) monitor, it has only operated since July, 1980. Between July and September, the highest and second highest one hour averages reported were 183 and $73 \mu\text{g}/\text{m}^3$ (70 and 28 ppb) respectively. The $183 \mu\text{g}/\text{m}^3$ occasion

contributed to a 3-hour average of $86 \mu\text{g}/\text{m}^3$ (33 ppb). Ninety-nine per cent of the data were below $15 \mu\text{g}/\text{m}^3$.

While the highest 3-hour average is somewhat below the highest onsite 3-hour average, the limited quantity of data restricts the comparison potential.

Carbon Monoxide. Carbon monoxide (CO) was monitored at three DER sites at different times. All one-hour averages were below $13 \text{ mg}/\text{m}^3$ (11 ppm), the overall averages are near $1.5 \text{ mg}/\text{m}^3$. The stations are located near major thoroughfares and the maximum levels observed occurred during morning "rush-hour" periods. Both the maximum and the average levels were higher at the DER sites than those measured onsite.

2.8.3 References

- (1) U. S. Environmental Protection Agency, Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD), EPA-450/2-78-019, May, 1978.
- (2) U. S. Environmental Protection Agency, "Volume I Principles," Quality Assurance Handbook for Air Pollution Measurement Systems, EPA-600/9-76-005, March, 1976.
- (3) U. S. Environmental Protection Agency, "Volume II Ambient Air Specific Methods," Quality Assurance Handbook for Air Pollution Measurement Systems, EPA-600/4-77-027a, May, 1977.
- (4) Black & Veatch Consulting Engineers, Ambient Air Monitoring First Quarterly Report May, 1980 - July, 1980, prepared for Orlando Utilities Commission, 1980.
- (5) Black & Veatch Consulting Engineers, Ambient Air Monitoring Second Quarterly Report August, 1980 - October, 1980, prepared for Orlando Utilities Commission, 1980.
- (6) Black & Veatch Consulting Engineers, Ambient Air Monitoring Third Quarterly Report November, 1980 - January, 1981, prepared for Orlando Utilities Commission, 1980.
- (6a) Black & Veatch Consulting Engineers, Ambient Air Monitoring Fourth Quarterly Report February, 1981 - April, 1981, prepared for Orlando Utilities Commission, 1981.
- (7) Black & Veatch Consulting Engineers, Quality Assurance Plan for Ambient Air Quality and Meteorological Monitoring Program, prepared for Orlando Utilities Commission, 1980.
- (8) Letter dated March 25, 1981, Brian Kerchoff, Eng. Tech. III, Florida DER to P. M. Fransioli, Meteorologist, Black & Veatch.

TABLE 2.8-1 AMBIENT AIR QUALITY STANDARDS

Standard	Short-Term*	24-Hour* Average	Annual** Average
Sulfur Dioxide ($\mu\text{g}/\text{m}^3$)			
Federal Primary	--	365	80
Federal Secondary	1300 (3 hour)	--	--
Florida	1300 (3 hour)	260	60
Nitrogen Dioxide ($\mu\text{g}/\text{m}^3$)			
Federal Primary and Secondary	--	--	100
Florida	--	--	100
Carbon Monoxide (mg/m^3)			
Federal Primary and Secondary	40 (1 hour)	--	--
Federal Primary and Secondary	10 (8 hour)	--	--
Florida	Same as Federal	--	--
Total Suspended Particulate ($\mu\text{g}/\text{m}^3$)			
Federal Primary	--	260	75
Federal Secondary	--	150	60
Florida	--	150	60

*Not to be exceeded more than once per year; averaging times given in parentheses.

**The annual average for total suspended particulate is computed as a geometric mean, whereas the annual average for sulfur dioxide and nitrogen dioxide are computed as arithmetic means.

$\mu\text{g}/\text{m}^3$: micrograms per cubic metre at 25 C and 760 mm Hg

mg/m^3 : milligrams per cubic metre at 25 C and 760 mm Hg

TABLE 2.8-2. FEDERAL PSD (PREVENTION OF SIGNIFICANT DETERIORATION)
CLASS II INCREMENTS

<u>Pollutant</u>	<u>Increment</u> micrograms per cubic metre
Sulfur Dioxide (3-hour)	512*
Sulfur Dioxide (24-hour)	91*
Sulfur Dioxide (Annual)	20
Total Suspended Particulates (24-hour)	37*
Total Suspended Particulates (Annual)	19

*Not to be exceeded more than once per year.

TABLE 2.8-3. NEARBY AIR QUALITY MONITORING STATIONS

Site*	SAROAD No.	Site Name	Parameters	Notes
1	0380-004-F02	Tico Airport	Hi Vol, SO ₂ Bubbler	NO _x Bubbler removed 1/5/81
2	0930-001-F02	DeBary	Hi Vol	Open 2/9/81
3	2680-002-F01	Merritt Is. Courthouse	Hi Vol and SO ₂	
4	3240-001-F01	Sewage Trt. Plt., Taft	Hi Vol	
5	3240-003-F01	Pine Hills El. School	Hi Vol	Open 9/25/80
6	3240-004-F01	Zellwood El. School	Hi Vol	Open 9/25/80
7	3240-005-F01	SR50 and 436	CO, WS/WD	Open 7/16/80
8	3280-003-F01	W. Central & Parramore	Hi Vol	
9	3280-004-F01	595 N. Primrose	Hi Vol	SO ₂ and NO _x Bubblers removed 1/5/80
10	3280-005-F01	Orange and Central	CO	Open 10/29/80
11	4040-003-F02	Sanford City Hall	Hi Vol	
12	4140-002-F03	Orlando Dr., Sanford	O ₃ , WS/WD	O ₃ open 4/11/80 WS/WD open 5/7/80
13	4480-001-F02	611 Singleton-Titusville	Hi Vol	
14	4900-002-F01	Lake Isle Est. Winter Park	SO ₂ , O ₃ , WS/WD CO, THC, CH ₄ , NMHC	SO ₂ open 7/80 CO and all HC off 12/80
15	3240-002-J05	Stanton Energy Center	SO ₂ , CO, NO, NO ₂ , NO _x , Hi Vol Dichot-Samp., WS/WD, Temp., Dew Pt., Precip.	Open 5/1/80

*Site No. corresponds to locations in Figure 2.8-1.

Source: Reference (8)

TABLE 2.8-4. PARAMETERS MEASURED AND DATA RECOVERY RATES

<u>Parameter</u>	<u>Method</u>	<u>Manfuacterer and Model</u>	<u>Data Recovery per cent</u>
1. SO ₂	Flame photometric	Meloy SA285E	89.2
2. NO/NO ₂ /NO _x	Chemiluminescence	CSI1600	92.2
3. CO	Non-dispersive infra-red	ML 8310	92.8
4. TSP	Hi-vol, gravimetric	GMWL 2000H	96.7
5. IP	Dichotomous sampler	Sierra 244	45.9
6. WS/WD	Anemometer, vane	MRI 1022	58.3
7. Scalar Speed	Anemometer	MRI 1022	87.4
8. Temperature	Thermistor	MRI 892-1	94.3
9. Dew Point Temperature	LiCl cell	MRI 892-1	83.0
10. Precipitation	Tipping bucket	MRI 302	57.2
11. Data Recording	Digital: Tape	SumX SX-410	--

TABLE 2.8-4. PARAMETERS MEASURED AND DATA RECOVERY RATES

<u>Parameter</u>	<u>Method</u>	<u>Manfuacterer and Model</u>	<u>Data Recovery* per cent</u>
1. SO ₂	Flame photometric	Meloy SA285E	86.3
2. NO/NO ₂ /NO _x	Chemiluminescence	CSI1600	91.0
3. CO	Non-dispersive infra-red	ML 8310	90.8
4. TSP	Hi-vol, gravimetric	GMWL 2000H	95.6
5. IP	Dichotomous sampler	Sierra 244	30.4
6. WS/WD	Anemometer, vane	MRI 1022	45.4
7. Temperature	Thermistor	MRI 892-1	93.0
8. Dew Point Temperature	LiCl cell	MRI 892-1	82.2
9. Precipitation	Tipping bucket	MRI 302	43.7
10. Data Recording	Digital: Tape	SumX SX-410	--

*Nine months.

TABLE 2.8-5. SUMMARY OF TWELVE MONTHS OF ONSITE AIR QUALITY DATA COMPARED
WITH AMBIENT AIR QUALITY STANDARDS

4

<u>Pollutant and Time Average</u>	<u>Highest</u>	<u>"Second Highest"</u>	<u>Most Stringent Standard</u>	
Sulfur Dioxide ($\mu\text{g}/\text{m}^3$)				
3-Hour	124	115	1,300	1
24-Hour	44	41	260	
Twelve Months	14.4	--	60 (Annual)	
Nitrogen Dioxide ($\mu\text{g}/\text{m}^3$)				1
Twelve Months	10.7	--	100 (Annual)	
Carbon Monoxide (mg/m^3)				
1-Hour	10.6	10.5	40	
8-Hour	5.2	4.6	10	
Total Suspended Particulate ($\mu\text{g}/\text{m}^3$)				
24-Hour	105*	90*	150	1
Twelve Months*	34**	--	60** (Annual)	

*Two 24-hour samples are not reported because of nonrepresentative local influences; see text.

**Geometric mean values.

TABLE 2.8-5. SUMMARY OF NINE MONTHS OF ONSITE AIR QUALITY DATA COMPARED WITH AMBIENT AIR QUALITY STANDARDS

<u>Pollutant and Time Average</u>	<u>Highest</u>	<u>"Second Highest"</u>	<u>Most Stringent Standard</u>
Sulfur Dioxide ($\mu\text{g}/\text{m}^3$)			
3-Hour	124	115	1,300
24-Hour	44	41	260
Twelve Months	14.4	--	60 (Annual)
Nitrogen Dioxide ($\mu\text{g}/\text{m}^3$)			
Twelve Months	10.7	--	100 (Annual)
Carbon Monoxide (mg/m^3)			
1-Hour	10.6	10.5	40
8-Hour	5.2	4.6	10
Total Suspended Particulate ($\mu\text{g}/\text{m}^3$)			
24-Hour	105*	90*	150
Twelve Months*	34**	--	60** (Annual)

*Two 24-hour samples are not reported because of nonrepresentative local influences; see text.

**Geometric mean values.

TABLE 2.8-5. SUMMARY OF NINE MONTHS OF ONSITE AIR QUALITY DATA COMPARED WITH AMBIENT AIR QUALITY STANDARDS

<u>Pollutant and Time Average</u>	<u>Highest</u>	<u>"Second Highest"</u>	<u>Most Stringent Standard</u>
Sulfur Dioxide ($\mu\text{g}/\text{m}^3$)			
3-Hour	124	116	1,300
24-Hour	44	41	260
Nine Months	14.7	--	60 (Annual)
Nitrogen Dioxide ($\mu\text{g}/\text{m}^3$)			
Nine Months	9.5	--	100 (Annual)
Carbon Monoxide (mg/m^3)			
1-Hour	10.6	10.5	40
8-Hour	5.2	4.6	10
Total Suspended Particulate ($\mu\text{g}/\text{m}^3$)			
24-Hour	82*	73*	150
Nine Months	32**	--	60** (Annual)

*Two 24-hour samples are not reported because of nonrepresentative local influences; see text.

**Geometric mean values.

TABLE 2.8-6. TSP DATA COMPARISONS BETWEEN ONSITE AND FLORIDA DER STATIONS

<u>Month</u>	<u>Parameter</u>	<u>Site 15 (Onsite)</u>	<u>Site 4</u>	<u>Site 8</u>	<u>Site 9</u>
Jan. 80	Max.			73	58
	Avg.			65	50
Feb.	Max.			78	76
	Avg.			56	62
Mar.	Max.		60	90	77
	Avg.		58	82	66
Apr.	Max.		69	59	57
	Avg.		48	58	50
May	Max.	82	54	63	60
	Avg.	39	36	50	55
Jun.	Max.	59	55	72	75
	Avg.	40	39	52	53
Jul.	Max.	73	54	73	68
	Avg.	35	42	53	55
Aug.	Max.	49	65	86	125
	Avg.	29	42	64	69
Sep.	Max.	22	37	49	43
	Avg.	17	26	41	39
Oct.	Max.	49	55	78	76
	Avg.	33	40	51	57
Nov.	Max.	71	61	85	86
	Avg.	35	37	54	48
Dec.	Max.	55	55	77	76
	Avg.	33	38	60	59
Jan. 81	Max.	63			
	Avg.	50			
Feb. 81	Max.	80			
	Avg.	37			

TABLE 2.8-6 (Continued). TSP DATA COMPARISONS BETWEEN ONSITE AND FLORIDA
DER STATIONS

<u>Month</u>	<u>Parameter</u>	<u>Site 15</u> <u>(Onsite)</u>	<u>Site 4</u>	<u>Site 8</u>	<u>Site 9</u>
Mar. 81	Max.	105			
	Avg.	67			
Apr. 81	Max.	47			
	Avg.	34			

Notes: All TSP values are in micrograms per cubic metre.

Site numbers correspond to those given in Table 2.8-3.

TABLE 2.8-6. TSP DATA COMPARISONS BETWEEN ONSITE AND FLORIDA DER STATIONS

<u>Month</u>	<u>Parameter</u>	<u>Site 15 (Onsite)</u>	<u>Site 4</u>	<u>Site 8</u>	<u>Site 9</u>
Jan. 80	Max.			73	58
	Avg.			65	50
Feb.	Max.			78	76
	Avg.			56	62
Mar.	Max.		60	90	77
	Avg.		58	82	66
Apr.	Max.		69	59	57
	Avg.		48	58	50
May	Max.	82	54	63	60
	Avg.	39	36	50	55
Jun.	Max.	59	55	72	75
	Avg.	40	39	52	53
Jul.	Max.	73	54	73	68
	Avg.	35	42	53	55
Aug.	Max.	49	65	86	125
	Avg.	29	42	64	69
Sep.	Max.	22	37	49	43
	Avg.	17	26	41	39
Oct.	Max.	49			
	Avg.	33			
Nov.	Max.	71			
	Avg.	35			
Dec.	Max.	55			
	Avg.	33			
Jan. 81	Max.	63			
	Avg.	50			

Notes: All TSP values are in micrograms per cubic metre.

Site numbers correspond to those given in Table 2.8-3.

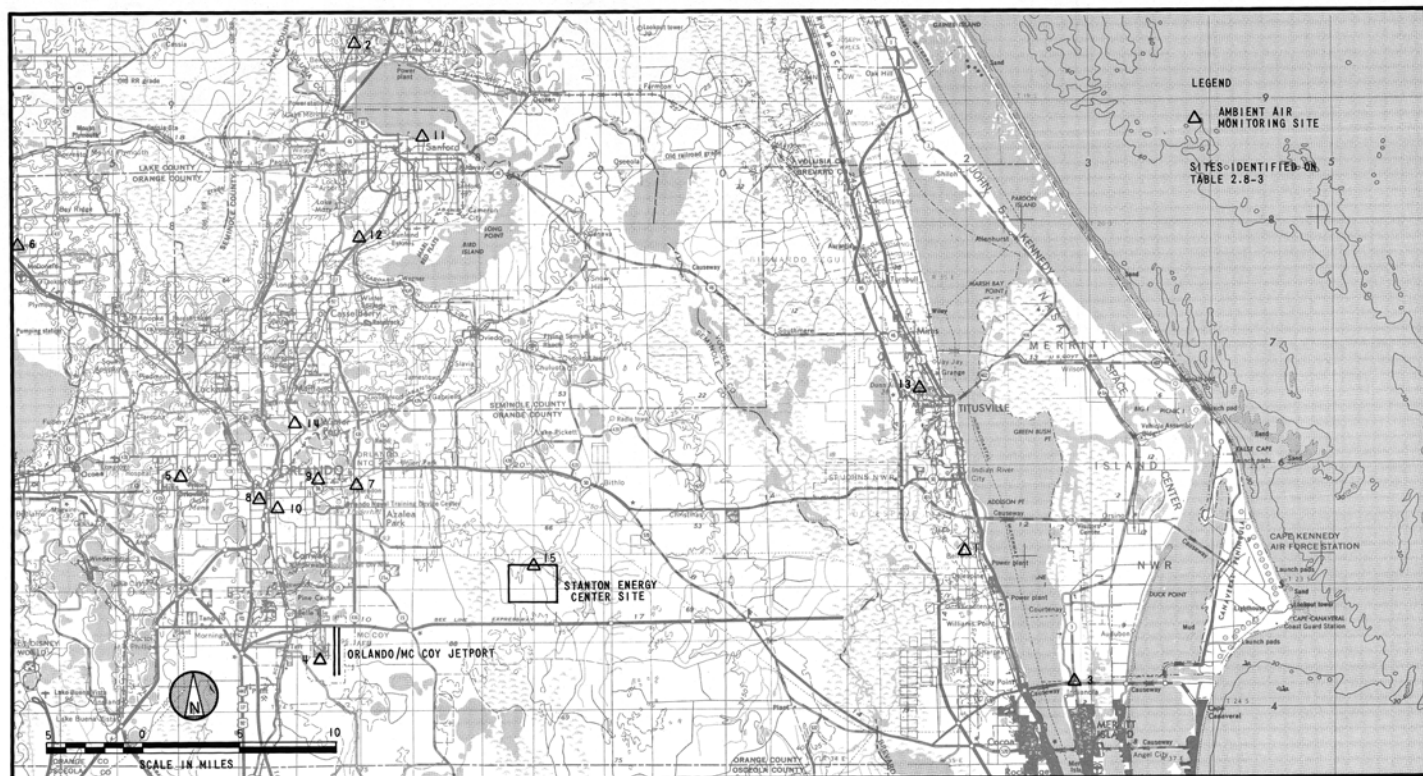


FIGURE 2.8-1. LOCATION OF NEARBY AIR QUALITY MONITORING STATIONS

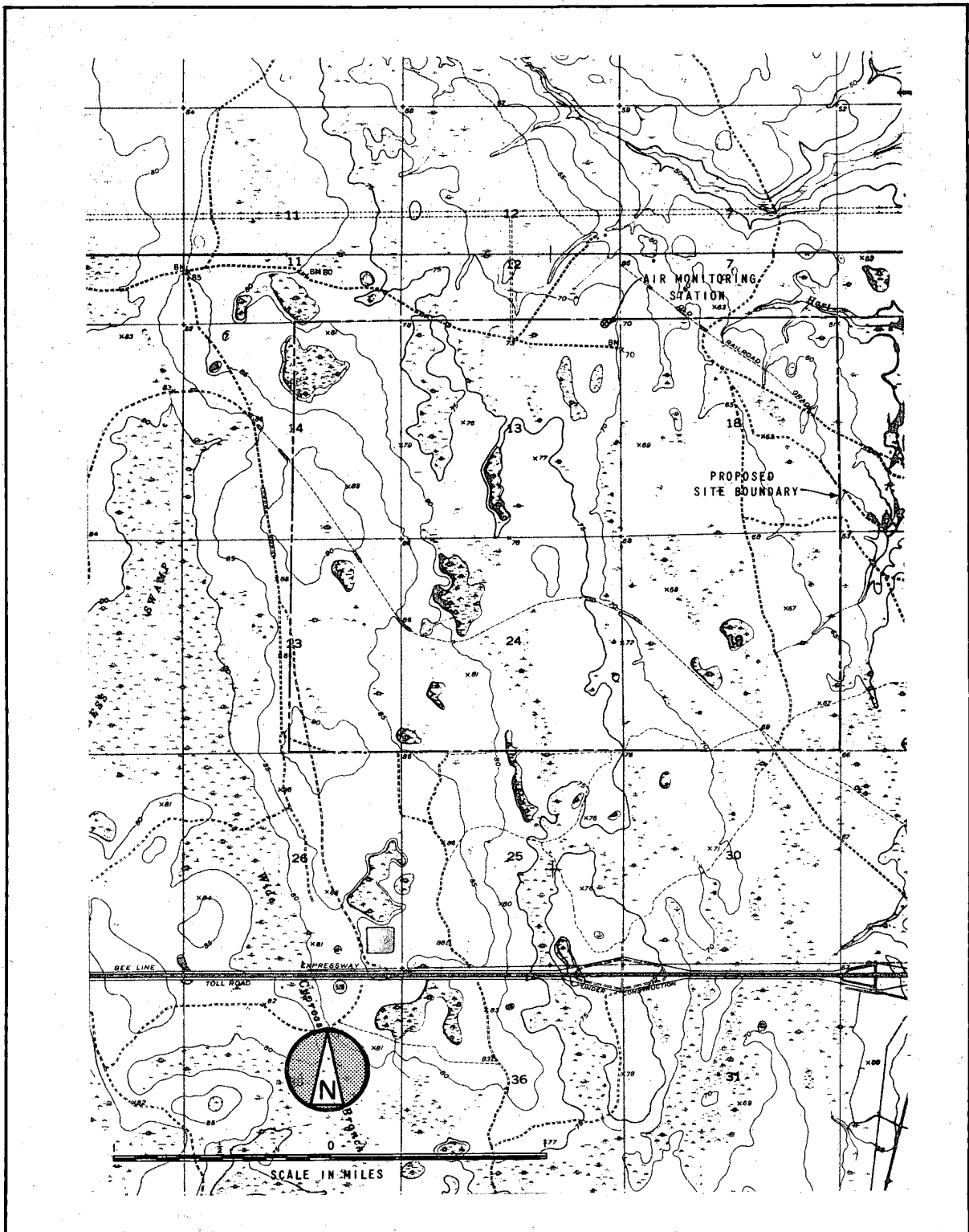
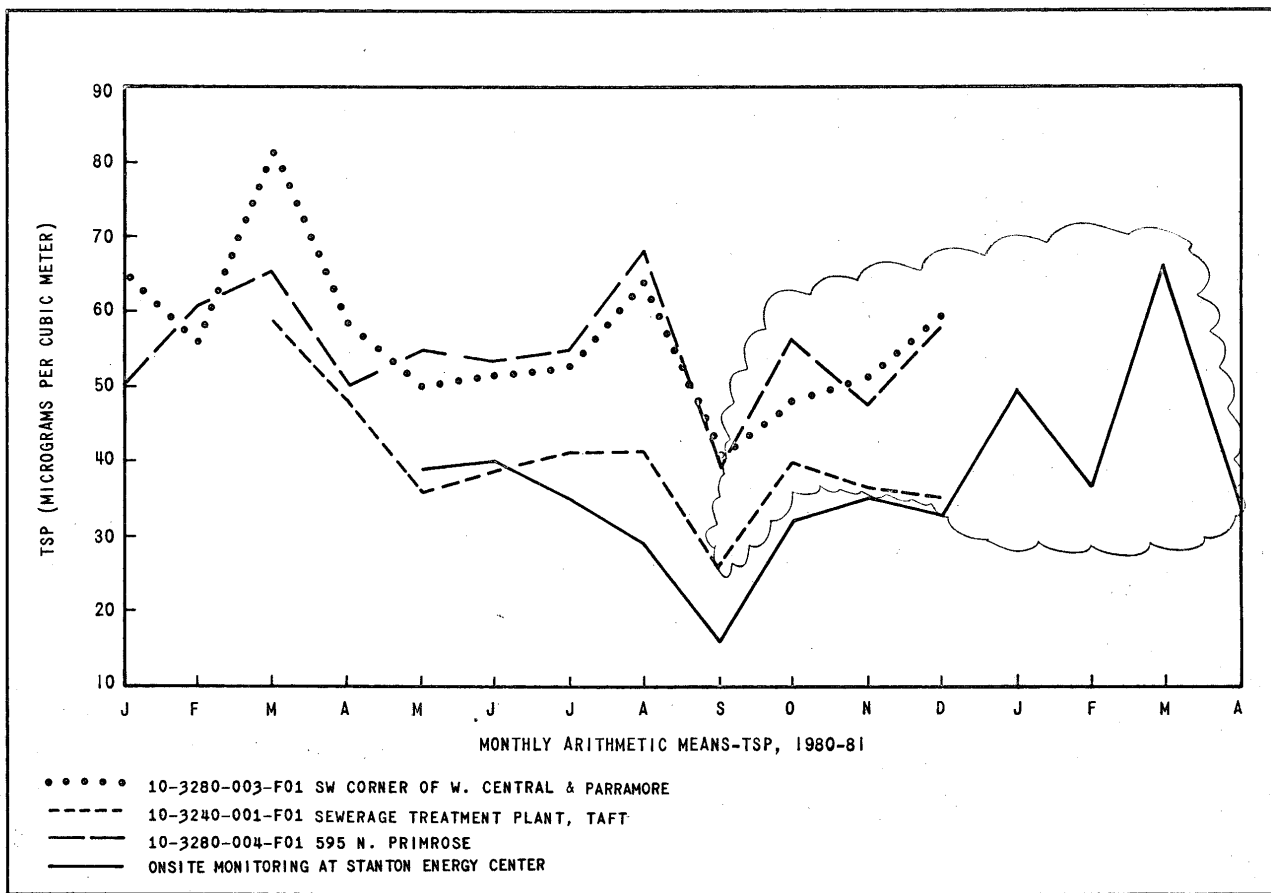


FIGURE 2.8-2. TOPOGRAPHY AROUND THE AIR MONITORING STATION



AMENDMENT I
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FIGURE 2.8-3. MONTHLY MEAN TSP DATA
FROM ONSITE AND DER STATIONS

2.9 OTHER ENVIRONMENTAL FEATURES

2.9.1 Baseline Noise Levels

Ambient noise levels on the proposed project site and in the immediate vicinity were surveyed in May and December of 1980 in accordance with the methodology described in Section 6.3.1 Noise Survey Methodology. Three sampling stations were established for the noise survey as illustrated by Figure 2.9-1. Station 1 is located on the proposed site where little human activity presently occurs. Station 2 is located approximately 1,000 feet from the nearest active landfill area and 2,000 feet from the center of the landfill operation. Station 3 is located near the Beeline Expressway, a major source of noise.

During each noise survey, ambient sound pressure levels were monitored during daytime hours, in the evening, and during nighttime hours at Stations 1 and 3. Measurements were taken at Station 2 only during daytime hours (0700-2200) because landfill operation is confined to daytime.

The results of the noise level surveys have been analyzed for both statistical frequency of occurrence and for the sound pressure levels associated with 9 frequency bands which make up the sounds normally audible to the human ear. The statistical frequency of occurrence analyses for all ambient noise measurements address the per cent of time during which sound pressure levels in dBA were equalled or exceeded. Table 2.9-1 presents the results of these statistical analyses at the 1 per cent, 10 per cent, 50 per cent, 90 per cent, and 99 per cent values.

Baseline noise measurements for all stations were also analyzed for the sound pressure levels (L_p) in dBA for 9 frequency bands from 31 Hertz (cycles per second) to 8,000 (8K). Noise measurement data were also analyzed to obtain a 24-hour A-weighted sound level (L_{eq}) with acoustic energy equivalent to the accumulated time-varying noise for the same 24-hour period. Table 2.9-2 presents the results of these analyses.

The Orange County Landfill is a major source of noise near the site, but actual noise level measurements within 1 metre of the specific sources were not obtained. Measurements of sound pressure levels at Station 2 were

used in calculations which provided estimates of the sound power levels in dB and dBA values at the center of the landfill operations for the 9 frequency bands and a 15-hour L_{eq} (0700-2200). These estimates of acoustic energy originating from the landfill operations center were important input for the development of ambient 24-hour L_{eq} noise contours shown on Figure 2.9-2 and ambient 24-hour L_{dn} noise contours shown on Figure 2.9-3. Measurements of sound pressure levels were slightly higher in May than in December; therefore, the May measurements were used to develop the baseline noise contours to provide a conservatively high background level for construction and operation impact assessments presented in Sections 4.1.3 and 5.7.2.

Table 2.9-3 presents the values based on the May, 1980 measurements for Station Two.

At most stations, daytime noise levels were higher than nighttime levels. Background noises included insect sounds, livestock sounds, bird sounds, and rustling of leaves. Small aircraft flying over the stations resulted in readings up to 50 dBA while commercial aircraft caused readings up to 59 dBA.

At Station 2 near the landfill, no evening or nighttime measurements were taken since no landfill activity occurs then. It is probable that nighttime noise levels are similar to those measured at Station 1. Nighttime noise levels at Station 3 were significantly higher than either nighttime or daytime levels at Station 1 because of the continuous highway traffic on the Beeline Highway.

Ambient noises measured on the proposed site at Station 1 are relatively uniform in both the statistical sound pressure levels through the 24-hour periods and in the sound pressure levels found for each of the 9 frequency bands. Near the Beeline Highway at Station 3, slightly higher noise levels were found during daytime hours. Examination of the octave band sound pressure levels indicates that the vehicular noises from the highway contain higher sound pressure at the higher frequencies which are more noticed by humans.

2.9.2 Other Features

No other features pertinent to the environmental evaluation of the proposed project have been identified.

TABLE 2.9-1. BASELINE NOISE LEVELS IN dBA

	Statistical Sound Pressure Levels*				
	<u>L₉₉</u>	<u>L₉₀</u>	<u>L₅₀</u>	<u>L₁₀</u>	<u>L₁</u>
<u>Date and Station</u>					
<u>May 1980</u>					
<u>Station One</u>					
day (0700-1900)	41	42	43	46	50
evening (1900-2200)	40	41	42	44	47
night (2200-0700)	40	41	42	47	53
<u>Station Two</u>					
day (operating)	35	38	44	52	58
<u>Station Three</u>					
day (0700-1900)	43	47	56	73	82
evening (1900-2200)	45	47	54	67	80
night (2200-0700)	44	45	52	68	81
<u>December 1980</u>					
<u>Station One</u>					
day (0700-1900)	32	33	37	40	49
evening (1900-2200)	40	40	40	42	51
night (2200-0700)	40	40	41	41	43
<u>Station Two</u>					
day (operating)	45	45	46	49	33
<u>Station Three</u>					
day (0700-1900)	42	45	57	73	82
evening (1900-2200)	40	45	56	69	80
night (2200-0700)	28	37	50	65	79

*Per cent of time sound level equalled or exceeded.

Source: B&V.

TABLE 2.9-2. BASELINE OCTAVE BAND NOISE ANALYSIS IN dBA

	Frequency (Hertz)								
	<u>31</u>	<u>63</u>	<u>125</u>	<u>250</u>	<u>500</u>	<u>1K</u>	<u>2K</u>	<u>4K</u>	<u>8K</u>
<u>Date and Station</u>									
<u>May 1980</u>									
<u>Station One</u>									
day (0700-1900): Lp (dBA)	26	37	38	35	38	36	35	36	32
evening (1900-2200): Lp (dBA)	24	35	36	33	36	34	33	34	30
night (2200-0700): Lp (dBA)	24	35	36	33	36	34	33	34	30
<u>Station Two</u>									
operation Lp (dBA)	30	41	42	37	39	41	38	38	33
<u>Station Three</u>									
day (0700-1900): Lp (dBA)	32	38	54	58	67	64	59	51	51
evening (1900-2200): Lp (dBA)	30	36	52	56	65	62	57	49	49
night (2200-0700): Lp (dBA)	30	36	52	56	65	62	57	49	49
<u>December 1980</u>									
<u>Station One</u>									
day (0700-1900): Lp (dBA)	21	28	34	30	30	31	29	29	25
evening (1900-2200): Lp (dBA)	25	32	38	34	34	35	33	33	29
night (2200-0700): Lp (dBA)	24	31	37	33	33	34	32	32	28
<u>Station Two</u>									
day (operating): Lp (dBA)	16	29	35	30	31	41	45	35	28
<u>Station Three</u>									
day (0700-1900): Lp (dBA)	33	39	55	59	68	65	60	52	52
evening (1900-2200): Lp (dBA)	31	37	53	57	66	63	58	50	50
night (2200-0700): Lp (dBA)	28	34	50	54	63	60	55	47	47

*Lp.

**L_{eq} (24 hr) is the 24-hour A-weighted sound level having equivalent acoustic energy as the accumulated time-varying noise for the same 24-hour period.

Source: B&V.

TABLE 2.9-3. ESTIMATED OCTAVE BAND NOISE LEVELS--ORANGE COUNTY LANDFILL CENTER

	Frequency (Hertz)									L_{eq}
	<u>31</u>	<u>63</u>	<u>125</u>	<u>250</u>	<u>500</u>	<u>1K</u>	<u>2K</u>	<u>4K</u>	<u>8K</u>	
day* (Average):										
L_w (dB)**	121	121	113	99	93	98	95	100	101	124
day* (Average):										
L_w (dBA)***	82	95	97	90	90	98	96	101	100	106

*Operation day is 0700 to 2200 hours.

** L_w (dB).

*** L_w (dBA).

Source: B&V.

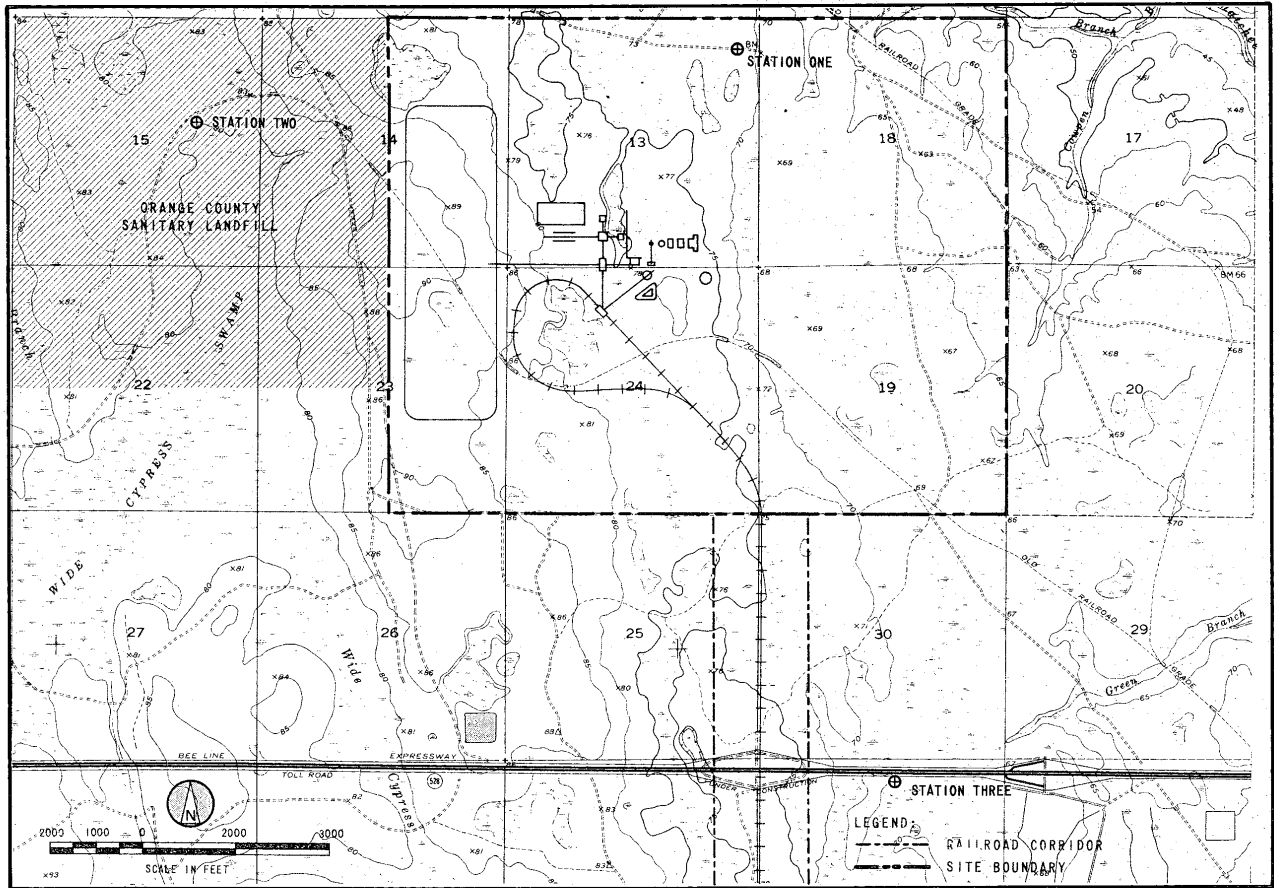


FIGURE 2.9-1. NOISE MONITORING STATIONS-
CURTIS H. STANTON ENERGY CENTER

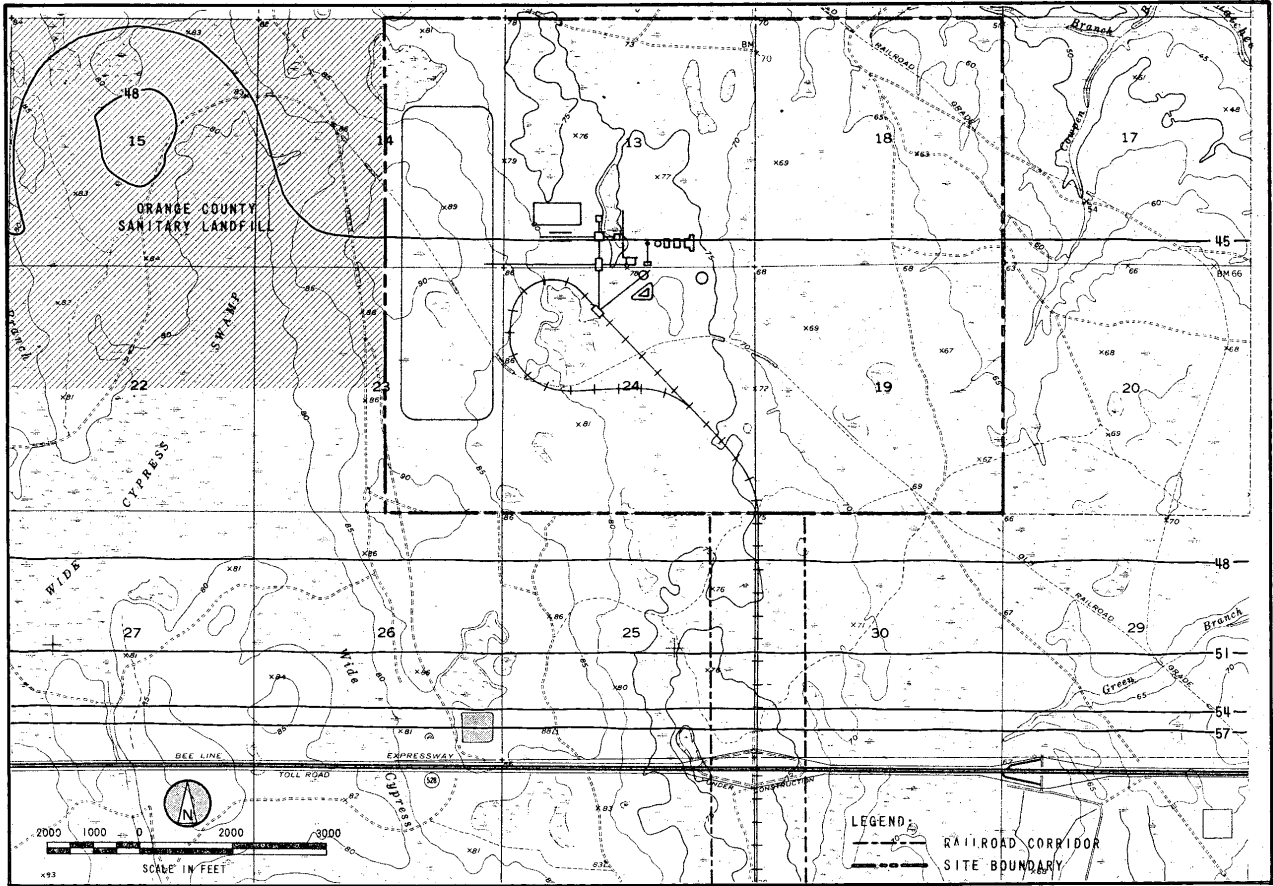


FIGURE 2.9-2. EXISTING L_{eq} (dBA) CONTOURS FOR THE VICINITY OF THE PROPOSED CURTIS H. STANTON ENERGY CENTER

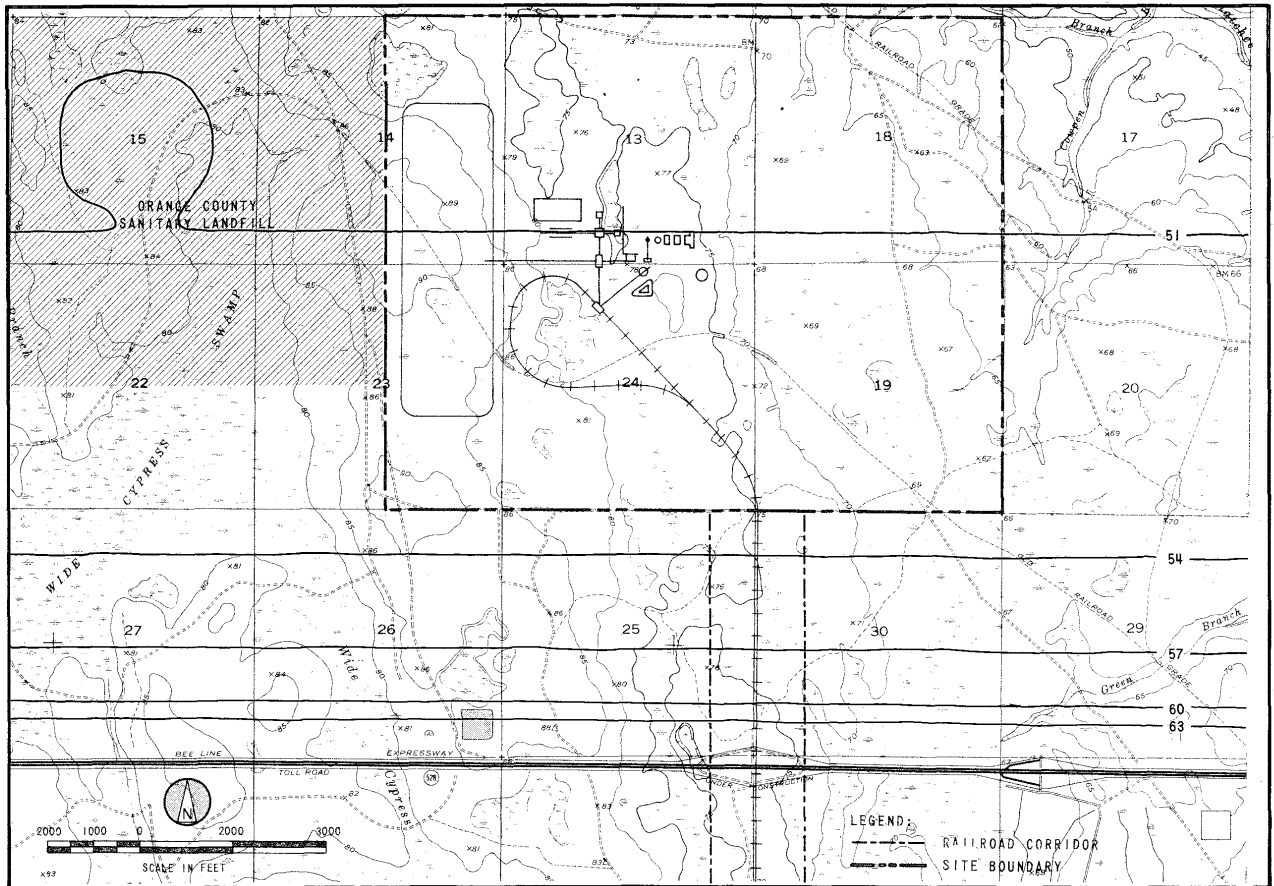


FIGURE 2.9-3. EXISTING L_{dn} (dBA) CONTOURS FOR THE VICINITY OF THE PROPOSED CURTIS H. STANTON ENERGY CENTER

**SITE CERTIFICATION
APPLICATION**

**ORLANDO UTILITIES COMMISSION
CURTIS H. STANTON ENERGY CENTER
UNIT 1**

VOLUME 2

ORLANDO UTILITIES COMMISSION
CURTIS H. STANTON ENERGY CENTER
UNIT 1

SITE CERTIFICATION APPLICATION

VOLUME 2

ORLANDO UTILITIES COMMISSION
CURTIS H. STANTON ENERGY CENTER
UNIT 1

SITE CERTIFICATION APPLICATION

VOLUME 2

APPLICATION FOR CERTIFICATION OF A PROPOSED
ELECTRICAL POWER GENERATING PLANT SITE

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3.0 THE PLANT

3.1 EXTERNAL APPEARANCE

The initial development phase of the Curtis H. Stanton Energy Center will include Unit 1, a 460 gross-415 net MW, coal-fueled steam/electric generator. Unit 1 facilities will also include an electrostatic precipitator, sulfur dioxide removal equipment, and a chimney. Several other facilities will be constructed during initial development to serve ultimate development of 4 units at the site. These include the cooling tower makeup water supply storage pond, the coal pile runoff pond, the recycle basin, the active combustion waste area runoff pond, and the associated onsite facilities. The coal storage area and associated coal-handling facilities will be initially constructed for two units with expansion to four-unit capacity when Unit 3 is constructed.

Artist's renditions of the Stanton Energy Center with one unit and with four units have been prepared and are included as Figures 3.1-1 and 3.1-2.

3.1.1 Plant Profile

A general plant profile of the Unit 1 central generating facilities is shown in Figure 3.1-3. This profile is based on the elevations of the various facilities as viewed from the north looking south. All structures shown by the profile except the Administration and Plant Services Buildings will be totally enclosed with base walls of precast concrete and upper walls of steel panels with bonded coatings. The Administration and Plant Services Building will have a brick veneer exterior. The elevations and dimensions shown in Figure 3.1-3 are preliminary and may change as detailed engineering design proceeds.

3.1.2 Site Arrangement

Initial development of the Stanton Energy Center will consist of Unit 1 and associated facilities. As shown by Figure 3.1-4, certain facilities will be initially developed to accommodate ultimate site capacity of

4 units. The ultimate site capacity is 4 units as shown in Figure 3.1-5. The location, orientation, and arrangement of the units and associated facilities were based on the locations of nest-cavity trees of the red-cockaded woodpecker, existing wetland areas, and relationships among the less compatible project facilities. The solid waste disposal area was placed along the western boundary of the site because of the existing high surface elevations which would allow the use of the area as a source of fill material, because of the lack of nest-cavity trees or significant wetlands, and because of the presence of an existing sanitary landfill on adjacent property to the west. The railroad loop logically was placed along the south side of the complex since the railroad spur from Orlando approaches from the south.

The initial development of the site will involve the use of 960 acres of land exclusively for Unit 1 and associated facilities. Complete development to the ultimate site capacity of 4 units will require the exclusive use of about 1,100 acres of the site. The remaining 2,180 acres will be maintained as a buffer zone and portions will provide foraging habitat for the red-cockaded woodpecker.

3.1.3 Release Points

The Stanton Energy Center is designed so no wastewater discharges to surface waters will be necessary. Surface runoff from undisturbed portions of the site will follow existing natural drainage patterns. Surface runoff from the coal storage pile and the active solid waste storage area will be collected in lined ponds and transferred to a lined recycle basin for use in the plant. Surface runoff from the developed portions of the central plant complex will be routed to the makeup water supply storage pond which will be unlined to promote percolation. Part of the cooling tower blowdown and central plant complex drainage will be directed to the recycle basin for use in the flue gas desulfurization equipment. The remainder of the

blowdown and plant drainage in excess of plant needs will be pumped to the Orange County Easterly Subregional Wastewater Treatment Plant for treatment and separate disposal. A detailed description of the water supply, uses, and management is presented in Section 3.3.

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Combustion gas wastes will be released from two sources associated with Unit 1. The major source will be the combustion of coal in the steam generator and the release point will be the 550-foot tall chimney. The oil-fired auxiliary boiler to be used for unit startup will also generate combustion gases. The release point for these gaseous wastes will be the auxiliary boiler chimney to be located on the roof of the Administration and Plant Services Building.

With expansion to the ultimate site capacity of 4 units, 3 major release points for combustion gas wastes will be added; the chimneys to be installed with each unit. No additional auxiliary boilers will be required.

Fugitive dust release points for one unit will consist of the coal storage pile, the stacker/reclaimer, conveyor systems, transfer houses, unit train unloading facility, fly ash storage silo, lime handling equipment and storage silo, and the limestone storage pile and handling equipment. Detailed descriptions of these fugitive dust release points are provided in Section 3.2, Section 3.7, and Section 3.9.

Fugitive dust release points for the 4-unit development will be similar to 1 unit, but will involve larger quantities of coal and limestone, additional conveyors for the additional units, and additional fly ash storage silos.

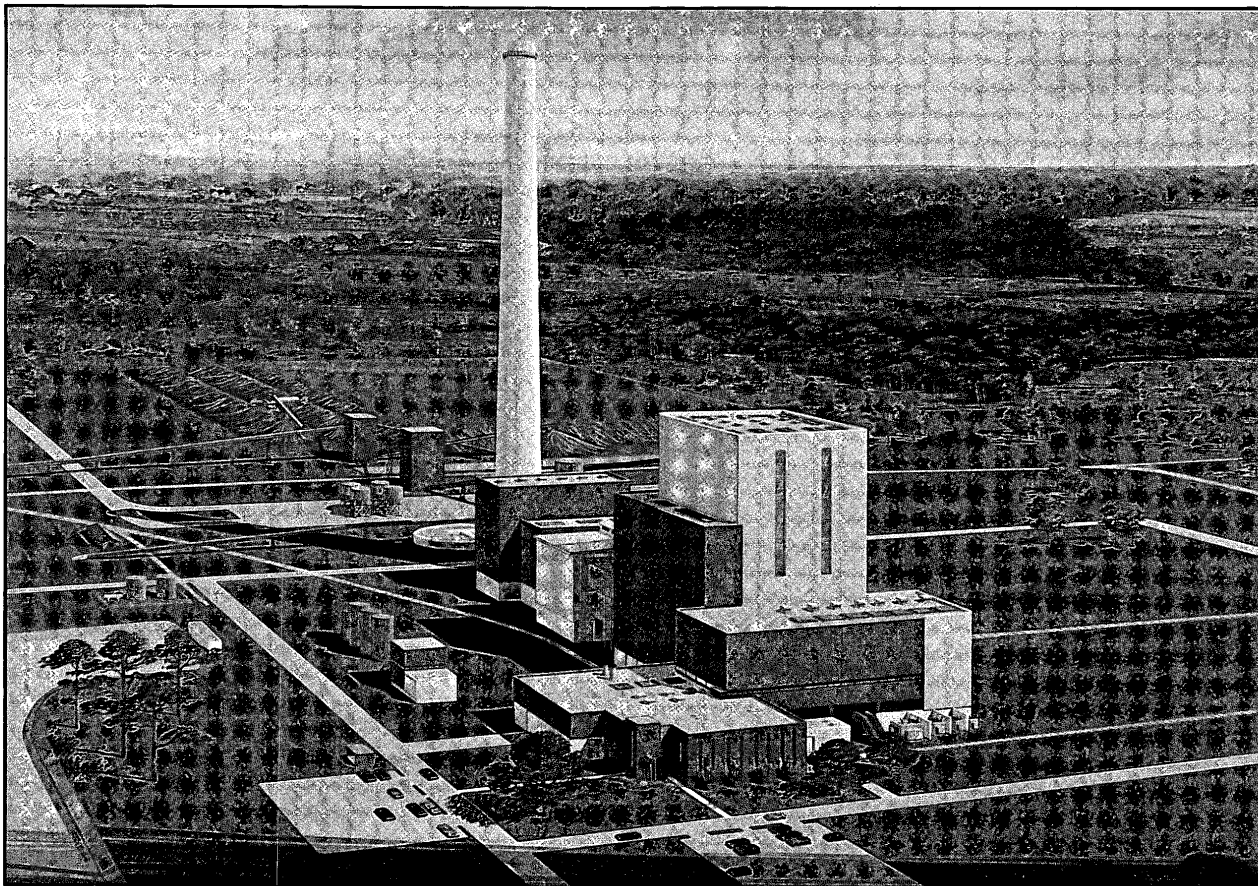


FIGURE 3.1-1. ARTIST'S RENDITION OF CURTIS H. STANTON
ENERGY CENTER - 1 UNIT

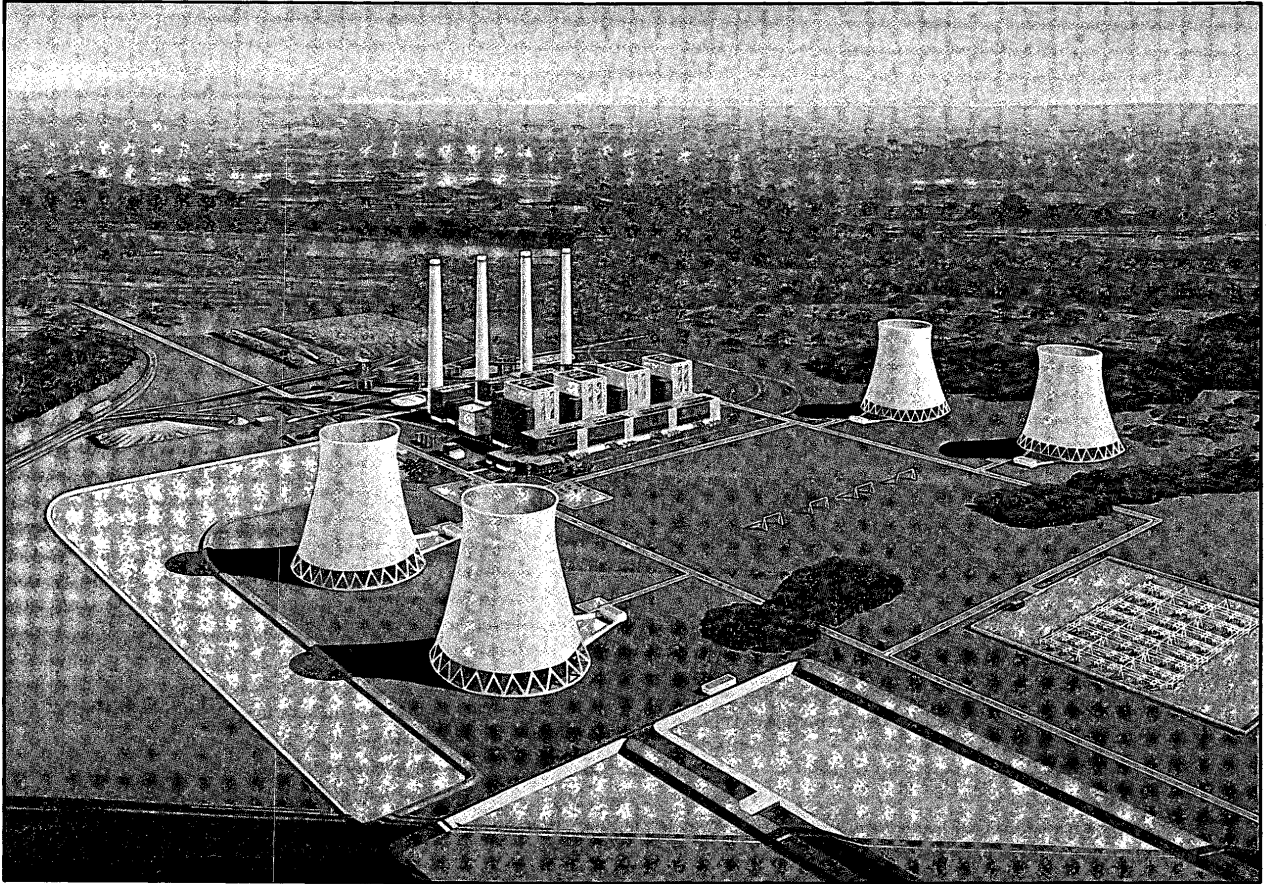
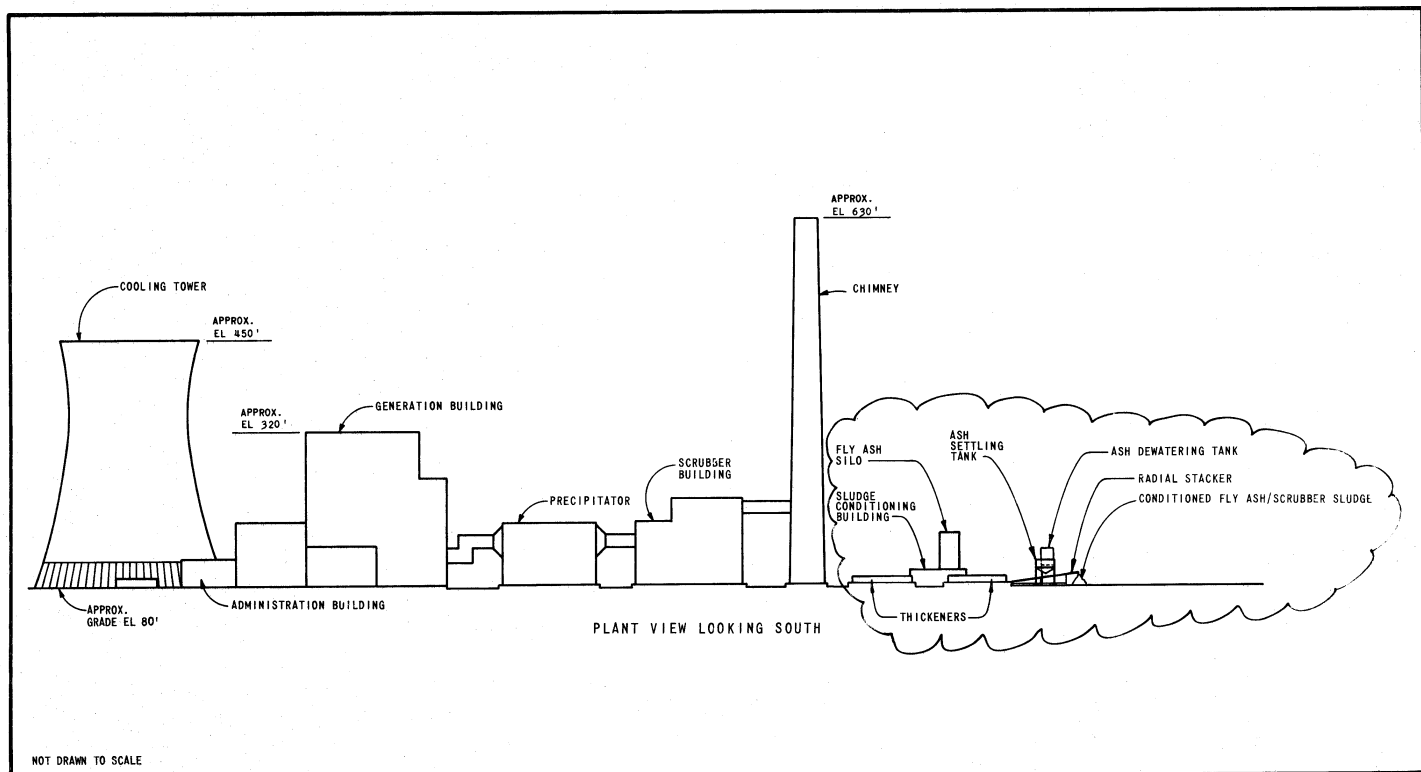


FIGURE 3.1-2. ARTIST'S RENDITION OF CURTIS H. STANTON
ENERGY CENTER - 4 UNITS



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FIGURE 3.1-3. GENERATION FACILITIES PROFILE

3.2 FUEL

3.2.1 Fuel Types and Qualities

The primary fuel for the Stanton Energy Center will be coal. Although coal supply contracts for Unit 1 have not been finalized, it is anticipated that bituminous coal from the Appalachian coal fields or the Illinois Basin will be used. It is also anticipated that the coal supplies for the Stanton Energy Center may change as future units are added. To provide the necessary design flexibility to accommodate the use of coals with a wide range of properties, three typical coals with differing properties were selected as design bases. The design-basis coal for the steam generator is a washed Illinois Basin coal; the design-basis coal for the particulate removal system is a washed Appalachian coal; and the design-basis coal for the flue gas desulfurization system is an unwashed Illinois Basin coal. Table 3.2-1 presents the typical and ranges of properties of these three coals. Designing these three major components to each handle a "worst case" design-basis coal will provide the overall system design flexibility to burn any coal with properties within the ranges illustrated in Table 3.2-1.

The importance of design flexibility in relation to coal supplies and their properties is illustrated by the following factors.

- (1) Specific coal supplies for Unit 1 are not known.
 - (a) Coal supply contract for Unit 1 initial supply has not been completed.
 - (b) Unit 1 coal supply may change with the renegotiation of coal supply contracts and the addition of future units.
- (2) Coal storage and handling areas and facilities for Unit 1 will be designed and constructed to provide for possible segregation of coal supplies for individual units. However, the flexibility of Unit 1 to burn a wide range of coals will reduce the probability that such segregation will be necessary.

The steam generator will be started with No. 6 fuel oil. During periods of low load operation, No. 6 fuel oil will also be used for flame stabilization. The auxiliary boiler, emergency generator, emergency fire

pumps, and mobile coal handling and solid waste disposal equipment will use No. 2 fuel oil; and other vehicles will use gasoline or diesel fuel.

3.2.2 Fuel Quantities

Based on a heating value range of 11,000 to 13,500 Btu/lb, the maximum coal consumption rate will be 154 to 191 tons/hr. At a 64.6 per cent load factor during the early years of the plant life, the annual coal consumption for Unit 1 would be 900,000 to 1,100,000 tons per year. At lifetime capacity factor of 53.6 per cent, annual coal consumption for Unit 1 would be 750,000 to 910,000 tons per year.

It is estimated that Unit 1 will experience 10 cold and 20 hot start-ups per year during the initial years of operation. This will require 80,000 gallons of No. 6 fuel oil per year. The unit may be used as a cycling unit during the later years of its life. Based on 200 startups per year (50 cold and 150 hot) the unit would consume 310,000 gallons of No. 6 fuel oil per year.

The auxiliary boiler will be required during cold and hot startup of Unit 1. Based on 10 cold and 20 hot startups per year, the annual fuel consumption will be 57,000 gallons per year. When Unit 2 begins operation, it is expected that the auxiliary boiler will be used only during rarely occurring conditions when one unit is down and the other unit is starting up.

3.2.3 Fuel Transportation

Coal will be transported to the plant site by unit trains with 70 to 100 cars of 100-tons capacity. Two to three trains per week will be required to supply the coal required for Unit 1. Train turnaround time will be approximately 6 days. The coal will be transported to the site from the Seaboard Coast Line Railroad (SCL) on a rail spur that connects to SCL south of Orlando, Florida and runs east parallel to the Bee Line Expressway and then north into the site. A description of the rail spur is given in Section 3.9.

Fuel oil will be shipped to the plant by truck or rail, depending on the supplier. Diesel fuel and gasoline will be transported to the site by truck.

3.2.4 Coal Handling and Storage

The coal handling system will consist of unloading, stocking, reclaiming, and long term reserve storage facilities. Figure 3.2-1 shows a schematic of the coal handling process, Figure 3.2-2 shows the layout of the coal handling facilities and Figure 3.2-3 shows a perspective of the coal handling facilities.

The unit train unloading will employ an enclosed bottom-dumping type facility designed for rapid-discharge bottom-dump cars. Unloading of the rapid-discharge bottom-dump cars will be accomplished by moving the train across a receiving hopper at a slow speed (approximately 1/3 mph) and automatically dumping the contents of the rail car as it passes over the receiving hoppers. Cars will be unloaded at a rate of 35 cars per hour. The entire operation of unloading a complete unit train from the time it enters the site until it leaves for the mine will take approximately 4 hours.

As the train is being unloaded, the coal will be conveyed to the transfer house where it can be conveyed to the crusher building directly, to the emergency stockout, or to the stacker/reclaimer for stockout and reuse. A normal mode of operation would be to divert enough coal directly to the crusher building (and subsequently to the plant) to top off the coal silos and stock the remainder with the stacker/reclaimer to be reclaimed later as necessary.

The stacker/reclaimer system will consist of a bucket-wheel-short boom trencher-type equipment which will travel on a track. The stacker/reclaimer will stock active reserve coal on both sides of the track allowing a reclaim capacity of approximately 12,000 tons per side as a minimum.

Long term inactive reserve storage will be a pile of approximately 400,000 tons located north of the active storage pile. An emergency storage and reclaim pile located north of the transfer building will be available for use as surge capacity when unloading a train or reclaim activities, in the event the stacker/reclaimer is out of service.

Coal conveyed to the crusher and on to the steam generator building will supply unit coal silos located directly above the coal pulverizers. Coal scales will be provided for inventory control and coal sampling equipment will be provided for monitoring coal quality.

The coal handling, unloading, and stockout systems are capable of supplying the coal for the ultimate four unit development. Initial facilities will be capable of handling two units. Facilities required to be added for Units 3 and 4 consist of extension of active storage area (berm and stacker reclaimer track), and addition of a crusher house and associated conveyors, scales, and sampling equipment for Units 3 and 4.

Fugitive dust associated with the handling of coal will be controlled with conveyor enclosures, water and chemical sprays, compaction, telescopic chute, and bag filters. All coal conveyors not underground or within buildings will be constructed with enclosures consisting of a roof and sides with a steel-grate floor except for those sections which pass over other plant facilities such as roads, buildings, and work areas. Such sections will be constructed with solid floors to intercept coal which falls from the conveyor belt. The transfer and cascade conveyors between the plant transfer hopper and the coal silos within the generation building will be totally enclosed and connected to the bag filter system which serves the coal silos. Table 3.2-2 lists the release points and control methods. Estimated emission levels of fugitive coal dust for the release points are given in Section 5.5.

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3.2.5 Fuel Oil Storage and Handling

The fuel oil, as received, will be unloaded and pumped to storage tanks. No. 6 fuel oil will be stored in a 250,000 gallon tank and No. 2 fuel oil will be stored in a 41,000 gallon tank. The storage tanks will be located south of the main generating facilities. A spill-prevention dike will be located around the tanks. The area inside the dike will be lined. The supply to the steam generator igniters and auxiliary boiler in the main plant buildings will be by pumps located at the storage tank facility.

3.2.6 Alternate Fuel Types

No special design features have been included in the design of Unit 1 to allow burning of alternate fuels. Consideration has been included in the site layout for future reception and storage of slurry coal from a pipeline entering the site from the north. In addition, the site layout has considered the future addition of refuse receiving, preparation, conveying, and burning in future units.

TABLE 3.2-1. SUMMARY OF DESIGN COAL PROPERTIES

	Steam Generator		Particulate Removal		Desulfurization	
	Illinois Basin Coal		Appalachian Coal		Illinois Basin Coal	
	Washed		Washed		Not Washed	
	Typical	Range	Typical	Range	Typical	Range
Proximate Analysis						
Moisture (%)	8.00	7.0-9.0	5.0	4.5-5.5	7.5	6.5-8.5
Ash (%)	7.80	7.0-8.5	10.0	8.5-11.0	16.5	15.5-18.5
Volatile (%)	39.20	38.0-40.4	28.4	28.2-29.2	35.4	33.5-37.0
Fixed Carbon (%)	45.00	43.0-47.0	56.6	54.3-58.4	40.6	39.0-42.0
Heating Value (Btu/lb)	12,400	12,200-12,600	13,000	12,900-13,150	11,000	10,900-11,300
Sulfur (%)	2.8	2.5-3.1	0.77	0.71-0.82	3.85	3.5-4.0
Sulfur Forms						
Pyritic (%)	1.30	1.20-1.40	0.22	0.20-0.24	2.25	2.0-2.5
Organic (%)	1.65	1.55-1.77	0.54	0.52-0.56	1.83	1.70-1.95
Sulfate (%)	0.09	0.07-0.11	0.00		0.08	0.06-0.10
Reduction of SO ₂ by Washing (%)	35.48		--		-0-	
Ultimate Analysis %						
Moisture	8.0	7.0-9.0	5.00	4.5-5.5	7.5	6.5-8.5
Carbon	68.73	66.0-70.0	74.09	73.0-78.0	60.15	58.0-62.0
Hydrogen	4.86	4.5-5.1	4.71	4.65-4.90	4.20	4.0-4.4
Nitrogen	1.14	1.0-1.3	1.26	1.24-1.49	1.14	1.0-1.3
Chlorine	0.16	0.12-0.20	0.13	0.02-0.15	0.12	0.08-0.16
Sulfur	2.80	2.2-3.4	0.76	0.71-0.82	3.85	3.5-4.0
Ash	7.8	7.0-8.5	10.00	8.5-11.0	16.50	15.5-18.5
Oxygen	6.51	6.0-7.0	4.04	2.38-4.04	6.54	5.5-7.0
Mineral Analysis of Ash (%)						
Phosphate Pentoxide, (P ₂ O ₅)	0.12	0.08-0.16	0.30	0.25-0.45	0.18	0.15-0.20
Silica, (SiO ₂)	49.67	48.0-51.0	47.94	46.09-48.77	43.66	42.0-45.0
Ferric Oxide, (Fe ₂ O ₃)	19.09	17.5-20.5	9.39	8.60-11.82	21.21	20.0-22.4
Alumina, (Al ₂ O ₃)	20.25	19.0-21.5	28.95	27.5-30.36	16.17	15.5-17.0
Titania, (TiO ₂)	0.98	0.75-1.25	1.27	1.20-1.48	0.81	0.65-0.95
Lime, (CaO)	3.01	2.5-3.5	3.21	2.97-3.27	6.70	6.0-7.5
Magnesia, (MgO)	1.02	0.8-1.2	1.28	1.27-1.33	0.90	0.80-1.0
Sulfur Trioxide, (SO ₃)	2.42	2.0-3.0	2.66	1.91-3.21	7.20	6.5-8.0
Potassium Oxide, (K ₂ O)	2.65	2.2-3.2	2.08	1.39-2.15	2.19	2.0-2.4
Sodium Oxide, (Na ₂ O)	0.50	0.4-0.7	0.14	0.12-0.45	0.58	0.50-0.70
Undetermined	0.24		2.78		0.40	
Fusion Temperature of Ash, F						
Reducing Atmosphere						
Initial Deformation	2,000	1,950-2,050	2,350	2,320-2,400	2,020	1,950-2,050
Softening (H-W)	2,150	2,100-2,200	2,510	2,500-2,600	2,130	2,050-2,200
Hemispherical (H-W/2)	2,200	2,150-2,250	2,670	2,600-2,740	2,160	2,100-2,200
Fluid	2,610	2,550-2,650	2,770	2,750-2,800	2,300	2,250-2,350
Viscosity T250, F	2,440	2,400-2,500	2,699	2,656-2,742	2,290	2,270-2,310
Oxidizing Atmosphere						
Initial Deformation	2,150	2,100-2,200			2,150	2,100-2,200
Softening (H-W)	2,290	2,250-2,350			2,320	2,280-2,360
Hemispherical (H-W/2)	2,350	2,300-2,400			2,350	2,300-2,400
Fluid	2,560	2,600-2,700			2,480	2,430-2,520
Viscosity, T250, F						
Fouling and Slagging Indices						
Base/Acid Ratio	0.37	0.34-0.40	0.206		0.52	0.48-0.56
Base/Acid Ratio x per cent Sulfur (dry basis)	1.13	1.05-1.21	0.167		2.16	2.0-2.3
Base/Acid Ratio x Na ₂ O (per cent of Ash) ²	0.19	0.17-0.21	0.029		0.30	0.25-0.35
Free Swelling Index	5.5	5.0-6.0	7	6-8	5.5	5.0-6.0
Hardgrove Grindability Index	55	50-60	73	65-75	55	53-58
Minimum Grindability Index	50		65		53	
Minimum Heating Value	12,200		12,900		10,900	
Top Size of Coal	1.5"		+1.25"		+2"	
Size of Bottom Mesh	28		28		28	
Per cent of Coal Passing Bottom Mesh	7.81	6-9	29.6	25-34	8.50	

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Exhibit 6

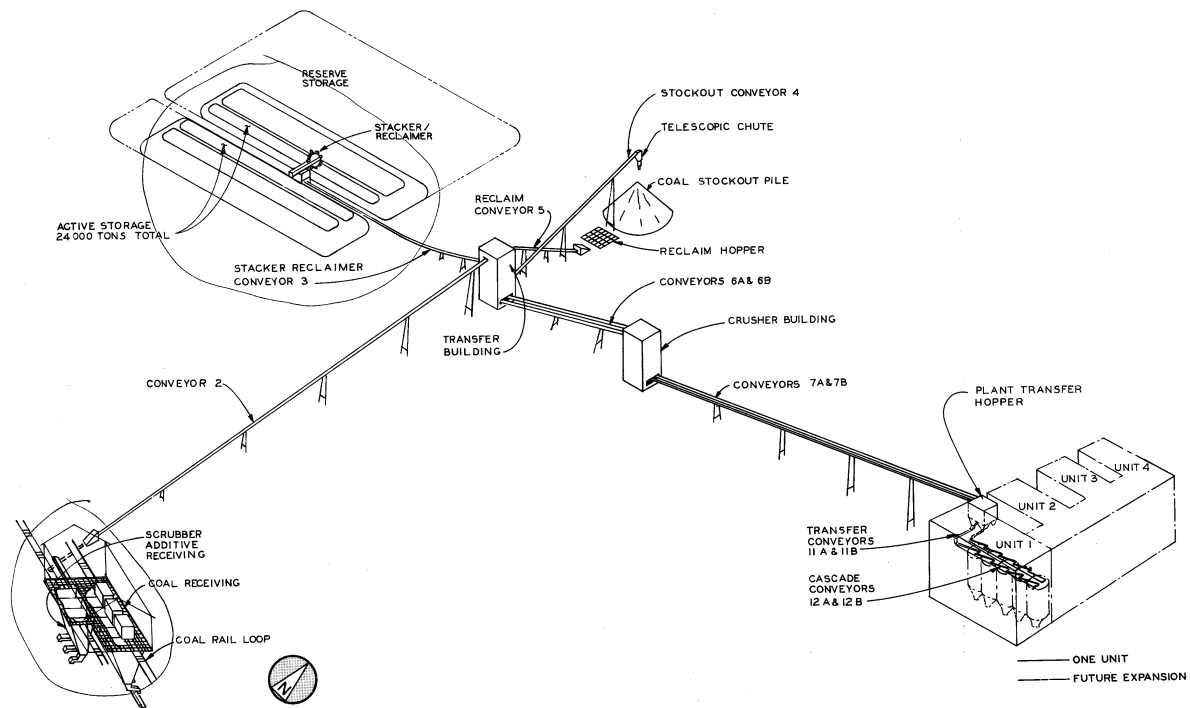


FIGURE 3.2-3. PERSPECTIVE OF COAL HANDLING SYSTEM

TABLE 3.2-2. FUGITIVE COAL DUST EMISSIONS CONTROL

<u>Source of Emissions</u>	<u>Dust Control Method</u>	<u>Control Efficiency</u> per cent		
Bottom Car Dumper	Water Spray and Building Enclosure	97	5	
Conveyor 2	Enclosed	90	RFM-1	
Transfer Building	Enclosed and Baghouse	99+		
Conveyor 3	Wind Screen	50		
Active Storage				
Load In	Stacker Spray Water	75		
Load Out	Reclaimer Spray Water	80		
Wind Erosion	Water Spray and Compaction	80		
Conveyor 4	Enclosed	90	RFM-1	
Emergency Stockout				
Load In	Telescopic Chute and Water	85		
Load Out	Dozer	50		
Wind Erosion	Limit Residence Time	80		
Emergency Reclaim	Bag Filter	99+		
Reserve Storage				
Load In	Dozer Sprayer Water	50		
Wind Erosion	Crusting and Chemical Sprays	90		
Conveyor 5	Enclosed	90	RFM-1	
Conveyor 6A and 6B	Enclosed	90		
Crusher Building	Enclosed and Baghouse	99+		
Conveyor 7A and 7B	Totally Enclosed*	99	RFM-1a	RFM-1
Surge Tower	Baghouse	99+		
Plant Silo	Baghouse	99+		

*With solid floor to protect other plant facilities and work areas.

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TABLE 3.2-2. FUGITIVE COAL DUST EMISSIONS CONTROL

<u>Source of Emissions</u>	<u>Dust Control Method</u>	<u>Control Efficiency per cent</u>	
Bottom Car Dumper	Water Spray and Building Enclosure	97	5
Conveyor 2	Enclosed	<u>90</u> 99+	RFM-1
Transfer Building	Enclosed and Baghouse	99+	
Conveyor 3	Wind Screen	50	
Active Storage			
Load In	Stacker Spray Water	75	
Load Out	Reclaimer Spray Water	80	
Wind Erosion	Water Spray and Compaction	80	
Conveyor 4	Enclosed	<u>90</u> 99+	RFM-1
Emergency Stockout			
Load In	Telescopic Chute and Water	85	
Load Out	Dozer	50	
Wind Erosion	Limit Residence Time	80	
Emergency Reclaim	Bag Filter	99+	
Reserve Storage			
Load In	Dozer Sprayer Water	50	
Wind Erosion	Crusting and Chemical Sprays	90	
Conveyor 5	Enclosed	<u>90</u> 99+	RFM-1
Conveyor 6A and 6B	Enclosed	<u>90</u> 99+	
Crusher Building	Enclosed and Baghouse	99+	
Conveyor 7A and 7B	Enclosed	<u>95*</u> 99+	RFM-1
Surge Tower	Baghouse	99+	
Plant Silo	Baghouse	99+	

*One-half of Conveyor 7A and 7B gallery will be solidly floored;
therefore, overall efficiency is 95 per cent.

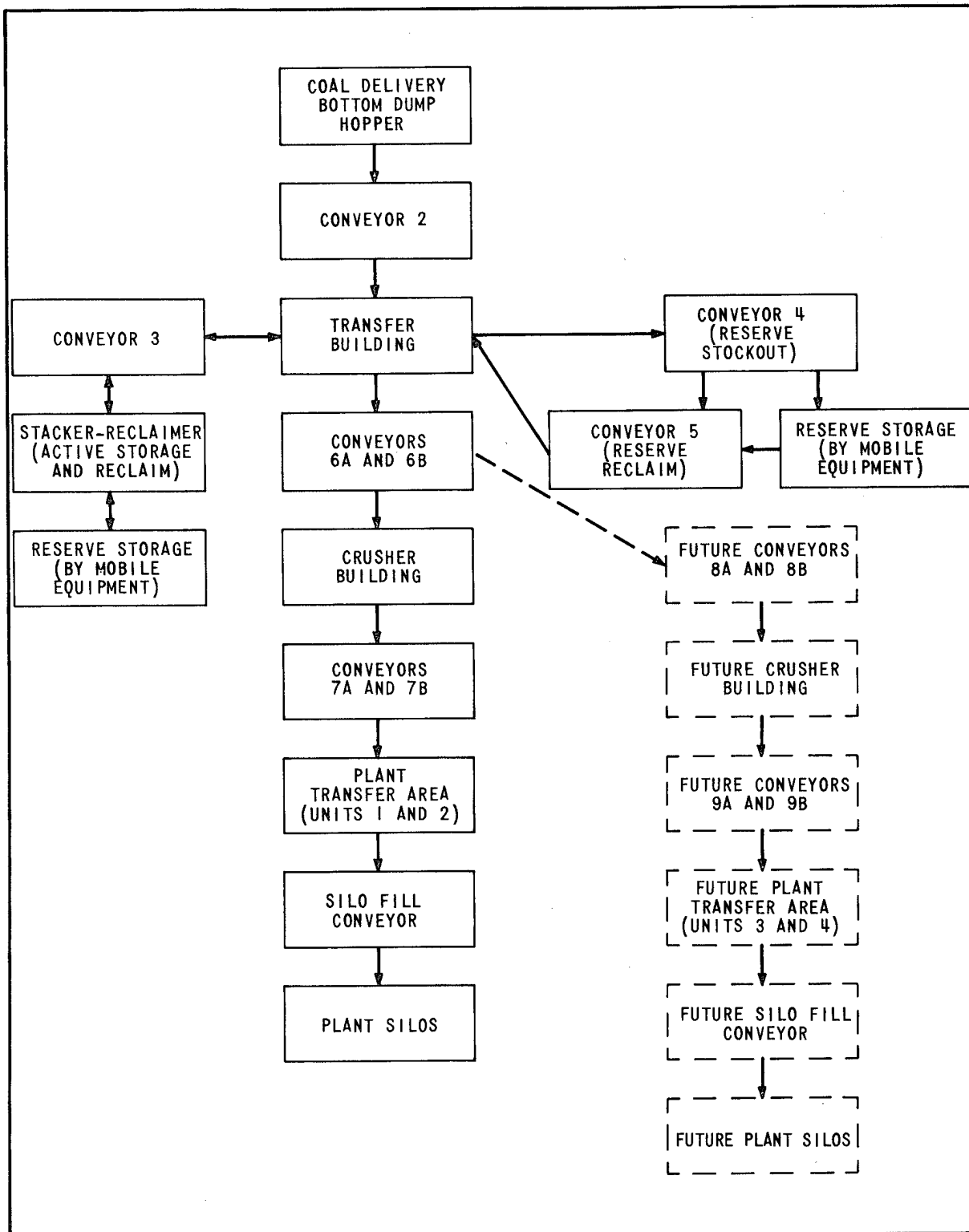
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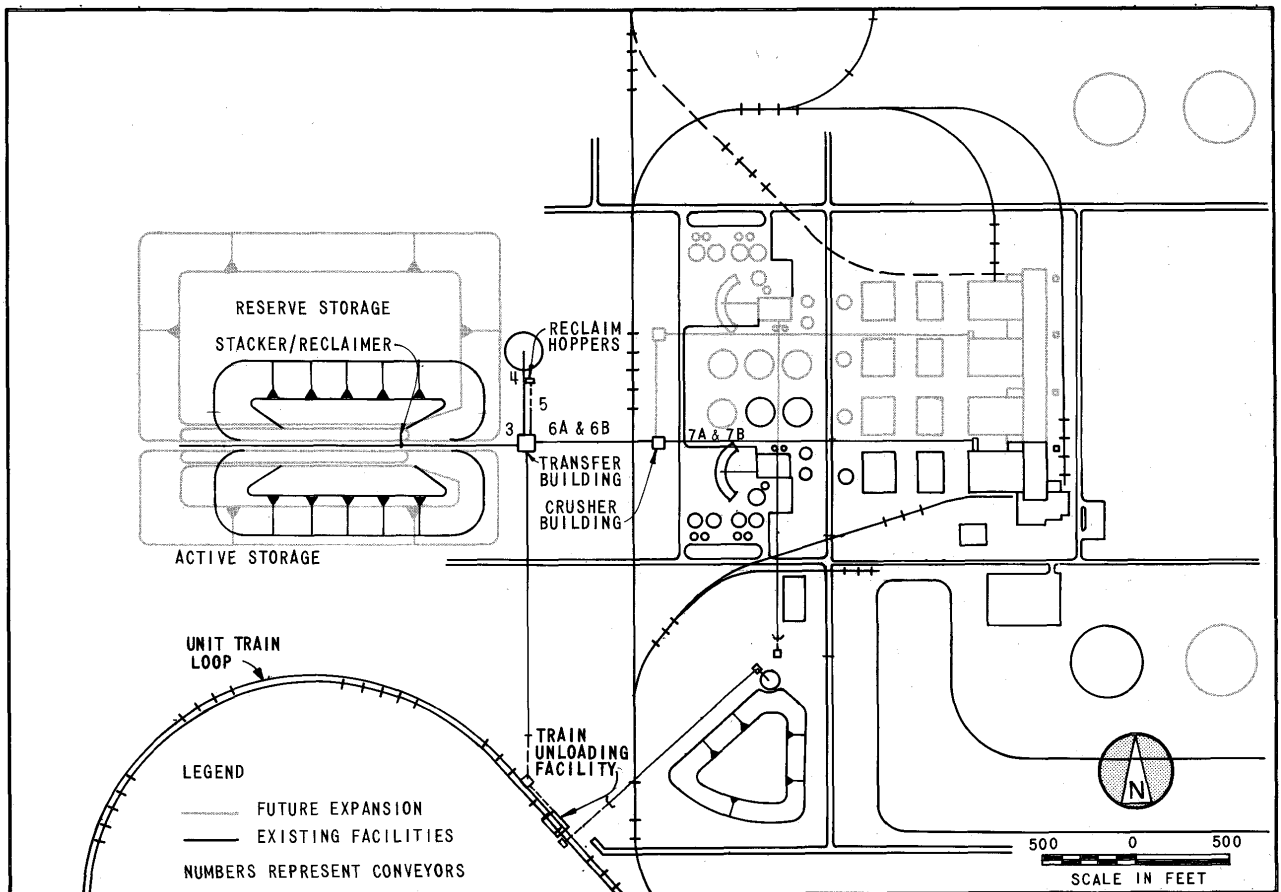


FIGURE 3.2-2. COAL HANDLING SYSTEM LAYOUT

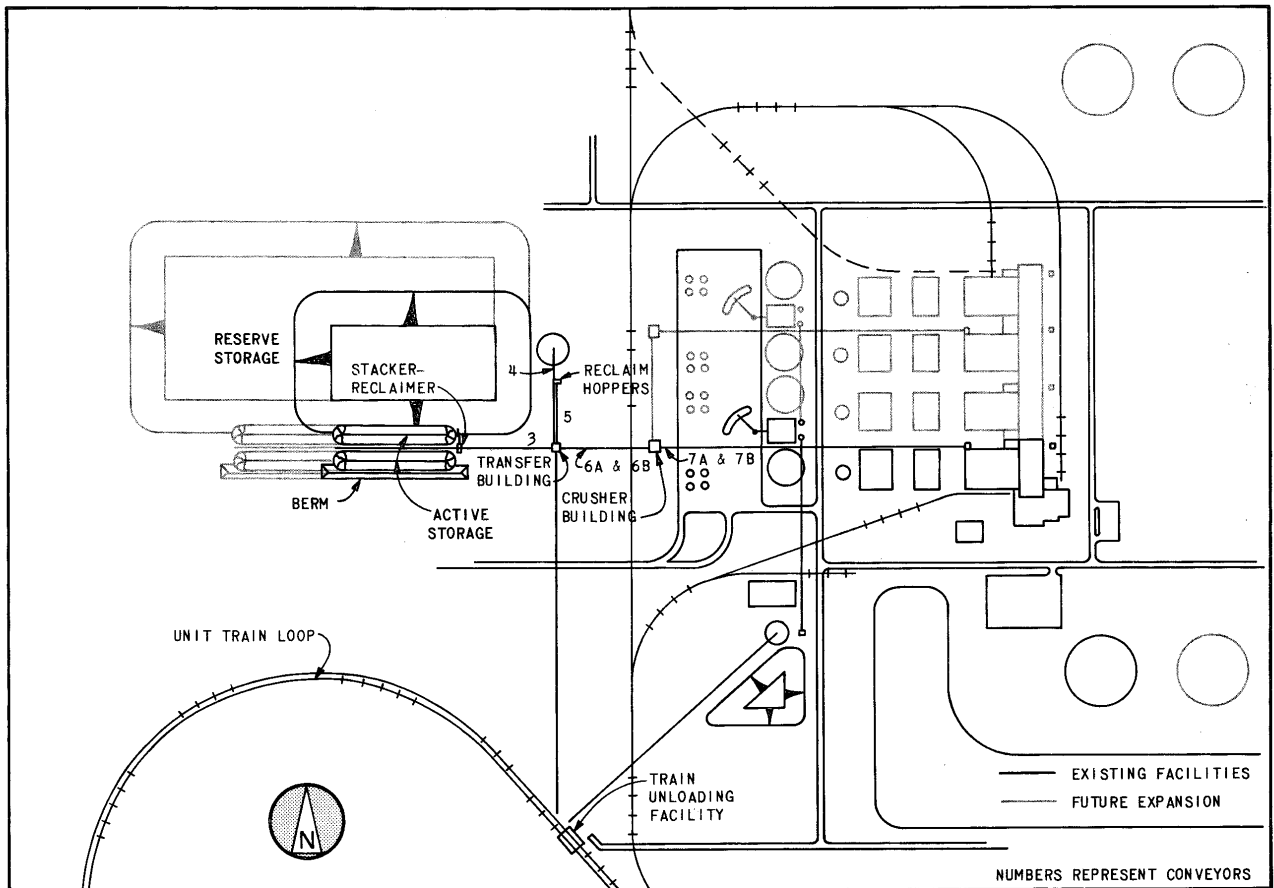


FIGURE 3.2-2. COAL HANDLING SYSTEM LAYOUT

3.3 PLANT WATER USE

Water used at the Stanton Energy Center will come from three sources: Orange County Easterly Subregional Wastewater Treatment Plant, wells, and precipitation. The majority of the water will be used as makeup to the cooling towers. Cooling tower makeup will be Orange County Plant effluent plus collected site runoff and direct precipitation on the makeup water supply storage pond. Well water will be used for potable water, general plant uses and steam cycle makeup. A water mass balance for normal and peak uses is shown on Figure 3.3-1. The water sources and water uses are described in the following subsections.

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3.3.1 Water Sources

Cooling tower makeup will be primarily effluent from the Orange County Plant. The description of the source and quality is presented in Subsection 3.4.2.

RFM-1

The well water will be from two 850 gpm onsite wells that will pump from the Floridan aquifer. For ultimate site development, a third well and pump will be installed along with the third unit. Only two of the three pumps will ever be operated at the same time. The well water will be pumped directly to a solids contact unit for treatment by aeration, lime softening, filtration, and chlorination. The expected qualities of the raw and treated well water are shown on Table 3.3-1.

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Precipitation from the central plant area will be collected and drained to the makeup water supply storage pond. This runoff and any direct precipitation on the makeup water supply storage pond will either evaporate, exfiltrate, or be used as cooling tower makeup. The precipitation runoff collected from the unlined coal storage area and the active solid waste disposal area will be directed to the lined recycle basin for use as scrubber and ash handling system makeup. The coal storage area runoff pond and the active solid waste disposal area runoff pond will also be lined. Site drainage is described in Section 3.10.

The precipitation collected in the ponds by direct precipitation and runoff are based on an annual average precipitation rate of 51.2 inches per

year. Evaporation losses are based on an annual average evaporation of 47 inches per year.

3.3.2 Water Uses

3.3.2.1 Cooling Tower. The major use of water by the proposed project will be for makeup to the cooling tower. The rejection of waste heat from the steam cycle requires the evaporation of large amounts of water which must be replaced by makeup. To maintain the cooling tower water quality at nine cycles of concentration, blowdown is required to remove dissolved solids. Makeup is also required to replace the blowdown and drift losses that will occur. The makeup to the cooling tower will come from the makeup water supply storage pond. The water in the pond will come from the onsite sewage treatment plant effluent, Orange County Plant effluent, site runoff, and direct pond precipitation. Losses from the pond will consist of evaporation and seepage. On an annual average basis, seepage and evaporation will approximately equal site runoff and direct precipitation to the pond. RFM-1

The cooling tower blowdown will be sent to the recycle basin for use as scrubber and ash handling system makeup or to a pump pit for return to the Orange County Plant. The amount of cooling tower blowdown returned to the Orange County Plant depends on the unit load, the amount of precipitation, and the type of coal burned. During periods of high precipitation and low loads, all cooling tower blowdown plus some miscellaneous plant drainage may be returned to the Orange County Plant since collected runoff and direct precipitation will be adequate to supply scrubber and ash handling system makeup. During periods of no precipitation and high unit loads, most of the cooling tower blowdown will be required for scrubber and ash handling system makeup. Another factor influencing cooling tower blowdown reuse is the type of coal used. Burning high sulfur coals would result in a greater use of blowdown than burning low sulfur coals. Burning of high sulfur coals would result in more scrubber sludge production and therefore more water would be lost in the disposal of the sludge (20-30 per cent water). The mass balance presented in Figure 3.3-1 is based on a low sulfur coal (the precipitator design coal shown in Section 3.2) and therefore represents a mass balance with a high annual average return of cooling tower blowdown to the Orange County Plant. The quality of the cooling RFM-1

tower blowdown to be returned to the Orange County Plant is described in Subsection 3.4.3. RFM-1

3.3.2.2 Recycle Basin. The recycle basin shown on Figure 3.3-1 will be a lined pond designed to collect plant wastewater for use as scrubber and ash handling system makeup. Inflows to the basin include direct precipitation, coal storage area runoff, active solid waste disposal area runoff, cooling tower blowdown, neutralization basin effluent, and miscellaneous plant drains.

3.3.2.3 Bottom Ash and Pulverizer Rejects. The ash handling system will utilize water for sluicing the bottom ash and pulverizer rejects from the bottom ash hoppers and pulverizer rejects hoppers. The ash will be dewatered prior to being transported to the solid waste disposal area, with the sluice water being reclaimed and reused in the ash handling system. Water from an ash water storage tank will be used to sluice bottom ash and pulverizer rejects from the bottom ash hoppers and pulverizer rejects hoppers to a transfer tank. From the transfer tank, the slurry will be pumped to a batch-type dewatering bin for gravity decanting of the sluice water and temporary storage of the ash material. The dewatered bottom ash and pulverizer rejects will be taken from the dewatering bins and transported to the solid waste disposal area. Decant from the dewatering bins will overflow into an ash water settling tank for further clarification. Clarified water from the settling tank will be stored in the ash water storage tank while the sludge will be pumped back to the dewatering bins.

Makeup to the dewatering system will be required to replace the water entrained in the ash discharged from the bins, and also for evaporation losses. Makeup water other than the service water added as seal and flush water, will be supplied to the ash water storage tank from the recycle basin. The amount of makeup will depend on the unit load, the type of coal that is being burned, the supply requirements as established by the ash handling system manufacturer, and the time duration for a given conveying cycle. A small amount of service water will be required for crusher seal water and ash sluice gate flush water.

3.3-3

3.3.2.4 Flue Gas Scrubber. A wet limestone type scrubber will be used for the removal of sulfur dioxide from the flue gas. Limestone will be fed as a slurry to a scrubber module where it comes in contact with the flue gas and reacts with sulfur dioxide to form a calcium sulfate/sulfite precipitate. The spray slurry drains into the reaction tank and is recirculated back to the scrubber module. A portion of the spray slurry is bled off from the reaction tank to the thickener. Clarified thickener overflow water is returned to the reaction tank. The sludge, which contains primarily calcium sulfate and calcium sulfite with some unreacted limestone, is de-
watered and transferred to a mixer where it is blended with boiler hopper and fly ash that has been collected in the boiler hopper and removed from the flue gas by electrostatic precipitators. Scrubber sludge combined with fly ash and boiler hopper ash will form a stable mixture which will be transported to the solid waste disposal area. Makeup water from the recycle basin will be required by the desulfurization system to replace water entrained in the solids and evaporation losses. The amount of makeup required will depend on the type of coal that is being burned and the unit load. All water entering the scrubber system will eventually be either evaporated or entrained in the solid waste. Service water will be required by the desulfurization system for seal water and various other uses.

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3.3.2.5 Combustion Waste Storage. Ash and scrubber solids will be stored in 15-acre active areas. Runoff from the active areas will be collected in the lined, active combustion waste area runoff pond. The runoff pond will be sized to contain runoff and direct precipitation from a 100-year, 24-hour rainfall event, assuming an active area of 15 acres. Controlled drainage of the active combustion waste area runoff pond to the recycle basin will be accomplished through a buried pipeline.

5

Runoff from the nonactive areas will be directed to the site natural drainage systems in the area. Nonactive areas are undeveloped portions (areas not yet utilized for combustion waste storage) and developed portions

5

(former active segments which have been reclaimed by covering with topsoil and revegetated).

5

3.3.2.6 Coal Storage Area. A lined pond will be provided to collect rainfall runoff from the unlined coal pile and surrounding coal yard area. The pond will be sized to contain runoff and direct precipitation from a 10-year, 24-hour rainfall event. Runoff from precipitation exceeding the 10-year, 24-hour event will be directed to the recycle basin. Controlled drainage of the coal storage area runoff pond to the recycle basin will be accomplished through a buried pipeline.

5

3.3.2.7 Service Water. A solids contact type softener-clarifier and a gravity filter system will be provided for the treatment of the well water. Lime, coagulant, and coagulant aid will be fed to the solids contact basin for softening the raw water. The solids contact basin will have a concentrator section for collecting the sludge produced in the softening reaction. The sludge will be withdrawn at the rate it is produced and will be piped to a sump. Gravity filters will be provided for filtering the solids contact basin effluent. The filter backwash wastewater will also be piped to the sludge sump. From the sludge sump, the service water treatment wastes will be routed to the flue gas desulfurization system. The service water (gravity filter effluent) will be stored in two 500,000 gallon service water storage tanks. Half of this volume will be dedicated to fire protection. The service water will be of potable quality and, therefore, potable water supply will be from the service water system.

3.3.2.8 Sanitary Wastes. Treatment of the sanitary wastes is described in Section 3.6. Effluent from the onsite sanitary treatment plant will be directed to the makeup water supply storage pond for use as cooling tower makeup.

3.3.2.9 Chemical Wastewater. As described in Section 3.5, various plant chemical wastewaters are collected and then neutralized in a neutralization basin. From the neutralization basin, the wastewater will be transported

to the recycle basin. Essentially, all chemical wastewater will be regenerant wastes from the makeup demineralizer and condensate polishers.

3.3.2.10 Miscellaneous Plant Drains. Miscellaneous plant drains will collect wastewater from recovered steam cycle losses and miscellaneous plant services, such as normal plant cleaning, maintenance activities, equipment and pipe leakage, and relief valve drains. Steam cycle losses will result from evaporation, blowdown, soot blowing, and leakage. Miscellaneous plant drains will be routed to the recycle basin for use in other plant systems or will be routed to the pump pit for return to the Orange County Plant with the cooling tower blowdown.

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3.3.3 Water Consumption

Table 3.3-2 presents the annual average water consumption for Unit 1. Also presented is water flow before plant construction begins. The flow rates for precipitation and evaporation are based on the area of site to be developed (area in which precipitation is collected).

Water consumption during unit shutdown will consist of well water which will be treated and supplied to the service water system. From the service water system, water will be supplied for potable uses, demineralization, and miscellaneous plant services. The potable flow will be approximately the same as during unit operation. The other two flows will be greatly reduced from normal operation amounts.

Water for construction will be provided by one of the onsite wells. Water from the well will be treated by a temporary construction chlorination facility and aerator before storage in a service water tank. Estimated construction water consumption is 300 gpm.

TABLE 3.3-1. ANTICIPATED RAW WELL WATER AND TREATED WATER ANALYSES

Constituent	Raw Well Water			Treated Typical*
	Minimum	Maximum	Typical	
Calcium as CaCO_3	114	302	280	37
Magnesium as CaCO_3	14	41	18	16
Sodium as CaCO_3	17	35	30	30
Potassium as CaCO_3	1	2	1	1
M-Alkalinity as CaCO_3	170	289	288	35
Sulfate as CaCO_3	1	15	13	21
Chloride as CaCO_3	10	28	28	28
Silica as SiO_2	8	25	14	14
Iron as Fe	0.05	2	1.2	0

*Assumes 1 grain per gallon alum added as coagulant.

TABLE 3.3-2. AVERAGE ANNUAL WATER BALANCE*

	Balance During Average Unit Operation gpm	Balance Before Construction gpm		
Water Inflows				
Precipitation	1,019	1,019	5	
Orange County Plant Effluent	2,644	0	5	RFM-1
Well Water	<u>202</u>	<u>0</u>		
Total	3,865	1,019	5	
Water Losses				
Evaporation and Transpiration	3,322	779	5	
Runoff to Natural Drainage	0	200	5	
Seepage	280	40	5	
Return to Orange County Plant	251	0	5	RFM-1
Wastewater Disposal Retention	<u>12</u>	<u>0</u>		
Total	3,865	1,019	5	

*Based on area of site where precipitation runoff is collected.

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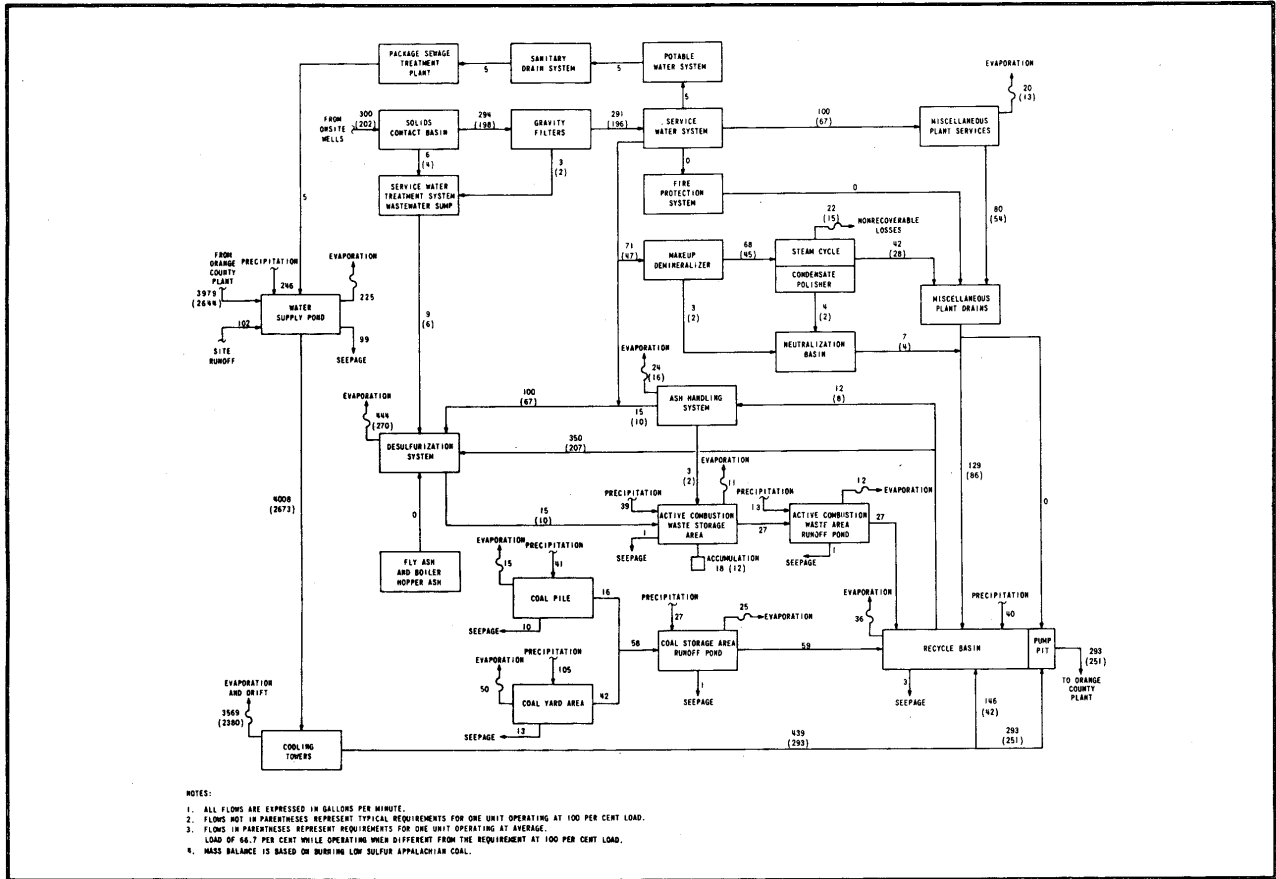


FIGURE 3.3-1. WATER MASS BALANCE FOR UNIT 1

3.4 HEAT DISSIPATION SYSTEM

Plant waste heat will be rejected to the atmosphere in a closed-cycle circulating water system utilizing a natural draft cooling tower. Makeup water to the closed-cycle cooling system will be treated effluent from the Orange County Easterly Subregional Wastewater Treatment Plant.

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3.4.1 Intake and Outfall

An intake will be located at the Orange County Plant to pump treated effluent to an on-site storage pond. Another intake will be located in the on-site makeup water supply storage pond to pump makeup water from the pond to the cooling tower. An outfall will be located in a basin adjacent to the recycle basin. The outfall will contain pumps to pump cooling tower blowdown in excess of that required for makeup to the recycle basin or to the Orange County Plant. None of these structures will be located in existing bodies of water.

3.4.2 Source of Cooling Water

The water for use in the heat dissipation system will come from the Orange County Easterly Subregional Wastewater Treatment Plant. The Orange County Plant is located 7 miles east of the City of Orlando in Section 3, R31E, T23S. The facility is designed for secondary and advanced wastewater treatment. Secondary treatment includes removal of suspended solids and biochemical oxygen demand. Advanced wastewater treatment includes phosphorus removal, nitrogen removal, filtration, and chlorination. Makeup water for the Stanton Energy Center cooling towers will be final plant effluent. The expected effluent quality is shown in Table 3.4-1.

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The effluent will be pumped to the Stanton Energy Center site in a buried 36-inch fiberglass reinforced plastic pipe. The routing of the pipe is described in Subsection 3.9.5. The pipe is sized to supply the makeup water requirement of the ultimate four unit development.

The estimated maximum makeup rate for the Unit 1 cooling system is 4,008 gpm. At a lifetime capacity factor of 53.6 per cent (66.7 per cent load while operating), the average makeup rate is expected to be 2,673 gpm. The flow rate of the Orange County Plant effluent is predicted to average 6 million gallons per day. Storage ponds at the Orange County Plant will provide adequate surge capacity for sewage treatment plant effluent to allow pumping of the effluent on an as-needed basis.

The onsite makeup water supply storage pond arrangement is shown on Figure 3.1-4. The pond will have a surface area of 93 acres and an embankment length of about 10,000 feet. The bottom of the pond will be excavated to an average elevation of 62 feet, msl. Excavated material will be used as embankment and/or general site fill. A detailed description of the makeup water supply storage pond is contained in Section 3.10.

The pond will be used for site runoff collection as well as for makeup water storage. Pond size is established by runoff collection requirements during Unit 1 construction as well as the estimated maximum makeup water requirement for one week with four units operating (560 acre-feet). The estimated average pond seepage rate is 99 gpm and estimated average annual evaporation rate is 226 gpm. The estimated average annual direct precipitation equates to a makeup rate to the pond of 246 gpm. The average annual site runoff to the pond equates to a makeup rate of 102 gpm. Thus, the average yearly losses from seepage and evaporation (325 gpm) will approximately equal the average yearly makeup from direct rainfall and site runoff (348 gpm).

In addition to the water sources described above, the effluent from the Stanton Energy Center sanitary wastewater treatment plant will also be

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The estimated maximum makeup rate for the Unit 1 cooling system is 4,008 gpm. At a lifetime capacity factor of 53.6 per cent (66.7 per cent load while operating), the average makeup rate is expected to be 2,673 gpm. The flow rate of the Iron Bridge Facility effluent is predicted to vary from 4,000 to 46,000 gpm. At the lowest flow the discharge rate may be nearly equal to the Unit 1 maximum demand and considerably less than the maximum demand for the ultimate four unit development. Therefore, the effluent for makeup supply will be pumped to an on-site storage pond during high discharge rate periods and the pumping system will be shut down during low discharge rate periods. The initial pumping installation at the Iron Bridge Facility will include three vertical wet pit pumps in a surge type storage basin. Two pumps will be capable of supplying the water requirements of the first two units at the site. The third pump will be a standby pump. The ultimate four unit development will require the addition of two more pumps to the pump structure.

The onsite makeup water supply storage pond arrangement is shown on Figure 3.1-4. The pond will have a surface area of 93 acres and an embankment length of about 10,000 feet. The bottom of the pond will be excavated to an average elevation of 62 feet, msl. Excavated material will be used as embankment and/or general site fill. A detailed description of the makeup water supply storage pond is contained in Section 3.10.

The pond will be used for site runoff collection as well as for makeup water storage. Pond size is established by runoff collection requirements during Unit 1 construction as well as the estimated maximum makeup water requirement for one week with four units operating (560 acre-feet). The estimated average pond seepage rate is 99 gpm and estimated average annual evaporation rate is 226 gpm. The estimated average annual direct precipitation equates to a makeup rate to the pond of 246 gpm. The average annual site runoff to the pond equates to a makeup rate of 102 gpm. Thus, the average yearly losses from seepage and evaporation (325 gpm) will approximately equal the average yearly makeup from direct rainfall and site runoff (348 gpm).

In addition to the water sources described above, the effluent from the Stanton Energy Center sanitary wastewater treatment plant will also be

discharged into the makeup water supply pond and used as cooling tower makeup. The estimated annual average effluent rate is 5 gpm.

Makeup to the cooling towers will be pumped to the tower from the makeup water supply storage pond by two full capacity pumps located in a pump structure in the pond.

3.4.3 System Design

The system consists of a condenser, a natural draft cooling tower, circulating water pumps, and supply and return circulating water piping.

The surface condenser will be a single-pressure, single-shell, surface condenser located in the generator building directly beneath the steam turbine low pressure exhaust. The condenser will be designed to operate under maximum conditions with the following parameters.

- (1) Condenser surface area--270,000 square feet.
- (2) Circulating water flow--175,000 gpm, 1st pass/200,000 gpm, 2nd pass. | 5
- (3) Tube material--Type 304 stainless steel.
- (4) Tube sheet material--Carbon steel. | 5
- (5) Peak pressure--3.35 inches HgA. | 5
- (6) Circulating water inlet temperature--91.7 F.
- (7) Maximum heat rejection-- 2.02×10^9 Btu/h. | 5

In addition to the surface condenser, an auxiliary cooling system for equipment cooling will be located in the generation building. This system consists of two water-to-water heat exchangers, and receives cooling water from the circulating water system at the rate of approximately 25,000 gpm. The cooling water in this system is subsequently returned to the second pass of the condenser. | 5

The cooling tower will be a natural draft, counterflow, cooling tower with an approximate base diameter of 290 feet and an approximate height of 430 feet. The tower will be constructed of concrete and will utilize polyvinyl chloride fill. The cooling tower will be designed to operate under the following conditions. | 5

- (1) Circulating water flow--200,000 gpm.
- (2) Tower approach--13 F.

- (3) Tower range--22.8 F.
- (4) Design wet bulb temperature--78 F.
- (5) Design relative humidity--55 per cent.
- (6) Maximum heat rejection-- 2.28×10^9 Btu/h.

The circulating water will be pumped from the cooling tower to the condenser and back to the cooling tower by circulating water pumps through buried concrete circulating water lines.

The cooling tower maximum evaporation rate will be approximately 3,559 gpm. The predicted makeup water quality should allow the cooling tower to operate at nine cycles of concentration. Based on the nine cycles of concentration, maximum blowdown will be approximately 439 gpm. The quality of the circulating water is shown in Table 3.4-2. Blowdown will be from the cold side of the cooling tower with a maximum expected temperature of approximately 98 F. Cooling tower blowdown will be used as makeup to the recycle basin with excess blowdown pumped to the Orange County Plant through a pipeline approximately 4 miles in length. The temperature of the blowdown at the Orange County Plant will be the same temperature as the ground in which the pipeline is buried. Estimated travel time in the pipeline when the return pumps are operating is approximately 1.5 hours.

RFM-1

The circulating water will be treated with chemicals to protect the system and to prevent excessive scaling and corrosion. Sulfuric acid will be added at the cooling tower basin to reduce alkalinity and to control the scaling tendency of the circulating water system. Control of sulfuric acid feed will be in proportion to the makeup water flow with a pH bias. To further inhibit scale deposition, organic phosphates will be automatically fed at the cooling tower basin as a sequestering agent. To prevent biofouling of the circulating water system, intermittent shock chlorination will be used. A chlorine solution will be fed into the circulating pump basin through diffusers.

TABLE 3.4-1. ESTIMATED MAKEUP WATER ANALYSIS FROM ORANGE COUNTY EASTERLY
SUBREGIONAL WASTEWATER TREATMENT PLANT

RFM-1

<u>Chemical Constituents</u>	<u>Effluent Concentration</u>	RFM-1
Calcium, mg/l as CaCO_3	88	
Magnesium, mg/l as CaCO_3	33	
Sodium, mg/l as CaCO_3	108	
Alkalinity, mg/l as CaCO_3	89	
Sulfate, mg/l as CaCO_3	16	
Chloride, mg/l as CaCO_3	120	
Silica, mg/l as SiO_2	15	RFM-1
Iron, mg/l as Fe	0.5	
Residual Chlorine, mg/l as Cl	1	
<u>Treated Water Characteristic</u>		
Suspended Solids, mg/l	5	
Biochemical Oxygen Demand, mg/l	5	
Total Nitrogen, mg/l as N	3	
Total Phosphorus, mg/l as P	1	

TABLE 3.4-2. ESTIMATED CIRCULATING WATER ANALYSIS

<u>Chemical Constituents*</u>	<u>Concentration</u>		
Calcium, mg/l as CaCO_3	792		
Magnesium, mg/l as CaCO_3	297		
Sodium, mg/l as CaCO_3	972	5	
Alkalinity, mg/l as CaCO_3	200		
Sulfate, mg/l as CaCO_3	745		
Chloride, mg/l as CaCO_3	1,080	5	RFM-1
Nitrate, mg/l as CaCO_3	36		
Silica, mg/l as SiO_2	135		
Iron, mg/l as Fe	4.5	5	
Total Nitrogen, mg/l as N	27		
Total Phosphorus, mg/l as P	20		
pH	8.0-8.5		

*Based on operating at nine cycles of concentration, feeding H_2SO_4 to control alkalinity to 200 mg/l as CaCO_3 , and utilizing an organic phosphate scale inhibitor.

3.5 CHEMICAL AND BIOCIDES WASTES

The principal uses of chemicals and biocides at the proposed project will be for cooling tower circulating water quality control, steam cycle water quality control, service water treatment, sanitary wastewater treatment, makeup water demineralization, steam cycle condensate polishing, chemical cleaning of the boiler and preboiler cycle piping systems, and miscellaneous chemical drains.

3.5.1 Cooling Tower Circulating Water Treatment

The cooling tower circulating water systems will use sulfuric acid for pH control, chlorine injection for control of algae and biofouling, and an organic phosphate as a scale inhibitor. The sulfuric acid and organic phosphate will be stored in tanks located in a curbed area beside the circulating water pump structures. The chlorine will be stored in 2000-pound containers in the same area. The estimated average usage of these chemicals based on the quality of the Orange County Plant effluent listed in Table 3.4-1 will be 148 gallons per day of 66 degree Baumé sulfuric acid, 10 gallons per day of the organic phosphate, and 200 pounds per day of chlorine. The chemicals will be discharged in the cooling tower blowdown. Part of the cooling tower blowdown will be used as scrubber and ash handling system makeup with the remainder to be returned to the Orange County Plant as described in Subsection 3.3.2.

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3.5.2 Steam Cycle Water Treatment

The steam cycle water will be treated using hydrazine for oxygen scavenging and ammonia for pH control. Sodium phosphate may be fed to the cycle water in the event of a condenser tube leak. Residual phosphate will react with calcium hardness to form a non-adherent precipitate. The hydrazine and sodium phosphate will be stored in the Generation Building and the ammonia will be stored outside the Generation Building. Estimated average usages of these chemicals are 2 pounds per day of hydrazine and 51 pounds per day of ammonia. Sodium phosphate will not normally be used. If the condensate polishing system is operated past ammonia breakthrough, ammonia

usage can be reduced to approximately 1 pound per day. Boiler blowdown will be routed to the recycle basin.

3.5.3 Service Water Treatment

The service water treatment system will soften and remove iron from the plant well water supply. Chemicals used will be lime, coagulant, a coagulant aid, and chlorine. Hydrated lime will be stored in a hopper and will be mixed with service water to form a slurry before addition to the solids contact basin. The coagulant and coagulant aid will be stored in tanks in the Water Management Building and pumped to the solids contact basin as required. A gas solution chlorination system will feed chlorine solution into the gravity filters effluent to assure disinfection and a potable service water system. Chlorine will be stored in 150 pound cylinders in an isolated room in the Water Management Building. Estimated average usages of these chemicals are 597 pounds per day of lime (90 per cent CaO), 41 pounds per day of coagulant (aluminum sulfate), 1.2 pounds per day of coagulant aid (Calgon 243), and 5 pounds per day of chlorine.

The solids contact basin will have a concentrator section for collecting the sludge produced in the softening reaction. The sludge will be withdrawn at the rate it is produced and will be piped to a sump. Gravity filters will be provided for filtering the solids contact basin effluent. The filter backwash wastewater will also be piped to the sludge sump. From the sludge sump, the water treatment wastes will be routed to the flue gas desulfurization system.

The chemical feed and the resultant amount of precipitated sludge produced in the solids contact basin will depend upon the flow throughput and the raw water chemical characteristics. Based on the well water analysis presented on Table 3.3-1, 5.4 pounds of precipitate, predominantly calcium carbonate, will be formed per 1,000 gallons throughput. Assuming a 3 per cent solids concentration in the sludge, the average waste water flow will be approximately 6,100 gpd. It is anticipated that two gravity filter modules with three bays per module will be provided. When required, each bay will be backwashed for 15 minutes at a rate of 12 gpm per square foot of filter area. The average estimated backwash flow is 2,470 gpd.

3.5.4 Sanitary Wastewater Treatment

The sanitary treatment system will use chlorine tablets (sodium hypochlorite) or a gas solution chlorination system for bacteria control in the effluent. The sanitary treatment process is described in Subsection 3.6.2.

3.5.5 Makeup Water Demineralization

The demineralizer system will use sodium hydroxide for anion resin regeneration and sulfuric acid for cation resin regeneration. The sodium hydroxide and sulfuric acid will be stored in tanks located in or adjacent to the Water Management Building. The uses of these chemicals will be on an intermittent basis dependent on demineralizer operation. Based on the annual plant capacity factor and makeup requirements, the estimated usage rate for 66 degree Baumé sulfuric acid will be 121 pounds per day and the rate of 100 per cent sodium hydroxide will be 70 pounds per day. The wastes from this system will be regenerant waters containing unreacted sulfuric acid and caustic plus sodium and sulfate salts of the ions removed from the ion exchange resins during regeneration. The estimated regenerant wastes will average 3,270 gpd. These wastes will be routed to the neutralization basin for neutralization as described in Subsection 3.5.9.

3.5.6 Steam Cycle Condensate Polishing

The condensate polishing system will also use sodium hydroxide for anion resin regeneration and sulfuric acid for cation resin regeneration. The sodium hydroxide will be stored in a tank in the Generation Building and the sulfuric acid will be stored in a curbed area adjacent to the Generation Building. The use of these chemicals will be on an intermittent basis and dependent on polisher operation. Based upon the annual plant capacity factor, full flow condensate polishing and operation past the ammonia breakthrough point; the estimated usage rate of 66 degree Baumé sulfuric acid will be 72 pounds per day and the rate for 100 per cent sodium hydroxide will be 41 pounds per day. The wastes from this system will be regenerant waters containing unreacted sulfuric acid and caustic plus sodium and sulfate salts of the ions removed from the ion exchange

resins during regeneration. The estimated wastes will average 3,800 gpd. These wastes will be routed to the neutralization basin for neutralization as described in Subsection 3.5.9.

3.5.7 Chemical Cleaning

The steam generator and pre-boiler cycle piping will be chemically cleaned initially during commissioning and also periodically during the life of the plant. The chemicals used will not be stored onsite and will be administered utilizing a temporary system. The chemical cleaning solutions to be used for acid and alkaline cleaning of the boiler will be somewhat dependent on the boiler manufacturer selected. The actual cleaning solutions used must be consistent with the boiler manufacturer's recommendations. Chemicals used in boiler and preboiler cleaning include the following.

- (1) Inhibited hydrochloric acid.
- (2) Ammonia bifluoride.
- (3) Hydroxyacetic acid.
- (4) Formic acid.
- (5) Disodium phosphate.
- (6) Trisodium phosphate.
- (7) Soda ash.
- (8) Non-foaming wetting agents.
- (9) Foam inhibitors.

These wastewaters will consist of the cleaning solutions and material removed during the cleaning process. Since chemical cleaning is a maintenance operation, it does not contribute to the liquid wastes produced by the normal operation of the plant. The preoperational chemical cleaning wastes are estimated to be approximately 650,000 gallons, with subsequent acid cleaning of the boiler alone resulting in an estimated additional 330,000 gallons for each cleaning operation. This waste will be routed to the neutralization basin for neutralization as described in Section 3.5.9.

3.5.8 Miscellaneous Chemical Drains

Chemical wastewaters can result from draining a chemical storage tank, overflowing a chemical tank during a filling operation, or from maintenance operations such as hosing down chemical storage areas. A separate floor drain collection system will be provided to route miscellaneous chemical wastes to the neutralization basin. Flows from the miscellaneous chemical drains will be intermittent and will not normally contribute to the wastewater flows.

3.5.9 Neutralization Basin

A neutralization basin of approximately 120,000 gallons capacity will be provided for treatment of chemical wastes prior to their ultimate disposal. A basin of this capacity will be sufficient to simultaneously accommodate the wastewaters produced during regeneration of the makeup demineralizer and one condensate polisher, and will handle the largest volume of chemical cleaning solution wastes expected at one time, that being the acid cleaning solution from a steam generator. The neutralization basin will be a reinforced concrete basin lined with chemical resistant membrane, brick, and mortar. A chemical waste mixer, mounted on a walkway spanning the basin, will be provided to hasten neutralization of the chemical wastes. Sulfuric acid and sodium hydroxide, as required for neutralization, will be available from the makeup demineralizer regeneration equipment. The neutralized chemical wastewaters will be transported to the recycle basin.

3.6 SANITARY AND SOLID WASTES

3.6.1 Sanitary Wastes

The construction sanitary wastes will be disposed of by two methods. The construction office building and the construction change buildings will have sanitary facilities which will discharge into the plant sanitary waste treatment facility located beside the makeup water supply storage pond. Other construction sanitary wastes will be collected locally throughout the plant in portable toilet facilities and will be removed by the site services contractor. The plant sanitary waste treatment facilities will consist of a package sewage treatment plant. The package sewage treatment plant will be an activated sludge unit which employs the extended aeration process method of treatment. The process equipment will be installed in a concrete basin with separate aeration and clarification sections. A comminutor will be provided to reduce the size of solids at the inlet to the plant. A chlorine contact chamber and a gas solution chlorination system will be provided to disinfect the effluent. Treated effluent from the packaged plant will be discharged to the makeup water supply storage pond for percolation.

During Unit 1 operation, sanitary waste from each of the permanent buildings having sanitary facilities will gravity flow in a piping system to the plant sanitary sewage treatment facilities located beside the makeup water supply storage pond. The effluent from the facilities will be discharged to the makeup water supply storage pond for use as cooling tower makeup.

Prior to operation of Unit 1, the estimated hydraulic loadings for the sewage treatment plant will be as follows.

400 construction personnel at 20 gpd	8,000 gpd
75 construction supervisory and secretarial personnel at 25 gpd	1,875 gpd
50 visitors and temporary personnel at 25 gpd	<u>1,250 gpd</u>
TOTAL	11,125 gpd

Biological loading will be approximately 0.045 pound of BOD₅ per day for construction personnel, visitors, and temporary personnel, or a total of approximately 24 pounds of BOD₅ per day.

After construction is complete and Unit 1 is operating, the estimated hydraulic loading figures are as follows.

163 permanent personnel at 35 gpd	5,700 gpd
20 visitors and temporary personnel at 25 gpd	<u>500 gpd</u>
TOTAL	6,200 gpd

Biological loading will be approximately 0.075 pound per day of BOD₅ for permanent personnel and 0.045 pound per day of BOD₅ for visitors and temporary personnel or a total of approximately 13 pounds per day of BOD₅.

3.6.2 Solid Wastes

The solid wastes generated by the operation of Stanton Energy Center, Unit 1 will consist of fly ash, boiler hopper ash, flue gas desulfurization wastes, bottom ash and coal pulverizer rejects. These wastes will be stored onsite in an unlined landfill (combustion waste storage) area on the west side of the site. The quantities of waste produced will depend on the coal burned. The following quantities are based on a typical washed Illinois coal.

The fly ash will be collected by an electrostatic precipitator. The estimated production of fly ash is 46,000 tons/yr. The fly ash will be conveyed by vacuum to a fly ash storage silo. A bag filter will be employed to control fugitive emissions from the silo and vacuum system. | 5

The fly ash which falls out in the boiler hopper will be conveyed to the fly ash storage silo by a branch of the fly ash vacuum transport system. Estimated production of boiler hopper ash is 2,400 tons/yr. | 5

The scrubber sludge produced in the flue gas desulfurization (FGD) equipment is estimated at 201,000 tons/yr. The sludge from the FGD system will contain primarily calcium sulfate and calcium sulfite, with inerts and some unreacted limestone. The scrubber sludge will be dewatered by thickeners and vacuum filters to approximately 50 to 60 per | 5

Biological loading will be approximately 0.045 pound of BOD₅ per day for construction personnel, visitors, and temporary personnel, or a total of approximately 24 pounds of BOD₅ per day.

After construction is complete and Unit 1 is operating, the estimated hydraulic loading figures are as follows.

163 permanent personnel at 35 gpd	5,700 gpd
20 visitors and temporary personnel at 25 gpd	<u>500 gpd</u>
TOTAL	6,200 gpd

Biological loading will be approximately 0.075 pound per day of BOD₅ for permanent personnel and 0.045 pound per day of BOD₅ for visitors and temporary personnel or a total of approximately 13 pounds per day of BOD₅.

3.6.2 Solid Wastes

The solid wastes generated by the operation of Stanton Energy Center, Unit 1 will consist of fly ash, boiler hopper ash, flue gas desulfurization wastes, bottom ash and coal pulverizer rejects. These wastes will be stored onsite in an unlined landfill (combustion waste storage) area on the west side of the site. The quantities of waste produced will depend on the coal burned. The following quantities are based on a typical washed Illinois coal.

The fly ash will be collected by an electrostatic precipitator. The estimated production of fly ash is 56,700 tons/yr. The fly ash will be conveyed by vacuum to a fly ash storage silo. A bag filter will be employed to control fugitive emissions from the silo and vacuum system.

The fly ash which falls out in the boiler hopper will be conveyed to the fly ash storage silo by a branch of the fly ash vacuum transport system. Estimated production of boiler hopper ash is 3,000 tons/yr.

The scrubber sludge produced in the flue gas desulfurization (FGD) equipment is estimated at 111,300 tons/yr. The sludge from the FGD system will contain primarily calcium sulfate with some calcium sulfite, inerts, and unreacted limestone. The scrubber sludge will be dewatered by thickeners or liquid cyclones and vacuum filters to approximately 70 to 80 per

cent solids. The reclaimed water will be returned for makeup to the scrubber loop. The dewatered sludge will be mixed with fly ash and trucked to the combustion waste storage area.

The bottom ash production is estimated at 14,900 tons/yr. The bottom ash will be hydraulically sluiced to a transfer tank and then slurried to bottom ash dewatering bins. The bottom ash will be dewatered in the bins and the reclaimed waters will be returned for use in bottom ash hydraulic transport. The bottom ash will be trucked from the dewatering bins to the combustion waste storage area.

Pulverizer rejects are primarily iron pyrites, hard rock, or slate. The estimated rejects production rate is 3,800 tons/yr. The pulverizer rejects will be sluiced to the bottom ash transfer tank for disposal with the bottom ash. | 5

The active combustion waste storage area at any one time will consist of an area of approximately 15 acres. The vegetation and topsoil from this area will be removed and the topsoil stockpiled separately for reuse. The conditioned sludge and bottom ash will be hauled to the area, deposited, and compacted with mechanical equipment. Drainage from the active combustion waste storage area will be intercepted by a drainage collection system and directed to the active combustion waste area runoff pond. This runoff pond will drain to the recycle basin. When this active area has been filled, it will be surfaced with the previously stockpiled topsoil to drain toward natural drainage systems in the area. This portion of land will be reclaimed by restoring vegetation. Conditioned sludge will be deposited and compacted in the new area. Drainage from this new area will be intercepted as described above. Figure 3.6-1 shows the combustion waste storage process. The process will be repeated until the entire designated combustion waste storage area has been utilized. The total waste storage requirement will be approximately 5,220 acre-feet for the 30-year life of Unit 1. | 5
The waste storage area consists of 312 acres. One-fourth of this area will be required for Unit 1. The remaining area is provided for ultimate site development.

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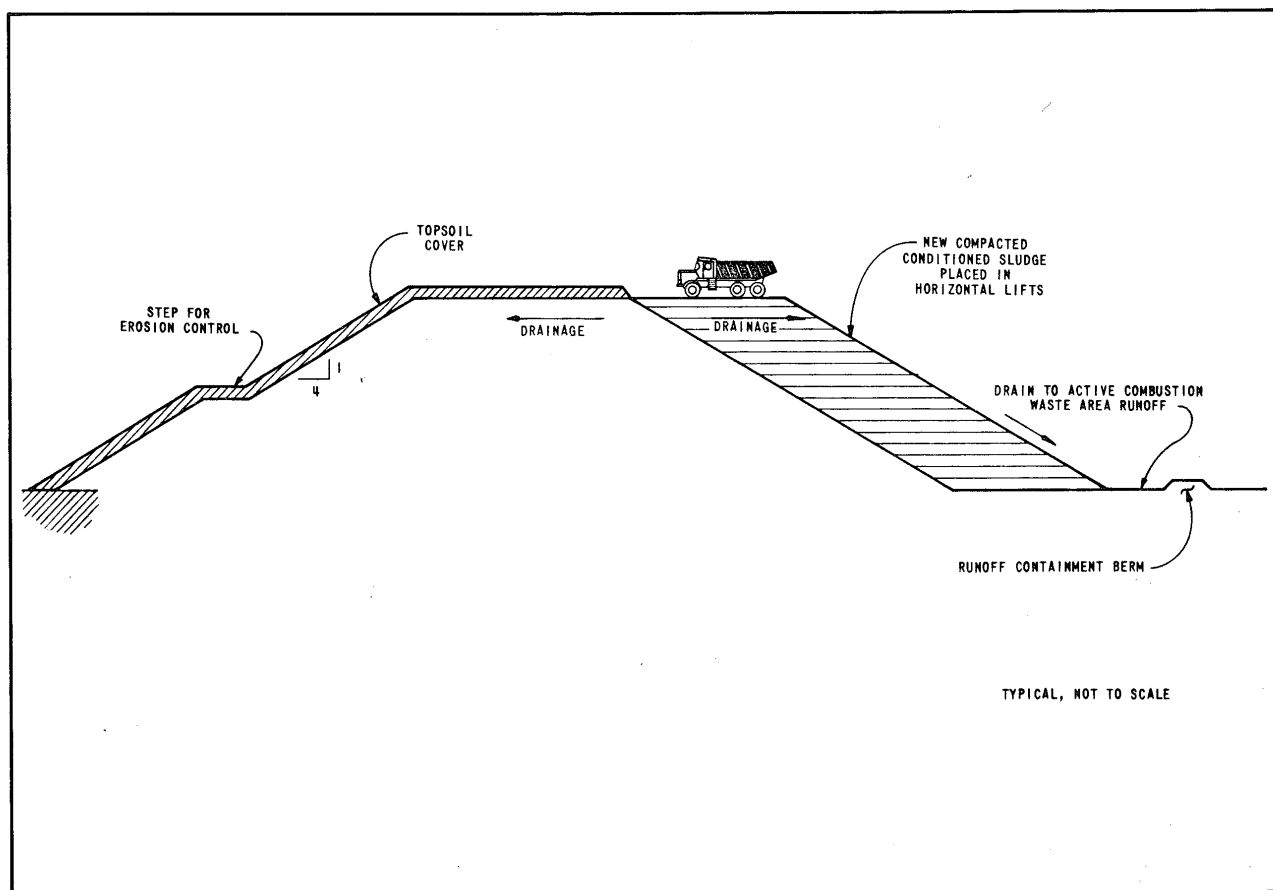


FIGURE 3.6-1. COMBUSTION WASTE STORAGE FILL OPERATION

3.7 AIR EMISSIONS

3.7.1 Air Emission Types and Sources

The types and sources of air emissions are as follows.

- (1) Fugitive dust from coal handling, limestone handling, lime handling, fly ash handling, scrubber sludge disposal operations, and traffic. 5
- (2) Nitrogen oxides from the combustion process.
- (3) Particulate from the combustion process.
- (4) Sulfur dioxide from the combustion process.
- (5) Combustion flue gases from the start-up auxiliary boiler.

3.7.2 Air Emission Controls

3.7.2.1 Fugitive Dust. The fugitive dust controls for coal handling and limestone handling will include fabric filters, partially and totally enclosed conveyors, compaction, water and chemical sprays, and telescopic chutes. Coal handling fugitive dust controls are described in Subsection 3.2.4. Limestone handling fugitive dust controls are described in Subsection 3.9.4. Lime handling fugitive dust controls are described in Subsection 3.9.6. RFM-1 5

Another fugitive dust release point will be the fly ash transport system. Fly ash from the boiler hoppers and electrostatic precipitator hoppers will be transported to a fly ash storage silo by a vacuum type pneumatic system. The system will consist of vacuum pumps which will transport the fly ash to the fly ash storage silo and then vent through fabric filters. Estimated control efficiency is 99+ per cent. Estimated emission rates are presented in Section 5.5.

Other expected fugitive dust sources are traffic on limestone surfaced roads and scrubber sludge landfill operations. The control of this nuisance dust will be by spraying the areas with water or a dust palliative.

3.7.2.2 Nitrogen Oxides. In the combustion process, nitrogen oxides (NO_x) are formed in the high temperature regions of the boiler in and around the

3.7-1

flame zone by oxidation of both atmospheric nitrogen and nitrogen in the fuel. Formation of NO_x can be reduced by lowering peak combustion temperatures by limiting the amount of excess air available to the fuel.

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NO_x will be controlled to meet the federal emission standards by utilizing features to minimize NO_x formation during combustion. These design features will include one or more of the following.

- (1) Compartmented windbox (improved combustion control).
- (2) Large furnace and widely spaced burners (reduced temperatures).
- (3) Staged combustion.

The large furnace and widely spaced burners increase the burner firing zone absorption area and decrease peak combustion temperatures, thus minimizing NO_x formation.

The steam generators will be designed to operate so that the oxides of nitrogen emission rate will not exceed the federal emission standards of 0.60 lb NO_x per million Btu of heat input for bituminous coals, and will be guaranteed by the steam generator manufacturer.

3.7.2.3 Particulate. The principal particulate removal equipment will be an electrostatic precipitator. The electrostatic precipitator will be located directly downstream of the steam generator air heater. The design of the precipitator is based on a washed Appalachian coal as listed in Section 3.2. This particular coal results in a relatively large precipitator that will be capable of operating with numerous coals and still meet the new source performance standards of 0.03 lb particulate matter per million Btu heat input. The precipitator design will also include margins to help assure that the emission standards will be met under off-design operating conditions.

The design conditions for the electrostatic precipitator will be as follows.

- (1) Flue gas flow at system inlet.
 - (a) Mass flow rate--5,255,000 lbs/h.
 - (b) Volumetric flow rate at 29.26 inch HgA and 278 F--
1,635,000 acfm.
- (2) Flue gas temperature--278 F.
- (3) Inlet dust loading at 278 F and 29.26 inch HgA--0.7 to 4.0 gr/acf.

- (4) Outlet guarantee dust loading--0.013 gr/dscf.
- (5) Particulate inlet--8.52 to 6.46 lb/10⁶ Btu.
- (6) Outlet particulate emission--0.03 lb/10⁶ Btu.
- (7) Chimney plume opacity limitation--20 per cent.
- (8) Number of fields in the direction of gas flow--6.
- (9) Net Specific Collecting Area, square feet per 1,000 acfm (based on design flow conditions)--743.
- (10) Minimum Aspect Ratio--1.9.

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The electrostatic precipitator will be capable of operating continuously and within particulate emission guarantees down to 20 per cent of unit load.

3.7.2.4 Sulfur Dioxide. The flue gas desulfurization system will consist of a multi-module wet limestone spray tower scrubber located downstream of the induced draft fans. The system will have three 50 per cent capacity modules with a bypass system. The system will be designed to limit sulfur dioxide emissions to 0.60 lbs per million Btu when total removal (coal washing and flue gas scrubbers) is less than 90 per cent (70 per cent minimum) and otherwise a removal efficiency of 90 per cent.

The design of the scrubber is based on an unwashed Illinois Basin coal as listed in Section 3.2. This particular coal is high in sulfur content and low in heating value and will result in a relatively large scrubber that will be capable of operating with numerous coals and still meet the new source performance standards. The scrubber design will also include margins to assure that the emission standards will be met under off-design operating conditions.

The design conditions for the flue gas scrubber will be as follows.

- (1) Flue gas flow at scrubber inlet.
 - (a) Mass flow rate--5,118,000 lb/h. ✓
 - (b) Volumetric flow rate at 30.30 inch HgA and 287 F-- ✓
1,534,000 acfm.
- (2) Flue gas inlet temperature--287 F. ✓

5

- (4) Outlet guarantee dust loading--0.013 gr/dscf.
- (5) Particulate inlet--8.52 to 6.46 lb/10⁶ Btu.
- (6) Outlet particulate emission--0.03 lb/10⁶ Btu.
- (7) Chimney plume opacity limitation--20 per cent.
- (8) Minimum number of fields in the direction of gas flow--6.
- (9) Minimum Specific Collecting Area, square feet per 1,000 acfm (based on design flow conditions)--700.
- (10) Minimum Aspect Ratio--2.0.

The electrostatic precipitator will be capable of operating continuously and within particulate emission guarantees down to 20 per cent of unit load.

3.7.2.4 Sulfur Dioxide. The flue gas desulfurization system will consist of a multi-module wet limestone spray tower scrubber located downstream of the induced draft fans. The system will have three 50 per cent capacity modules with a bypass system. The system will be designed to limit sulfur dioxide emissions to 0.60 lbs per million Btu when total removal (coal washing and flue gas scrubbers) is less than 90 per cent (70 per cent minimum) and otherwise a removal efficiency of 90 per cent.

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The design of the scrubber is based on an unwashed Illinois Basin coal as listed in Section 3.2. This particular coal is high in sulfur content and low in heating value and will result in a relatively large scrubber that will be capable of operating with numerous coals and still meet the new source performance standards. The scrubber design will also include margins to assure that the emission standards will be met under off-design operating conditions.

The design conditions for the flue gas scrubber will be as follows.

- (1) Flue gas flow at scrubber inlet.
 - (a) Mass flow rate--5,023,000 lb/h.
 - (b) Volumetric flow rate at 30.30 inch HgA and 278 F--1,507,000 acfm.
- (2) Flue gas inlet temperature--278 F.

- (3) SO₂ inlet concentration--1.08 to 7.34 lbs/10⁶ Btu.
- (4) Guaranteed SO₂ outlet concentration--0.108 to 0.734 lb/10⁶ Btu, respectively.
- (5) Guaranteed removal efficiencies--90 per cent.

The flue gas will be discharged from the scrubber directly into the chimney without reheating.

3.7.2.5 Startup Auxiliary Boiler Flue Gas Emissions. An auxiliary boiler will be provided for the startup of Unit 1. The auxiliary boiler will be a packaged unit and will burn Number 2 fuel oil. The estimated maximum heat input rate to the auxiliary boiler will be 83 million Btu/h. Based on typical No. 2 fuel oil properties of 19,430 Btu/lb, 0.003 lb sulfur/lb, 0.0002 lb nitrogen/lb, and then 0.0003 lb ash/lb; estimated auxiliary boiler emissions are presented in Table 3.7-1. The flue gas from the auxiliary boiler will be released from a stack on the roof of the Administration and Plant Services Building. The stack will be approximately 48 feet above grade. No equipment will be added to treat the auxiliary boiler flue gases for purposes of reducing emissions. It is anticipated that the auxiliary boiler will be used less than 150 hours per year for Unit 1 alone and very seldom if at all after additional units are installed.

3.7.3 Combustion Gas Discharge

The combustion gas from the steam generator will be discharged through a concrete chimney with a brick liner. The chimney will have a height of 550 feet and an inside diameter at the top of 19 feet. The chimney will be designed to handle a gas flow of 1,420,000 acfm at 127 F resulting in an exit velocity of 83 feet per second.

3.7.4 Best Available Control Technology (BACT)

3.7.4.1 BACT Evaluation Fuels. The coal supply for the Stanton Energy Center Unit 1 has not been committed and it will probably vary over

- (3) SO_2 inlet concentration--6.19 to 8.25 lbs/ 10^6 Btu.
- (4) Guaranteed SO_2 outlet concentration--0.619 to 0.825 lb/ 10^6 Btu, respectively.
- (5) Guaranteed removal efficiencies--90 per cent.

The flue gas will be discharged from the scrubber directly into the chimney without reheating.

3.7.2.5 Startup Auxiliary Boiler Flue Gas Emissions. An auxiliary boiler will be provided for the startup of Unit 1. The auxiliary boiler will be a packaged unit and will burn Number 2 fuel oil. The estimated maximum heat input rate to the auxiliary boiler will be 92 million Btu/h. Based on typical No. 2 fuel oil properties of 19,430 Btu/lb, 0.003 lb sulfur/lb, 0.0002 lb nitrogen/lb, and then 0.0003 lb ash/lb; estimated auxiliary boiler emissions are presented in Table 3.7-1. The flue gas from the auxiliary boiler will be released from a stack on the roof of the Administration and Plant Services Building. The stack will be approximately 48 feet above grade. No equipment will be added to treat the auxiliary boiler flue gases for purposes of reducing emissions. It is anticipated that the auxiliary boiler will be used less than 150 hours per year for Unit 1 alone and very seldom if at all after additional units are installed.

3.7.3 Combustion Gas Discharge

The combustion gas from the steam generator will be discharged through a concrete chimney with a brick liner. The chimney will have a height of 550 feet and an inside diameter at the top of 19 feet. The chimney will be designed to handle a gas flow of 1,420,000 acfm at 127 F resulting in an exit velocity of 83 feet per second.

3.7.4 Best Available Control Technology (BACT)

3.7.4.1 BACT Evaluation Fuels. The coal supply for the Stanton Energy Center Unit 1 has not been committed and it will probably vary over

the life of the unit. Therefore, the evaluation of flue gas cleaning equipment was based on three typical coal analyses. The analyses are shown in Table 3.7-2. The coals are all bituminous and were identified as Illinois, Medium Sulfur Appalachian and Higher Sulfur Appalachian. The ranges of these coals encompass the ranges of the coals being considered for Unit 1 of the Stanton Energy Center and should also be typical of possible future coals.

3.7.4.2 Nitrogen Oxide BACT. The current NO_x New Source Performance Standard (NSPS) for bituminous coal is $0.60 \text{ lb}/10^6 \text{ Btu}$, which the boiler manufacturer will guarantee. Presently, the greatest promise for NO_x control lies in preventing NO_x formation in the furnace. However, the currently implemented methods of reducing NO_x released to the atmosphere by utility boilers cannot achieve more than 50 per cent reduction. From what is known about combustion control approaches today, it appears unlikely that they alone are feasible for meeting more stringent NO_x emissions standards than those required by the NSPS.

Post-combustion NO_x controls are necessary to achieve extremely low NO_x emission levels. The post-combustion process closest to commercial acceptance for utility application is the selective catalytic reduction (SCR) of NO_x with ammonia. This process has the most R&D attention, initially in Japan and mainly for dealing with NO_x from low-sulfur fuel oil and natural gas, which are widely used in that country. The major problem is to adapt the process to coal-fired applications, where higher levels of SO_2 and particulate matter can easily impair performance. The SCR application to coal-fired NO_x control is characterized by many unanswered questions and unresolved issues. System costs are therefore difficult to assess. Current estimates are from \$75 to \$200 per kilowatt of plant capacity, which would be a significant portion of total plant costs. Because of the high capital cost to install SCR, an unproven technology for coal fired NO_x reduction, it will not be used at the Stanton Energy Center Unit 1. NO_x control will be by combustion control.

3.7.4.3 Particulate Removal BACT. Particulate emission control is required to comply with the emission standards of 0.03 lb per million Btu heat input. Two basic types of particulate removal systems capable of meeting this New Source Performance Standards have been applied to large, coal-fired boilers: electrostatic precipitators and fabric filters.

Electrostatic precipitators of the size and efficiency required to meet the emission limitations applicable to the Stanton Energy Center Unit 1 have been proven in operation. Electrostatic precipitators utilize transformer-rectifiers to energize high voltage discharge electrodes which produce a dc high-voltage electrical field between the discharge electrodes and the grounded collecting electrodes. Particulates entering the electric field acquire a charge and migrate to the collecting electrodes. A layer of collected particles forms on the collecting electrodes and is removed periodically by rapping the electrodes. The collected particulates drop into hoppers below the precipitator and are periodically removed by the fly ash handling system.

Electrostatic precipitators are generally categorized as being hot or cold, depending upon their location in the flue gas stream. Hot precipitators are located on the hot side of the air heaters (between the economizer and the air heater), where the operating temperatures vary from 600 to 900 F. Cold precipitators are located on the cold side of the air heaters (between the air heater and the chimney), where the operating temperatures generally vary from 250 to 350 F. A hot precipitator will not be considered for Stanton Energy Center Unit 1 because it has greater thermal losses, is subject to greater thermal stresses than the cold side precipitator, and has exhibited significant operating problems which have resulted in poor performance at several installations. A cold side precipitator is feasible for use on this unit.

Fabric filters have been used extensively in small industrial applications, but, until recently, have not been used in utility boiler applications. Short filter bag life was the primary reason for their unsuitability. Recently, however, a large amount of work has been performed by fabric filter manufacturers, electric utilities, and textile manufacturers

to correct the most common causes of bag failure and to develop more durable filter fabrics. Consequently, fabric filters are becoming more prevalent in the utility market, especially for small and medium-size units.

Fabric filters utilize fabric bags as filters to collect the particulate. Particulate-laden gas enters one of several fabric filter compartments and passes through the filter bags. The collected particulate forms a cake on the bags which enhances the filtering efficiency. At predetermined time intervals or on a high differential pressure signal, the bags are cleaned of most of the collected particulate by reverse air-deflation, shaking, a rapid pulse of air, or a combination of the first two actions, leaving an optimum dust layer on the bags to aid in the filtration process. The particulates are collected in hoppers below the fabric filter housing and are periodically removed from the hoppers by conventional fly ash removal systems.

Cold side electrostatic precipitators and fabric filters were evaluated using fly ash production rates and removal efficiencies presented in Table 3.7-3. The details of the evaluation are shown in Appendix 3.7A. Different size precipitators could be used for each of the coals considered to meet required removal efficiencies. Fabric filter collection systems are approximately the same size for all three coals.

A comparative cost evaluation of these two types of particulate removal systems is shown in Table 3.7-4. A cold side electrostatic precipitator is the most economical particulate removal system for all three coals considered.

A cold side electrostatic precipitator is the most advantageous combustion gas particulate removal system for the Stanton Energy Center Unit 1. An evaluation of available systems and costs indicates that this is the most reliable and economical particulate removal system. In addition, it has the most operating experience. Electrostatic precipitators for utility boilers the size of the proposed unit have been in use for many years and the reliability of cold side precipitators on medium and high sulfur fuels has been demonstrated.

3.7.4.4 Desulfurization BACT. Research, testing, and development of flue gas desulfurization (FGD) has produced over 200 desulfurization processes. Only seven processes have been commercially applied: lime, limestone, spray absorber, double alkali, soda ash, magnesium oxide, and Wellman-Lord processes. One other process, flue gas sparging (Chiyoda), is being offered, but it has not been proven in a full-scale utility application. Although the majority of the FGD systems which have been purchased and planned utilize lime/limestone technology, research is being conducted toward the development of newer, more sophisticated systems capable of the recovery of usable byproducts from the flue gas cleaning wastes. Table 3.7-5 presents a summary of the current status of FGD systems on utility applications in the United States.

FGD systems are divided into two basic categories, throwaway processes and recovery processes. The categories refer to the end product derived from the sulfur dioxide removed from the flue gas. In throwaway processes, the end product has no commercial value and, like ash, must be disposed of in ponds or landfills. Recovery processes yield a salable material such as gypsum, sulfur, sulfuric acid, or fertilizer base compounds.

The advantages and disadvantages of these eight FGD processes are presented in Table 3.7-6. A more detailed discussion of these eight processes are presented in Appendix 3.7B. To be considered a feasible alternative for Stanton Energy Center Unit 1, the process must meet the following criteria.

- (1) Demonstrated technical feasibility.
- (2) Advanced level of availability.
- (3) Acceptance by the utility industry.
- (4) Favorable economic impact.
- (5) Acceptable environmental impact of waste disposal or a marketable end product.
- (6) Capable of meeting emission rates for a wide range of coals.

Based on the selection criteria and the advantages and disadvantages of the eight processes listed in Table 3.7-6, the lime and limestone scrubbers are considered feasible alternatives for the proposed facility. Both

lime and limestone are available in the counties surrounding the site. Limestone, a naturally occurring mineral, is mined extensively in Florida. Lime, which is produced by calcining limestone, is also available from in-state and out-of-state producers. With an adequate supply of both additives and the extensive history of utility operation, both lime and limestone additive processes are considered to be feasible alternatives.

Lime and limestone scrubbers were evaluated using the sulfur dioxide production rates and removal requirements in Table 3.7-7. Details of the evaluation are presented in Appendix 3.7B.

A comparative cost evaluation of these two types of scrubbers is shown in Table 3.7-8. Limestone scrubbers are the most economical scrubbers for all three coals considered.

A limestone scrubber is the most advantageous combustion gas desulfurization system for the proposed facility. An evaluation of available systems and costs indicates that this is the most reliable and economical desulfurization system.

The limestone scrubber for Unit 1 will be designed for an unwashed Illinois coal with properties similar to the Illinois coal used for the BACT evaluation. Therefore, cost differences between limestone and lime scrubbers shown for the Illinois coal in Table 3.7-8 are representative of the differences that would be expected for the actual design coal. The design scrubber removal is 90 per cent. If scrubber efficiencies much greater than this were required on a continuous basis, limestone packed towers or a lime scrubber may be required. Both packed towers and lime are more expensive. The relative costs for lime and limestone FGD systems are shown in Table 3.7-8. The 90 per cent removal design for the scrubber will meet new source performance standards. Greater removal efficiency requirements would cause substantial cost increases and may result in decrease unit availability.

3.7.4.5 Best Available Control Technology Data. The completed form entitled Best Available Control Technology Data from the Site Certification Guidelines is shown in Table 3.7-9.

TABLE 3.7-1. ESTIMATED AUXILIARY BOILER FLUE GAS EMISSIONS

	<u>Auxiliary Boiler Emission Rates</u>	<u>Maximum Auxiliary Boiler Emission Rates</u>	<u>Expected Annual Auxiliary Boiler Emission</u>
	lb/10 ⁶ Btu	lb/h	lb
Sulfur Dioxide	.31	25.4	2,201
Nitrogen Oxides	.16	13.1	1,135
Particulate Matter	.015	1.25	110

TABLE 3.7-2. BACT EVALUATION FUEL ANALYSES

Description	Coal					
	Illinois Coal*		Medium Sulfur Appalachian Coal		Higher Sulfur Appalachian Coal	
	Average	Range	Average	Range	Average	Range
Proximate Analysis, per cent						
Moisture	10.1	6.0 - 15.0	6.0	3.5 - 8.0	6.0	3.5 - 8.0
Volatile matter	33.8		33.0		40.0	
Fixed carbon	47.1		54.5		48.0	
Ash	9.0	7.5 - 14.0	6.5	6.0 - 12.0	6.0	6.0 - 13.5
Ultimate Analysis, per cent						
Carbon	65.5		73.3		74.5	
Hydrogen	4.5		4.9		5.0	
Nitrogen	0.5		1.3		1.4	
Chlorine	0.14	0.08 - 0.20	0.02	0.01 - 0.05	0.01	0.01 - 0.05
Sulfur	2.10**	2.0 - 4.50**	0.86	0.75 - 1.50	1.40	1.40 - 2.40
Oxygen	8.16		7.12		5.69	
Ash	9.0	7.5 - 14.0	6.5	6.0 - 12.0	6.0	6.0 - 13.5
Moisture	10.1	6.0 - 15.0	6.0	3.5 - 8.0	6.0	3.5 - 8.0
Heating Value (Btu/lb)	11,730	10,500 - 12,000	13,125	12,000 - 13,600	12,840	11,750 - 13,600

*Analysis is for washed Illinois coal.

**Raw coal maximum and average sulfur contents are approximately 5.46 and 2.55 per cent, respectively. The minimum and average heating values are 8,925 and 10,000 Btu/lb, respectively.

TABLE 3.7-3. PARTICULATE PRODUCTION RATES AND REMOVAL REQUIREMENTS

Parameter	Illinois Coal		Medium Sulfur Appalachian Coal		High Sulfur Appalachian Coal	
	Maximum	Average	Maximum	Average	Maximum	Average
Fly ash production rate, pounds per 10^6 Btu	10.67	6.14	8.00	3.96	9.19	3.74
Allowable particulate emission, pounds per 10^6 Btu	0.03	0.03	0.03	0.03	0.03	0.03
Particulate removal rate, pounds per 10^6 Btu	10.64	6.11	7.97	3.93	9.16	3.71
Particulate removal efficiency, per cent	99.7	99.5	99.6	99.2	99.7	99.2

TABLE 3.7-4. COMPARATIVE COSTS FOR PARTICULATE REMOVAL EQUIPMENT

	Electrostatic Precipitator			
	<u>Illinois Coal</u>	<u>Medium Sulfur Appalachian Coal</u>	<u>High Sulfur Appalachian Coal</u>	<u>Fabric Filter</u>
	<u>\$1,000</u>	<u>\$1,000</u>	<u>\$1,000</u>	<u>\$1,000</u>
Capital Costs				
Material and erection (1980 costs)	Base	1,530	1,711	5,924
Escalation	Base	718	803	2,780
Sales tax	Base	90	101	348
Interest during construction	Base	142	159	551
Indirect cost	<u>Base</u>	<u>446</u>	<u>499</u>	<u>1,728</u>
Differential capital cost	Base	2,926	3,273	11,331
Levelized Operating Costs				
Operating personnel	Base	Base	Base	Base
Maintenance	Base	Base	Base	715
Demand charge	59	112	119	Base
Energy charge	<u>Base</u>	<u>86</u>	<u>96</u>	<u>434</u>
Comparative operating cost	59	198	215	1,149
Differential operating cost	Base	139	156	1,090
Annual Costs				
Fixed charges	Base	298	334	1,156
Levelized operating costs	<u>Base</u>	<u>139</u>	<u>156</u>	<u>1,090</u>
Comparative annual costs	Base	437	490	2,246

TABLE 3.7-5. STATUS OF GAS DESULFURIZATION PROCESSES ON COAL-FIRED STEAM ELECTRIC GENERATING UNITS IN THE UNITED STATES

Scrubber Status	Throwaway Processes					Recovery Process		Total
	Lime	Limestone	Spray Absorber	Soda Ash	Double- Alkali	Magnesium Oxide	Wellman- Lord	
Operational								
MW	8,801	11,464	110	925	1,181	0	1,540	24,021
Per cent of total	36	48	1	4	5	0	6	100
Under construction or contracts awarded								
MW	3,836	17,390	3,313	330	842	724	534	26,969
Per cent of total	14	65	12	1	3	3	2	100
								50,990 MW

Reference: EPA Utility FGD Survey: October-December 1980, USEPA, EPA-600/7-81-012a, January, 1981.

TABLE 3.7-6. FGD PROCESS ADVANTAGES AND DISADVANTAGES

Process	Advantages	Disadvantages
Throwaway Processes		
Lime	• Extensive operating experience. • Numerous qualified suppliers. • Stable waste product produced. • Relatively low cost additives.	• Scaling and plugging potential throughout system. • Relatively high L/G required. • Large quantities of waste products produced.
Limestone	• Extensive operating experience. • Numerous qualified suppliers. • Stable waste product produced. • Relatively low cost additives.	• Scaling and plugging potential throughout system. • Relatively high L/G required. • Large quantities of waste products produced.
Spray Absorber	• Decreased pumping requirements. • No scaling conditions. • Decreased flue gas pressure drop. • Waste products in a dry state.	• Low additive utilization. • Limited SO₂ removal efficiency. • Limited operating experience on full scale system.
Double Alkali	• Limited scaling potential. • Compared with soda ash, has lower additive costs. • Relatively low L/G required.	• Limited operating experience. • Incomplete sodium recovery. • Large quantities of waste products produced. • Storage of two additives required.
Soda Ash	• High SO₂ removal efficiency. • No slurry pumping. • Simple additive preparation equipment. • Lower capital costs.	• Waste disposal extremely difficult. • High additive costs. • Large quantities of waste products produced.

TABLE 3.7-6 (Continued). FGD PROCESS ADVANTAGES AND DISADVANTAGES

Process	Advantages	Disadvantages
Chiyoda	• Highly oxidized waste product. • High additive utilization. • Low cost additive. • Decreased pumping requirements.	• Relatively high flue gas pressure drop. • Limited operating experience. • Large quantities of waste products produced.
Recovery Processes		
Magnesium Oxide	• High SO₂ removal efficiency. • Nonscaling conditions in scrubber. • Marketable end product.	• Low availability in pilot tests. • Low additive regeneration efficiency. • High capital cost.
Wellman-Lord	• A clear scrubbing solution. • No slurry pumping in scrubber. • Nonscaling conditions in scrubber. • Marketable end product.	• Complex equipment train. • Requires highly trained operators. • High capital cost.

TABLE 3.7-7. SULFUR DIOXIDE PRODUCTION RATES AND REMOVAL REQUIREMENTS

Parameter	Illinois Coal		Medium Sulfur Appalachian Coal		Higher Sulfur Appalachian Coal	
	Maximum	Average	Maximum	Average	Maximum	Average
SO ₂ production from raw coal, pounds per 10 ⁶ Btu (100 per cent conversion of sulfur to sulfur dioxide)	12.24	5.11	2.50	1.31	4.09	2.18
Overall SO ₂ removal requirements to meet allowable emission rate (based on raw coal), per cent	91	89	76	70	86	73
Allowable SO ₂ emission rate (based on raw coal), pounds per 10 ⁶ Btu	1.20	0.60	0.60	0.39	0.60	0.60
Required SO ₂ reduction, pounds per 10 ⁶ Btu	11.04	4.51	1.90	0.92	3.49	1.58
Sulfur reduction resulting from coal washing, pounds per 10 ⁶ Btu (as SO ₂)	3.67*	1.53*	--	--	--	--
SO ₂ reduction required in FGD system, pounds per 10 ⁶ Btu	7.37	2.98	1.90	0.92	3.49	1.58
FGD system removal efficiency, per cent	86**	84**	76	70	86	73

*The SO₂ reduction resulting from coal washing represents the difference in the SO₂ production estimated for the raw coal and the SO₂ production based on the Illinois washed coal analysis.

**FGD system removal efficiency is determined as the SO₂ reduction required for the washed Illinois coal to comply with the total reduction required for the raw coal.

TABLE 3.7-8. COMPARATIVE COSTS FOR DESULFURIZATION EQUIPMENT

	Illinois Coal		Medium Sulfur Appalachian Coal		High Sulfur Appalachian Coal	
	<u>Limestone</u> \$1,000	<u>Lime</u> \$1,000	<u>Limestone</u> \$1,000	<u>Lime</u> \$1,000	<u>Limestone</u> \$1,000	<u>Lime</u> \$1,000
Capital Costs						
Scrubber material and erection	1,370	400	900	Base	1,840	900
Additive equipment	1,620	2,590	450	Base	1,110	760
Waste handling equipment	820	750	20	Base	250	180
Subtotal	3,810	3,790	1,370	Base	3,200	1,840
Escalation	1,790	1,780	640	Base	1,500	860
Escalated Cost	5,600	5,570	2,010	Base	4,700	2,700
Sales tax	220	220	80	Base	190	110
Interest during construction	390	390	140	Base	330	190
Indirect costs	700	690	250	Base	590	340
Comparative capital cost	6,910	6,870	2,480	Base	5,810	3,340
Levelized Operating Costs						
Demand charge	258	136	97	Base	229	126
Energy charge	693	404	222	Base	659	395
Additive	1,432	9,596	Base	2,007	391	3,953
Waste disposal	498	329	46	Base	139	60
Comparative operating costs	2,881	10,465	365	2,007	1,418	4,534
Differential operating costs	2,516	10,100	Base	1,642	1,053	4,169
Annual Costs						
Fixed charges	705	701	253	Base	593	341
Operating costs	2,516	10,100	Base	1,642	1,053	4,169
Comparative annual cost	3,221	10,801	253	1,642	1,646	4,510
Differential comparative annual cost	2,968	10,548	Base	1,389	1,393	4,257

TABLE 3.7-9. BEST AVAILABLE CONTROL TECHNOLOGY DATA

A. Emission Limitations For Any Pollutants Emitted From The Source Pursuant To 17-2, F.A.C.?

Yes (X) No ()

POLLUTANT	RATE OF CONCENTRATION
Particulates	0.1 #/MBtu
SO ₂	1.2 #/MBtu
NO _x	0.70 #/MBtu

B. Are Standards of Performance For New Stationary Sources Pursuant To 40 C.F.R. Part 60 Applicable To The Source?

Yes (X) No ()

POLLUTANT	RATE OF CONCENTRATION
Particulates (TSP)	0.03 #/MBtu
SO ₂	1.2 #/MBtu*
NO _x	0.60 #/MBtu

C. Has EPA Declared The Best Available Control Technology For This Class Of Sources? (If Yes Attach Copy)

Yes () No (X)

POLLUTANT	RATE OF CONCENTRATION

*Plus the per cent removal requirements of the applicable New Source Performance Standard.

TABLE 3.7-9 (Continued). BEST AVAILABLE CONTROL TECHNOLOGY DATA

D. What Emission Levels Do You Propose As Best Available Control Technology?

POLLUTANT	RATE OF CONCENTRATION
<u>TSP</u>	<u>0.03 #/MBtu</u>
<u>SO₂</u>	<u>New Source Performance Standard</u>
<u>NO_x</u>	<u>0.60 #/MBtu</u>

E. Describe the Control Technology Proposed.

1. Control Device:	Electrostatic Precipitator	Wet Limestone Flue Gas Scrubber	Coal Wash Facility* at Coal Mine
2. Efficiency:	99.61 per cent	90 per cent	Coal supply dependent*
3. Capital Cost:	\$13,250,000 (1981 dollars)	\$20,140,000 (1981 dollars)	Coal supply dependent*
4. Life:	35 years	35 years	Coal supply dependent*
5. Operating Cost:*	\$1,200,000/yr	\$5,400,000/yr	Coal supply dependent*
6. Energy: (at maximum capability)	3.5 MW	3.8 MW	Coal supply dependent*
7. Maintenance Cost:**	\$1,300,000/yr	\$2,000,000/yr	Coal supply dependent*
8. Stack Parameters:			
	a. Height: 550 Ft.	b. Diameter: 19 Ft.	
	c. Flow Rate: 1,420,000 CFM	d. Temperature: 127 F	
	e. Velocity: 83 FPS		

*The facilities used to wash the coal and reduce the sulfur dioxide production rate will be owned and operated by the coal supplier. These parameters, if a washed coal is purchased, will be dependent on the specifications of the coal selected.

**Based on operation with design basis coal for respective component, 1981 dollar values.

TABLE 3.7-9 (Continued). BEST AVAILABLE CONTROL TECHNOLOGY DATA

9. Fuels:*

	Hourly Use		Hourly Heat Input	
	lb		10 ⁶ Btu	
	AVG.	MAX.	AVG.	MAX.
Washed Illinois Basin Coal	222,500	339,020	2,760	4,136
Washed Appalachian Coal	212,200	320,620	2,760	4,136
Unwashed Illinois Basin Coal	250,800	379,450	2,760	4,136
Washed Illinois Basin Coal	256,740 (300,330)	399,610 (489,590)	2,760	4,136
No. 6 Fuel Oil (startup fuel)	14,700	23,790	269	435
TYPE	DENSITY	%S	%N	%ASH
	lb/ft ³			
Washed Illinois Basin Coal	84	3.1	1.3	8.5
Washed Appalachian Coal	84	.82	1.49	11.0
Unwashed Illinois Basin Coal	84	4.0	1.3	18.5
Washed Illinois Basin Coal	84	3.8 (5.0)	1.5	12.5
No. 6 Fuel Oil (startup fuel)	61.1	2.5	0.1	0.5

*Main coal to be burned has not been selected. The first three coals listed are design basis coals for the steam generator, particulate removal equipment and scrubber, respectively. These coal selections for design basis result in equipment capable of burning numerous coals and meeting NSPS. Coal properties listed are maximum values. Refer to Table 3.2-1 for typical values and ranges. Also listed is the coal which results in the greatest SO₂ emission rate of all the coals bid for supply to Stanton Energy Center Unit 1 which can meet NSPS. The numbers in parentheses for this coal are the raw (unwashed) coal properties. The washed minimum heating value is 10,350 Btu/lb while the raw minimum heating value is 8,500 Btu/lb.

TABLE 3.7-9 (Continued). BEST AVAILABLE CONTROL TECHNOLOGY DATA

9. Fuels:*

	Hourly Use lb		Hourly Heat Input 10 ⁶ Btu	
	AVG.	MAX.	AVG.	MAX.
<u>Washed Illinois Basin Coal</u>	<u>222,500</u>	<u>339,020</u>	<u>2,760</u>	<u>4,136</u>
<u>Washed Appalachian Coal</u>	<u>212,200</u>	<u>320,620</u>	<u>2,760</u>	<u>4,136</u>
<u>Unwashed Illinois Basin Coal</u>	<u>250,800</u>	<u>379,450</u>	<u>2,760</u>	<u>4,136</u>
<u>Unwashed Illinois Basin Coal</u>	<u>250,900</u>	<u>382,500</u>	<u>2,760</u>	<u>4,136</u>
<u>No. 6 Fuel Oil (startup fuel)</u>	<u>14,700</u>	<u>23,790</u>	<u>269</u>	<u>435</u>
TYPE	DENSITY lb/ft ³	%S	%N	%ASH
<u>Washed Illinois Basin Coal</u>	<u>84</u>	<u>3.1</u>	<u>1.3</u>	<u>8.5</u>
<u>Washed Appalachian Coal</u>	<u>84</u>	<u>.82</u>	<u>1.49</u>	<u>11.0</u>
<u>Unwashed Illinois Basin Coal</u>	<u>84</u>	<u>4.0</u>	<u>1.3</u>	<u>18.5</u>
<u>Unwashed Illinois Basin Coal</u>	<u>84</u>	<u>4.46</u>	<u>1.48</u>	<u>12.9</u>
<u>No. 6 Fuel Oil (startup fuel)</u>	<u>61.1</u>	<u>2.5</u>	<u>0.1</u>	<u>0.5</u>

10. Wastes Generated: Based on Typical Washed Illinois Coal

Pulverizer Rejects	4,100 tons/yr
Bottom Ash	14,900 tons/yr
Fly Ash	56,700 tons/yr
Scrubber Solids	111,300 tons/yr
Total	187,000 tons/yr

*Main coal to be burned has not been selected. The first three coals listed are design basis coals for the steam generator, particulate removal equipment and scrubber, respectively. These coal selections for design basis result in equipment capable of burning numerous coals and meeting NSPS. Coal properties listed are maximum values. Refer to Table 3.2-1 for typical values and ranges. Also listed is the coal which results in the greatest SO₂ emission rate of all the coals bid for supply to Stanton Energy Center Unit 1.

TABLE 3.7-9 (Continued). BEST AVAILABLE CONTROL TECHNOLOGY DATA

10. Wastes Generated:	Based on Typical Washed Illinois Coal
	Pulverizer Rejects 3,800 tons/yr
	Bottom Ash 12,200 tons/yr
	Fly and Boiler Hopper Ash 48,400 tons/yr
	Scrubber Solids 201,000 tons/yr
	Total 265,400 tons/yr

Disposal Method: Truck haul to onsite landfill

Cost of Disposal: \$740,000/yr (1981 dollar values)

F. Show Derivation of Efficiency Estimation.

Electrostatic Precipitator - particulate input - $8.52 \text{ lb}/10^6 \text{ Btu}$
 particulate outlet - $0.03 \text{ lb}/10^6 \text{ Btu}$

$$\text{Eff} = \frac{8.52 \text{ lb}/10^6 \text{ Btu} - 0.03 \text{ lb}/10^6 \text{ Btu}}{8.52 \text{ lb}/10^6 \text{ Btu}} \times 100\% = 99.65\%$$

For design basis coal-Washed Appalachian, this coal results in precipitator designed to handle other coal and emit $0.03 \text{ lb}/10^6 \text{ Btu}$ or less

Coal Wash Facilities and Wet Limestone Scrubber

Raw coal potential SO_2 production rate-- $11.76 \text{ lb}/10^6 \text{ Btu}$

BACT SO_2 stack emission*-- $1.176 \text{ lb}/10^6 \text{ Btu}$

$$\text{Overall effect} = \frac{11.76 \text{ lb}/10^6 \text{ Btu} - 1.176 \text{ lb}/10^6 \text{ Btu}}{11.76 \text{ lb}/10^6 \text{ Btu}} = 90 \text{ per cent}$$

Based on NSPS 90 per cent removal is required for emission of greater than $0.60 \text{ lb}/10^6 \text{ Btu}$ up to $1.2 \text{ lb}/10^6 \text{ Btu}$ - 90 per cent removal is required.

G. An 8-1/2 x 11 inch Flow Diagram Which Will, Identify the Individual Operations and/or Processes. Indicate Where Raw Materials Enter, Where Solid and Liquid Waste Exist, Where Gaseous Emissions and/or Airborne Particles Are Evolved (see Figure 3.7-1).

*Maximum 3-hour stack emissions will require further reductions to $1.14 \text{ lb per } 10^6 \text{ Btu}$ for increment protection. The sulfur dioxide emission controls as designed are capable of achieving this level of control.

TABLE 3.7-9 (Continued). BEST AVAILABLE CONTROL TECHNOLOGY DATA

Disposal Method: Truck haul to onsite landfill

Cost of Disposal: \$520,000/yr (1981 dollar values)

F. Show Derivation of Efficiency Estimation.

Electrostatic Precipitator - particulate input - $8.52 \text{ lb}/10^6 \text{ Btu}$

particulate outlet - $0.03 \text{ lb}/10^6 \text{ Btu}$

$$\text{Eff} = \frac{8.52 \text{ lb}/10^6 \text{ Btu} - 0.03 \text{ lb}/10^6 \text{ Btu}}{8.52 \text{ lb}/10^6 \text{ Btu}} \times 100\% = 99.65\%$$

For design basis coal-Washed Appalachian, this coal results in precipitator designed to handle other coal and emit $0.03 \text{ lb}/10^6 \text{ Btu}$ or less

Scrubber - SO_2 input - $8.25 \text{ lb}/10^6 \text{ Btu}$

Based on NSPS 90 per cent removal is required for emission of greater than $0.60 \text{ lb}/10^6 \text{ Btu}$ up to $1.2 \text{ lb}/10^6 \text{ Btu}$ - 90 per cent removal is required for unwashed Illinois coal which is worst coal for scrubber of the coals bid.

G. An 8-1/2 x 11 inch Flow Diagram Which Will, Identify the Individual Operations and/or Processes. Indicate Where Raw Materials Enter, Where Solid and Liquid Waste Exist, Where Gaseous Emissions and/or Airborne Particles Are Evolved (see Figure 3.7-1).

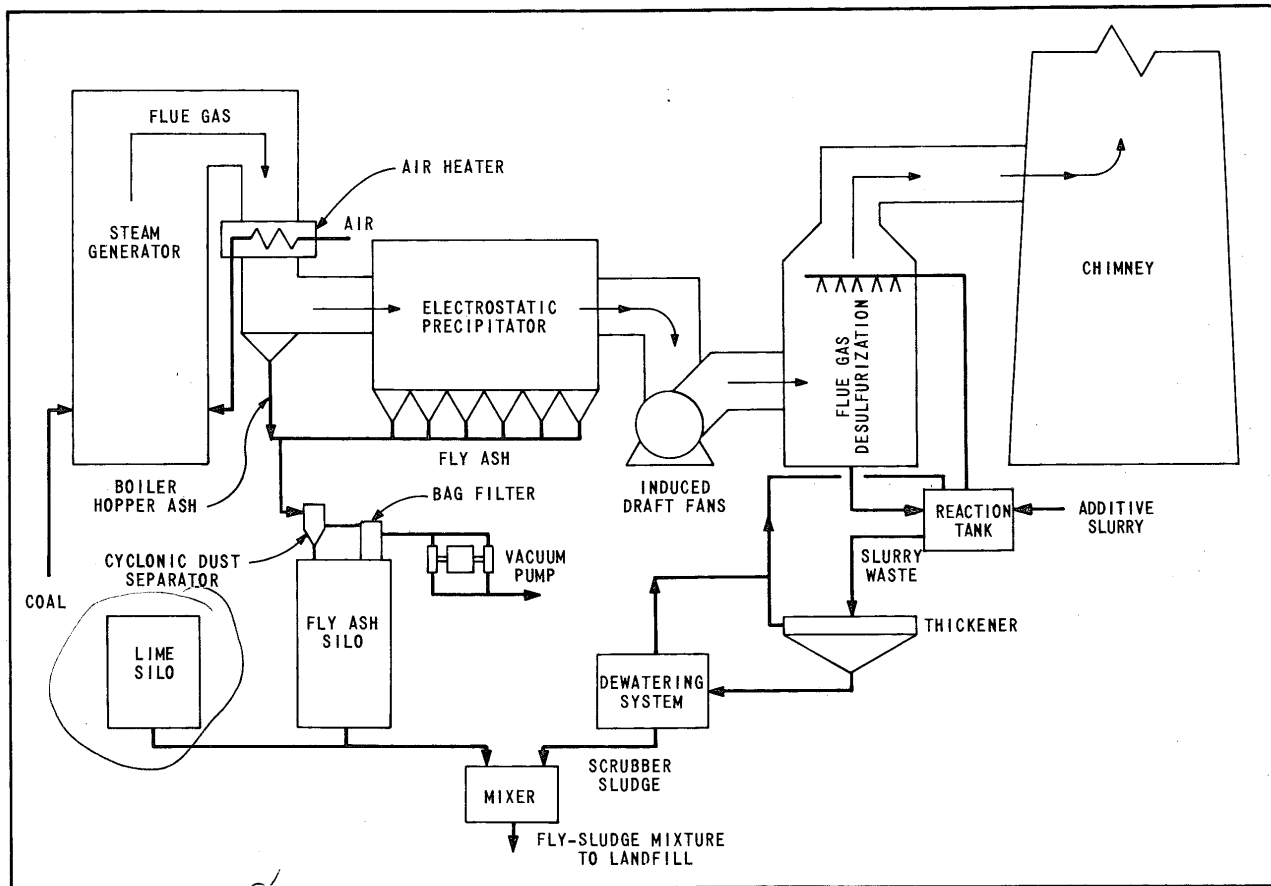


FIGURE 3.7-1. FLUE GAS CLEANING FLOW DIAGRAM

one 8

APPENDIX 3.7A
ANALYSIS OF PARTICULATE REMOVAL SYSTEMS

APPENDIX 3.7A
ANALYSIS OF PARTICULATE REMOVAL SYSTEMS

3.7A.1 INTRODUCTION

This appendix discusses the alternative methods of particulate removal considered for Stanton Energy Center Unit 1 and their feasibility for use on the project.

3.7A.2 REQUIREMENTS OF PARTICULATE REMOVAL SYSTEM

- (1) The particulate removal system shall be capable of removing particulate such that Florida Ambient Air Standards and New Source Performance Standards (NSPS) are met. The emission limitations in NSPS are more restrictive than Florida Ambient Air standards and therefore shall prevail. NSPS standards are as follows.
 - (a) Particulate emission rates are limited to 0.03 pound per million Btu heat input.
 - (b) Opacity is limited to 20 per cent, except for one 6-minute period per hour of not more than 27 per cent opacity.The production rates and removal efficiencies for the three coals considered are listed in Table 3.7A-1.
- (2) The operating reliability of the particulate removal system must be such that the generating capability of the unit would not be limited by the particulate removal system.
- (3) The particulate removal system must be applicable to any of the coals under consideration.

3.7A.3 ALTERNATE PARTICULATE REMOVAL SYSTEMS

The demonstrated methods of removing particulate matter from gas streams on coal-fired generating plants are as follows.

- (1) Electrostatic precipitators.
- (2) Fabric filters.
- (3) Wet particulate scrubbers.

3.7A.3.1 Electrostatic Precipitators

Electrostatic precipitators of the size and efficiencies required for Unit 1 have been proven in operation on similar sized utility power plants firing the types of coal under consideration. This particulate removal process is the most widely used on large units at the present time, especially when high removal efficiencies are required.

Electrostatic precipitators utilize transformer-rectifiers to energize discharge electrodes which produce a dc high voltage electrical field between the discharge electrodes and the grounded collecting electrodes. Particulates entering the electrical field acquire a charge and migrate to the collecting electrodes. A layer of collected particles forms on the collecting electrodes and is removed periodically by rapping the electrodes. The collected particulates drop into hoppers below the precipitator and are periodically removed by the fly ash handling system.

The physical size of an electrostatic precipitator is determined by the required specific collection area (SCA) and gas volume to be treated. Design of precipitators is determined by the particulate and flue gas properties, gas flow, and the required collection efficiency. The most significant particulate property affecting precipitator design is fly ash resistivity which varies with the moisture content, the chemical composition, and the temperature of the fly ash in the flue gas. Operation also depends on the accuracy of precipitator electrode alignment, uniformity, and smoothness of gas flow through the precipitator, rapping of the electrodes, and the size and electrical stability of the transformer-rectifiers.

Electrostatic precipitators are generally categorized as being either hot or cold depending upon their location. Hot precipitators are located upstream of the air heaters where the operating temperatures are in the range of 600 to 900 F. Cold precipitators are located downstream of the air heaters where the operating temperatures are generally in the range of 250 to 350 F.

3.7A.3.1.1 Hot Precipitators. Hot precipitators have been used on low sulfur coals to take advantage of the lower resistivity of the fly ash at

high temperatures. The improvement in the resistivity of the fly ash with higher temperatures for medium and high sulfur coals is not as significant as with low sulfur coals and not required for performance. Therefore, hot precipitators have not generally been applied when firing such fuels.

Some heat is lost from the flue gas even though heavy thermal insulation is utilized. Since this heat loss is ahead of the air heater, the thermal efficiency of the boiler is lowered. There have been some structural failures of hot precipitators due to thermal expansions and this problem could be compounded by numerous starts per year. Also, some hot side precipitators have experienced problems resulting in poor performance.

Although the hot precipitator theoretically requires a smaller collection area than a cold precipitator to achieve the required removal efficiency, a hot precipitator will have a greater volumetric flow rate than a cold precipitator because of its higher operating temperature. The higher volumetric flow rates tend to require larger precipitator casings, ducts, and flues as compared to the cold precipitator.

3.7A.3.1.2 Cold Precipitators. The lower flue gas temperature in a cold precipitator results in higher ash resistivity. The desired level of collection efficiency is obtained at the higher resistivity by increasing the precipitator SCA, the sectionalization, and the transformer-rectifier capacity. Cold precipitators have been used for many years on units burning low sulfur western fuels as well as higher sulfur eastern fuels.

The advantages of cold precipitators over hot precipitators are as follows.

- (1) Cold precipitators are located downstream of the air heaters, and any heat loss from a cold precipitator does not affect the boiler efficiency.
- (2) Cold precipitators are subjected to less thermal expansion and stress, because of its lower operating temperature.

The fuels under consideration are not expected to have exceptionally high resistivity or other properties which would make the ash difficult to collect at the temperatures expected following the air heater. Therefore,

it is not necessary to consider a hot side precipitator with its inherent expansion and design problems. Only cold side precipitators will be considered for use at this station.

Design parameters for cold precipitators are shown on Table 3.7A-2. These parameters have been developed in this analysis for cost comparisons.

3.7A.3.2 Fabric Filters

Fabric filters have been extensively used for years in small industrial applications but, until recently, have not been used extensively in utility boiler applications. This was primarily due to short bag life rather than to the inability of this type of device to collect particulates. Recently, however, a large amount of work has been performed by fabric filter manufacturers, electric utilities, and textile manufacturers to determine how to correct the most common causes of bag failure and to develop more durable fabrics. As a consequence, fabric filters are becoming more prevalent in the utility market, especially for small and medium size units.

Fabric filters utilize fabric bags as filters to collect the particulate. The process of filtration of gases to remove particulate matter is a combination of the mechanisms of inertial impaction, interception, and diffusion. Factors such as gravitational, electrostatic, or thermal forces can have an influence on the collection efficiency.

The particulate-laden gas enters the fabric filter compartments and passes through the filter bags. The collected particulate forms a cake on the bags which enhances the filtering efficiency. At predetermined time intervals or on a high differential pressure signal, the bags are cleaned of most of the collected particulate by reverse air-deflation, shaking, or a rapid pulse of air, leaving a residual dust layer on the bags to aid in the filtration process. The particulates are collected in hoppers below the fabric filter housing and are periodically removed from the hoppers by conventional fly ash removal systems.

Generally, filter bag life depends on the duty load of the fabric filter, the cleaning cycle frequency, and the care in handling the filter bag by service or maintenance personnel. The filter bags which are used in

a utility boiler application are generally fiberglass with a Teflon or silicone-graphite finish. These filter bags have a maximum operating temperature of approximately 550 F and are resistant to acid or alkali attack.

The flue gas is not allowed to cool to the acid or water dew point in the fabric filter. Severe corrosion damage to the fabric filter's structural steel can occur if flue gas temperature is not properly controlled. Whenever a fabric filter compartment is taken off-line for maintenance or the generating unit is shut down for an extended period, the fabric filter must be thoroughly ventilated to prevent condensation and corrosion as the filter cools.

Fiberglass bag material is susceptible to failure through abrasion and breakage of the glass fibers during the bag cleaning cycle. For this reason reverse air-deflation cleaning is most often specified with this bag material as it exposes the bags to the least stress. In instances where reverse air has proven insufficient to adequately clean the bags, shaking of the bags during cleaning has been included.

Fabric filter collection efficiencies are not affected by the resistivity of the fly ash, so the filters are sized only on the flue gas flow rate and the design air-to-cloth ratio. The selection of the air-to-cloth ratio for woven glass bag filters is a function of the desired bag life, residual pressure drop, method of cleaning, and required cleaning cycle. An air-to-cloth ratio of 2:1 is typical for a reverse air type fabric filter used in utility applications.

Design parameters for a fabric filter system for any of the three coals are listed on Table 3.7A-3. These parameters were used in the economic analyses.

3.7A.3.3 Wet Particulate Scrubbers

Wet particulate scrubbers have been utilized on coal-fired power plants. The wet particulate scrubber is normally utilized in the power industry in combination with a sulfur dioxide removal scrubber. Particulate scrubbers have not demonstrated a capability for providing continuous

compliance with an emission standard of 0.03 lb/MBtu. New developments which utilize a low energy venturi, spray tower and a wet electrostatic precipitator at the scrubber outlet as a "polishing" device have been pilot tested but have not been demonstrated on a large unit. Wet particulate scrubbers, including those with wet electrostatic precipitators, have not demonstrated the capability for continuous compliance with particulate emission standards and are not considered further.

3.7A.4 COMPARATIVE COSTS OF VIABLE PARTICULATE REMOVAL SYSTEM

Comparative capital and operating costs for the viable alternative methods of particulate removal have been estimated based on the design parameters presented on Tables 3.7A-2 and 3.7A-3. These costs are presented in Table 3.7A-4 and are described below.

3.7A.4.1 Capital Costs

The estimated capital cost for each of the alternative methods of particulate removal is shown on Table 3.7A-4. These costs include the basic equipment and also the structural support steel, limited amounts of ductwork, and insulation and lagging. For the purpose of this study the foundations required for the equipment were considered to be equivalent for the different methods.

The electrostatic precipitator is complete with casings, transformer-rectifiers, inlet diffuser and outlet nozzle, a roof weather enclosure, system controls, access platforms, and rapping system. Also included is electrical construction.

Fabric filters include casings complete with fabric filter bags, dampers with operators, system controls, access platforms, and reverse air fans with electric drive motors. Electrical construction is also included.

Escalation to 1985 which is the estimated time of delivery, Sales Tax and interest during construction based on a two year erection period have been added for comparative purposes. Indirect costs include company overheads and engineering costs and have been added.

3.7A.4.2 Operating Costs

The estimated levelized annual operating cost for each of the alternative methods of particulate removal is shown on Table 3.7A-4. These operating costs include demand and energy charges for auxiliary power consumption including differential induced draft fan power. The operation and maintenance costs for each alternative based on personnel requirements are also included. Fabric filter bag replacement is included under maintenance and is based on an average 2 year bag life.

3.7A.4.3 Summary of Costs

Comparison of the annual costs presented on Table 3.7A-4 indicates that a cold side electrostatic precipitator has the lowest capital cost, the lowest annual operating cost, and the lowest total annual cost of the methods investigated for particulate removal.

3.7A.5 CONCLUSIONS

A cold side electrostatic precipitator is the most advantageous combustion gas particulate removal system for Stanton Energy Center Unit 1. An evaluation of available systems and costs (Table 3.7A-4) indicates that this is the most reliable and economical particulate removal system. In addition, it has the most operating experience. Electrostatic precipitators have been used on utility boilers the size of Stanton Energy Center Unit 1 for many years. Also, the reliability of cold side precipitators on medium and high sulfur fuels has been demonstrated.

The precipitator will be designed to meet NSPS when collecting ash from a low sulfur Appalachian coal flue gas. The ash in this coal flue gas will be hard to collect, resulting in a large precipitator. If coals with lower ash resistivity are burned, the collection efficiency will increase, resulting in emission rates less than NSPS.

TABLE 3.7A-1. PARTICULATE PRODUCTION RATES AND REMOVAL REQUIREMENTS

Parameter	Illinois Coal		Medium Sulfur Appalachian Coal		High Sulfur Appalachian Coal	
	Maximum	Average	Maximum	Average	Maximum	Average
Fly ash production rate, pounds per 10^6 Btu	10.67	6.14	8.00	3.96	9.19	3.74
Allowable particulate emission, pounds per 10^6 Btu	0.03	0.03	0.03	0.03	0.03	0.03
Particulate removal rate, pounds per 10^6 Btu	10.64	6.11	7.97	3.93	9.16	3.71
Particulate removal efficiency, per cent	99.7	99.5	99.6	99.2	99.7	99.2

TABLE 3.7A-2. ELECTROSTATIC PRECIPITATOR DESIGN PARAMETERS*

Parameter	Coal		
	Illinois	Medium Sulfur Appalachian	Higher Sulfur Appalachian
Removal efficiency, per cent	99.7	99.6	99.7
Gas flow, acfm	1,814,000	1,768,000	1,860,000
Gas temperature, F	300	300	300
Gas velocity, fps	4	4	4
Effective front end area, ft ²	7,560	7,370	7,750
Plate height, ft	36	42	41
Effective width, ft	210	175	189
Field depth, ft	72	84	82
Aspect ratio	2.0	2.0	2.0
Specific collecting area, ft ² /Macfm	600	700	675
Total collecting area, ft ²	1,088,000	1,238,000	1,256,000
Number of transformer rectifiers	48	60	60
Total power required, MW	2.7	3.1	3.2

*Design parameters used for capital and operating cost development and are for one 460 MW gross unit.

TABLE 3.7A-3. FABRIC FILTER DESIGN PARAMETERS*

Parameter	Value
Gas flow, acfm	1,860,000
Gas temperature, F	300
Number of units	2
Number of compartments	32
Number of bags per compartment	320
Total number of bags	10,240
Filter area per bag, ft ²	90
Filter area per compartment, ft ²	28,800
Total filter area, ft ²	921,600
Air-to-cloth ratio, ft ³ /min/ft ²	
All compartments	2.02:1
1 compartment cleaning	2.15:1
1 compartment cleaning, 1 compartment maintenance	2.31:1
Bag cleaning method	Reverse Air
Normal operation flue gas, Δp	4 to 6

*Design parameters used in capital and operating cost developments and are for one 460 MW gross unit.

TABLE 3.7A-4. COMPARATIVE COSTS FOR PARTICULATE REMOVAL EQUIPMENT*

	Electrostatic Precipitator			Fabric Filter \$1,000
	<u>Illinois Coal</u> \$1,000	<u>Medium Sulfur</u> <u>Appalachian Coal</u> \$1,000	<u>High Sulfur</u> <u>Appalachian Coal</u> \$1,000	
Capital Costs				
Material and erection (1980 costs)	Base	1,530	1,711	5,924
Escalation	Base	718	803	2,780
Sales tax	Base	90	101	348
Interest during construction	Base	142	159	551
Indirect cost	<u>Base</u>	<u>446</u>	<u>499</u>	<u>1,728</u>
Differential capital cost	Base	2,926	3,273	11,331
Levelized Operating Costs				
Operating personnel	Base	Base	Base	Base
Maintenance**	Base	Base	Base	715
Demand charge***	59	112	119	Base
Energy charge***	<u>Base</u>	<u>86</u>	<u>96</u>	<u>434</u>
Comparative operating cost	59	198	215	1,149
Differential operating cost	Base	139	156	1,090
Annual Costs				
Fixed charges	Base	298	334	1,156
Levelized operating costs	<u>Base</u>	<u>139</u>	<u>156</u>	<u>1,090</u>
Comparative annual costs	Base	437	490	2,246

*Costs are presented for one 460 MW gross unit.

**Maintenance includes bag replacement.

***Includes differential ID fan power requirements.

APPENDIX 3.7B
ANALYSIS OF DESULFURIZATION SYSTEMS

APPENDIX 3.7B
ANALYSIS OF DESULFURIZATION SYSTEMS

3.7B.1 INTRODUCTION

This appendix discusses the available methods of desulfurization considered for Stanton Energy Center Unit 1 and their feasibility for use on the project.

3.7B.2 REQUIREMENTS OF DESULFURIZATION SYSTEM

- (1) The desulfurization system shall be capable of operation in accordance with the requirements outlined in Florida Ambient Air Standards and New Source Performance Standards (NSPS). The emission requirements in NSPS are more restrictive than the Florida Ambient Air standards and therefore shall prevail. The NSPS standards are as follows.
 - (a) The sulfur dioxide (SO_2) emission rate will be limited to a maximum of 1.2 pounds SO_2 per 10^6 Btu heat input.
 - (b) A percentage reduction in sulfur dioxide emissions from the sulfur contained in the raw coal must be achieved. A curve depicting the allowable emission rates of SO_2 emitted versus the sulfur content of the coal is shown in Figure 3.7B-1. This reduction must be at least 70 per cent (30 day average) and the emission rate must not exceed 0.60 pound SO_2 per 10^6 Btu heat input unless at least a 90 per cent reduction is achieved. Compliance with these requirements will be determined on the basis of a 30-day rolling average. Percentage removal credit can be obtained for coal preparation and reduction.
 - (c) Gas bypassing is allowed if the criteria in (b) are met. The production rates and removal requirements of sulfur dioxide for the three coals considered are listed in Table 3.7B-1.

- (2) The operating reliability of the desulfurization system shall be such that the generating capability of the unit shall not be limited by the desulfurization system.
- (3) The desulfurization system shall meet the following requirements.
 - (a) Demonstrated feasibility.
 - (b) Advanced level of availability.
 - (c) Acceptance by utility industry.
 - (d) Favorable economic impact.
 - (e) Acceptable environmental impact of waste disposal or a marketable end product.
 - (f) Applicability to any two of the coals under consideration.

3.7B.3 ALTERNATE DESULFURIZATION SYSTEMS

3.7B.3.1 Desulfurization Methods

An enormous amount of research, testing, and development has occurred in the area of flue gas desulfurization in the past 10 years. In the United States alone, operating units with nearly 24,000 megawatts of electric generating capacity are currently equipped with FGD systems. An additional 27,000 megawatts of generating capacity are planned or under construction with flue gas desulfurization. Of the over 200 desulfurization processes that have been studied, the following seven processes have been sold for application to a utility steam generator.

- (1) Lime.
- (2) Limestone.
- (3) Spray absorber processes.
- (4) Double alkali.
- (5) Soda ash.
- (6) Magnesium oxide.
- (7) Wellman-Lord.

One other process, flue gas sparging (Chiyoda), is being offered but has not yet been utilized in a full scale utility application. Table 3.7B-2 presents a summary of the current status of desulfurization systems on utility steam generator installations in the United States.

The leading type of desulfurization processes for large power plants are identified in the block diagram shown on Figure 3.7B-2. The basic divisions are into recovery and throwaway processes based on the treatment approach for the scrubber solids, with subdivisions into wet and dry processes.

In throwaway processes the end product has no significant commercial value and must be disposed of in ponds or landfills. Recovery processes yield a salable materials such as gypsum, sulfur, sulfuric acid, or fertilizer base compounds. Extensive research is presently underway for development of scrubbing processes which would yield either a salable end product or a product which is easily and economically disposed.

3.7B.3.1.1 Throwaway Processes

- (1) Lime Process. Lime (CaO) is slaked to calcium hydroxide and used to absorb the sulfur dioxide from the flue gas producing a wet sludge. A schematic of the system is shown on Figure 3.7B-3. The scrubber additive system requires a slaker to hydrate the lime. The scrubber vessels are generally open, counter-current spray tower types with multiple spray levels. SO_2 removal efficiencies of about 90 per cent are achievable. The use of packed towers or mobile bed towers can further improve efficiencies. Liquid to gas (L/G) ratios of 40 to 60 gallons per 1,000 cubic feet of gas are typical for lime scrubbers. There is considerable operating experience and a high degree of reliability for most operational systems. The lime additive is generally available; however, it is expensive, approximately 10 times the cost of limestone on a per ton basis. The system is generally controlled by monitoring the pH in the recirculating liquor. The required pH level is established by the SO_2 removal required. System controls are responsive because of the rapid dissolution of the slaked lime.

The major disadvantage of the lime scrubber is that the sludge produced generally contains a significant amount of calcium sulfite which does not dewater readily and is also thixotropic.

The thixotropic property results in a sludge which, when moved, tends to reliquify. Forced oxidation, to decrease the sulfite and increase the sulfate concentration, is difficult with a lime scrubber because the normal pH operating range (6 to 7) is not favorable to oxidation.

- (2) Limestone Process. The limestone process, which is also shown on Figure 3.7B-3, is very similar to the lime process. The basic difference is that limestone (CaCO_3) is crushed, slurried and used as the alkali additive. The additive system utilizes a ball mill for grinding and slurrying the limestone. The scrubber vessels are generally open, counter-current spray towers with multiple spray levels. SO_2 removal efficiencies up to 90 per cent are achievable. The use of packed towers or mobile bed towers to increase liquid surface areas can result in efficiencies up to 95 per cent. Liquid to gas ratios of 50 to 80 gallons per 1,000 cubic feet of gas treated are typical. The utility industry has considerable operating experience with limestone scrubbers and there is a high degree of reliability for most operational systems. Limestone additive is generally inexpensive and readily available. The system is generally controlled at a selected pH in the recirculating liquor, which is necessary to remove SO_2 and dissolve the limestone. The pH control point in a limestone scrubber is generally lower than for a lime scrubber. The system controls are not as responsive as a lime system because of the lower reactivity of the limestone and its inherent buffering tendencies. The system can utilize forced oxidation of the sludge from sulfite to sulfate which creates a sludge which is easily dewatered and disposable.

The disadvantages of the limestone scrubber include the maintenance requirements for the grinding equipment and for the piping and pumping systems because of the abrasiveness of the slurry. This process usually creates more sludge for disposal than other systems because of the lower utilization of the additive.

- (3) Spray Absorber Process. The spray absorber process is a relatively recent development in combustion gas cleaning technology. It is a two-stage sulfur dioxide and particulate removal process that utilizes a spray dryer type absorber and fabric filter or electrostatic precipitator in series. Both lime and soda ash can be used as additives. The stoichiometric quantities of lime required are greater than the quantities of soda ash due to the lower reactivity of lime. SO_2 removal with lime is limited to a maximum of about 90 per cent.

A spray absorber is a type of continuous mass transfer equipment. As shown on Figure 3.7B-4 lime slurry or soda ash solution is pumped to an atomizer, located at the top of the spray dryer, which produces a dispersed spray of fine droplets. The alkali absorbent is accelerated to a high velocity in the high speed rotating atomizer and is forced radially outward in a cross-flow path to the incoming flue gas. Flue gas from the air heater enters the spray dryer where it passes downward through the atomized alkali solution.

The turbulent characteristic of the combustion gas within the absorber and the atomized alkali droplets provide intimate mixing of the two phases. The alkali additive reacts with the gas which is absorbed by the water to form sulfite and sulfate. At the same time, the thermal energy of the combustion gas evaporates the water in the droplets to produce a dry mixture of sulfite, sulfate, and unreacted alkali additive. These dry waste products are removed along with the fly ash in the second stage of the system consisting of a fabric filter or electrostatic precipitator. In this stage, additional sulfur dioxide removal can occur due to reaction with unreacted alkali additive material. The spent absorbent can either be conveyed to a recirculation system or to landfill for disposal.

The typical liquid-to-gas ratio for the spray absorber is approximately 0.3 gallon per 1,000 acf of the combustion gas

treated. Because of the low liquid-to-gas ratio, there is not enough water injected to cool the gas to its dew point, and reheating is not required; however, the combustion gas temperature is cooled to within 20-50 F of the water dew point in the spray absorber.

Control of the spray absorber is accomplished by measuring the temperature of the combustion gas at the outlet of the spray absorber and the sulfur dioxide content in the combustion gas entering the chimney. The amount of dilution water added to the additive solution prior to atomization in the spray absorber is controlled by the outlet combustion gas temperature. The solids per cent of the additive slurry entering the spray absorber is controlled by outlet sulfur dioxide concentration.

The 100 MW lime additive full scale demonstration unit, a Northern States Power Riverside plant, has recently started operation. No data has been made available, but preliminary reports indicate that aside from the usual problems of a new system, the demonstration plant is performing as expected. A 100 MW demonstration plant at Niagara Mohawk Power Cooperative's Charles Huntley station is currently under construction and is scheduled for initial testing in 1982. This system will use sodium carbonate as an additive. Lime additive spray absorber systems for a 455 MW unit at Basin Electric Power Cooperative's Antelope Valley Plant and a 550 MW unit at their Laramie River Plant are scheduled to start up full scale in late 1981 and 1982. A 400 MW unit at Otter Tail Power's Coyote Station is scheduled to start up with soda ash additive in 1981.

- (4) Double-Alkali Process. This concept uses a counterflow spray tower type scrubber with soda ash as the alkali additive. The soda ash can then be regenerated by the addition of lime in a secondary reactor. A process schematic is shown on Figure 3.7B-5. There is limited utility experience with operational systems. The system has demonstrated acceptable reliability and SO₂ removal performance.

The advantages of the system are that the scrubber liquor is a clear solution rather than a slurry so that the potential for wear and plugging in the scrubber loop are minimized. The system has a high inherent SO_2 removal efficiency because of the reactivity of the sodium in the scrubber loop. Removal efficiencies of 95 per cent and greater are common with L/G ratios of 10 to 40 gallons per 1,000 cubic feet of gas treated. The disadvantages includes the need for two alkali preparation systems, one for the soda ash and another for the lime. The regeneration of the sodium by the lime requires careful operator attention in that portion of the process. A major drawback is that sodium recovery in the full scale units has not been as high as originally planned which has significantly increased the use of an expensive additive. The sludge from the double-alkali process can contain significant amounts of sodium sulfate and sulfite. This makes the sludge difficult to dispose of because of leaching and mechanical instability.

- (5) Soda Ash Process. The soda ash process as shown on Figure 3.7B-6 is very similar to the double-alkali process except that lime is not added to the process and the sodium is not recovered for reuse in the scrubber. The scrubber liquor is pumped directly from the recirculation tank to a disposal area. This process requires the use of evaporation ponds for disposal of the waste. This process has only been applied in the arid areas of the U.S. where there is the possibility of using an evaporation pond.
- (6) Flue Gas Sparging (Chiyoda) Process. As shown on Figure 3.7B-7, the flue gas leaving the induced draft fans is first quenched by spray nozzles to control the gas temperature and the wet/dry interface of the system. The gas then enters the reactor where it is directed downward to numerous sparging pipes. These pipes are partially submerged in the absorber slurry. The gas, leaving the sparging pipes as finely divided bubbles, reacts with the limestone in the slurry to form calcium sulfite and calcium

sulfate. The treated flue gas leaves the reactor and passes through the mist eliminator. The oxidizing air blower provides the air for oxidizing the sulfite to sulfate in the reactor. The absorber slurry continuously overflows by gravity to the limestone slurry tank where fresh limestone additive is introduced. Limestone addition is controlled by the pH of the reaction tank slurry. A portion of the absorber slurry is discharged to the solids disposal system by the reactor blowdown pumps. Reclaimed water from the solids disposal system is returned to limestone slurry tank and the flue gas quench sprays.

A 23 MW demonstration plant at Gulf Power's Scholz Station has completed over a year of operating data from treating flue gas from a boiler burning Alabama bituminous coal. There are no full scale systems operating or under contract. A full scale demonstration unit is presently being sought by EPRI.

3.7B.3.1.2 Recovery Processes. The recovery processes utilize a spray tower type scrubber similar to that utilized in the lime or limestone system.

- (1) Magnesium Oxide Process. Magnesium oxide (MgO), in a liquor, is used to absorb sulfur dioxide in this process and magnesium sulfite ($MgSO_3$) is produced as an intermediate product. Sulfur dioxide is extracted from this sulfite and converted to sulfuric acid. The magnesium sulfite salt may be shipped to an offsite sulfuric acid plant, which returns the reformed MgO for reuse in the scrubber. MgO recovery has not been as efficient as originally planned. This increases the requirement for an expensive additive. There is also a requirement for a sulfuric acid plant within a reasonable distance of the plant site for additive recovery.

Philadelphia Electric has been testing the magnesium oxide system since 1975 at its Eddystone station and has awarded contracts for this system for three more units (724 MW total). The expected startup date for these systems is 1982.

- (2) Wellman-Lord Process. In this process, sodium sulfite (Na_2SO_3) is used to absorb the sulfur dioxide and elemental sulfur or SO_2 can be ultimately produced. The process requires that a complex recovery process be operated as part of the scrubber system. This recovery process would depend on the ultimate form for the sulfur. Soda ash additive is required for the process and there is a requirement to dispose of sodium sulfate sludge. There is also a need for a market or disposal method for the concentrated SO_2 or sulfur produced.

The first full scale Wellman-Lord FGD system was installed at Public Service of New Mexico's San Juan Generating Station in early 1978. The operating experience has been good with the unit exhibiting acceptable availability.

3.7B.3.2 Feasible Desulfurization Systems

To be considered as a feasible alternative for flue gas desulfurization for the Stanton project, a process must meet the criteria presented in Section 3.7B.2.

The lime and limestone processes meet all the requirements for a feasible system. The utility industry has to date used these two processes extensively. Both lime and limestone are available in the counties surrounding the site. Limestone is mined locally. Lime, which is produced by calcining limestone, is available by rail from various in-state and out-of-state producers.

The spray absorber process has been pilot tested, and sold to the utility industry. There are several suppliers of the process. The process has not been demonstrated on a full scale unit and has therefore not demonstrated an advanced level of availability. The process has been generally accepted by the utility industry. However, the dry scrubbing process will not be applicable to all the coals under consideration. The amount of additive required for continuous high efficiency removal when coupled with the need to keep the flue gas temperature above the water dew point results

in technical limitations (pumping problems) for the high removal efficiencies required. The spray absorber process is judged not feasible for use on this project.

The double alkali process offers certain operational advantages, such as scrubbing with a clear solution rather than a slurry. The process has been successfully applied and has demonstrated acceptable reliability. The process will use nearly the same amount of lime as a lime scrubber. The process also requires the use of soda ash to make up for sodium losses in the sludge. The soda ash usage requirement is higher than the differential lime usage and soda ash is significantly more expensive than lime. The sludge produced contains sodium and is not easily disposed in an environmentally acceptable fashion. The double alkali process will not be economically attractive because of the soda ash usage and the cost for sludge disposal and is therefore not considered feasible for this project.

The soda ash process is not considered feasible for this project for the same reasons that the double alkali system is not considered feasible.

The flue gas sparging process has not been applied on a full scale unit. This process has not demonstrated the ability for continuous acceptable performance with an acceptable availability. This process is not considered feasible for use on this project.

The magnesium oxide process has not been widely accepted by the utility industry. There are no full scale units presently using this process for SO_2 removal. The recovery rate for the magnesium oxide has not been as good as originally planned based on the pilot work. This process requires a sulfuric acid plant for magnesium recovery at a location relatively near the plant. This process is not considered feasible for use on this project.

The Wellman-Lord process has not been widely accepted by the utility industry. The additive required is soda ash which would be expensive. This process requires a rather complex sodium recovery process which must be located and operated on site. This process also requires a market or at least an acceptable disposal method for the sodium sulfate and liquid or gaseous SO_2 which will be produced. These products are not easily stored on site in large quantities. The lack of an acceptable disposal method for the wastes produced makes this process not feasible for use on this project.

In summary, the lime and limestone processes are the only processes considered to be feasible with all of the potential coals.

3.7B.4 COMPARATIVE COSTS

3.7B.4.1 Capital Costs

The estimated capital cost for each of the alternative methods for SO₂ removal is shown on Table 3.7B-3. These costs include the basic equipment and also the structural support steel, interconnecting ductwork, and insulation and lagging. For the purpose of this study, the foundations required for the equipment were considered to be equivalent for the different methods. Capital costs for the additive preparation system have been included based on the cost of the additive receiving and yard facilities as well as the slurry preparation equipment and tanks. Capital costs have also been included for solids disposal based on a commercial system for mixing the scrubber sludge with fly ash. No optimization of the disposal system has been included.

3.7B.4.2 Operating Costs

The estimated levelized annual operating costs for each of the alternative methods for SO₂ removal is shown on Table 3.7B-3. These operating costs include demand and energy charges for auxiliary power including induced draft fan power. The additive cost has been included based on the expected additive usage of each process and the delivered additive prices quoted by suppliers.

3.7B.4.3 Summary of Costs

The comparative annual costs are shown on Table 3.7B-3. These costs include the fixed charges on capital expenditures and the levelized operating costs. A comparison of the annual costs for the wet scrubbers indicates that the limestone scrubber has a higher capital cost, lower annual operating cost and lower total annual cost for the three coals considered in this study.

3.7B.5 CONCLUSIONS

A wet limestone scrubber is the most advantageous combustion gas desulfurization system for Stanton Energy Center Unit 1. An evaluation of available desulfurization system costs (Table 3.7B-3) indicates that this is the most reliable and economical desulfurization system. In addition, it has extensive operating experience. Wet limestone scrubbers have been used on utility boilers for many years and have a demonstrated reliability.

TABLE 3.7B-1. SULFUR DIOXIDE PRODUCTION RATES AND REMOVAL REQUIREMENTS

Parameter	Illinois Coal		Medium Sulfur Appalachian Coal		Higher Sulfur Appalachian Coal	
	Maximum	Average	Maximum	Average	Maximum	Average
SO ₂ production from raw coal, pounds per 10 ⁶ Btu (100 per cent conversion of sulfur to sulfur dioxide)	12.24	5.11	2.50	1.31	4.09	2.18
Overall SO ₂ removal requirements to meet allowable emission rate (based on raw coal), per cent	91	89	76	70	86	73
Allowable SO ₂ emission rate (based on raw coal), pounds per 10 ⁶ Btu	1.20	0.60	0.60	0.39	0.60	0.60
Required SO ₂ reduction, pounds per 10 ⁶ Btu	11.04	4.51	1.90	0.92	3.49	1.58
Sulfur reduction resulting from coal washing, pounds per 10 ⁶ Btu (as SO ₂)	3.67*	1.53*	--	--	--	--
SO ₂ reduction required in FGD system, pounds per 10 ⁶ Btu	7.37	2.98	1.90	0.92	3.49	1.58
FGD system removal efficiency, per cent	86**	84**	76	70	86	73

*The SO₂ reduction resulting from coal washing represents the difference in the SO₂ production estimated for the raw coal and the SO₂ production based on the Illinois washed coal analysis.

**FGD system removal efficiency is determined as the SO₂ reduction required for the washed Illinois coal to comply with the total reduction required for the raw coal.

TABLE 3.7B-2. STATUS OF GAS DESULFURIZATION PROCESSES ON COAL-FIRED STEAM ELECTRIC GENERATING UNITS IN THE UNITED STATES

Scrubber Status	Throwaway Processes					Recovery Process		Total
	Lime	Limestone	Spray Absorber	Soda Ash	Double-Alkali	Magnesium Oxide	Wellman-Lord	
Operational								
MW	8,801	11,464	110	925	1,181	0	1,540	24,021
Per cent of total	36	48	1	4	5	0	6	100
Under construction or contracts awarded								
MW	3,836	17,390	3,313	330	842	724	534	26,969
Per cent of total	14	65	12	1	3	3	2	100
								50,990 MW

Reference: EPA Utility FGD Survey: April-June 1980, USEPA, EPA-600/7-81-012a, January 1981.

TABLE 3.7B-3. COMPARATIVE COSTS FOR DESULFURIZATION EQUIPMENT*

	Illinois Coal		Medium Sulfur Appalachian Coal		High Sulfur Appalachian Coal	
	<u>Limestone</u> \$1,000	<u>Lime</u> \$1,000	<u>Limestone</u> \$1,000	<u>Lime</u> \$1,000	<u>Limestone</u> \$1,000	<u>Lime</u> \$1,000
Capital Costs						
Scrubber material and erection	1,370	400	900	Base	1,840	900
Additive equipment	1,620	2,590	450	Base	1,110	760
Waste handling equipment	820	750	20	Base	250	180
Subtotal	3,810	3,790	1,370	Base	3,200	1,840
Escalation	1,790	1,780	640	Base	1,500	860
Escalated Cost	5,600	5,570	2,010	Base	4,700	2,700
Sales tax	220	220	80	Base	190	110
Interest during construction	390	390	140	Base	330	190
Indirect costs	700	690	250	Base	590	340
Comparative capital cost	6,910	6,870	2,480	Base	5,810	3,340
Levelized Operating Costs						
Demand charge	258	136	97	Base	229	126
Energy charge	693	404	222	Base	659	395
Additive	1,432	9,596	Base	2,007	391	3,953
Waste disposal	498	329	46	Base	139	60
Comparative operating costs	2,881	10,465	365	2,007	1,418	4,534
Differential operating costs	2,516	10,100	Base	1,642	1,053	4,169
Annual Costs						
Fixed charges	705	701	253	Base	593	341
Operating costs	2,516	10,100	Base	1,642	1,053	4,169
Comparative annual cost	3,221	10,801	253	1,642	1,646	4,510
Differential comparative annual cost	2,968	10,548	Base	1,389	1,393	4,257

*Costs are for one 460 MW gross unit.

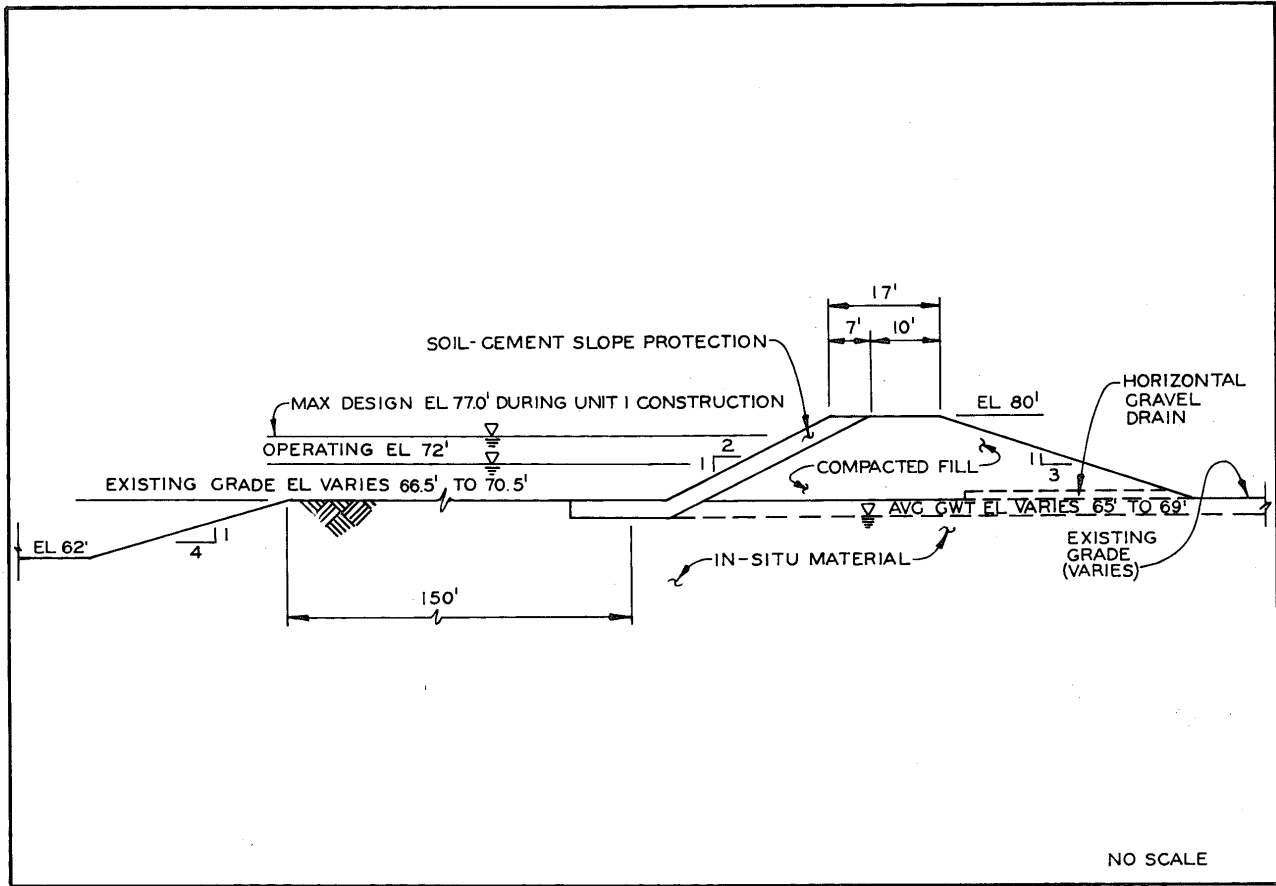


FIGURE 3.10-2. MAKEUP WATER SUPPLY STORAGE
POND EMBANKMENT SECTION

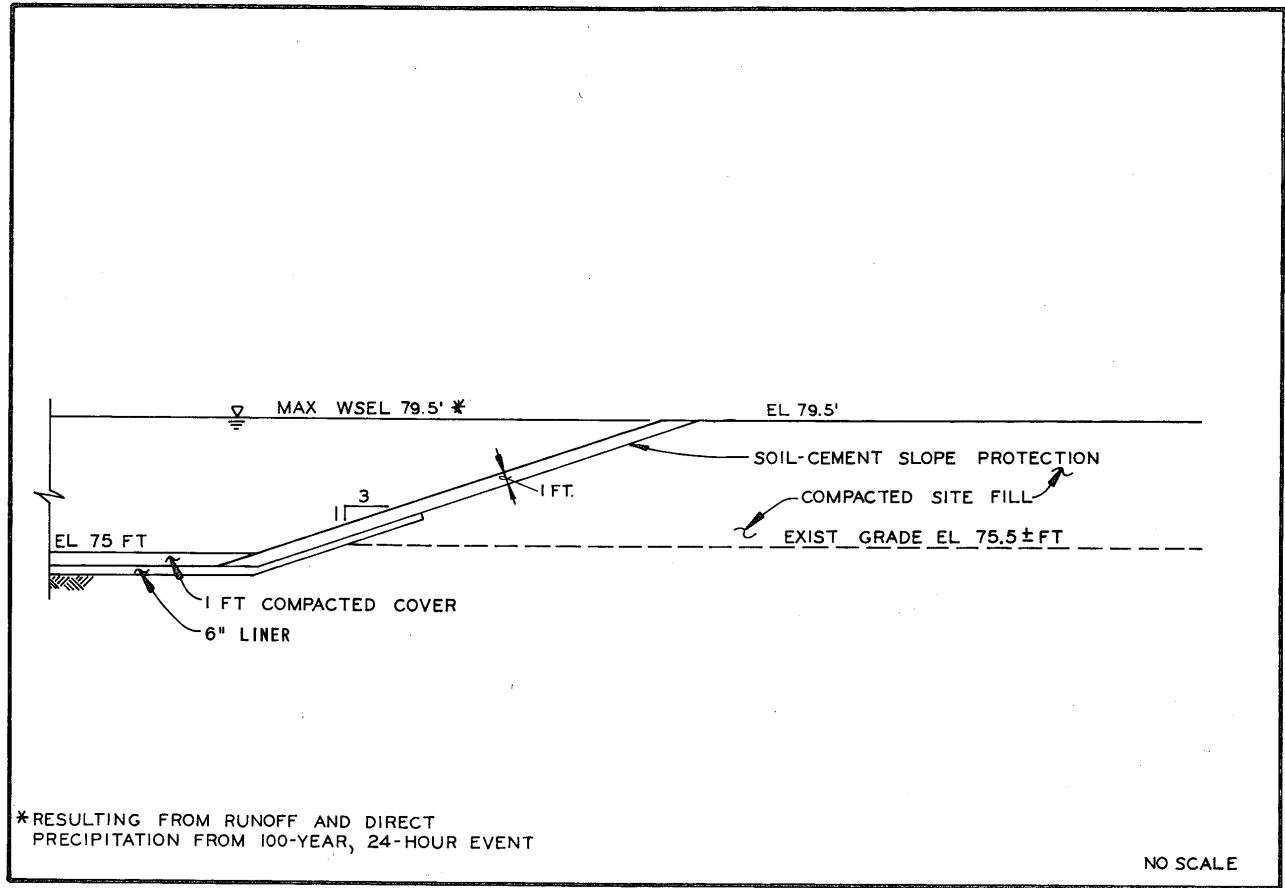


FIGURE 3.10-3. COAL STORAGE AREA RUNOFF
POND EMBANKMENT SECTION

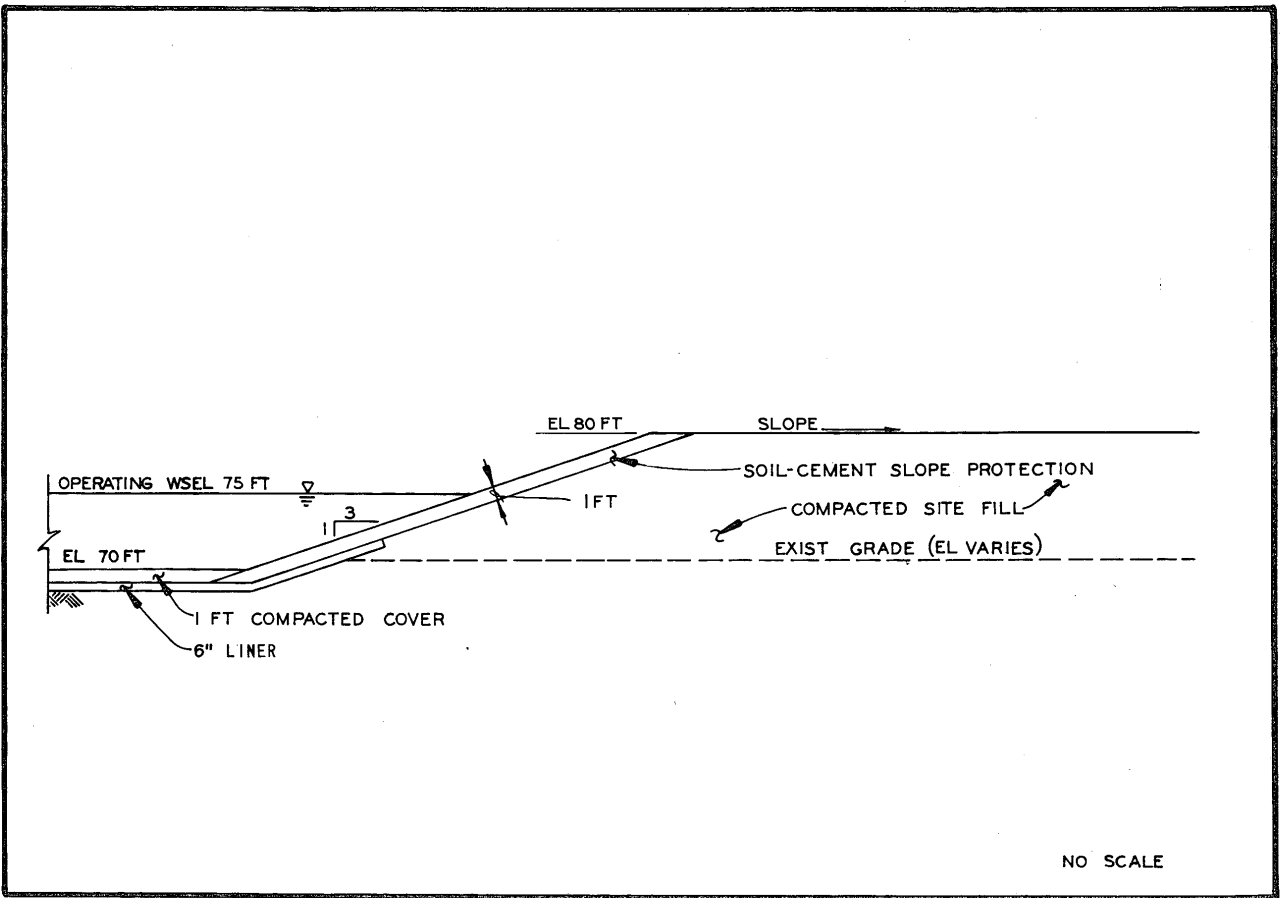


FIGURE 3.10-4. RECYCLE BASIN
EMBANKMENT SECTION

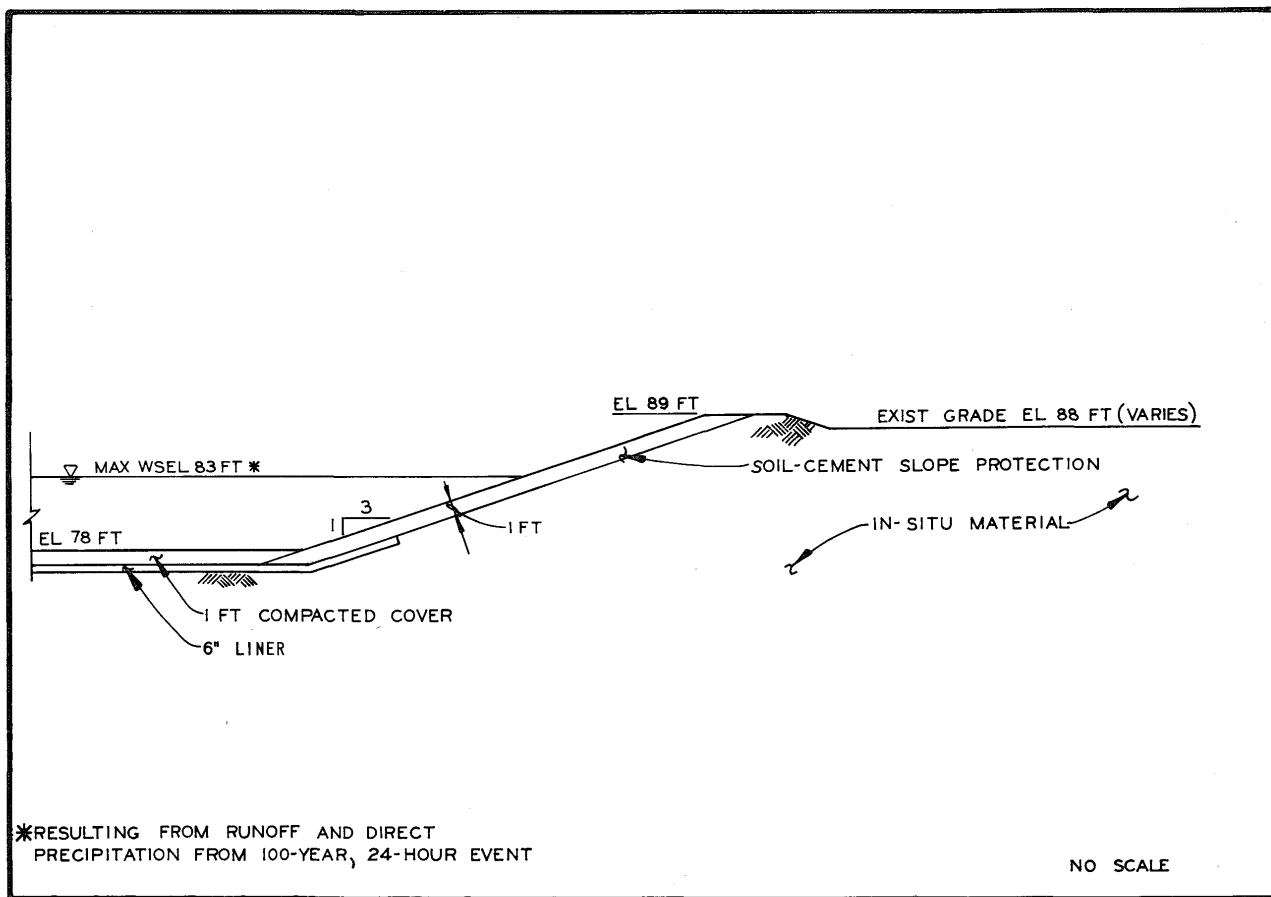


FIGURE 3.10-5. ACTIVE COMBUSTION WASTE STORAGE AREA
RUNOFF POND EMBANKMENT SECTION

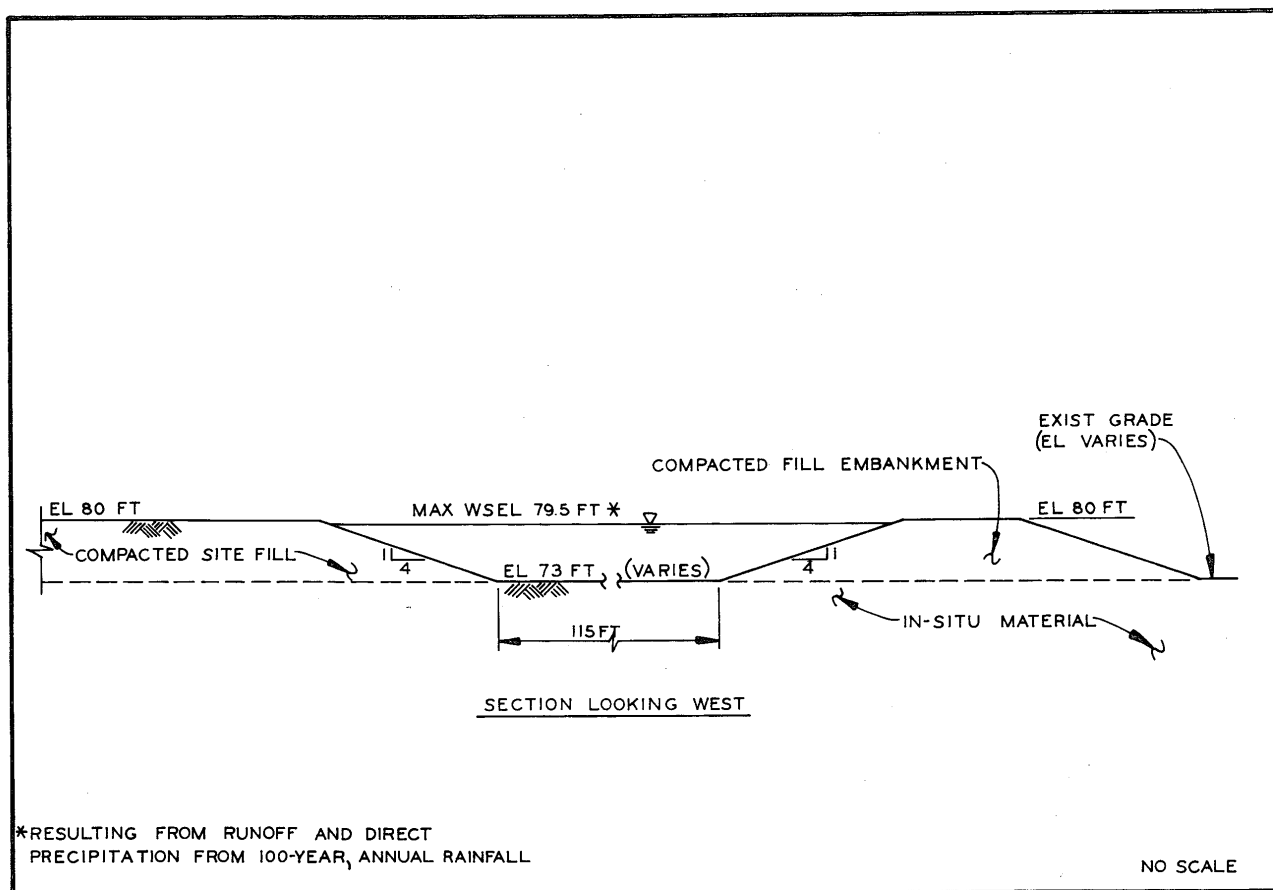
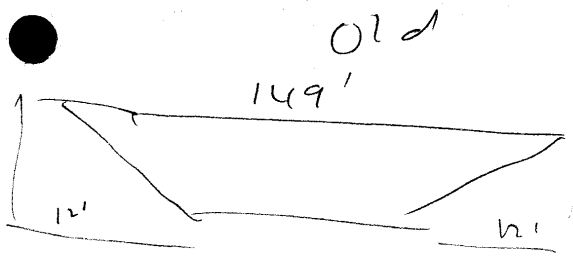


FIGURE 3.10-6. CONSTRUCTION LAYDOWN AREA
RUNOFF RETENTION AREA SECTION



$$A = \left(\frac{149 + 125}{2} \right) (4) = 548 \text{ ft}^2$$

New

$$\left[\frac{115 + (115 + 2(6.5 \times 4))}{2} \right] 6.5 = 916.5$$

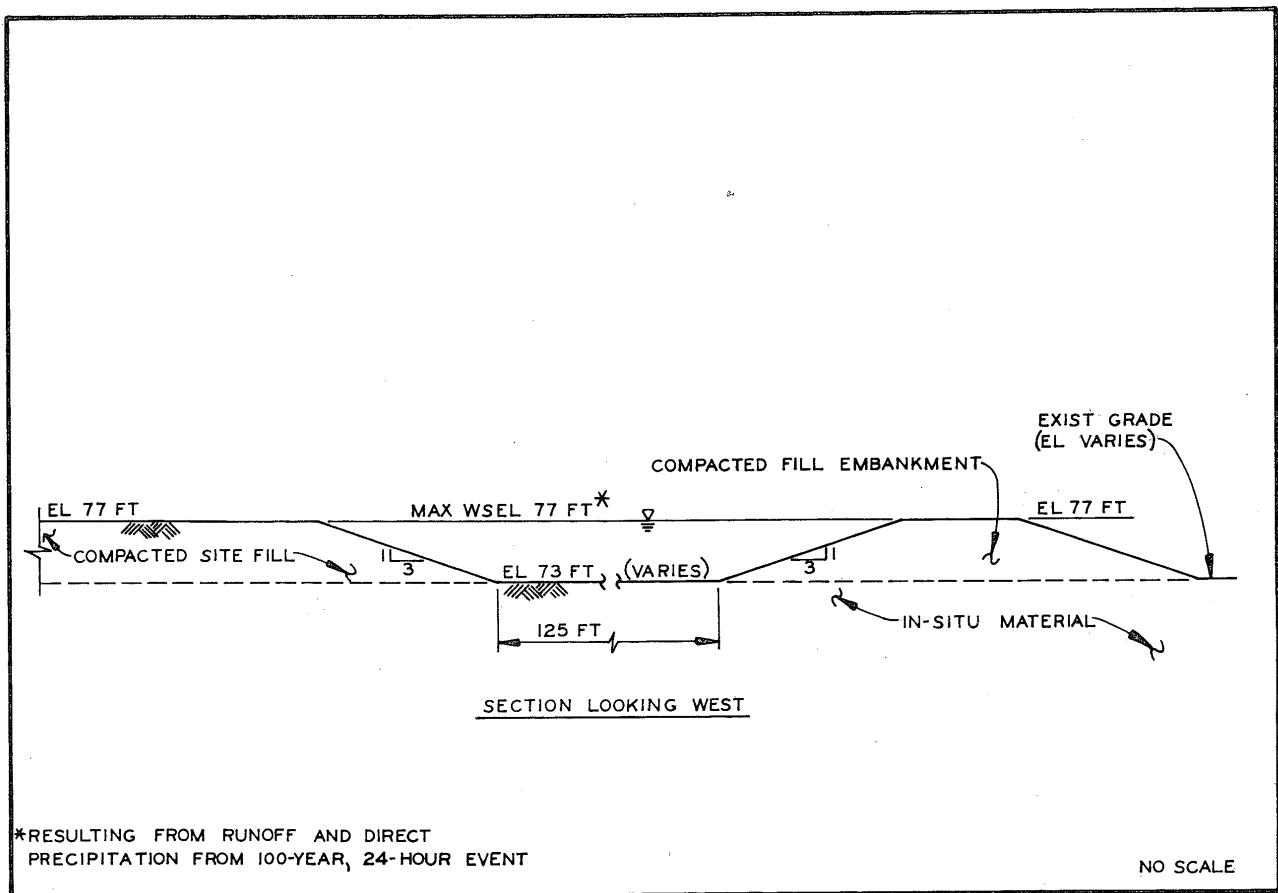


FIGURE 3.10-6. CONSTRUCTION LAYDOWN AREA
RUNOFF RETENTION AREA SECTION

APPENDIX 3.10A
GENERAL SITE RUNOFF ANALYSIS

APPENDIX 3.10A
GENERAL SITE RUNOFF ANALYSIS

3.10A.1 Introduction

The objective of this appendix is to provide a detailed discussion of the procedures used to determine the general site area runoff characteristics and the operational characteristics of the makeup water supply storage pond. The capacity of the makeup water supply storage pond is determined by site runoff retention requirements during construction of Unit 1 as well as the estimated maximum makeup water requirement for one week with four units operating (560 acre-feet). After Unit 1 becomes operational, a portion of the site runoff and direct pond precipitation will be utilized as cooling tower makeup.

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3.10A.2 METEOROLOGY

There are no existing local meteorological data with long periods of record for the Stanton Energy Center site area. However, the Stanton Energy Center site is approximately 10 miles east-northeast of the Orlando International Airport. The average meteorological conditions for the airport are considered representative of the Stanton Energy Center site and are used to describe the local site meteorology. Evaporation records for the Lisbon weather station were assumed applicable for the site area.

3.10A.2.1 Precipitation. Total annual precipitation readings were analyzed through the utilization of plotting positions to determine total precipitation for periods of two and four successive years having a 25-year recurrence interval. Probability analysis based on plotting positions and a Log Pearson Type III distribution was performed on the total annual precipitation readings to determine the probability distribution of total annual precipitation. The derived precipitation data are given in Table 3.10A-1. The monthly distribution of annual precipitation has also been derived and is shown on Table 3.10A-2.

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3.10A.2.2 Evaporation. The design of the makeup water supply storage pond is based on an average annual shallow lake evaporation of 47 inches. The

3.10A-1

monthly distribution of total annual evaporation is based on evaporation records available at the Lisbon station. The monthly distribution of the annual evaporation derived on the basis of 1960 monthly evaporation data is shown on Table 2.6-5.

3.10A.3 GENERAL SITE RUNOFF

In order to provide sufficient runoff retention capacity within the makeup water supply storage pond during Unit 1 construction, it is necessary to determine an appropriate value for the ratio of total annual surface runoff to total annual precipitation. This ratio will be denoted as the annual runoff ratio. The annual runoff ratio for the proposed site subsequent to the placement of compacted site fill material will vary from year to year, depending primarily on total annual precipitation and stage of site development.

Available gaging station records in the vicinity of the site, as well as technical publications, were examined to determine values of the annual runoff ratio for the existing site, prior to the commencement of earthwork operations. A discussion of this analysis is presented in Subsection 2.5.1.6. It was determined that approximately 10 inches of surface runoff would occur at the site in the existing condition during a year experiencing average total annual precipitation of about 51 inches. This represents an annual runoff ratio of 0.20. Table 3.10A-3 illustrates the dependence of the annual runoff ratio on precipitation by indicating values obtained at two gaging stations in the site vicinity for years experiencing variable amounts of precipitation. The annual runoff ratios given in Table 3.10A-3 are based on average annual streamflow and total annual precipitation. Runoff ratios computed in this manner can be exaggerated due to the contribution of ground water inflow to the measured discharge, especially during years experiencing high total annual precipitation. The gaging station on the Econlockhatchee River near Chuluota is located approximately 10 miles upstream from the confluence with the St. Johns River. At this location, the Econlockhatchee River stream bed is well incised into the ground water table and receives a significant portion of its total discharge from ground

water inflow. While the Little Econlockhatchee River near Union Park is not as deeply incised into the normal ground water table, a significant portion of the discharge would have resulted from ground water inflow during 1959 and 1960, both of which experienced above average amounts of precipitation. As a result, the annual runoff ratios based on direct surface runoff only for existing conditions would be somewhat less than those presented in Table 3.10A-3.

It is estimated that development of the Stanton Energy Center will require the placement of an average of 6 feet of compacted site fill to raise the project facilities above the 100-year flood elevation and provide adequate surface drainage. The placement of site fill material will provide additional soil moisture storage capability. The South Florida Water Management District (SFWMD) provides a method for determining soil moisture storage capability in a publication entitled Permit Information Manual, Volume IV, Management and Storage of Surface Waters. The SFWMD method for soil storage capability is based on depth to water table and per cent impervious area. The placement of site fill will increase the average depth to water table approximately 6 feet. It is assumed that 50 per cent of this area will be impervious. The application of the SFWMD method indicated that this fill will produce an additional 8 inches of compacted soil moisture storage capability. This additional soil moisture storage capability would tend to decrease the amount of total annual runoff experienced at the site subsequent to the placement of site fill. Table 3.10A-4 presents the existing annual runoff ratios (including base flow contribution) for the gaging station near Chuluota along with adjusted ratios computed by assuming that an additional 8 inches of annual precipitation infiltrated into the soil. It can be seen that the additional soil moisture storage capacity provided by the site fill significantly decreased the annual runoff ratios. Adjusted annual runoff ratios based on surface runoff only would be less than those given in Table 3.10A-4.

While it is assumed the placement of site fill material will provide additional soil moisture storage capacity, thereby decreasing the annual site runoff, it must also be noted that certain aspects of site development

will tend to increase the amount of runoff experienced at the site. For example, the construction of an integrated grading and ditch system throughout the site will provide a more efficient means of drainage, thereby increasing annual runoff. In addition, the decrease in vegetative cover through the process of site development will cause a decrease in evapotranspiration losses and an increase in annual runoff.

Based on the above considerations, an annual runoff ratio of 0.20 will be used in the analysis of the makeup water supply storage pond for years experiencing average amounts of precipitation. An annual runoff ratio of 0.35 will be used for years experiencing significantly above average amounts of annual precipitation. It is felt that these coefficients represent a reasonable range of values to determine annual direct surface runoff from the plant site. | 5

3.10A.4 SEEPAGE

Embankment seepage analysis was performed through the use of a finite element computer program. The coefficients of permeability used were derived from values applicable to similar soils within the region as well as the results of a detailed onsite soils investigation program. The relationship between seepage and water surface elevation within the makeup water supply storage pond was determined from computer generated calculations performed for two headwater conditions. | 5

3.10A.5 MAKEUP WATER SUPPLY STORAGE POND ANALYSIS

The makeup water supply storage pond is designed to comply with all federal, state, and local regulations regarding the concept of zero discharge. Runoff from the central plant area (approximately 200 acres) will be directed to the makeup water supply storage pond. A portion of the runoff retained in the pond will either evaporate or be allowed to seep.

Some of the water that seeps out of the pond will emerge at the surface on the downstream side of the embankment and flow to natural drainage systems within the area.

Several pond configurations were analyzed. The analysis was based on pond storage capacity as well as environmental desirability. The pond configuration considered to be the most appropriate is shown on Figure 3.10-1. The pond shown has a surface area of approximately 93 acres and an embankment length of about 10,000 feet. Approximately 230 inches ($4P_{25}$) of precipitation was routed through the pond in two separate four-year sequences as indicated in Table 3.10A-5. These sequences are considered to represent the most extreme cases of the $4P_{25}$. It can be seen that in Sequence A, the $2P_{25}$ occurs in the first two years, while in Sequence B, the $2P_{25}$ occurs in the last 2 years.

The 4-year interval was selected because the most crucial period for the water surface elevation within the makeup water supply storage pond will occur during Unit 1 construction. During plant operation, excess amounts of runoff will be consumed as cooling tower makeup.

Routing computations were based on a calendar year being divided into twenty-four 15-day periods. Total annual precipitation was divided into 24 separate precipitation events whose distribution was based on observed monthly precipitation distribution for Orlando (Table 3.10A-2). The initial precipitation event and the runoff associated with it were considered to occur instantaneously at the beginning of the first 15-day period. The beginning of period stage was then determined from the previously defined stage-capacity relationship shown in Figure 3.10A-1. The total volume of seepage was determined through the use of a seepage-stage relationship. Evaporation was also determined for each period in a manner similar to that used for precipitation. Subtracting the total volume of seepage and evaporation from the beginning of period storage volume yielded the volume of water within the makeup water supply storage pond at the end of the first period. Second period precipitation and runoff were then added to this value to obtain the beginning of period storage volume for the second period. In this manner, total annual precipitation was routed through the pond, with allowances made for seasonal evaporation and variable seepage

rates. Pond elevations, with respect to time, are shown for precipitation Sequences A and B in Figures 3.10A-2 and 3.10A-3, respectively.

The maximum potential water surface elevation within the makeup water supply storage pond during Unit 1 construction was determined to be approximately 77.7 feet. This maximum elevation corresponds to a total 4-year precipitation of about 230 inches, distributed according to precipitation Sequence B. This total 4-year precipitation is considered to have a recurrence interval of approximately 25 years. The pond embankment will be constructed to a crest elevation of 80 feet. This will provide for a computed freeboard requirement of 2.8 feet, based on a sustained wind velocity of 100 miles per hour and an effective fetch length of approximately 1,800 feet.

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3.10A-6

TABLE 3.10A-1. DERIVED PRECIPITATION DATA

<u>Description</u>	<u>Designation</u>	<u>Precipitation inches</u>
Total annual precipitation having a 25-year recurrence interval	1^P_{25}	67.0
Total precipitation for two successive years having a 25-year recurrence interval	2^P_{25}	125
Total precipitation for four successive years having a 25-year recurrence interval	4^P_{25}	230

TABLE 3.10A-2. MONTHLY PRECIPITATION DISTRIBUTION FOR THREE AMOUNTS OF TOTAL ANNUAL PRECIPITATION

Month	Total Annual Precipitation		
	Normal inches	$1P_{10}^*$ inches	$1P_{33}^{**}$ inches
January	2.28	2.7	2.98
February	2.95	3.49	3.86
March	3.46	4.09	4.53
April	2.72	3.22	3.56
May	2.94	3.48	3.85
June	7.11	8.41	9.3
July	8.29	9.81	10.85
August	6.73	7.96	8.81
September	7.20	8.52	9.42
October	4.07	4.82	5.32
November	1.56	1.85	2.03
December	1.9	2.25	2.49
Annual	51.21	60.6	67.0

*Distribution based on ratio of $1P_{10}$ to $1P_{2.5}$ times monthly normal rainfall in Orlando.

**Distribution based on ratio of $1P_{33}$ to $1P_{2.5}$ times monthly normal rainfall in Orlando.

TABLE 3.10A-3. EXISTING ANNUAL RUNOFF RATIOS AT GAGING STATIONS IN VICINITY OF PROPOSED SITE

<u>Gaging Station Name</u>	<u>Average for Period of Record</u>	<u>1958 Precipitation = 51.2 in.</u>	<u>1959 Precipitation = 63.77 in.</u>	<u>1960 Precipitation = 68.74 in.**</u>
Little Econlockhatchee River near Union Park, Florida	0.25	*	*	0.38
Econlockhatchee River near Chuluota, Florida	0.29	0.26	0.38	0.56

*Streamflow records not available.

**Maximum annual precipitation for period of record (1940-present) measured at Orlando, Florida.

TABLE 3.10A-4. EXISTING AND ADJUSTED ANNUAL RUNOFF RATIOS FOR THE
ECONLOCKHATCHEE RIVER NEAR CHULUOTA, FLORIDA

<u>Item</u>	<u>Existing Runoff Ratio</u>	<u>Adjusted Runoff Ratio*</u>
Average for period of record, in.	0.29	0.14
1958--Precipitation = 51.2 in.	0.26	0.10
1959--Precipitation = 63.77 in.	0.38	0.26
1960--Precipitation = 68.74	0.56	0.44

*Computed by assuming an additional 8 inches of annual precipitation infiltrates into the soil due to added fill over water table.

TABLE 3.10A-5. FOUR-YEAR PRECIPITATION SEQUENCES HAVING A 25-YEAR
RECURRENCE INTERVAL

Sequence	Total Annual Precipitation, inches				
	Year 1	Year 2	Year 3	Year 4	Total
A	60.6	67.0	51.21	51.21	230.02
Recurrence Interval, years	10	25	2.5	2.5	25

B	51.21	51.21	60.6	67.0	230.02
Recurrence Interval, years	2.5	2.5	10	25	25

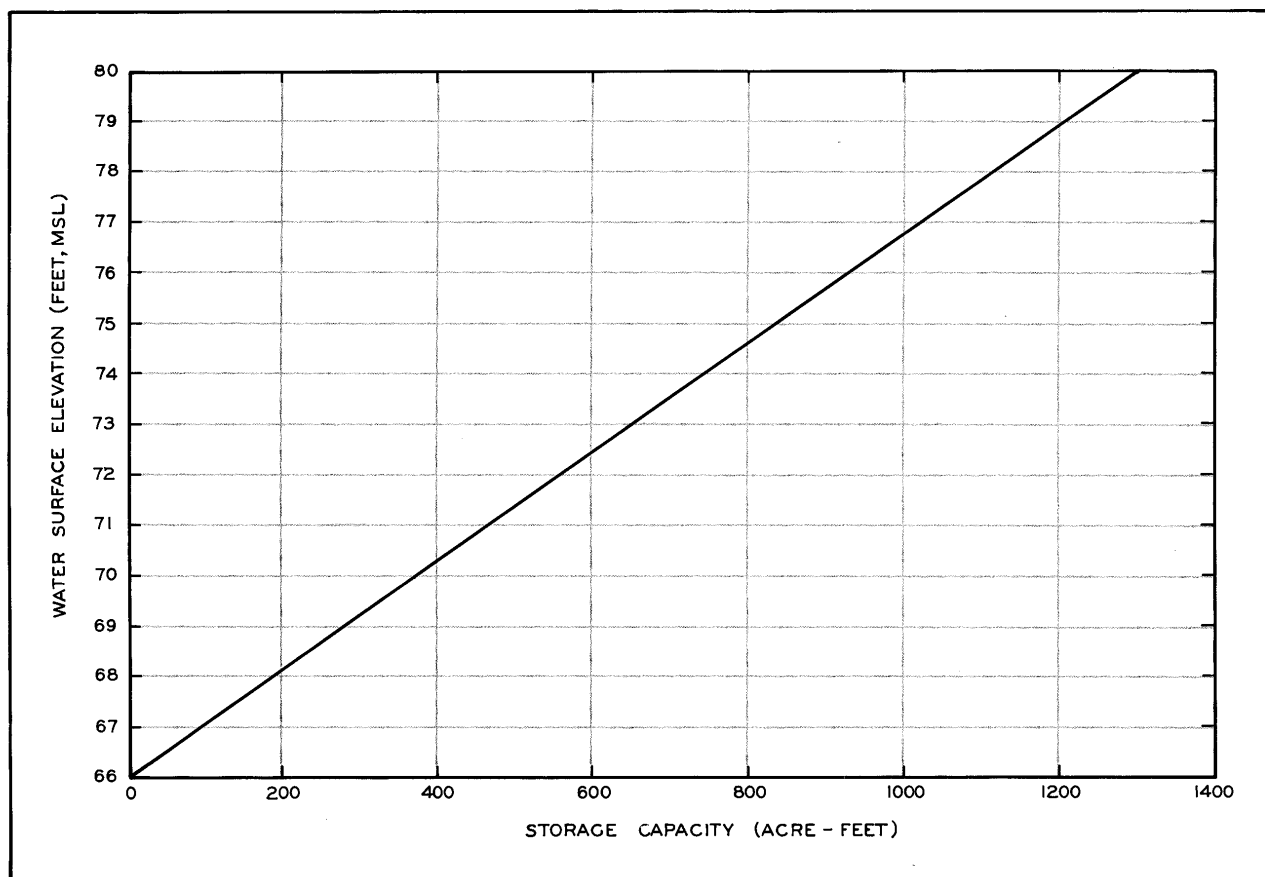
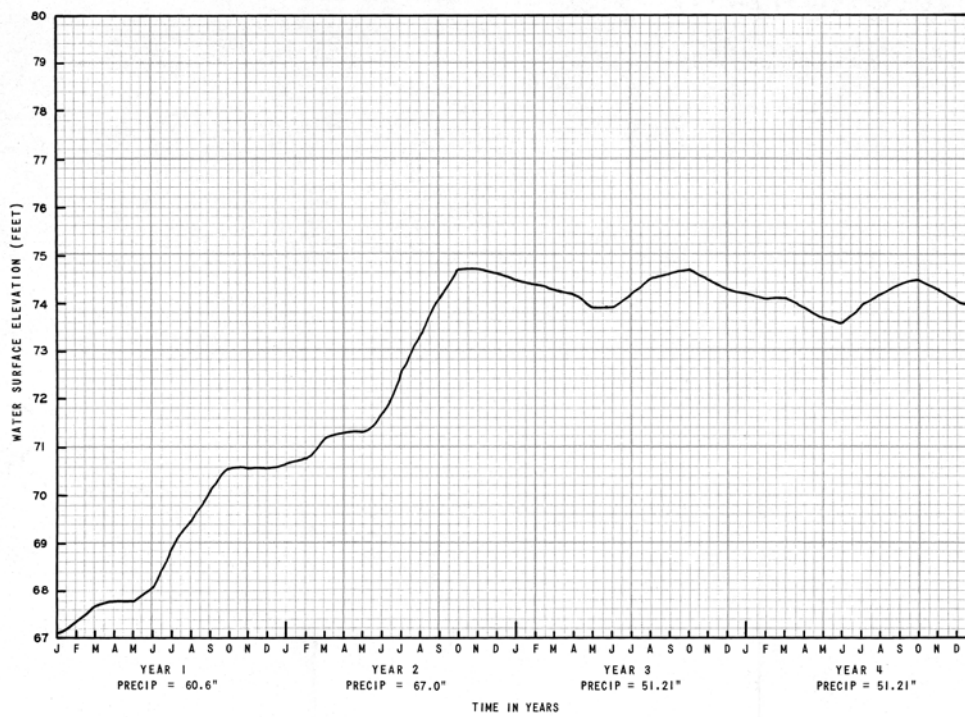


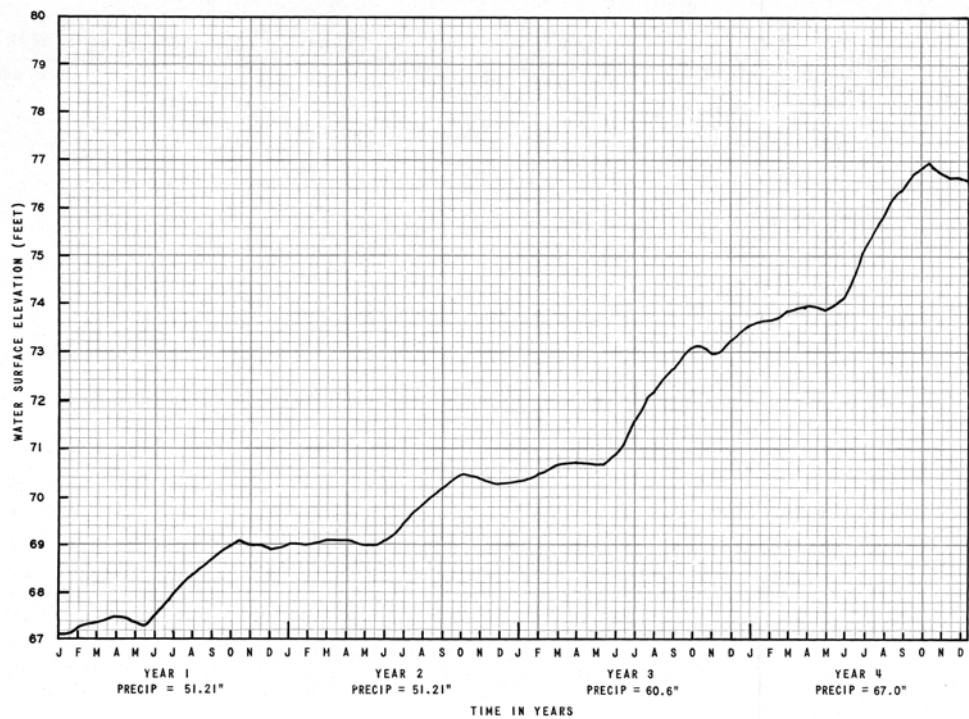
FIGURE 3.10A-1. STAGE - STORAGE CURVE FOR MAKEUP
WATER SUPPLY STORAGE POND



NOTE: WATER SURFACE ELEVATION REPRESENTS BEGINNING OF PERIOD VALUES

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FIGURE 3.10A-2. MAKEUP WATER SUPPLY STORAGE POND
STAGE PRECIPITATION SEQUENCE A



NOTE: WATER SURFACE ELEVATION REPRESENTS BEGINNING OF PERIOD VALUES

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FIGURE 3.10A-3. MAKEUP WATER SUPPLY STORAGE POND
STAGE PRECIPITATION SEQUENCE B

3.11 DESIGN ALTERNATIVES

The following sections describe various design alternatives considered in the development of the conceptual design of Stanton Energy Center Unit 1. The following alternatives are ones that have potential environmental effects. Numerous other design evaluations, which do not have an environmental impact were performed but are not presented here.

3.11.1 Alternate Site Arrangements

The evaluation of an optimum site arrangement requires study of the relationships between major systems of the units and the physical characteristics of the site. The selection of the optimum site arrangement is based on site characteristics and the functional and physical relationship of the plant system.

3.11.1.1 Site Characteristics.

3.11.1.1.1 Location. The site is located roughly 12 miles southeast of Orlando. The site is bounded as follows.

- (1) To the north by the Pershing Substation-to-Indian River transmission corridor, Highway 50, and some developed areas.
- (2) To the east by the Econlockhatchee River.
- (3) To the south by the Bee Line Expressway.
- (4) To the west by the Orange County sanitary landfill.

3.11.1.1.2 Topography. A gradual slope across the site from southwest to northeast provides a means for drainage during heavy rainfall and prevents excessive flooding during flood conditions on most areas of the site. The soil at ground surface consists of fine sand generally covered with grass vegetation. The ground water table is located 1 to 6 feet below ground surface varying with location within the site and fluctuating from season to season.

Locating the plant near the east boundary is avoided since the area is prone to flooding. Locating the plant near the central portion of the

site allows a means for the southwest to northeast drainage to be collected and stored by placing the retention areas east of the plant.

Scattered areas throughout the site that do not drain well are often wet and tend to support a great deal of vegetation and offer protection for certain wildlife. These areas are avoided whenever possible so as to not adversely effect the overall ecology of the site.

3.11.1.1.3 Critical Wildlife Present Onsite. The wildlife species considered critical with respect to the impact on site arrangement is the red-cockaded woodpecker.

It is the intent of this analysis to develop a site arrangement compatible with the habitat of the wildlife such that the impacts on cavity trees and foraging areas are minimized.

3.11.1.1.4 Climate. A review of wind data collected over a 30-year period indicates that the wind is predominantly out of the north, northeast, east, southeast, or south depending on season.

Analysis of cooling tower fallout and its impact on the electrical equipment, combined with the consideration of the boiler structure ventilation system, indicates a building arrangement with gas flow from east to west (i.e. Turbine Building facing east with the boiler, gas cleaning equipment, and chimneys following in a westerly direction) to be favorable. The basic arrangement is developed with this in mind, providing that the major systems external to the main generating complex may exit the plant in an organized radial manner and are compatible with their destination off-site or outside of the main complex.

Other climatological data such as rainfall, temperature, evaporation, etc., does not have a major impact on the actual site arrangement other than the sizing of various ponds and the design of site drainage.

3.11.1.1.5 Existing Transmission. The plant site is situated directly south of the existing transmission corridor running from Pershing Substation to the Indian River Power Plant. Transmission lines exiting the site

would extend north to the existing corridor. Locating the substation to the north side of the generation facilities with transmission exiting the substation to the north provides the most economical arrangement.

3.11.1.1.6 Transportation. The proposed location of the main plant access road is north of the site. The road would run south from Highway 50 (Cheney Highway) along the proposed makeup pipeline corridor to the existing transmission corridor and on to the site. The road would be approximately 8 miles in length from Highway 50 to the generation facilities.

The proposed routing of the coal supply and material delivery railroad spur to the site is from the west. The routing to the west (SCL Railroad) was selected since the environmental impacts and the costs of construction to the east (FEC Railroad) are much greater. The proposed spur would originate at a turnout from the Seaboard Coast Line Railroad mainline approximately 1 mile southwest of the Orlando International Airport. The spur would be required to cross under the Bee Line Expressway at an existing interchange just south of the site. With the coal delivery spur entering the south, the most advantageous location for the coal delivery loop would be the south side of the plant.

3.11.1.1.7 Miscellaneous Considerations. The cooling system makeup water source will be effluent from the Iron Bridge Road Regional Water Pollution Control Facility located north of the proposed site on the north side of the Little Econlockhatchee River. The pipeline will enter the site from the north using the same corridor as the access road and the transmission lines. Locating the makeup water supply storage pond toward the north side of the site would help to minimize makeup piping length.

Potable water will be obtained from an onsite well field and will not impact on the overall site arrangement.

A dry solid waste storage area will be located within the boundaries of the plant site. A sanitary landfill currently in operation is located approximately one mile west of the proposed plant site. Locating the solid waste storage area adjacent to the landfill with the plant east of the

solid waste storage area is preferred as compared to locating the plant near the landfill. This arrangement readily conforms to the east-west orientation and the radial concept. In addition, this concept would also result in the Administration and Plant Services Building being the furthest possible distance from the combustion waste storage area and sanitary landfill.

3.11.1.2 Alternative Site Arrangements. Having given consideration to those facts previously presented concerning site topography, wildlife, climatology, existing transmission, and transportation systems, three basic arrangements were developed for final consideration. Plans A, B, and C appear on Figures 3.11-1, 3.11-2, and 3.11-3, respectively. Plan A was included mainly for purposes of comparison since it is based purely on economics and neglects those requirements previously included for climatological and environmental purposes. Plans B and C attempt to satisfy all of those requirements developed herein. Table 3.11-1 provides the estimated comparative cost of construction for the three plans. The results indicate Plan B to be the most economical of those plans considered acceptable. In addition, the results indicate that for the additional cost of approximately \$4,514,000 (Plan A vs. Plan B), the Generation Building ventilation is improved; dust from the coal handling operation will be directed away from the building by the prevailing winds, and all but one of the active red cockaded woodpecker cavity trees can be avoided.

3.11.2 Alternative Heat Rejection Systems

Waste heat from the condensation of exhausted steam in the circulating water system must be transferred to the atmosphere by a heat rejection system. Several systems have been developed to transfer this heat either directly to the atmosphere or through large bodies of water.

3.11.2.1 Heat Rejection System Design Alternatives.

3.11.2.1.1 Once-Through Cooling. This cooling process pumps water from a river, lake, or pond through the condenser, and discharges the cooling water back to the source. This alternative requires the plant to be close to a river or lake or that a cooling pond be developed onsite. Since Stanton Energy Center is not close to a lake or river, a cooling pond would have to be developed onsite. Due to the environmental effects of covering a large area of the site (approximately 700 acres) with a cooling pond and the high capital cost of cooling ponds, once-through cooling was not considered a viable heat rejection system.

3.11.2.1.2 Dry and Wet/Dry Cooling Towers. Dry cooling towers do not depend upon water evaporation for cooling. Heat is dissipated from the condenser cooling water by conduction and convection directly to the ambient atmosphere. Heated cooling water from the condensers is pumped through banks of finned-tube heat exchangers. The heat in the water is transferred by conduction to the metal walls of the finned-tubing and is dissipated to the atmosphere.

This system is advantageous in areas where cooling water supplies are limited since the system does not require makeup to replace water lost by evaporation. However this system requires a vary large physical structure and is very costly both in terms of initial expenditures and high plant auxiliary power requirements.

Wet-dry cooling towers utilize a combination of dry and evaporative cooling. One type of wet-dry tower is a parallel path tower in which water is cooled first in a dry air-cooled section and then in a wet section. The air leaving the dry section and entering the wet is at a higher dry bulb temperature but much lower humidity than air in the wet section. Consequently, mixing occurs and the resulting air leaving the tower is in a warm but unsaturated condition. Evaporation is reduced and makeup requirements are minimized. This system is advantageous where a makeup water source is limited or fogging effects are important. Neither dry nor wet/dry cooling towers are considered viable alternatives for Stanton Energy Center since

capital and operating costs are high and an adequate supply of water for cooling tower makeup is available.

3.11.2.1.3 Natural Draft Cooling Towers. Wet natural draft cooling towers utilize a large chimney to create an upward draft which pulls air through the tower fill. Circulating water is pumped to the fill elevation of the tower and allowed to fall. Water is distributed over the fill and heat exchange occurs by evaporation and convection. The difference in density between the warm air inside the tower and the cooler air outside creates a draft and airflow is established without employing mechanical draft fans. Recent escalation in fuel costs has increased the feasibility of natural draft towers in utility applications since energy is not required for fan operation. However, the structure is large and initial capital costs are high. A natural draft cooling tower is considered a viable alternative for Stanton Energy Center.

3.11.2.1.4 Mechanical Draft Cooling Towers. Multifan mechanical draft cooling towers have been used extensively for power plant heat rejection systems. Mechanical draft towers use large fans to pull air over the tower fill. Water is distributed over the fill and heat exchange takes place by evaporation and convection. Since airflow is produced by mechanical fans, the structure of the tower is smaller than a natural draft tower and initial capital costs are lower.

Both rectangular mechanical draft towers and round mechanical draft towers have been utilized. Round towers have proven advantages over conventional rectangular towers, including plume consolidation which minimizes fogging and drifting. Round mechanical draft towers are considered a viable alternative for Stanton Energy Center.

3.11.2.2 Description of Viable Heat Rejection Systems. Two heat rejection systems are considered to be viable alternatives for Stanton Energy Center Unit 1: a natural draft cooling tower and a round mechanical draft cooling tower.

3.11.2.2.1 Natural Draft Cooling Tower. The site arrangement of the natural draft cooling tower for Stanton Energy Center Unit 1 would be as shown in Figure 3.11-4. The tower would have a height of approximately 370 feet. This height would reduce fogging and drift on plant facilities, therefore, the tower can be located closer to the plant, resulting in shorter lengths of circulating water pipe.

3.11.2.2.2 Round Mechanical Draft Cooling Tower. The site arrangement of round mechanical draft cooling tower would be as shown on Figure 3.11-5. The tower would be approximately 60 feet high. Mechanical draft cooling towers have greater fogging and drift effects than natural draft cooling towers and therefore, must be located farther away from the plant.

3.11.2.3 Comparison of Viable Heat Rejection Systems. The comparative capital costs and annual costs of the round mechanical and natural draft tower are presented in Tables 3.11-2. Initial capital costs are lower for the round mechanical draft tower than the natural draft tower; however, annual costs are higher. The results of a capital recovery analysis which considers initial capital cost versus operating cost indicates the natural draft cooling tower is more economical than round mechanical draft tower after the eighth year of operation.

The tall natural draft tower causes less ground fog and drift and is more economical with a short payment period. Based on these considerations, the most advantageous heat rejection system is a natural draft cooling tower.

3.11.3 Alternate Air Quality Control Systems

The air quality control system will consist of an electrostatic precipitator and a limestone scrubber. Evaluation of alternate air quality control systems is presented in Section 3.7.

3.11.4 Alternate Wastewater Disposal Methods

The water balance at Stanton Energy Center results in an excess of wastewater that must be disposed of or treated and reused. The excess

wastewater consists mostly of cooling tower blowdown. The following methods of wastewater management were considered.

3.11.4.1 Return Pipeline. The excess cooling tower blowdown would be returned to the Iron Bridge Road Regional Water Pollution Control Facility. The excess blowdown would be routed to a pump pit. From the pump pit, the blowdown would be pumped back to the Iron Bridge Facility in a 10-inch return pipeline that would parallel the makeup water supply pipeline.

3.11.4.2 Pretreatment of Circulating Water Makeup. By adding commercial grade quicklime, CaO , or hydrated lime, $\text{Ca}(\text{OH})_2$, the "carbonate hardness" of the makeup water can be reduced. "Carbonate hardness" consists of the carbonate and bicarbonate salts of calcium and magnesium. Treatment would take place in a conventional solids contact basin type clarifier. A coagulant and/or a coagulant aid would be fed to facilitate coagulation and settling. The degree of hardness removal may be improved by feeding soda ash, Na_2CO_3 , in addition to lime. Soda ash reacts to remove the non-alkalinity related calcium and magnesium.

However, since silica is limiting in determining cycles of concentration and therefore the blowdown required at the Stanton Energy Center, the pretreatment system employed must also remove silica. Silica can be removed by adsorption onto the magnesium hydroxide floc produced in the softening and coagulation process. Due to the limited magnesium present in the sewage effluent, there would be a limited amount of silica reduction achievable in a conventional solids contact basin utilizing lime-soda ash softening. With 16.5 mg/l silica as SiO_2 in the circulating water makeup, it is anticipated that silica could be reduced to about 12 mg/l as SiO_2 with conventional lime-soda ash softening. Reducing the silica concentration from 16.5 to 12 mg/l would allow an increase in the cycles of concentration from 9 to 12.5.

If cycles of concentration were increased to 12.5 in the circulating water systems, the amount of wastewater to be returned to the Iron Bridge Facility would be decreased. The resulting pipeline size for the return

line to the STP could be reduced from 10 inches to 6 inches resulting in a capital cost savings of approximately \$2,800,000. A 1987 capital cost for pretreatment systems for all four generating units is estimated at approximately \$5,500,000, which is in excess of the reduced capital costs associated with the smaller return line. In addition, the operating costs for a pretreatment plant would be considerable for chemicals, labor, and maintenance. For these reasons pretreatment was not considered a viable alternative for Stanton Energy Center.

3.11.4.3 Sidestream Treatment of Circulating Water by the Lime-Soda Ash Dense Solids Process. By taking a portion of the circulating water, removing calcium and silica in the stream, and returning the stream back to the circulating water systems, the cooling tower systems can be operated at higher cycles of concentration, thereby minimizing cooling tower blowdown.

Sidestream treatment would involve feeding lime and soda ash in a dense solids treatment system. The lime-soda ash dense solids treatment process uses a modified solids contact basin design, whereby a high solids concentration is maintained in the reaction zone to accomplish two objectives.

- (1) The increased solids provide more reaction sites which improve the efficiency of hardness removal reactions.
- (2) Magnesium hydroxide floc present in the recirculated sludge provides additional adsorption sites for silica, and consequently, results in improved silica removal.

Certain circulating water inhibitors may affect the results of treatment with this method by retarding the normal softening reactions. Substances contained in the STP effluent may also be present which affect the softening reactions. The presence of high density sludge in the mixing and reaction zones may help to overcome this effect.

3.11.4.4 Wastewater Treatment by the Lime-Soda Ash Dense Solids Process. This method of wastewater treatment is similar to the methods discussed in Subsection 3.11.4.3. However, instead of using sidestream treatment, an

alternate arrangement of directing the circulating water blowdown streams to the recycle basin would be used. Water from the recycle basin would be treated by the lime-soda ash dense solids process for reuse in the circulating water systems. Several advantages of this arrangement are as follows.

- (1) The treatment facility for all four units could be installed at one central location avoiding a separate sidestream treatment facility for each unit.
- (2) The treatment plant will treat all waste streams directed to the recycle basin, although the majority of the recycle basin influent will still be circulating water blowdown.
- (3) The surge capability of the recycle basin provides flexibility which may affect the selection of the size of the treatment facility.
- (4) The effluent from the lime-soda ash dense solids treatment plant may be directed to the makeup water supply storage pond rather than directly to the circulating water systems which would allow operation of the treatment facility when the unit or units are down or at a low load.

The lime-soda dense solids treatment process would be similar to that described under Section 3.11.4.3, with the same disadvantages and possible problems including the following.

- (1) It may be difficult to remove sufficient quantities of silica to make this a feasible process.
- (2) Inhibitors contained in the circulating water may affect the results of treatment with this method.
- (3) Substances contained in the pollution control facility effluent may be present which affect the softening reactions.

3.11.4.5 Wastewater Treatment Utilizing Reverse Osmosis and Brine Concentrators. Another method of wastewater treatment is to treat excess wastewater utilizing reverse osmosis and brine concentrators to achieve zero plant discharge. Reverse osmosis product water would be suitable to be directed back to the makeup water supply storage pond and the reject

brine would be directed to brine concentrator system. Product water from the brine concentrators will be low in total dissolved solids and will be directed to the demineralization system to take advantage of regenerant chemical savings. The small quantity of highly concentrated brine reject could be used as wetting water for solids waste disposal or dried to a solid. Due to the silica present in the wastewater to be treated and the suspended solids limitations of reverse osmosis, lime-soda ash pretreatment and filtration would be required preceeding the reverse osmosis units. Circulating water and recycle basin TDS would not be affected under this alternative.

The 1987 capital cost of this plan is estimated to be in excess of \$13,000,000. The high capital costs and high operating costs, including maintenance and labor costs, reverse osmosis membrane replacement costs, and the energy costs for operating a reverse osmosis and brine concentrator systems, makes this plan unattractive in comparison to other alternatives. Therefore, this plan is not given additional consideration.

3.11.4.6 Viable Alternate Plans. The following two plans were given detailed consideration.

- (1) Return Pipeline. All wastewater not reused at the site will be returned to the Iron Bridge Road Regional Water Pollution Control Facility. This primarily will consist of excess cooling tower blowdown. It is anticipated that a single 10 inch return line will be capable of handling the wastewater from four 460 MW gross units.
- (2) Wastewater Treatment. Under this plan, a lime-soda ash dense solids process treatment plant would treat excess waste water from the recycle basin and return it to the makeup water supply storage pond for reuse in the circulating water systems. The system would have the capability of treating approximately 1,500 gpm of excess wastewater. A wastewater return line to the Iron Bridge Facility is not utilized in this plan.

3.11.4.7 Comparative Costs. The comparative capital and annual costs of the two plans are shown in Table 3.11-3.

Annual operating costs for the plans will vary according to the number of units in service, and the unit capacity factors applied. Table 3.11-3 shows the comparative annual costs of operation of the two plans, assuming four units are operating at a 53.6 per cent capacity factor.

A capital recovery analysis was performed to determine in which year the cumulative present worth savings of the reduced operating costs would equal the 30-year cumulative present worth of the additional fixed charges. The results show that the pipeline plan will pay for itself, due to reduced operating costs during the 6th year of operation.

3.11.5 Discussion and Conclusion

The economic analysis shows that the 10-inch return pipeline to the Iron Bridge Facility will have greater capital costs than utilizing a lime-soda dense solids wastewater treatment facility with no return pipeline. However, on an annual cost basis, the wastewater return pipeline will be more economical.

Additional factors favoring the installation of the wastewater return pipeline over the wastewater treatment plan are as follows.

- (1) The return pipeline will be less susceptible to operational problems and equipment failure due to its simplicity of operation.
- (2) The return pipeline will be able to handle more easily the upsets caused by environmental factors, such as periods of heavy rainfall.
- (3) The circulating water will be lower in total dissolved solids, resulting in less exotic materials of construction for circulating water system and scrubber components. In addition, should there be any condenser leakage, the steam cycle water chemistry will be less affected and the condensate polishing system will be more capable of removing the contaminants.
- (4) The wastewater treatment plan utilizes a technology in which there is relatively little experience. The capability of the

lime-soda ash dense solids process for treating wastewater, which is largely concentrated secondary sewage treatment plant effluent containing added chemical inhibitors, is not clearly proven.

3.11.6 Alternate Site Access Road Location

Three options were considered for providing access to the site as shown on Figure 3.11-6. Plan A, as shown, would extend south from Highway 50 (Cheney Highway) along the proposed makeup pipeline corridor to the existing transmission corridor and on to the site. Plan A would also provide right-of-way and a means for maintenance access to the proposed makeup pipeline. Plan B would follow the existing transmission corridor to the site. Plan C would exit from the Bee Line Expressway and run north to the site. A disadvantage exists for Plan C in the fact that the Bee Line is a toll road. Likewise, Plan C enters the site from the south while the majority of the work force will most likely live northwest of the plant. However, Plan C is slightly shorter. Similarly, a disadvantage exists for Plan B in the fact that the road from which it originates is lined with housing, is not a quality road, and would not provide the ease of access that Highway 50 (Plan A) would. Table 3.11-4 provides the estimated comparative construction costs for the three plans. Based upon initial cost, Plan A is the most economical and is recommended as it would provide a practical access to the site.

3.11.7 Alternate Bottom Ash Systems

3.11.7.1 Overall Ash Handling. Bottom ash that falls from the boiler is collected in a water filled hopper at the bottom of the boiler. Two alternate methods of removing the bottom ash from the bottom ash hopper were considered: mechanical drag line and hydraulic sluicing. The mechanical drag line method of ash removal is presently not in operation in the United States. Due to its lack of experience with U.S. coal, it was not considered further. Hydraulic sluicing of the bottom ash will be used. The bottom ash will be sluiced from the bottom ash hopper to a transfer tank. From

the transfer tank, the bottom ash will be slurry pumped to temporary storage and dewatering facilities. Two methods of temporary storage and dewatering were considered: dewatering bins and lined ponds.

3.11.7.2 Dewatering Bins. Two dewatering bins would be provided with Unit 1. The bottom ash would be slurry pumped from the bottom ash transfer tank to the dewatering bins. The water from the bins would be clarified and reused. The bottom ash would be removed daily from the dewatering bins and trucked to the onsite landfill area.

3.11.7.3 Ponds. Two ponds, each capable of holding six months of ash production, would be provided. The bottom ash would be slurry pumped from the bottom ash transfer tank to the ponds. The water from the pond would be clarified and reused. The bottom ash would be removed from the ponds once a year and trucked to the onsite landfill area.

3.11.7.4 Comparative Costs. The comparative annual and capital costs of using dewatering bins or lined ponds is shown in Table 3.11-5. The dewatering bins are the most economical and therefore, will be used for bottom ash dewatering and temporary storage. The dewatering bins are also more environmentally desirable since ash pond liners could be damaged during ash removal.

3.11.8 Alternate Coal Handling Systems

The coal will be received by unit train and unloaded by a bottom dump unloading system. The coal will be stocked out and retrieved from the active coal pile by the coal stockout and reclaim system.

Four alternate stockout and reclaim plans were considered and are listed as follows.

- (1) Plan A--Elevated tripper and rotary plow feeder reclaim as shown in Figure 3.11-7.
- (2) Plan B--Stacker-reclaimer as shown in Figure 3.11-8.
- (3) Plan C--Silo active storage with vibratory feeder reclaim as shown in Figure 3.11-9.

- (4) Plan D--Barn active storage and rotary plow feeder reclaim as shown in Figure 3.11-10.

The comparative capital and annual costs of these four plans are shown on Tables 3.11-6 and 3.11-7, respectively. Plan B, the stacker-reclaimer, has the lowest capital and annual costs. The major disadvantage of Plan B is that it offers less control of fugitive dust than do Plans C and D which have coal unloading and reclaim in an enclosed area. Dust control for Plan B will consist of a water spray arranged to fog the area of material disturbance during reclaim operations and keeping the machine boom as close as possible to the job during stockout operations. The fugitive coal dust of the stacker-reclaimer arrangement is not expected to be a problem as indicated in Section 5.5. Therefore, the added costs of Plans C and D are not justified and the stacker-reclaimer will be used for coal stockout and reclaim.

3.11.9 Alternate Auxiliary Steam Systems

Auxiliary steam is required during startup of the unit. The auxiliary steam demands can be met with commercially available packaged oil-fired, electric, and in some cases coal-fired boilers. Only oil-fired and electric boilers are considered feasible for providing the auxiliary steam requirements for Stanton Energy Center Unit 1. Coal-fired auxiliary boilers are not feasible for the following reasons.

- (1) The addition of a second unit at the Stanton Energy Center site will reduce and may eliminate the need for the auxiliary boiler. Minimizing the amount of capital investment for an auxiliary boiler would be advantageous. By comparison, the present day capital cost for an oil-fired auxiliary boiler is between 2 to 3 dollars per pound of steam, and 18 to 22 dollars per pound for a coal-fired auxiliary boiler.
- (2) Required coal handling and ash handling systems would increase plant space and maintenance requirements.

Oil-fired boilers considered for evaluation are factory-assembled, pressurized furnace, water tube type, with superheat capability designed for Number 2 or Number 6 fuel. Electric boilers considered for evaluation

are factory-assembled, single drum, high voltage electrode type, designed for operation with a 13.2 kV, three-phase power supply.

The comparative capital and annual costs are shown in Table 3.11-8. The Number 2 Fuel Oil auxiliary boiler has the lowest capital and annual costs and therefore, will be used to supply the auxiliary steam requirements for Stanton Energy Center Unit 1. The Number 2 Fuel Oil auxiliary boiler is expected to have the least environmental effect since Number 6 fuel oil contains more ash and sulfur than Number 2 fuel oil and the Number 2 fuel oil auxiliary boiler (approximately 86 per cent efficient) would have a greater efficiency than the electrode auxiliary boiler (typical power plant which would supply electricity to the electric boiler is 35-40 per cent efficient).

TABLE 3.11-1. COMPARATIVE CAPITAL COST EVALUATION FOR VARIOUS SITE ARRANGEMENTS

<u>Item</u>	<u>Plan A*</u> <u>\$1,000</u>	<u>Plan B</u> <u>\$1,000</u>	<u>Plan C</u> <u>\$1,000</u>
Transmission	Base	2,052	2,052
Access Road	Base	408	408
Railroad	260	Base	510
Water Supply Pipeline	Base	420	420
Coal, Limestone, and Solid Waste Handling Systems	Base	1,980	3,520
Site Clearing	<u>86</u>	<u>Base</u>	<u>98</u>
Total Comparative Cost (1980 dollars)	346	4,860	7,008
Total Differential Comparative Cost	Base	4,514	6,662

*Plan A neglects Climatological and Environmental requirements.

TABLE 3.11-2. COMPARATIVE CAPITAL AND ANNUAL COSTS OF ROUND MECHANICAL AND NATURAL DRAFT TOWERS

	<u>Round Mechanical Draft</u> \$	<u>Natural Draft</u> \$
<u>Capital Costs</u>		
Cooling Tower	Base	4,436,000
Electrical Construction	512,000	Base
Condenser	Base	Base
Circulating Water Pipe	644,000	Base
Circulating Water Pumps and Motors	19,000	Base
Auxiliary Cooling System	<u>Base</u>	<u>Base</u>
Direct Costs	1,175,000	4,436,000
Escalation	<u>551,000</u>	<u>2,081,000</u>
Escalated Direct Costs	1,726,000	6,517,000
Sales Tax	69,000	261,000
Indirects	323,000	1,220,000
Interest During Construction	<u>108,000</u>	<u>408,000</u>
Total Comparative Capital Cost	2,226,000	8,406,000
Differential Total Comparative Capital Costs	Base	6,180,000
<u>Annual Costs</u>		
Fixed Charge	Base	630,000
Energy Cost	1,183,000	Base
Demand Charge	305,000	Base
Fuel Cost	120,000	Base
Maintenance	<u>105,000</u>	<u>Base</u>
Total Comparative Annual Cost	1,713,000	630,000
Differential of Comparative Annual Cost	1,183,000	Base

TABLE 3.11-3. COMPARATIVE CAPITAL AND ANNUAL COSTS 10" RETURN PIPELINE VS.
A LIME-SODA ASH DENSE SOLIDS WASTEWATER TREATMENT SYSTEM

<u>Item</u>	<u>10" Wastewater Return Pipeline \$1,000</u>	<u>Lime-Soda Ash Dense Solids Wastewater Treatment \$1,000</u>
CAPITAL COSTS		
Piping, valves, and fittings	2,395	Base
Dense Solids Wastewater Treatment System	--	830
Pumps and pump structures	15	Base
Building costs	--	216
Chemical storage facilities	--	120
Erection	<u>1,219</u>	<u>Base</u>
Direct costs subtotal	3,629	1,166
Escalation	942	303
Interest during construction	411	132
Indirect costs	549	176
Sales tax	<u>108</u>	<u>43</u>
Comparative capital costs	5,639	1,820
Differential capital costs	3,819	Base
ANNUAL COSTS		
Chemical costs	Base	1,131
Labor costs	Base	351
Energy costs	Base	13
Demand costs	<u>18</u>	<u>Base</u>
Comparative annual costs of operation	18	1,495
Differential annual costs of operation	Base	1,477
Fixed charges	<u>443</u>	<u>Base</u>
Total annual costs	443	1,477
Differential total annual cost	Base	1,034

TABLE 3.11-4. COMPARATIVE CAPITAL COST EVALUATION FOR ACCESS ROAD

<u>Item</u>	<u>Plan A</u>	<u>Plan B</u>	<u>Plan C</u>
	\$	\$	\$
Right-of-way	90,000	80,000	Base
Earthwork	Base	65,000	155,000
Subgrade and paving	295,000	145,000	Base
Drainage structures	Base	20,000	30,000
Seeding	10,000	10,000	Base
Fencing	80,000	70,000	Base
Makeup pipeline right-of-way and maintenance access road	<u>Base</u>	<u>200,000</u>	<u>400,000</u>
Total comparative cost (1981 dollars)	475,000	590,000	585,000
Differential total comparative cost	Base	115,000	110,000

TABLE 3.11-5. BOTTOM ASH SYSTEM COMPARATIVE CAPITAL AND ANNUAL COSTS

<u>Item</u>	<u>Slurry Pumps to Dewatering Bins \$1,000</u>	<u>Slurry Pumps to Ash Pond \$1,000</u>
CAPITAL COST		
Material and Erection	943	Base
Escalation	<u>488</u>	<u>Base</u>
Escalated Subtotal	1,431	Base
Sales Tax	58	Base
Interest During Construction	90	Base
Indirect Costs	<u>258</u>	<u>Base</u>
Total Comparative Capital Cost	1,837	Base
LEVELIZED ANNUAL COST		
Fixed Charge	187	Base
Demand Charge	Base	Base
Energy Charge	Base	Base
Operation and Maintenance Costs	<u>Base</u>	<u>338</u>
Total Comparative Levelized Annual Cost	187	338
Differential Levelized Annual Cost	Base	151

TABLE 3.11-6. COMPARATIVE COSTS---STOCKOUT AND RECLAIM PLANS

	Plan A Elevated Tripper \$	Plan B Stacker Reclaimer \$	Plan C Silo \$	Plan D Barn \$
Conveyors	878,000	500,000	Base	629,000
Conveyor Structures	125,000	Base	698,000	274,000
Transfer Structures	Base	135,000	673,000	Base
Enclosed Storage Structure	--	--	5,290,000	5,513,000
Traveling Tripper	165,000	--	--	165,000
Feeders and Gates	Base	84,000	342,000	84,000
Plow Feeders	360,000	--	--	360,000
Fire Protection	117,000	41,000	Base	90,000
Dust Collection	105,000	Base	504,000	791,000
Electrical	Base	20,000	23,000	33,000
Reserve Reclaim Structure	--	1,102,000	1,102,000	1,102,000
Stacker Reclaimer	--	3,662,000	--	--
Elevated Tripper and Reclaim Tunnel	<u>5,998,000</u>	<u>--</u>	<u>--</u>	<u>--</u>
Subtotal Comparative Cost	7,748,000	5,544,000	8,632,000	9,041,000
Escalation	<u>2,793,000</u>	<u>1,999,000</u>	<u>3,112,000</u>	<u>3,259,000</u>
Escalated Cost	10,541,000	6,543,000	11,744,000	12,300,000
Sales Tax	422,000	302,000	470,000	492,000
Interest During Construction	658,000	471,000	733,000	768,000
Indirect Cost	<u>1,973,000</u>	<u>1,412,000</u>	<u>2,199,000</u>	<u>2,303,000</u>
Total Comparative Capital Cost	13,594,000	9,728,000	15,146,000	15,863,000
Differential Total Comparative Capital Cost	3,866,000	Base	5,418,000	6,135,000

TABLE 3.11-7. COMPARATIVE COSTS--STOCKOUT AND RECLAIM SYSTEM

	Plan A Elevated Tripper \$	Plan B Stacker Reclaimer \$	Plan C Silo \$	Plan D Barn \$
Fixed Charge	394,000	Base	553,000	626,000
Energy Cost	109,000	359,000	Base	63,000
Demand Charge	15,000	Base	89,000	23,000
Maintenance	<u>35,000</u>	<u>140,000</u>	<u>Base</u>	<u>65,000</u>
Total Comparative Annual Cost	553,000	499,000	642,000	777,000
Differential Total Comparative Annual Cost	54,000	Base	143,000	278,000

TABLE 3.11-8. COMPARATIVE CAPITAL AND ANNUAL COSTS FOR AUXILIARY BOILERS

<u>Item</u>	<u>Plan A Number 2 Fuel Oil \$1,000</u>	<u>Plan B Number 6 Fuel Oil \$1,000</u>	<u>Plan C Electrode Boiler \$1,000</u>
CAPITAL COSTS			
Auxiliary boiler	Base	Base	110
Exhaust stack	60	60	--
Fuel oil electric heating	--	70	--
Fuel oil pumps and piping	10	10	--
Transformer	--	--	190
Switchgear, breakers, control, and protective relays	Base	Base	25
Electrical bus, cable, and raceway	Base	Base	30
Mechanical construction	10	20	Base
Electrical construction	Base	20	95
General construction	<u>20</u>	<u>24</u>	<u>Base</u>
Total direct costs	100	204	450
Escalation	<u>34</u>	<u>70</u>	<u>154</u>
Escalated subtotal	134	274	604
Sales tax	5	11	24
Interest during construction	11	23	50
Indirect costs	<u>25</u>	<u>51</u>	<u>113</u>
Total comparative costs	175	359	791
Differential comparative capital costs	Base	184	616
ANNUAL COSTS			
Fixed charges	18	37	81
Fuel oil costs	43	29	Base
Energy costs	<u>Base</u>	<u>5</u>	<u>76</u>
Total comprative annual costs	61	71	157
Differential annual costs	Base	10	96

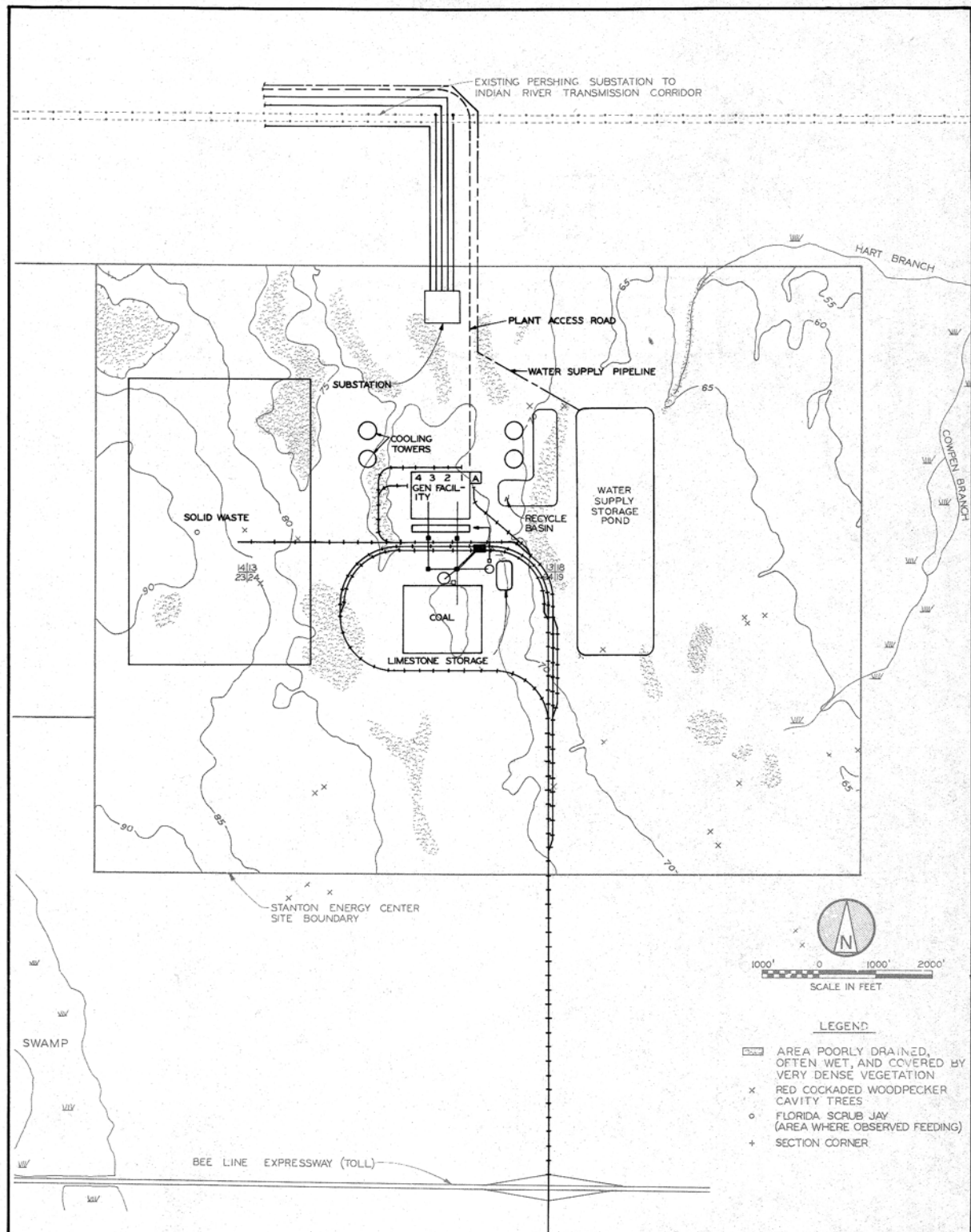


FIGURE 3.11-1. SITE ARRANGEMENT-PLAN A

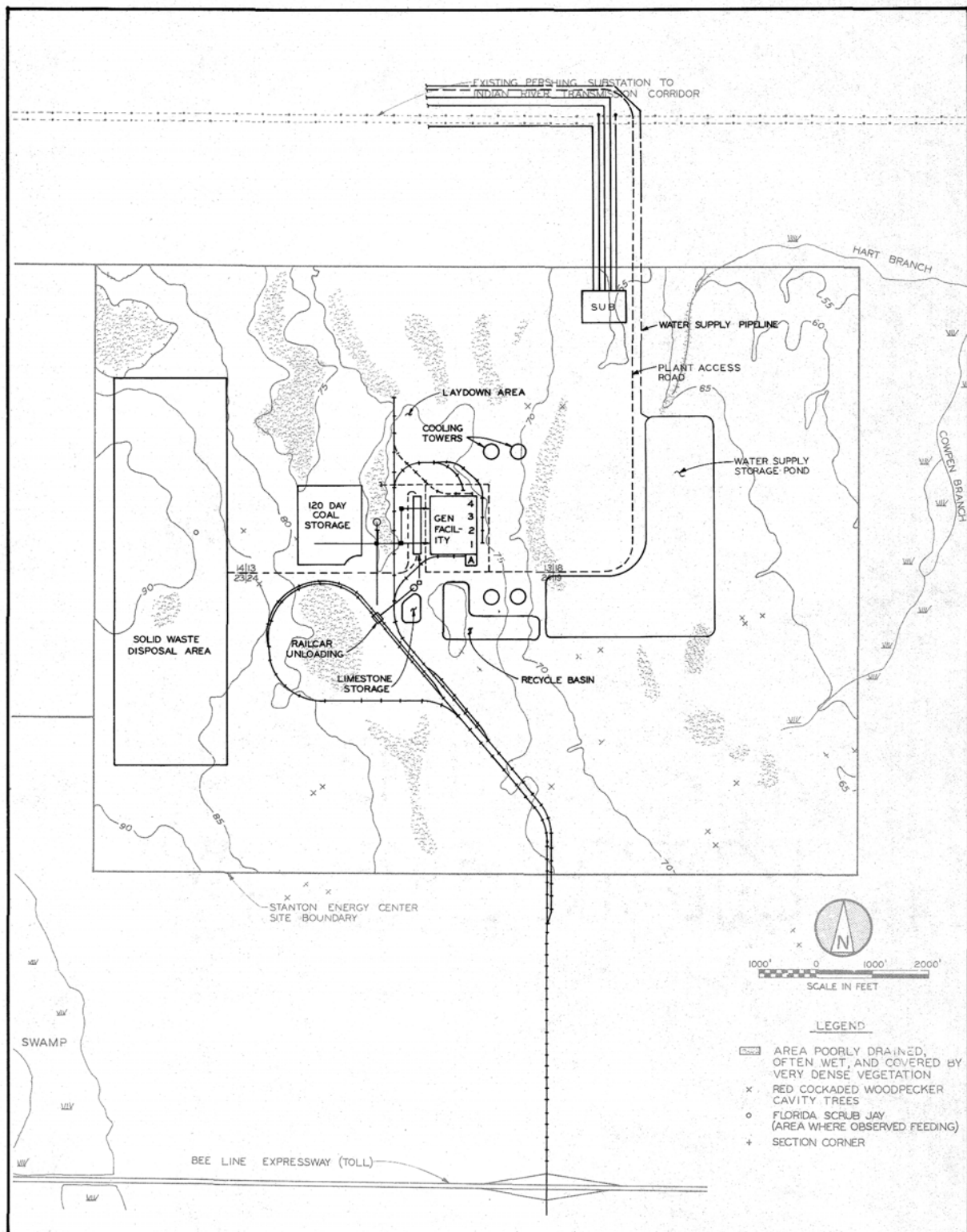


FIGURE 3.11-2. SITE ARRANGEMENT-PLAN B

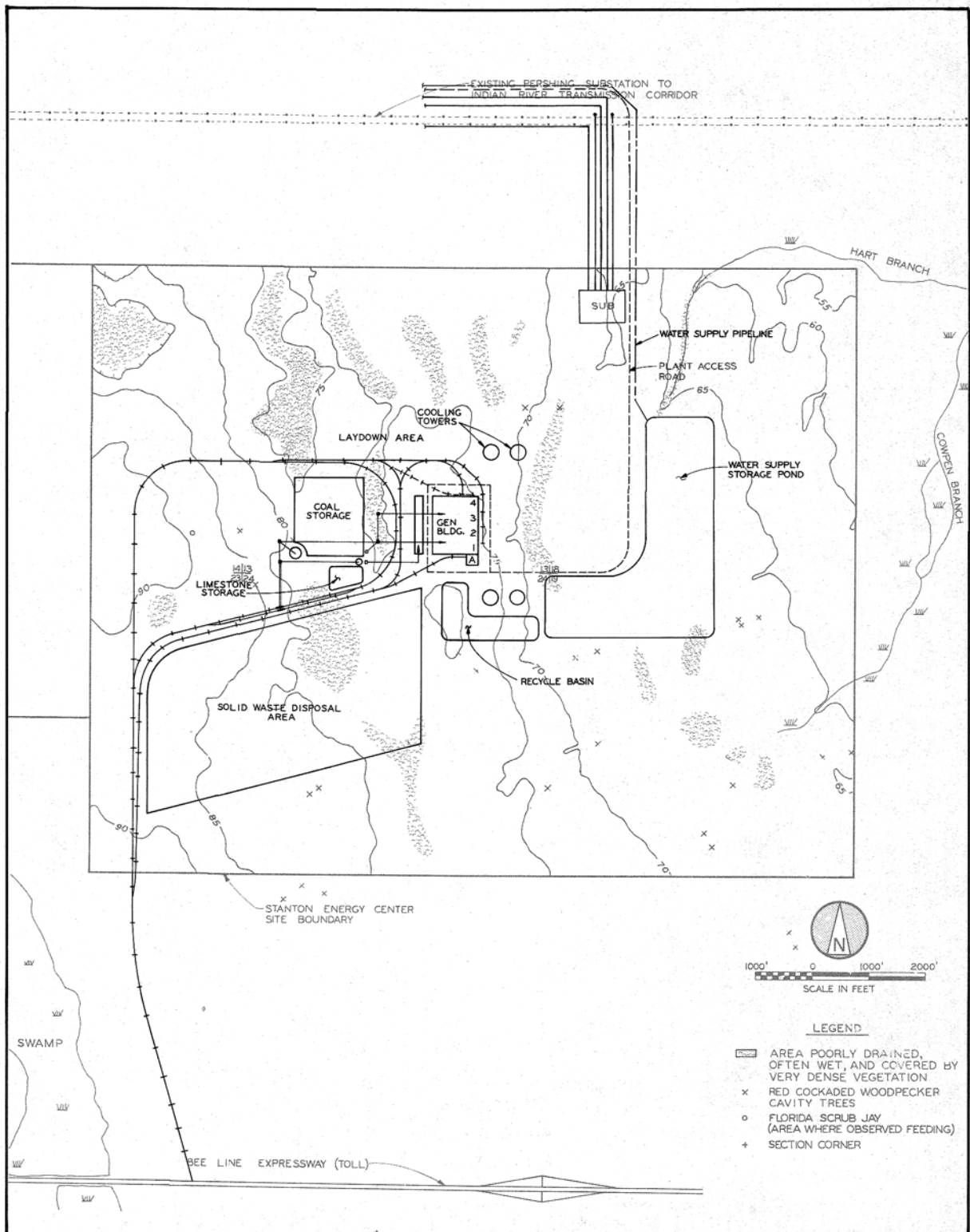


FIGURE 3.11-3. SITE ARRANGEMENT-PLAN C

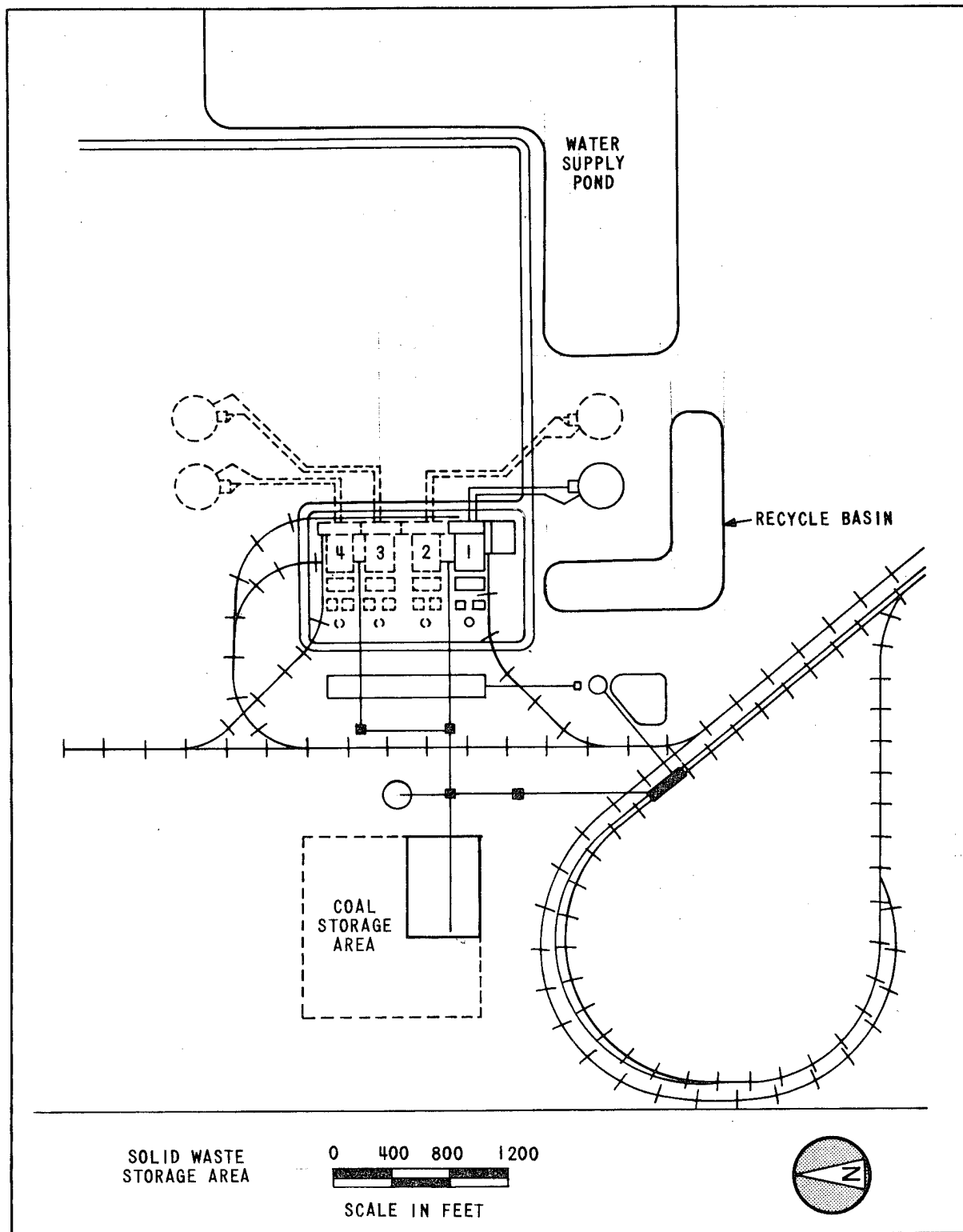


FIGURE 3.11-4. NATURAL DRAFT COOLING TOWER SITE ARRANGEMENT

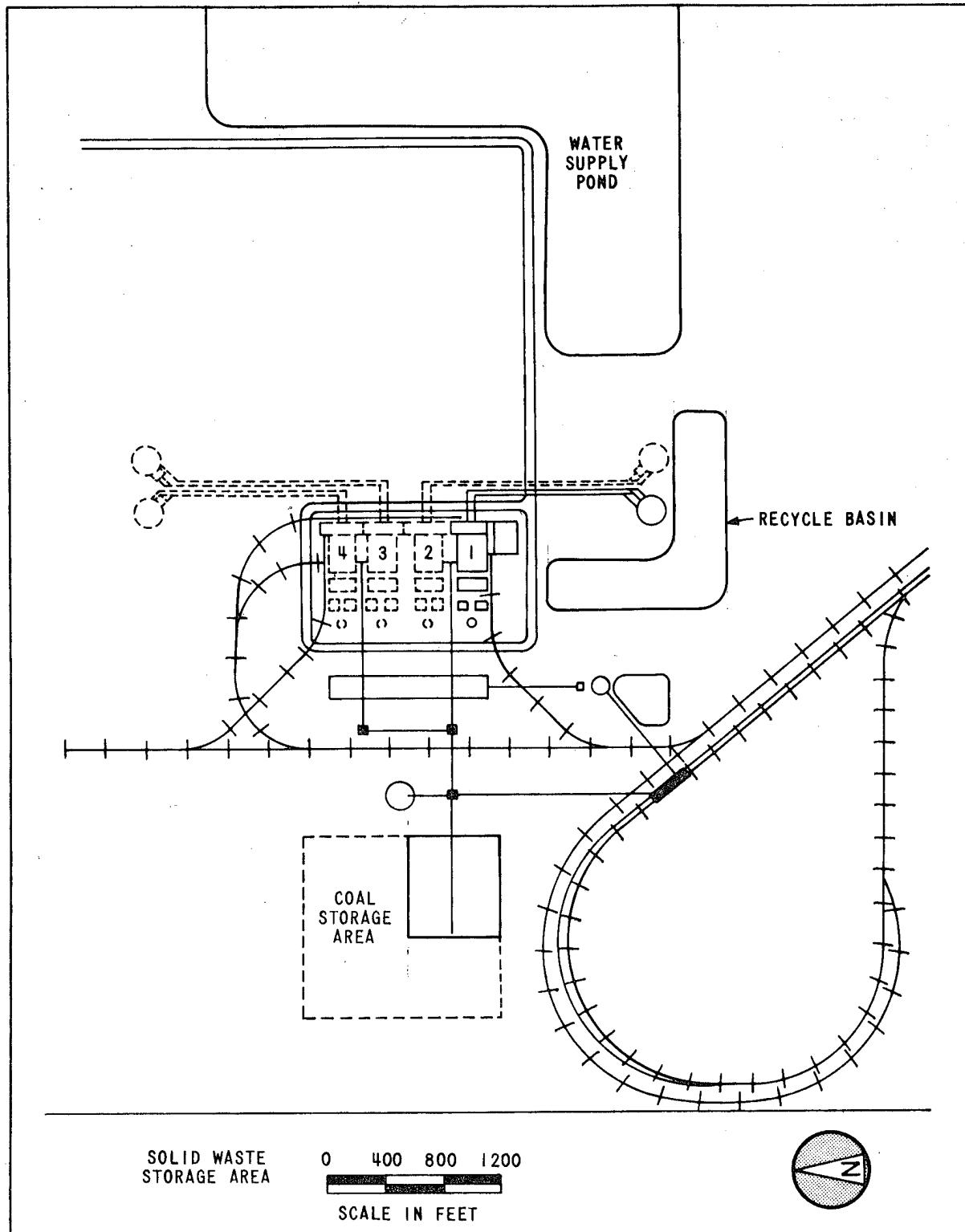


FIGURE 3.11-5. ROUND MECHANICAL DRAFT COOLING TOWER SITE ARRANGEMENT

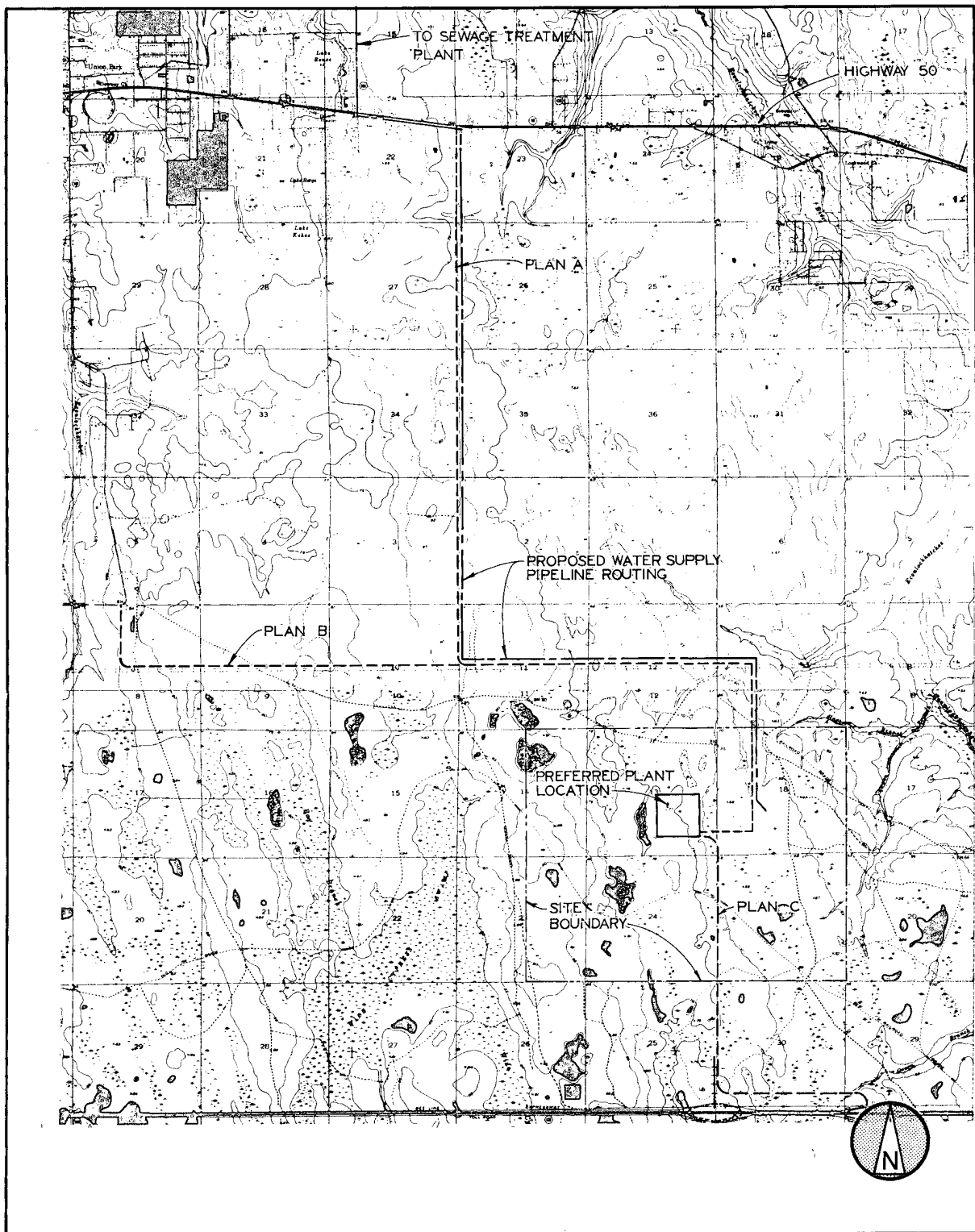


FIGURE 3.11-6. ALTERNATIVE PLANT ACCESS ROADS

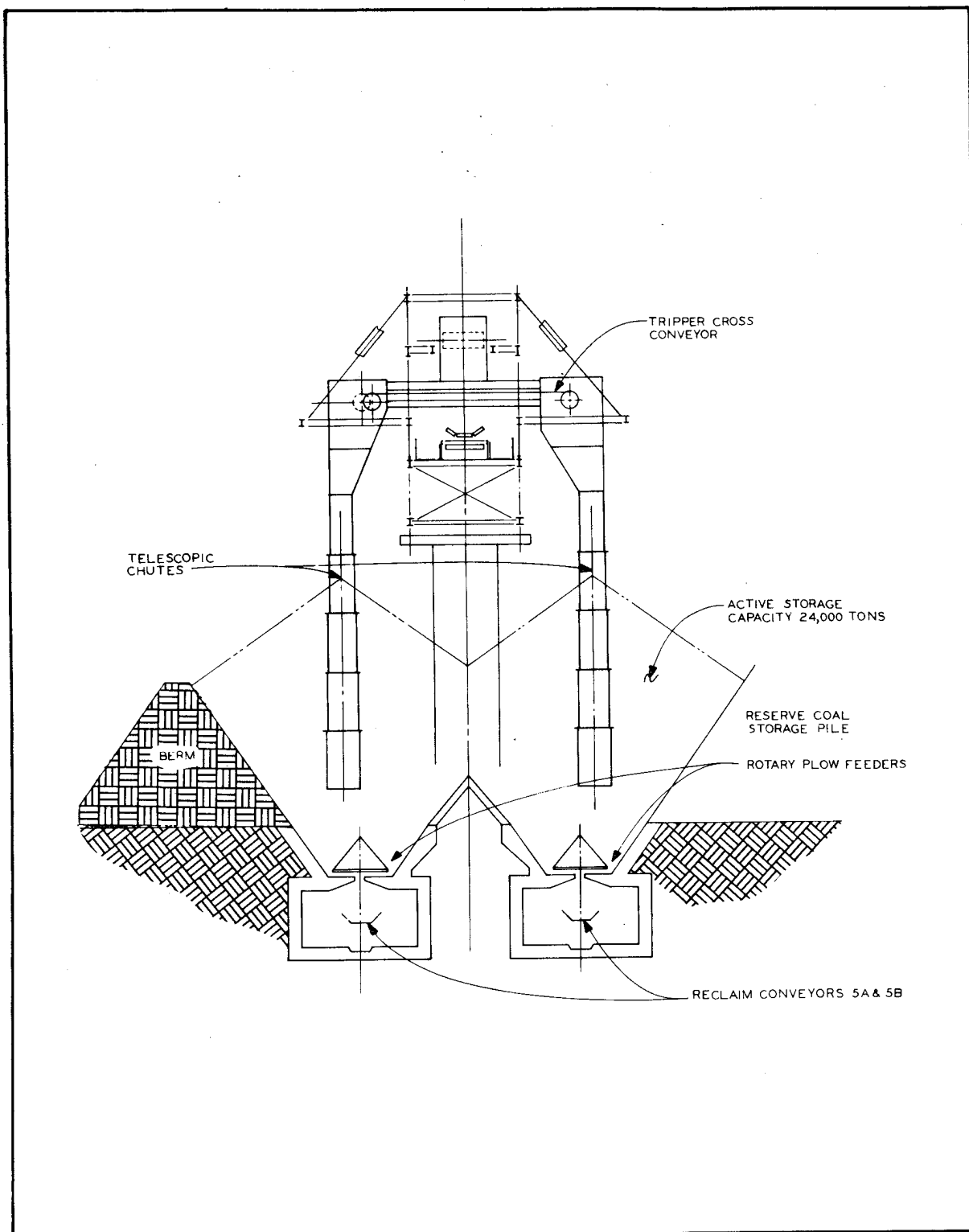


FIGURE 3.11-7. ELEVATED TRIPPER WITH
ROTARY PLOW RECLAIM

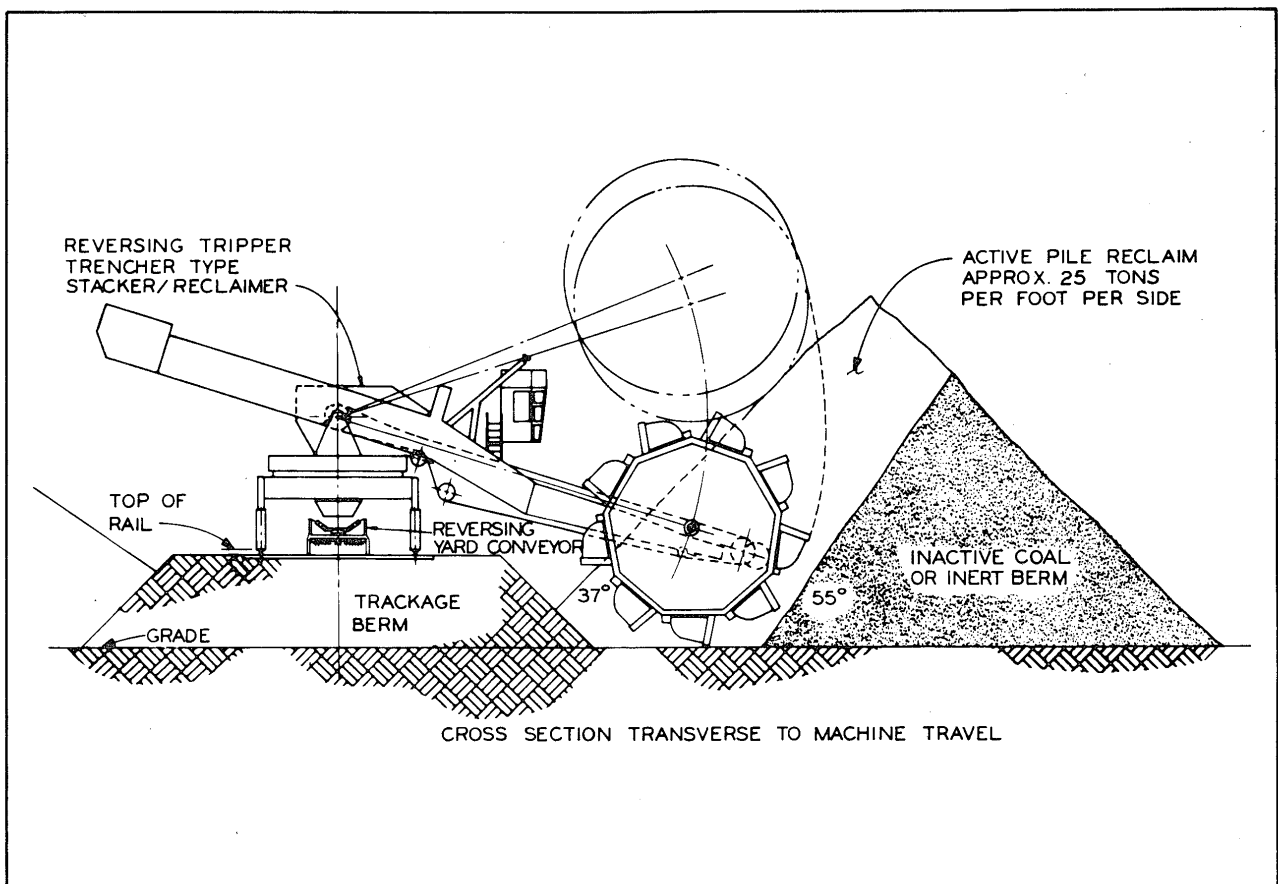


FIGURE 3.11-8. STACKER-RECLAIMER

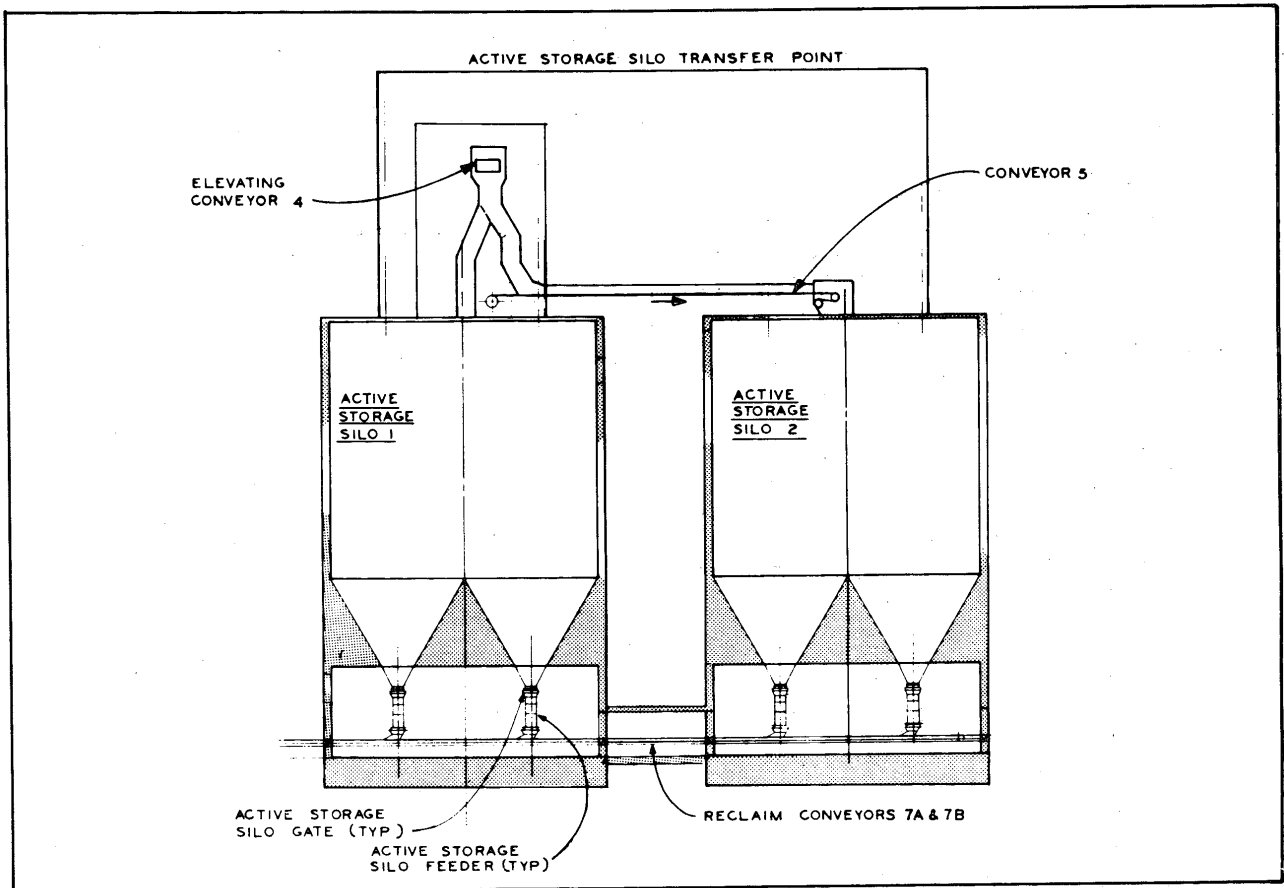


FIGURE 3.11-9. SILO STORAGE WITH VIBRATORY FEEDER RECLAIM

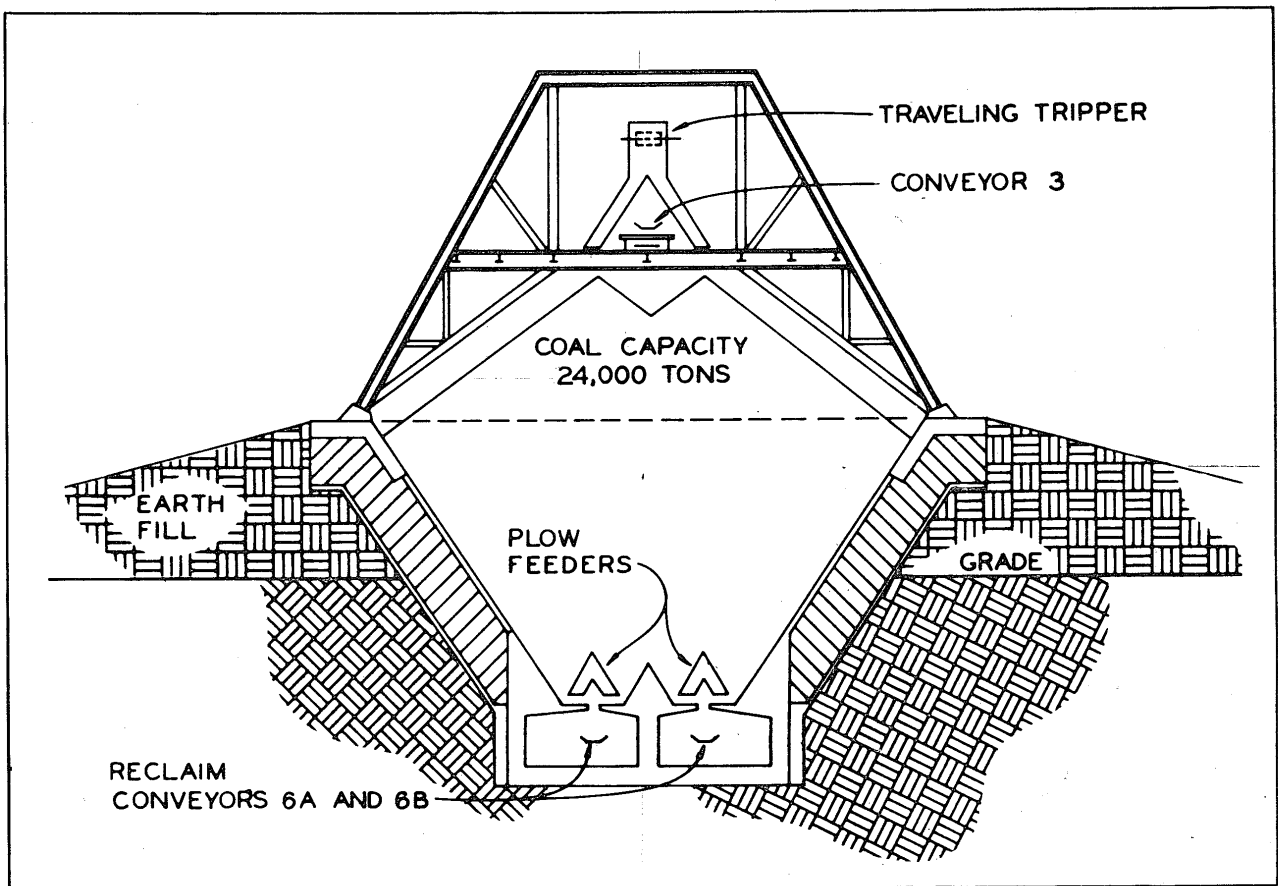


FIGURE 3.11-10. BARN STORAGE WITH ROTARY PLOW FEEDER RECLAIM

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

4

4.1 SITE PREPARATION AND PLANT CONSTRUCTION

4.1.1 Construction Areas

Approximately 65 acres of the total 960 acres to be cleared for the Stanton Energy Center Unit 1 site will be utilized for a materials and equipment laydown areas. No significant wetlands or red-cockaded woodpecker cavity trees are within the laydown areas.

4

Vegetation and wooden material removed by land clearing will be disposed of by open burning according to the provisions of the Florida Administrative Code, Section 5I-2.07. An open burning permit will be obtained, as required, from the Orange County Pollution Control Department with approvals from the Fire District and Division of Forestry. Other trash and nonhazardous chemical wastes will be removed to the Orange County Landfill adjacent to the site for appropriate disposal.

4.1.2 Land Impact

The construction of Unit 1 of the Stanton Energy Center will require the clearing of approximately 960 acres of land. Included in the area are about 125 acres of wetlands which will be eliminated. The wetland areas that will be effected are isolated and are not connected to other wetland systems or bodies of water. A description of the wetland areas and vegetation on the site is given in Section 2.7.

4

The ultimate development of the site for four generation units would require the clearing of an additional 120 acres for a total of 1,080 acres. An additional 18 acres of wetlands would be effected for a total of 143 acres eliminated by the development of the site for four units.

4

Vegetation removed by clearing will be burned in compliance with the regulations cited in Subsection 4.1.1. Trees suitable for pulp or other commercial uses will be sold.

No explosives will be used during the construction of the Stanton Energy Center.

A "Joint Application, Department of the Army/Florida Department of Environmental Regulation for Activity in Waters of the State of Florida",

SAJ Form 983 (July 21, 1977) has been prepared and is included as part of this application as Appendix 4.1A.

Consistent with the Orange County Growth Management Policy Plan⁽¹⁾ the plant will be located so as to minimize significant environmental effects. A majority of the conservation areas on the site, as defined by the Orange County Planning Department, will be retained in their natural state.⁽²⁾ In addition, location of the site adjacent to the County Landfill in an area of low residential development potential is logical and consistent with County planning objectives.

Utility systems are allowed as a special exception in agriculturally zoned districts.

4.1.3 Impact on Human Population

Construction Noise. Major construction activities consist of site clearing and preparation, foundation construction, and the erection of buildings, equipment, and other structures. Different types of equipment are used in each of these phases, and accurate noise calculations are dependent upon the numbers and type of equipment units in use at a given time, the duty factors for the types of equipment, and characteristic noise emissions levels. For construction equipment that may be used at the Stanton site, noise sources and sound power levels associated with the clearing, foundation, and erection phases of construction are given in Table 4.1-1. Construction sound power levels for each phase, and representative octave band breakdowns also are included in Table 4.1-2.

A computerized sound pressure level contour modeling program was used to determine construction noise contributions in the vicinity of the site. This program considered the characteristic resistance of air, sound pressure level decrease resulting from wave divergence, directivity and height of the sound source, and atmospheric absorption. Acoustic emissions from the construction clearing phase were combined with baseline levels as input to this program. All computations were completed independently, and then combined to obtain overall sound pressure levels.

Figure 4.1-1 shows the predicted 24-hour average noise contours for the clearing and site preparation phase of construction. No area located outside the site boundaries exceeds 55 dBA. There are also no nearby residences or recreational areas to receive noise impacts. Therefore, it is likely that impacts from construction noise will be insignificant.

4.1.4 Work Force

The construction work force will begin to arrive onsite in January 1983 with the site preparation construction. Construction work will be

completed in December 1986. The peak construction force will be 950 personnel in early 1985. The number of construction personnel which will be onsite during each month of the 48-month construction period is shown in Table 4.1-3.

4.1.5 Impact on Landmarks and Sensitive Areas

No known historic or archeological sites, landmarks, or scenic areas will be affected by the proposed project.

4.1.6 Mitigating Measures

Fugitive dust from transportation and construction activities will be controlled by periodic spraying of access ways with water. Major access ways will be paved where appropriate, cleared areas will be revegetated and the site will be landscaped to present a pleasing appearance, and to control dust and erosion.

A buffer zone will be maintained around the plant complex. With Unit 1, the buffer area will consist of approximately 2,320 acres, and a total of about 2,180 acres will be maintained with the ultimate site development of four units. Terrestrial habitat and wetlands will be preserved in these areas. More importantly, 58 cavity trees utilized by the red-cockaded woodpecker, an endangered species, will be preserved. Foraging habitat for the birds also will be provided which will be important for the survival of the woodpecker. A detailed discussion of the impacts on the woodpecker is given in Subsection 4.1.9

4.1.7 Benefits From Construction

Site preparation and plant construction will result in certain beneficial impacts on the Orlando area economic environment. As additional employment opportunities associated with the construction workforce, their payrolls and local expenditures for materials and equipment increase demands for goods and services in various sectors of the local economy, demands in still other sectors will be stimulated. The result will be an overall increase in economic activity.

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A buffer zone will be maintained around the plant complex. With Unit 1, the buffer area will consist of approximately 2,290 acres, and a total of about 2,170 acres will be maintained with the ultimate site development of four units. Terrestrial habitat and wetlands will be preserved in these areas. More importantly, 58 cavity trees utilized by the red-cockaded woodpecker, an endangered species, will be preserved. Foraging habitat for the birds also will be provided which will be important for the survival of the woodpecker. A detailed discussion of the impacts on the woodpecker is given in Subsection 4.1.9

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While the beneficial economic impacts will be significant in absolute amounts, they will be relatively small in the context of the entire Orlando economy. Detailed projections of the beneficial construction impacts are discussed in Subsection 7.2.1.2.

4.1.8 Impact on Water Bodies and Uses

There are no sizeable surface waters on the Stanton site. Small segments of the Cowpen Branch and the Hart Branch extend into the site. The small streams are within the buffer zone of the site which will not be affected by construction activities. Runoff from the construction area will be contained in a collection basin. The basin will be unlined and there will be some exfiltration of the runoff water collected, providing recharge of the water table aquifer. Little effect on ground water quality is expected. The major aquifer associated with the site, the Floridan Aquifer, is at a depth of approximately 200 feet and should be unaffected by construction activities.

4.1.9 Impacts on the Red-Cockaded Woodpecker

Terrestrial surveys of the Stanton site revealed the presence of the red-cockaded woodpecker which is listed as an endangered species by both state and federal wildlife officials. The findings of the surveys are given in Subsection 2.7.6.3. A total of 45 active cavity trees and 35 red-cockaded woodpeckers were observed in the vicinity of the proposed project. Once the presence of the birds was known, the proposed plant facilities arrangement was revised to preserve as many cavity trees and as much foraging habitat as possible.

The following narrative describes the primary impacts to the red-cockaded woodpecker populations of the site, including cavity tree removal, loss of foraging habitat, and loss of potential replacement cavity trees.

Construction of Unit 1 beginning in 1983 will require a total of 960 acres. Clearing operations to accommodate Units 2, 3, and 4 will include an additional 138 acres. The total area to be cleared will be 1,100 acres. Three-hundred and twelve acres of this clearing will occur for

the development of the solid waste storage area. This clearing of 312 acres will occur during the construction of Unit 1. The solid waste disposal area for Unit 1 will consist of about 80 acres which will be filled in 15-acre cells.

Impacts during plant construction which will affect the red-cockaded woodpecker include limited cavity tree removal and loss of some foraging habitat. Twenty-five active cavity trees and 38 start hole or abandoned cavity trees are associated with the nine clans on the site. Table 2.7-7 of the terrestrial ecology section shows each clan has an average of 2.8 active cavity trees with an additional 4.2 start hole trees or abandoned cavity trees.

Clearing of vegetation will result in the loss of a total of five cavity trees (Table 4.1-4). These trees include one active cavity tree, three cavity trees with start holes, and one abandoned cavity tree. From a population point of view, this represents an overall loss of 8 per cent of all available cavity trees, including 4 per cent of all active cavity trees and 11 per cent of all start hole or abandoned cavity trees (see Figure 4.1-2).

During the construction phase of the proposed plant, the anticipated loss of foraging habitat is approximately 450 acres (43 per cent of the total area proposed for clearing) for onsite clans (Clans A, B, C, D, E, F, G, H, and I), or 25 per cent of the foraging habitat used by the population on site. The foraging range of clans with colonies located offsite will not be directly affected by plant construction. Four clans (Clans E, F, H, and I) have colonies onsite located near the site boundary. It is estimated that portions of their present home range include offsite lands. The estimated onsite foraging ranges for Clans H and I and those portions of the estimated ranges for Clans E, F, H, and I that occur offsite will not be affected significantly by construction of the plant and associated facilities (e.g., railroad).

The largest loss of foraging range will occur in Clans B, C, and D, with smaller losses occurring in Clans E, F, and G (see Table 4.1-4 and Figure 4.1-3). For Clan A and Clan B, there are potentially suitable and

unoccupied foraging areas (approximately 150 acres) on the northern portion of the proposed site and just offsite. There are no known active colonies within 1 mile north of the site. Clans C and D have colonies on each side of their respective home ranges. Some unoccupied foraging habitat (approximately 100 acres) is available for these clans to the southwest.

The estimated number of potential replacement cavity trees (75 years or older) for each clan has not been finalized to date. However, based on general observation, the only colony currently occupying an area with a relatively limited number of potential replacement cavity trees is associated with Clan B. Colony B appears to have between 15 and 20 suitable replacement trees within the colony area. Of this total, three trees will be lost during plant construction. Other clans that will lose a portion of their colony area include Clans A, C, and D. Each of these colonies contains a relatively large number (more than 25) of potential replacement cavity trees. Losses from construction should not be greater than 4 or 5 potential cavity trees for each of these clans.

As indicated in Section 2.7, 19 colonies have been identified in the general vicinity of the proposed power plant. Ten of these colonies occur offsite (see Figures 2.7-7 and 2.7-8). Two of these colonies are located near the proposed railroad corridor; two other colonies are situated on the transmission corridor. None of these proposed corridors will result in the loss of active cavity trees. Both corridors, however, will impact foraging range for these four clans. It is likely that the impacts on foraging range in these clans will be similar to the effects on Clan G (i.e., 4 per cent loss). Other colonies in the area are located more than one-half mile from the various corridors and should not be influenced by these associated facilities.

The red-cockaded woodpecker will experience some unavoidable adverse impacts. Based on surveyed home ranges for four clans and estimated home ranges for the remaining five, 456 acres of occupied habitat will be lost unavoidably due to plant construction. Five cavity trees will also be removed during plant construction. This will involve one active cavity tree. There will also be some loss of potential replacement cavity trees.

These are short-term, unavoidable adverse impacts and may cause some clans to leave the area. The extent of possible movements of these clans off the site cannot be determined. However, it seems that at least five clans (Clans E, F, G, H, and I) will not be significantly influenced by these activities.

The long-term effects of the proposed action may offset some of these initial losses. The proposed energy center will provide a relatively stable and protected environment for onsite red-cockaded woodpeckers. A total of 2,170 acres will be managed for this species. Because of logging activities in this area, most sections on the site support neither the density nor the basal area of pine trees that would otherwise be expected. For one colony located just east of the site, the trees have recently been clear cut. With proper management in the buffer area of the plant site, the quality of foraging habitat could be improved. By excluding logging activities and allowing natural reseedling, the density and basal area within the preserved area could be substantially increased.

4.1.10 References

- (1) Orange County Planning Department Growth Management Policy, May 20, 1980.
- (2) Memorandum dated July 1, 1981, Tracy Watson, Planning Director, Orange County Planning Department, to Board of Zoning Adjustment, Orange County, Florida.

TABLE 4.1-1. CONSTRUCTION NOISE SOURCES

Phase	Equipment	Lp (15m.) (dBA)	Quantity	Usage*	Leq (15m.) (dBA)
Clearing and site preparation	Scraper	88	12	.35	94
	Dozer	87	4	.18	83
	Grader	85	3	.07	78
	Compactor	80	3	.10	75
	Truck	88	4	.16	83
Foundation (Pile Driving)	Driving rig	101	3	.04	92
	Side boom crawler	81	2	.04	70
	Mobile crane	83	1	.04	70
	Concrete delivery truck	88	2	.23	85
Foundation (Concrete Work)	Mobile crane	83	2	.08	75
	Front end loader	84	1	.4	80
	Concrete mixer	85	1	.4	81
	Concrete vibrator	76	3	.2	69
	Concrete pump	82	1	.07	81
	Concrete delivery truck	88	6	.26	90
Erection	Large crane	88	2	.10	78
	Mobile crane	83	3	.12	79
	Tractor trailer	88	2	.13	82
	Stationary hoist	83	3	.12	79
	Small crane	83	2	.12	74
	Impact wrenches	85	3	.13	81

*Fraction of time emitting noise.

TABLE 4.1-2. FREQUENCY DISTRIBUTION OF CONSTRUCTION SOUND POWER LEVELS

Construction Phase	Frequency (Hertz)									Overall
	<u>31</u>	<u>63</u>	<u>125</u>	<u>250</u>	<u>500</u>	<u>1,000</u>	<u>2,000</u>	<u>4,000</u>	<u>8,000</u>	
Clearing (dBA)	/	95	110	120	121	122	120	114	107	127
Foundation (dBA)	/	95	110	120	121	122	120	113	107	127
Erection (dBA)	/	87	102	112	113	114	112	106	99	99

TABLE 4.1-3. CONSTRUCTION WORK FORCE (Personnel per Month)

	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
January	110	630	950	665
February	110	630	950	625
March	400	630	950	550
April	405	630	950	460
May	405	630	910	410
June	405	770	910	380
July	405	770	840	335
August	405	825	815	230
September	460	880	815	180
October	615	880	815	145
November	615	880	780	125
December	615	880	675	85

TABLE 4.1-4. DESCRIPTION OF CONSTRUCTION IMPACTS ON RED-COCKADED WOODPECKERS

Clan	Total Number of Cavity Trees	Total Number of Cavity Trees Affected		Total Foraging Range acres	Loss from Construction Impacts per cent
		Active	Other*		
A	6	0	0	380	42
B	6	0	1	200**	50
C	11	0	2	127	58
D	12	1	1	138	49
E	6	0	0	200**	10
F	6	0	0	200**	12
G	7	0	0	172	4
H	7	0	0	200**	0
I	3	0	0	200**	0
Total	64	1	4	1,817	--
Average	7.1	--	--	202	25

*Abandoned and start hole cavity trees.

**Home range estimated as 200 acres.

SOURCE: ESE, 1981.

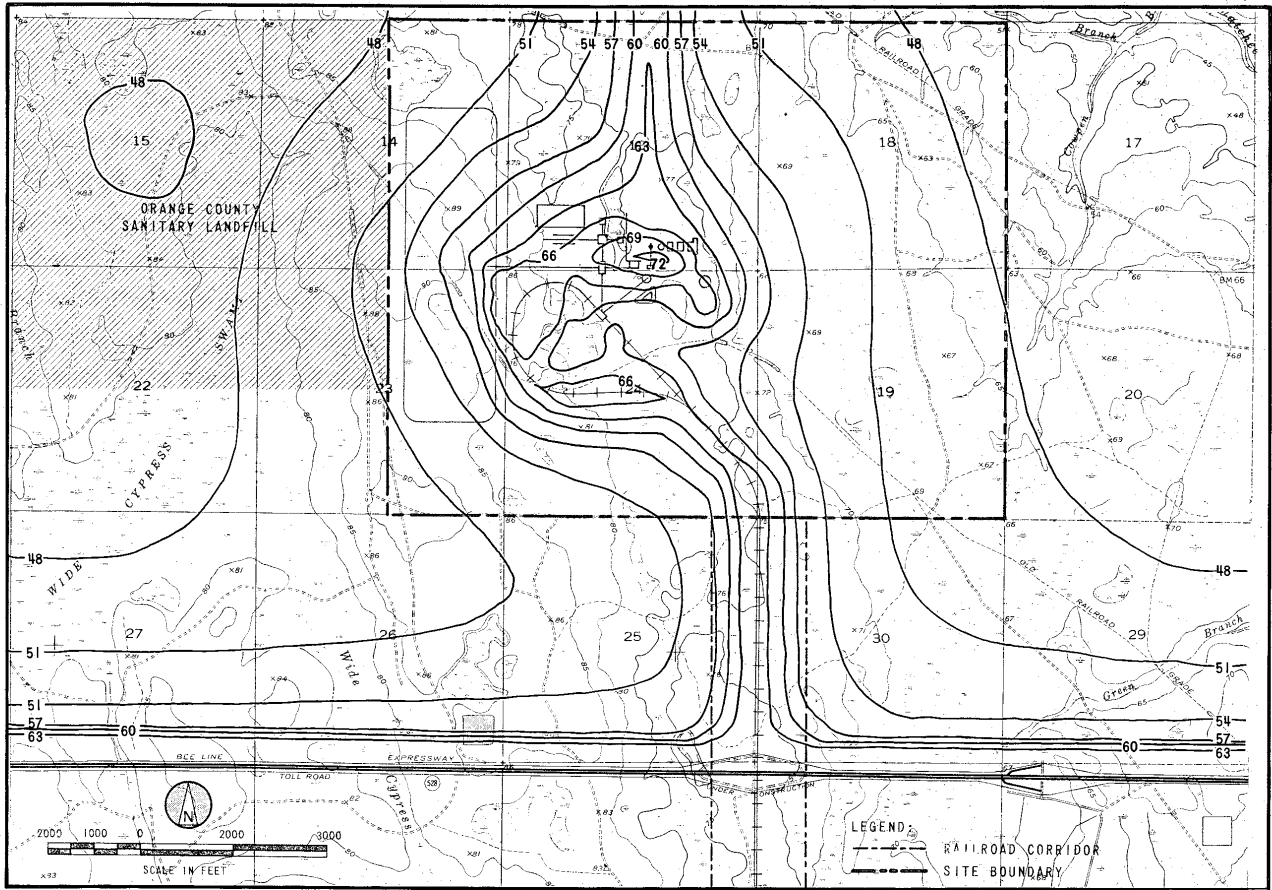


FIGURE 4.1-1. PREDICTED 24 HOUR AVERAGE NOISE CONTOURS (dBA) DURING CONSTRUCTION OF THE PROPOSED CURTIS H. STANTON ENERGY CENTER

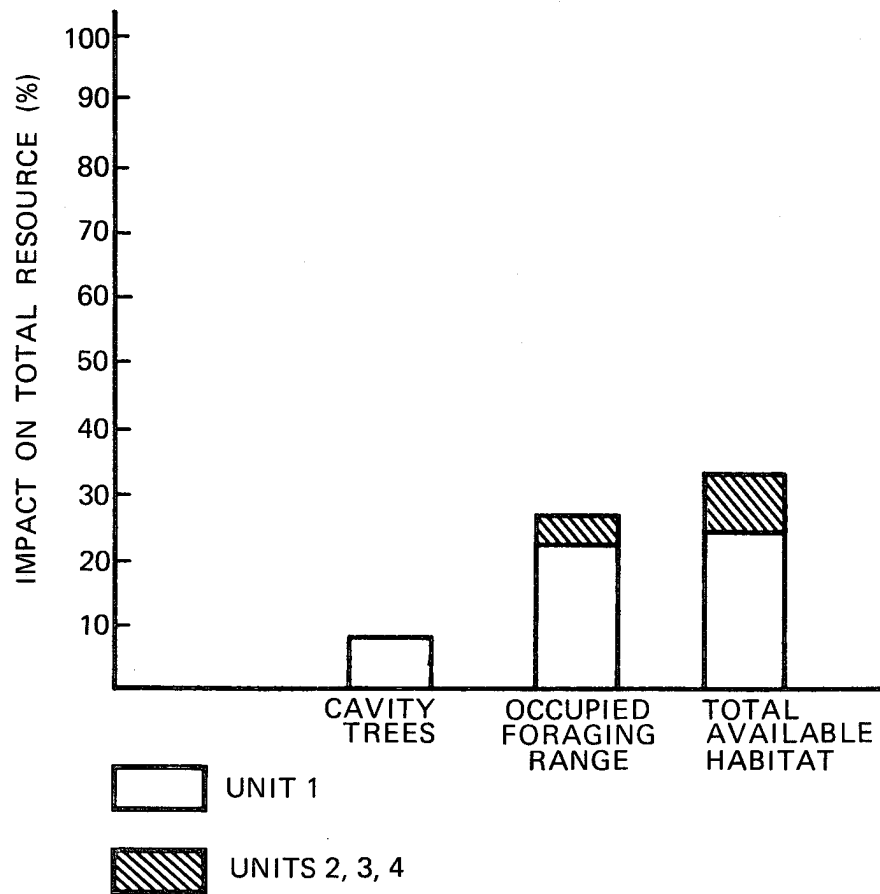


Figure 4.1-2 CONSTRUCTION IMPACTS ON
RED-COCKADED WOODPECKERS

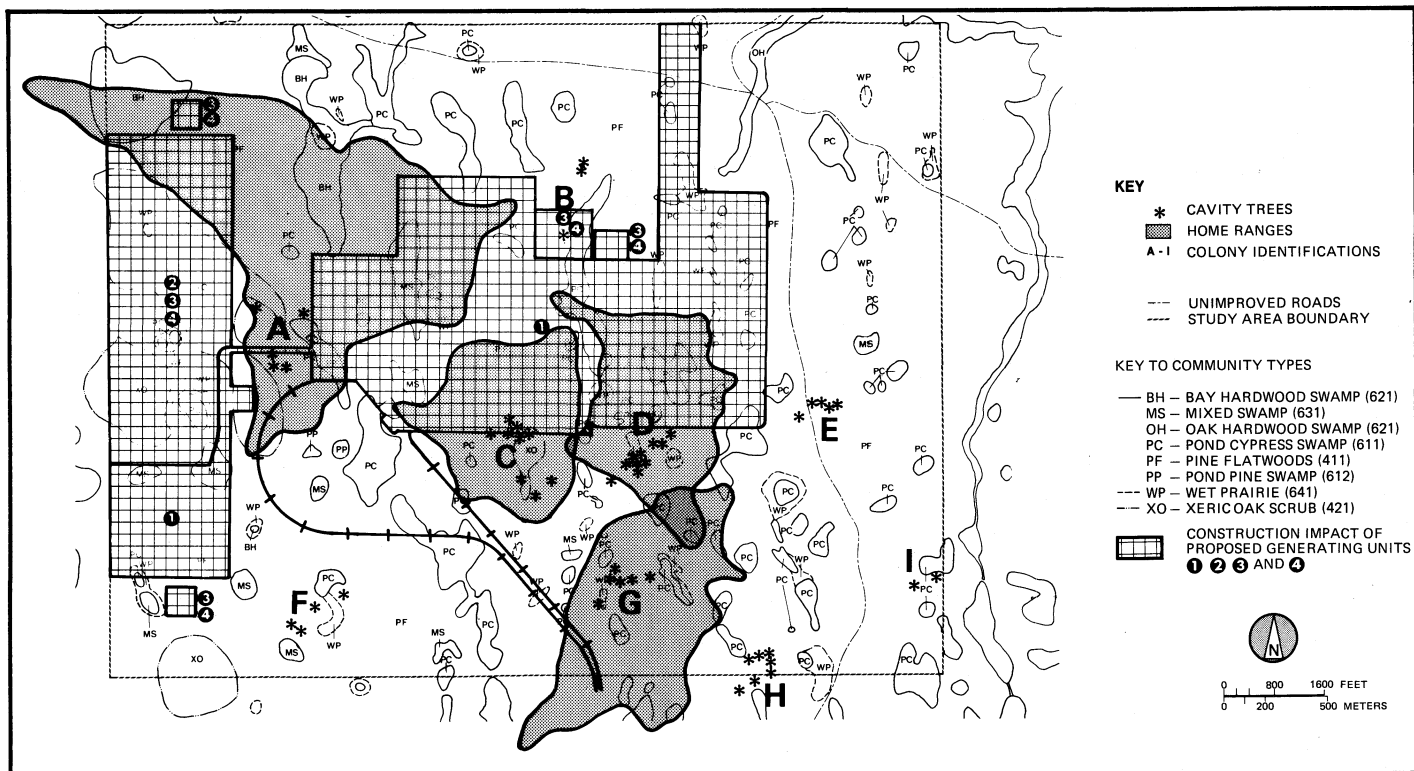


Figure 4.1-3 AREA OF CONSTRUCTION IMPACTS ON RED-CKADED WOODPECKERS

APPENDIX 4.1A
JOINT APPLICATION
DEPARTMENT OF THE ARMY/FLORIDA DEPARTMENT
OF
ENVIRONMENTAL REGULATION
FOR
ACTIVITIES IN WATERS OF THE STATE OF FLORIDA

JOINT APPLICATION
DEPARTMENT OF THE ARMY/FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
FOR
ACTIVITIES IN WATERS OF THE STATE OF FLORIDA

Refer to Instruction Pamphlet for explanation of numbered items and attachments required.

1. Application number (To be assigned)	2. Date Day Mo. Yr.	3. For official use only									
4. Name, address and zip code of applicant Orlando Utilities Commission P.O. Box 3193 Orlando, Florida 32802											
Telephone Number <u>305-423-9100</u>											
5. Name, address, zip code and title of applicant's authorized agent for permit application coordination B. E. Shoup, Director Environmental Divisions P.O. Box 3193											
Telephone Number <u>305-423-9141</u>											
6. Describe the proposed activity, its purpose and intended use, including a description of the type of structures, if any, to be erected on fills, or pipe or float-supported platforms, and the type, composition and quantity of materials to be discharged or dumped and means of conveyance. See Attached Sheets.											
<table style="width: 100%; border: none;"> <tr> <td style="width: 33%;"></td> <td style="width: 33%; text-align: center;">Dredged/Excavated</td> <td style="width: 33%; text-align: center;">Filled/Deposited</td> </tr> <tr> <td>Volume of Material:*</td> <td><u>0</u> CY <u>3,450,000</u> CY</td> <td><u>0</u> CY <u>3,444,000</u> CY</td> </tr> <tr> <td></td> <td style="text-align: center;">Waterward of O.H.W. or M.H.W.</td> <td style="text-align: center;">Landward of O.H.W. or M.H.W.</td> </tr> </table> *Sum of all dredge/fill quantities.				Dredged/Excavated	Filled/Deposited	Volume of Material:*	<u>0</u> CY <u>3,450,000</u> CY	<u>0</u> CY <u>3,444,000</u> CY		Waterward of O.H.W. or M.H.W.	Landward of O.H.W. or M.H.W.
	Dredged/Excavated	Filled/Deposited									
Volume of Material:*	<u>0</u> CY <u>3,450,000</u> CY	<u>0</u> CY <u>3,444,000</u> CY									
	Waterward of O.H.W. or M.H.W.	Landward of O.H.W. or M.H.W.									
7. Proposed use Private [] Public [X] Commercial [] Other [] (Explain in remarks)											
8. Name and address including zip code of adjoining property owners whose property also adjoins the waterway. See Attached Sheets.											
9. Location where proposed activity exists or will occur Street address See Attached Sheets Longitude _____ Latitude _____ (If known) Sec. _____ Twp. _____ Rge. _____ <u>Florida</u> <u>Orange</u> <u>Orlando</u> State County In City or Town Near City or Town											
10. Name of waterway at location of the activity Various Wetlands											

11. Date activity is proposed to commence January 1, 1983
Date activity is expected to be completed August 1, 1986

12. Is any portion of the activity for which authorization is sought now complete? Yes [] No [X]

If answer is "Yes" give reasons in the remarks section. Month and year the activity was completed _____
_____ . Indicate the existing work on the drawings.

13. List all approvals or certifications required by other Federal interstate, state or local agencies for any structures, construction, discharges, deposits or other activities described in this application, including whether the project is a Development of Regional impact.

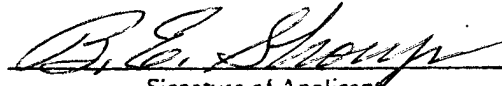
Issuing Agency	Type of Approval	Identification No.	Date of Application	Date of Approval
Florida Board (Governor and his Cabinet)	Site Certification F.S. 403.501 thru 403.517	N/A		Pending
Florida Public Service Commission	Certificate of Need F.S. 403.519	N/A		Pending

14. Has any agency denied approval for the activity described herein or for any activity directly related to the activity described herein?
Yes [] No [X] (If "Yes" explain in remarks)

15. Remarks (see Instruction Pamphlet for additional information required for certain activities)

See Attached Sheets.

16. Application is hereby made for a permit or permits to authorize the activities described herein. I agree to provide any additional information/data that may be necessary to provide reasonable assurance or evidence to show that the proposed project will comply with the applicable State Water Quality Standards or other environmental protection standards both during construction and after the project is completed. I also agree to provide entry to the project site for inspectors from the environmental protection agencies for the purpose of making preliminary analyses of the site and monitoring permitted works, if permit is granted. I certify that I am familiar with the information contained in this application, and that to the best of my knowledge and belief such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities.


Signature of Applicant

5/12/81
Date

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up by any trick, scheme, or device a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than \$10,000 or imprisoned not more than five years, or both.

The application must be signed by the person who desires to undertake the proposed activity; however, the application may be signed by a duly authorized agent if accompanied by a statement by that person designating the agent and agreeing to furnish upon request, supplemental information in support of the application.

FEE: Attach Checks/Money Orders on front
Payable to Department of Environmental Regulation
\$200 Standard form projects
\$20 Short forms and Chapter 403 projects only

INFORMATION NEEDED ON AFFIDAVIT OF OWNERSHIP OR CONTROL

1. The affidavit of ownership or control should be signed by at least one owner of the property, lessee, or easement holder.
2. If subdivided, the property should be described by lot number, block number (if any), name of subdivision, and plat book number and page where recorded.
3. If unplatted, the property should be described by section, township, and range, and subdivision of section.
4. If the description is based on courses and distances not following the plane coordinates, the point of beginning should be identified.

Please contact this office should clarification or further instructions be necessary.

AFFIDAVIT OF OWNERSHIP OR CONTROL

TO THE DEPARTMENT OF ENVIRONMENTAL REGULATION:

I hereby certify that I am the (check one):

SEE ATTACHED AFFIDAVIT

record owner _____

lessee _____

record ease-
ment holder _____

applicant to record owner for
easement _____

of the below described property situated in _____ County,
Florida; and that said property is all the property that is contiguous to and landward of the area
in which the work proposed in the permit application is to be conducted. Furthermore, I certify
that as record owner, lessee, or record easement holder I have or will have prior to undertaking
the work all necessary approvals or permission from all other persons with a legal interest in
said property to conduct the work proposed in the permit application.

LEGAL DESCRIPTION

Sworn to and subscribed before me at _____
_____, County, _____, this _____ day
of _____, 19____.

NOTARY PUBLIC

My commission expires:

ALTERNATE AFFIDAVIT OF OWNERSHIP OR CONTROL

I hereby certify that the Orlando Utilities Commission (OUC) is or will become the record owner of sufficient property interests to conduct the proposed activities. After approval of OUC's Site Certification Application, OUC will exercise its condemnation power for ownership of any property not already obtained by purchase. All property requiring dredge and fill activities is located Orange County, Florida. The property described below contains all of the property that is contiguous to and landward of the area where the work will be conducted. As present/future record owner I have or will have, prior to undertaking the work, all necessary approvals or permission from all other persons with a legal interest in said property to conduct the work proposed in the permit application.

LEGAL DESCRIPTION

The legal description of the site is given by section, township, and range designations in Section 2.1 of the Site Certification Application. New transmission lines will be located in expansions of existing transmission line rights-of-way. This property is described in Section 3.8 of the Site Certification Application. Other offsite facilities will be sited in corridors described in Section 3.9 of the Site Certification Application. The actual rights-of-way that will be obtained will be within those corridors.

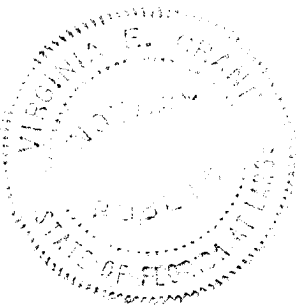
B. E. Shoup

Sworn to and subscribed before me at Orlando, Florida,
Orange County, Florida, this 12th
day of May, 1981.

Virginia E. Crane
NOTARY PUBLIC

My commission expires:

July 21, 1984



JOINT PERMIT APPLICATION
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ATTACHMENT TO SECTION 6

6. DESCRIPTION OF PROPOSED ACTIVITY

The activities that will involve dredge and fill work in wetland areas are related to the proposed Curtis H. Stanton Energy Center, Unit 1, by the Orlando Utilities Commission. The Energy Center will consist of a 460 MW coal-fired power station, its directly associated facilities, access railroad, access road, transmission lines, and makeup water and return pipelines.

The amounts of excavated and fill materials for the various areas are as follows.

A. Main Plant Site. The main structures and coal railroad will be located on fill.

Volume of Dredged/Excavated Material:

0	CY	3,400,000	CY
Waterward of MHW		Landward of MHW	

Volume of Filled/Deposited Material:

0	CY	2,826,200	CY
Waterward of MHW		Landward of MHW	

B. Access Railroad. Approximately 17.5 miles of railroad roadbed will be constructed.

Volume of Dredged/Excavated Material:

0	CY	34,600	CY
Waterward of MHW		Landward of MHW	

Volume of Filled/Deposited Material:

53,500	CY	503,750	CY
Waterward of MHW		Landward of MHW	

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C. Access Road. Approximately 7 miles of roadway roadbed will be constructed.

Volume of Dredged/Excavated Material:

0		15,000
Waterward of MHW	CY	Landward of MHW

Volume of Filled/Deposited Material:

0		113,800
Waterward of MHW	CY	Landward of MHW

D. Transmission Line.

Volume of Dredged/Excavated Material:

0		0
Waterward of MHW	CY	Landward of MHW

Volume of Filled/Deposited Material:

0		0
Waterward of MHW	CY	Landward of MHW

E. Makeup and Return Water Pipelines.

Volume of Dredged/Excavated Material:

0		0
Waterward of MHW	CY	Landward of MHW

Volume of Filled/Deposited Material:

0		0
Waterward of MHW	CY	Landward of MHW

The detailed breakdown of quantities and description of the above activities are presented in Section 15 of this application.

JOINT PERMIT APPLICATION
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ATTACHMENT TO SECTION 8

8. Name and address including zip code of adjoining property owners whose property also adjoins the waterway.*

Richard W. Sherwin, Trust
c/o Thomas H. Warlick, Esq.
210 E. Colonial Dr.
Orlando, FL 32801

Cape Orlando Corp.
c/o Magna Properties, Inc.
P.O. Box 2449
Pompano Beach, FL 33061

Harry H. Hansbrough, Trust
1607 Lee Rd.
Winter Park, FL 32789

Dayron Corp.
P.O. Box 20394
Orlando, FL 32814

John J. & Tosi Jo Brunetti
Frank J. Fiore
200 Route 9
Old Bridge Road, N.J. 08857

Charles E. Bradshaw, Jr.
P.O. Box 7853
Orlando, FL 32854

Leedy Corp. et al.
216 E. Jackson
Orlando, FL 32801

Dorothy W. Edward & James Poitras Trust
c/o Maury Carter
P.O. Box 8821
Orlando, FL 32856

Sun First National Bank of Orlando
c/o Florida Ranch Lands, Inc.
1500 Pan American Bldg.
Orlando, FL 32801

James E. Strates
P.O. Box 55
Orlando, FL 32802

*Partial List. The complete list will be provided shortly.

JOINT PERMIT APPLICATION
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ATTACHMENT TO SECTION 8

8a. Name and address including zip code of adjoining property owners whose property adjoins* a waterway in which fill is being placed and a 404 Permit is required.

Trestle 3

Richard W. Sherwin, Trust
c/o Thomas H. Warlick, Esq.
210 E. Colonial Dr.
Orlando, FL 32801

Orlando Rifle Association
c/o Odell Warren
910 S. Osceola
Orlando, Florida 32806

Harry H. Hansbrough, Trust
1607 Lee Rd.
Winter Park, FL 32789

Dayron Corp.
P.O. Box 20394
Orlando, FL 32814

Trestle 4

John J. & Tosi Jo Brunetti
Frank J. Fiore
200 Route 9
Old Bridge Road, N.J. 08857

Charles E. Bradshaw, Jr.
P.O. Box 7853
Orlando, FL 32854

Trestle 9

City National Bank of Miami
Trustee #P-258 (5000937)
P. O. Box 013280
Miami, Florida 33101
Orange County, Florida
2450 33rd Street
Orlando, Florida 32805

*Meaning property adjoining future OUC property within the wetland area of concern.

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JOINT PERMIT APPLICATION
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ATTACHMENT TO SECTION 9

9. Location where proposed activity exists or will occur.

Street Address: NA.

Longitude:* 81° 09' 40" Latitude:* 28° 28' 50".

<u>Section</u>	<u>Township</u>	<u>Range</u>
33, 34	21S	31E
3, 10, 15, 22, 23, 26, 27, 34, 35	22S	31E
7, 18, 19, 30, 31	23S	32E
2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 23, 24, 25	23S	31E
6	24S	32E
1, 2, 3, 8, 9, 10, 17, 18	24S	31E
13, 16, 17, 18, 21, 22, 23, 24, 26, 27	24S	30E
13, 14	24S	29E

*Coordinates computed at approximate center of main plant site.

JOINT PERMIT APPLICATION
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ATTACHMENT TO SECTION 15

15. REMARKS

A. DESCRIPTION OF PROPOSED PROJECT

The Orlando Utilities Commission proposes to construct a 460 MW, coal-fueled electric generating station to be named the Curtis H. Stanton Energy Center. Unit 1 construction is scheduled to commence January 1, 1983 and to be completed December 31, 1986.

The proposed facility will be located in Orange County, approximately 8 miles northeast of the Orlando International Airport and one mile north of the Bee Line Expressway. The general location of the project is shown on Figure 15-1.

The main plant site will contain approximately 3,280 acres within its boundaries. The proposed energy center facilities are described in Section 3.0 of the Applicants' Site Certification Application (SCA). Figure 15-2 shows the site arrangement.

Additional plant facilities which are not located within the main plant site boundary are as follows.

1. Access Railroad. This single track railroad will connect the plant railroad loop with the Seaboard Coast Line Railroad mainline near Taft, approximately 10 miles southwest of the plant site. Unit train traffic will provide the coal supplies necessary for plant fuel. The track will also provide for delivery of heavy plant equipment and materials such as boiler and turbine-generator parts, transformers, and structural steel components. Figures 15-3 and 15-4 show the proposed alignment of this railroad. The overall length of track, from the south plant site boundary to its connection with the Seaboard Coast Line mainline is 17.5 miles. One mile south of the plant site, the railroad will cross under the Bee Line Expressway. The existing bridges will be raised approximately 9 feet to provide adequate clearance. Figure 3.9-5 of the SCA shows the proposed modification.

JOINT PERMIT APPLICATION
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ATTACHMENT TO SECTION 9

9a. Location where proposed activity exists or will occur.

Street Address: NA.

Longitude:* 81° 09' 40" Latitude:* 28° 28' 50".

<u>Section</u>	<u>Township</u>	<u>Range</u>
33, 34	21S	31E
3, 10, 15, 22, 23, 26, 27, 34, 35	22S	31E
7, 18, 19, 30, 31	23S	32E
2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 23, 24, 25	23S	31E
6	24S	32E
1, 2, 3, 8, 9, 10, 17, 18	24S	31E
13, 16, 17, 18, 21, 22, 23, 24, 26, 27	24S	30E
13, 14	24S	29E

9b. Location where proposed activity will occur and requires a 404 Permit.**

<u>Area</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>
Trestle 3	11	245	31 E
Trestle 4	10	245	31 E
Trestle 9	21	245	30 E

*Coordinates computed at approximate center of main plant site.

**All other dredge and fill activities associated with other areas must meet the requirements of the Nationwide Permit.

2. Access Road. The main vehicular link of the plant site with the state highway system will be through a new access road, approximately 7 miles long, which will connect with State Highway 50 north of the plant site. The proposed route of the access road is shown on Figures 15-3 and 15-5. A two-mile segment of this road will parallel an existing transmission corridor in the east-west direction approximately one-half mile north of the plant site boundary. Approximately two miles of the access road to its connection with Highway 50, will coincide with an existing county road.
3. Makeup Supply and Return Water Pipelines. These will supply cooling tower makeup water from and return cooling tower blowdown to the new Iron Bridge Road Water Pollution Control Facility located approximately 9 miles north of the plant site. The pipelines will follow the plant access road right-of-way to Highway 50, parallel the highway for approximately one mile, and continue north along the right-of-way of Highway 520. The proposed alignment is shown on Figures 15-3 and 15-5.
4. Transmission Lines. Power generated at the new plant will be fed to the existing transmission system through two new transmission lines. One will utilize available space on existing towers along the line from the Indian River Plant to Pershing Substation located approximately 7 miles west of the plant site. The second line will require new towers which will be placed beside the existing towers by expanding the above corridor to the north. The new transmission lines will be terminated approximately 4 miles west of the plant site at the existing Florida Power Corporation transmission line running north to the Rio Pinar Substation. The proposed transmission route is shown on Figures 15-3 and 15-6.

B. NEED FOR PROPOSED WORK

The proposed energy center will serve the growing demand of the Applicants' service areas. In addition, the new facility will offset the level of oil consumption within the Applicants' system.

The projected need for the facilities is demonstrated in the Need For Power Document submitted by OUC to the Florida Public Service Commission.

The primary fuel for the plant will be midwestern coal which will be transported to the site by unit trains operating on the Seaboard Coast Line Railroad tracks within Florida to just south of the town of Taft. From there, the unit train traffic will operate on the plant access railroad track to bring the coal to the site unloading facility. The interconnection with the Seaboard Coast Line is the most advantageous from an economic and environmental standpoint. Not only will it provide an economical and reliable mode for fuel transportation, but it will allow for an efficient delivery of construction materials and plant equipment which are too large and heavy to be transported over the road.

Access to the plant site during both construction and plant operation will be gained through the plant access road. Connection with Highway 50 was preferred over connection with the Bee Line Expressway so that high speed traffic over the tollway would not be disrupted by slow moving construction vehicles and equipment. In addition, it is expected that the majority of the construction force will travel over Highway 50 to reach the site.

The source of cooling water for the plant will be effluent from the Iron Bridge Facility. The makeup water pipeline will supply cooling tower makeup to the plant for onsite storage. During periods of high rainfall, cooling tower makeup needs will be partially satisfied by site runoff which will be collected in the makeup water supply storage pond.

Blowdown from the cooling towers will be returned to the Iron Bridge Facility for treatment. A second, smaller pipeline, parallel to the water supply pipeline, will return the blowdown to the Iron Bridge Facility.

Power generated at the new plant must be distributed to the various participants' systems. The existing transmission line corridor presently connecting the Indian River Plant with the Pershing Substation, provides the most efficient and economical route for the new transmission lines. Widening of the existing corridor will be the only requirement to accommodate the set of new towers.

C. ALTERNATIVES CONSIDERED

An extensive site study was undertaken to determine the most advantageous site location. This study took into consideration the load center

to be served, available resources, fuel delivery, economics, preservation of the environment, engineering factors, demography, meteorology, access, and availability of labor force. The proposed site location, shown on Figure 15-1, offered the most advantageous combination of the above factors.

Additional studies were performed to determine the optimum orientation of facilities within the selected site area. Major consideration was given to plant operational requirements, preservation of the wetlands, and effects on the environment. The site arrangement depicted on Figure 15-2 represents the configuration which best accommodates both engineering and environmental factors. Wetlands and other environmentally sensitive areas within the plant site boundaries are identified on Figures 2.1-5 and 2.7-2 of the SCA. A detailed discussion of the site selection process is presented in Section 8.1 of the SCA.

Extensive studies were performed on the railroad alignment to maintain economy and to avoid significant impact on the environment and on developed areas. A route was finally selected which crosses the minimum amount of wetlands, and utilizes existing corridors which have already been disturbed by other activities. It becomes evident from Figures 15-3 and 15-4 that even though the route selected is not the most direct between the plant site and the Seaboard Coast Line mainline, it is one that infringes the least on sensitive areas. Wetlands and other environmentally sensitive areas within the proposed railroad corridor are shown on Figure 2.7-7 of the SCA.

The route selected was inspected in the field with a representative from the DER. The DER recommended realignment of the track in the vicinity of Station 32+500 (Figure 15-3) to cross Hart Branch (tributary to Lake Hart) downstream from its confluence with two small tributaries which join it in that area. In addition, the alignment of the railroad will stay as close as feasible to the right-of-way of State Highway 537 in the vicinity of Station 72+000 (Figure 15-4) where it crosses Boggy Creek Canal to minimize the impact on the wetland.

Various transmission line routes were studied and the final route was inspected in the field with a representative of the DER. The recommended

alignment is shown on Figures 15-3 and 15-6. The entire route is along an existing corridor connecting the Indian River Plant with the Pershing Substation. The only impact will result from widening of the corridor. No new access roads will be required.

The plant access road was aligned to follow an existing disturbed corridor along the transmission line, or along an existing graded right-of-way, as shown on Figures 15-3 and 15-5. An alternate route would have connected the plant site with the Bee Line Expressway approximately one mile south. It was determined that the impact of heavy, slow moving construction traffic on the toll expressway would have an undesirable impact. In addition, the majority of the construction work force is expected to come from the area northwest of the site, more easily accessible to Highway 50. The proposed access road route connecting with Highway 50 was also reconnoitered with the DER representative and no changes resulted from this investigation.

The makeup and return water pipelines have been routed within the right-of-way of existing or proposed roads, as shown on Figures 15-3 and 15-5. The impact of such routing is minimal.

D. DREDGE AND FILL

The major dredge and fill impact from the proposed project on the environment will be a result of construction activity within the wetlands, particularly deposition of fill material. Extensive field investigations based on vegetative cover, and soil types have assisted in the identification of such areas within the plant site boundaries and along the various access corridors. These are shown on Figures 2.7-2, 2.7-7, 2.7-8, and 2.7-9 of the Site Certification Application.

Investigations of alternate site arrangements and routes for the access railroad, access road, transmission lines, and pipelines were based on vegetation and soils maps, aerial photographs, and topographic maps produced by the U.S. Geological Survey.

1. Main Plant Site

Existing grade elevations within the plant site vary from approximately 55 feet msl to 90 feet msl. The majority of the plant site drains toward

the Econlockhatchee River to the east through smaller tributaries such as Cowpen Branch, Hart Branch, Green Branch, and an unnamed tributary. These are shown on Figure 2.5-5 of the SCA.

Due to the relatively flat topography, the predominant mode of flooding is overland sheet flow. This mode causes shallow flooding over extensive areas. The 100-year flood levels computed by the U.S. Geological Survey and shown on the Flood Prone Area maps, vary from elevation 60 to elevation 90. These flood prone areas within the plant site are shown on Figure 2.5-6 of the SCA.

Old 80 Ground floor elevations for plant structures have been established as elevation (82). Due to the extensive flood prone areas present, a significant portion of the plant site will require fill to provide protection from the 100-year flood levels. The areas within the plant site which will require fill or excavation are shown on Figure 15-7. Approximately 380 acres will require fill and 437 acres will require excavation. The total amount of fill to be placed will be 2,826,000 cubic yards. This will require the excavation of 3.4 million cubic yards of material assuming a 20 per cent shrinkage factor. The excavated material will be produced from the upland areas of the plant site. The breakdown of fill required for the various parts of the site is shown in Table 15-1. Approximately 125 acres of isolated wetland areas will be filled and/or cleared. This represents only 24 per cent of the total present within the site boundaries. The environmental considerations of plant construction and operation are described in detail in Sections 4.0 and 5.0 of the SCA.

2. Access Railroad

The main issues considered in the selection of the railroad alignment were the following.

(a) Environmental impacts of dredging and filling within the wetlands present along the way were minimized by selecting a route which avoided wetland areas to the greatest extent possible. A typical railroad cross section is shown on Figure 15-8. Embankment depths average less than 5 feet in height. The total width of disturbance from toe to toe of the embankment will vary from 30 to 74 feet. Where possible, the side slopes

of the embankment will be reduced to steeper than 3H to 1V to reduce the disturbance width, particularly in wetland areas. Environmental impact within the wetlands will be minimized by trestle-type crossings of various lengths at the most sensitive areas and culverts to maintain sheet flow. This type of construction eliminates the necessity to dredge, demuck, or fill, and allows for free passage of sheet flow through the wetland. The required lengths of trestle were computed on the basis of hydrological considerations, as will be described in (b) of this subsection. The locations of the proposed trestles are shown on Figures 15-3 and 15-4. The proposed lengths are shown in Table 15-2. Typical trestle construction is shown on Figures 15-9 and 15-10. Trestles will be constructed of all precast concrete materials which is typical for such structures in this type of environment. The construction shown has been adapted from the standards of the Seaboard Coast Line Railroad. The lengths of trestles were determined as integer multiples of 24-foot spans to standardize the precast component production and achieve economy. In areas where flows are small or where equalization of water levels on two sides of a wetland is required, corrugated metal pipe or arch culverts of the appropriate size will be provided. Their locations are shown on Figures 15-3 and 15-4, and their sizes listed in Table 15-3. A field investigation of the proposed trestle and culvert locations with a representative of the DER revealed complete satisfaction on environmental issues. Detailed descriptions of the environmental considerations within the access railroad corridor are presented in Sections 4.0 and 5.0 of the SCA.

Fill material for embankment construction will be obtained from borrow locations in the upland areas. A certain amount will be produced from cuts in high areas along the route. Table 15-4 shows the amount of excavation or fill required along the alignment stations shown in Figures 15-3 and 15-4. (b) Surface runoff. When an embankment is constructed across a drainage route it creates a constriction which can cause two effects: excessive flooding upstream and erosion immediately downstream of the flow opening. These effects are both caused by inadequate passage opening provided through the embankment. The impact criteria used to size the trestles under the

railroad embankment at drainage locations were that the flow velocities will be 3 feet per second or less, and that the headwater buildup on the upstream side will be minimal, considering the flatness of the topography. Because of the sandy soils present in the areas, a non-eroding velocity of 3 fps is considered as an upper limit. Additional rip-rap will be provided with trestles T9 and T10 for erosion control since the design flow velocities are slightly greater than 3 fps. The drainage basins contributing flows along the access railroad are shown on Figures 15-11 and 15-12. Flood flows for these areas were determined based on the methodology presented in the publication "Using the Cypress Creek Formula to Estimate Runoff Rates in the Southern Coastal Plain and Adjacent Flatwoods Land Resource Areas" by J. C. Stephens and W. C. Mills. This information, as well as estimated 100-year peak flow rates for the indicated trestle locations, were provided by Mr. Charles A. Hall, Director of the Water Management Division of the South Florida Water Management District. Table 15-5 shows the applicable parameters and computed 100-year flood flows for the various drainage basins.

Trestle lengths and culvert sizes resulting from flow requirements are shown in Tables 15-2 and 15-3. Additional considerations, however, also become factors for the final sizing of the trestles. These involve sheet flows through the wetlands and preservation of the environment in its original condition to the greatest extent possible. For this reason, the proposed final lengths of the trestles along the railroad have been modified as presented in Table 15-2. The proposed trestle lengths have been discussed with DER representatives during a field visit and found to be acceptable from the environmental standpoint.

At locations where a culvert is required for water level equalization, a minimum culvert size of 30 inches will be used to prevent plugging by debris, silt, etc. At trestle location T8, because of the interconnection with the Boggy Creek Canal drainage, part of the flow will be allowed to flow directly to Boggy Creek Canal. Therefore, a 24-foot trestle will be provided only for environmental reasons. Boggy Creek Canal drains a significant area upstream of the Bee Line Expressway as well as the entire

Orlando International Airport area. Information provided by the Greater Orlando Airport Authority indicates that the design flow in Boggy Creek Canal is

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3,000 cfs. The releases from the airport drainage system have been designed so that they do not cause adverse effects where they meet existing drainage structures such as the bridge on State Highway 527 where it crosses Boggy Creek Canal. The proposed plant access railroad trestle has therefore been sized to match the existing 180 foot long bridge at that location. Since the two structures will be parallel and at close spacing to each other, this configuration will maintain existing conditions.

After initial review of this application, a letter dated December 7, 1981 was sent from Algis G. Taruski of the Department of the Army, Corps of Engineers, to the Orlando Utilities Commission indicating that additional information was required on Trestles 3, 4, 5, 6, 7, and 9. The letter also stated that the fill associated with Trestles 3 and 4 would require a 404 Permit and that the fill associated with Trestles 5, 6, 7, and 9 may qualify under the Nationwide Permit pending review of the requested additional information. On January 28, 1982 a field trip to the above trestle locations was made by the Corps of Engineers, Orlando Utilities Commission, Saint Johns River Water Management District, Black & Veatch, and Environmental Science and Engineering representatives. At this time the additional information requested by the Corps of Engineers was provided and it was concluded that Trestles 3, 4, and 9 would require a 404 Permit while Trestles 5, 6, and 7 met the requirements of the Nationwide Permit. On February 9, 1982 OUC and Black & Veatch again met with the Corps of Engineers representatives to formally submit the information requested to process a 404 Permit for Trestles 3, 4, and 9. The same information appears in the Site Certification Application Amendment 5.

Figures 15-8a through 15-8f show plan and profile information for the proposed fill and trestles in trestle areas 3, 4, 5, 6, 7, and 9. Fill activities associated with Trestles 5 and 6 meet the conditions of the Nationwide Permit because of the limited length and quantity of fill within the wetland. Trestle 7 also meets the conditions for a Nationwide Permit since the average annual flow through the trestle is less than 5 cfs.

3. Access Road

The considerations that apply to the access road are the same as those discussed for the access railroad. A typical road section is shown on Figure 15-13. Since the access road follows existing corridors for 4 of the total 7 miles, the environmental impact is minimal. The route is generally along a ridge; therefore the wetland crossings are practically nonexistent. Figures 15-11 and 15-14 show the drainage basins which contribute flows under the road embankment. Table 15-6 shows the size of the basins, the computed design flows, and resulting culvert sizes. No trestles are proposed for the access road. A detailed description of the environmental considerations within the access road corridor is presented in Sections 4.0 and 5.0 of the SCA.

Fill material for embankment construction will be obtained from borrow locations in the upland areas. Table 15-7 shows the amount of fill required for the access road along the alignment stations shown on Figures 15-3 and 15-5.

A field reconnaissance of the proposed culvert locations along the access road with a representative of the DER revealed that the proposed locations and sizes are satisfactory from the environmental standpoint.

4. Transmission Line

Almost the entire length of the proposed transmission line is along an existing transmission corridor, as shown on Figures 15-3 and 15-6.

Since the existing corridor already includes an access roadway to the transmission towers, no new fill will be required. Detailed descriptions of the environmental considerations for the transmission corridor are presented in Sections 4.0 and 5.0 of the SCA.

5. Makeup and Return Water Pipelines

The entire length of the proposed makeup and return water pipelines is along an existing or new right-of-way, as indicated on Figures 15-3 and 15-5. The pipelines will be laid in a trench in a cut and cover operation. The finished contours along the covered trench will be the same as the undisturbed grade contours. At the point where Highway 50 crosses the Little Econlockhatchee River, the pipelines will be suspended from the existing bridge structure.

E. CONSTRUCTION

Construction methods pertaining to dredge and fill operations for the main plant and associated facilities have been determined on the basis of maps, aerial photos, site reconnaissance, environmental investigations, and preliminary soil exploration.

Preliminary soil investigations indicate that the major plant structures will be supported on piles driven through engineered site fill and in situ material. Clearing of the land will be required prior to placing of site fill material. Any significant layers of incompetent, organic material that might be encountered will be removed prior to fill operations.

The material for site fill will be obtained from onsite sources. A detailed description of the in-situ soils, as obtained from the preliminary soil exploration program, is presented in Section 2.4 of the SCA. No spoil material will be deposited in the wetlands. Since most spoil material is organic in nature and not useful as structural fill, nearly all of what would be spoil material will be utilized for topsoil cover to promote vegetation growth over structural fill areas, slopes, etc.

Site preparation operations will be performed with a variety of construction equipment including scrapers, bulldozers, graders, rollers, haul trucks, water trucks, and draglines. Organic vegetation collected as a result of clearing will be initially logged and the remainder will be

burned. Pond embankments will be constructed from suitable onsite available material. Soil cement slope protection will be provided where required. All other erosion protection will be through vegetative cover. Ponds requiring sealing against seepage will be sealed with a layer of bentonite clay. A detailed description of pond requirements is provided in Section 3.10 of the SCA.

The railroad embankment will be constructed from material borrowed from the highlands or material resulting from local excavation. No spoil material will be deposited in the wetlands. Embankment construction will require vegetation clearing and removal of incompetent organic material. The extent of such removal will be determined at a later time when a detailed soil exploration and topographic mapping program is completed along the corridor. Railroad trestle construction will be from all precast concrete materials as shown on Figures 15-9 and 15-10. Vegetation clearing will be required at trestle locations but no removal of in-situ soil material will be required. The precast concrete construction will eliminate most of the debris resulting from the cast-in-place concrete construction such as forms, concrete spatter, reinforcing steel scrap, etc. Slope protection around trestle abutments will be limestone riprap or soil cement. Culverts will be corrugated metal pipe or arch, galvanized. Soil cement or limestone riprap slope protection will be provided around the inlets and outlets. Minimum size will be 30-inch diameter.

Equipment required for trestle erection will include cranes, trucks, pile drivers, and miscellaneous small equipment. The contractor will be responsible for regrading of disturbed wetland bottom areas to bring the soil conditions to near original condition, particularly in areas adjacent to trestles that may be disturbed during construction. Earthwork will require the same type of equipment as for site preparation. Trackwork construction will proceed from the west end where the access railroad joins the Seaboard Coast Line mainline. Ballast, ties, rail, and other hardware will be brought in by rail car and positioned as required. Access for construction and track maintenance will be provided by the railroad roadbed. No additional maintenance road will be required.

The access road embankment will be constructed from material obtained from the uplands. Paving materials will be brought in by truck. Earthwork construction will proceed with equipment similar to those required for site preparation and railroad embankment. Rollers will be required for the compaction of paving. Vegetation clearing and muck removal requirements are the same as for the railroad. It is not anticipated that trestle construction will be required. However, cast-in-place concrete box culverts may be required at one location. The rest of the culverts will be of the same construction as those under the railroad.

Pipeline construction will be confined along and within the right-of-way of the existing road or the proposed new access road. Trenching will be performed with backhoes. Trenched material will be stored temporarily along the trench. Imported crushed limerock bedding material will be deposited with loaders. Backfill material will be compacted with vibratory compactors and the final contours brought to the same elevation as the original grade. Pre-existing vegetative cover will be re-established.

Transmission line construction will involve the widening of the existing corridor by clearing of trees and tall vegetation as shown on Figure 15-15. The vegetative debris resulting from clearing operations will be stockpiled and burned. New transmission towers will be supported by piles. No earthwork operations are anticipated since access is already available.

F. HAZARDOUS MATERIALS

The proposed project will not involve the handling of hazardous materials in connection with the dredge and fill operations.

LIST OF TABLES

- 15-1 Fill Requirements for Plant Site Areas
- 15-2 Proposed Trestle Lengths Along Access Railroad
- 15-3 Proposed Culvert Sizes Along Access Railroad
- 15-4 Excavation and Fill Amounts Along Access Railroad
- 15-5 Drainage Basin Flood Flows Along Access Railroad
- 15-6 Design Flows and Culverts Along Access Road
- 15-7 Excavation and Fill Amounts Along Access Road

LIST OF FIGURES

- 15-1 General Site Vicinity Map
- 15-2 Site Arrangement
- 15-3 Plant Facility Corridors/Central Area
- 15-4 Plant Facility Corridors/West Area
- 15-5 Plant Facility Corridors/North Area
- 15-6 Plant Facility Corridors/Northwest Area
- 15-7 General Site Fill Concept
- 15-8 Typical Railroad Section
- 15-8a Proposed Fill and Trestle Number 3
- 15-8b Proposed Fill and Trestle Number 4
- 15-8c Proposed Fill and Trestle Number 5
- 15-8d Proposed Fill and Trestle Number 6
- 15-8e Proposed Fill and Trestle Number 7
- 15-8f Proposed Fill and Trestle Number 9
- 15-9 Typical Trestle Section
- 15-10 Typical Trestle Profile
- 15-11 Central Area Drainage Basins
- 15-12 West Area Drainage Basins
- 15-13 Access Road Cross Section
- 15-14 North Area Drainage Basins

5

5

TABLE 15-1. FILL REQUIREMENTS FOR PLANT SITE AREAS

<u>Area</u>	<u>Fill</u> cu-yards in place
Main Plant Complex	1,436,000
Coal Handling Area	170,000
Construction Laydown Area	170,000
Coal Loop Railroad	400,000
Plant Railroad	116,000
Runoff Pond Dike	325,000
Roads	<u>209,000</u>
Total	2,826,000

TABLE 15-2. PROPOSED TRESTLE LENGTHS ALONG ACCESS RAILROAD

<u>Location</u>	<u>Station</u>	<u>100-Year Flood Elevation</u> feet msl	<u>Required Length</u> feet	<u>Proposed Length</u> feet	4
T1	3+200	75.0	38	192	
T2	9+500	74.0	16	72	
T3	19+000	72.5	37	96	
T4	25+500	75.0	35	144	
T5	32+400	77.0	32	96	
T6	39+200	76.5	73	288	
T7	62+800	77.5	13	48	
T8	67+800	76.0	1	48	
T9	72+200	75.0	75	192	
T10	83+800	85.0	32	48	
T11	86+700	85.0	27	96	
T12	89+100	84.5	14	48	

originally 216
5

TABLE 15-2. PROPOSED TRESTLE LENGTHS ALONG ACCESS RAILROAD

<u>Location</u>	<u>Station</u>	<u>100-Year Flood Elevation</u> feet msl	<u>Required Length</u> feet	<u>Proposed Length</u> feet
T1	3+200	75.0	55	192
T2	9+500	74.0	27	72
T3	19+000	73.5	44	96
T4	25+500	75.0	82	144
T5	32+400	77.0	43	96
T6	39+200	76.5	138	288
T7	62+800	77.5	115	216
T8	67+800	76.0	24	24
T9	72+200	75.0	*	192
T10	83+800	85.0	40	48
T11	86+700	85.0	44	96
T12	89+100	84.5	20	48

*No required length due to flow has been computed. Proposed length is based on length of existing highway trestle.

TABLE 15-3. PROPOSED CULVERT SIZES ALONG ACCESS RAILROAD*

<u>Location</u>	<u>Station</u>	<u>Size</u> <u>inches</u>
C1	0+500	30
C2	10+000	30
C3	46+200	30
C4	51+300	30
C5	57+500	30
C6	58+500	30
C7	76+000	30
C8	79+000	30

*These do not include the culverts associated with Trestles 3, 4, 5, 6, 7, and 9 as shown on Figures 15-8a, 15-8b, 15-8c, 15-8d, 15-8e, and 15-8f, respectively.

TABLE 15-4. EXCAVATION AND FILL QUANTITIES ALONG ACCESS RAILROAD*

<u>Station</u>	<u>Fill</u>	<u>Cut</u>	<u>Cumulative</u>	
			<u>Fill</u>	<u>Cut</u>
0+000				
	57,000	--	57,000	--
10+000				
	79,000	--	136,000	--
20+000				
	61,000	31,000	197,000	31,000
30+000				
	57,000	1,000	254,000	32,000
40+000				
	30,000	2,000	284,000	34,000
50+000				
	29,000	1,000	313,000	35,000
60+000				
	78,000	--	391,000	35,000
70+000				
	89,000	--	480,000	35,000
80+000				
	62,000	--	542,000	35,000
90+000				
	15,000	--	557,000	35,000
92+650				

*All quantities in cubic yards.

TABLE 15-4. EXCAVATION AND FILL QUANTITIES ALONG ACCESS RAILROAD*

<u>Station</u>	<u>Fill</u>	<u>Cut</u>	<u>Cumulative</u>	
			<u>Fill</u>	<u>Cut</u>
0+000	57,000	--	57,000	--
10+000	79,000	--	136,000	--
20+000	51,000	31,000	187,000	31,000
30+000	47,000	1,000	234,000	32,000
40+000	20,000	2,000	254,000	34,000
50+000	19,000	1,000	273,000	35,000
60+000	68,000	--	341,000	35,000
70+000	86,000	--	427,000	35,000
80+000	62,000	--	489,000	35,000
90+000	15,000	--	504,000	35,000
92+650				

*All quantities in cubic yards.

TABLE 15-5. DRAINAGE BASIN FLOOD FLOWS ALONG ACCESS RAILROAD

<u>Basin No.</u>	<u>Drainage Area acres</u>	<u>Flood Flow cfs</u>
1	1,338	330
2	710	200
3	2,676	595
4	5,286	1,045
5	2,301	520
6	6,051	1,170
7	552	160
8	21	10
9	18,500	3,000
10	630	180
11	1,339	330
12	366	120

5

4

TABLE 15-5. DRAINAGE BASIN FLOOD FLOWS ALONG ACCESS RAILROAD

<u>Basin No.</u>	<u>Drainage Area acres</u>	<u>Flood Flow cfs</u>
1	1,388	330
2	710	200
3	2,319	530
4	5,644	1,100
5	2,301	520
6	6,474	1,240
7	4,160	860
8	340	110
9	18,500	3,000
10	630	180
11	1,339	330
12	366	120

TABLE 15-6. DESIGN FLOWS AND CULVERTS ALONG ACCESS ROAD

<u>Drainage Basin No.</u>	<u>Basin Area acres</u>	<u>Design Flow cfs</u>	<u>Culvert Size inches</u>
1A	226	75	2-58" x 36"*
2A	192	65	2-50" x 31"*
3A	221	75	4-36" x 22"*
4A	121	45	2-43" x 27"*
5A	73	30	2-30"
6A	101	40	2-42"
7A	43	20	1-43" x 27"*
8A	1,295	325	2-8'-2" x 5'-9"*
9A	121	45	2-43" x 27"*
10A	179	65	2-50" x 31"*
11A	41	20	1-43" x 27"*

*Pipe-arch culverts.

TABLE 15-6. DESIGN FLOWS AND CULVERTS ALONG ACCESS ROAD

<u>Drainage Basin No.</u>	<u>Basin Area acres</u>	<u>Design Flow cfs</u>	<u>Culvert Size inches</u>
1A	226	75	2-58" x 36"*
2A	192	65	2-50" x 31"*
3A	221	75	4-36" x 22"*
4A	121	45	2-43" x 27"*
5A	73	30	2-30"
6A	101	40	2-42"
7A	43	20	1-42"
8A	1,295	325	2-8'-2" x 5'-9"*
9A	390	120	2-72" x 44"*
10A	69	30	1-42"

*Pipe-arch culverts.

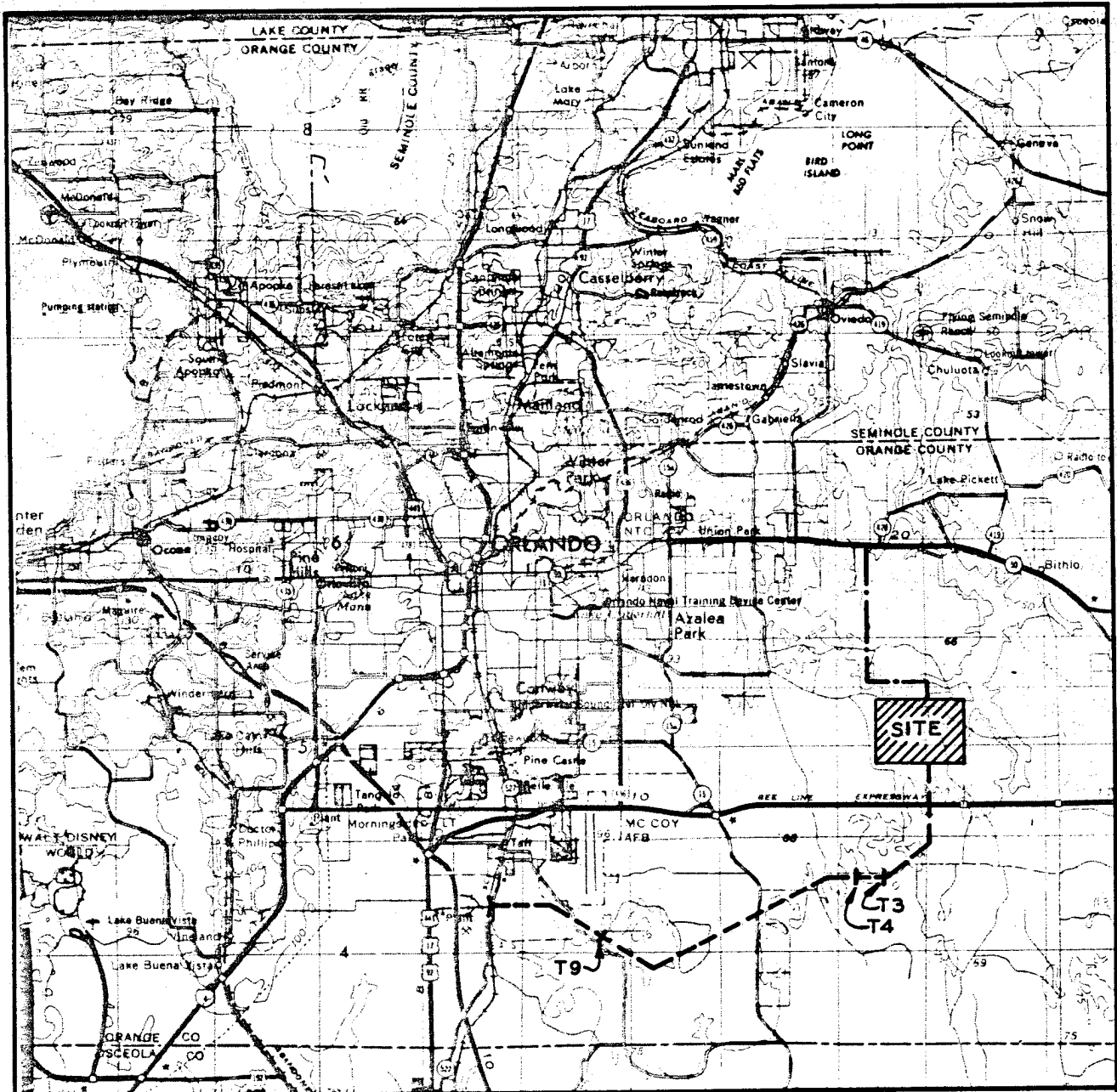
TABLE 15-7. EXCAVATION AND FILL QUANTITIES ALONG ACCESS ROAD*

Station	Fill	Cut	Cumulative	
			Fill	Cut
0+000 (HWY 50)				
	43,300	26,291	43,300	26,291
10+000	18,900	43,911	62,200	70,202
20+000	15,989	39,710	78,189	109,912
30+000	19,640	6,003	97,829	115,915
36+300 (Edge of Site)				

*All quantities in cubic yards.

Image Quality

As you review the next group of images, Please note that the original documents were of poor quality.



5 0 5 MILES

SCALE IN MILES

LEGEND

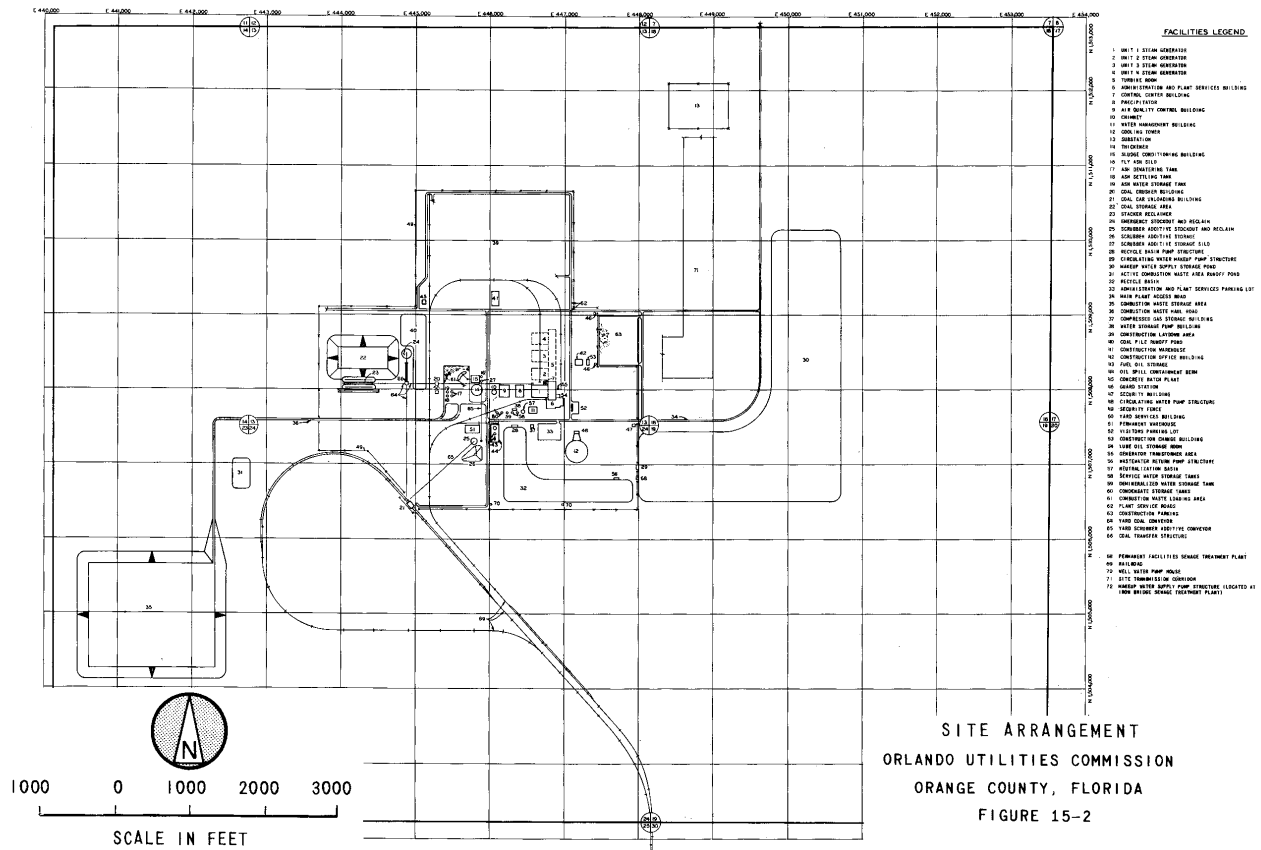
----- RAILROAD
 - - - - - ROADWAY

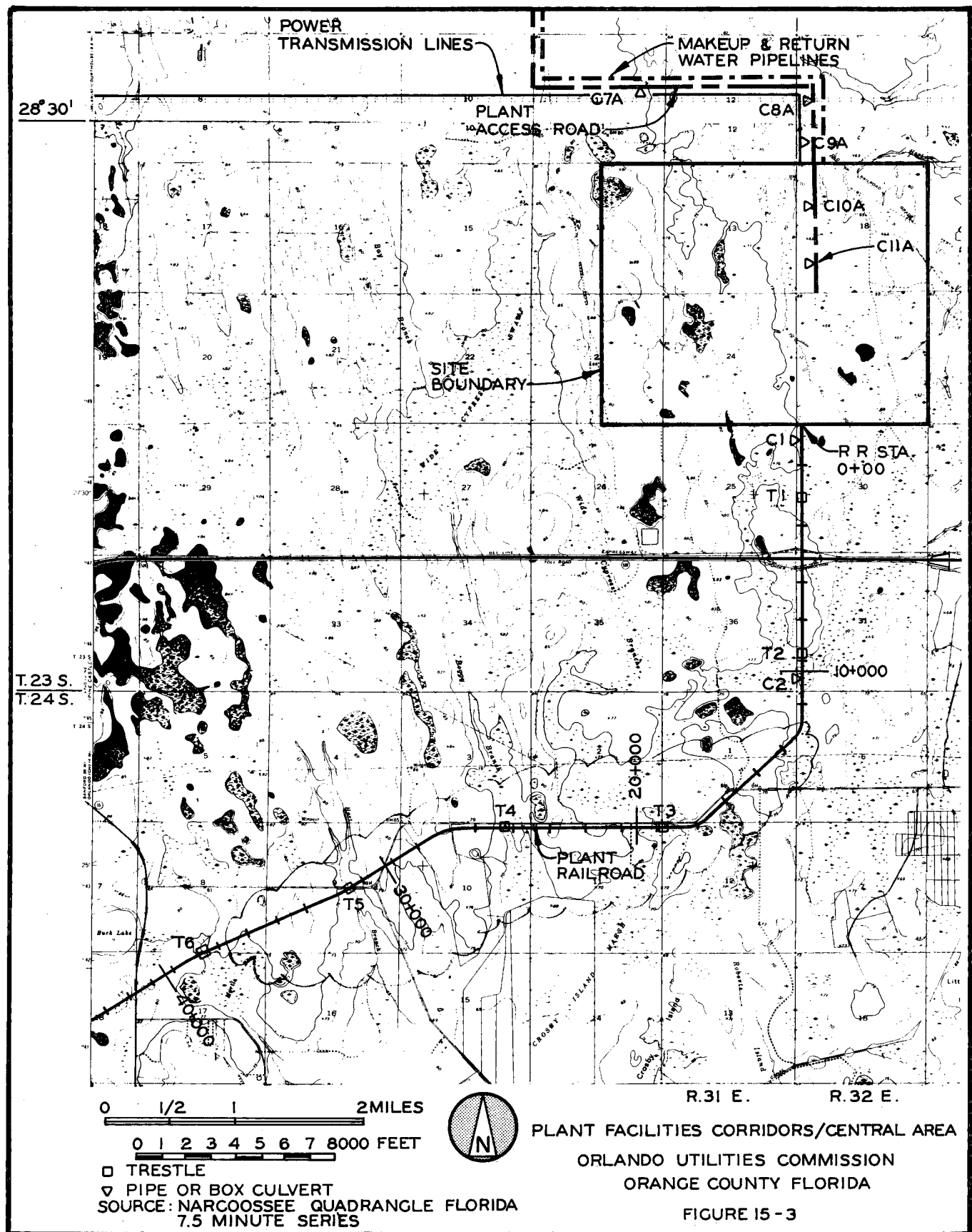
GENERAL SITE VICINITY MAP

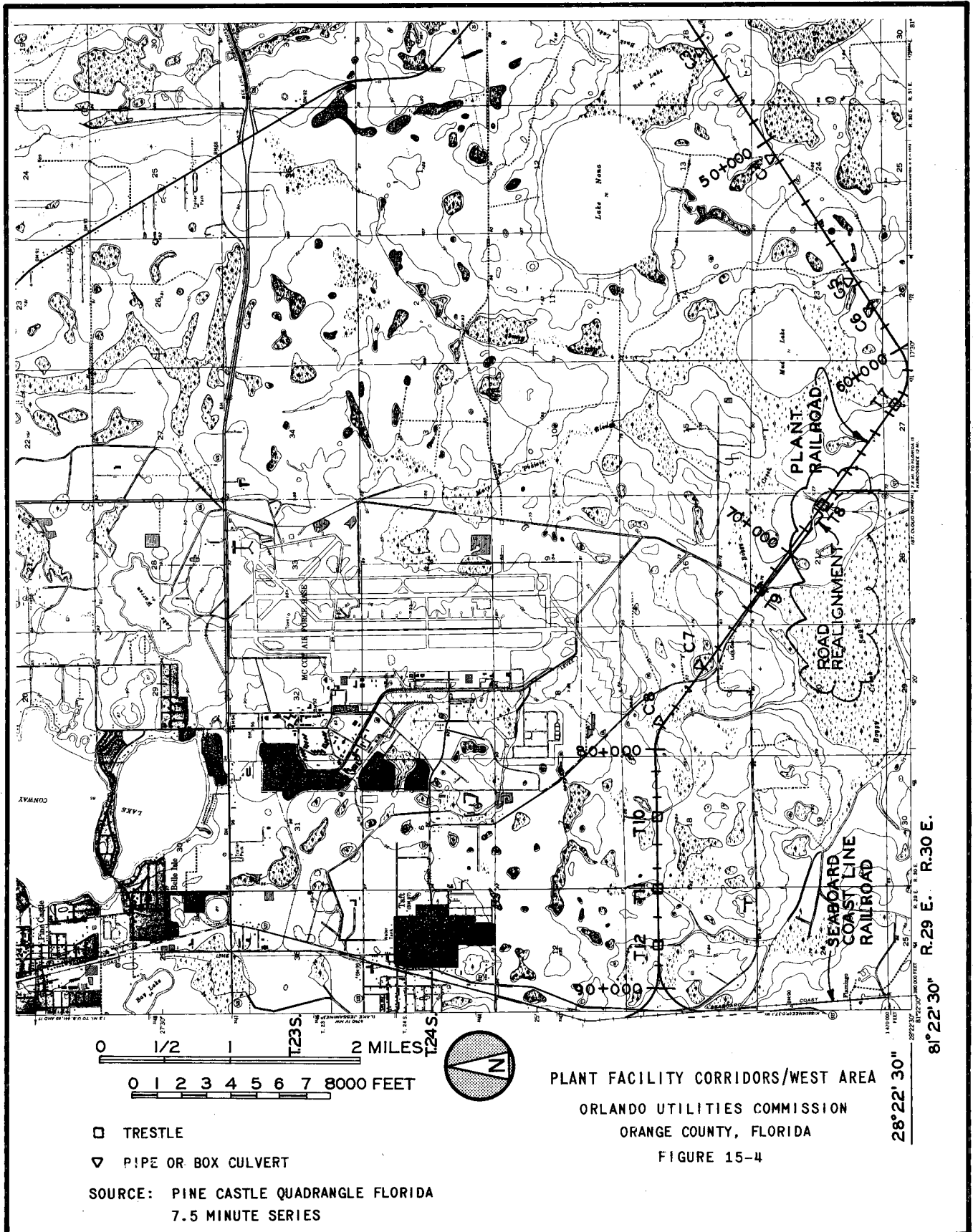
ORLANDO UTILITIES COMMISSION
 ORANGE COUNTY, FLORIDA

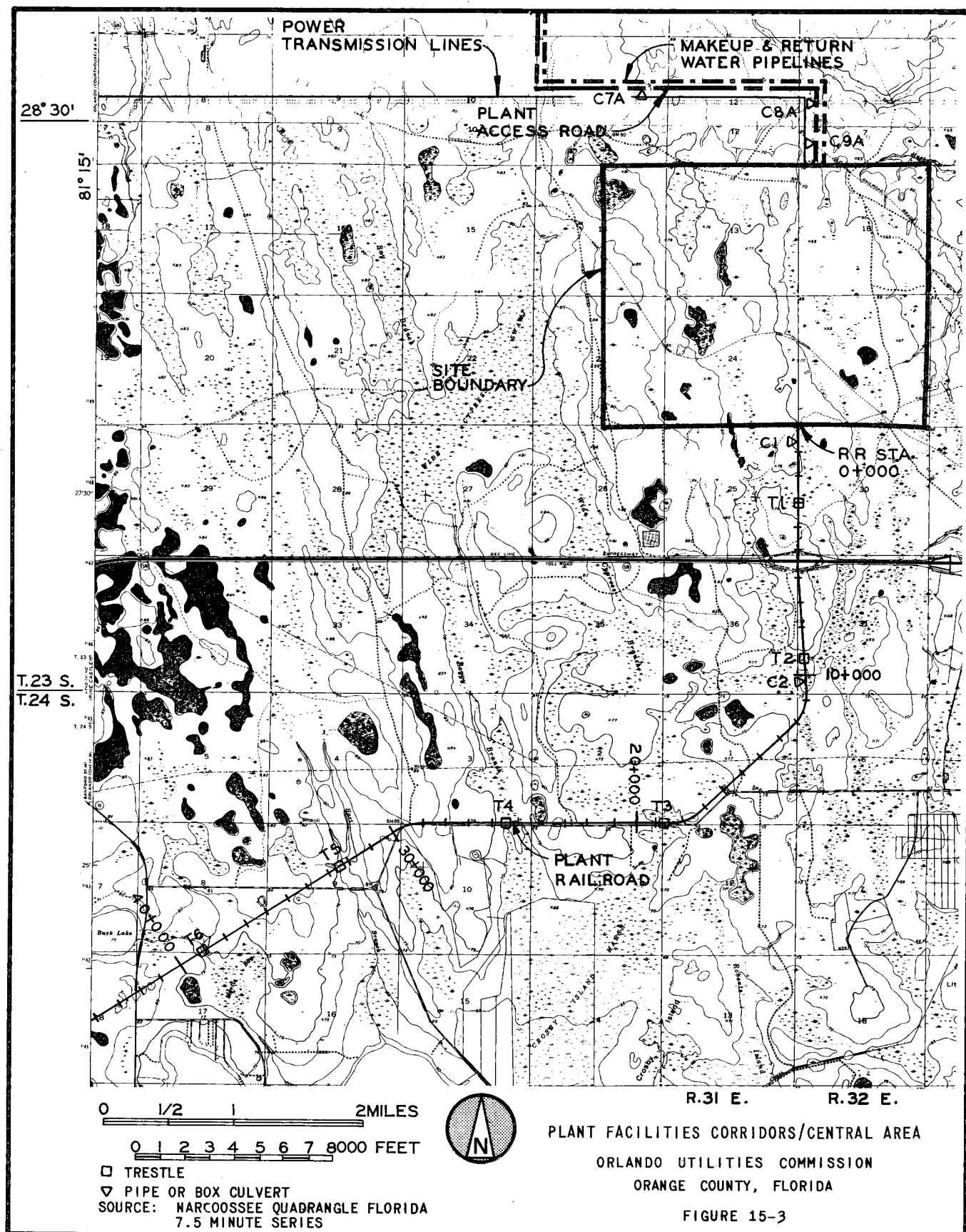
SOURCE: ORLANDO QUADRANGLE FLORIDA
 1 MINUTE BY 2 MINUTE SERIES

FIGURE 15-1







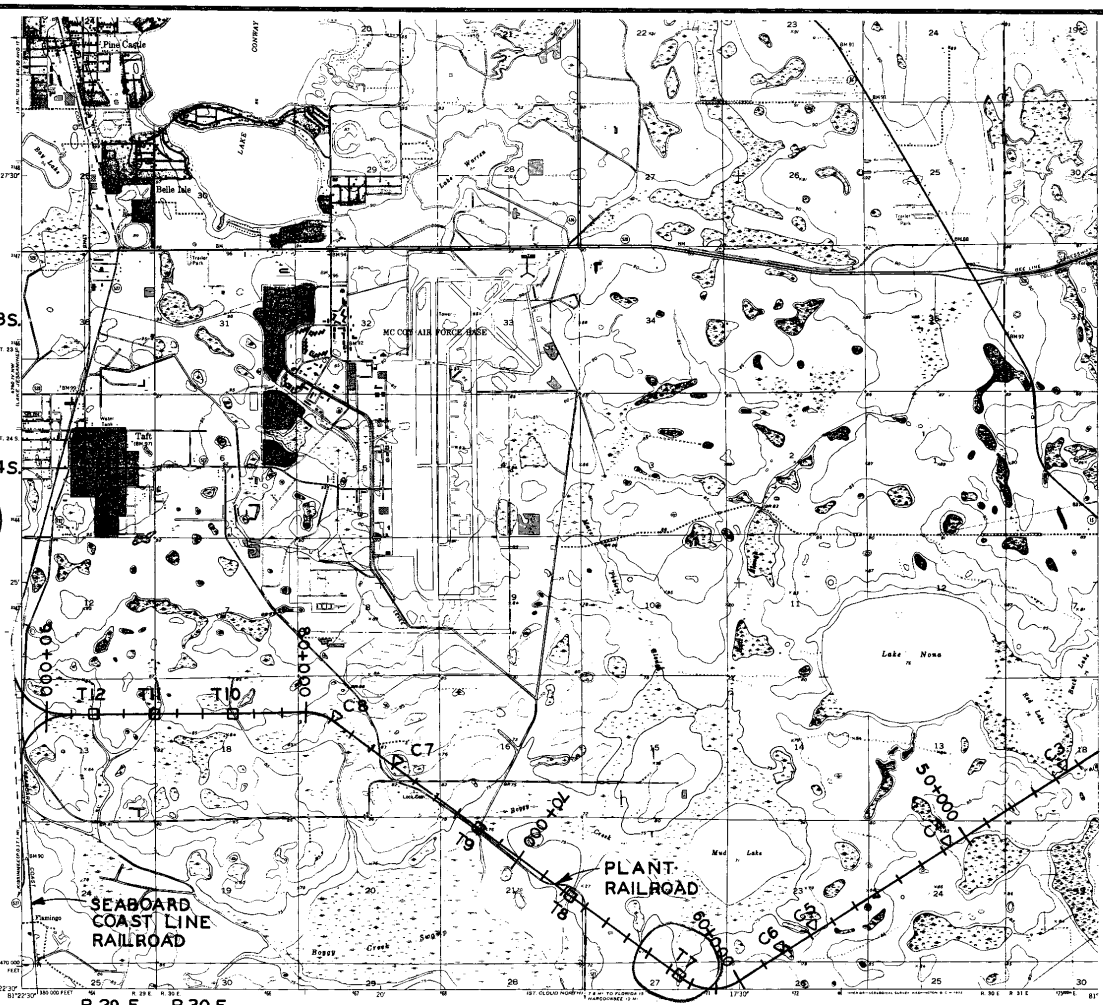


□ TRESTLE
 ▽ PIPE OR BOX CULVERT
 SOURCE: PINE CASTLE QUADRANGLE FLORIDA
 7.5 MINUTE SERIES



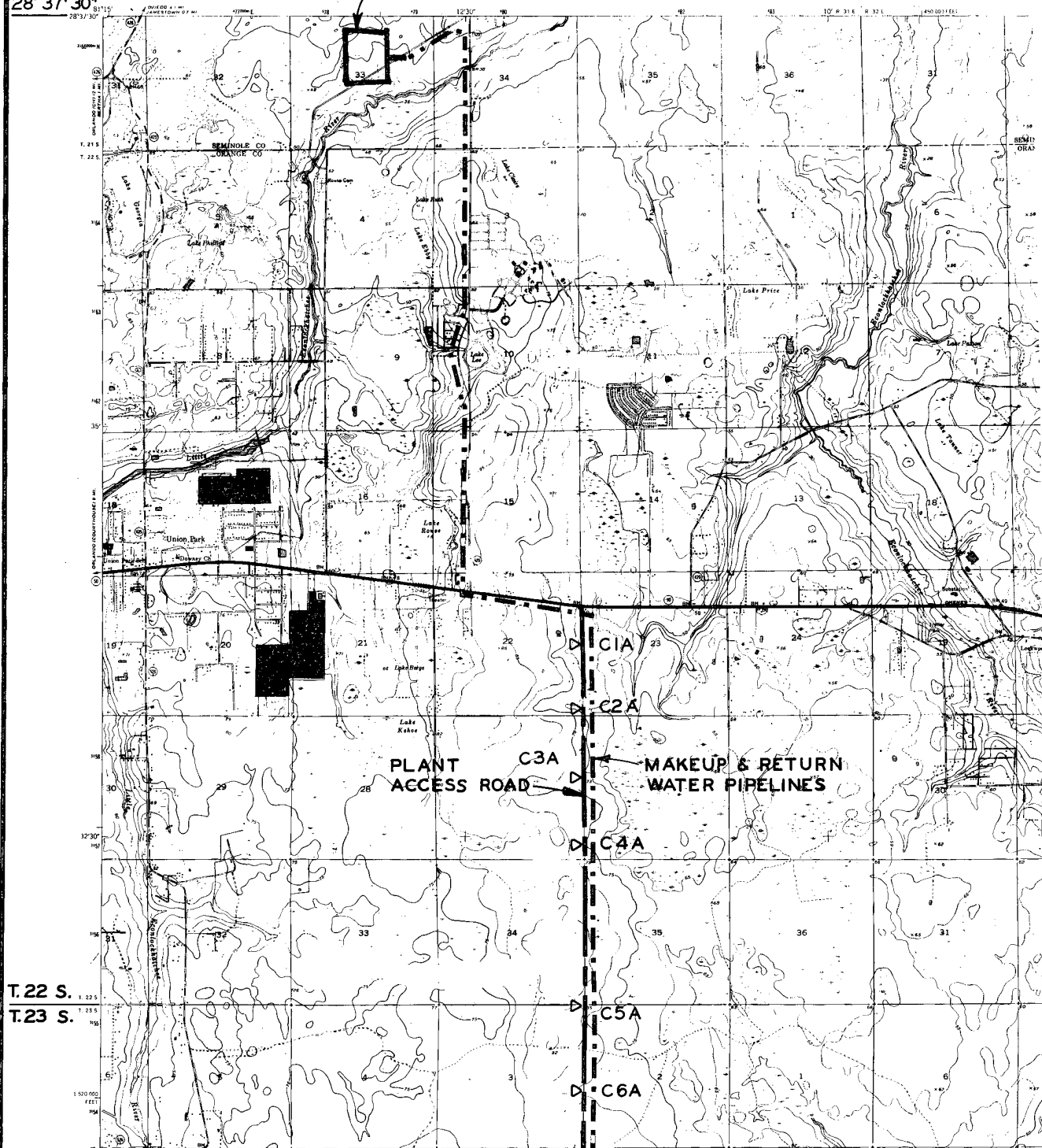
PLANT FACILITY CORRIDORS/WEST AREA
 ORLANDO UTILITIES COMMISSION
 ORANGE COUNTY, FLORIDA
 FIGURE 15-11

28°22'30"
 81°22'30" R.29 E. R.30 E.



81° 15'
28° 37' 30"

IRON BRIDGE ROAD WATER
POLLUTION CONTROL FACILITY



T. 22 S.
T. 23 S.

0 1/2 1 2 MILES
0 1 2 3 4 5 6 7 8 000 FEET

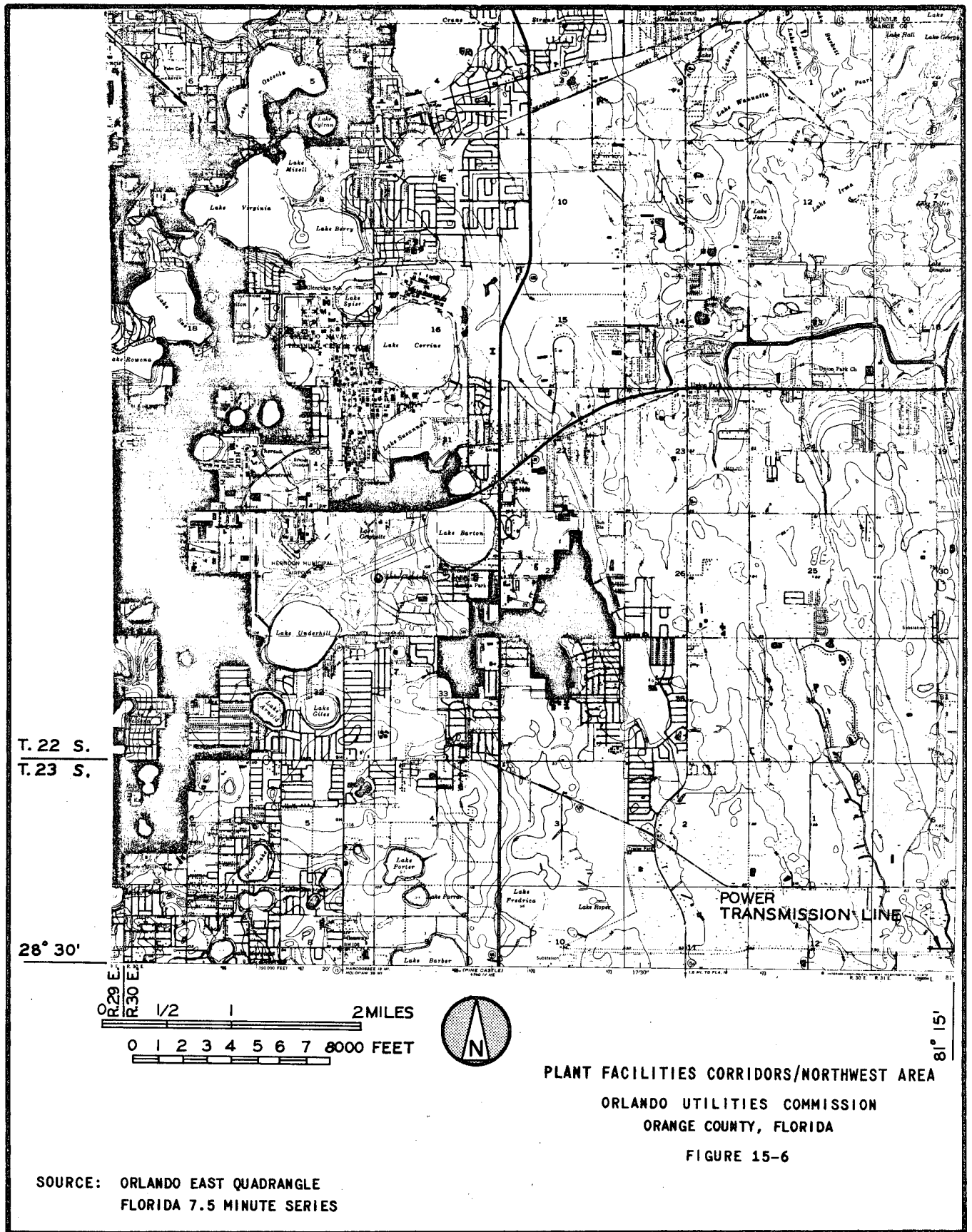


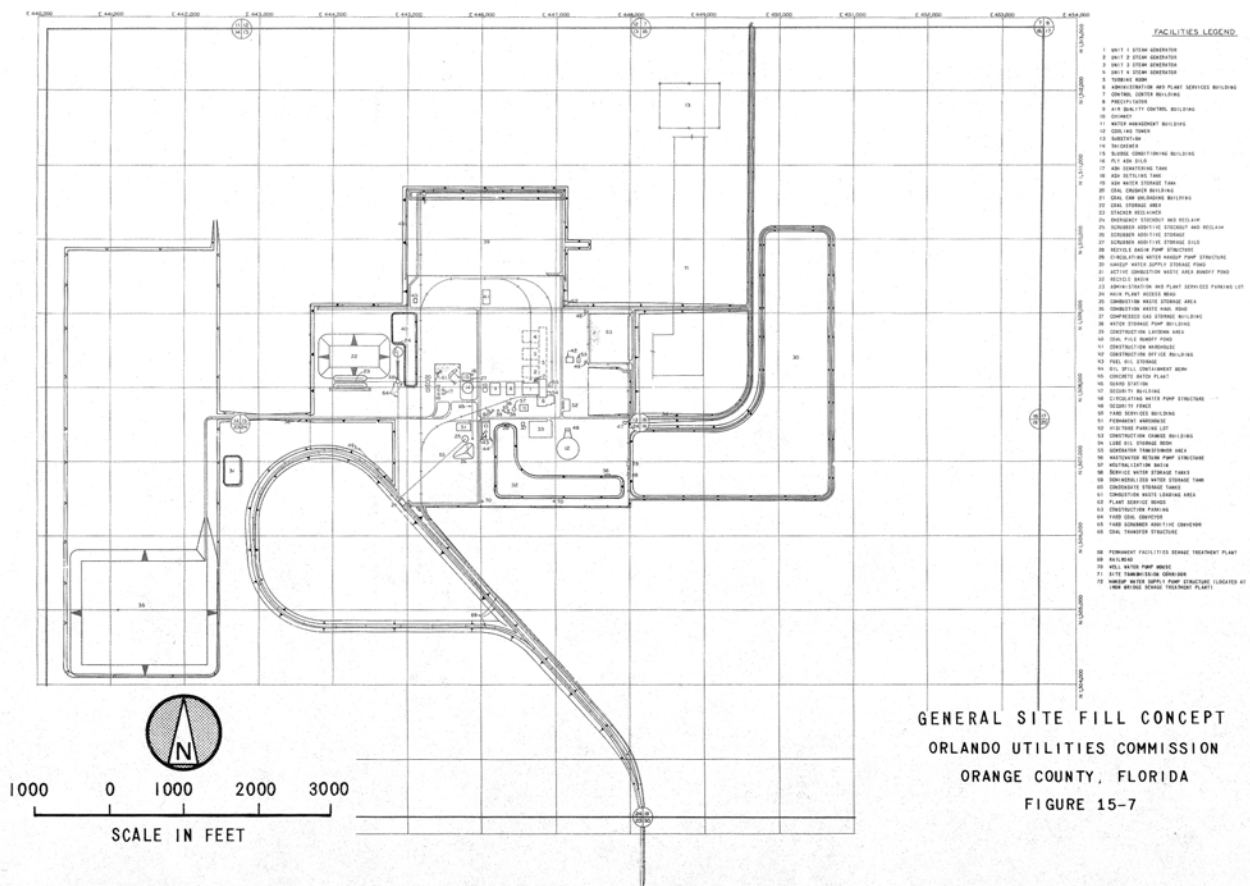
SOURCE: OVIEDO SW QUADRANGLE FLORIDA
7.5 MINUTE SERIES

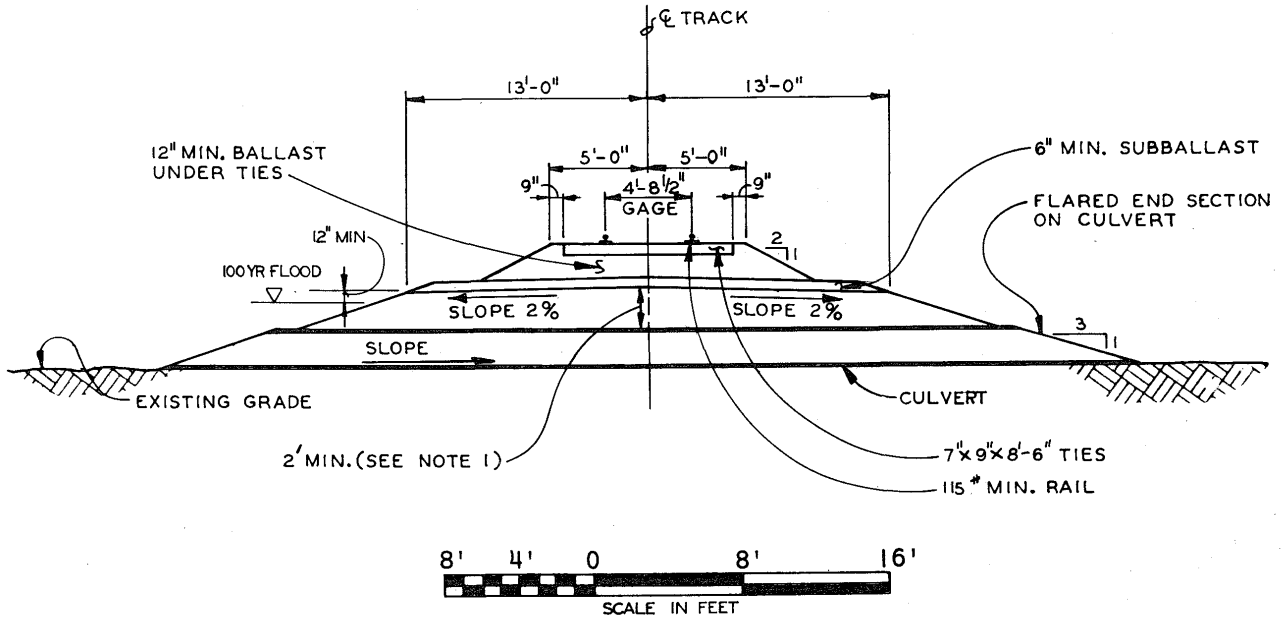
R. 31 E. R. 32 E.
PLANT FACILITY CORRIDORS/NORTH AREA

ORLANDO UTILITIES COMMISSION
ORANGE COUNTY, FLORIDA

FIGURE 15-5



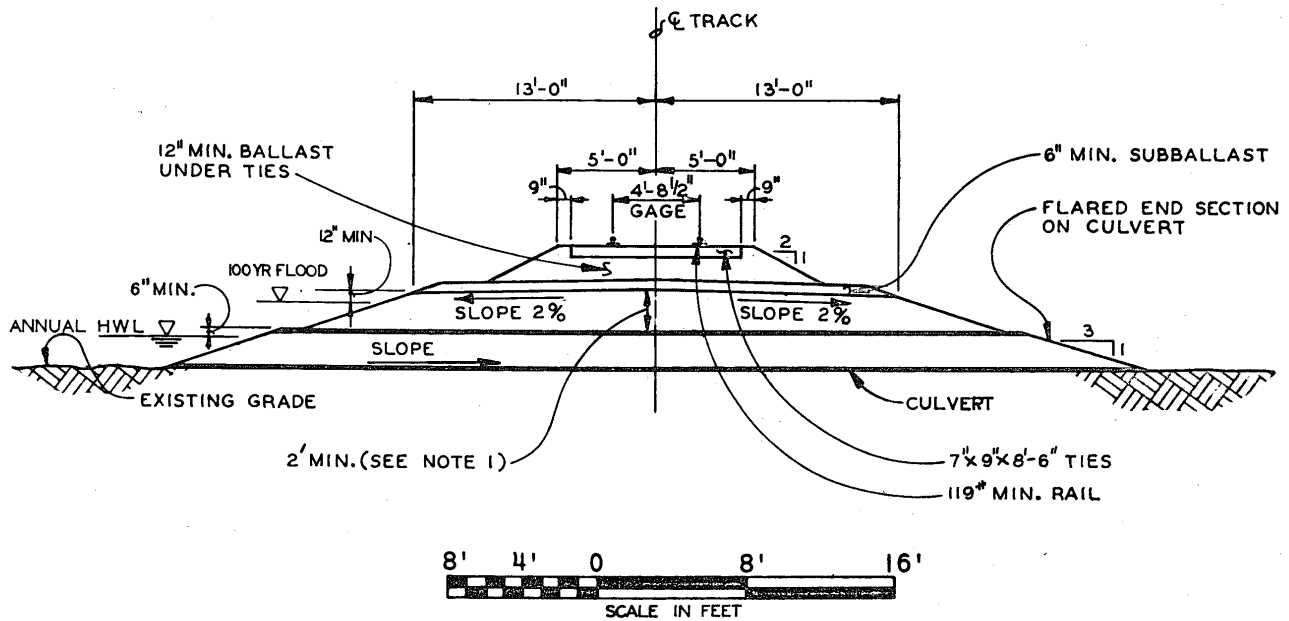




NOTES

1. COVER DEPTH AS REQUIRED FOR E80 LOADING
2. CULVERT TO BE INSTALLED WHERE REQUIRED

TYPICAL RAILROAD SECTION
ORLANDO UTILITIES COMMISSION
ORANGE COUNTY, FLORIDA
FIGURE 15-8



NOTES

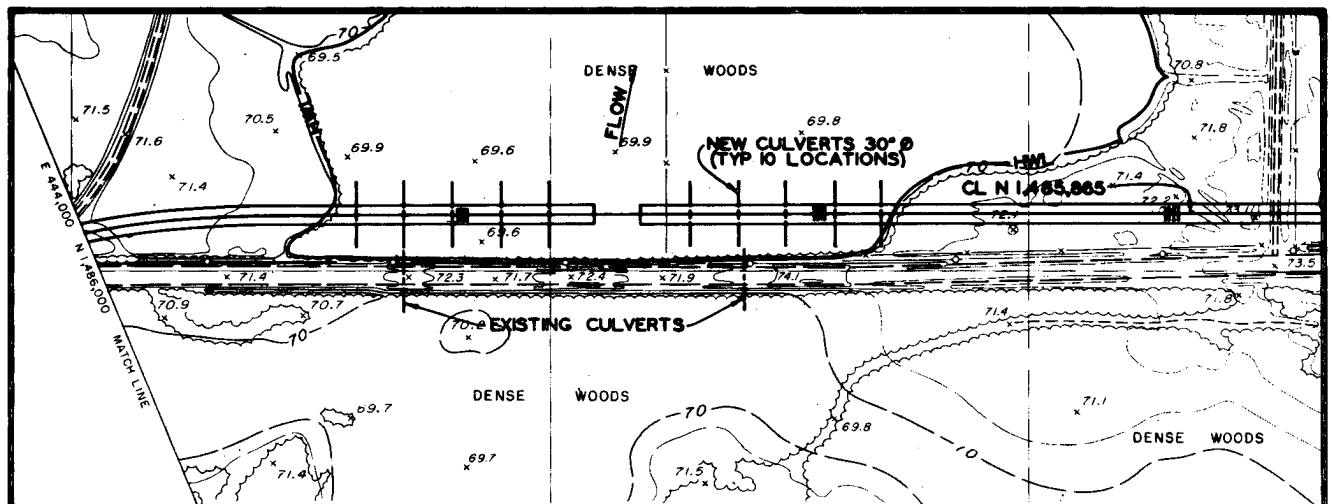
1. COVER DEPTH AS REQUIRED FOR E80 LOADING
2. CULVERT TO BE INSTALLED WHERE REQUIRED

TYPICAL RAILROAD SECTION
 ORLANDO UTILITIES COMMISSION
 ORANGE COUNTY, FLORIDA

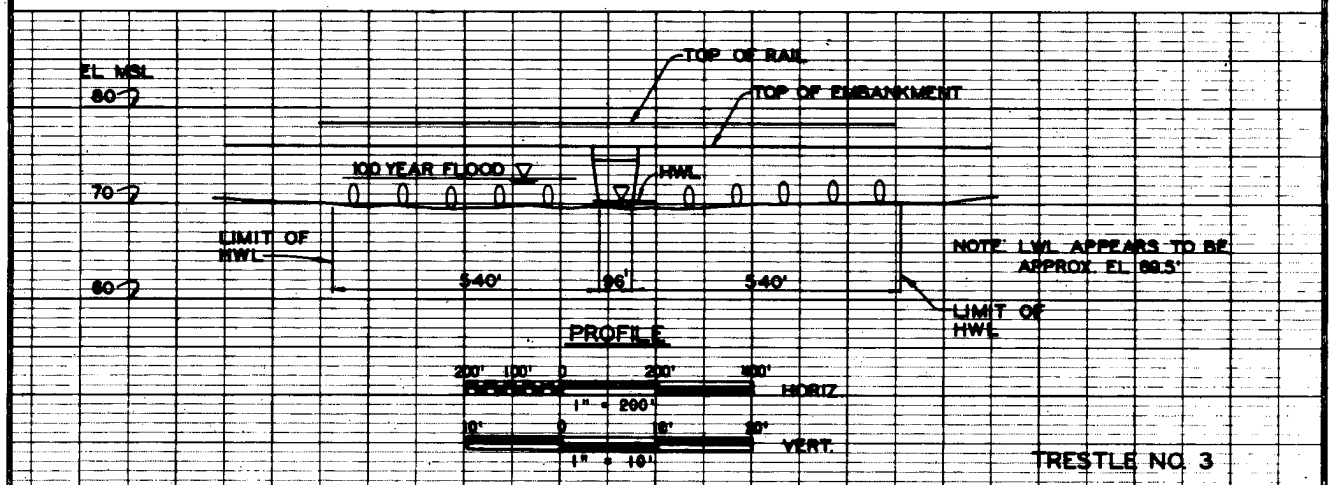
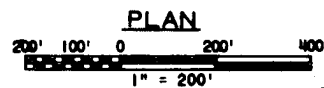
FIGURE 15-8

Image Quality

As you review the next group of images, Please note that the original documents were of poor quality.



FILL QUANTITIES
 ABOVE HWL 10,840 CY
 BELOW HWL 1,240 CY



PURPOSE: RAILROAD EMBANKMENT
AND TRESTLE

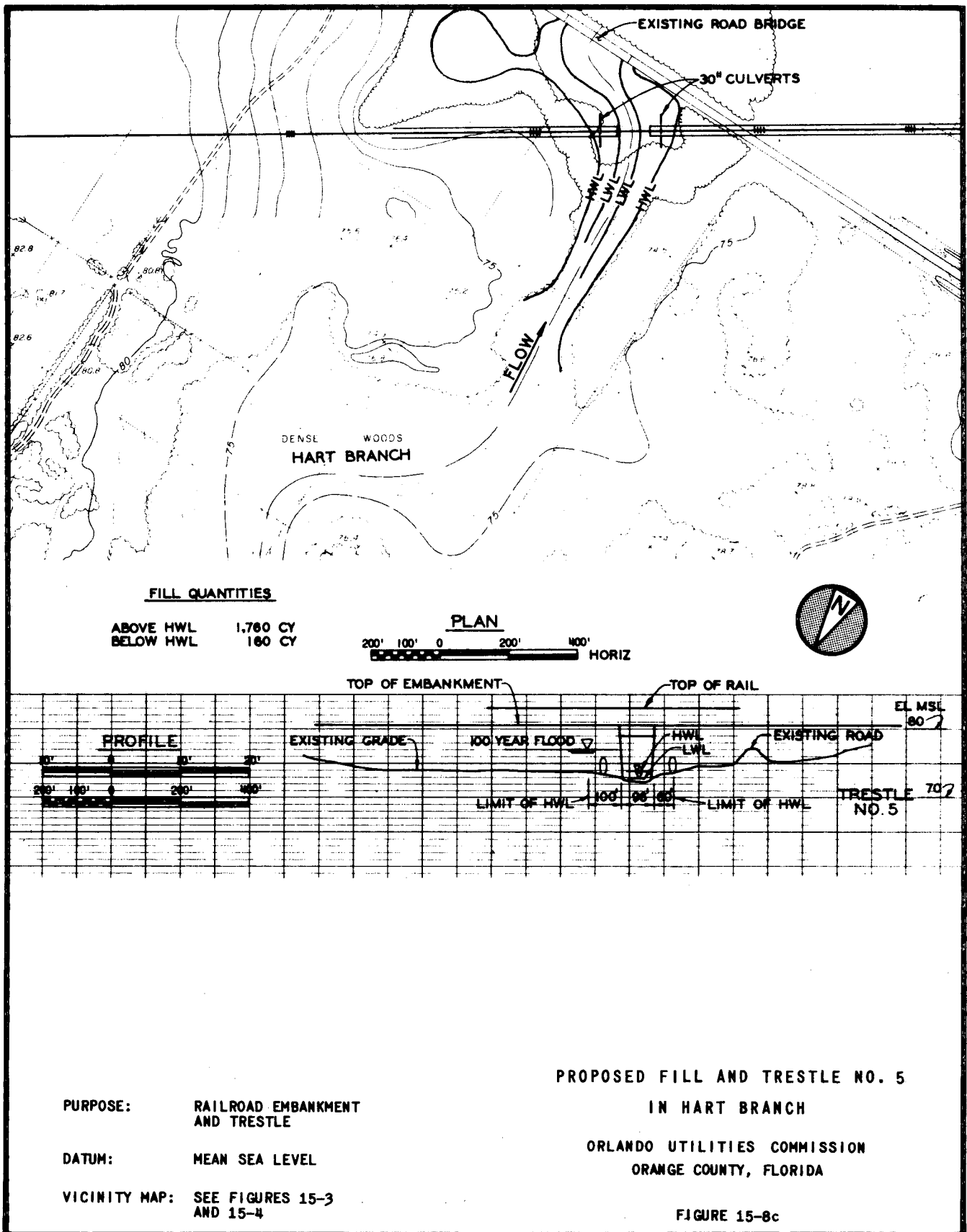
DATUM: MEAN SEA LEVEL

VICINITY MAP: SEE FIGURES 15-3
AND 15-4

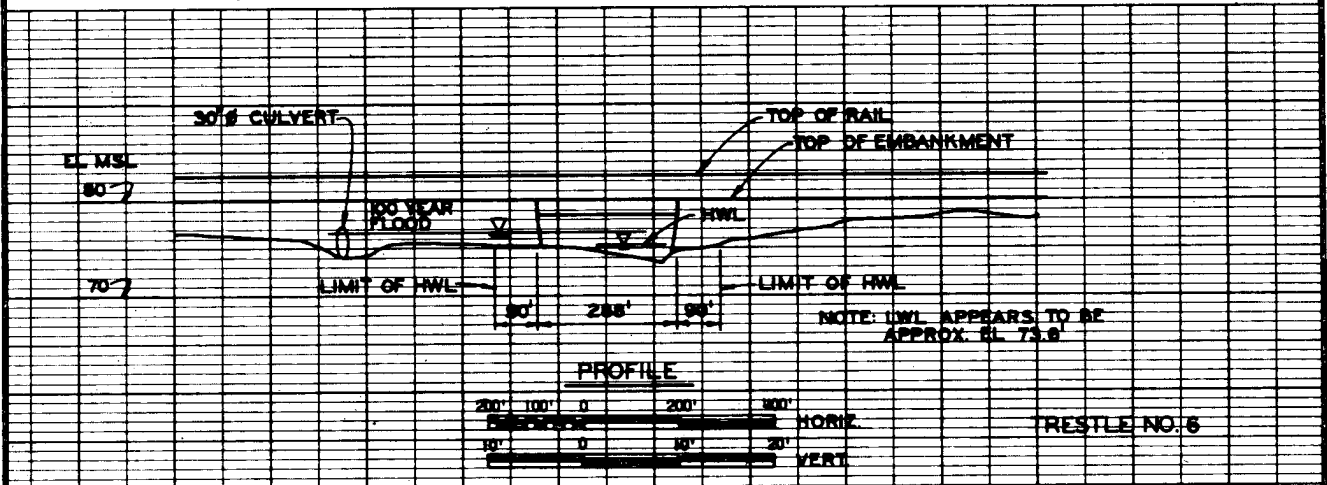
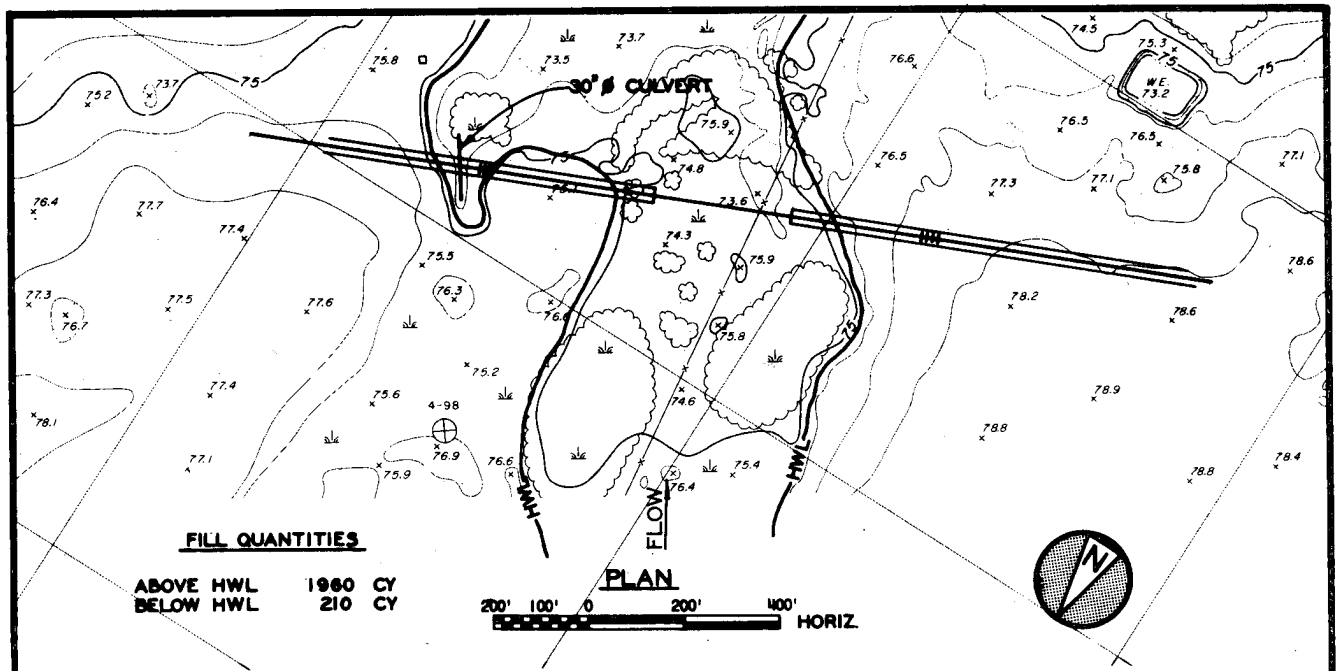
**PROPOSED FILL AND TRESTLE NO. 3
IN TRIBUTARY TO CROSBY ISLAND MARSH**

**ORLANDO UTILITIES COMMISSION
ORANGE COUNTY, FLORIDA**

FIGURE 15-8a



AMENDMENT 5
 030382



PURPOSE: RAILROAD EMBANKMENT AND TRESTLE

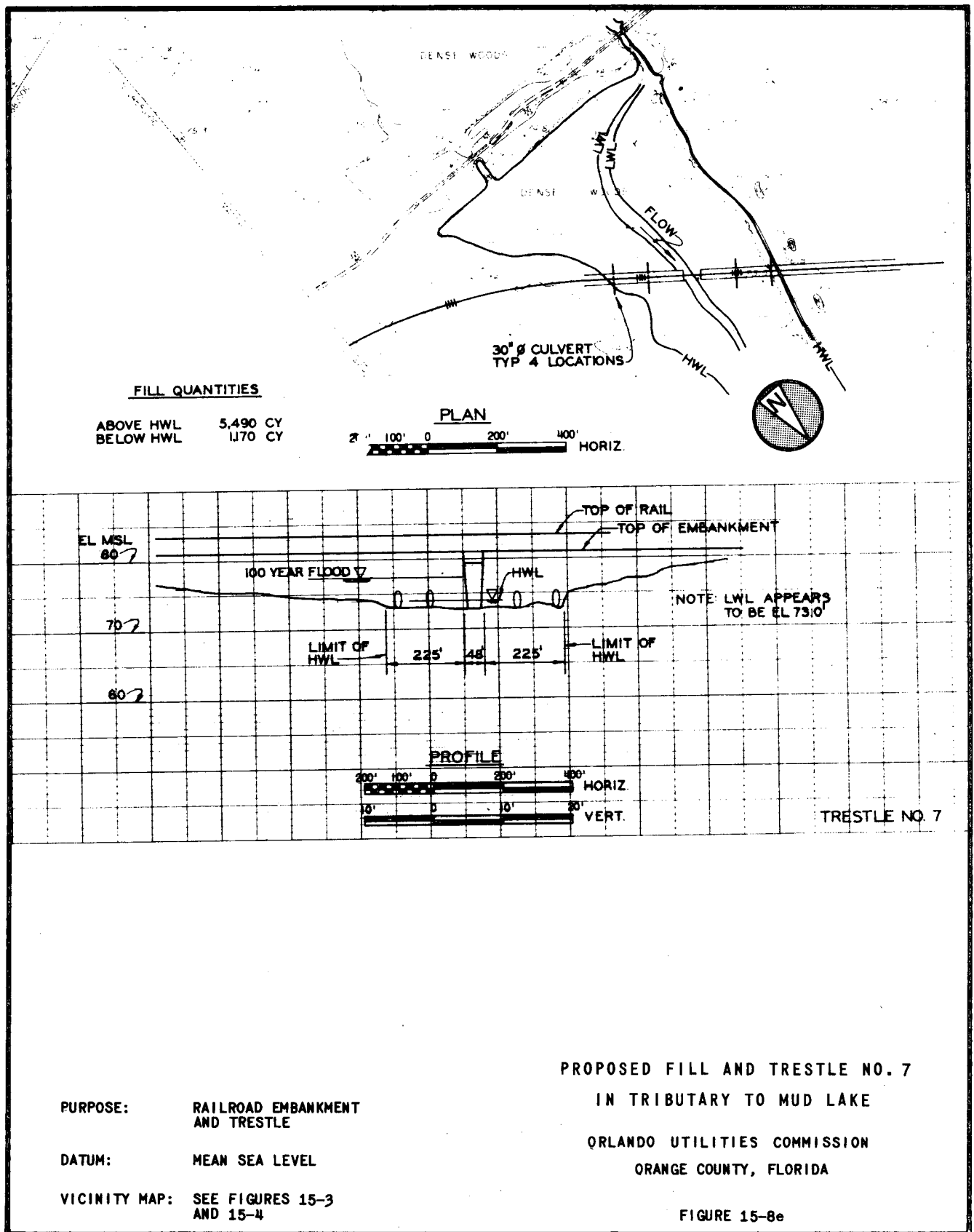
DATUM: MEAN SEA LEVEL

VICINITY MAP: SEE FIGURES 15-3 AND 15-4

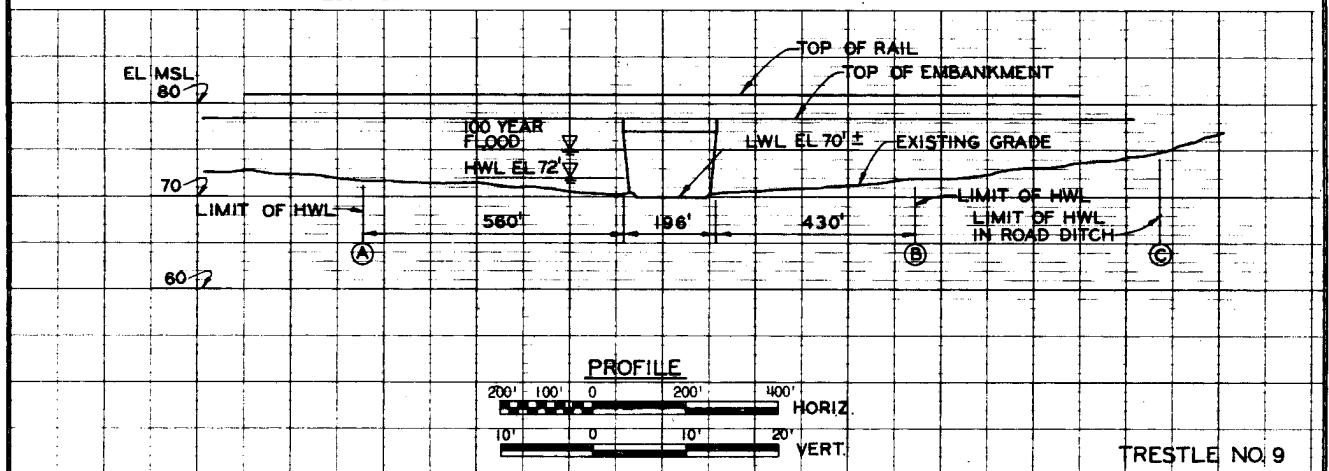
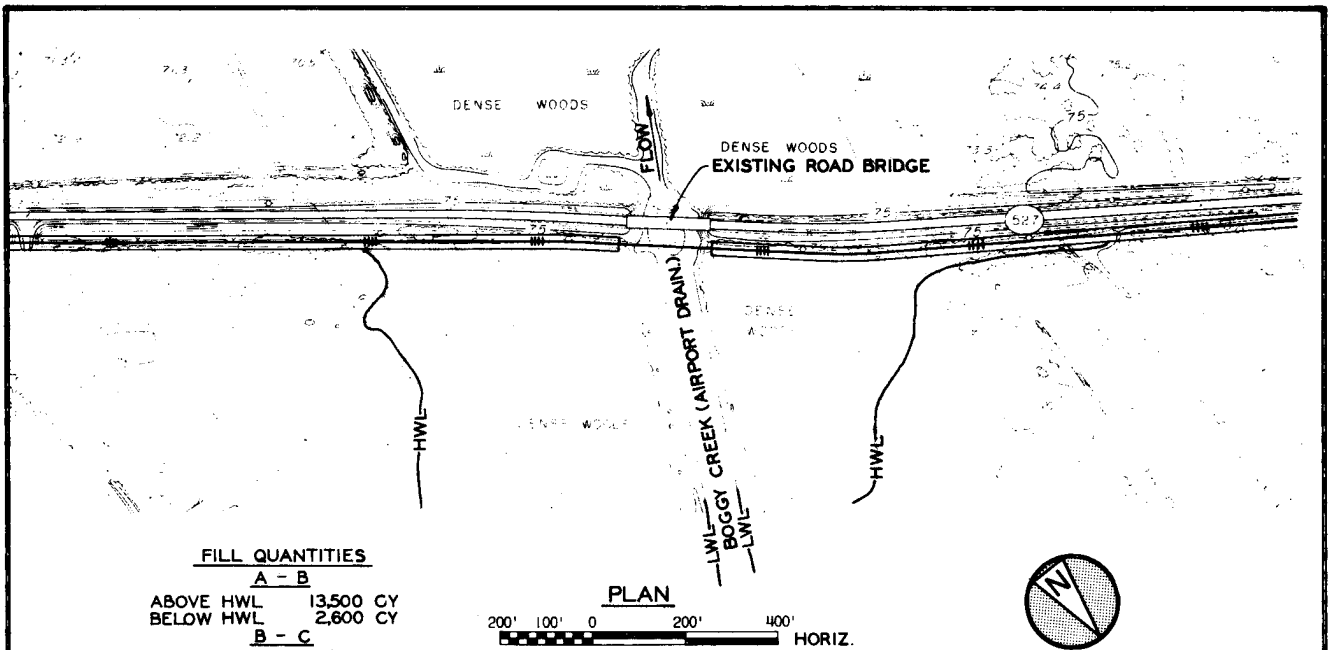
PROPOSED FILL AND TRESTLE NO. 6 IN MYRTLE BAY

ORLANDO UTILITIES COMMISSION
ORANGE COUNTY, FLORIDA

FIGURE 15-8d



AMENDMENT 5
030382



PURPOSE: RAILROAD EMBANKMENT
AND TRESTLE

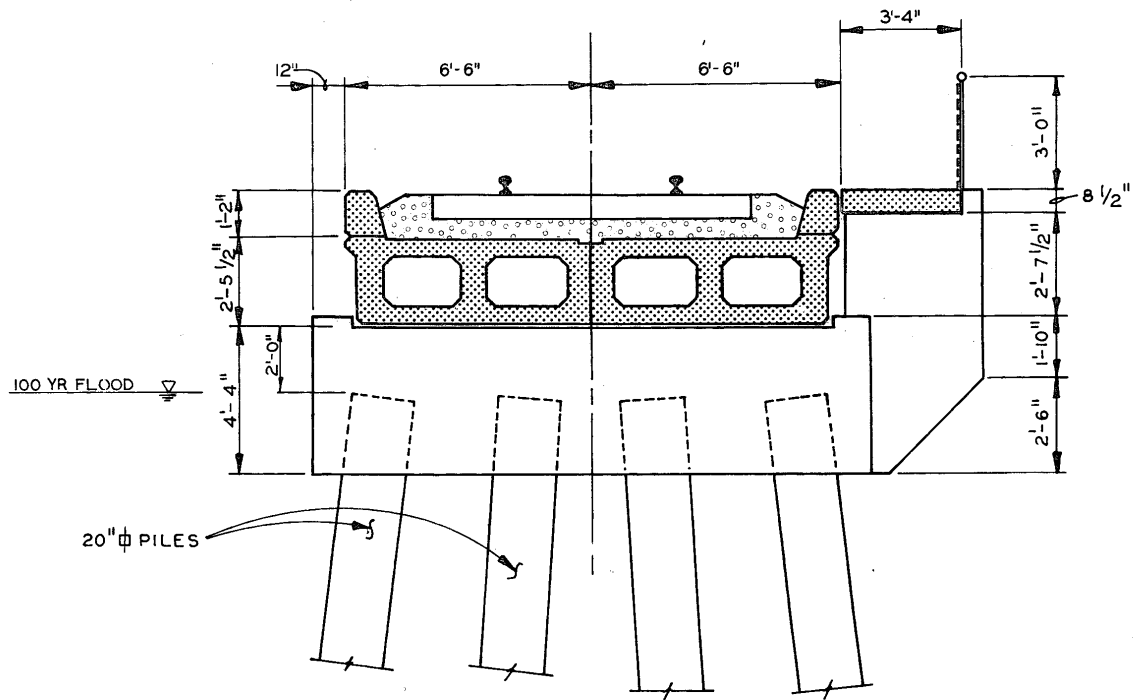
DATUM: MEAN SEA LEVEL

VICINITY MAP: SEE FIGURES 15-3
AND 15-4

PROPOSED FILL AND TRESTLE NO. 9 IN BOGGY CREEK

ORLANDO UTILITIES COMMISSION
ORANGE COUNTY, FLORIDA

FIGURE 15-8f

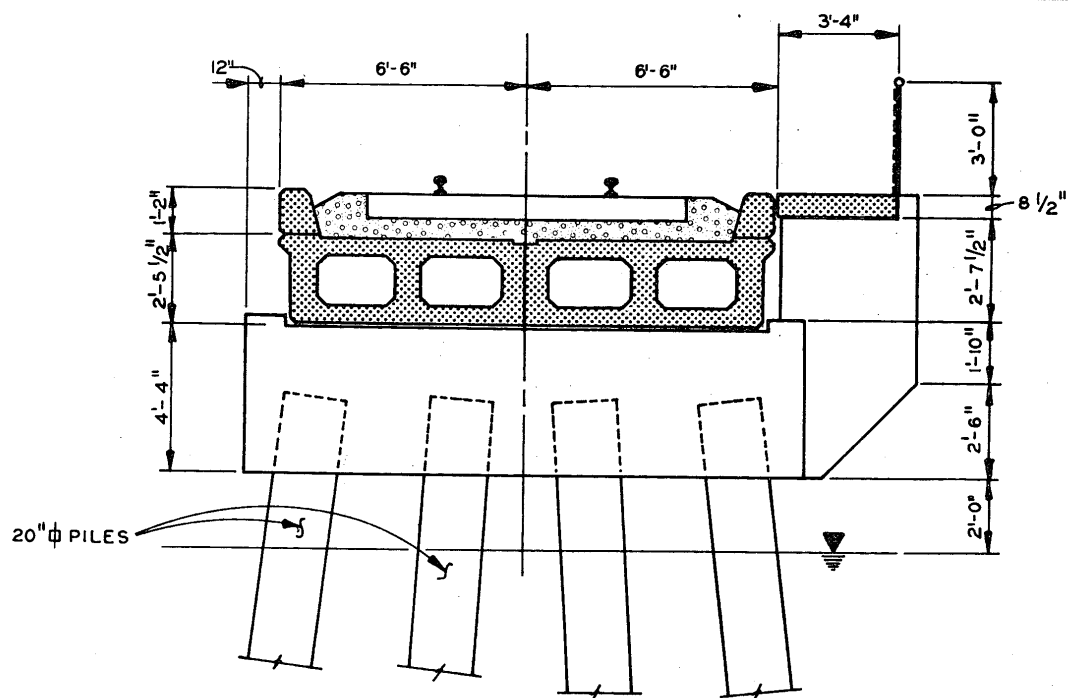


NOTE: ALL STRUCTURAL ELEMENTS
CONSTRUCTED OF PRECAST,
PRESTRESSED CONCRETE



TYPICAL TRESTLE SECTION
ORLANDO UTILITIES COMMISSION
ORANGE COUNTY, FLORIDA

FIGURE 15-9

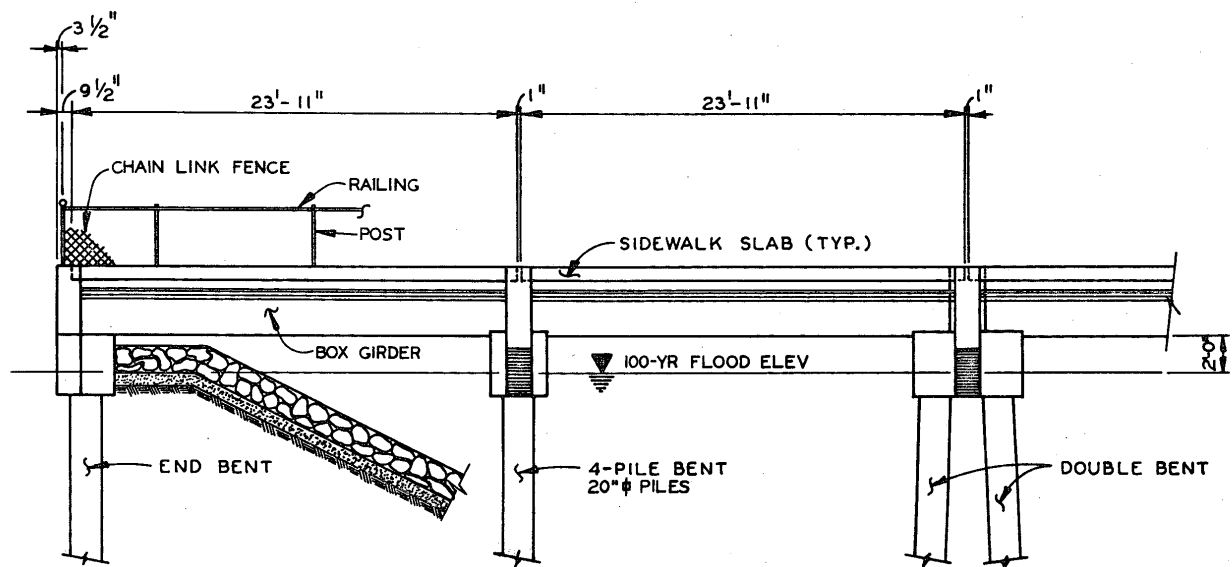


NOTE: ALL STRUCTURAL ELEMENTS
CONSTRUCTED OF PRECAST,
PRESTRESSED CONCRETE



TYPICAL TRESTLE SECTION
ORLANDO UTILITIES COMMISSION
ORANGE COUNTY, FLORIDA

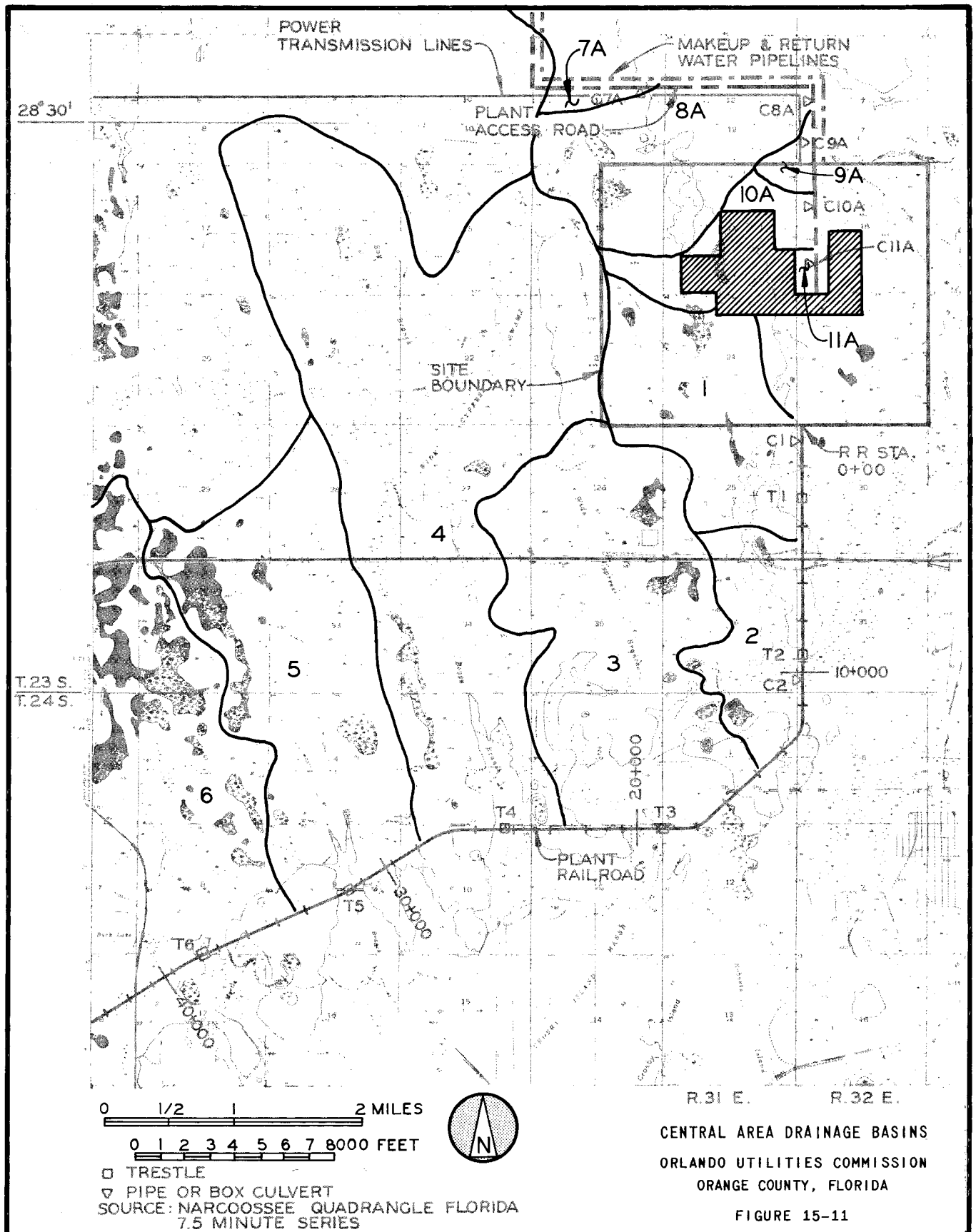
FIGURE 15-9

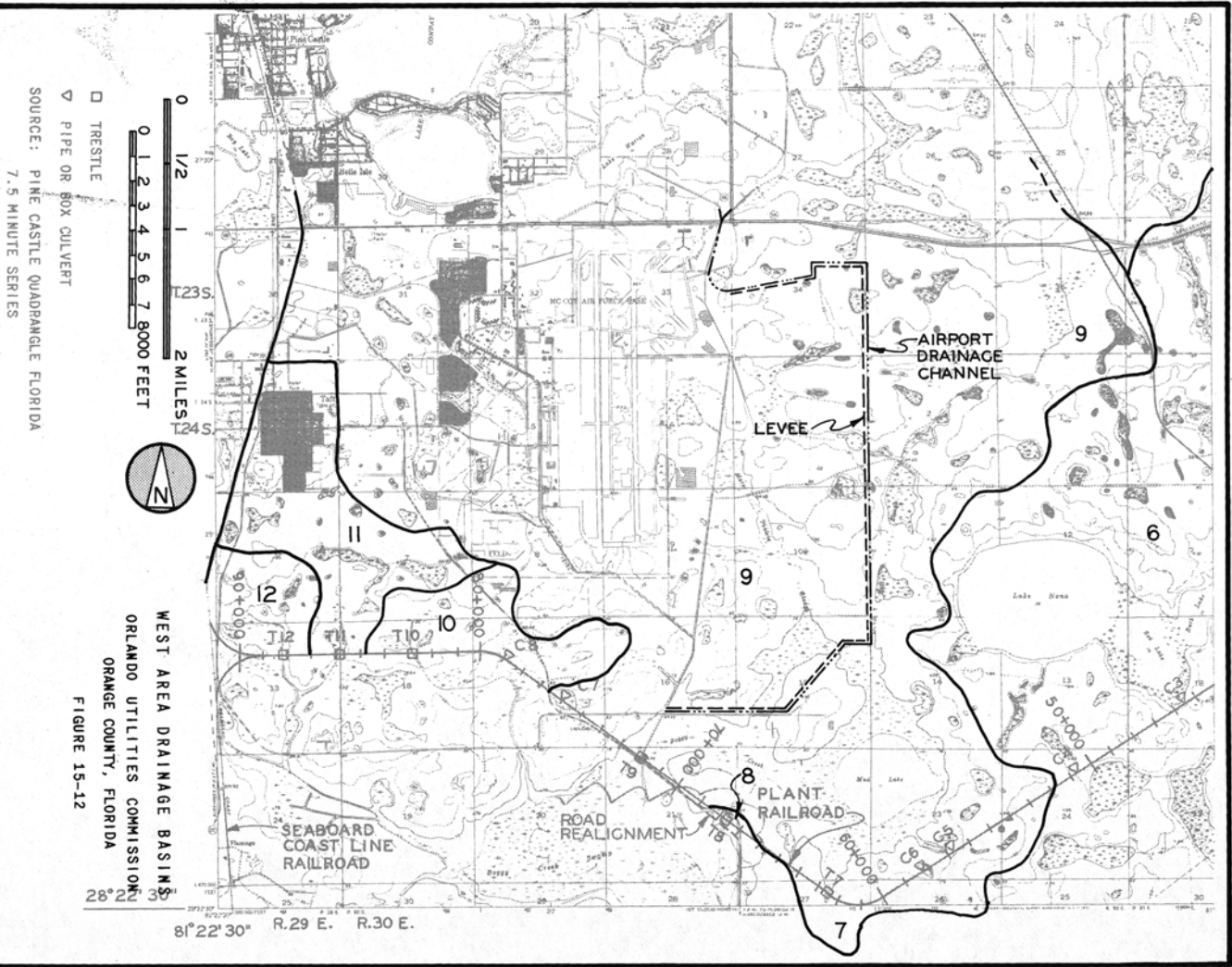


NOTE: ALL STRUCTURAL ELEMENTS
CONSTRUCTED OF PRECAST,
PRESTRESSED CONCRETE

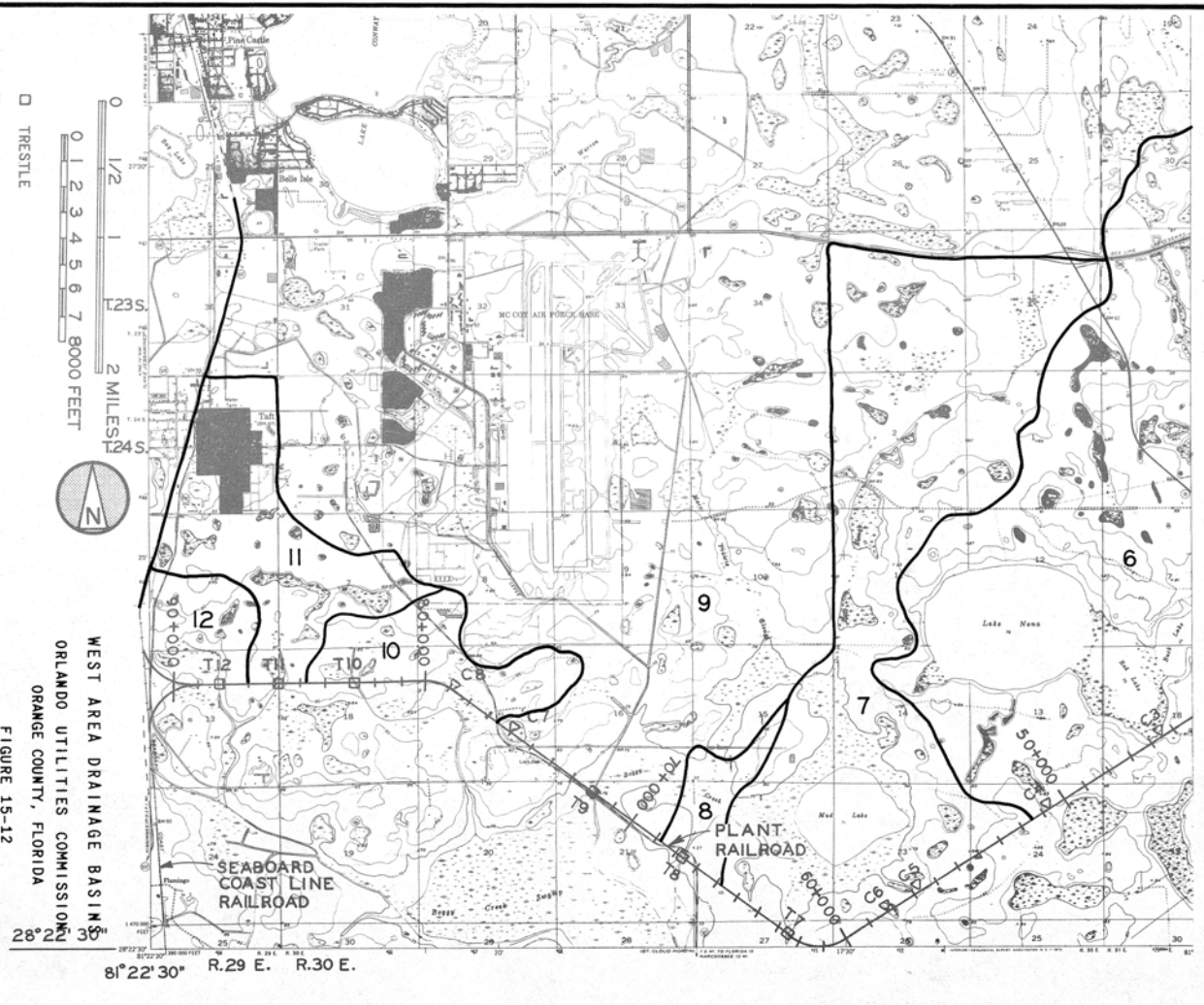


TYPICAL TRESTLE PROFILE
ORLANDO UTILITIES COMMISSION
ORANGE COUNTY, FLORIDA
FIGURE 15-10

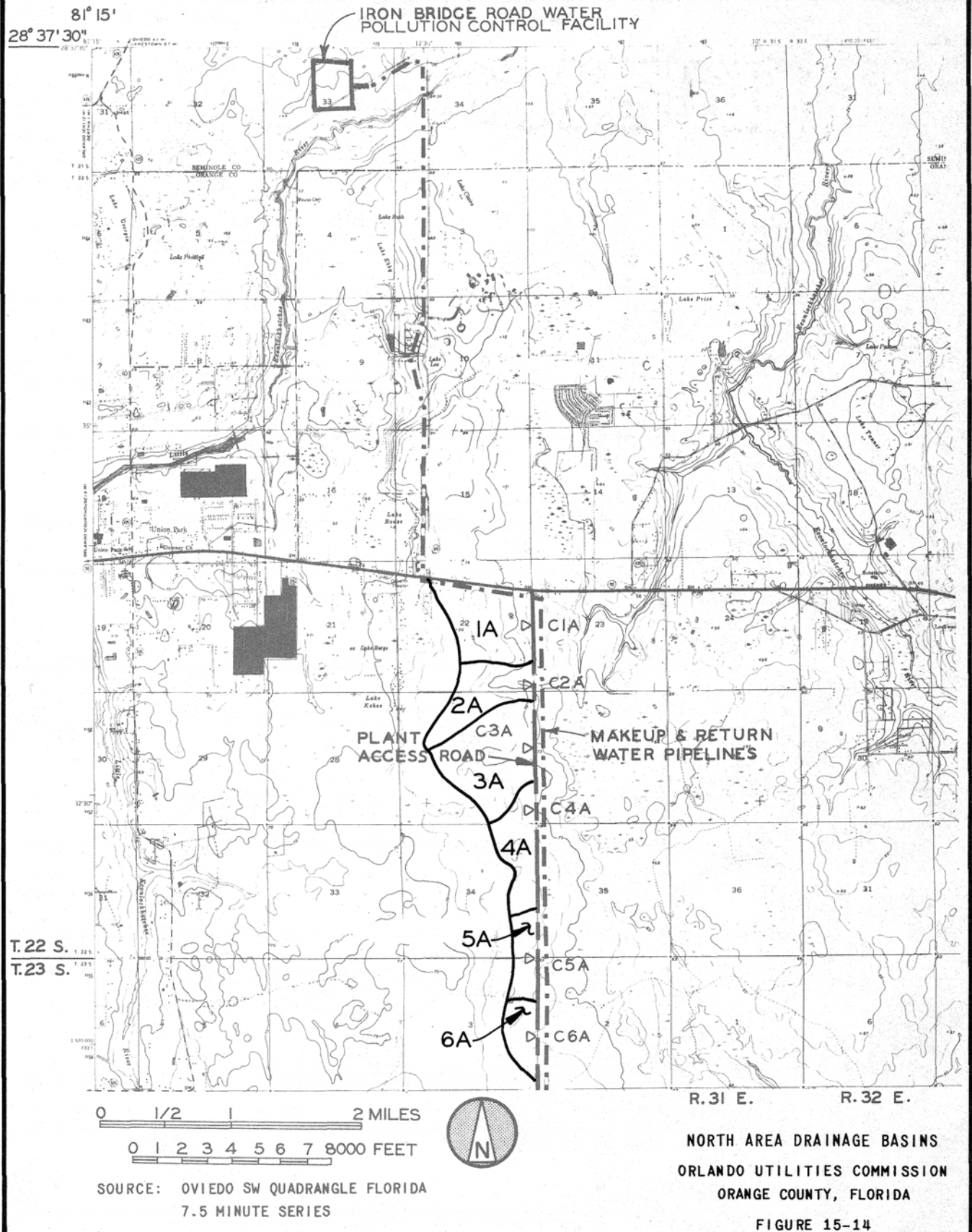




□ TRESTLE
 ▽ PIPE OR BOX CULVERT
 SOURCE: PINE CASTLE QUADRANGLE FLORIDA
 7.5 MINUTE SERIES



ACCESS ROAD CROSS SECTION
ORLANDO UTILITIES COMMISSION
ORANGE COUNTY, FLORIDA
FIGURE 15-13



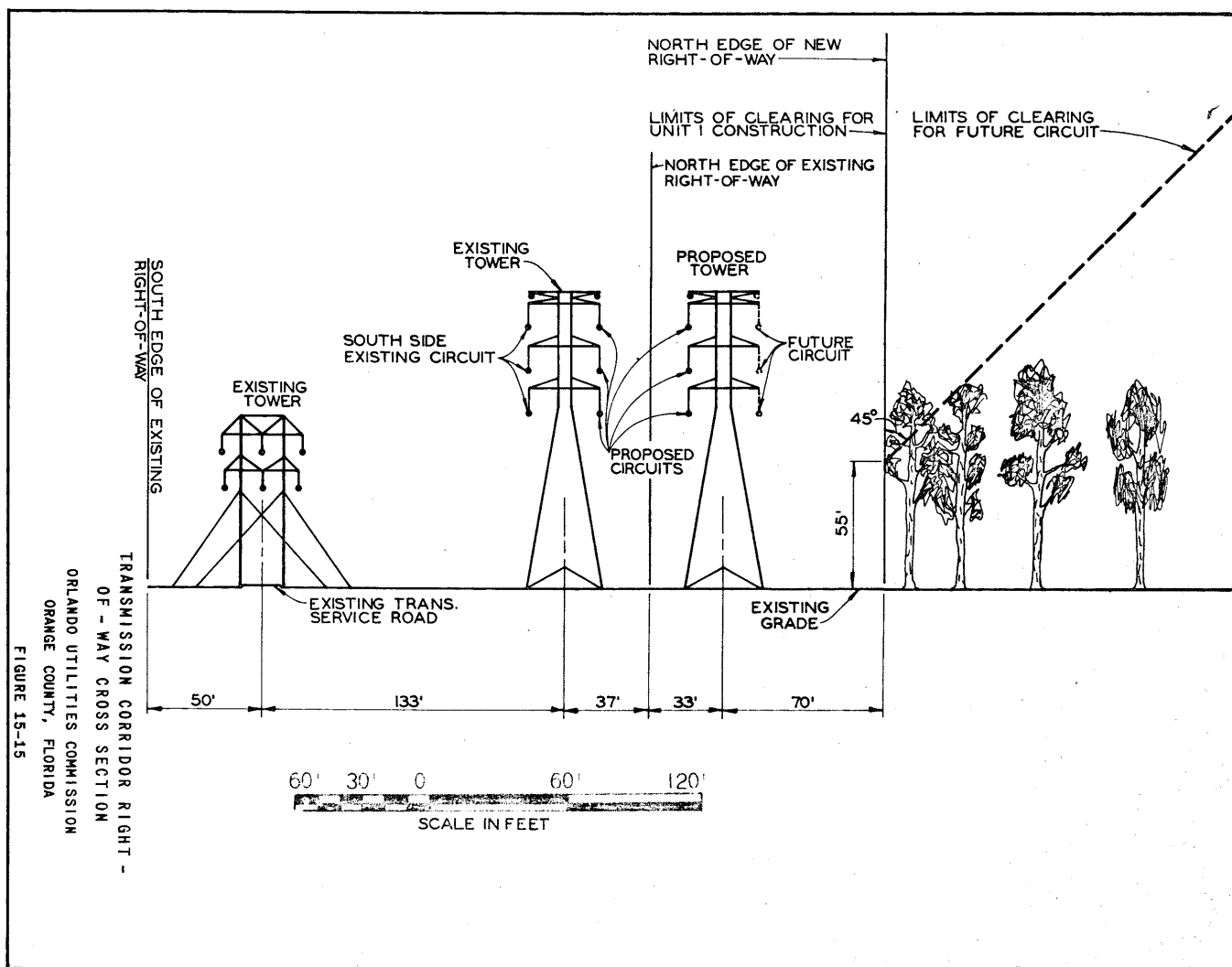


FIGURE 15-15

4.2 SPECIAL FEATURES

Vegetation cleared during site preparation will be burned. Suitable trees will be sold for pulp or other commercial uses. There will be a temporary increase in particulate concentration and combustion products because of these activities. Adverse impacts on air quality will be temporary, and vegetation and wildlife in the vicinity should not be affected. Burning will be carried out according to state regulation (Florida Administrative Code, Section 5I-2.07). Any nonhazardous chemical wastes will be transported to the adjacent Orange County Landfill for disposal in an environmentally acceptable manner.

4.3 CONSTRUCTION OF DIRECTLY ASSOCIATED TRANSMISSION FACILITIES

The new transmission lines associated with Stanton Energy Center Unit 1 have been located to minimize environmental impacts. The transmission lines will require approximately six miles or 141 acres of new right-of-way. The location of the new transmission lines is shown on Figure 3.8-2.

Except for exiting the plant site, the new transmission lines will be placed adjacent and parallel to existing transmission line facilities. The existing rights-of-way will be widened and trees cleared for new construction. The new plant access road and existing maintenance road will be utilized in the construction of the new transmission line facilities.

The primary effect on the land will be the necessary clearing. Following clearing, the land can continue to be used as pasture. A small segment of an orange grove will be crossed; however, no clearing will be done and fruit production will be unaffected. The new transmission facilities should cause little inconvenience to the adjacent landowners since the land may continue to be used as it has in the past. The planned facilities also will not change traffic patterns from those already existing.

4.3.1 Permanent Changes to Vegetation, Wildlife, and Aquatic Life

Right-of-way clearing will affect about 141 acres of existing vegetation. Terrestrial habitat provided by trees and other vegetation will be reduced along the 6 miles of expanded transmission corridor. Of course, the cleared areas will continue to be utilized by some wildlife. Deer, birds, and small mammals are often seen in these areas. The construction is not anticipated to change either the hydrology or topography of the area. Growth retardants, chemicals, biocides, sprays, etc., will not be used during construction.

4.3.2 Extent of Impact on Sensitive Areas

Wetlands are the most sensitive areas associated with the transmission line construction. Approximately 1-1/2 miles of wetlands will be traversed and approximately 25 acres of wetlands will be cleared. Since these wetland

areas have already been disturbed by the construction of the existing transmission corridor, construction impacts will be minimal. The loss of habitat provided by cleared vegetation will be the most significant impact.

There are no natural shorelines, wildlife refuges, parks, national forest areas, shelter belts, steep slopes, or wilderness areas in the vicinity of the new construction.

4.3.3 New Roads

No new roads will be built for the construction of the new transmission lines. An existing permeable surface construction road will be used for the construction of the new facilities. In addition, the new power plant access road discussed in Section 3.9, will be utilized.

4.3.4 Erosion

No significant erosion is anticipated in the construction of the new transmission line facilities. The construction techniques used will be similar to those utilized previously in Florida to construct transmission facilities. No erosion problems have resulted from such past construction projects.

4.3.5 Impact on Land Use

No changes in agricultural activities along the new facilities are anticipated. The land can continue to be used for pasture, and clearing will enhance the growth of grasses. The existing orange grove can remain in production. There are no historic, cultural, or archeologically significant areas along the new transmission line right-of-way.

4.3.6 Mitigative Measures

Clearing and construction performed on the new right-of-way will result in minimum impact on aquatic life or wildlife. Construction waste, including concrete, will be properly collected and transported to disposal sites. Streams will be protected from contamination by construction debris. Felled trees will be trimmed of their branches and cut into logs. Logs

will be stacked at the edge of the right-of-way. Underbrush, tree limbs, and other vegetation will be windrowed and used as mulch. This procedure will enhance environmental benefits by increasing the number of nesting and foraging sites for small animals, control of soil erosion, returning nutrients to the soil, and building and binding top soil because of slow decomposition of organics in place.

No rare or endangered species will likely be impacted by the transmission line construction. No special landmarks or sensitive areas, other than wetlands, have been identified.

4.4 RESOURCES COMMITTED

Some resources will be irreversibly and irretrievably committed as a result of the construction and operation of the Stanton Energy Center. The resources either will be expended or altered so that reuse in other applications will not be feasible.

4.4.1 Land

Approximately 960 acres of land will be cleared for the construction of Unit 1. A total of about 125 acres of wetlands will be included in the land required. Habitat on this land will be altered to such an extent that it will be irretrievably lost. A description of the terrestrial habitat is given in Section 2.7. | 5

The railroad corridor from the plant site to the Seaboard Coast Line mainline will convert about 18 miles of land from its present uses. Approximately 2.5 miles of wetlands will be altered by the railroad corridor. Trestles and culverts will be used to preserve the hydrological characteristics of the wetlands, but clearing of trees and vegetation within the corridor will be necessary. It is unlikely that the land used for the construction of the railroad will be returned to its original condition following the useful life of the Stanton Energy Center.

It is not probable that the 8 miles of access road to the plant site will be converted to the present land uses after the Stanton Energy Center is no longer operational.

4.4.2 Vegetation and Cavity Trees

Approximately 960 acres of land on the plant site will be cleared of all vegetative cover. In addition, 18 miles of vegetation within the railroad corridor will be cleared and maintained, and about 8 miles will be cleared for the access road. Vegetation production will be irretrievably lost unless structures and facilities are removed at the end of the plant life. Natural revegetation will require varying lengths of time depending on the erosiveness of the soil and other factors. | 5

As discussed in Subsection 4.4.2, clearing of the site will result in the loss of one active cavity tree utilized by the red-cockaded woodpecker, an endangered species. In addition, three cavity trees with start holes and one abandoned cavity tree also will be removed. This loss represents 8 per cent of all available cavity trees on the site, including 4 per cent of all active cavity trees and 11 per cent of all start hole or abandoned cavity trees. The site arrangement of the plant facilities was adjusted so that only one active cavity tree will be lost. The removal of cavity trees will be irreversible.

Approximately 450 acres of red-cockaded woodpecker foraging habitat will be cleared during the construction of the Stanton Energy Center. It is unlikely that this habitat will be completely reestablished following the life of the generating facility.

4.4.3 Materials

The estimated quantities of construction materials committed to the Stanton Energy Center are listed in Table 4.4-1. Recovery of these materials at the end of the 30 year plant life will depend on their relative value at plant decommissioning. Resource recovery may not be economically practical if recovery operations require expenditures of energy and materials exceeding the value of the reclaimed resource.

TABLE 4.4-1. COMMITMENT OF CONSTRUCTION MATERIALS FOR THE STANTON
GENERATING STATION--UNIT 1

<u>Material</u>	<u>Quantity</u>
Concrete	60,000 cubic yards
Steel	
Structural	13,000 tons
Rail	5,500 tons
Miscellaneous Metals	1,100 tons
Wood	500,000 board-feet

4.5 CONSTRUCTION OF OTHER ASSOCIATED FACILITIES

4.5.1 Railroad

Approximately 18 miles of railroad will be constructed between the Stanton Energy Center and the Seaboard Coast Line northwest of the site. About 2.5 miles of wetlands will be affected by the railroad construction. A description of the railroad corridor including the wetland areas is given in Subsection 2.7.7.

Trestles will be constructed to span larger wetland areas within the corridor and culverts will be used in other wetland sections to maintain the water flow. The locations of the trestles and culverts together with the details of their design are given in Section 4.1.

The wetlands along the railroad corridor are the most sensitive environmental areas. The water flow between portions of the wetlands should not be affected by the railroad. All trestles and culverts will be sized based on the 100-year peak discharge from the appropriate drainage basin.

It will be necessary to clear trees and other vegetation through wetland areas. The removal of this vegetation canopy will permit more light to reach the water which will stimulate the growth of phytoplankton and various aquatic plant species. The biological composition of the cleared portion of the wetland will be altered. The changes will not necessarily be adverse, but different from the present biological state.

The removal of trees and vegetation from the wetlands will reduce the value of the areas as habitat for various birds and other animals. The 2.5 miles of wetlands that will be affected by the railroad, however, represents only a small percentage of the total amount of wetland habitat in the area.

During construction activities in the wetland areas, there will be an increase in the turbidity of the water. The increased turbidity should be temporary, ending when construction is completed.

4.5.2 Pipeline

Two parallel pipelines approximately 4 miles long will be constructed from the Stanton Energy Center to the new Orange County Easterly Subregional Wastewater Treatment Plant. The pipelines will be entirely within the right-of-way of the new county road which will have been already cleared.

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The pipelines will be buried along the entire 4 mile corridor, but after the pipelines are installed, the construction area will be returned to its original condition. The right-of-way in which the pipeline will run will already have been disturbed.

RFM-1

During construction, there may be a temporary increase in water turbidity. The pipe will be at the bottom of a trench; therefore, the water flow will not be affected. Details of the general design of the pipelines are given in Appendix 4.1A.

RFM-1

4.5.3 Access Road

Access road from the Stanton Energy Center to Highway 50 will be provided by a new Orange County highway. The road will be approximately 8 miles long and the right-of-way for the road will also be utilized for the pipeline which will extend from the Stanton Energy Center to the Orange County Plant.

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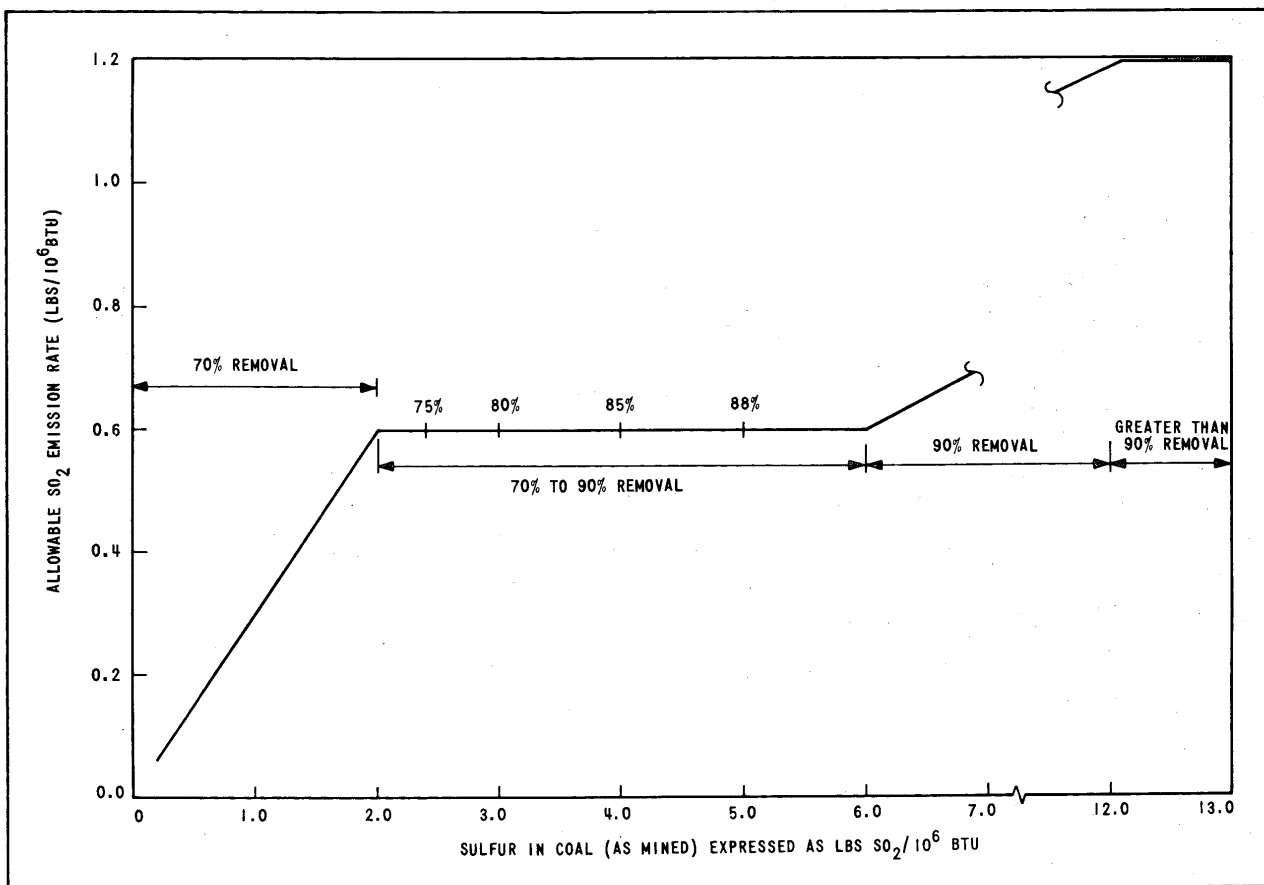


FIGURE 3.7B-1. ALLOWABLE EMISSION RATES
SO₂ EMITTED VS SULFUR IN COAL

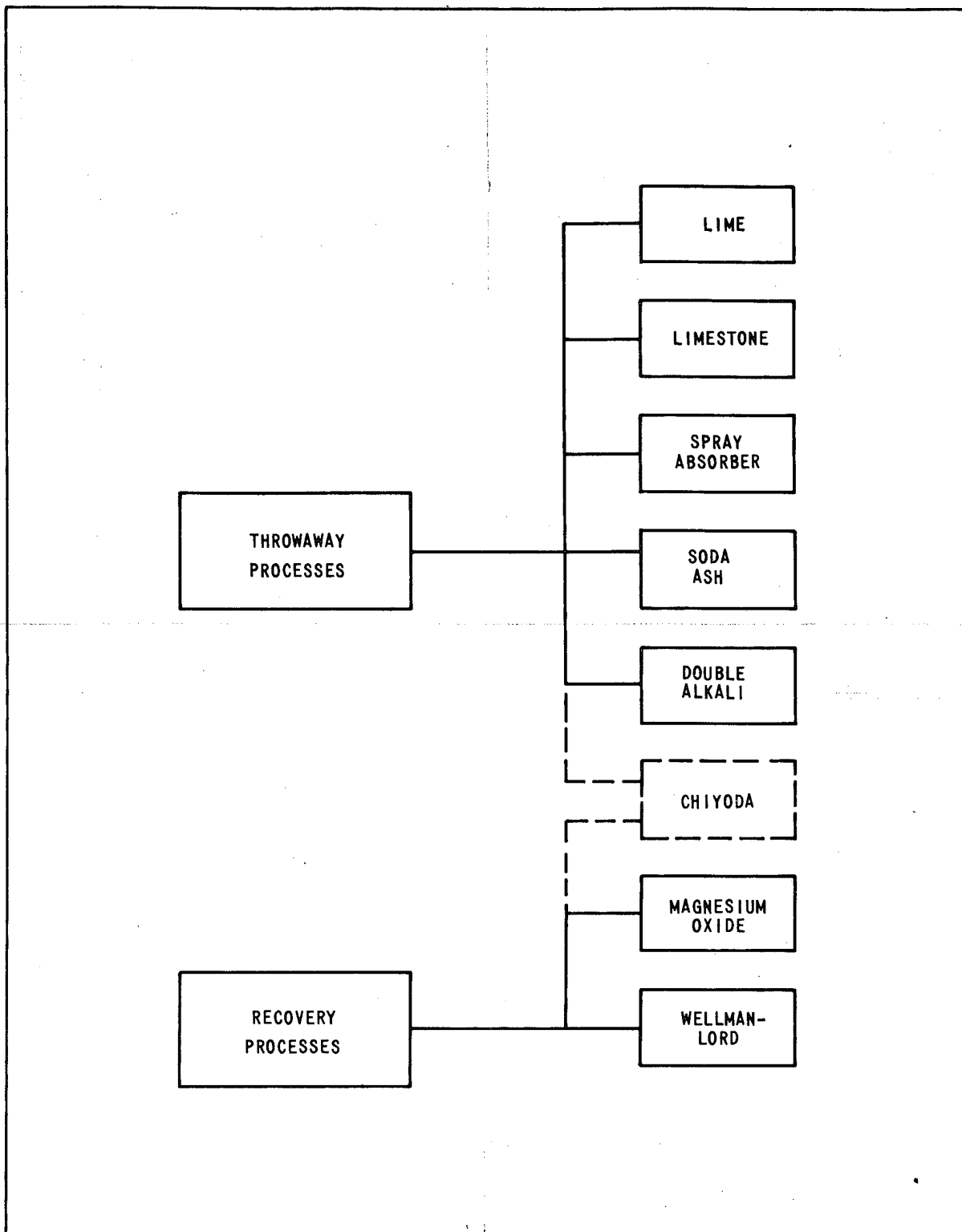


FIGURE 3.7B-2. DESULFURIZATION PROCESSES

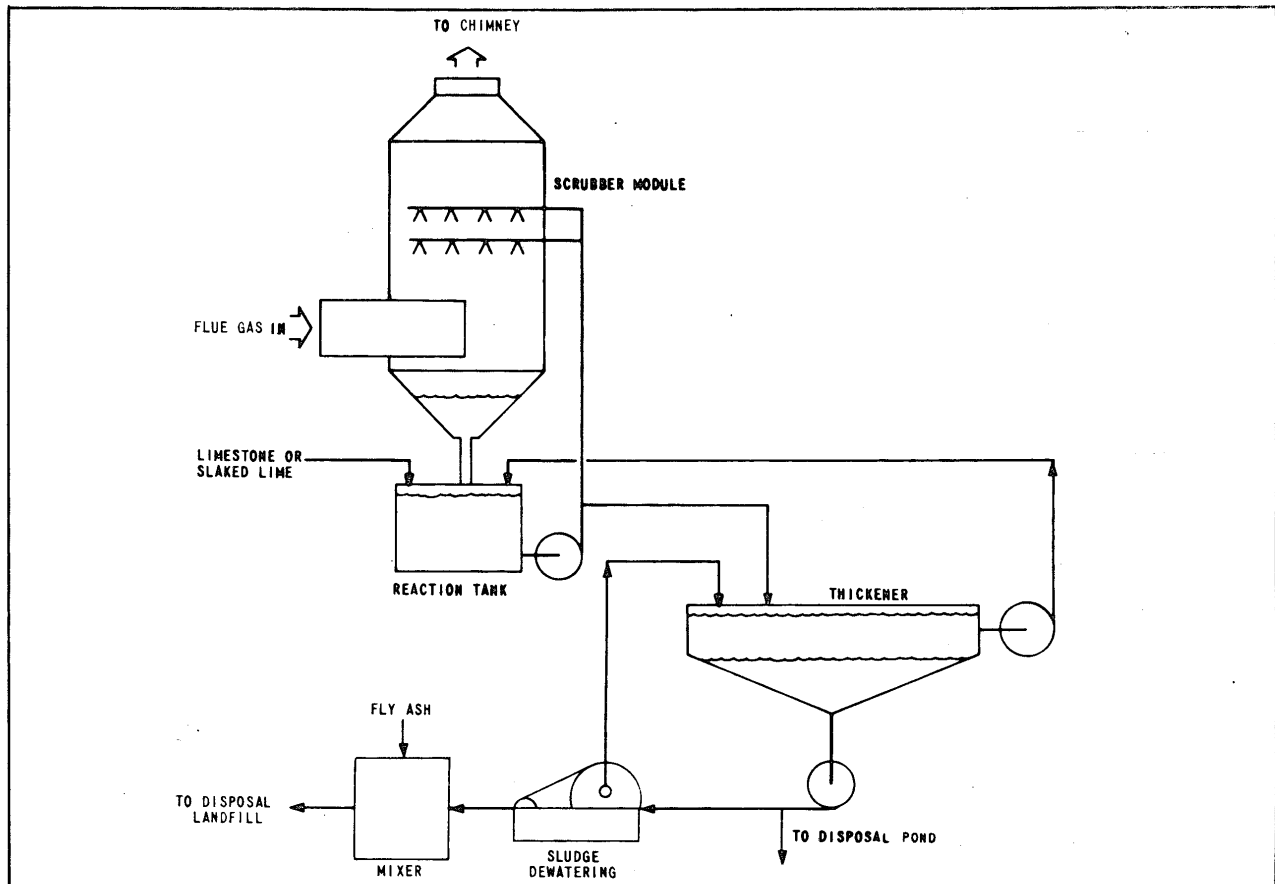


FIGURE 3.7B-3. LIME OR LIMESTONE PROCESS

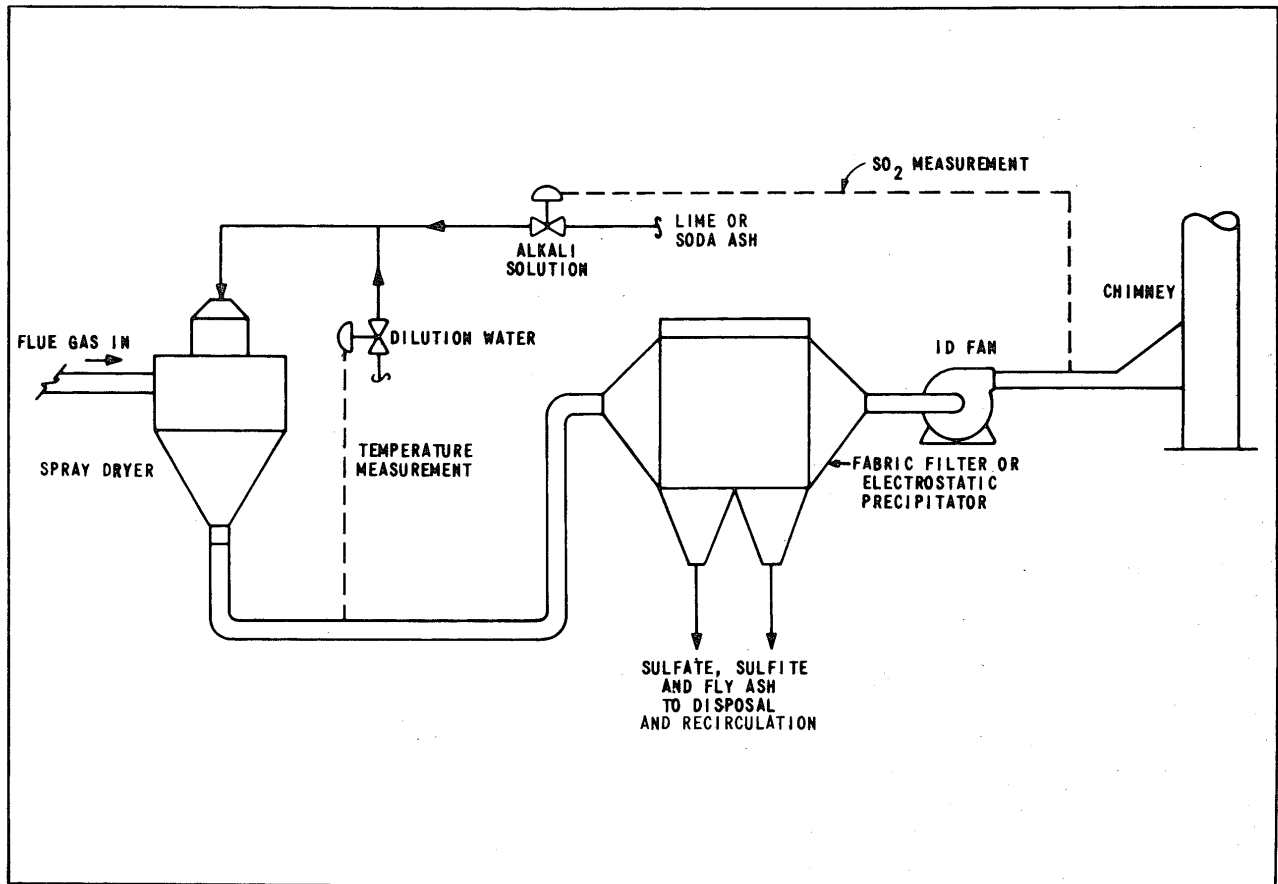


FIGURE 3.7B-4. SPRAY ABSORBER PROCESS

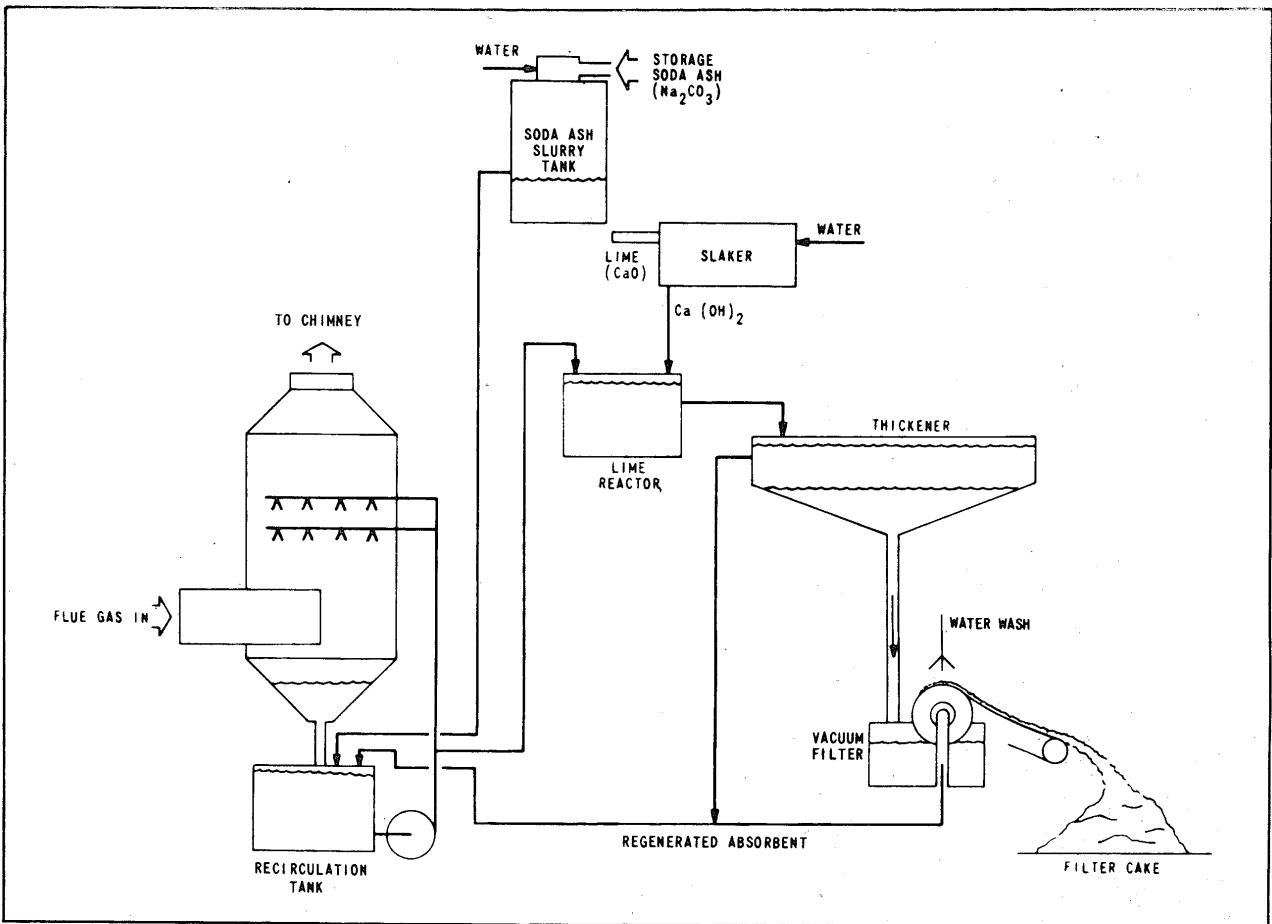


FIGURE 3.7B-5. DOUBLE-ALKALI PROCESS

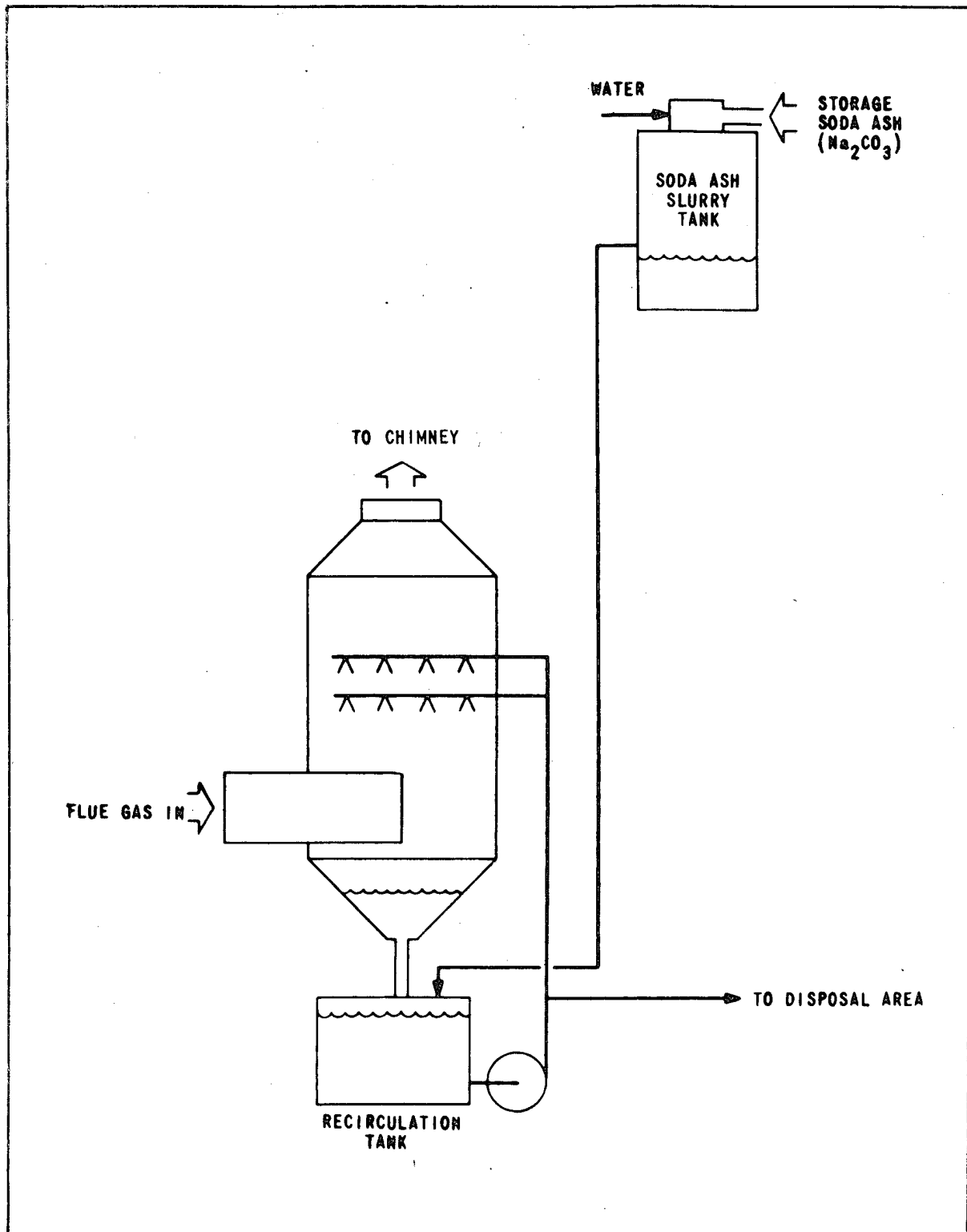


FIGURE 3.7B-6. SODA ASH PROCESS

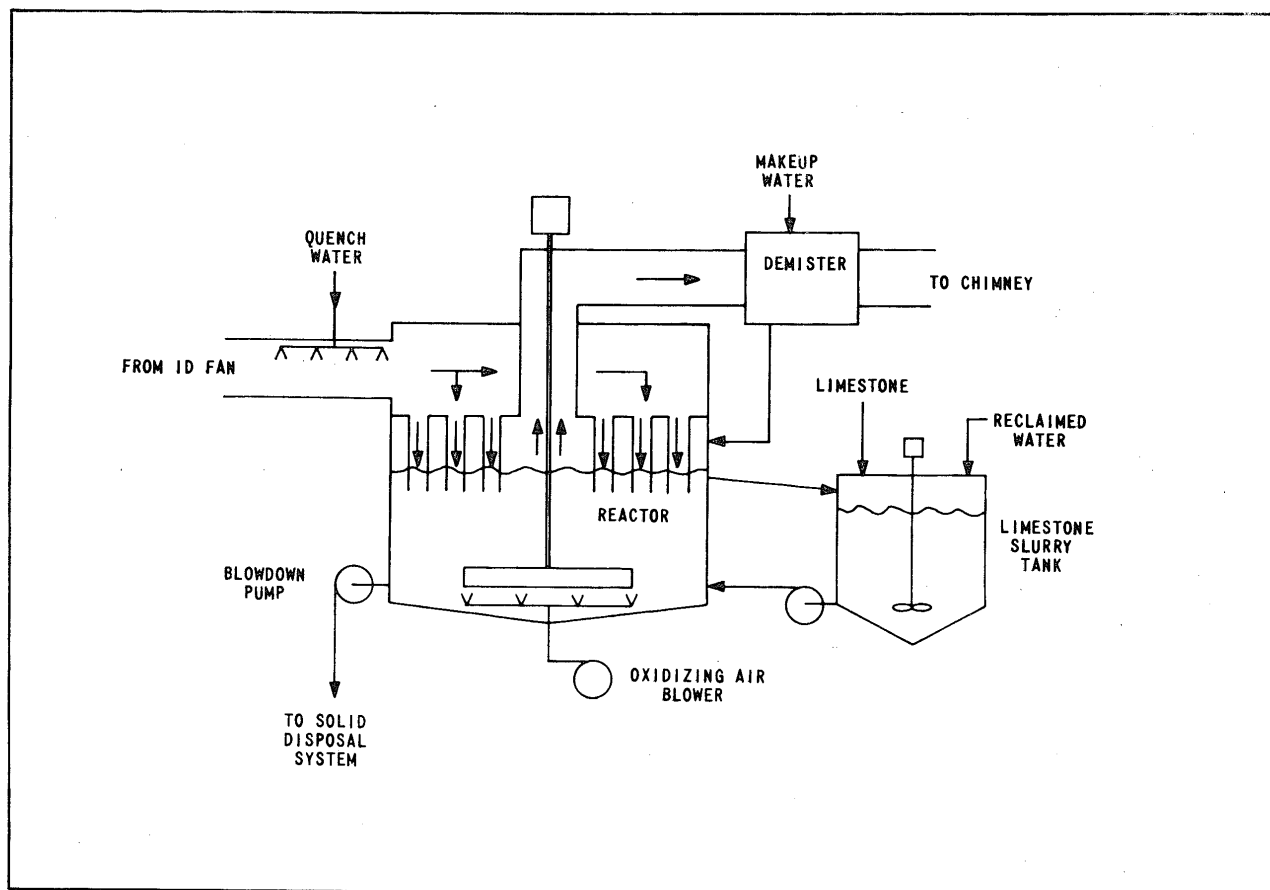


FIGURE 3.7B-7. FLUE GAS SPARGING (CHIYODA) PROCESS

3.8 DIRECTLY ASSOCIATED TRANSMISSION LINES

3.8.1 Route and Size

The existing Orlando Utilities Commission 115 and 230 kV transmission network is shown on Figure 3.8-1. The transmission lines associated with Stanton Energy Center Unit 1 will be routed north from the proposed power plant substation to the existing Orlando Utilities Commission Pershing Substation (No. 6) to Indian River Substation (No. 7) transmission line right-of-way. The Stanton Energy Center Substation (No. 16) will be located in Section 18, T23S, R32E as shown on Figure 3.8-2. A transmission line corridor approximately one half mile long and 590 feet wide will be required to connect the Stanton Energy Center Substation to the existing Pershing to Indian River line right-of-way in Section 7, T23S, R32E.

Existing transmission lines located on the Pershing to Indian River transmission line right-of-way from Pershing Substation east (approximately 3 miles) to Section 7, T23S, R31E are as follows.

- (1) Pershing to Rio Pinar - 230 kV (north circuit on double circuit lattice steel towers).
- (2) Pershing to Indian River - 230 kV (south circuit on double circuit lattice steel towers).
- (3) Pershing to Indian River - 115 kV (double circuit on guyed wood H-frame structures).

Existing transmission lines located on the Pershing to Indian River transmission line right-of-way in the vicinity of the proposed Stanton Energy Center are as follows.

- (1) Pershing to Indian River - 230 kV (south circuit on double circuit lattice steel towers).
- (2) Pershing to Indian River - 115 kV (double circuit on guyed wood H-frame structures).

The existing Pershing to Indian River 230 kV transmission line will be looped into the proposed Stanton Energy Center Substation resulting in the following directly associated transmission lines.

- (1) Stanton Energy Center to Indian River - 230 kV (existing south circuit on double circuit lattice steel towers).
- (2) Stanton Energy Center to Pershing - 230 kV (existing south circuit on double circuit lattice steel towers).

A new 103 foot wide right-of-way contiguous to the north edge of the existing Pershing to Indian River right-of-way will be required from Section 7, T23S, R32E to its intersection with the existing Florida Power Corporation Rio Pinar line right-of-way in Section 7, T23S, R31E (approximately 5 1/2 miles). The Stanton Energy Center to Rio Pinar line will exit the proposed power plant substation to the north for a distance of approximately one half mile at which point it will be routed west to the existing Florida Power Corporation Rio Pinar line right-of-way. This line will be the south 230 kV circuit on new galvanized lattice steel towers.

With the installation of the Stanton Energy Center to Rio Pinar line as stated above, the existing Pershing to Rio Pinar 230 kV line is not required. The existing Pershing to Rio Pinar line will be extended, utilizing the open space on the north side of the existing 230 kV double circuit tower from a point in Section 7, T23S, R31E to the proposed Stanton Energy Center Substation. The only new right-of-way required for this circuit will be that connecting the Stanton Energy Center Substation to the Pershing-Indian River line right-of-way.

An elevation of the transmission corridor, looking north, as it leaves the Stanton Energy Center Substation is shown on Figure 3.8-3. An elevation of the transmission corridor, looking west, at a location north of the Stanton Energy Center site, is shown on Figure 3.8-4. An elevation of the transmission corridor, looking west, just east of the intersection of the Pershing to Indian River transmission line right-of-way and the Rio Pinar transmission line right-of-way is shown on Figure 3.8-5.

The maintenance road in the existing right-of-way will be used to maintain the new transmission lines. The plant access road and the makeup water and return water pipelines will parallel the transmission lines from a point where they exit the site and to a point 2 miles west along the existing Pershing to Indian River corridor as shown on Figures 3.8-2 and 3.8-4.

3.8.2 Land Use Impact

The land adjacent to the existing transmission corridor which will be widened, consists mostly of native or improved pasture and wetlands. Two residences exist along the south side of the transmission right-of-way. Since the expansion of the right-of-way will be to the north, those residences will not be affected. One orange grove borders the north side of the corridor.

The transmission corridor consists of three basic sections. The first section is the half mile portion exiting north from the site. This section will be approximately 590 feet wide. No wetlands exist in this area. Only scattered, sparse trees exist in this corridor and these trees will be removed.

The second section of the transmission corridor is the 2 miles paralleling the existing transmission corridor and containing the new transmission towers and the plant access road, water supply pipeline and return water pipeline. This corridor will consist of the 220 foot existing right-of-way plus a new right-of-way 260 feet wide which will be contiguous with the northern edge of the existing right-of-way. This new right-of-way will cross approximately 2,000 feet of wetlands. The wetland trees as well as other scattered trees in the corridor will be cleared.

The third section of the transmission corridor is the 3.5 miles from the point where the plant access road and pipelines turn north to the intersection of the Florida Power Corporation Rio Pinar transmission line with the Pershing to Indian River transmission corridor. This corridor will consist of the 220 foot existing right-of-way plus a new 103 foot wide

right-of-way which will be contiguous with the northern edge of the existing right-of-way. This new right-of-way will cross approximately 5,700 feet of wetlands, the Little Econlockhatchee River and an orange grove. The orange grove and Little Econlockhatchee River will be spanned by the transmission lines. The trees in the wetlands as well as other scattered trees will be cleared.

3.8.3 Beneficial Uses

A portion of the transmission corridor will have multiple uses. This portion is the one half mile long exit corridor going north from the site and the 2 mile length of corridor immediately west of the exit corridor. This portion of the corridor will be parallel to the plant access road and the makeup water supply and return water pipelines. The remaining 3-1/2 miles of new transmission corridor will be used for transmission lines only.

3.8.4 Visibility

The transmission corridor is located approximately 4 miles south of Cheney Highway and 3.5 miles north of the Bee Line Expressway. The new transmission lines will not be visible from Cheney Highway and rarely visible, at a long distance, from the Bee Line Expressway.

The only other road that is frequently traveled and passes under the transmission lines is the access road to the sanitary landfill adjacent to the Stanton Energy Center Site.

3.8.5 Associated Transmission Structures

The new transmission lines will be supported on the existing galvanized steel transmission towers and on new galvanized steel transmission towers along the existing corridor. The new corridor, which exits the site to the north, will utilize new galvanized lattice steel structures as shown on Figure 3.8-3. The steel towers will be approximately 110 feet tall with the tower base dimensions being approximately 22 feet by 30 feet. The average horizontal span between towers will be approximately 1,000 feet. Front and side elevations of a typical tower are shown on Figure 3.8-6.

The only new substation required will be the Stanton Energy Center Substation located onsite. The substation will be a low profile, rigid bus design utilizing galvanized steel structures. The electrical arrangement will consist of a breaker-and-a-half scheme. Initial development will consist of an area approximately 400 feet by 400 feet. The ultimate substation development will be approximately 600 feet by 800 feet. The ultimate substation area will be fenced and surfaced with crushed stone during Unit 1 construction. A side elevation of the proposed Stanton Energy Center Substation is shown on Figure 3.8-7.

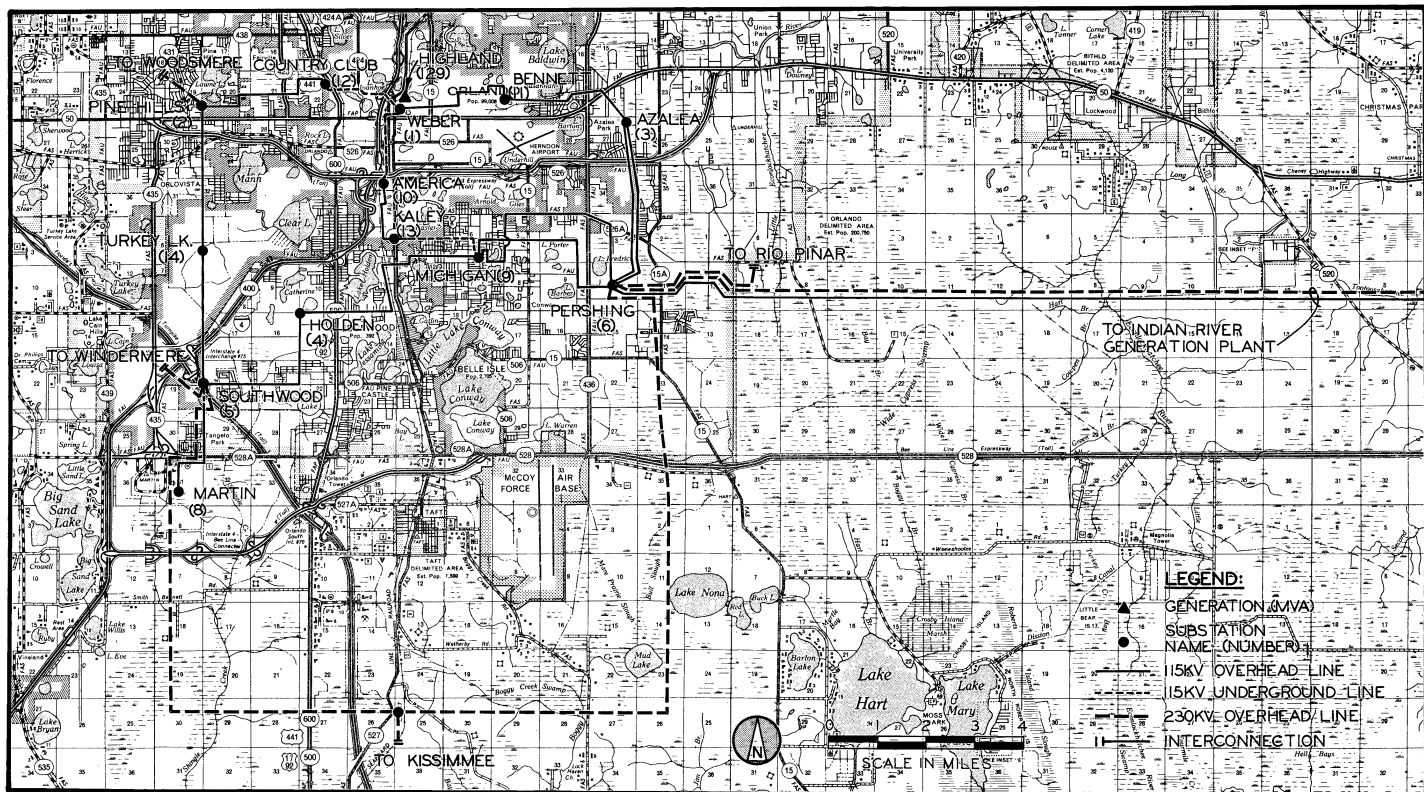


FIGURE 3.8-1. EXISTING OUC ELECTRIC TRANSMISSION NETWORK

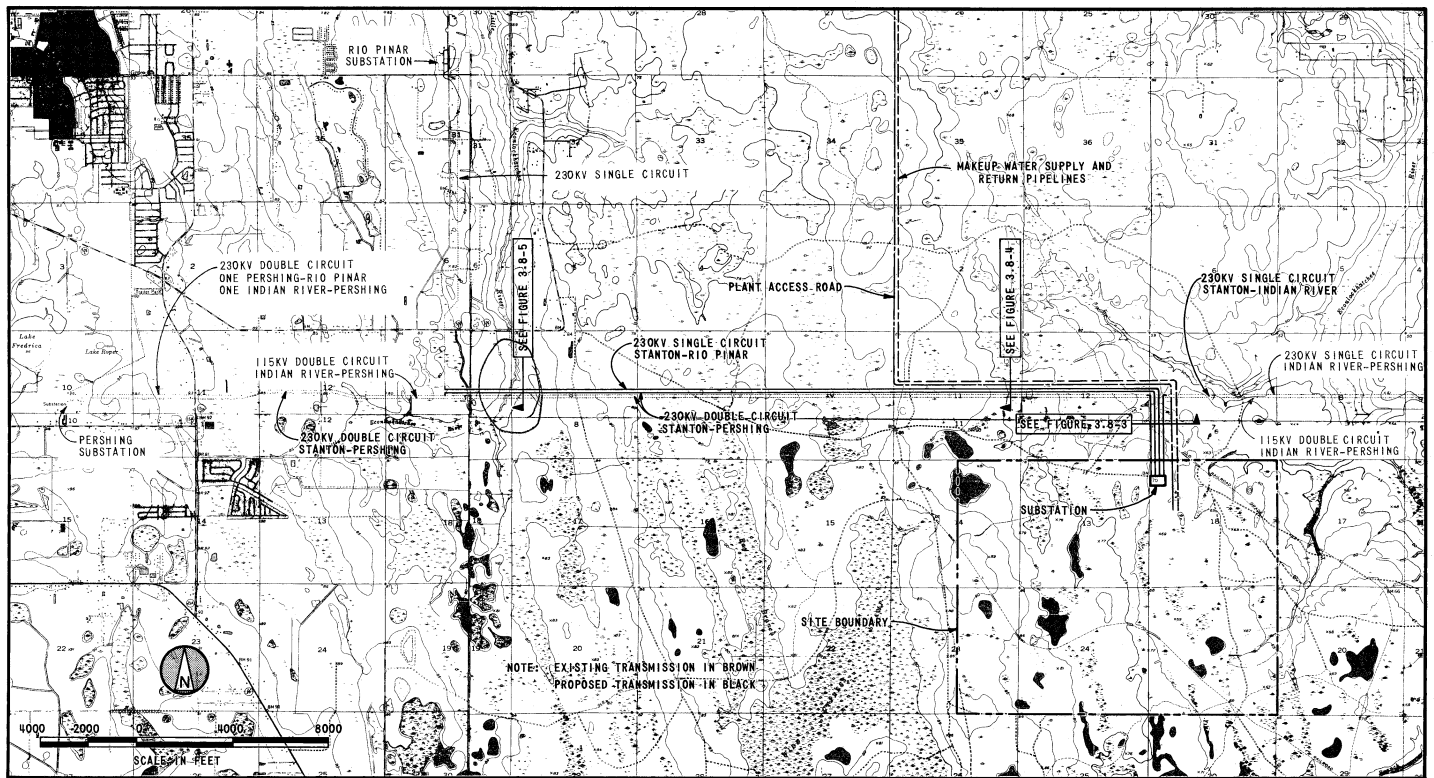


FIGURE 3.8-2. STANTON ENERGY CENTER
UNIT I ASSOCIATED
TRANSMISSION FACILITIES

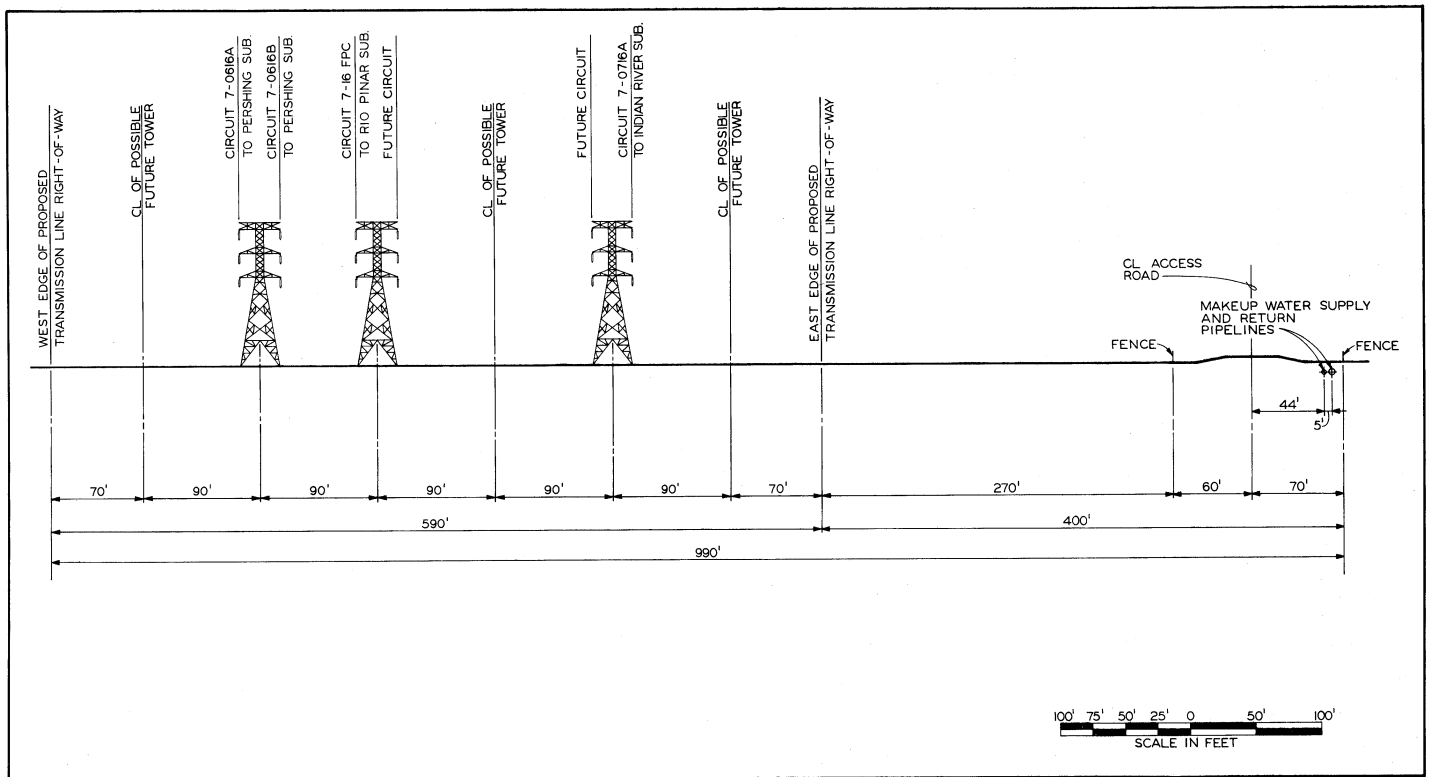


FIGURE 3.8-3. TRANSMISSION CORRIDOR ELEVATION
EXITING SITE LOOKING NORTH

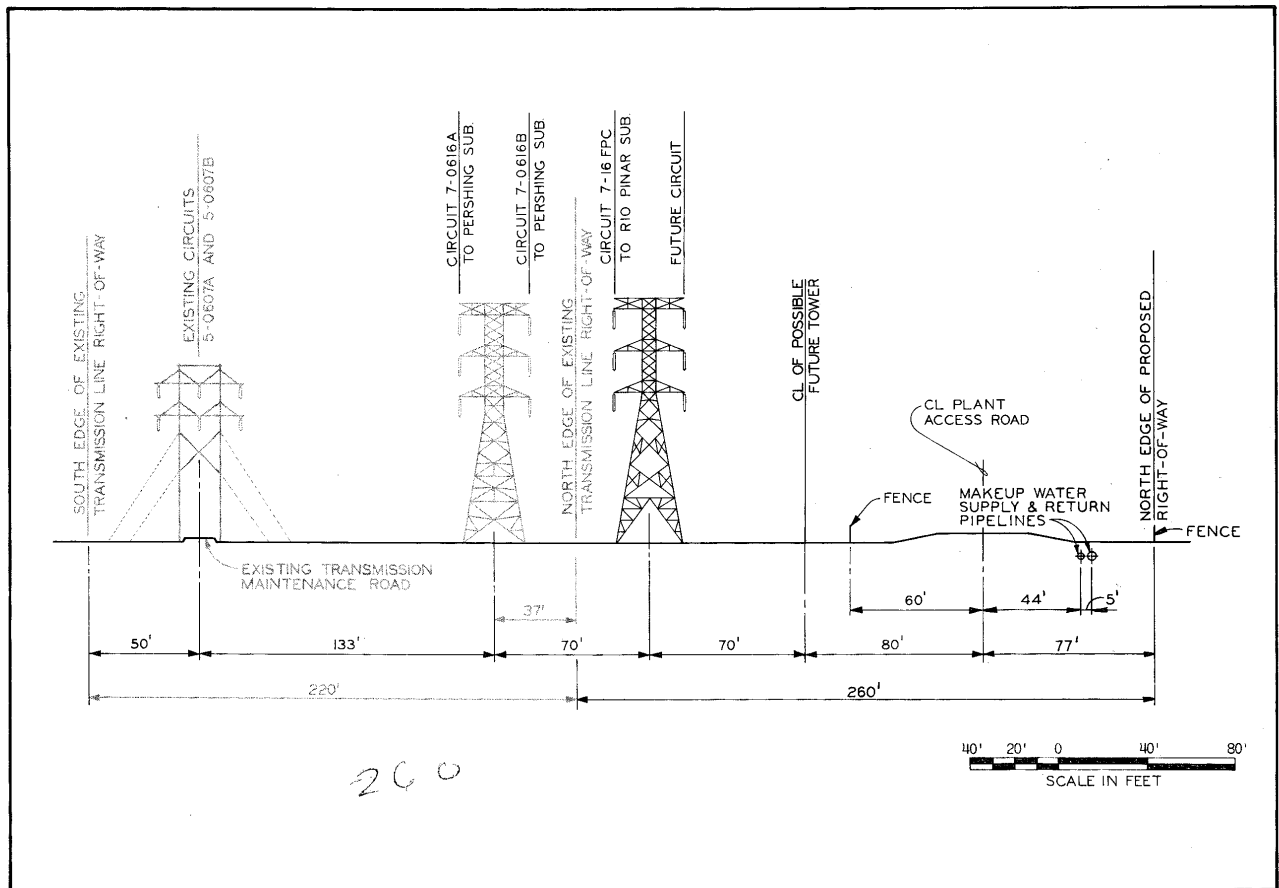


FIGURE 3.8-4. TRANSMISSION CORRIDOR ELEVATION
NORTH OF SITE LOOKING WEST

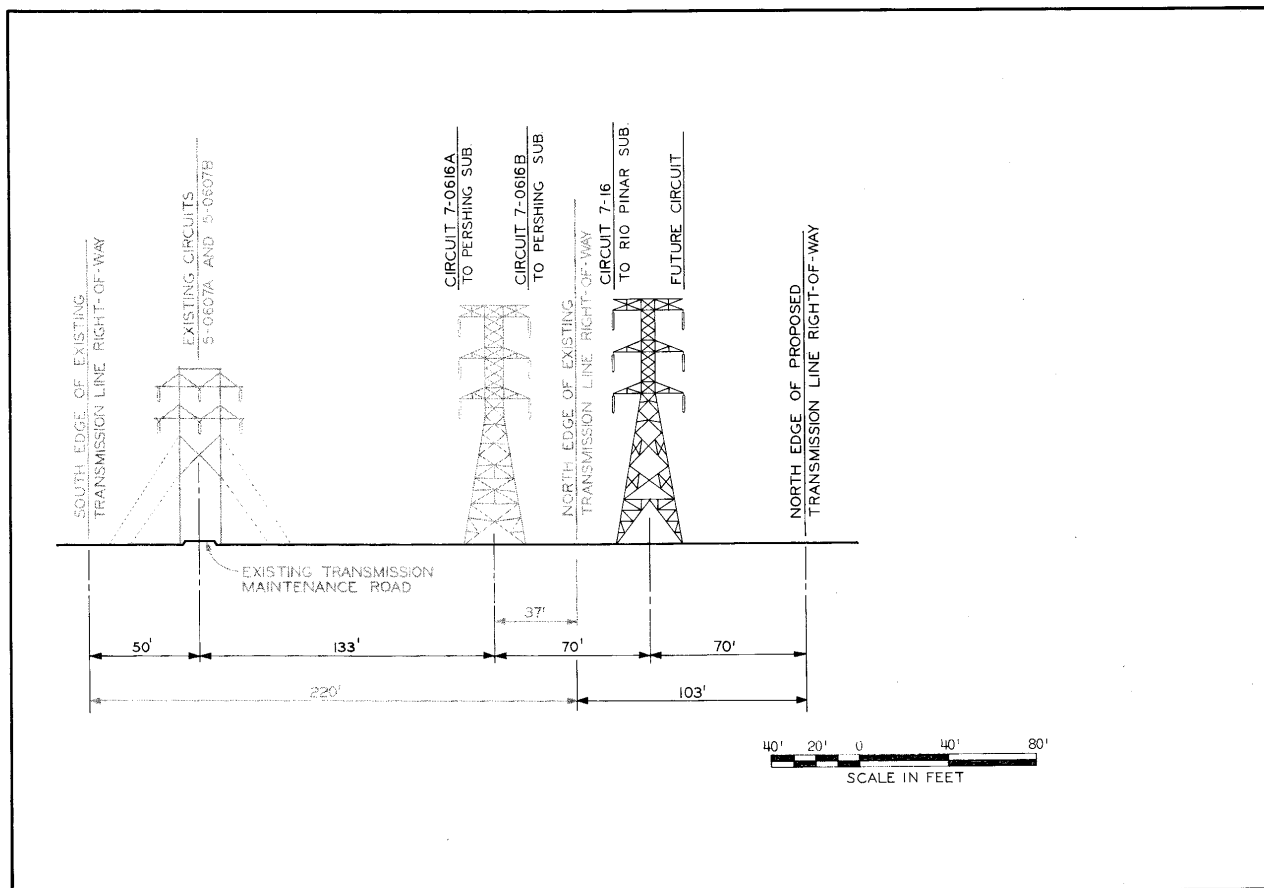


FIGURE 3.8-5. TRANSMISSION CORRIDOR ELEVATION
EAST OF RIO PINAR INTERSECTION
LOOKING WEST

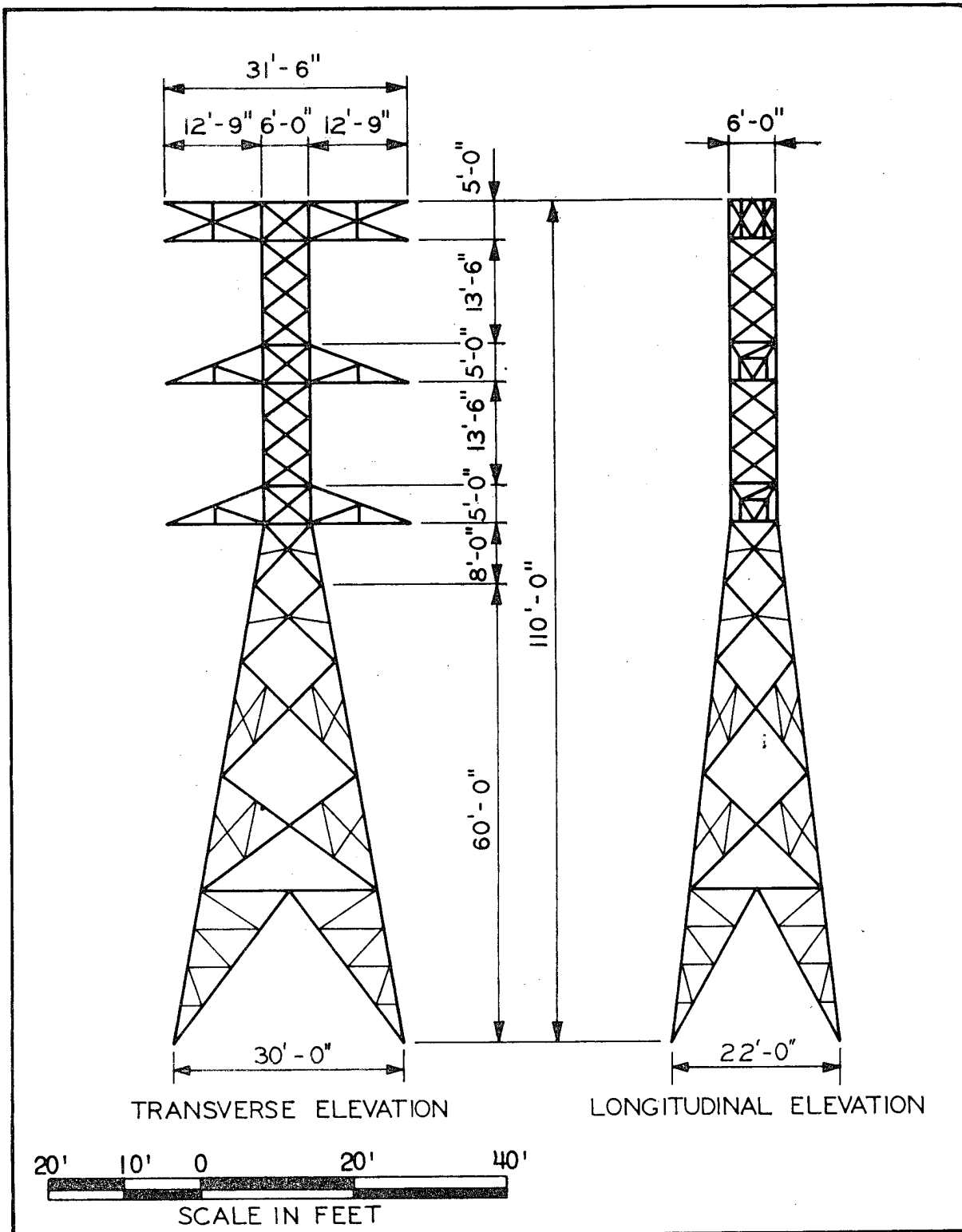


FIGURE 3.8-6. TYPICAL 230KV LATTICE STEEL TRANSMISSION TOWER

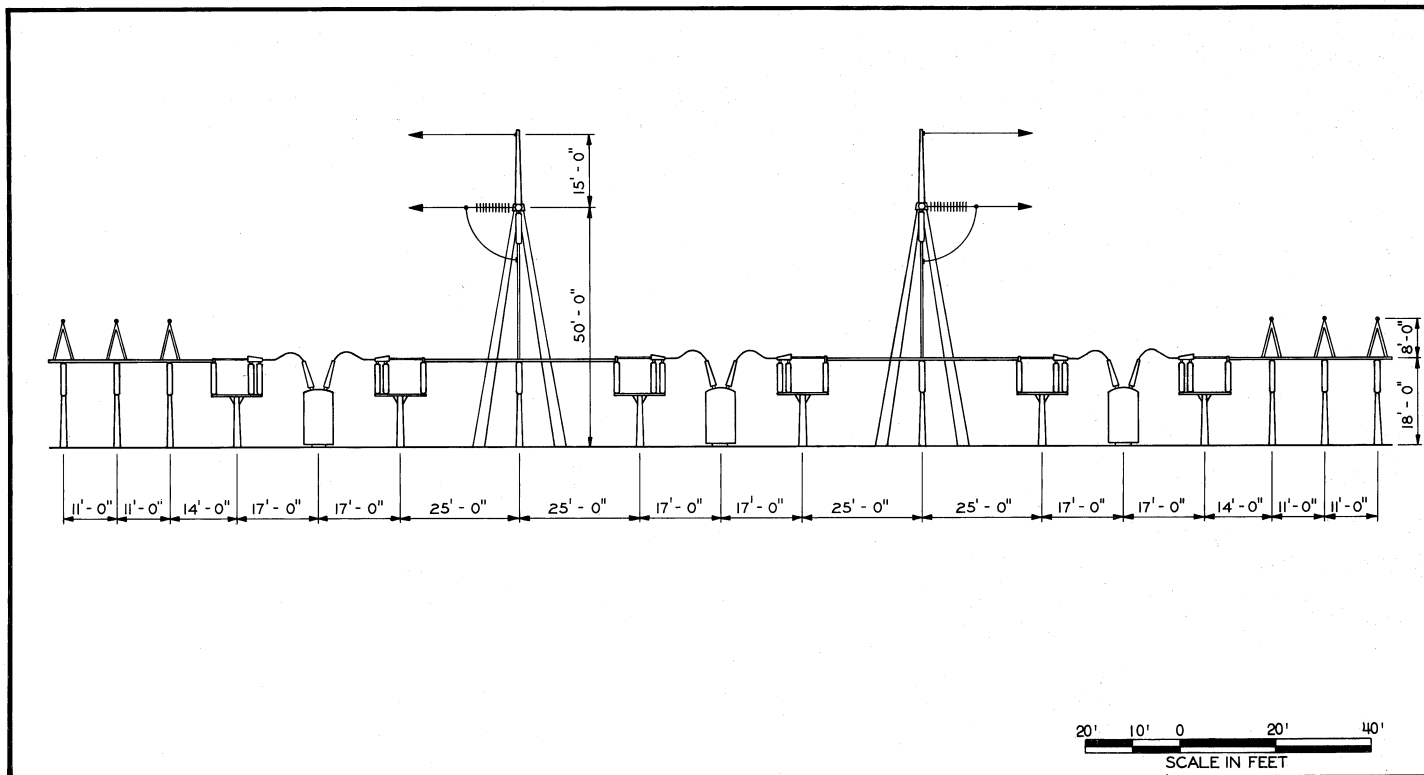


FIGURE 3.8-7. STANTON ENERGY CENTER SUBSTATION
ELEVATION LOOKING WEST

3.9 DIRECTLY ASSOCIATED FACILITIES

Directly associated facilities include railroads, access and plant roads, fencing and security, limestone handling facilities, makeup and return water pipelines, and lime handling facilities as described in the following sections. Associated transmission facilities are described in Section 3.8.

3.9.1 Railroads

A system of railroad tracks will be required for coal delivery and transportation of materials and equipment for construction and maintenance. The routing of the railroad to the site and the arrangement of the railroad on-site are shown in Figures 3.9-1 and 3.9-2, respectively. A spur will originate at a turnout from the Seaboard Coast Line (SCL) Railroad mainline approximately one mile west of the Orlando International Airport. The new spur will be approximately 18 miles in length from the SCL turnout to the coal loop at the site.

The railroad to the site will be routed in the modified corridor shown on Figure 3.9-1. The rail corridor consists of 800 feet either side of a centerline originating at the south boundary of the site at State Plane Coordinates (SPC) 1,502,160N; 448,140E; proceeding south, under the Bee Line Expressway to SPC 1,490,030N; 448,100E; turning southwest and proceeding to SPC 1,485,880N; 443,860E; turning west and proceeding to SPC 1,486,150N; 443,400E; turning southwest and proceeding to SPC 1,468,520N; 405,000E; turning northwest and proceeding to SPC 1,478,160N; 392,480E; turning west and running within 3,000 feet either side of the centerline proceeding to SPC 1,477,990N; 379,420E.

The railroad corridor modification is located southeast of Mud Lake, Lake Nona, and Red Lake and west of State Route 15. It consists of a triangular area approximately 3.25 miles long by 0.42 miles wide at its widest point. This area contains approximately 425 acres of land. The original affected segment included four culverts; four pipe culverts within the corridor modification will be used to maintain existing drainage patterns. Three of the pipe culverts will prevent surface water ponding on

3.9-1

either side of the railroad berms and the fourth will permit surface runoff to drain to the southeast. No significant changes in surface drainage patterns will result from the modification.

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The railroad spur will be a single track line, elevated above the 100-year flood elevation by an embankment. At locations where the railroad interrupts natural drainage patterns, culverts or trestle drainage structures will be provided. Wetland and swamp crossings will utilize precast concrete pile trestles in addition to embankment construction. Additional openings will be provided as required for wildlife crossings. A typical railroad section is shown in Figure 3.9-3. A typical railroad trestle detail is shown in Figure 3.9-4.

The railroad spur will cross several roads. Where the railroad spur crosses Boggy Creek Road near its intersection with Weatherby Road, Boggy Creek Road will be relocated along the south side of the railroad right-of-way. A grade crossing with Weatherby Road will be required. All railroad road crossings, with the exception of the Bee Line Expressway crossing, will be at grade. The new railroad spur will be constructed under the Bee Line Expressway through an existing interchange. The clearance at the existing interchange is less than that recommended by the American Railway Engineering Association. As a result, new bridges will be constructed to replace the existing bridges to furnish adequate clearance. A section of the Bee Line Expressway at the interchange is shown in Figure 3.9-5.

On-site railroad construction will consist of a coal delivery loop and plant access railroad. The coal delivery loop will be elevated to approximately 10 feet above grade. The loop will be elevated to minimize the depth that the coal unloading system structure must extend into the ground water table. The railroad will be constructed over coal unloading hoppers located within the embankment. A portion of the loop will have a dual track to allow for rail delivery of limestone (scrubber additive) and railcar storage. The limestone unloading system will be similar to the coal handling system unloading facilities. The coal and limestone unloading equipment will be located adjacent to each other in a common building.

The plant access rail will be provided by an extension of the coal delivery spur into the generation facilities immediate area. Rail spurs will be constructed to provide access to the following.

- (1) Generator transformer, turbine generator, and condenser areas.
- (2) Permanent turbine room access bay.
- (3) Boiler construction (remove as construction progresses).
- (4) Materials laydown area.
- (5) Fuel oil storage.
- (6) Lime unloading hopper.

Construction of these spurs will be completed in conjunction with site preparation and construction of the plant access road.

Railroad embankments will be constructed from on-site borrow material or material obtained along the right-of-way. All road and railroad embankment slopes will be seeded to establish grass and provide erosion control. Whenever possible, all slopes will be constructed to no steeper than 3 horizontal on 1 vertical.

3.9.2 Access and Plant Roads

A new Orange County road, named Alafaya Trail Extension, will be constructed from State Highway 50, Cheney Highway, south from the intersection of State Highways 50 and 520. This new road is being constructed by Orange County to serve a new industrial facility being constructed by the Martin-Marietta Corporation, the new Orange County Easterly Subregional Wastewater Treatment Plant, and the Curtis H. Stanton Energy Center. Just southwest of the planned location of the Orange County Plant, the new road turns east along section lines and extends east to the main site entrance of the Stanton Energy Center. Because of this new Orange County road, construction of the main plant access road, as certified, is no longer necessary. In addition to serving as the main plant access road, the new county road will also define the route for the makeup water supply and cooling tower blowdown return pipelines. These parallel lines will follow the new county road from Stanton Energy Center to the Orange County Plant and will not extend to the Iron Bridge Facility in Seminole County. Alternate access to the site from the new county road will be provided by a short access road within the joint-facilities corridor.

RFM-1

The main plant road onsite will have an embankment section as shown on Figure 3.9-8, and will provide access to construction parking lots as well as the plant entrance at the construction and permanent security facilities. The roadway will terminate at the main plant perimeter loop road. The main plant access road is expected to be paved initially, except for that portion serving the administration area. This unpaved portion will eventually be paved prior to start-up of Unit 1.

The operations and visitor parking lots will initially have space for 150 and 20 vehicles, respectively. Each lot will be surfaced with a lime-rock base. Prior to Unit 1 start-up, a 4-inch thick bituminous pavement

will be applied to the two lots. The construction parking areas will have a crushed rock surface sprayed with a dust palliative. The main construction parking lot will be sized to accommodate 650 vehicles, while a separate construction management lot will accommodate 80 to 100 vehicles.

The main plant perimeter loop road, including cooling tower and batch plant access roads, will be as shown on Figure 3.9-8. The remaining lesser travelled service roads will also be as shown on Figure 3.9-8. The construction laydown area roads will be similar in width to low density service roads; however, they will have a thinner limerock base.

Road embankments will be slightly elevated above existing grade to ensure proper drainage from the road surface and will be constructed from local material obtained along the road right-of-way or on-site. A limerock base coarse will provide a stable subgrade for the road surface. All road surface elevations will be above the 100-year flood elevation.

Culvert pipe or box culvert drainage structures will be provided at interfaces with existing drainage patterns to ensure proper drainage of storm runoff.

3.9.3 Fencing and Security

Fencing and security will provide for the physical enclosure of secured areas and allow for the monitoring of incoming and outgoing traffic. A security fence will enclose the main plant and construction areas as shown on Figure 3.9-7. Fencing may also be installed around special construction areas such as the electrical laydown areas where required.

The security fence will enclose the main plant area and allow only limited access. An entrance at the construction guard station will be maintained during construction. Outdoor construction lighting will be provided for security. The security facilities, parking lots, and entrance road within 300 feet of the gate will be lighted.

The permanent security building will serve to monitor the passage of visitors and operations personnel to and from the plant. A manually-actuated power operated gate will be provided which could be operated from within the security building or by key from the fence exterior.

3.9.4 Limestone Handling

The additive for the flue gas desulfurization system at Stanton Energy Center will be limestone. The source of supply has not been determined at this time. Potential sources involve the use of both truck and rail delivery of the limestone. Therefore, provisions for delivery by both methods will be included at the plant. Truck delivery will require 15 trucks of 24 tons each per day for five days per week. Railcar delivery will require 18 railcars of 100 tons each per week.

The limestone handling system will be capable of unloading, stocking, reclaiming and long term reserve storage. Figure 3.9-9 shows a schematic of the limestone handling process, Figure 3.9-10 shows the layout of the limestone handling facilities and Figure 3.9-11 shows a perspective of the limestone handling facilities. Limestone delivered by rail will be received by a bottom dump-type unloading facility located adjacent to the coal train unloading facility. As the train is being unloaded, the limestone will be conveyed to a stockout pile located southeast of the Crusher Building. This pile will be used for active storage. Limestone delivered by truck will be dumped directly into the stockout area. A large reserve limestone pile of 38,000 tons (120 days for Unit 1) will be maintained just south of the stockout area. Reclaimed limestone will be conveyed to the scrubber additive storage day bin prior to being ground and mixed with water to produce the additive slurry.

RFM-1

Fugitive dust generated by the handling and storage of limestone will be controlled by the use of water spray suppression, enclosed stockout conveyor, totally enclosed reclaim conveyor, and a bag filter at the day silos and shuttle conveyor. The limestone unloading facility receiving hopper will be adjacent to the coal unloading facility within a building. The limestone receiving hopper will be equipped with a water spray dust suppression system. The main stockout conveyor shown on Figure 3.9-11 will be enclosed with a roof and sides and a steel-grate floor except where it passes over roads or other facilities. Solid floors will be provided for such areas. The limestone reclaim conveyor will be totally enclosed with a solid floor because it passes over other plant facilities or service areas.

RFM-1

This conveyor discharges onto a belt-type shuttle conveyor which distributes the limestone to the day silos. At this transfer point, a dust collection hood operating at negative pressure will be provided. The exhaust from this hood will be routed through the bag filter system which controls the exhaust from the day silos during filling.

RFM-1

Table 3.9-1 lists the release points and control methods for the limestone handling facilities. Estimated emission levels for the release points are presented in Section 5.5.

3.9.5 Makeup and Return Water Pipelines

A makeup water pipeline and a return water pipeline will connect the Stanton Energy Center to the Orange County Easterly Subregional Wastewater Treatment Plant. The corridor in which the pipeline will be routed is shown on Figure 3.9-6. The makeup pipeline will consist of a 36 inch fiberglass reinforced plastic pipe and will be used to supply Orange County Plant effluent to the site for use as cooling tower makeup. The return pipeline will consist of 10 inch fiberglass reinforced plastic pipe and will be used to return excess plant wastewater to the Orange County Plant.

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RFM-1

RFM-1

The pipelines will be routed in a common trench and will parallel the new county road for 4 miles from the site to the Orange County Plant. The new county road connects to the Stanton Energy Center site near the north-western corner of Section 18, T23S, R32E. From the site the road extends north about 2,550 feet to a point of intersection within the existing OUC transmission right-of-way at State Plane Coordinates N 1,515,389 and E 449,068. The road turns northwest at this point for about 4,115 feet to a point of intersection at State Plane Coordinates N 1,518,343 and E 445,550. From this point the road runs due west along a section line for approximately 5,340 feet to a point of intersection at State Plane Coordinates N 1,518,335 and E 440,593. The road turns north-northwest at this point to a true azimuth of approximately 338 degrees for about 5,330 feet to a point of intersection at State Plane Coordinates N 1,523,299 and E 438,695. At this point the road turns nearly due west with the pipelines extending to a point at SPC N 1,523,424 and E 434,444. The pipelines turn due south to enter

RFM-1

the Orange County Easterly Subregional Wastewater Treatment Plant. The new county road continues northward from this location to its intersection with State Highway 50. The total length of the pipeline corridor from the Stanton Energy Site to the Orange County Plant is approximately 4 miles.

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3.9-6a

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3.9.6 Lime Handling and Storage

Pebble lime will be used as an additive to condition the scrubber sludge/flyash mixture. The lime will be received by truck or by railcar dumping into an enclosed receiving hopper. A rail/truck unloading facility is served by the plant maintenance rail spur near the Coal Crusher Building as shown on Figure 3.1-4. The lime will be transported from the hopper to a storage silo by a pressurized pneumatic system. The silo will vent through a fabric bag filter system with a removal efficiency of at least 99 per cent. From the storage silo, the lime will be conveyed to a pulverizer and then to the sludge/flyash mixers.

5

3.9.7 Radioactive Level Detection Systems

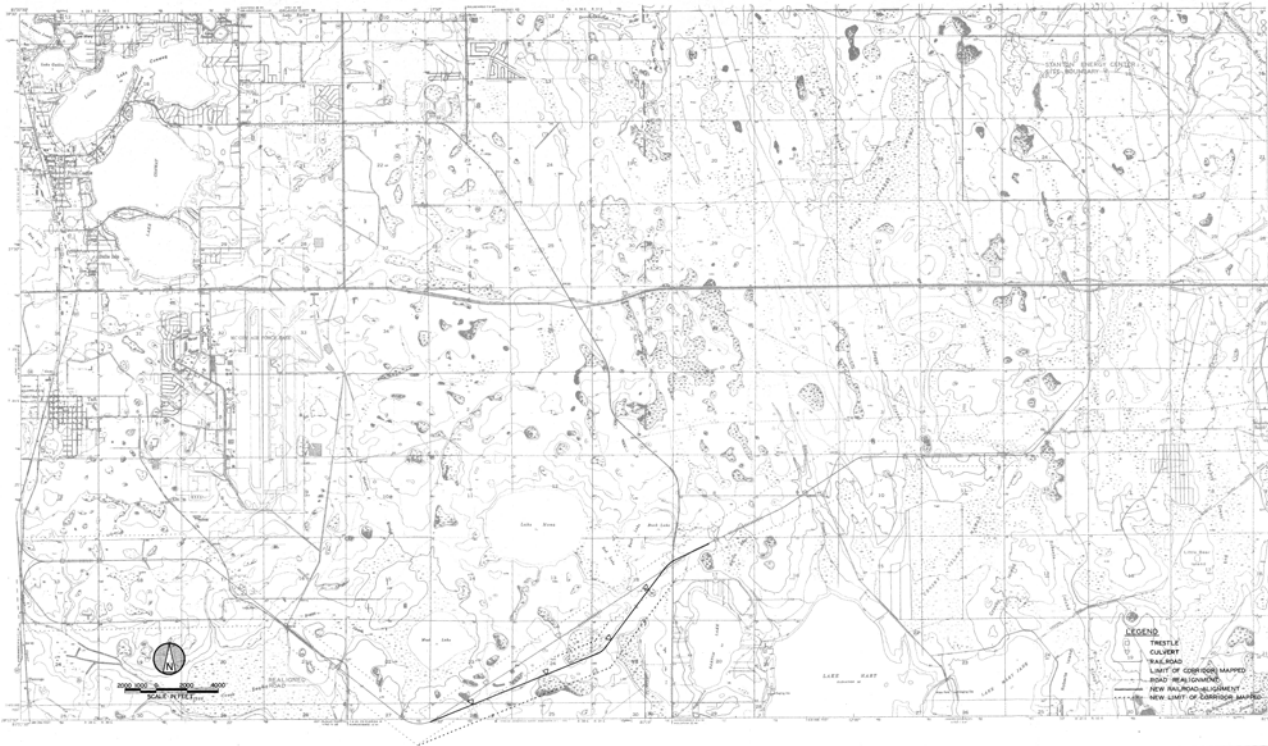
Radioactive devices will be used to monitor levels of bulk materials, liquids, and combustion wastes. Coal silos, main steam line moisture collection pots, and fly ash hoppers under the electrostatic precipitators are the principal system applications of these devices. The radioactive materials used in these devices are regulated by the Florida Department of Health and Rehabilitative Services. Completed applications for licenses for radioactive materials are included as Appendix 3.9A.

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TABLE 3.9-1. FUGITIVE LIMESTONE DUST EMISSIONS CONTROL

<u>Source of Emissions</u>	<u>Dust Control Method</u>	<u>Control Efficiency per cent</u>	
Bottom Car Dumper	Water Spray and Building Enclosure	97	5
Stockout Conveyor	Enclosed	90 99+	RFM-1
Active Storage			
Load In	Telescopic Chute	85	
Load Out	Dozer	50	
Wind Erosion	Crusting	80	
Reserve Storage			
Load In	Dozer	50	
Load Out	Dozer	50	
Wind Erosion	Crusting	80	
Reclaim Conveyor	Enclosed*	99 +	RFM-1
Storage Day Bin	Bag Filter	99+	

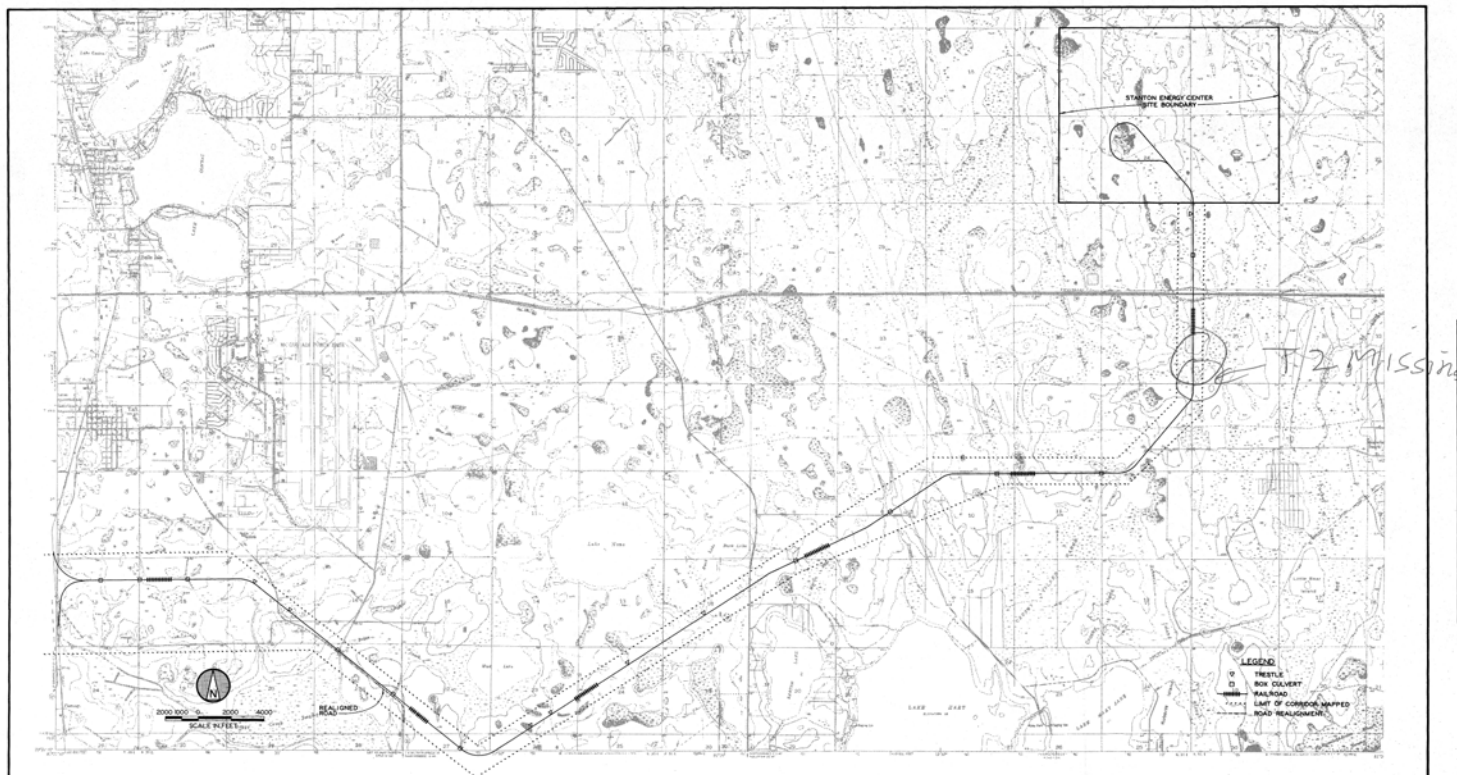
*With solid floor to protect other plant facilities and work areas. | RFM-1



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FIGURE 3.9-1. ROUTING OF RAILROAD TO SITE

New



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FIGURE 3.9-1. ROUTING OF RAILROAD TO SITE

ouc-4

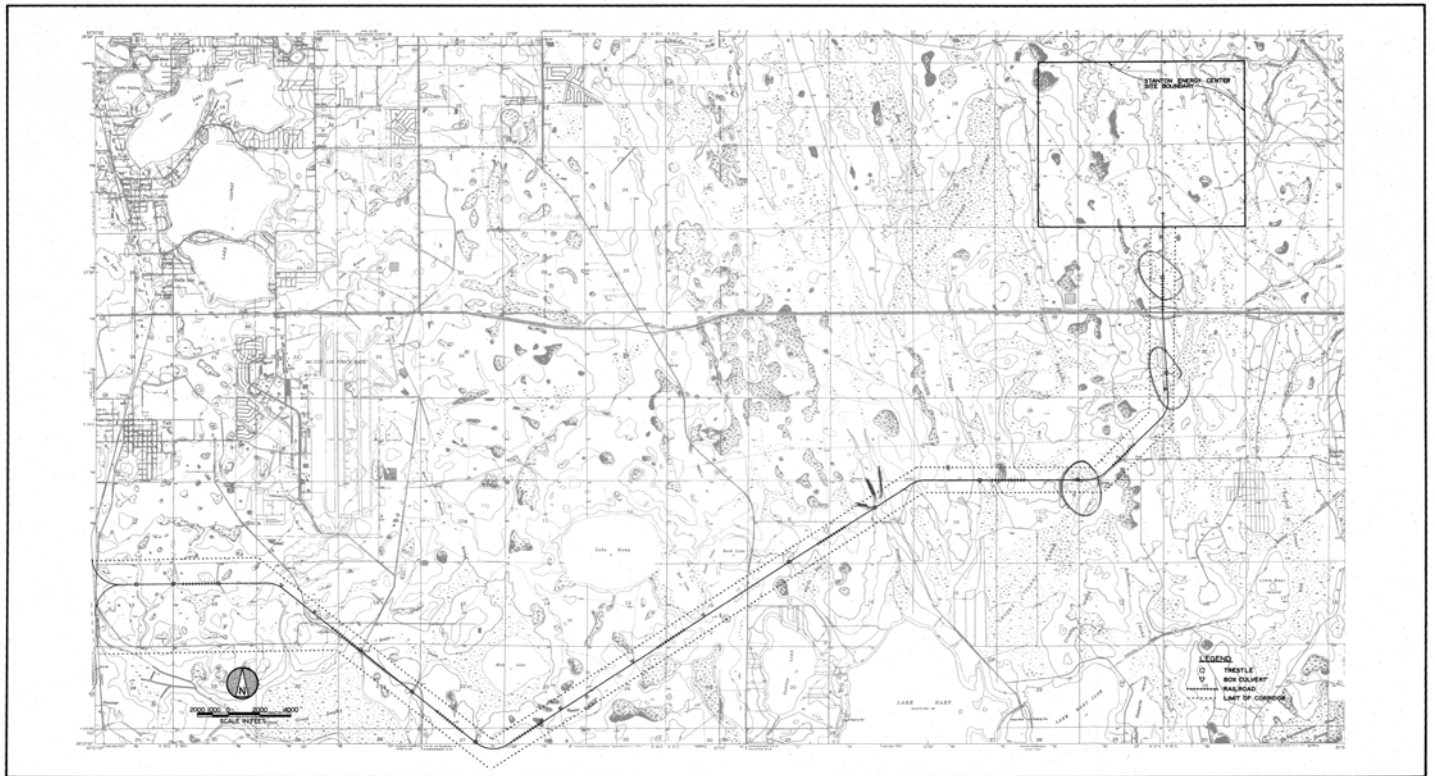


FIGURE 3.9-1. ROUTING OF RAILROAD TO SITE



FIGURE 3.9-3. TYPICAL RAILROAD SECTION

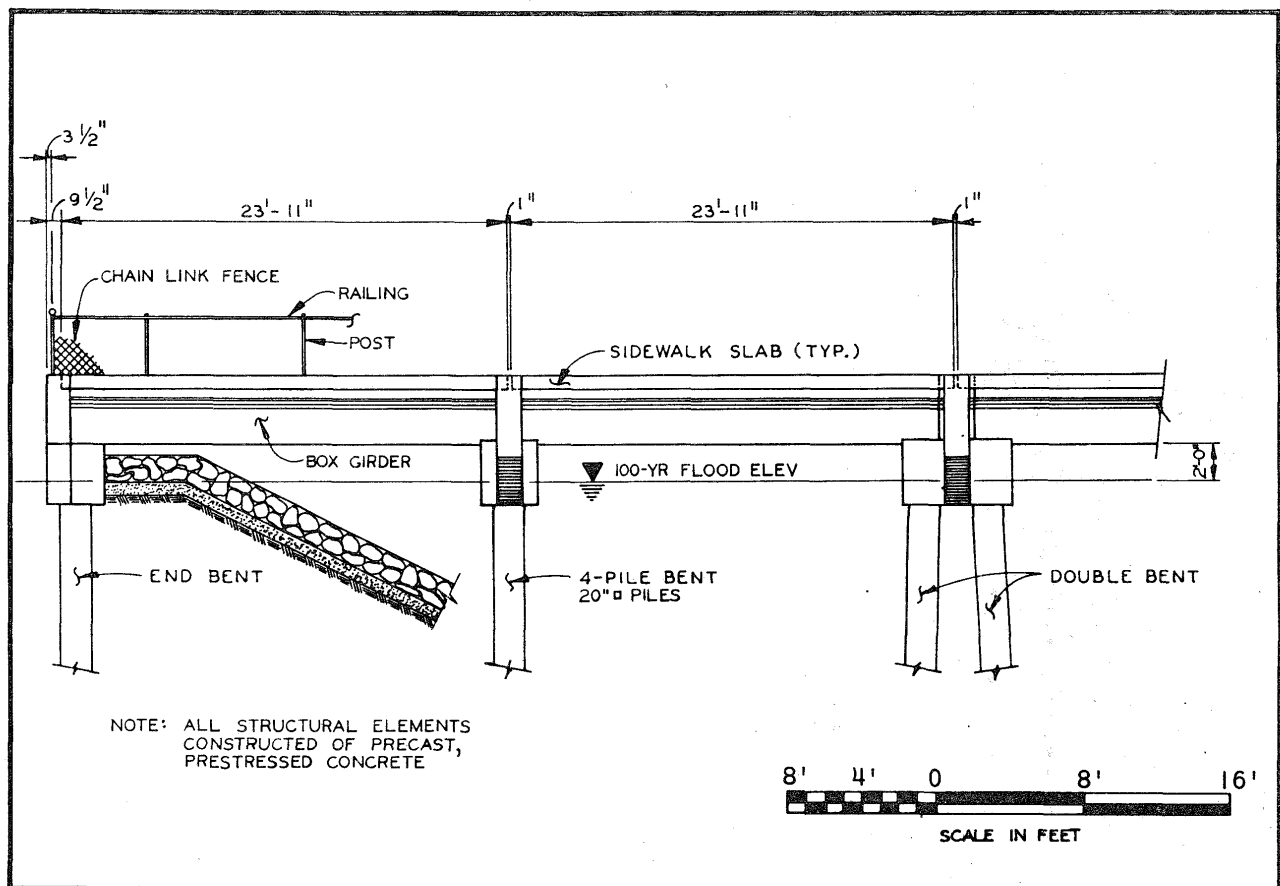


FIGURE 3.9-4. TYPICAL RAILROAD TRESTLE DETAIL

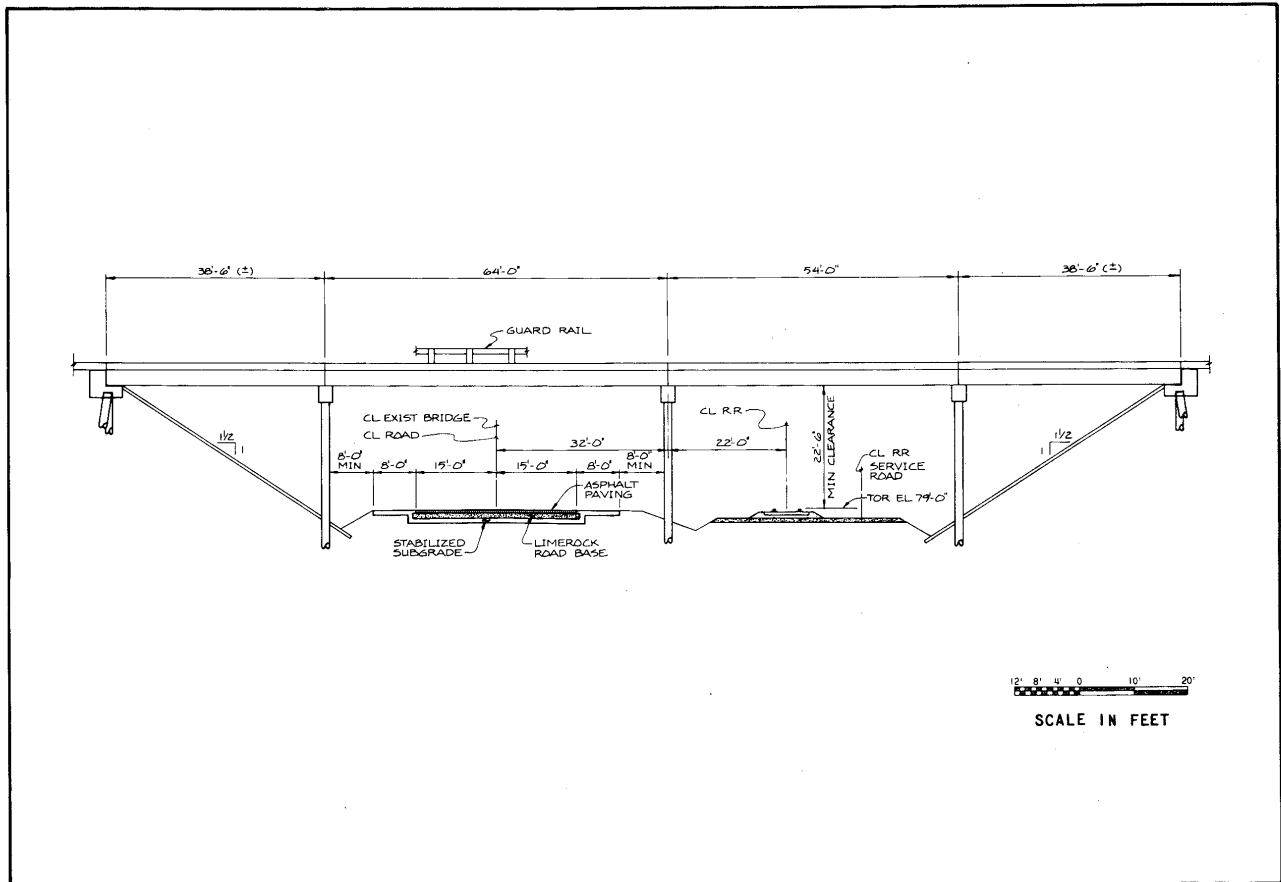


FIGURE 3.9-5. BEE LINE EXPRESSWAY
RAILROAD UNDERPASS

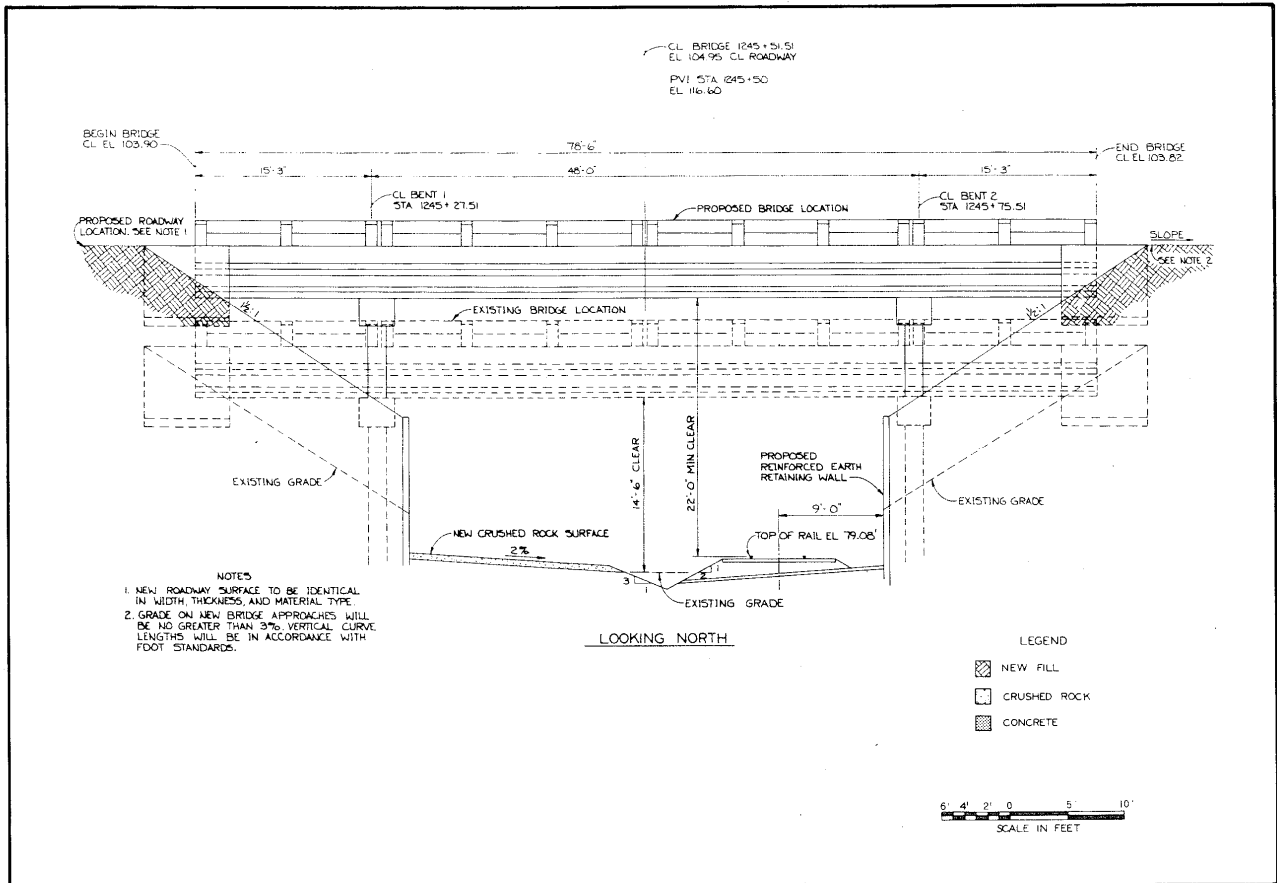


FIGURE 3.9-5. BEE LINE EXPRESSWAY
RAILROAD UNDERPASS

RFM-1

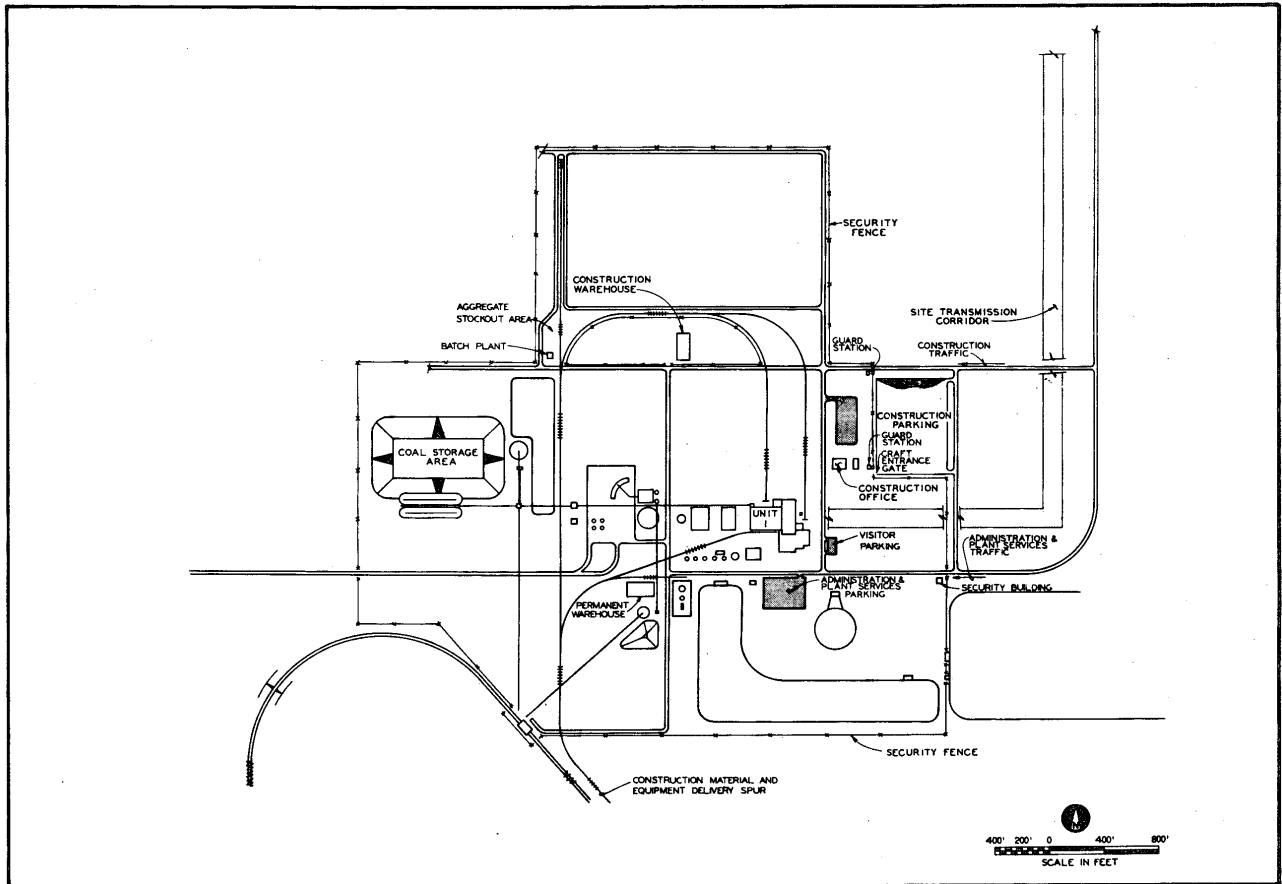


FIGURE 3.9-7. SITE ROADS AND SECURITY

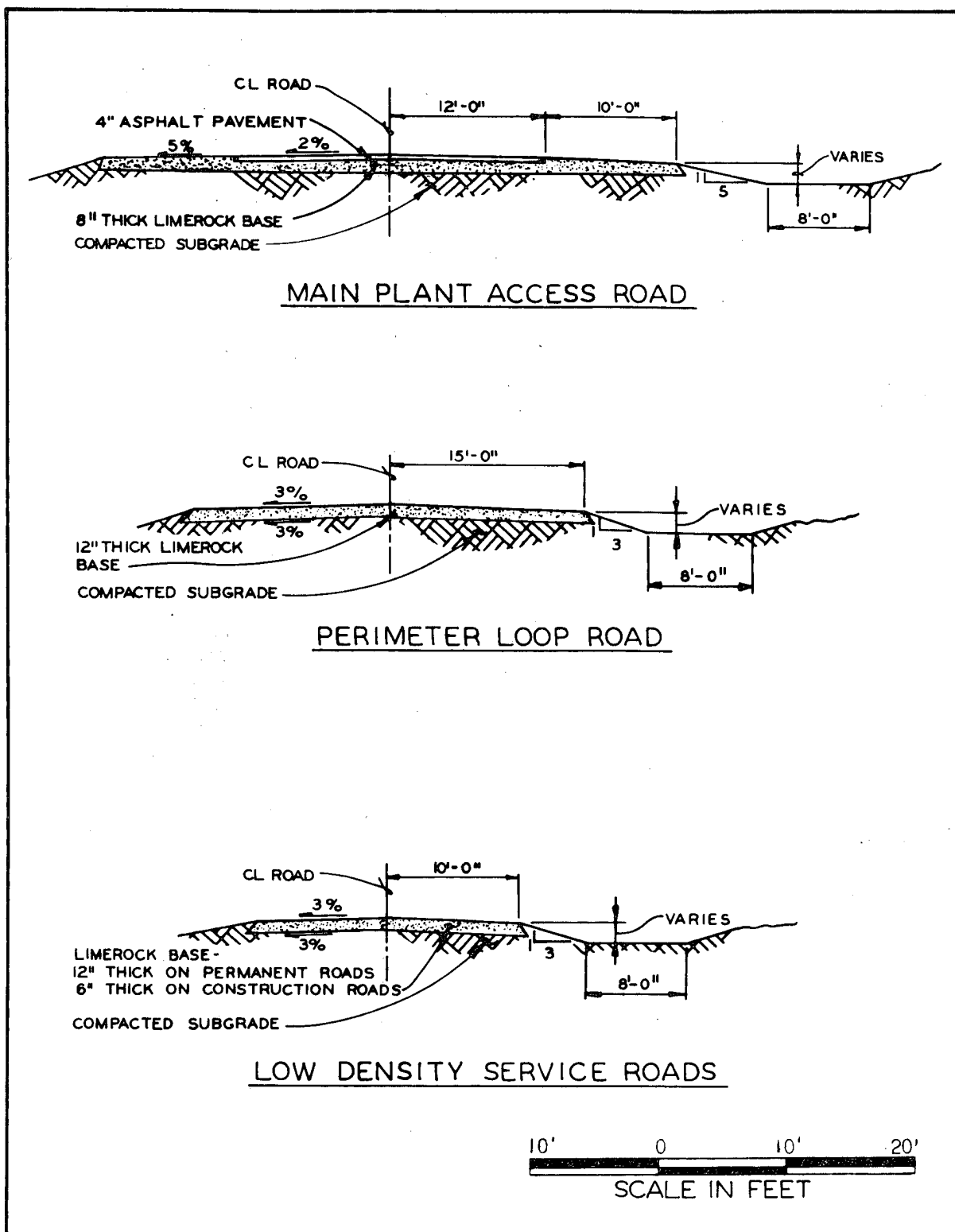


FIGURE 3.9-8. TYPICAL ROAD SECTIONS

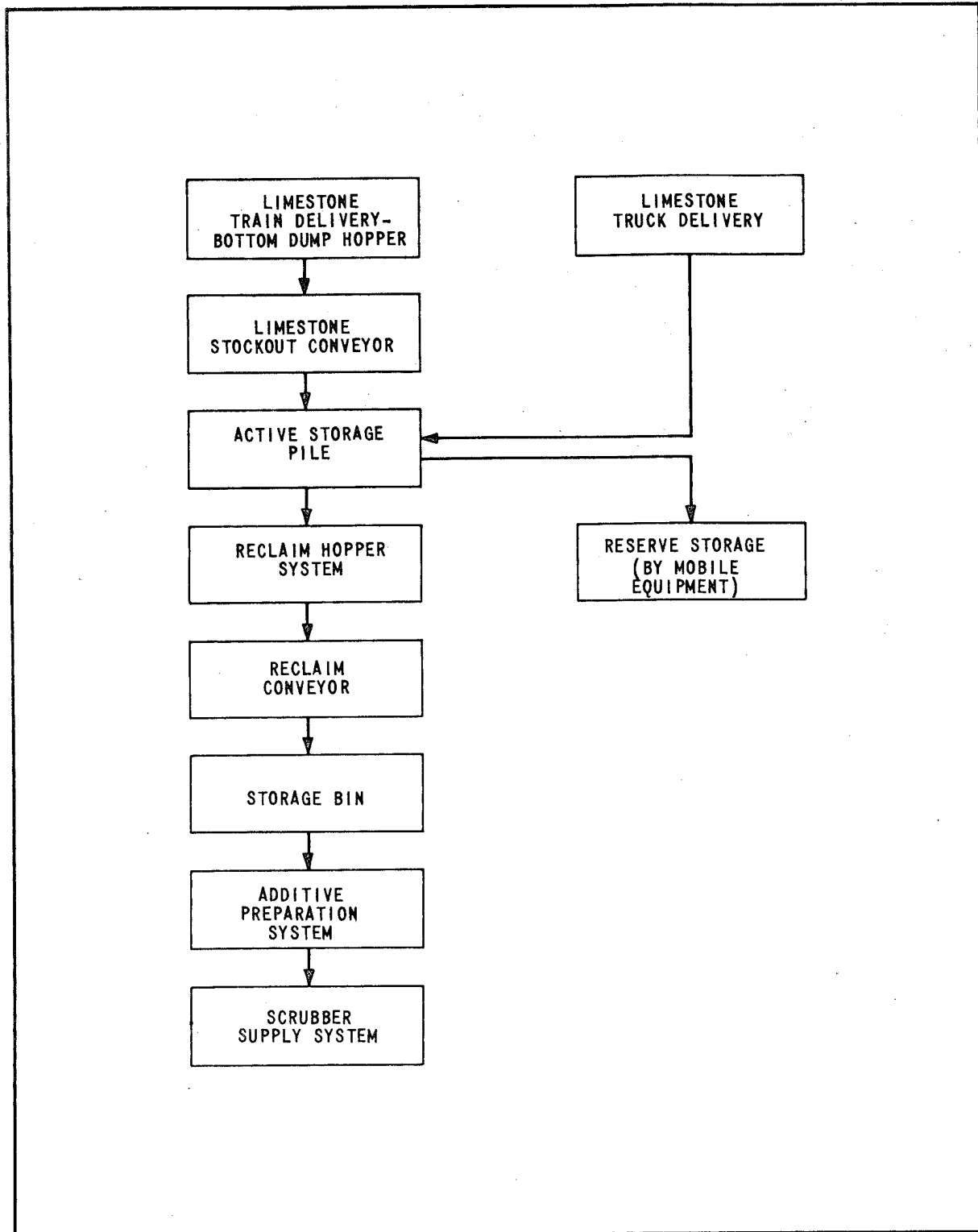


FIGURE 3.9-9. LIMESTONE HANDLING SYSTEM

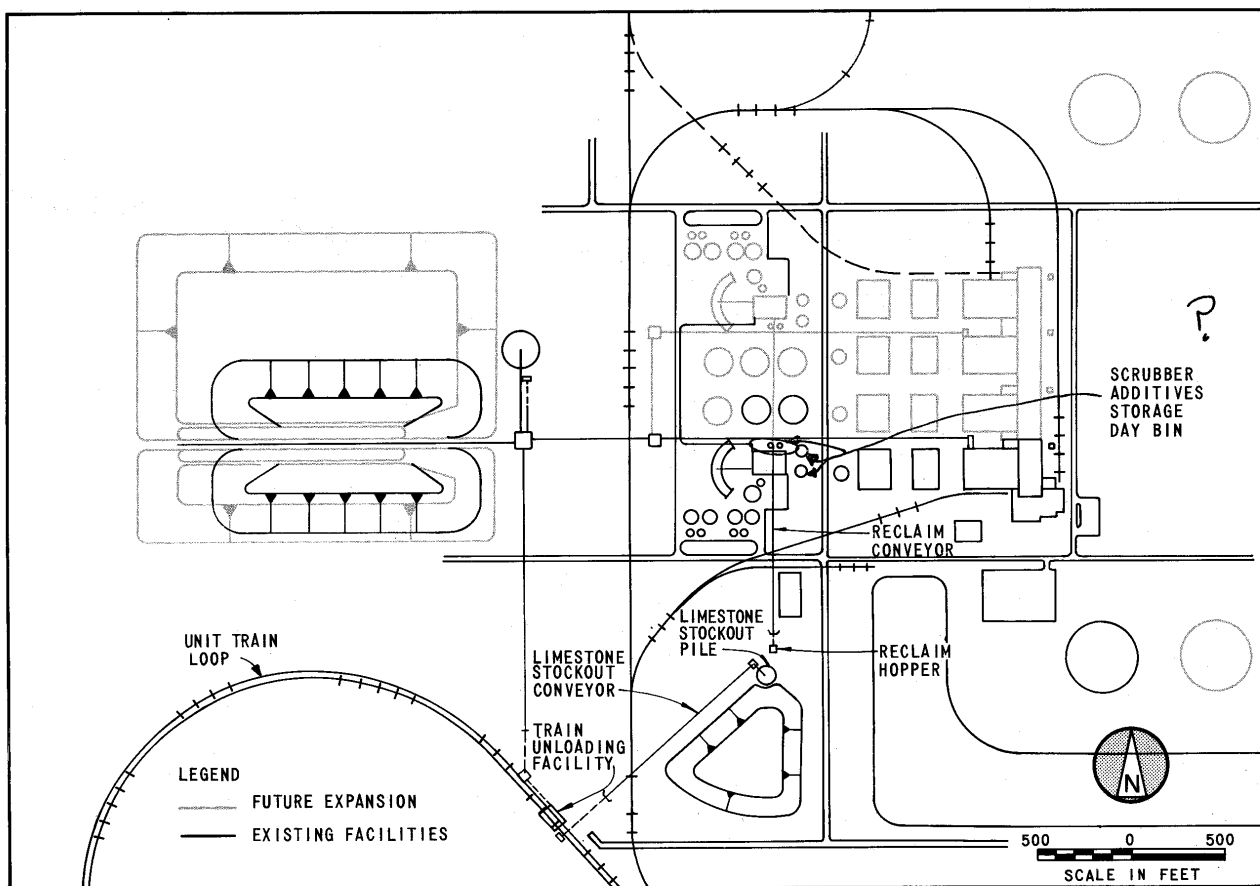


FIGURE 3.9-10. SCRUBBER ADDITIVE
HANDLING SYSTEM LAYOUT

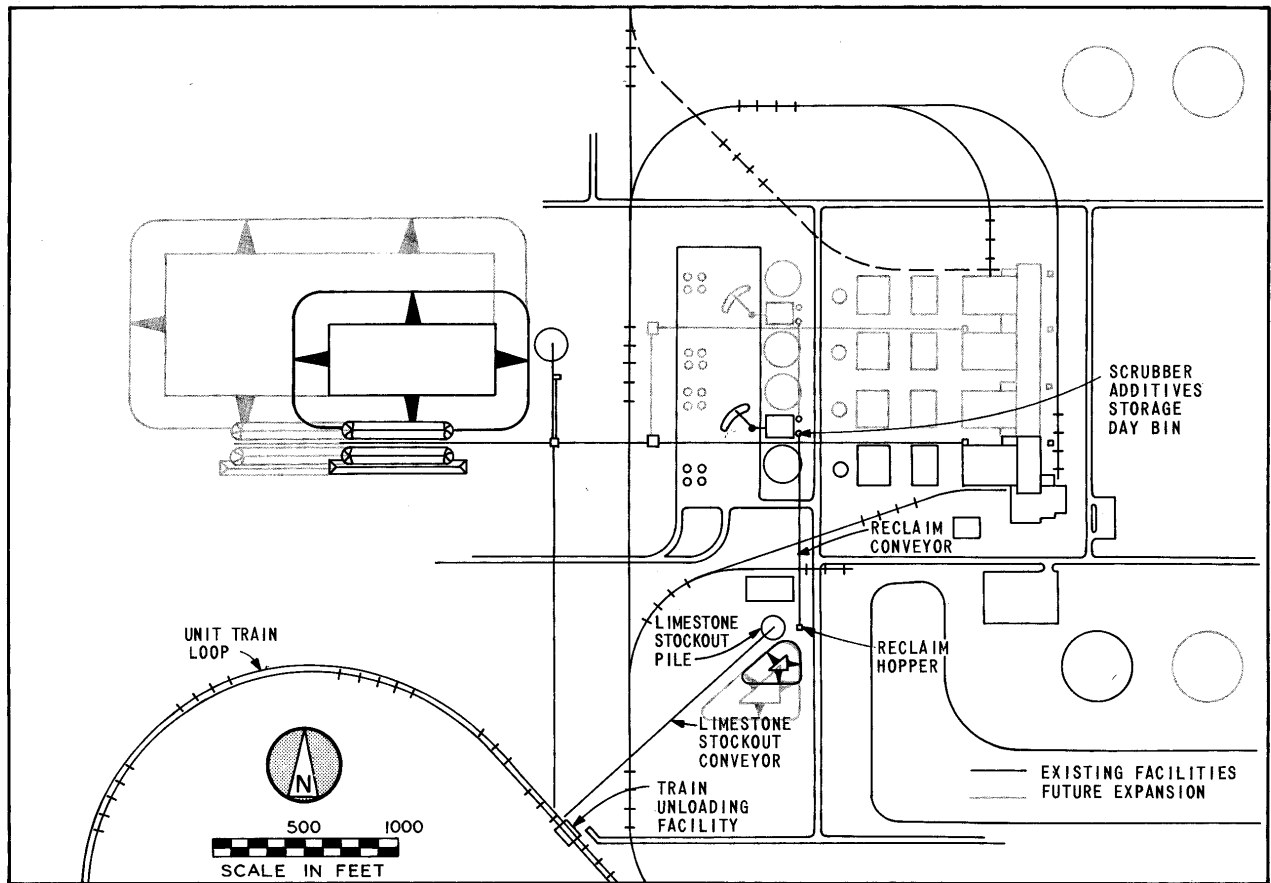
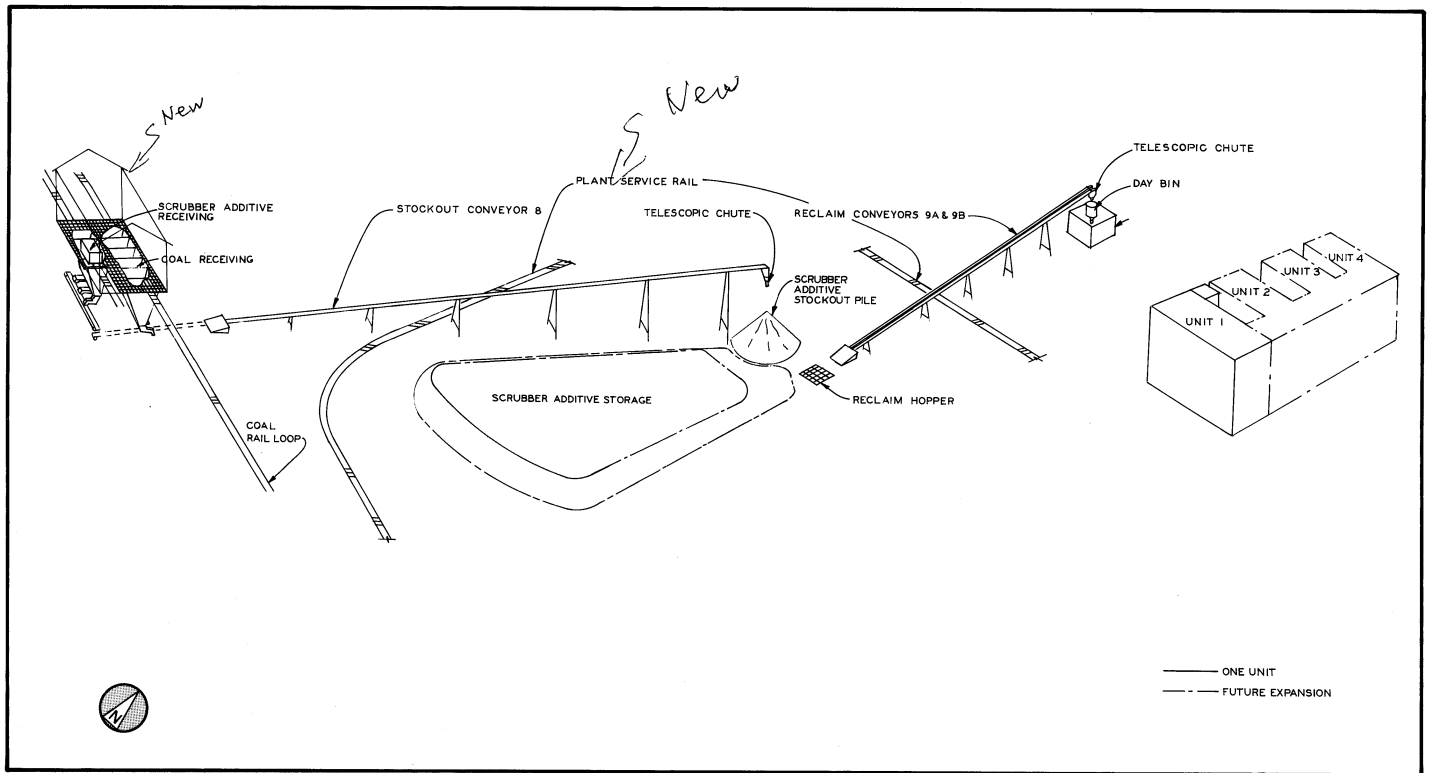


FIGURE 3.9-10. SCRUBBER ADDITIVE HANDLING SYSTEM LAYOUT



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FIGURE 3.9-11. PERSPECTIVE OF SCRUBBER
ADDITIVE HANDLING SYSTEM

OUR
x7

APPENDIX 3.9A
APPLICATION
FOR
RADIOACTIVE MATERIALS LICENSE
FLORIDA
DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES

Request for Modification 1
092383

NON-HUMAN USE

STATE OF FLORIDA
DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES
RADIATION CONTROL
APPLICATION FOR RADIOACTIVE MATERIALS LICENSE

INSTRUCTIONS—Complete Items 1 through 16 if this is an initial application or if application is for renewal of a license. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail four copies to: Department of HRS, 1317 Winewood Blvd., Tallahassee, FL 32301. Upon approval of an application, the applicant will receive a "Radioactive Materials License" issued pursuant to statutory and implementing regulatory authority and subject to all applicable rules, regulations and orders of all appropriate regulatory agencies now or hereafter in effect and to any conditions specified in the license.

1. (a) NAME AND STREET ADDRESS OF APPLICANT. (Institution, firm, company, person, etc.) Orlando Utilities Commission 500 South Orange Avenue, P. O. Box 3193 Orlando, Florida 32802	(b) STREET ADDRESS(ES) AT WHICH RADIOACTIVE MATERIAL WILL BE USED. (If different from 1 (a)) Curtis H. Stanton Energy Center Orange County, Florida Phone No. _____
2. FEE ENCLOSED FOR: ☒ New License application ☐ Amendment request	OFFICE USE ONLY: Fee category: _____ Amount paid: _____
3. (a) PREVIOUS LICENSE NUMBER(S) — (If this is an application for renewal of a license, please give number.) (b) HAVE YOU EVER BEEN DENIED A LICENSE No ☒ Yes ☐ (c) HAS YOUR LICENSE EVER BEEN SUSPENDED OR REVOKED No ☒ Yes ☐ If yes, describe details on additional sheet.	
4. INDIVIDUAL USER(S). (Name and title of individual(s) who will use or directly supervise use of radioactive materials. State training and experience in Items 6 & 7 or documentation attached) To be named later	5. RADIOLOGICAL SAFETY OFFICER (Name of person designated as radiation safety officer. If other than individual user, attach resume of his training and experience as in Items 6 & 7) To be named later

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 (Use supplemental sheets if necessary)

6. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle Answer)	FORMAL COURSE (Circle Answer)
a. Principles and practices of radiation protection			Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments			Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No
d. Biological effects of radiation			Yes No	Yes No

7. EXPERIENCE WITH RADIATION. (Actual use of radioactive materials or equivalent experience.)

RADIOACTIVE MATERIALS	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE

8. (a) RADIOACTIVE MATERIALS. (Element and mass number of each.) Cs 137 Ra 226	(b) CHEMICAL AND/OR PHYSICAL FORM Isotope RaSO ₄	(c) MAXIMUM AMOUNT YOU WILL POSSESS AT ANY ONE TIME (If sealed source(s), also state number of sources and maximum activity per source.) 57 sources - 100 mc maximum 10 sources - 10 mc maximum
--	--	--

9. DESCRIBE PURPOSE FOR WHICH RADIOACTIVE MATERIALS WILL BE USED. (If radioactive material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)

See attached table

10. RADIATION DETECTION INSTRUMENTS. (Use supplemental sheets if necessary.)

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm ²)	USE (Monitoring, surveying, measuring)
N/A					

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.

N/A

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. (For film badges, specify method of calibrating and processing, or name of supplier. State frequency of exchange.)

N/A

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc.
Explanatory sketch of facility is attached.
(Circle answer) ☒ Yes ☐ No

N/A

14. RADIATION PROTECTION PROGRAM.

N/A

15. WASTE DISPOSAL

N/A

CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT ALL INFORMATION CONTAINED IN THIS APPLICATION, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

Applicant named in Item 1

Date: _____

By: _____

Typed name and title of certifying official

NOTE: Any misrepresentation of any material fact found to have been made in securing a license pursuant to this application shall constitute

ATTACHMENT 1

APPLICATION FOR RADIOACTIVE MATERIALS LICENSE

Item	Purpose	Radioactive Material	Chemical or Physical Form	Expected Activity Per Source	Number of Sources	Number of Detectors	Manufacturer	Source Model No.	Detector Type	Detector Model No.	Detector Sensitivity	Detector Window Thickness
1	Precipitator Hopper High Level Switches	Cs 137	Isotope	100 mc Maximum	24	48	Later ¹	Later	Ion Chamber	Later	Later ²	NA
2	Economizer Hopper High Level Switches	Cs 137	Isotope	100 mc Maximum	4	8	Later ¹	Later	Ion Chamber	Later	Later ²	NA
3	Air Heater Hopper High Level Switches	Cs 137	Isotope	100 mc Maximum	2	4	Later ¹	Later	Ion Chamber	Later	Later ²	NA
4	Coal Unloading Hopper Low Level Switches	Cs 137	Isotope	100 mc Maximum	6	6	Later ¹	Later	Ion Chamber	Later	Later ²	NA
5	Coal Reclaim Hopper Low Level Switches	Cs 137	Isotope	100 mc Maximum	2	3	Kay-Ray	7062B	Ion Chamber	Later	Later ²	NA
6	Limestone Reclaim Hopper Low Level Switches	Cs 137	Isotope	100 mc Maximum	2	2	Kay-Ray	7062B	Ion Chamber	Later	Later ²	NA
7	Coal Crusher Hopper Low Level Switches	Cs 137	Isotope	100 mc Maximum	2	2	Kay-Ray	7062B	Ion Chamber	Later	Later ²	NA
8	Plant Coal Surge Hopper Low Level Switches	Cs 137	Isotope	100 mc Maximum	2	2	Kay-Ray	7062B	Ion Chamber	Later	Later ²	NA
9	Scrubber Slurry Density Monitors	Cs 137	Isotope	100 mc Maximum	5	5	Later ¹	Later	Geiger Mueller Tube	Later	Later ³	NA
10	Scrubber Sludge Density Monitors	Cs 137	Isotope	100 mc Maximum	6	6	Later ¹	Later	Geiger Mueller Tube	Later	Later ³	NA
11	Scrubber Thickener Influent Sludge Density Monitor	Cs 137	Isotope	100 mc Maximum	2	2	Later ¹	Later	Geiger Mueller Tube	Later	Later ³	NA
12	Pulverizer Coal Feeder Coal Inlet Monitor	Radium 226	RaSO ₄ (dehydrated)	10 mc Maximum	10	10	Stock	RA-01	Geiger Mueller Tube	TGM Detector Co. #1J334X		NA

¹Manufacturer will be Kay-Ray, Texas Nuclear, or Ohmart.²Typically .25 Mr/Hr, expected range - .2 Mr/Hr to 1 Mr/Hr.³Typically 5 Mr/Hr.

3.10 ONSITE DRAINAGE SYSTEM

Runoff from areas of the site not disturbed by construction activities or plant operations will be directed to the natural drainage systems within the area. Runoff from areas of the site disturbed by construction activities or plant operations will be collected in an engineered system of ditches and ponds as described in the following subsections. A site arrangement showing onsite drainage patterns is shown on Figure 3.10-1.

As described in Subsection 2.5.1, Surface Water Hydrology, the predominant mode of flooding in the vicinity of the site is by sheet flow. The 100-year flood elevations vary from approximately 60 feet, msl at the northeast corner of the plant site, to approximately 90 feet, msl at the southwest. The flood prone areas are shown on Figure 2.5-6. Compacted fill material will be deposited within the plant site so that all major plant facilities are located above the 100-year flood elevation.

3.10.1 Makeup Water Supply Storage Pond

Runoff from the central plant area (excluding the coal storage area, substation, combustion waste storage area, and construction laydown area north of the loop road) will be collected in an engineered ditch system and directed to the unlined makeup water supply storage pond as shown on Figure 3.10-1. Runoff retained within the pond will evaporate, exfiltrate, or be used as cooling tower makeup. Some of the water that seeps out of the pond will rise to the surface on the downstream side of the embankment and be directed to natural drainage systems within the area through the utilization of an embankment toe ditch. The pond will have a surface area of approximately 93 acres and will be surrounded by an embankment having a crest elevation of 80.0 feet, msl. The pond interior will be excavated to an average bottom elevation of 62.0 feet, msl except for a 150-foot wide strip adjacent to the embankment which will be left at existing grade. Excavated material obtained from the pond interior will be used as embankment and/or general site fill. A typical cross section of the makeup water supply storage pond embankment is shown on Figure 3.10-2.

The construction runoff of Unit 1 will be collected for approximately 3-1/2 years before unit operation. The storage capacity of the makeup water supply storage pond will be adequate to retain surface runoff from

3.10-1a

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disturbed areas of the site, and direct pond precipitation for up to 4 years, assuming a total 4-year precipitation of 230 inches. This 4-year total represents the precipitation with a recurrence interval of approximately 25 years. Under these conditions, the maximum potential water surface elevation within the pond would be approximately 77.0 feet. If average annual precipitation were to occur during the entire four years of Unit 1 construction, accumulating to a total of 204 inches, it is estimated that the water surface elevation within the pond would approach an elevation of approximately 72.3 feet. The ratio of total annual surface runoff to total annual precipitation (hereafter denoted as annual runoff ratio) varied from 0.20 for years experiencing average rainfall amounts up to 0.35 for years experiencing total precipitation significantly greater than the annual average.

During Unit 1 operation, the makeup water supply storage pond will be maintained at an operating elevation of 72 feet. It is estimated that at this elevation, the total annual pond losses due to evaporation and seepage will nearly equal total annual site runoff and direct pond precipitation during a year having total precipitation of about 51 inches (mean annual precipitation). At this normal operating level, the pond would still be capable of retaining, without discharge, site runoff and direct precipitation from a 100-year, 24-hour precipitation event. The water surface elevation within the pond will be maintained by makeup from the Orange County Easterly Subregional Wastewater Treatment Plant. In the event the makeup system from the Orange County Plant becomes temporarily inoperable, the makeup water supply storage pond would continue to furnish makeup water to the circulating water system until repairs have been made.

The basis for the determination of the makeup water supply pond size is shown in Appendix 3.10A.

3.10.2 Coal Storage Area Runoff Pond

Surface runoff from the coal storage area will be collected in a lined coal storage area runoff pond (CSA runoff pond), as shown on Figure 3.10-1. The one unit coal pile will have a surface area of approximately 15.4 acres, while the surrounding coal yard area will have an area of 39.6 acres. The

3.10-2

coal pile and yard area are assumed to have pervious surfaces and represent 24 per cent and 60 per cent of the total coal storage area, respectively, which includes the coal pile, coal yard and CSA runoff pond. The CSA runoff pond will have a surface area of approximately 10.4 acres (16 per cent of coal storage area), with an embankment length of 4,100 feet and is designed to retain without discharge the surface runoff and direct pond precipitation from a 24-hour event having a recurrence interval of 10 years. The 10-year, 24-hour precipitation event is considered to be 7.5 inches as indicated in Section 2.6. The capacity of the CSA runoff pond was determined by assuming an average of 50 per cent (3.75 inches) of the design precipitation would occur as surface runoff. This corresponds to a runoff curve number (U.S. Soil Conservation Service) of 67. Runoff from precipitation exceeding the 10-year, 24-hour event will be directed to the recycle basin.

The maximum design water surface elevation within the CSA runoff pond is 79.5 feet, msl. This elevation would result from surface runoff and direct pond precipitation during a 10-year, 24-hour event or greater. The pond bottom will be at Elevation 75 feet, msl and will consist of a one-foot thick layer of compacted material providing cover for a 6-inch thick highly impermeable liner. Soil-cement will be utilized to provide slope protection. A section of the proposed CSA runoff pond embankment is shown on Figure 3.10-3.

Runoff and direct precipitation retained within the CSA runoff pond will be directed to the recycle basin to be used as makeup for the flue gas desulfurization and ash handling systems. Controlled drainage of the CSA runoff pond to the recycle basin will be accomplished through the use of a buried pipeline.

3.10.3 Recycle Basin

The recycle basin, shown on Figure 3.10-1, will be lined to control seepage loss. The recycle basin is designed to provide for the temporary storage of effluents from the neutralization basin and wastewater from the

miscellaneous plant drains. The recycle basin will also receive intermittent flows from the coal storage area runoff pond and the active combustion waste area runoff pond. The recycle basin will provide makeup to the desulfurization and ash handling systems. Blowdown from the cooling tower will provide makeup to the recycle basin as required to maintain proper water surface elevation.

The recycle basin will have a surface area of approximately 15 acres with an embankment length of 5,200 feet. The operating water surface elevation within the recycle basin will be 75 feet, msl corresponding to an average depth of 5 feet. The pond bottom will be at Elevation 70 feet, msl and will consist of a 1-foot thick layer of compacted material providing cover for a 6-inch thick highly impermeable liner. Soil-cement will be utilized to provide slope protection. A section of the proposed recycle basin embankment is shown on Figure 3.10-4. | 5

Compacted site fill will be placed to Elevation 80 feet, msl within the area. The site fill material will be sloped away from the perimeter of the recycle basin to prevent surface runoff from entering the basin. Surface runoff from the area will be directed to the makeup water supply storage pond. | 5

3.10.4 Active Combustion Waste Area Runoff Pond

Surface runoff from the active portion of the combustion waste storage area will be directed to the lined active combustion waste area runoff pond (ACWA runoff pond) shown on Figure 3.10-1. Runoff from both the developed and undeveloped portions of the combustion waste storage area will be directed to natural drainage systems within the area. The developed portion of the waste storage area is defined as a formerly active portion which has been reclaimed by covering with topsoil and reestablished with vegetation. The undeveloped portion is that which has not yet been utilized for combustion waste storage. The undeveloped portion of the area will be reseeded subsequent to site borrow operations.

Approximately 312 acres have been allocated for combustion waste storage. This area will be developed in active increments of approximately

PLANT NAME stanton UNIT 1

UTILITY	<u>orlando O.C.</u>	NAME PLATE CAP. mw	<u>425</u>
COUNTY	<u>Orange</u>	ANN. GENERATION mwh	
TOWN	<u>orlando</u>	HEAT RATE mm btu/h	
LONG/LAT GRW	<u>81° 09' 40" 28° 28' 50"</u>	CONSTRUCTION DATE	
LONG/LAT UTM	<u>484000E 3150500W</u>	ON-LINE DATE	<u>Nov 1986</u>
AQCR REG.		RETIREMENT DATE	<u>130</u>
RIVER BASIN		No. UNITS	<u>1 (unit 2 online 1994)</u>

UNIT DATA

	1	2	3	4	5	6
STATUS	<u>P</u>					
FIRING CAPAB.						
FUEL	<u>C</u>					
UNIT CAPACITY mw						
UNIT FACTOR	<u>53.6</u>					
HEAT RATE mm btu/h						
FUEL CONS. #/h	<u>154-191</u>	<u>(750,000 - 1,100,000 tons/year)</u>				
BOILER MFR.						
STACK DATA						
HEIGHT ft						
DIAMETER ft						
EXIT VEL. ft/s						
EXIT TMP. °F						
SO2 CONTROL						
TYPE	<u>limestone scrubbing (1800 tons/wk by rail & truck)</u>					
EFFICIENCY						
PARTIC. CONTROL						
TYPE	<u>col. s. b. esp</u>					
EFFICIENCY						

FUEL DATA

	OIL	COAL
% SULFUR		<u>.71 - 3.1</u>
% ASH		<u>7.0 - 11.0</u>
HEAT CONTENT		<u>11,000-13,500 btu/lb</u>
SOURCE		<u>wash sec. or washed Appl.</u>

WATER SUPPLY

	COOLING	BOILER	ASH TRANSPORT
SOURCE			
MINIMUM 7-Q-10			
TYPE SYSTEM			
INTAKE cfs			
DISCHARGE cfs			
CONSUMPTION cfs			
DISCH. POINT			
DISCH. PH			
DISCH. SS ppm			
DELTA T			
HEAT REJECTION (btu x 10 ⁹)/h			

Coal Transportation — UNIT Trains, 70-100 100-ton cars, 2-3 trains/wk
 Seaboard Coastline RR — spur 800 ft corridor
 single track, elevated above 100 ft flood by embankment
 w. trestles & wildlife openings 2-20 miles
 8 mile plant access road

POT. CSP
 receiving considered

Limestone storage

38,000tm reserve, (120 day supply)

- 2 -

PLANT NAME _____
(Con't)

ASH/ASH POND DATA

(80 acres in 15 acre cells)
for unit 1 & sub P. 1
312 acre c. land by unit 1

Vacuum R.
Hydroad
Truck

FLY ASH t/y 46 K + 2.4 K
BOTTOM ASH t/y 14.9 K
TOTAL ASH t/y 60.9
SLUDGE t/y 201,000
POND CONST. DATE _____
POND TYPE _____

ASH/ASH POND DATA
POND AREA
ORIG. VOLUME ft³
ORIG. CAPAC. t ash
REMAINING VOL. ft³
REMAINING CAPAC. t ash
FILL DATE
vol. reg.

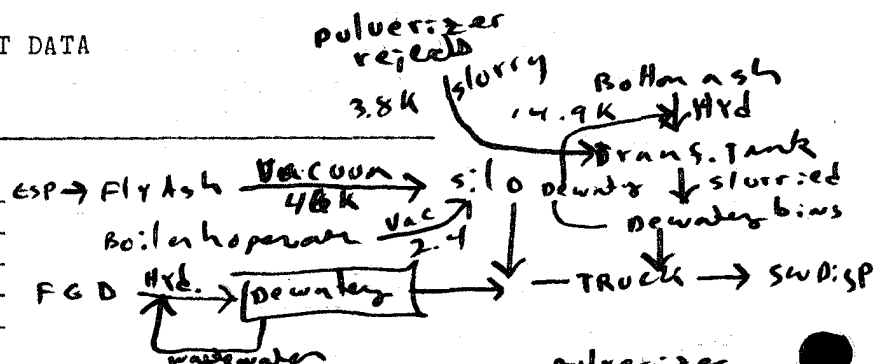
Active
5,220 AF for 150 g m
plant life

COAL STORAGE

BASAL AREA ft² _____ STORAGE CAPAC. t _____
HEIGHT ft _____ SUPPLY days _____

PERMIT DATA

SIP PERMIT
ALLOWABLE SO₂ EMISSION (lbs/mm btu) _____
NPDES
PERMIT NUMBER _____
EFFECTIVE DATE _____
REISSUE DATE _____
EXPIRATION DATE _____
RECEIVING WATER _____



OUTFALL PERMIT LIMITATIONS

SERIAL No.	TYPE	FLOW MGD	Cl mg/l	HEAT REJ. mm btu/h	PH	TSS lbs/day ave. max.	TOT Fe mg/l	TOT Cu mg/l

CONVERSION HISTORY

	1945	1950	1955	1960	1965	1970	1975	1980	1985	1990
1 .	.	.	.	.	.	.	.	.	.	.
2 .	.	.	.	.	.	.	.	.	.	.
3 .	.	.	.	.	.	.	.	.	.	.
4 .	.	.	.	.	.	.	.	.	.	.
5 .	.	.	.	.	.	.	.	.	.	.
6 .	.	.	.	.	.	.	.	.	.	.

COAL FIRING
OIL FIRING

ON-LINE DATE
CONVERSION DATE

RETIREMENT DATE

15 acres. The ACWA runoff pond is designed to collect surface runoff from the active combustion waste storage area and direct precipitation from a 24-hour event having a 100-year recurrence interval (10.8 inches). The capacity of the runoff pond was determined by assuming an average of 90 per cent or 9.72 inches of the design precipitation would occur as surface runoff. The surface area of the runoff pond will be approximately 5.0 acres. | 5

Because of the relatively low relief in the area the maximum potential water surface elevation within the active combustion waste area runoff pond caused by a 100-year, 24-hour event was limited to 83 feet, msl. Existing grade at this location is approximately 88 feet. The pond bottom will be at Elevation 78 feet and will consist of a 1-foot thick layer of compacted material covering a 6-inch thick impermeable liner. Soil-cement will be utilized to provide slope protection. A section of the proposed active combustion waste area runoff pond embankment is shown on Figure 3.10-5. A low berm will be constructed to Elevation 89 feet around the perimeter of the ACWA runoff pond to prevent the inflow of surface runoff from undisturbed areas. Surface runoff from undisturbed areas surrounding the ACWA runoff pond will be directed to natural drainage systems within the area. | 5

Runoff and direct precipitation retained within the ACWA runoff pond will be directed to the recycle basin to be used as makeup for the desulfurization and ash handling systems. Controlled drainage of the ACWA runoff pond to the recycle basin will be accomplished through the use of a buried pipeline.

3.10.5 Construction Laydown Area

The construction laydown area north of the loop road, as shown on Figure 3.10-1, will be graded to direct runoff to a ditch and embankment system located on the north side of the area. The ditch system is designed to retain the annual runoff and direct precipitation resulting from a year with total precipitation having a 10-year recurrence interval. Runoff collected will either evaporate or exfiltrate from the ditch system. Runoff from precipitation exceeding the 10-year annual precipitation will be directed to the general site drainage system in the area. | 5

3.10-5

Issue

15 acres. The ACWA runoff pond is designed to collect surface runoff from the active combustion waste storage area and direct precipitation from a 24-hour event having a 100-year recurrence interval (10.8 inches). The capacity of the runoff pond was determined by assuming an average of 90 per cent or 9.72 inches of the design precipitation would occur as surface runoff. The surface area of the runoff pond will be approximately 4.0 acres.

The maximum potential water surface elevation within the active combustion waste area runoff pond caused by a 100-year, 24-hour event is 88 feet. Existing grade at this location is approximately 89 feet. The pond bottom will be at Elevation 81 feet and will consist of a 1-foot thick layer of compacted material covering a 6-inch thick impermeable liner. Soil-cement will be utilized to provide slope protection. A section of the proposed active combustion waste area runoff pond embankment is shown on Figure 3.10-5. A low berm will be constructed to Elevation 90 feet around the perimeter of the ACWA runoff pond to prevent the inflow of surface runoff from undisturbed areas. Surface runoff from undisturbed areas surrounding the ACWA runoff pond will be directed to natural drainage systems within the area.

Runoff and direct precipitation retained within the ACWA runoff pond will be directed to the recycle basin to be used as makeup for the desulfurization and ash handling systems. Controlled drainage of the ACWA runoff pond to the recycle basin will be accomplished through the use of a buried pipeline.

3.10.5 Construction Laydown Area

The construction laydown area north of the loop road, as shown on Figure 3.10-1, will be graded to direct runoff to a ditch and embankment system located on the north side of the area. The ditch system is designed to collect the surface runoff and direct precipitation from a 24-hour event having a 100-year recurrence interval (10.8 inches). Runoff collected will either evaporate or exfiltrate from the ditch system. Runoff from precipitation exceeding the 100-year, 24-hour event will be directed to the general site drainage system in the area.

The maximum design water surface elevation within the runoff retention area is 79.5 feet. The top elevation of the embankment and grade elevation of the site fill material will be at Elevation 80 feet. The average bottom elevation of the ditch system will be 73 feet, resulting in an average water depth at design capacity of 6.5 feet. A section of the proposed construction laydown area runoff retention system is shown on Figure 3.10-6. The capacity of the runoff retention area was determined by assuming an average of 60 per cent of the design annual precipitation would occur as surface runoff. The surface area of the runoff retention system will be approximately 7.7 acres. This represents about 15 per cent of the total contributing drainage area (50 acres).

3.10.6 Substation

The substation location is shown on Figure 3.10-1. The substation area will be raised above the 100-year flood elevation by the placement of compacted fill material. The top of this material will be covered with a layer of crushed stone and graded nearly level to promote percolation. Storm water runoff from the substation area will be directed to natural drainage systems within the area. Foundations of structures supporting equipment containing oil will be curbed to provide for cleanup of potential spills.

The maximum design water surface elevation within the runoff retention area is 77 feet, corresponding to the top elevation of the embankment and grade elevation of the site fill material. The average bottom elevation of the ditch system will be 73 feet, resulting in an average water depth at design capacity of 4 feet. A section of the proposed construction laydown area runoff retention system is shown on Figure 3.10-6. The capacity of the runoff retention area was determined by assuming an average of 40 per cent (4.32 inches) of the design precipitation would occur as surface runoff. This corresponds to a runoff curve number of 52. The surface area of the runoff retention system will be approximately 5.7 acres. This represents about 6 per cent of the total contributing drainage area (90 acres).

3.10.6 Substation

The substation location is shown on Figure 3.10-1. The substation area will be raised above the 100-year flood elevation by the placement of compacted fill material. The top of this material will be covered with a layer of crushed stone, graded nearly level to promote percolation. A perimeter ditch and embankment system will be constructed around the substation. This system will be designed to retain the runoff and direct precipitation from a 24-hour event having a 100-year recurrence interval.

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

4

4.1 SITE PREPARATION AND PLANT CONSTRUCTION

4.1.1 Construction Areas

Approximately 65 acres of the total 960 acres to be cleared for the Stanton Energy Center Unit 1 site will be utilized for a materials and equipment laydown areas. No significant wetlands or red-cockaded woodpecker cavity trees are within the laydown areas.

4

Vegetation and wooden material removed by land clearing will be disposed of by open burning according to the provisions of the Florida Administrative Code, Section 5I-2.07. An open burning permit will be obtained, as required, from the Orange County Pollution Control Department with approvals from the Fire District and Division of Forestry. Other trash and nonhazardous chemical wastes will be removed to the Orange County Landfill adjacent to the site for appropriate disposal.

4.1.2 Land Impact

The construction of Unit 1 of the Stanton Energy Center will require the clearing of approximately 960 acres of land. Included in the area are about 125 acres of wetlands which will be eliminated. The wetland areas that will be effected are isolated and are not connected to other wetland systems or bodies of water. A description of the wetland areas and vegetation on the site is given in Section 2.7.

4

The ultimate development of the site for four generation units would require the clearing of an additional 120 acres for a total of 1,080 acres. An additional 18 acres of wetlands would be effected for a total of 143 acres eliminated by the development of the site for four units.

4

Vegetation removed by clearing will be burned in compliance with the regulations cited in Subsection 4.1.1. Trees suitable for pulp or other commercial uses will be sold.

No explosives will be used during the construction of the Stanton Energy Center.

A "Joint Application, Department of the Army/Florida Department of Environmental Regulation for Activity in Waters of the State of Florida",

SAJ Form 983 (July 21, 1977) has been prepared and is included as part of this application as Appendix 4.1A.

Consistent with the Orange County Growth Management Policy Plan⁽¹⁾ the plant will be located so as to minimize significant environmental effects. A majority of the conservation areas on the site, as defined by the Orange County Planning Department, will be retained in their natural state.⁽²⁾ In addition, location of the site adjacent to the County Landfill in an area of low residential development potential is logical and consistent with County planning objectives.

Utility systems are allowed as a special exception in agriculturally zoned districts.

4.1.3 Impact on Human Population

Construction Noise. Major construction activities consist of site clearing and preparation, foundation construction, and the erection of buildings, equipment, and other structures. Different types of equipment are used in each of these phases, and accurate noise calculations are dependent upon the numbers and type of equipment units in use at a given time, the duty factors for the types of equipment, and characteristic noise emissions levels. For construction equipment that may be used at the Stanton site, noise sources and sound power levels associated with the clearing, foundation, and erection phases of construction are given in Table 4.1-1. Construction sound power levels for each phase, and representative octave band breakdowns also are included in Table 4.1-2.

A computerized sound pressure level contour modeling program was used to determine construction noise contributions in the vicinity of the site. This program considered the characteristic resistance of air, sound pressure level decrease resulting from wave divergence, directivity and height of the sound source, and atmospheric absorption. Acoustic emissions from the construction clearing phase were combined with baseline levels as input to this program. All computations were completed independently, and then combined to obtain overall sound pressure levels.

Figure 4.1-1 shows the predicted 24-hour average noise contours for the clearing and site preparation phase of construction. No area located outside the site boundaries exceeds 55 dBA. There are also no nearby residences or recreational areas to receive noise impacts. Therefore, it is likely that impacts from construction noise will be insignificant.

4.1.4 Work Force

The construction work force will begin to arrive onsite in January 1983 with the site preparation construction. Construction work will be

completed in December 1986. The peak construction force will be 950 personnel in early 1985. The number of construction personnel which will be onsite during each month of the 48-month construction period is shown in Table 4.1-3.

4.1.5 Impact on Landmarks and Sensitive Areas

No known historic or archeological sites, landmarks, or scenic areas will be affected by the proposed project.

4.1.6 Mitigating Measures

Fugitive dust from transportation and construction activities will be controlled by periodic spraying of access ways with water. Major access ways will be paved where appropriate, cleared areas will be revegetated and the site will be landscaped to present a pleasing appearance, and to control dust and erosion.

A buffer zone will be maintained around the plant complex. With Unit 1, the buffer area will consist of approximately 2,320 acres, and a total of about 2,180 acres will be maintained with the ultimate site development of four units. Terrestrial habitat and wetlands will be preserved in these areas. More importantly, 58 cavity trees utilized by the red-cockaded woodpecker, an endangered species, will be preserved. Foraging habitat for the birds also will be provided which will be important for the survival of the woodpecker. A detailed discussion of the impacts on the woodpecker is given in Subsection 4.1.9

4.1.7 Benefits From Construction

Site preparation and plant construction will result in certain beneficial impacts on the Orlando area economic environment. As additional employment opportunities associated with the construction workforce, their payrolls and local expenditures for materials and equipment increase demands for goods and services in various sectors of the local economy, demands in still other sectors will be stimulated. The result will be an overall increase in economic activity.

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Fugitive dust from transportation and construction activities will be controlled by periodic spraying of access ways with water. Major access ways will be paved where appropriate, cleared areas will be revegetated and the site will be landscaped to present a pleasing appearance, and to control dust and erosion.

A buffer zone will be maintained around the plant complex. With Unit 1, the buffer area will consist of approximately 2,290 acres, and a total of about 2,170 acres will be maintained with the ultimate site development of four units. Terrestrial habitat and wetlands will be preserved in these areas. More importantly, 58 cavity trees utilized by the red-cockaded woodpecker, an endangered species, will be preserved. Foraging habitat for the birds also will be provided which will be important for the survival of the woodpecker. A detailed discussion of the impacts on the woodpecker is given in Subsection 4.1.9

4.1.7 Benefits From Construction

Site preparation and plant construction will result in certain beneficial impacts on the Orlando area economic environment. As additional employment opportunities associated with the construction workforce, their payrolls and local expenditures for materials and equipment increase demands for goods and services in various sectors of the local economy, demands in still other sectors will be stimulated. The result will be an overall increase in economic activity.

While the beneficial economic impacts will be significant in absolute amounts, they will be relatively small in the context of the entire Orlando economy. Detailed projections of the beneficial construction impacts are discussed in Subsection 7.2.1.2.

4.1.8 Impact on Water Bodies and Uses

There are no sizeable surface waters on the Stanton site. Small segments of the Cowpen Branch and the Hart Branch extend into the site. The small streams are within the buffer zone of the site which will not be affected by construction activities. Runoff from the construction area will be contained in a collection basin. The basin will be unlined and there will be some exfiltration of the runoff water collected, providing recharge of the water table aquifer. Little effect on ground water quality is expected. The major aquifer associated with the site, the Floridan Aquifer, is at a depth of approximately 200 feet and should be unaffected by construction activities.

4.1.9 Impacts on the Red-Cockaded Woodpecker

Terrestrial surveys of the Stanton site revealed the presence of the red-cockaded woodpecker which is listed as an endangered species by both state and federal wildlife officials. The findings of the surveys are given in Subsection 2.7.6.3. A total of 45 active cavity trees and 35 red-cockaded woodpeckers were observed in the vicinity of the proposed project. Once the presence of the birds was known, the proposed plant facilities arrangement was revised to preserve as many cavity trees and as much foraging habitat as possible.

The following narrative describes the primary impacts to the red-cockaded woodpecker populations of the site, including cavity tree removal, loss of foraging habitat, and loss of potential replacement cavity trees.

Construction of Unit 1 beginning in 1983 will require a total of 960 acres. Clearing operations to accommodate Units 2, 3, and 4 will include an additional 138 acres. The total area to be cleared will be 1,100 acres. Three-hundred and twelve acres of this clearing will occur for

the development of the solid waste storage area. This clearing of 312 acres will occur during the construction of Unit 1. The solid waste disposal area for Unit 1 will consist of about 80 acres which will be filled in 15-acre cells.

Impacts during plant construction which will affect the red-cockaded woodpecker include limited cavity tree removal and loss of some foraging habitat. Twenty-five active cavity trees and 38 start hole or abandoned cavity trees are associated with the nine clans on the site. Table 2.7-7 of the terrestrial ecology section shows each clan has an average of 2.8 active cavity trees with an additional 4.2 start hole trees or abandoned cavity trees.

Clearing of vegetation will result in the loss of a total of five cavity trees (Table 4.1-4). These trees include one active cavity tree, three cavity trees with start holes, and one abandoned cavity tree. From a population point of view, this represents an overall loss of 8 per cent of all available cavity trees, including 4 per cent of all active cavity trees and 11 per cent of all start hole or abandoned cavity trees (see Figure 4.1-2).

During the construction phase of the proposed plant, the anticipated loss of foraging habitat is approximately 450 acres (43 per cent of the total area proposed for clearing) for onsite clans (Clans A, B, C, D, E, F, G, H, and I), or 25 per cent of the foraging habitat used by the population on site. The foraging range of clans with colonies located offsite will not be directly affected by plant construction. Four clans (Clans E, F, H, and I) have colonies onsite located near the site boundary. It is estimated that portions of their present home range include offsite lands. The estimated onsite foraging ranges for Clans H and I and those portions of the estimated ranges for Clans E, F, H, and I that occur offsite will not be affected significantly by construction of the plant and associated facilities (e.g., railroad).

The largest loss of foraging range will occur in Clans B, C, and D, with smaller losses occurring in Clans E, F, and G (see Table 4.1-4 and Figure 4.1-3). For Clan A and Clan B, there are potentially suitable and

unoccupied foraging areas (approximately 150 acres) on the northern portion of the proposed site and just offsite. There are no known active colonies within 1 mile north of the site. Clans C and D have colonies on each side of their respective home ranges. Some unoccupied foraging habitat (approximately 100 acres) is available for these clans to the southwest.

The estimated number of potential replacement cavity trees (75 years or older) for each clan has not been finalized to date. However, based on general observation, the only colony currently occupying an area with a relatively limited number of potential replacement cavity trees is associated with Clan B. Colony B appears to have between 15 and 20 suitable replacement trees within the colony area. Of this total, three trees will be lost during plant construction. Other clans that will lose a portion of their colony area include Clans A, C, and D. Each of these colonies contains a relatively large number (more than 25) of potential replacement cavity trees. Losses from construction should not be greater than 4 or 5 potential cavity trees for each of these clans.

As indicated in Section 2.7, 19 colonies have been identified in the general vicinity of the proposed power plant. Ten of these colonies occur offsite (see Figures 2.7-7 and 2.7-8). Two of these colonies are located near the proposed railroad corridor; two other colonies are situated on the transmission corridor. None of these proposed corridors will result in the loss of active cavity trees. Both corridors, however, will impact foraging range for these four clans. It is likely that the impacts on foraging range in these clans will be similar to the effects on Clan G (i.e., 4 per cent loss). Other colonies in the area are located more than one-half mile from the various corridors and should not be influenced by these associated facilities.

The red-cockaded woodpecker will experience some unavoidable adverse impacts. Based on surveyed home ranges for four clans and estimated home ranges for the remaining five, 456 acres of occupied habitat will be lost unavoidably due to plant construction. Five cavity trees will also be removed during plant construction. This will involve one active cavity tree. There will also be some loss of potential replacement cavity trees.

These are short-term, unavoidable adverse impacts and may cause some clans to leave the area. The extent of possible movements of these clans off the site cannot be determined. However, it seems that at least five clans (Clans E, F, G, H, and I) will not be significantly influenced by these activities.

The long-term effects of the proposed action may offset some of these initial losses. The proposed energy center will provide a relatively stable and protected environment for onsite red-cockaded woodpeckers. A total of 2,170 acres will be managed for this species. Because of logging activities in this area, most sections on the site support neither the density nor the basal area of pine trees that would otherwise be expected. For one colony located just east of the site, the trees have recently been clear cut. With proper management in the buffer area of the plant site, the quality of foraging habitat could be improved. By excluding logging activities and allowing natural reseeding, the density and basal area within the preserved area could be substantially increased.

4.1.10 References

- (1) Orange County Planning Department Growth Management Policy, May 20, 1980.
- (2) Memorandum dated July 1, 1981, Tracy Watson, Planning Director, Orange County Planning Department, to Board of Zoning Adjustment, Orange County, Florida.

TABLE 4.1-1. CONSTRUCTION NOISE SOURCES

Phase	Equipment	Lp (15m.) (dBA)	Quantity	Usage*	Leq (15m.) (dBA)
Clearing and site preparation	Scraper	88	12	.35	94
	Dozer	87	4	.18	83
	Grader	85	3	.07	78
	Compactor	80	3	.10	75
	Truck	88	4	.16	83
Foundation (Pile Driving)	Driving rig	101	3	.04	92
	Side boom crawler	81	2	.04	70
	Mobile crane	83	1	.04	70
	Concrete delivery truck	88	2	.23	85
Foundation (Concrete Work)	Mobile crane	83	2	.08	75
	Front end loader	84	1	.4	80
	Concrete mixer	85	1	.4	81
	Concrete vibrator	76	3	.2	69
	Concrete pump	82	1	.07	81
	Concrete delivery truck	88	6	.26	90
Erection	Large crane	88	2	.10	78
	Mobile crane	83	3	.12	79
	Tractor trailer	88	2	.13	82
	Stationary hoist	83	3	.12	79
	Small crane	83	2	.12	74
	Impact wrenches	85	3	.13	81

*Fraction of time emitting noise.

TABLE 4.1-2. FREQUENCY DISTRIBUTION OF CONSTRUCTION SOUND POWER LEVELS

Construction Phase	Frequency (Hertz)									Overall
	<u>31</u>	<u>63</u>	<u>125</u>	<u>250</u>	<u>500</u>	<u>1,000</u>	<u>2,000</u>	<u>4,000</u>	<u>8,000</u>	
Clearing (dBA)	/	95	110	120	121	122	120	114	107	127
Foundation (dBA)	/	95	110	120	121	122	120	113	107	127
Erection (dBA)	/	87	102	112	113	114	112	106	99	99

TABLE 4.1-3. CONSTRUCTION WORK FORCE (Personnel per Month)

	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
January	110	630	950	665
February	110	630	950	625
March	400	630	950	550
April	405	630	950	460
May	405	630	910	410
June	405	770	910	380
July	405	770	840	335
August	405	825	815	230
September	460	880	815	180
October	615	880	815	145
November	615	880	780	125
December	615	880	675	85

TABLE 4.1-4. DESCRIPTION OF CONSTRUCTION IMPACTS ON RED-COCKADED WOODPECKERS

Clan	Total Number of Cavity Trees	Total Number of Cavity Trees Affected		Total Foraging Range acres	Loss from Construction Impacts per cent
		Active	Other*		
A	6	0	0	380	42
B	6	0	1	200**	50
C	11	0	2	127	58
D	12	1	1	138	49
E	6	0	0	200**	10
F	6	0	0	200**	12
G	7	0	0	172	4
H	7	0	0	200**	0
I	3	0	0	200**	0
Total	64	1	4	1,817	--
Average	7.1	--	--	202	25

*Abandoned and start hole cavity trees.

**Home range estimated as 200 acres.

SOURCE: ESE, 1981.

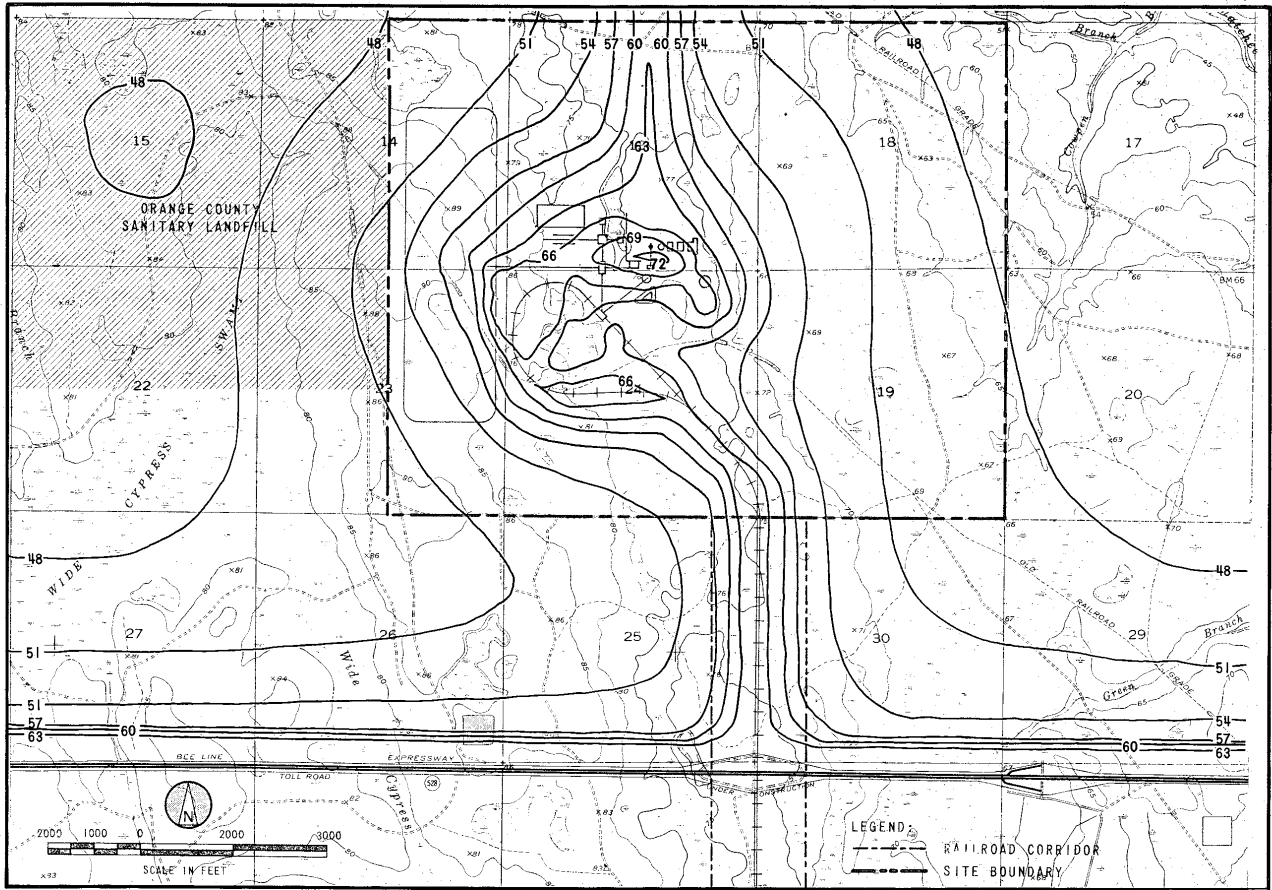


FIGURE 4.1-1. PREDICTED 24 HOUR AVERAGE NOISE CONTOURS (dBA) DURING CONSTRUCTION OF THE PROPOSED CURTIS H. STANTON ENERGY CENTER

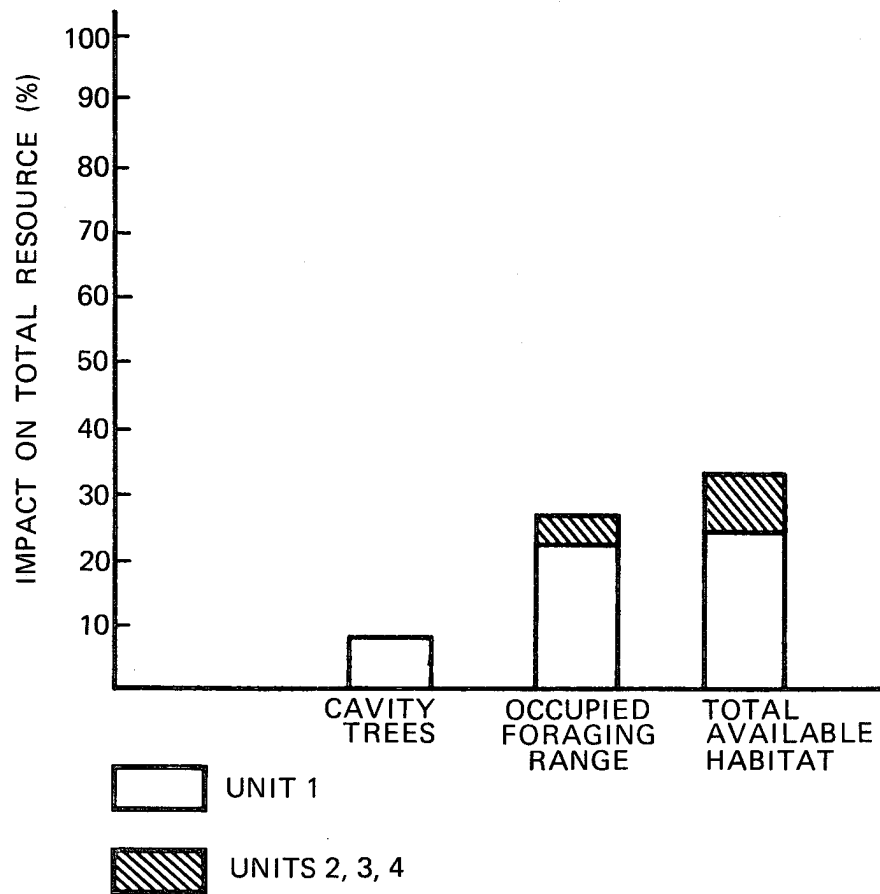


Figure 4.1-2 CONSTRUCTION IMPACTS ON RED-COCKADED WOODPECKERS

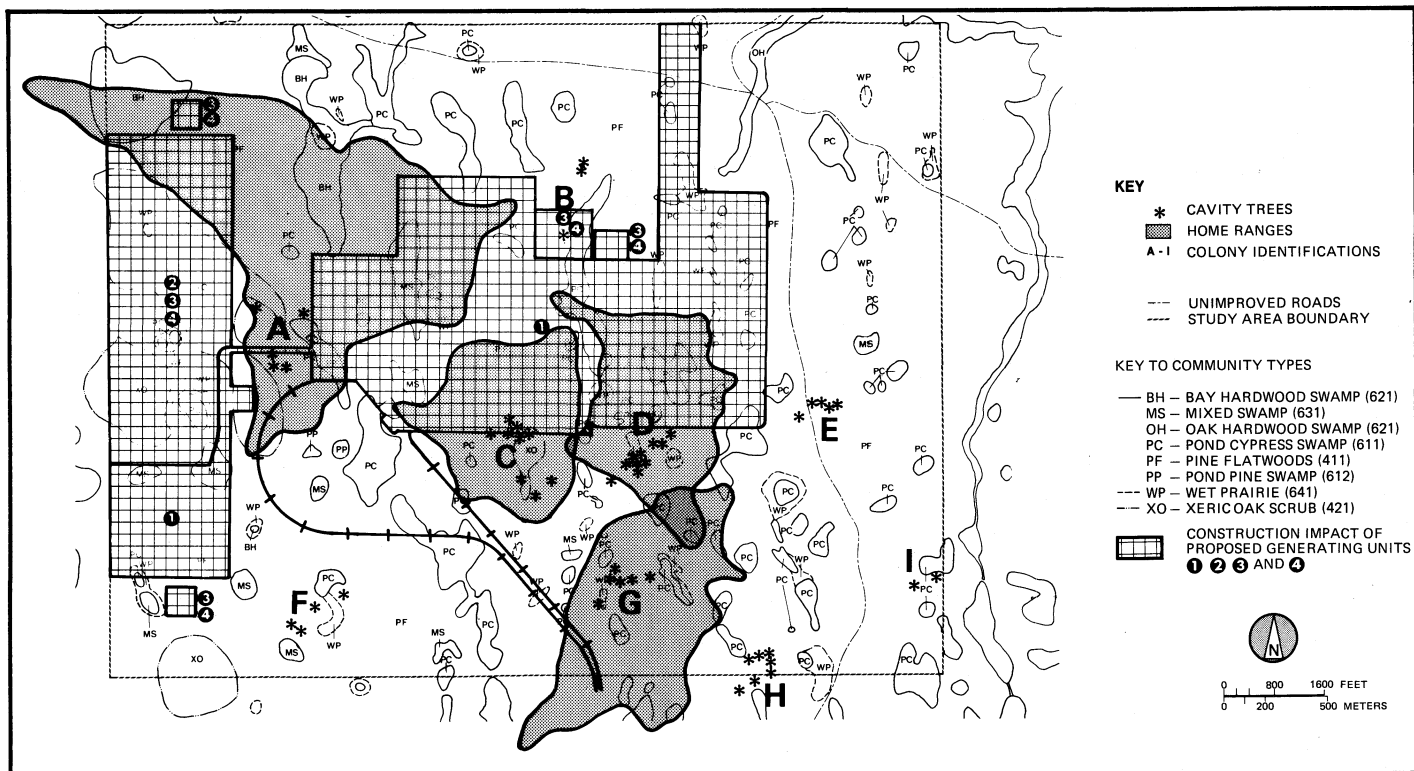


Figure 4.1-3 AREA OF CONSTRUCTION IMPACTS ON RED-COCKADED WOODPECKERS

APPENDIX 4.1A
JOINT APPLICATION
DEPARTMENT OF THE ARMY/FLORIDA DEPARTMENT
OF
ENVIRONMENTAL REGULATION
FOR
ACTIVITIES IN WATERS OF THE STATE OF FLORIDA

JOINT APPLICATION
DEPARTMENT OF THE ARMY/FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
FOR
ACTIVITIES IN WATERS OF THE STATE OF FLORIDA

Refer to Instruction Pamphlet for explanation of numbered items and attachments required.

1. Application number (To be assigned)	2. Date Day Mo. Yr.	3. For official use only															
4. Name, address and zip code of applicant Orlando Utilities Commission P.O. Box 3193 Orlando, Florida 32802																	
Telephone Number <u>305-423-9100</u>																	
5. Name, address, zip code and title of applicant's authorized agent for permit application coordination B. E. Shoup, Director Environmental Divisions P.O. Box 3193																	
Telephone Number <u>305-423-9141</u>																	
6. Describe the proposed activity, its purpose and intended use, including a description of the type of structures, if any, to be erected on fills, or pipe or float-supported platforms, and the type, composition and quantity of materials to be discharged or dumped and means of conveyance. See Attached Sheets.																	
<table style="width: 100%; border: none;"> <tr> <td style="width: 33%;"></td> <td style="text-align: center; border-bottom: 1px solid black;">Dredged/Excavated</td> <td style="width: 33%;"></td> <td style="text-align: center; border-bottom: 1px solid black;">Filled/Deposited</td> <td style="width: 33%;"></td> </tr> <tr> <td>Volume of Material:*</td> <td style="text-align: center;"><u>0</u> CY</td> <td style="text-align: center;"><u>3,450,000</u> CY</td> <td style="text-align: center;"><u>0</u> CY</td> <td style="text-align: center;"><u>3,444,000</u> CY</td> </tr> <tr> <td></td> <td style="text-align: center; font-size: small;">Waterward of O.H.W. or M.H.W.</td> <td style="text-align: center; font-size: small;">Landward of O.H.W. or M.H.W.</td> <td style="text-align: center; font-size: small;">Waterward of O.H.W. or M.H.W.</td> <td style="text-align: center; font-size: small;">Landward of O.H.W. or M.H.W.</td> </tr> </table> *Sum of all dredge/fill quantities.				Dredged/Excavated		Filled/Deposited		Volume of Material:*	<u>0</u> CY	<u>3,450,000</u> CY	<u>0</u> CY	<u>3,444,000</u> CY		Waterward of O.H.W. or M.H.W.	Landward of O.H.W. or M.H.W.	Waterward of O.H.W. or M.H.W.	Landward of O.H.W. or M.H.W.
	Dredged/Excavated		Filled/Deposited														
Volume of Material:*	<u>0</u> CY	<u>3,450,000</u> CY	<u>0</u> CY	<u>3,444,000</u> CY													
	Waterward of O.H.W. or M.H.W.	Landward of O.H.W. or M.H.W.	Waterward of O.H.W. or M.H.W.	Landward of O.H.W. or M.H.W.													
7. Proposed use Private [] Public [X] Commercial [] Other [] (Explain in remarks)																	
8. Name and address including zip code of adjoining property owners whose property also adjoins the waterway. See Attached Sheets.																	
9. Location where proposed activity exists or will occur Street address See Attached Sheets Longitude _____ Latitude _____ (If known) Sec. _____ Twp. _____ Rge. _____ <u>Florida</u> <u>Orange</u> <u>Orlando</u> State County In City or Town Near City or Town																	
10. Name of waterway at location of the activity Various Wetlands																	

11. Date activity is proposed to commence January 1, 1983
Date activity is expected to be completed August 1, 1986

12. Is any portion of the activity for which authorization is sought now complete? Yes ☐ No ☒

If answer is "Yes" give reasons in the remarks section. Month and year the activity was completed _____

_____ Indicate the existing work on the drawings.

13. List all approvals or certifications required by other Federal interstate, state or local agencies for any structures, construction, discharges, deposits or other activities described in this application, including whether the project is a Development of Regional impact.

Issuing Agency	Type of Approval	Identification No.	Date of Application	Date of Approval
Florida Board (Governor and his Cabinet)	Site Certification F.S. 403.501 thru 403.517	N/A		Pending
Florida Public Service Commission	Certificate of Need F.S. 403.519	N/A		Pending

14. Has any agency denied approval for the activity described herein or for any activity directly related to the activity described herein?

Yes ☐ No ☒ (If "Yes" explain in remarks)

15. Remarks (see Instruction Pamphlet for additional information required for certain activities)

See Attached Sheets.

16. Application is hereby made for a permit or permits to authorize the activities described herein. I agree to provide any additional information/data that may be necessary to provide reasonable assurance or evidence to show that the proposed project will comply with the applicable State Water Quality Standards or other environmental protection standards both during construction and after the project is completed. I also agree to provide entry to the project site for inspectors from the environmental protection agencies for the purpose of making preliminary analyses of the site and monitoring permitted works, if permit is granted. I certify that I am familiar with the information contained in this application, and that to the best of my knowledge and belief such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities.


Signature of Applicant

5/12/81
Date

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up by any trick, scheme, or device a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than \$10,000 or imprisoned not more than five years, or both.

The application must be signed by the person who desires to undertake the proposed activity; however, the application may be signed by a duly authorized agent if accompanied by a statement by that person designating the agent and agreeing to furnish upon request, supplemental information in support of the application.

FEE: Attach Checks/Money Orders on front
Payable to Department of Environmental Regulation
S200 Standard form projects
S20 Short forms and Chapter 403 projects only

INFORMATION NEEDED ON AFFIDAVIT OF OWNERSHIP OR CONTROL

1. The affidavit of ownership or control should be signed by at least one owner of the property, lessee, or easement holder.
2. If subdivided, the property should be described by lot number, block number (if any), name of subdivision, and plat book number and page where recorded.
3. If unplatted, the property should be described by section, township, and range, and subdivision of section.
4. If the description is based on courses and distances not following the plane coordinates, the point of beginning should be identified.

Please contact this office should clarification or further instructions be necessary.

AFFIDAVIT OF OWNERSHIP OR CONTROL

TO THE DEPARTMENT OF ENVIRONMENTAL REGULATION:

I hereby certify that I am the (check one):

SEE ATTACHED AFFIDAVIT

record owner _____

lessee _____

record easement holder _____

applicant to record owner for
easement _____

of the below described property situated in _____ County,
Florida; and that said property is all the property that is contiguous to and landward of the area
in which the work proposed in the permit application is to be conducted. Furthermore, I certify
that as record owner, lessee, or record easement holder I have or will have prior to undertaking
the work all necessary approvals or permission from all other persons with a legal interest in
said property to conduct the work proposed in the permit application.

LEGAL DESCRIPTION

Sworn to and subscribed before me at _____
_____ County, _____, this _____ day
of _____, 19____.

NOTARY PUBLIC

My commission expires:

ALTERNATE AFFIDAVIT OF OWNERSHIP OR CONTROL

I hereby certify that the Orlando Utilities Commission (OUC) is or will become the record owner of sufficient property interests to conduct the proposed activities. After approval of OUC's Site Certification Application, OUC will exercise its condemnation power for ownership of any property not already obtained by purchase. All property requiring dredge and fill activities is located Orange County, Florida. The property described below contains all of the property that is contiguous to and landward of the area where the work will be conducted. As present/future record owner I have or will have, prior to undertaking the work, all necessary approvals or permission from all other persons with a legal interest in said property to conduct the work proposed in the permit application.

LEGAL DESCRIPTION

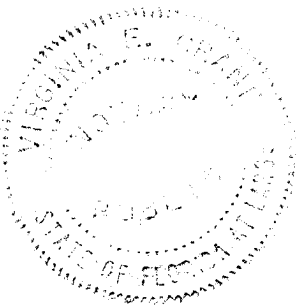
The legal description of the site is given by section, township, and range designations in Section 2.1 of the Site Certification Application. New transmission lines will be located in expansions of existing transmission line rights-of-way. This property is described in Section 3.8 of the Site Certification Application. Other offsite facilities will be sited in corridors described in Section 3.9 of the Site Certification Application. The actual rights-of-way that will be obtained will be within those corridors.

B. E. Shoup

Sworn to and subscribed before me at Orlando, Florida,
Orange County, Florida, this 12th
day of May, 1981.

Virginia E. Crane
NOTARY PUBLIC

My commission expires: July 21, 1984



JOINT PERMIT APPLICATION
U.S. ARMY CORPS OF ENGINEERS/
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ATTACHMENT TO SECTION 6

6. DESCRIPTION OF PROPOSED ACTIVITY

The activities that will involve dredge and fill work in wetland areas are related to the proposed Curtis H. Stanton Energy Center, Unit 1, by the Orlando Utilities Commission. The Energy Center will consist of a 460 MW coal-fired power station, its directly associated facilities, access railroad, access road, transmission lines, and makeup water and return pipelines.

The amounts of excavated and fill materials for the various areas are as follows.

A. Main Plant Site. The main structures and coal railroad will be located on fill.

Volume of Dredged/Excavated Material:

0	CY	3,400,000	CY
Waterward of MHW		Landward of MHW	

Volume of Filled/Deposited Material:

0	CY	2,826,200	CY
Waterward of MHW		Landward of MHW	

B. Access Railroad. Approximately 17.5 miles of railroad roadbed will be constructed.

Volume of Dredged/Excavated Material:

0	CY	34,600	CY
Waterward of MHW		Landward of MHW	

Volume of Filled/Deposited Material:

53,500	CY	503,750	CY
Waterward of MHW		Landward of MHW	

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C. Access Road. Approximately 7 miles of roadway roadbed will be constructed.

Volume of Dredged/Excavated Material:

<u>0</u>	CY	<u>15,000</u>	CY
Waterward of MHW		Landward of MHW	

Volume of Filled/Deposited Material:

<u>0</u>	CY	<u>113,800</u>	CY
Waterward of MHW		Landward of MHW	

D. Transmission Line.

Volume of Dredged/Excavated Material:

<u>0</u>	CY	<u>0</u>	CY
Waterward of MHW		Landward of MHW	

Volume of Filled/Deposited Material:

<u>0</u>	CY	<u>0</u>	CY
Waterward of MHW		Landward of MHW	

E. Makeup and Return Water Pipelines.

Volume of Dredged/Excavated Material:

<u>0</u>	CY	<u>0</u>	CY
Waterward of MHW		Landward of MHW	

Volume of Filled/Deposited Material:

<u>0</u>	CY	<u>0</u>	CY
Waterward of MHW		Landward of MHW	

The detailed breakdown of quantities and description of the above activities are presented in Section 15 of this application.

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ATTACHMENT TO SECTION 8

8. Name and address including zip code of adjoining property owners whose property also adjoins the waterway.*

Richard W. Sherwin, Trust
c/o Thomas H. Warlick, Esq.
210 E. Colonial Dr.
Orlando, FL 32801

Cape Orlando Corp.
c/o Magna Properties, Inc.
P.O. Box 2449
Pompano Beach, FL 33061

Harry H. Hansbrough, Trust
1607 Lee Rd.
Winter Park, FL 32789

Dayron Corp.
P.O. Box 20394
Orlando, FL 32814

John J. & Tosi Jo Brunetti
Frank J. Fiore
200 Route 9
Old Bridge Road, N.J. 08857

Charles E. Bradshaw, Jr.
P.O. Box 7853
Orlando, FL 32854

Leedy Corp. et al.
216 E. Jackson
Orlando, FL 32801

Dorothy W. Edward & James Poitras Trust
c/o Maury Carter
P.O. Box 8821
Orlando, FL 32856

Sun First National Bank of Orlando
c/o Florida Ranch Lands, Inc.
1500 Pan American Bldg.
Orlando, FL 32801

James E. Strates
P.O. Box 55
Orlando, FL 32802

*Partial List. The complete list will be provided shortly.

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ATTACHMENT TO SECTION 8

8a. Name and address including zip code of adjoining property owners whose property adjoins* a waterway in which fill is being placed and a 404 Permit is required.

Trestle 3

Richard W. Sherwin, Trust
c/o Thomas H. Warlick, Esq.
210 E. Colonial Dr.
Orlando, FL 32801

Orlando Rifle Association
c/o Odell Warren
910 S. Osceola
Orlando, Florida 32806

Harry H. Hansbrough, Trust
1607 Lee Rd.
Winter Park, FL 32789

Dayron Corp.
P.O. Box 20394
Orlando, FL 32814

Trestle 4

John J. & Tosi Jo Brunetti
Frank J. Fiore
200 Route 9
Old Bridge Road, N.J. 08857

Charles E. Bradshaw, Jr.
P.O. Box 7853
Orlando, FL 32854

Trestle 9

City National Bank of Miami
Trustee #P-258 (5000937)
P. O. Box 013280
Miami, Florida 33101
Orange County, Florida
2450 33rd Street
Orlando, Florida 32805

*Meaning property adjoining future OUC property within the wetland area of concern.

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ATTACHMENT TO SECTION 9

9. Location where proposed activity exists or will occur.

Street Address: NA.

Longitude:* 81° 09' 40" Latitude:* 28° 28' 50".

<u>Section</u>	<u>Township</u>	<u>Range</u>
33, 34	21S	31E
3, 10, 15, 22, 23, 26, 27, 34, 35	22S	31E
7, 18, 19, 30, 31	23S	32E
2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 23, 24, 25	23S	31E
6	24S	32E
1, 2, 3, 8, 9, 10, 17, 18	24S	31E
13, 16, 17, 18, 21, 22, 23, 24, 26, 27	24S	30E
13, 14	24S	29E

*Coordinates computed at approximate center of main plant site.

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ATTACHMENT TO SECTION 15

15. REMARKS

A. DESCRIPTION OF PROPOSED PROJECT

The Orlando Utilities Commission proposes to construct a 460 MW, coal-fueled electric generating station to be named the Curtis H. Stanton Energy Center. Unit 1 construction is scheduled to commence January 1, 1983 and to be completed December 31, 1986.

The proposed facility will be located in Orange County, approximately 8 miles northeast of the Orlando International Airport and one mile north of the Bee Line Expressway. The general location of the project is shown on Figure 15-1.

The main plant site will contain approximately 3,280 acres within its boundaries. The proposed energy center facilities are described in Section 3.0 of the Applicants' Site Certification Application (SCA). Figure 15-2 shows the site arrangement.

Additional plant facilities which are not located within the main plant site boundary are as follows.

1. Access Railroad. This single track railroad will connect the plant railroad loop with the Seaboard Coast Line Railroad mainline near Taft, approximately 10 miles southwest of the plant site. Unit train traffic will provide the coal supplies necessary for plant fuel. The track will also provide for delivery of heavy plant equipment and materials such as boiler and turbine-generator parts, transformers, and structural steel components. Figures 15-3 and 15-4 show the proposed alignment of this railroad. The overall length of track, from the south plant site boundary to its connection with the Seaboard Coast Line mainline is 17.5 miles. One mile south of the plant site, the railroad will cross under the Bee Line Expressway. The existing bridges will be raised approximately 9 feet to provide adequate clearance. Figure 3.9-5 of the SCA shows the proposed modification.

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ATTACHMENT TO SECTION 9

9a. Location where proposed activity exists or will occur.

Street Address: NA.

Longitude:* 81° 09' 40" Latitude:* 28° 28' 50".

<u>Section</u>	<u>Township</u>	<u>Range</u>
33, 34	21S	31E
3, 10, 15, 22, 23, 26, 27, 34, 35	22S	31E
7, 18, 19, 30, 31	23S	32E
2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 23, 24, 25	23S	31E
6	24S	32E
1, 2, 3, 8, 9, 10, 17, 18	24S	31E
13, 16, 17, 18, 21, 22, 23, 24, 26, 27	24S	30E
13, 14	24S	29E

9b. Location where proposed activity will occur and requires a 404 Permit.**

<u>Area</u>	<u>Section</u>	<u>Township</u>	<u>Range</u>
Trestle 3	11	245	31 E
Trestle 4	10	245	31 E
Trestle 9	21	245	30 E

*Coordinates computed at approximate center of main plant site.

**All other dredge and fill activities associated with other areas must meet the requirements of the Nationwide Permit.

2. Access Road. The main vehicular link of the plant site with the state highway system will be through a new access road, approximately 7 miles long, which will connect with State Highway 50 north of the plant site. The proposed route of the access road is shown on Figures 15-3 and 15-5. A two-mile segment of this road will parallel an existing transmission corridor in the east-west direction approximately one-half mile north of the plant site boundary. Approximately two miles of the access road to its connection with Highway 50, will coincide with an existing county road.
3. Makeup Supply and Return Water Pipelines. These will supply cooling tower makeup water from and return cooling tower blowdown to the new Iron Bridge Road Water Pollution Control Facility located approximately 9 miles north of the plant site. The pipelines will follow the plant access road right-of-way to Highway 50, parallel the highway for approximately one mile, and continue north along the right-of-way of Highway 520. The proposed alignment is shown on Figures 15-3 and 15-5.
4. Transmission Lines. Power generated at the new plant will be fed to the existing transmission system through two new transmission lines. One will utilize available space on existing towers along the line from the Indian River Plant to Pershing Substation located approximately 7 miles west of the plant site. The second line will require new towers which will be placed beside the existing towers by expanding the above corridor to the north. The new transmission lines will be terminated approximately 4 miles west of the plant site at the existing Florida Power Corporation transmission line running north to the Rio Pinar Substation. The proposed transmission route is shown on Figures 15-3 and 15-6.

B. NEED FOR PROPOSED WORK

The proposed energy center will serve the growing demand of the Applicants' service areas. In addition, the new facility will offset the level of oil consumption within the Applicants' system.

The projected need for the facilities is demonstrated in the Need For Power Document submitted by OUC to the Florida Public Service Commission.

The primary fuel for the plant will be midwestern coal which will be transported to the site by unit trains operating on the Seaboard Coast Line Railroad tracks within Florida to just south of the town of Taft. From there, the unit train traffic will operate on the plant access railroad track to bring the coal to the site unloading facility. The interconnection with the Seaboard Coast Line is the most advantageous from an economic and environmental standpoint. Not only will it provide an economical and reliable mode for fuel transportation, but it will allow for an efficient delivery of construction materials and plant equipment which are too large and heavy to be transported over the road.

Access to the plant site during both construction and plant operation will be gained through the plant access road. Connection with Highway 50 was preferred over connection with the Bee Line Expressway so that high speed traffic over the tollway would not be disrupted by slow moving construction vehicles and equipment. In addition, it is expected that the majority of the construction force will travel over Highway 50 to reach the site.

The source of cooling water for the plant will be effluent from the Iron Bridge Facility. The makeup water pipeline will supply cooling tower makeup to the plant for onsite storage. During periods of high rainfall, cooling tower makeup needs will be partially satisfied by site runoff which will be collected in the makeup water supply storage pond.

Blowdown from the cooling towers will be returned to the Iron Bridge Facility for treatment. A second, smaller pipeline, parallel to the water supply pipeline, will return the blowdown to the Iron Bridge Facility.

Power generated at the new plant must be distributed to the various participants' systems. The existing transmission line corridor presently connecting the Indian River Plant with the Pershing Substation, provides the most efficient and economical route for the new transmission lines. Widening of the existing corridor will be the only requirement to accommodate the set of new towers.

C. ALTERNATIVES CONSIDERED

An extensive site study was undertaken to determine the most advantageous site location. This study took into consideration the load center

to be served, available resources, fuel delivery, economics, preservation of the environment, engineering factors, demography, meteorology, access, and availability of labor force. The proposed site location, shown on Figure 15-1, offered the most advantageous combination of the above factors.

Additional studies were performed to determine the optimum orientation of facilities within the selected site area. Major consideration was given to plant operational requirements, preservation of the wetlands, and effects on the environment. The site arrangement depicted on Figure 15-2 represents the configuration which best accommodates both engineering and environmental factors. Wetlands and other environmentally sensitive areas within the plant site boundaries are identified on Figures 2.1-5 and 2.7-2 of the SCA. A detailed discussion of the site selection process is presented in Section 8.1 of the SCA.

Extensive studies were performed on the railroad alignment to maintain economy and to avoid significant impact on the environment and on developed areas. A route was finally selected which crosses the minimum amount of wetlands, and utilizes existing corridors which have already been disturbed by other activities. It becomes evident from Figures 15-3 and 15-4 that even though the route selected is not the most direct between the plant site and the Seaboard Coast Line mainline, it is one that infringes the least on sensitive areas. Wetlands and other environmentally sensitive areas within the proposed railroad corridor are shown on Figure 2.7-7 of the SCA.

The route selected was inspected in the field with a representative from the DER. The DER recommended realignment of the track in the vicinity of Station 32+500 (Figure 15-3) to cross Hart Branch (tributary to Lake Hart) downstream from its confluence with two small tributaries which join it in that area. In addition, the alignment of the railroad will stay as close as feasible to the right-of-way of State Highway 537 in the vicinity of Station 72+000 (Figure 15-4) where it crosses Boggy Creek Canal to minimize the impact on the wetland.

Various transmission line routes were studied and the final route was inspected in the field with a representative of the DER. The recommended

alignment is shown on Figures 15-3 and 15-6. The entire route is along an existing corridor connecting the Indian River Plant with the Pershing Substation. The only impact will result from widening of the corridor. No new access roads will be required.

The plant access road was aligned to follow an existing disturbed corridor along the transmission line, or along an existing graded right-of-way, as shown on Figures 15-3 and 15-5. An alternate route would have connected the plant site with the Bee Line Expressway approximately one mile south. It was determined that the impact of heavy, slow moving construction traffic on the toll expressway would have an undesirable impact. In addition, the majority of the construction work force is expected to come from the area northwest of the site, more easily accessible to Highway 50. The proposed access road route connecting with Highway 50 was also reconnoitered with the DER representative and no changes resulted from this investigation.

The makeup and return water pipelines have been routed within the right-of-way of existing or proposed roads, as shown on Figures 15-3 and 15-5. The impact of such routing is minimal.

D. DREDGE AND FILL

The major dredge and fill impact from the proposed project on the environment will be a result of construction activity within the wetlands, particularly deposition of fill material. Extensive field investigations based on vegetative cover, and soil types have assisted in the identification of such areas within the plant site boundaries and along the various access corridors. These are shown on Figures 2.7-2, 2.7-7, 2.7-8, and 2.7-9 of the Site Certification Application.

Investigations of alternate site arrangements and routes for the access railroad, access road, transmission lines, and pipelines were based on vegetation and soils maps, aerial photographs, and topographic maps produced by the U.S. Geological Survey.

1. Main Plant Site

Existing grade elevations within the plant site vary from approximately 55 feet msl to 90 feet msl. The majority of the plant site drains toward

the Econlockhatchee River to the east through smaller tributaries such as Cowpen Branch, Hart Branch, Green Branch, and an unnamed tributary. These are shown on Figure 2.5-5 of the SCA.

Due to the relatively flat topography, the predominant mode of flooding is overland sheet flow. This mode causes shallow flooding over extensive areas. The 100-year flood levels computed by the U.S. Geological Survey and shown on the Flood Prone Area maps, vary from elevation 60 to elevation 90. These flood prone areas within the plant site are shown on Figure 2.5-6 of the SCA.

Old 80 Ground floor elevations for plant structures have been established as elevation (82). Due to the extensive flood prone areas present, a significant portion of the plant site will require fill to provide protection from the 100-year flood levels. The areas within the plant site which will require fill or excavation are shown on Figure 15-7. Approximately 380 acres will require fill and 437 acres will require excavation. The total amount of fill to be placed will be 2,826,000 cubic yards. This will require the excavation of 3.4 million cubic yards of material assuming a 20 per cent shrinkage factor. The excavated material will be produced from the upland areas of the plant site. The breakdown of fill required for the various parts of the site is shown in Table 15-1. Approximately 125 acres of isolated wetland areas will be filled and/or cleared. This represents only 24 per cent of the total present within the site boundaries. The environmental considerations of plant construction and operation are described in detail in Sections 4.0 and 5.0 of the SCA.

2. Access Railroad

The main issues considered in the selection of the railroad alignment were the following.

(a) Environmental impacts of dredging and filling within the wetlands present along the way were minimized by selecting a route which avoided wetland areas to the greatest extent possible. A typical railroad cross section is shown on Figure 15-8. Embankment depths average less than 5 feet in height. The total width of disturbance from toe to toe of the embankment will vary from 30 to 74 feet. Where possible, the side slopes

of the embankment will be reduced to steeper than 3H to 1V to reduce the disturbance width, particularly in wetland areas. Environmental impact within the wetlands will be minimized by trestle-type crossings of various lengths at the most sensitive areas and culverts to maintain sheet flow. This type of construction eliminates the necessity to dredge, demuck, or fill, and allows for free passage of sheet flow through the wetland. The required lengths of trestle were computed on the basis of hydrological considerations, as will be described in (b) of this subsection. The locations of the proposed trestles are shown on Figures 15-3 and 15-4. The proposed lengths are shown in Table 15-2. Typical trestle construction is shown on Figures 15-9 and 15-10. Trestles will be constructed of all precast concrete materials which is typical for such structures in this type of environment. The construction shown has been adapted from the standards of the Seaboard Coast Line Railroad. The lengths of trestles were determined as integer multiples of 24-foot spans to standardize the precast component production and achieve economy. In areas where flows are small or where equalization of water levels on two sides of a wetland is required, corrugated metal pipe or arch culverts of the appropriate size will be provided. Their locations are shown on Figures 15-3 and 15-4, and their sizes listed in Table 15-3. A field investigation of the proposed trestle and culvert locations with a representative of the DER revealed complete satisfaction on environmental issues. Detailed descriptions of the environmental considerations within the access railroad corridor are presented in Sections 4.0 and 5.0 of the SCA.

Fill material for embankment construction will be obtained from borrow locations in the upland areas. A certain amount will be produced from cuts in high areas along the route. Table 15-4 shows the amount of excavation or fill required along the alignment stations shown in Figures 15-3 and 15-4. (b) Surface runoff. When an embankment is constructed across a drainage route it creates a constriction which can cause two effects: excessive flooding upstream and erosion immediately downstream of the flow opening. These effects are both caused by inadequate passage opening provided through the embankment. The impact criteria used to size the trestles under the

railroad embankment at drainage locations were that the flow velocities will be 3 feet per second or less, and that the headwater buildup on the upstream side will be minimal, considering the flatness of the topography. Because of the sandy soils present in the areas, a non-eroding velocity of 3 fps is considered as an upper limit. Additional rip-rap will be provided with trestles T9 and T10 for erosion control since the design flow velocities are slightly greater than 3 fps. The drainage basins contributing flows along the access railroad are shown on Figures 15-11 and 15-12. Flood flows for these areas were determined based on the methodology presented in the publication "Using the Cypress Creek Formula to Estimate Runoff Rates in the Southern Coastal Plain and Adjacent Flatwoods Land Resource Areas" by J. C. Stephens and W. C. Mills. This information, as well as estimated 100-year peak flow rates for the indicated trestle locations, were provided by Mr. Charles A. Hall, Director of the Water Management Division of the South Florida Water Management District. Table 15-5 shows the applicable parameters and computed 100-year flood flows for the various drainage basins.

Trestle lengths and culvert sizes resulting from flow requirements are shown in Tables 15-2 and 15-3. Additional considerations, however, also become factors for the final sizing of the trestles. These involve sheet flows through the wetlands and preservation of the environment in its original condition to the greatest extent possible. For this reason, the proposed final lengths of the trestles along the railroad have been modified as presented in Table 15-2. The proposed trestle lengths have been discussed with DER representatives during a field visit and found to be acceptable from the environmental standpoint.

At locations where a culvert is required for water level equalization, a minimum culvert size of 30 inches will be used to prevent plugging by debris, silt, etc. At trestle location T8, because of the interconnection with the Boggy Creek Canal drainage, part of the flow will be allowed to flow directly to Boggy Creek Canal. Therefore, a 24-foot trestle will be provided only for environmental reasons. Boggy Creek Canal drains a significant area upstream of the Bee Line Expressway as well as the entire

Orlando International Airport area. Information provided by the Greater Orlando Airport Authority indicates that the design flow in Boggy Creek Canal is

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3,000 cfs. The releases from the airport drainage system have been designed so that they do not cause adverse effects where they meet existing drainage structures such as the bridge on State Highway 527 where it crosses Boggy Creek Canal. The proposed plant access railroad trestle has therefore been sized to match the existing 180 foot long bridge at that location. Since the two structures will be parallel and at close spacing to each other, this configuration will maintain existing conditions.

After initial review of this application, a letter dated December 7, 1981 was sent from Algis G. Taruski of the Department of the Army, Corps of Engineers, to the Orlando Utilities Commission indicating that additional information was required on Trestles 3, 4, 5, 6, 7, and 9. The letter also stated that the fill associated with Trestles 3 and 4 would require a 404 Permit and that the fill associated with Trestles 5, 6, 7, and 9 may qualify under the Nationwide Permit pending review of the requested additional information. On January 28, 1982 a field trip to the above trestle locations was made by the Corps of Engineers, Orlando Utilities Commission, Saint Johns River Water Management District, Black & Veatch, and Environmental Science and Engineering representatives. At this time the additional information requested by the Corps of Engineers was provided and it was concluded that Trestles 3, 4, and 9 would require a 404 Permit while Trestles 5, 6, and 7 met the requirements of the Nationwide Permit. On February 9, 1982 OUC and Black & Veatch again met with the Corps of Engineers representatives to formally submit the information requested to process a 404 Permit for Trestles 3, 4, and 9. The same information appears in the Site Certification Application Amendment 5.

Figures 15-8a through 15-8f show plan and profile information for the proposed fill and trestles in trestle areas 3, 4, 5, 6, 7, and 9. Fill activities associated with Trestles 5 and 6 meet the conditions of the Nationwide Permit because of the limited length and quantity of fill within the wetland. Trestle 7 also meets the conditions for a Nationwide Permit since the average annual flow through the trestle is less than 5 cfs.

3. Access Road

The considerations that apply to the access road are the same as those discussed for the access railroad. A typical road section is shown on Figure 15-13. Since the access road follows existing corridors for 4 of the total 7 miles, the environmental impact is minimal. The route is generally along a ridge; therefore the wetland crossings are practically nonexistent. Figures 15-11 and 15-14 show the drainage basins which contribute flows under the road embankment. Table 15-6 shows the size of the basins, the computed design flows, and resulting culvert sizes. No trestles are proposed for the access road. A detailed description of the environmental considerations within the access road corridor is presented in Sections 4.0 and 5.0 of the SCA.

Fill material for embankment construction will be obtained from borrow locations in the upland areas. Table 15-7 shows the amount of fill required for the access road along the alignment stations shown on Figures 15-3 and 15-5.

A field reconnaissance of the proposed culvert locations along the access road with a representative of the DER revealed that the proposed locations and sizes are satisfactory from the environmental standpoint.

4. Transmission Line

Almost the entire length of the proposed transmission line is along an existing transmission corridor, as shown on Figures 15-3 and 15-6.

Since the existing corridor already includes an access roadway to the transmission towers, no new fill will be required. Detailed descriptions of the environmental considerations for the transmission corridor are presented in Sections 4.0 and 5.0 of the SCA.

5. Makeup and Return Water Pipelines

The entire length of the proposed makeup and return water pipelines is along an existing or new right-of-way, as indicated on Figures 15-3 and 15-5. The pipelines will be laid in a trench in a cut and cover operation. The finished contours along the covered trench will be the same as the undisturbed grade contours. At the point where Highway 50 crosses the Little Econlockhatchee River, the pipelines will be suspended from the existing bridge structure.

E. CONSTRUCTION

Construction methods pertaining to dredge and fill operations for the main plant and associated facilities have been determined on the basis of maps, aerial photos, site reconnaissance, environmental investigations, and preliminary soil exploration.

Preliminary soil investigations indicate that the major plant structures will be supported on piles driven through engineered site fill and in situ material. Clearing of the land will be required prior to placing of site fill material. Any significant layers of incompetent, organic material that might be encountered will be removed prior to fill operations.

The material for site fill will be obtained from onsite sources. A detailed description of the in-situ soils, as obtained from the preliminary soil exploration program, is presented in Section 2.4 of the SCA. No spoil material will be deposited in the wetlands. Since most spoil material is organic in nature and not useful as structural fill, nearly all of what would be spoil material will be utilized for topsoil cover to promote vegetation growth over structural fill areas, slopes, etc.

Site preparation operations will be performed with a variety of construction equipment including scrapers, bulldozers, graders, rollers, haul trucks, water trucks, and draglines. Organic vegetation collected as a result of clearing will be initially logged and the remainder will be

burned. Pond embankments will be constructed from suitable onsite available material. Soil cement slope protection will be provided where required. All other erosion protection will be through vegetative cover. Ponds requiring sealing against seepage will be sealed with a layer of bentonite clay. A detailed description of pond requirements is provided in Section 3.10 of the SCA.

The railroad embankment will be constructed from material borrowed from the highlands or material resulting from local excavation. No spoil material will be deposited in the wetlands. Embankment construction will require vegetation clearing and removal of incompetent organic material. The extent of such removal will be determined at a later time when a detailed soil exploration and topographic mapping program is completed along the corridor. Railroad trestle construction will be from all precast concrete materials as shown on Figures 15-9 and 15-10. Vegetation clearing will be required at trestle locations but no removal of in-situ soil material will be required. The precast concrete construction will eliminate most of the debris resulting from the cast-in-place concrete construction such as forms, concrete spatter, reinforcing steel scrap, etc. Slope protection around trestle abutments will be limestone riprap or soil cement. Culverts will be corrugated metal pipe or arch, galvanized. Soil cement or limestone riprap slope protection will be provided around the inlets and outlets. Minimum size will be 30-inch diameter.

Equipment required for trestle erection will include cranes, trucks, pile drivers, and miscellaneous small equipment. The contractor will be responsible for regrading of disturbed wetland bottom areas to bring the soil conditions to near original condition, particularly in areas adjacent to trestles that may be disturbed during construction. Earthwork will require the same type of equipment as for site preparation. Trackwork construction will proceed from the west end where the access railroad joins the Seaboard Coast Line mainline. Ballast, ties, rail, and other hardware will be brought in by rail car and positioned as required. Access for construction and track maintenance will be provided by the railroad roadbed. No additional maintenance road will be required.

The access road embankment will be constructed from material obtained from the uplands. Paving materials will be brought in by truck. Earthwork construction will proceed with equipment similar to those required for site preparation and railroad embankment. Rollers will be required for the compaction of paving. Vegetation clearing and muck removal requirements are the same as for the railroad. It is not anticipated that trestle construction will be required. However, cast-in-place concrete box culverts may be required at one location. The rest of the culverts will be of the same construction as those under the railroad.

Pipeline construction will be confined along and within the right-of-way of the existing road or the proposed new access road. Trenching will be performed with backhoes. Trenched material will be stored temporarily along the trench. Imported crushed limerock bedding material will be deposited with loaders. Backfill material will be compacted with vibratory compactors and the final contours brought to the same elevation as the original grade. Pre-existing vegetative cover will be re-established.

Transmission line construction will involve the widening of the existing corridor by clearing of trees and tall vegetation as shown on Figure 15-15. The vegetative debris resulting from clearing operations will be stockpiled and burned. New transmission towers will be supported by piles. No earthwork operations are anticipated since access is already available.

F. HAZARDOUS MATERIALS

The proposed project will not involve the handling of hazardous materials in connection with the dredge and fill operations.

LIST OF TABLES

- 15-1 Fill Requirements for Plant Site Areas
- 15-2 Proposed Trestle Lengths Along Access Railroad
- 15-3 Proposed Culvert Sizes Along Access Railroad
- 15-4 Excavation and Fill Amounts Along Access Railroad
- 15-5 Drainage Basin Flood Flows Along Access Railroad
- 15-6 Design Flows and Culverts Along Access Road
- 15-7 Excavation and Fill Amounts Along Access Road

LIST OF FIGURES

- 15-1 General Site Vicinity Map
- 15-2 Site Arrangement
- 15-3 Plant Facility Corridors/Central Area
- 15-4 Plant Facility Corridors/West Area
- 15-5 Plant Facility Corridors/North Area
- 15-6 Plant Facility Corridors/Northwest Area
- 15-7 General Site Fill Concept
- 15-8 Typical Railroad Section
- 15-8a Proposed Fill and Trestle Number 3
- 15-8b Proposed Fill and Trestle Number 4
- 15-8c Proposed Fill and Trestle Number 5
- 15-8d Proposed Fill and Trestle Number 6
- 15-8e Proposed Fill and Trestle Number 7
- 15-8f Proposed Fill and Trestle Number 9
- 15-9 Typical Trestle Section
- 15-10 Typical Trestle Profile
- 15-11 Central Area Drainage Basins
- 15-12 West Area Drainage Basins
- 15-13 Access Road Cross Section
- 15-14 North Area Drainage Basins

5

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TABLE 15-1. FILL REQUIREMENTS FOR PLANT SITE AREAS

<u>Area</u>	<u>Fill</u> cu-yards in place
Main Plant Complex	1,436,000
Coal Handling Area	170,000
Construction Laydown Area	170,000
Coal Loop Railroad	400,000
Plant Railroad	116,000
Runoff Pond Dike	325,000
Roads	<u>209,000</u>
Total	2,826,000

TABLE 15-2. PROPOSED TRESTLE LENGTHS ALONG ACCESS RAILROAD

<u>Location</u>	<u>Station</u>	<u>100-Year Flood Elevation</u> feet msl	<u>Required Length</u> feet	<u>Proposed Length</u> feet	4
T1	3+200	75.0	38	192	
T2	9+500	74.0	16	72	
T3	19+000	72.5	37	96	
T4	25+500	75.0	35	144	
T5	32+400	77.0	32	96	
T6	39+200	76.5	73	288	
T7	62+800	77.5	13	48	
T8	67+800	76.0	1	48	
T9	72+200	75.0	75	192	
T10	83+800	85.0	32	48	
T11	86+700	85.0	27	96	
T12	89+100	84.5	14	48	

originally 216
5

TABLE 15-2. PROPOSED TRESTLE LENGTHS ALONG ACCESS RAILROAD

<u>Location</u>	<u>Station</u>	<u>100-Year Flood Elevation feet msl</u>	<u>Required Length feet</u>	<u>Proposed Length feet</u>
T1	3+200	75.0	55	192
T2	9+500	74.0	27	72
T3	19+000	73.5	44	96
T4	25+500	75.0	82	144
T5	32+400	77.0	43	96
T6	39+200	76.5	138	288
T7	62+800	77.5	115	216
T8	67+800	76.0	24	24
T9	72+200	75.0	*	192
T10	83+800	85.0	40	48
T11	86+700	85.0	44	96
T12	89+100	84.5	20	48

*No required length due to flow has been computed. Proposed length is based on length of existing highway trestle.

TABLE 15-3. PROPOSED CULVERT SIZES ALONG ACCESS RAILROAD*

<u>Location</u>	<u>Station</u>	<u>Size</u> <u>inches</u>
C1	0+500	30
C2	10+000	30
C3	46+200	30
C4	51+300	30
C5	57+500	30
C6	58+500	30
C7	76+000	30
C8	79+000	30

*These do not include the culverts associated with Trestles 3, 4, 5, 6, 7, and 9 as shown on Figures 15-8a, 15-8b, 15-8c, 15-8d, 15-8e, and 15-8f, respectively.

TABLE 15-4. EXCAVATION AND FILL QUANTITIES ALONG ACCESS RAILROAD*

<u>Station</u>	<u>Fill</u>	<u>Cut</u>	<u>Cumulative</u>	
			<u>Fill</u>	<u>Cut</u>
0+000				
	57,000	--	57,000	--
10+000				
	79,000	--	136,000	--
20+000				
	61,000	31,000	197,000	31,000
30+000				
	57,000	1,000	254,000	32,000
40+000				
	30,000	2,000	284,000	34,000
50+000				
	29,000	1,000	313,000	35,000
60+000				
	78,000	--	391,000	35,000
70+000				
	89,000	--	480,000	35,000
80+000				
	62,000	--	542,000	35,000
90+000				
	15,000	--	557,000	35,000
92+650				

*All quantities in cubic yards.

TABLE 15-4. EXCAVATION AND FILL QUANTITIES ALONG ACCESS RAILROAD*

<u>Station</u>	<u>Fill</u>	<u>Cut</u>	<u>Cumulative</u>	
			<u>Fill</u>	<u>Cut</u>
0+000	57,000	--	57,000	--
10+000	79,000	--	136,000	--
20+000	51,000	31,000	187,000	31,000
30+000	47,000	1,000	234,000	32,000
40+000	20,000	2,000	254,000	34,000
50+000	19,000	1,000	273,000	35,000
60+000	68,000	--	341,000	35,000
70+000	86,000	--	427,000	35,000
80+000	62,000	--	489,000	35,000
90+000	15,000	--	504,000	35,000
92+650				

*All quantities in cubic yards.

TABLE 15-5. DRAINAGE BASIN FLOOD FLOWS ALONG ACCESS RAILROAD

<u>Basin No.</u>	<u>Drainage Area acres</u>	<u>Flood Flow cfs</u>
1	1,338	330
2	710	200
3	2,676	595
4	5,286	1,045
5	2,301	520
6	6,051	1,170
7	552	160
8	21	10
9	18,500	3,000
10	630	180
11	1,339	330
12	366	120

5

4

TABLE 15-5. DRAINAGE BASIN FLOOD FLOWS ALONG ACCESS RAILROAD

<u>Basin No.</u>	<u>Drainage Area acres</u>	<u>Flood Flow cfs</u>
1	1,388	330
2	710	200
3	2,319	530
4	5,644	1,100
5	2,301	520
6	6,474	1,240
7	4,160	860
8	340	110
9	18,500	3,000
10	630	180
11	1,339	330
12	366	120

TABLE 15-6. DESIGN FLOWS AND CULVERTS ALONG ACCESS ROAD

<u>Drainage Basin No.</u>	<u>Basin Area acres</u>	<u>Design Flow cfs</u>	<u>Culvert Size inches</u>
1A	226	75	2-58" x 36"*
2A	192	65	2-50" x 31"*
3A	221	75	4-36" x 22"*
4A	121	45	2-43" x 27"*
5A	73	30	2-30"
6A	101	40	2-42"
7A	43	20	1-43" x 27"*
8A	1,295	325	2-8'-2" x 5'-9"*
9A	121	45	2-43" x 27"*
10A	179	65	2-50" x 31"*
11A	41	20	1-43" x 27"*

*Pipe-arch culverts.

TABLE 15-6. DESIGN FLOWS AND CULVERTS ALONG ACCESS ROAD

<u>Drainage Basin No.</u>	<u>Basin Area acres</u>	<u>Design Flow cfs</u>	<u>Culvert Size inches</u>
1A	226	75	2-58" x 36"*
2A	192	65	2-50" x 31"*
3A	221	75	4-36" x 22"*
4A	121	45	2-43" x 27"*
5A	73	30	2-30"
6A	101	40	2-42"
7A	43	20	1-42"
8A	1,295	325	2-8'-2" x 5'-9"*
9A	390	120	2-72" x 44"*
10A	69	30	1-42"

*Pipe-arch culverts.

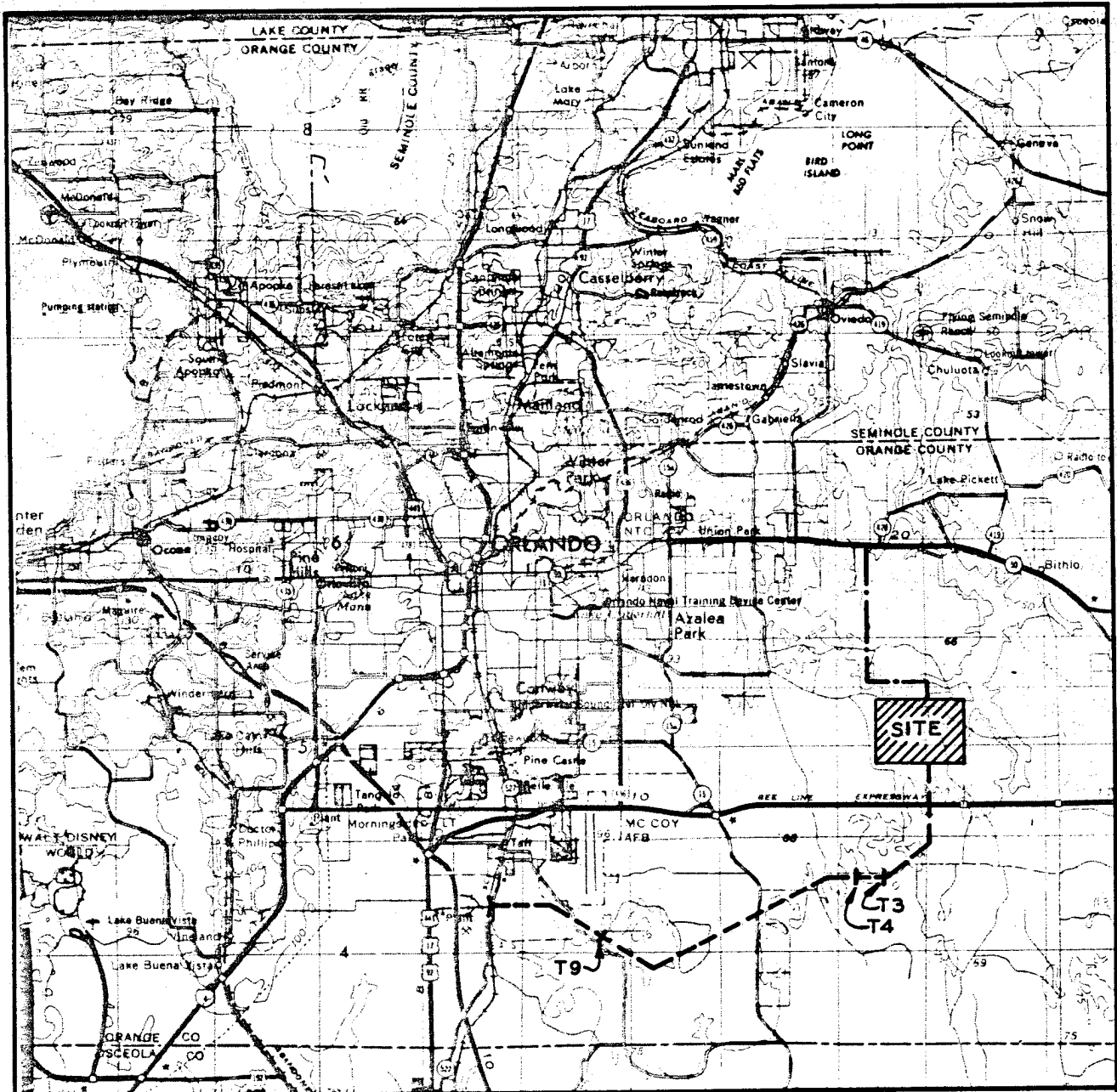
TABLE 15-7. EXCAVATION AND FILL QUANTITIES ALONG ACCESS ROAD*

<u>Station</u>	<u>Fill</u>	<u>Cut</u>	<u>Cumulative</u>	
			<u>Fill</u>	<u>Cut</u>
0+000 (HWY 50)				
	43,300	26,291	43,300	26,291
10+000	18,900	43,911	62,200	70,202
20+000	15,989	39,710	78,189	109,912
30+000	19,640	6,003	97,829	115,915
36+300 (Edge of Site)				

*All quantities in cubic yards.

Image Quality

As you review the next group of images, Please note that the original documents were of poor quality.



5 0 5 MILES

SCALE IN MILES

LEGEND

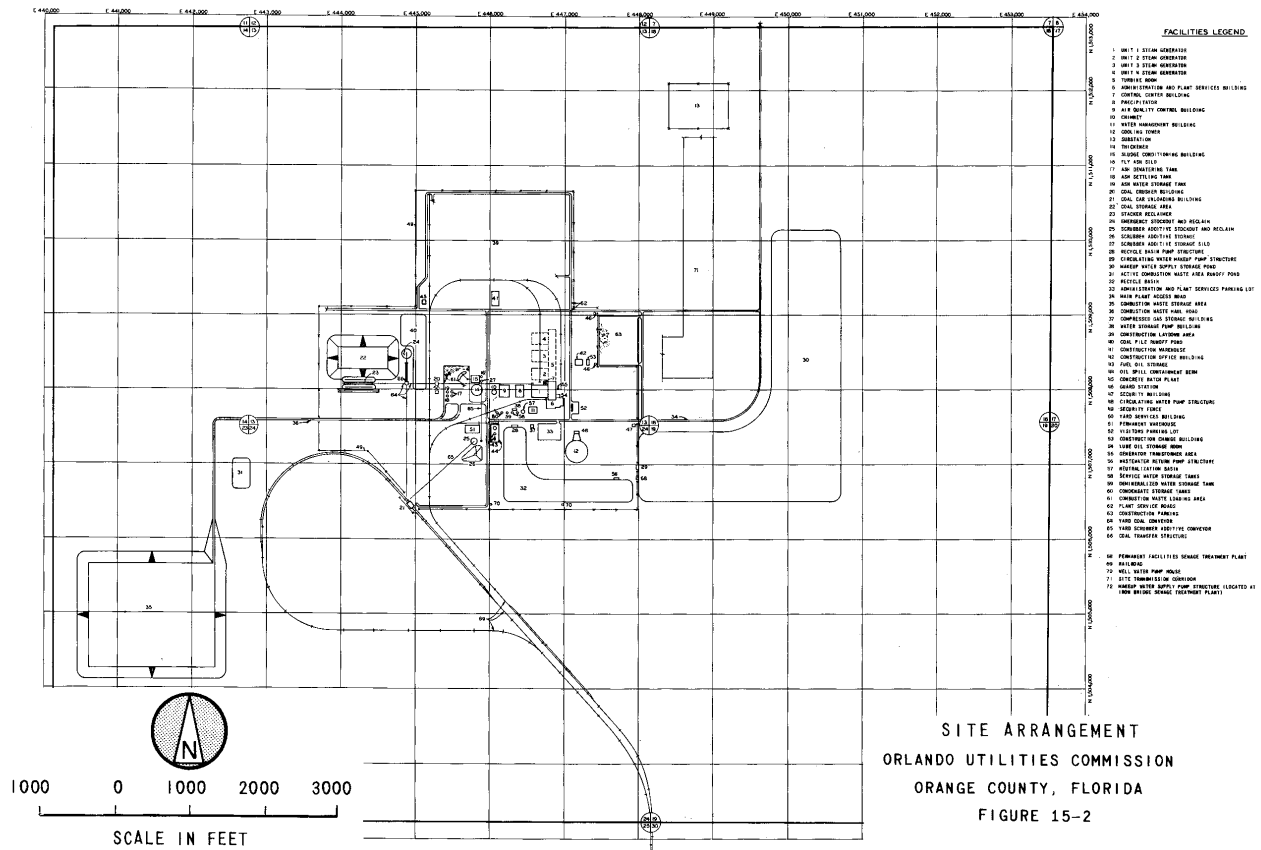
--- RAILROAD
 --- ROADWAY

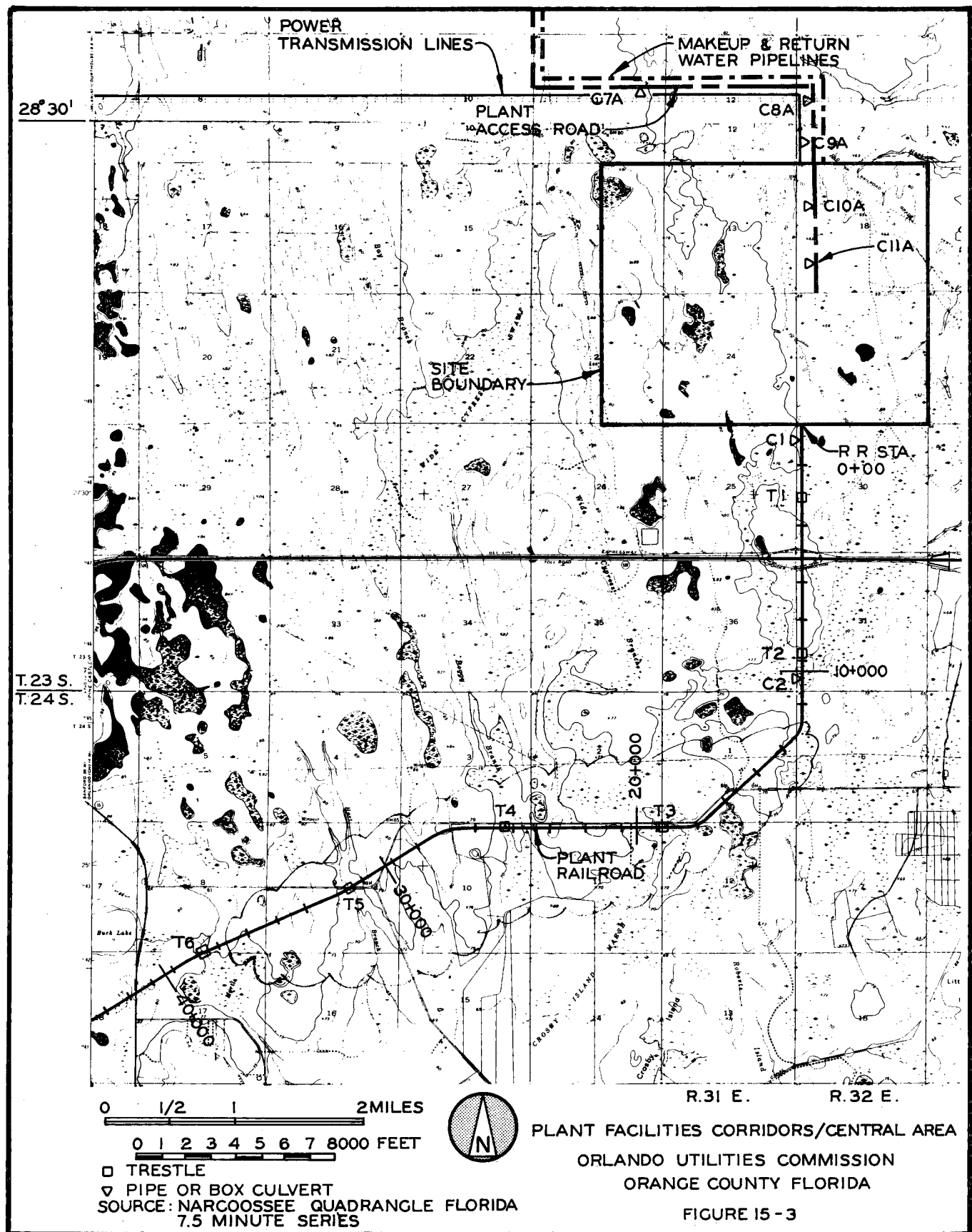
GENERAL SITE VICINITY MAP

ORLANDO UTILITIES COMMISSION
 ORANGE COUNTY, FLORIDA

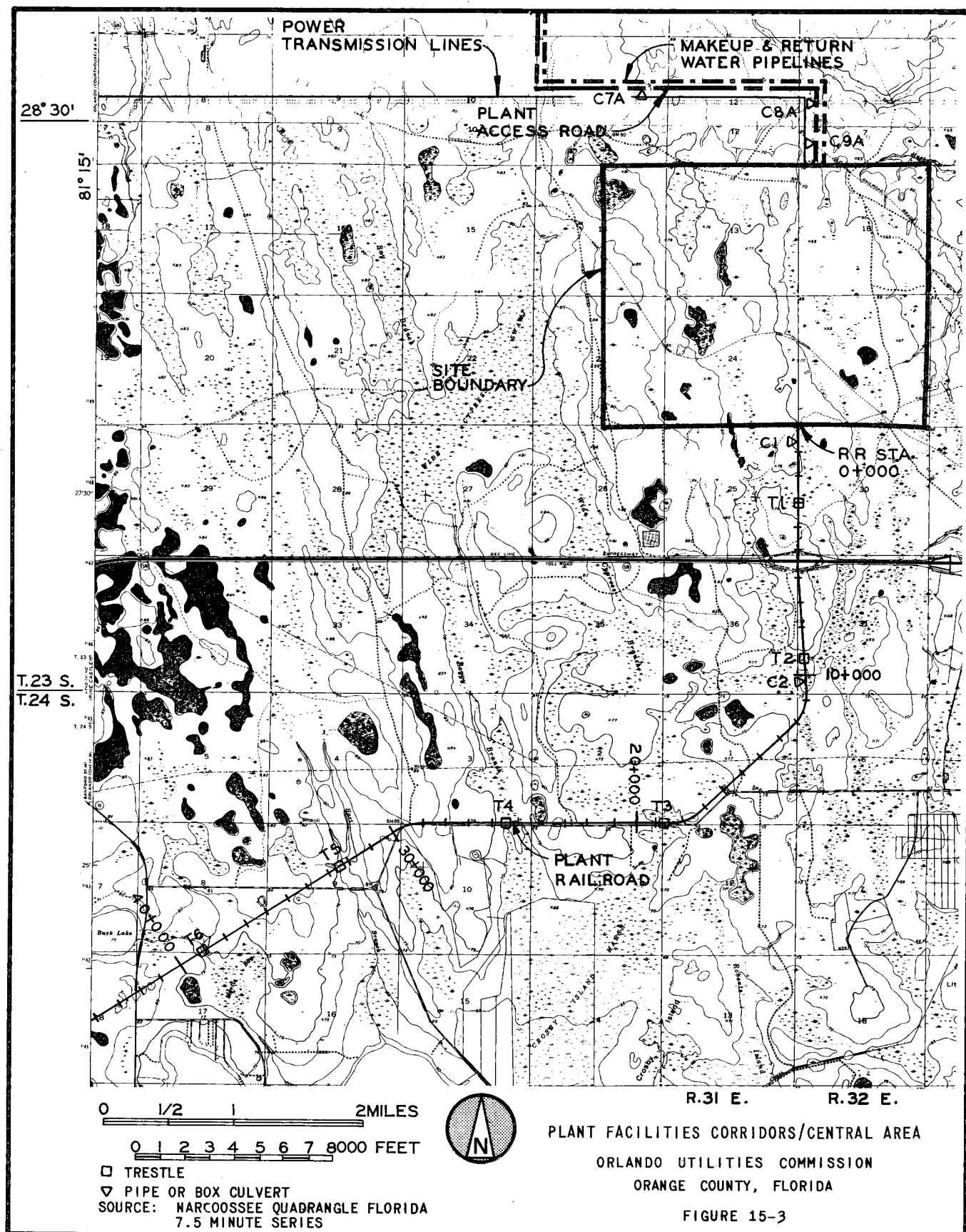
SOURCE: ORLANDO QUADRANGLE FLORIDA
 1 MINUTE BY 2 MINUTE SERIES

FIGURE 15-1







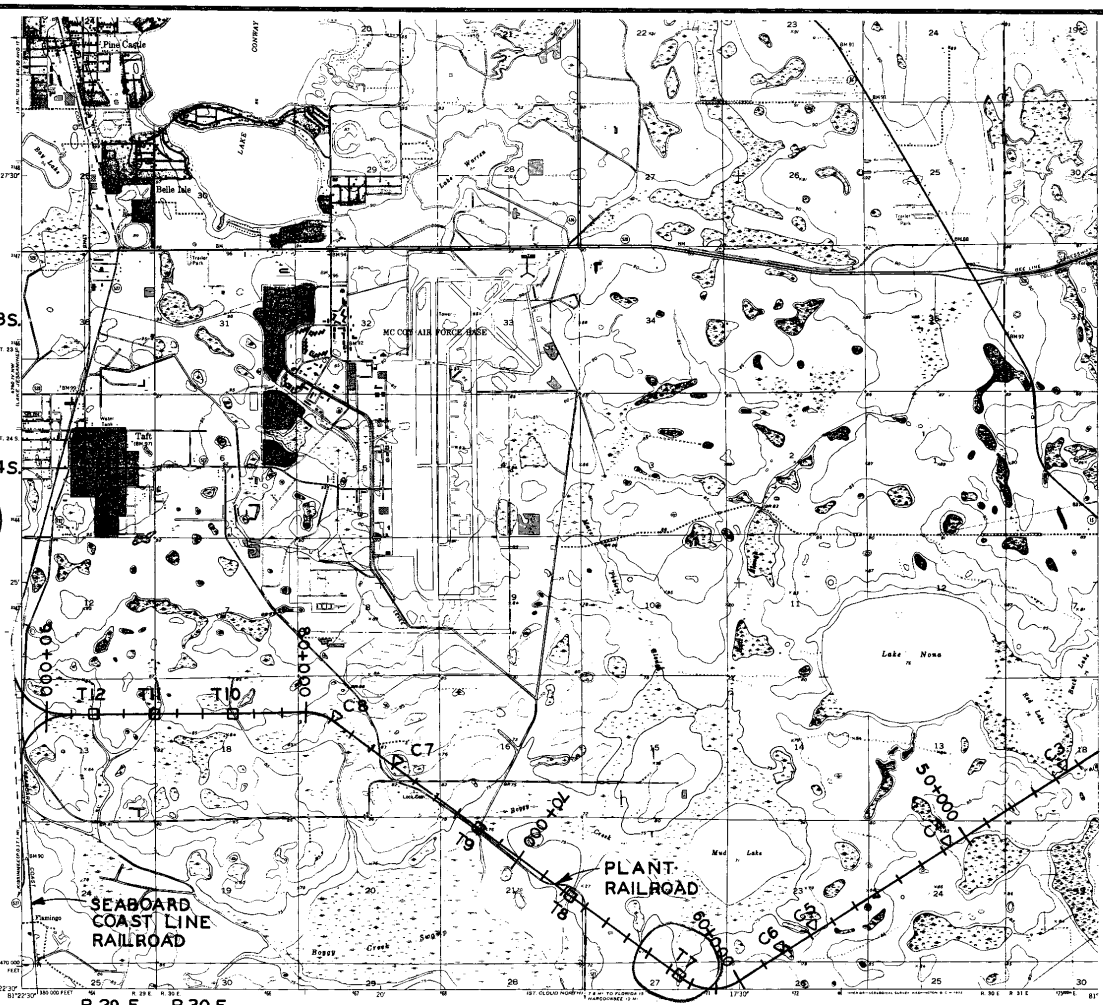


□ TRESTLE
▽ PIPE OR BOX CULVERT
SOURCE: PINE CASTLE QUADRANGLE FLORIDA
7.5 MINUTE SERIES



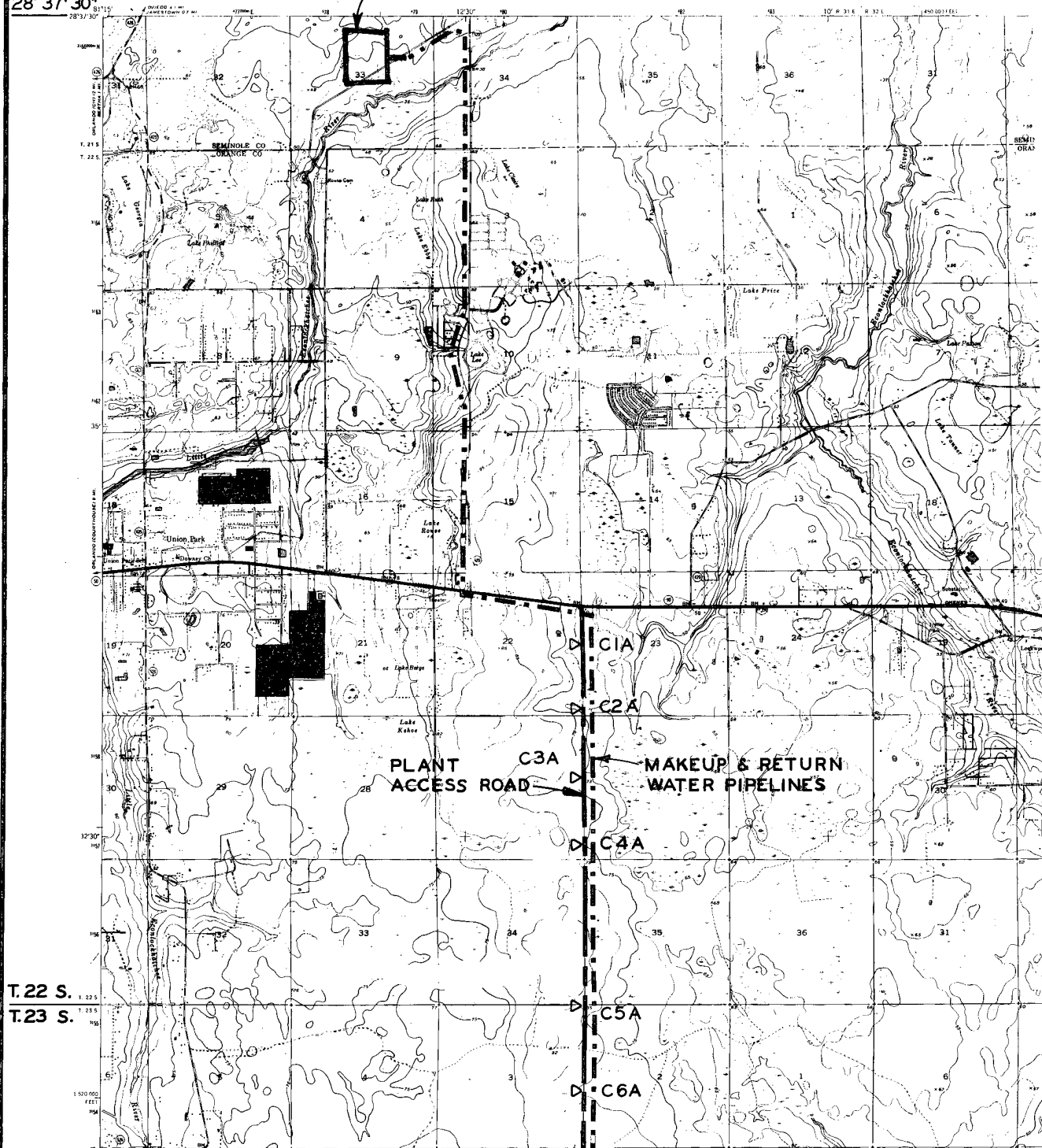
PLANT FACILITY CORRIDORS/WEST AREA
ORLANDO UTILITIES COMMISSION
ORANGE COUNTY, FLORIDA
FIGURE 15-11

28°22'30"
81°22'30" R.29 E. R.30 E.



81° 15'
28° 37' 30"

IRON BRIDGE ROAD WATER
POLLUTION CONTROL FACILITY



T.22 S.
T.23 S.

0 1/2 1 2 MILES
0 1 2 3 4 5 6 7 8 000 FEET



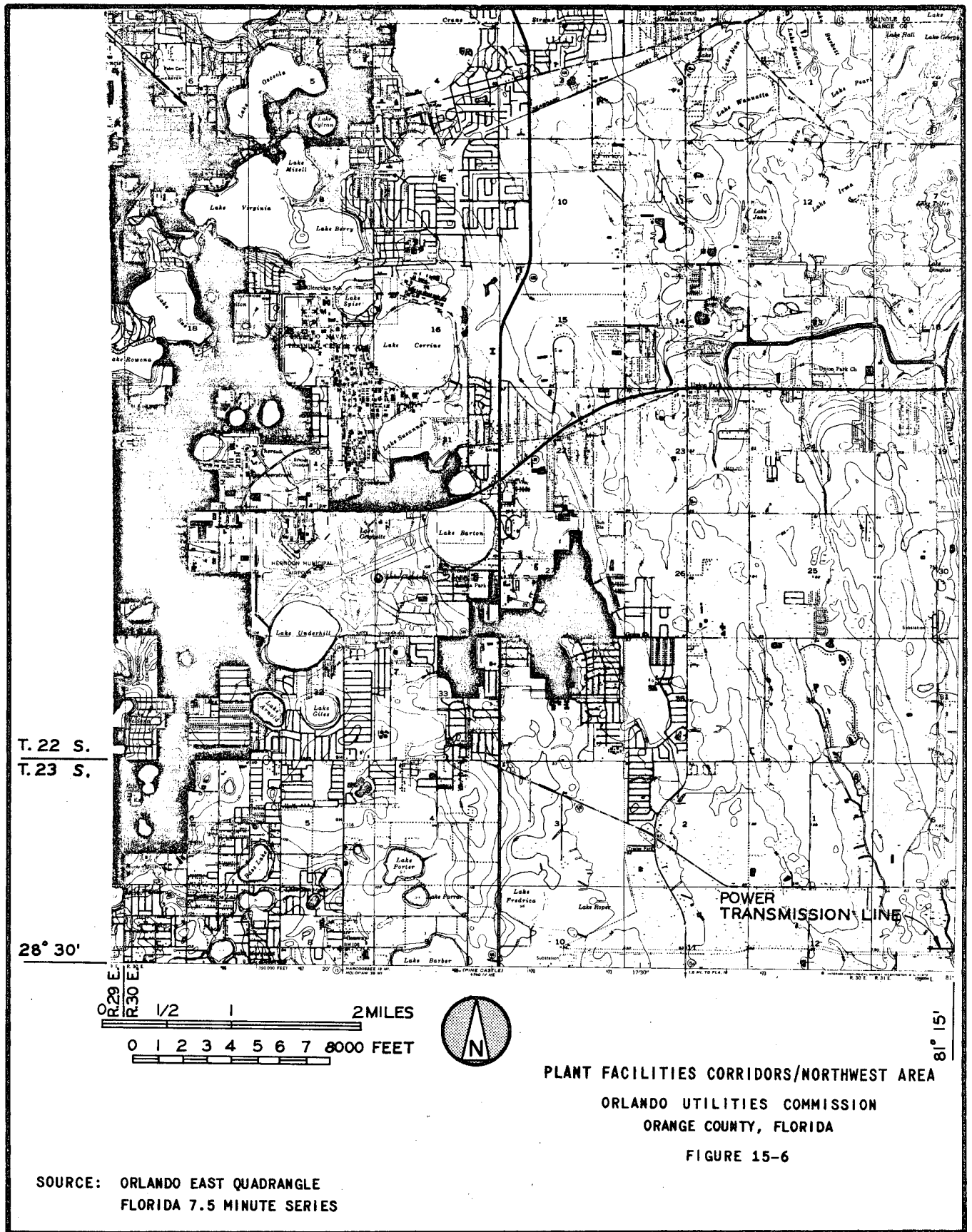
SOURCE: OVIEDO SW QUADRANGLE FLORIDA
7.5 MINUTE SERIES

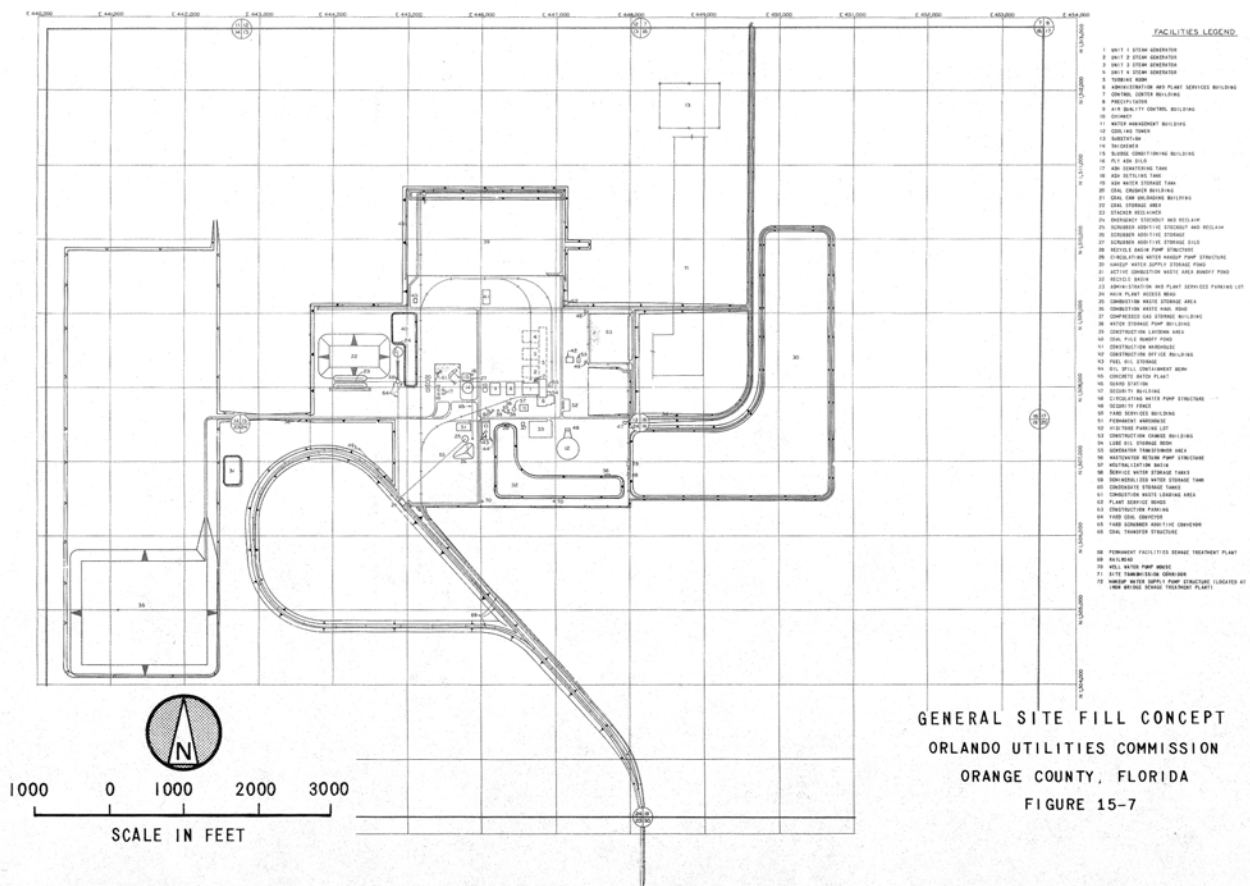
R.31 E. R.32 E.

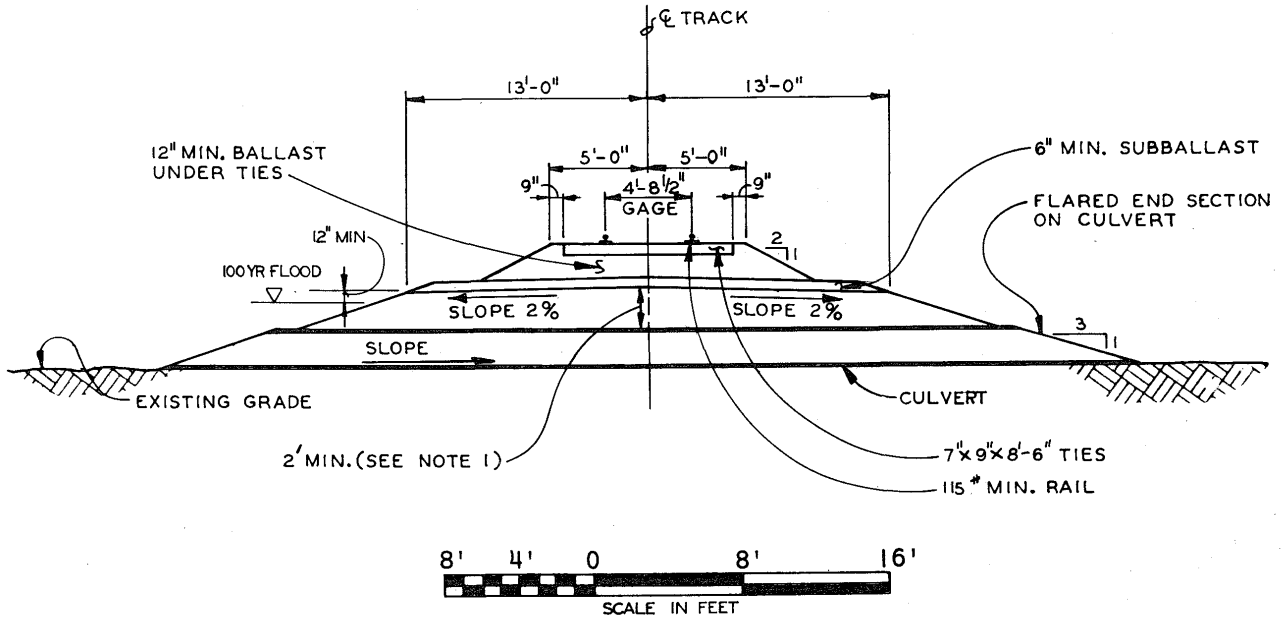
PLANT FACILITY CORRIDORS/NORTH AREA

ORLANDO UTILITIES COMMISSION
ORANGE COUNTY, FLORIDA

FIGURE 15-5







NOTES

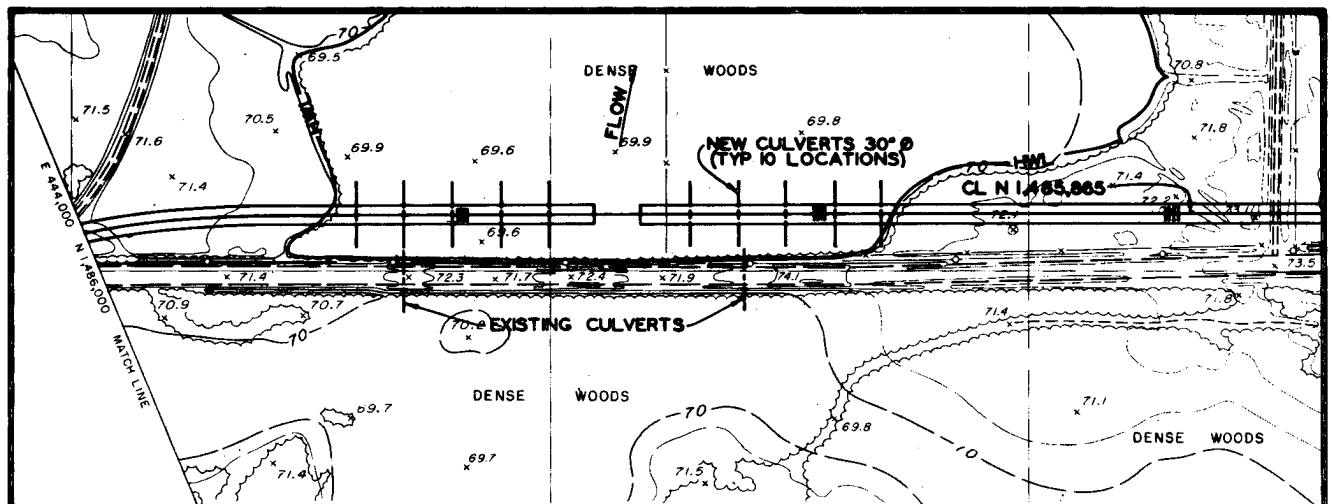
1. COVER DEPTH AS REQUIRED FOR E80 LOADING
2. CULVERT TO BE INSTALLED WHERE REQUIRED

TYPICAL RAILROAD SECTION
ORLANDO UTILITIES COMMISSION
ORANGE COUNTY, FLORIDA
FIGURE 15-8

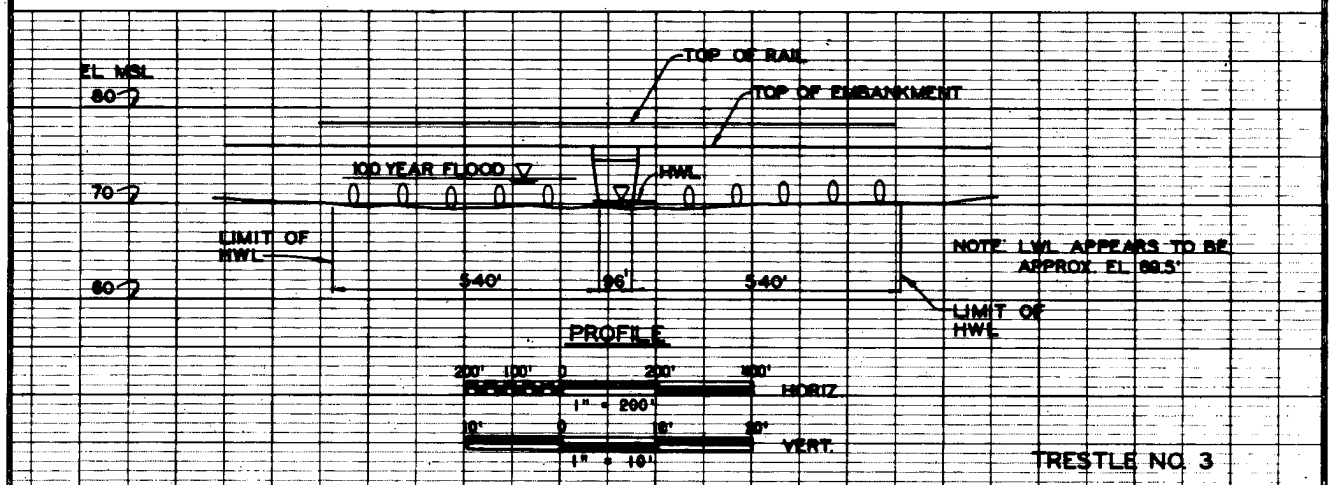
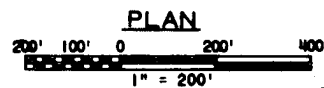
FIGURE 15-8

Image Quality

As you review the next group of images, Please note that the original documents were of poor quality.



FILL QUANTITIES
 ABOVE HWL 10,840 CY
 BELOW HWL 1,240 CY



PURPOSE: RAILROAD EMBANKMENT
AND TRESTLE

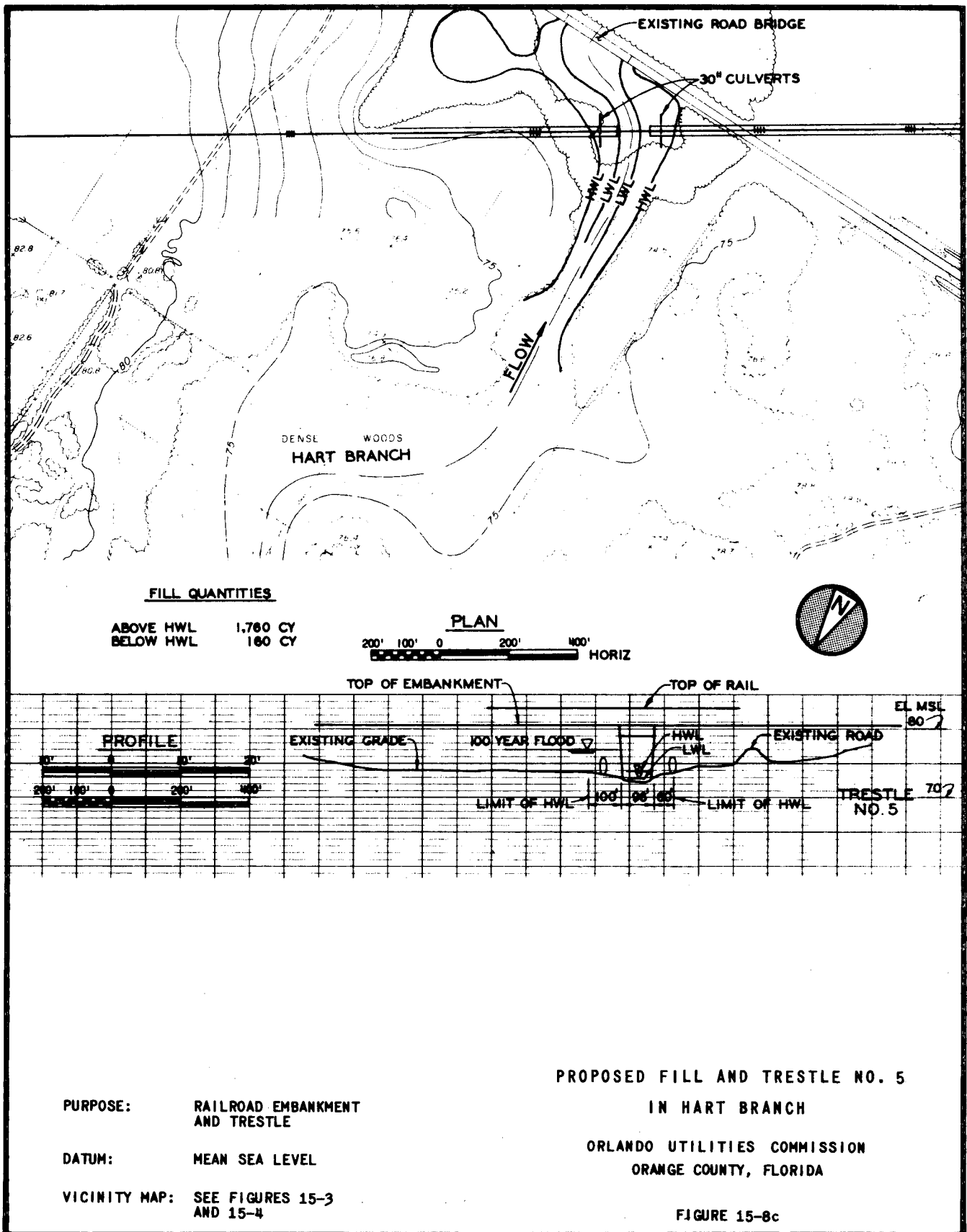
DATUM: MEAN SEA LEVEL

VICINITY MAP: SEE FIGURES 15-3
AND 15-4

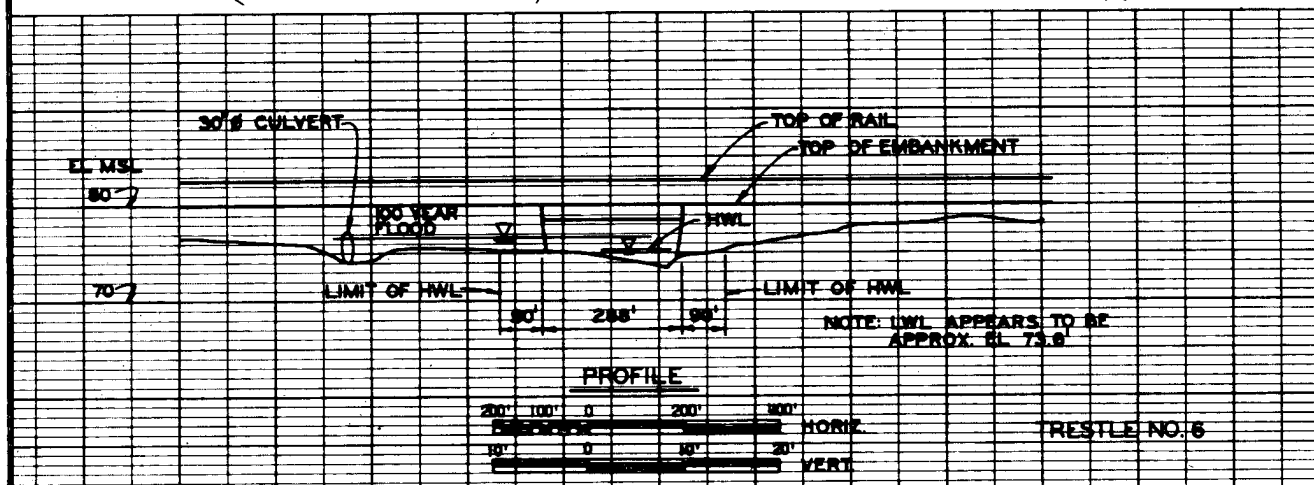
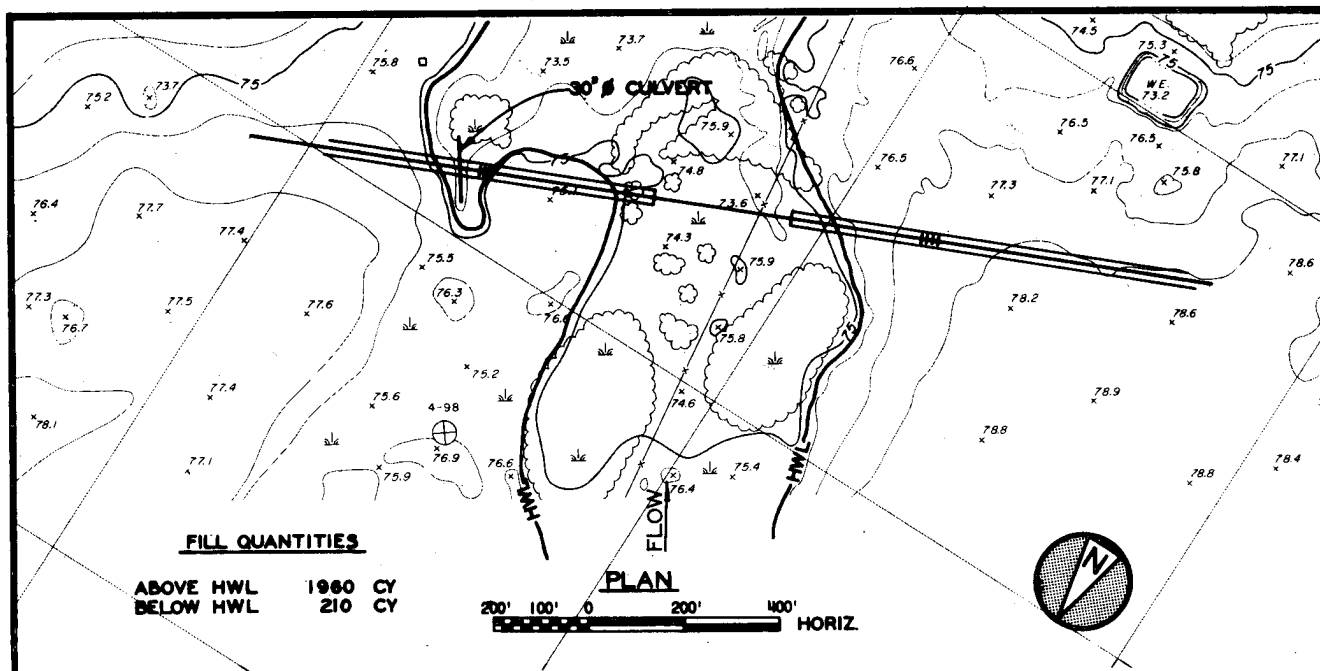
**PROPOSED FILL AND TRESTLE NO. 3
IN TRIBUTARY TO CROSBY ISLAND MARSH**

**ORLANDO UTILITIES COMMISSION
ORANGE COUNTY, FLORIDA**

FIGURE 15-8a



AMENDMENT 5
 030382



PURPOSE: RAILROAD EMBANKMENT AND TRESTLE

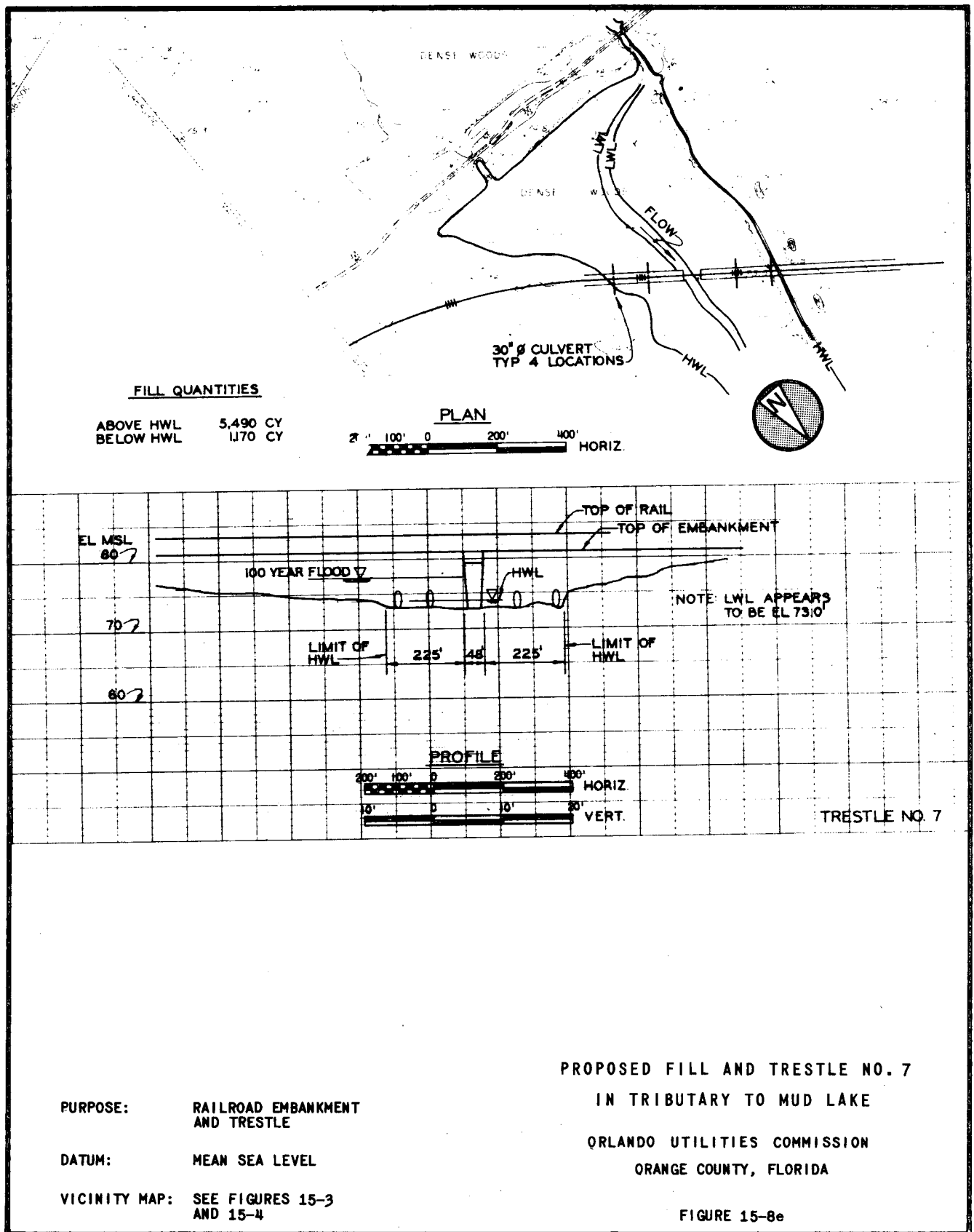
DATUM: MEAN SEA LEVEL

VICINITY MAP: SEE FIGURES 15-3 AND 15-4

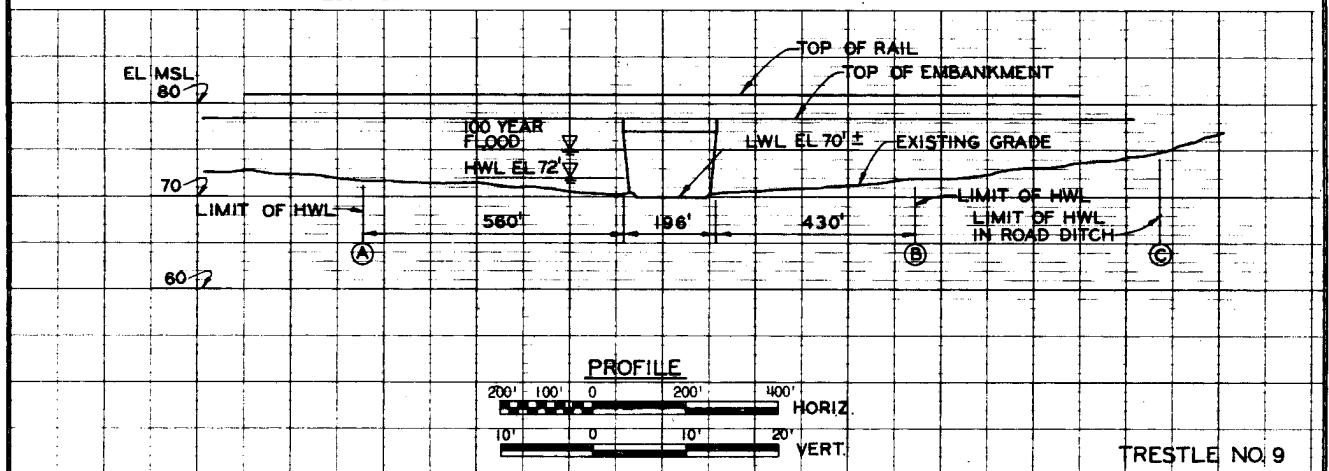
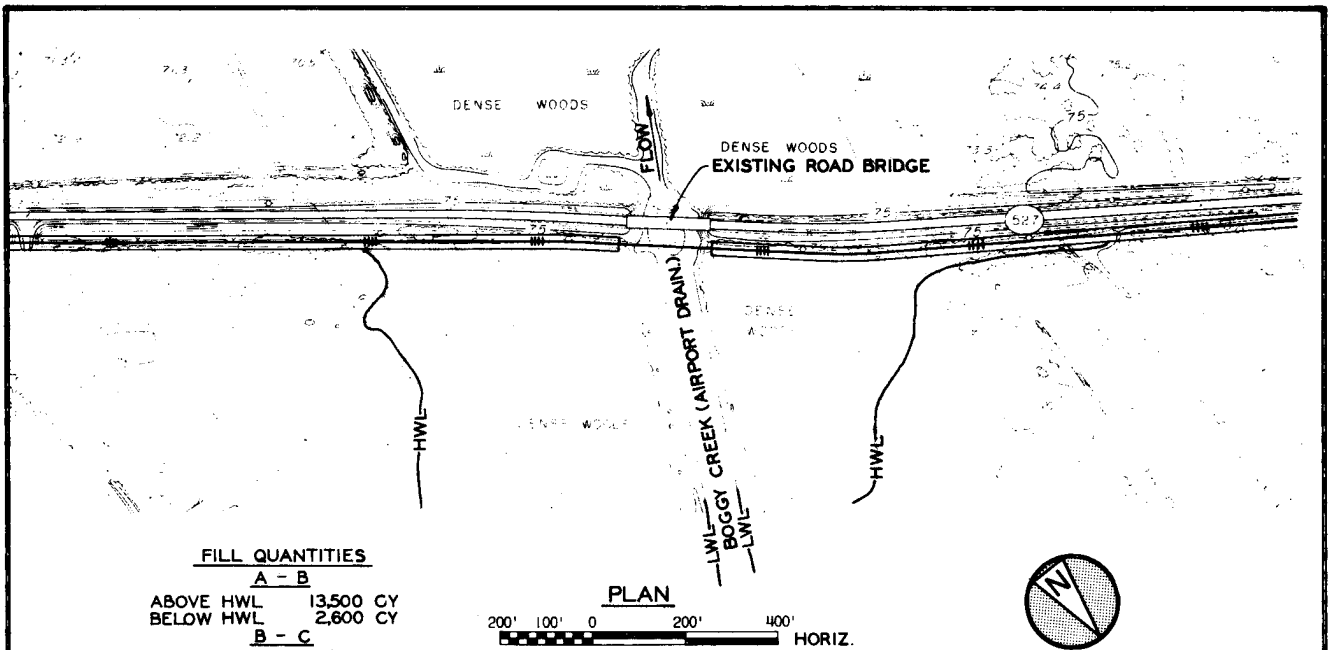
PROPOSED FILL AND TRESTLE NO. 6 IN MYRTLE BAY

ORLANDO UTILITIES COMMISSION
ORANGE COUNTY, FLORIDA

FIGURE 15-8d



AMENDMENT 5
030382



PURPOSE: RAILROAD EMBANKMENT AND TRESTLE

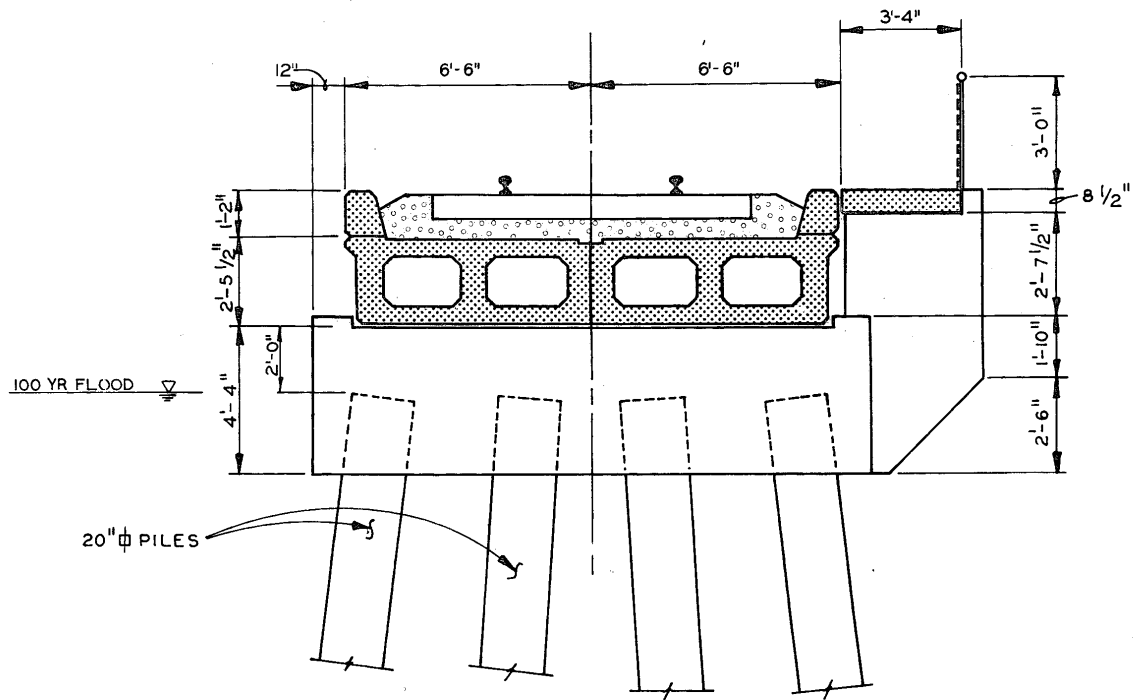
DATUM: MEAN SEA LEVEL

VICINITY MAP: SEE FIGURES 15-3 AND 15-4

PROPOSED FILL AND TRESTLE NO. 9 IN BOGGY CREEK

ORLANDO UTILITIES COMMISSION
ORANGE COUNTY, FLORIDA

FIGURE 15-8f

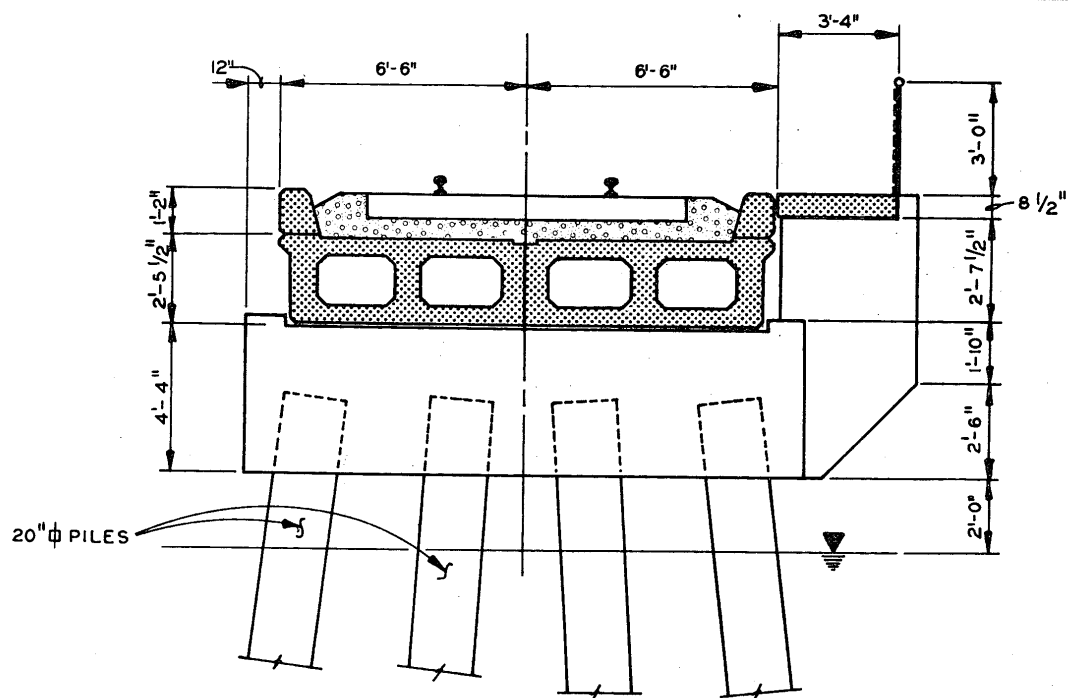


NOTE: ALL STRUCTURAL ELEMENTS
CONSTRUCTED OF PRECAST,
PRESTRESSED CONCRETE



TYPICAL TRESTLE SECTION
ORLANDO UTILITIES COMMISSION
ORANGE COUNTY, FLORIDA

FIGURE 15-9

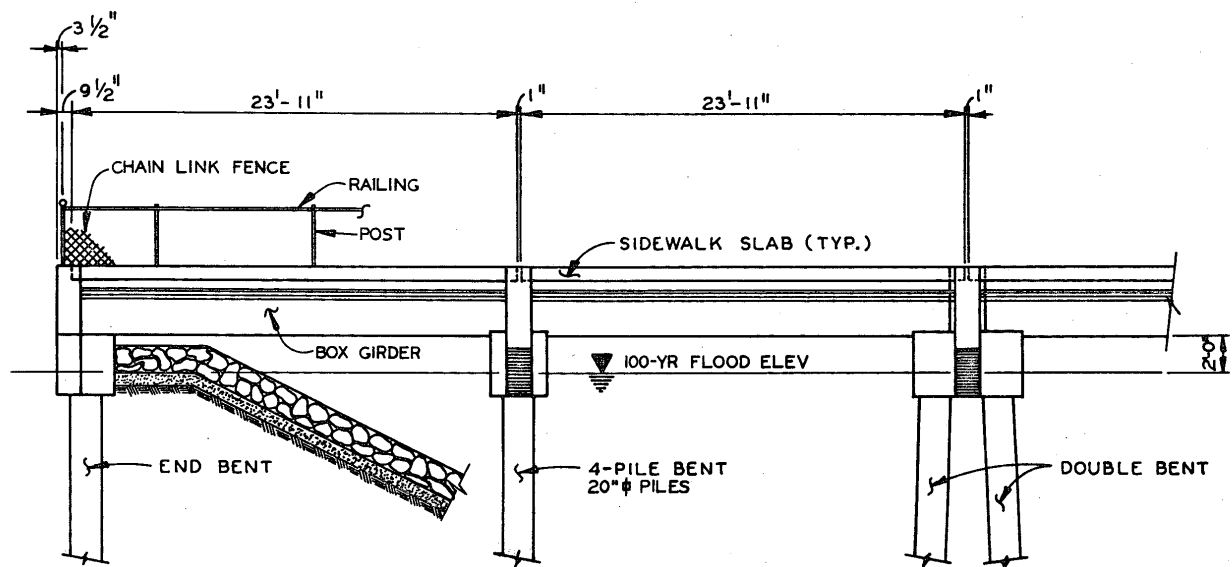


NOTE: ALL STRUCTURAL ELEMENTS
CONSTRUCTED OF PRECAST,
PRESTRESSED CONCRETE



TYPICAL TRESTLE SECTION
ORLANDO UTILITIES COMMISSION
ORANGE COUNTY, FLORIDA

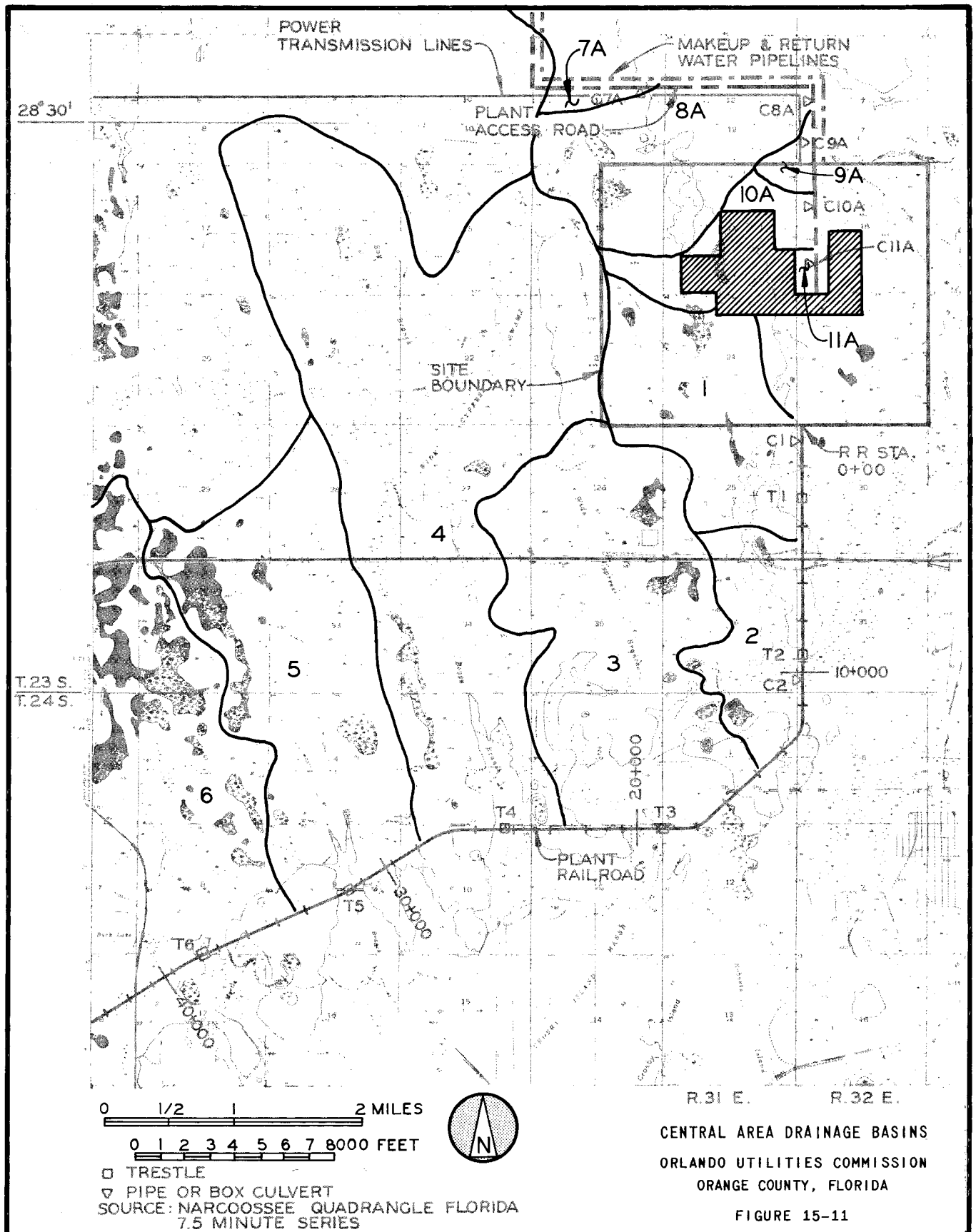
FIGURE 15-9

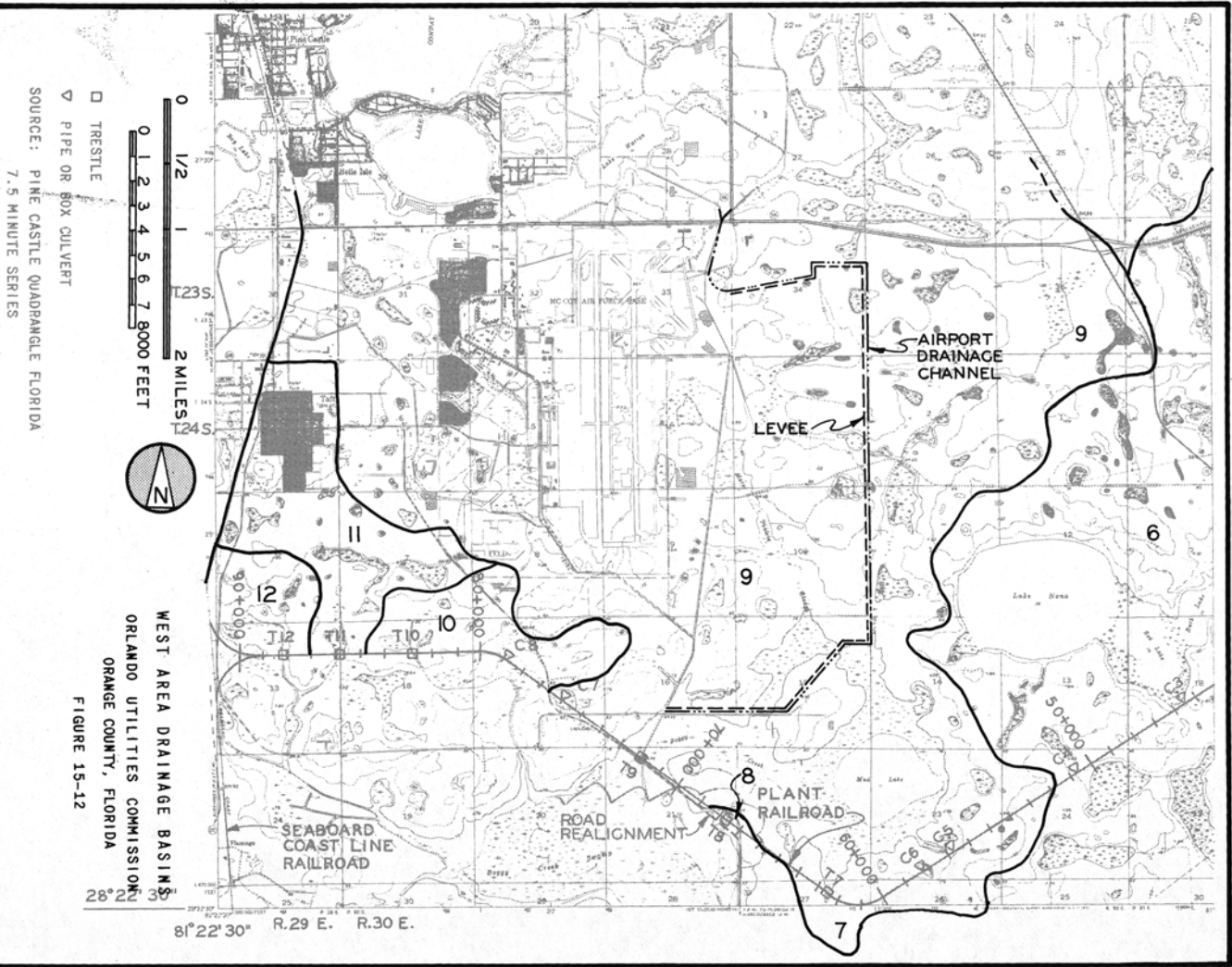


NOTE: ALL STRUCTURAL ELEMENTS
CONSTRUCTED OF PRECAST,
PRESTRESSED CONCRETE

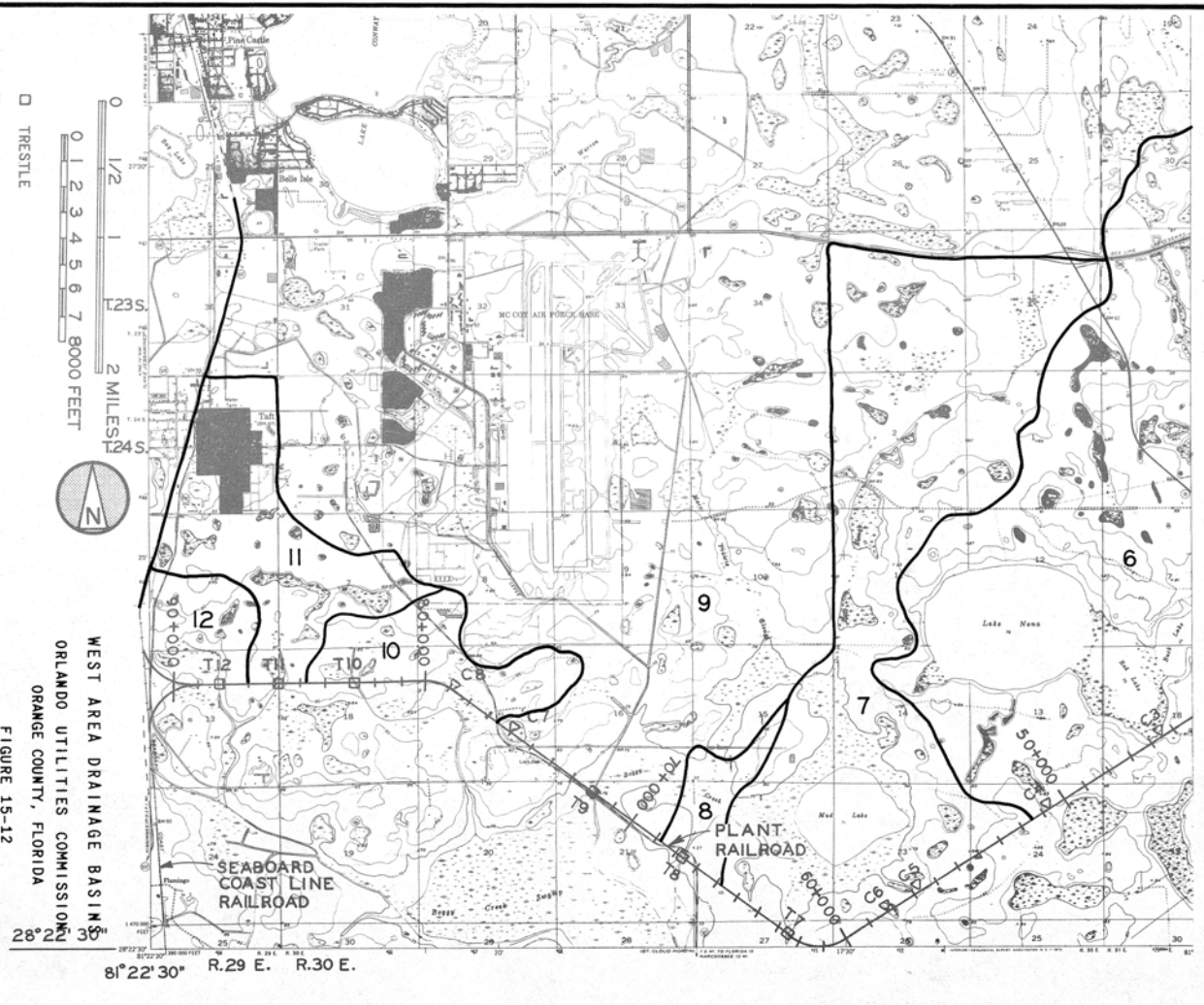


TYPICAL TRESTLE PROFILE
ORLANDO UTILITIES COMMISSION
ORANGE COUNTY, FLORIDA
FIGURE 15-10





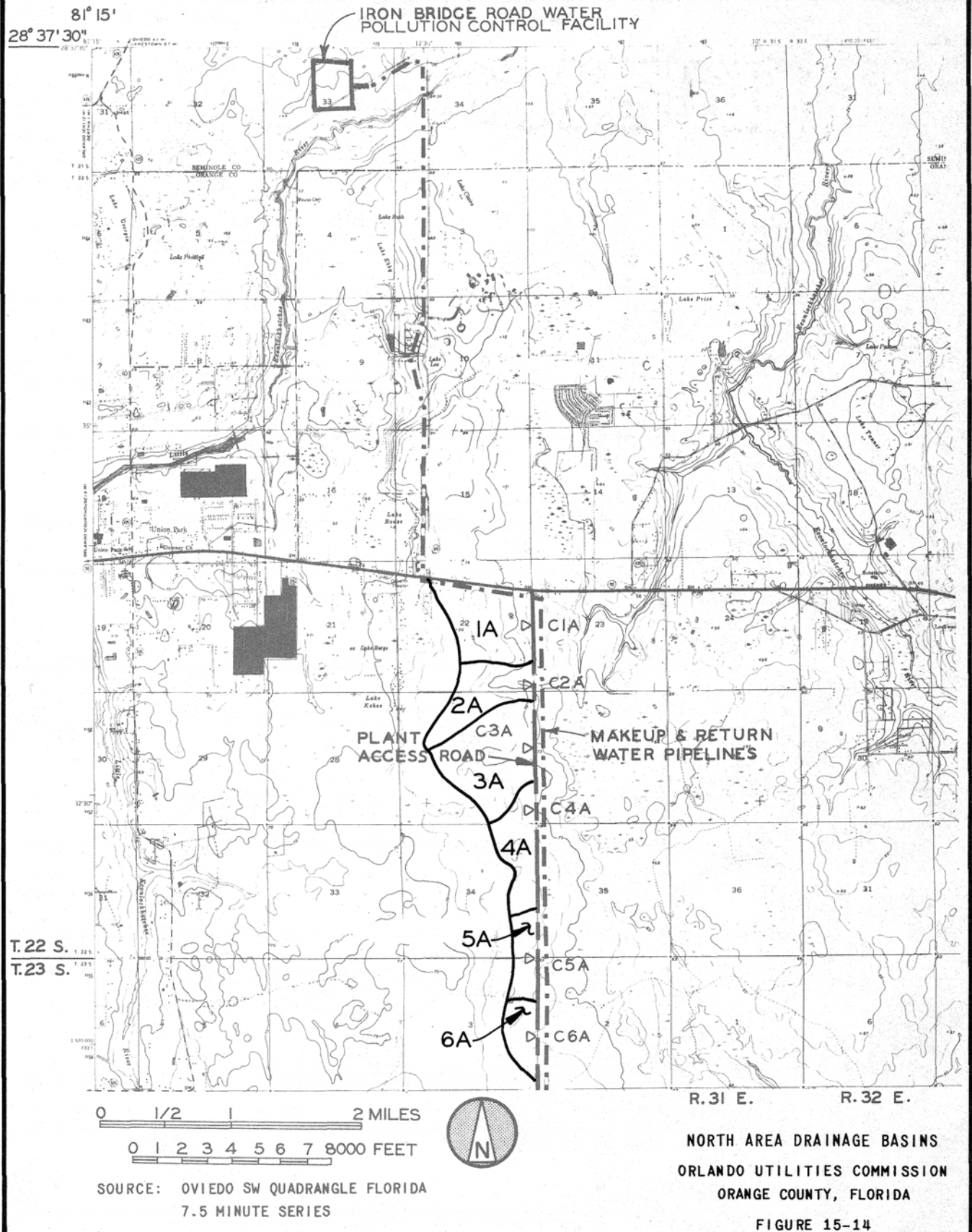
□ TRESTLE
 ▽ PIPE OR BOX CULVERT
 SOURCE: PINE CASTLE QUADRANGLE FLORIDA
 7.5 MINUTE SERIES





1. COVER DEPTH AS REQUIRED FOR H2O LOADING.

ACCESS ROAD CROSS SECTION
ORLANDO UTILITIES COMMISSION
ORANGE COUNTY, FLORIDA
FIGURE 15-13



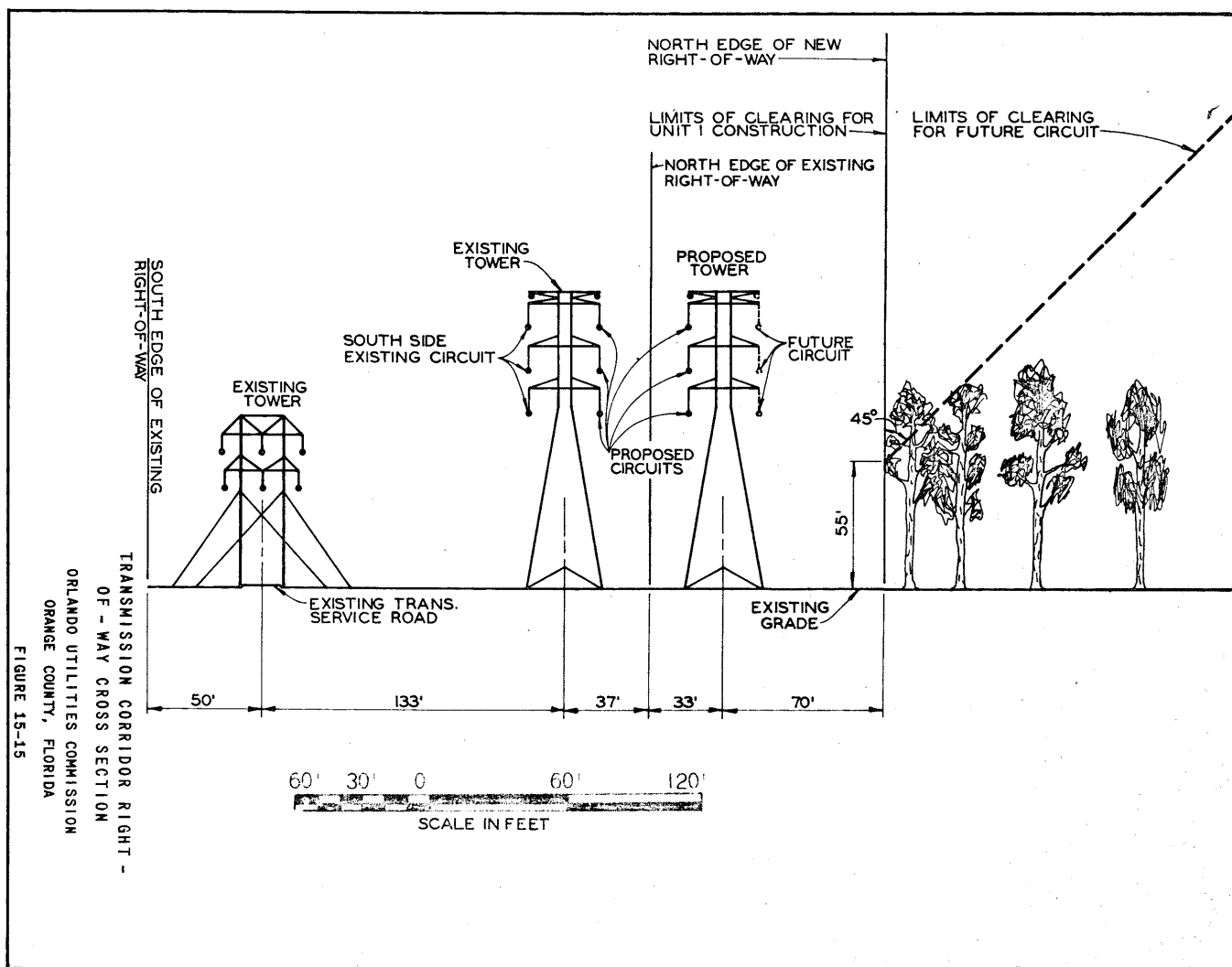


FIGURE 15-15

4.2 SPECIAL FEATURES

Vegetation cleared during site preparation will be burned. Suitable trees will be sold for pulp or other commercial uses. There will be a temporary increase in particulate concentration and combustion products because of these activities. Adverse impacts on air quality will be temporary, and vegetation and wildlife in the vicinity should not be affected. Burning will be carried out according to state regulation (Florida Administrative Code, Section 5I-2.07). Any nonhazardous chemical wastes will be transported to the adjacent Orange County Landfill for disposal in an environmentally acceptable manner.

4.3 CONSTRUCTION OF DIRECTLY ASSOCIATED TRANSMISSION FACILITIES

The new transmission lines associated with Stanton Energy Center Unit 1 have been located to minimize environmental impacts. The transmission lines will require approximately six miles or 141 acres of new right-of-way. The location of the new transmission lines is shown on Figure 3.8-2.

Except for exiting the plant site, the new transmission lines will be placed adjacent and parallel to existing transmission line facilities. The existing rights-of-way will be widened and trees cleared for new construction. The new plant access road and existing maintenance road will be utilized in the construction of the new transmission line facilities.

The primary effect on the land will be the necessary clearing. Following clearing, the land can continue to be used as pasture. A small segment of an orange grove will be crossed; however, no clearing will be done and fruit production will be unaffected. The new transmission facilities should cause little inconvenience to the adjacent landowners since the land may continue to be used as it has in the past. The planned facilities also will not change traffic patterns from those already existing.

4.3.1 Permanent Changes to Vegetation, Wildlife, and Aquatic Life

Right-of-way clearing will affect about 141 acres of existing vegetation. Terrestrial habitat provided by trees and other vegetation will be reduced along the 6 miles of expanded transmission corridor. Of course, the cleared areas will continue to be utilized by some wildlife. Deer, birds, and small mammals are often seen in these areas. The construction is not anticipated to change either the hydrology or topography of the area. Growth retardants, chemicals, biocides, sprays, etc., will not be used during construction.

4.3.2 Extent of Impact on Sensitive Areas

Wetlands are the most sensitive areas associated with the transmission line construction. Approximately 1-1/2 miles of wetlands will be traversed and approximately 25 acres of wetlands will be cleared. Since these wetland

areas have already been disturbed by the construction of the existing transmission corridor, construction impacts will be minimal. The loss of habitat provided by cleared vegetation will be the most significant impact.

There are no natural shorelines, wildlife refuges, parks, national forest areas, shelter belts, steep slopes, or wilderness areas in the vicinity of the new construction.

4.3.3 New Roads

No new roads will be built for the construction of the new transmission lines. An existing permeable surface construction road will be used for the construction of the new facilities. In addition, the new power plant access road discussed in Section 3.9, will be utilized.

4.3.4 Erosion

No significant erosion is anticipated in the construction of the new transmission line facilities. The construction techniques used will be similar to those utilized previously in Florida to construct transmission facilities. No erosion problems have resulted from such past construction projects.

4.3.5 Impact on Land Use

No changes in agricultural activities along the new facilities are anticipated. The land can continue to be used for pasture, and clearing will enhance the growth of grasses. The existing orange grove can remain in production. There are no historic, cultural, or archeologically significant areas along the new transmission line right-of-way.

4.3.6 Mitigative Measures

Clearing and construction performed on the new right-of-way will result in minimum impact on aquatic life or wildlife. Construction waste, including concrete, will be properly collected and transported to disposal sites. Streams will be protected from contamination by construction debris. Felled trees will be trimmed of their branches and cut into logs. Logs

will be stacked at the edge of the right-of-way. Underbrush, tree limbs, and other vegetation will be windrowed and used as mulch. This procedure will enhance environmental benefits by increasing the number of nesting and foraging sites for small animals, control of soil erosion, returning nutrients to the soil, and building and binding top soil because of slow decomposition of organics in place.

No rare or endangered species will likely be impacted by the transmission line construction. No special landmarks or sensitive areas, other than wetlands, have been identified.

4.4 RESOURCES COMMITTED

Some resources will be irreversibly and irretrievably committed as a result of the construction and operation of the Stanton Energy Center. The resources either will be expended or altered so that reuse in other applications will not be feasible.

4.4.1 Land

Approximately 960 acres of land will be cleared for the construction of Unit 1. A total of about 125 acres of wetlands will be included in the land required. Habitat on this land will be altered to such an extent that it will be irretrievably lost. A description of the terrestrial habitat is given in Section 2.7. | 5

The railroad corridor from the plant site to the Seaboard Coast Line mainline will convert about 18 miles of land from its present uses. Approximately 2.5 miles of wetlands will be altered by the railroad corridor. Trestles and culverts will be used to preserve the hydrological characteristics of the wetlands, but clearing of trees and vegetation within the corridor will be necessary. It is unlikely that the land used for the construction of the railroad will be returned to its original condition following the useful life of the Stanton Energy Center.

It is not probable that the 8 miles of access road to the plant site will be converted to the present land uses after the Stanton Energy Center is no longer operational.

4.4.2 Vegetation and Cavity Trees

Approximately 960 acres of land on the plant site will be cleared of all vegetative cover. In addition, 18 miles of vegetation within the railroad corridor will be cleared and maintained, and about 8 miles will be cleared for the access road. Vegetation production will be irretrievably lost unless structures and facilities are removed at the end of the plant life. Natural revegetation will require varying lengths of time depending on the erosiveness of the soil and other factors. | 5

As discussed in Subsection 4.4.2, clearing of the site will result in the loss of one active cavity tree utilized by the red-cockaded woodpecker, an endangered species. In addition, three cavity trees with start holes and one abandoned cavity tree also will be removed. This loss represents 8 per cent of all available cavity trees on the site, including 4 per cent of all active cavity trees and 11 per cent of all start hole or abandoned cavity trees. The site arrangement of the plant facilities was adjusted so that only one active cavity tree will be lost. The removal of cavity trees will be irreversible.

Approximately 450 acres of red-cockaded woodpecker foraging habitat will be cleared during the construction of the Stanton Energy Center. It is unlikely that this habitat will be completely reestablished following the life of the generating facility.

4.4.3 Materials

The estimated quantities of construction materials committed to the Stanton Energy Center are listed in Table 4.4-1. Recovery of these materials at the end of the 30 year plant life will depend on their relative value at plant decommissioning. Resource recovery may not be economically practical if recovery operations require expenditures of energy and materials exceeding the value of the reclaimed resource.

TABLE 4.4-1. COMMITMENT OF CONSTRUCTION MATERIALS FOR THE STANTON
GENERATING STATION--UNIT 1

<u>Material</u>	<u>Quantity</u>
Concrete	60,000 cubic yards
Steel	
Structural	13,000 tons
Rail	5,500 tons
Miscellaneous Metals	1,100 tons
Wood	500,000 board-feet

4.5 CONSTRUCTION OF OTHER ASSOCIATED FACILITIES

4.5.1 Railroad

Approximately 18 miles of railroad will be constructed between the Stanton Energy Center and the Seaboard Coast Line northwest of the site. About 2.5 miles of wetlands will be affected by the railroad construction. A description of the railroad corridor including the wetland areas is given in Subsection 2.7.7.

Trestles will be constructed to span larger wetland areas within the corridor and culverts will be used in other wetland sections to maintain the water flow. The locations of the trestles and culverts together with the details of their design are given in Section 4.1.

The wetlands along the railroad corridor are the most sensitive environmental areas. The water flow between portions of the wetlands should not be affected by the railroad. All trestles and culverts will be sized based on the 100-year peak discharge from the appropriate drainage basin.

It will be necessary to clear trees and other vegetation through wetland areas. The removal of this vegetation canopy will permit more light to reach the water which will stimulate the growth of phytoplankton and various aquatic plant species. The biological composition of the cleared portion of the wetland will be altered. The changes will not necessarily be adverse, but different from the present biological state.

The removal of trees and vegetation from the wetlands will reduce the value of the areas as habitat for various birds and other animals. The 2.5 miles of wetlands that will be affected by the railroad, however, represents only a small percentage of the total amount of wetland habitat in the area.

During construction activities in the wetland areas, there will be an increase in the turbidity of the water. The increased turbidity should be temporary, ending when construction is completed.

4.5.2 Pipeline

Two parallel pipelines approximately 4 miles long will be constructed from the Stanton Energy Center to the new Orange County Easterly Subregional Wastewater Treatment Plant. The pipelines will be entirely within the right-of-way of the new county road which will have been already cleared.

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The pipelines will be buried along the entire 4 mile corridor, but after the pipelines are installed, the construction area will be returned to its original condition. The right-of-way in which the pipeline will run will already have been disturbed.

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During construction, there may be a temporary increase in water turbidity. The pipe will be at the bottom of a trench; therefore, the water flow will not be affected. Details of the general design of the pipelines are given in Appendix 4.1A.

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4.5.3 Access Road

Access road from the Stanton Energy Center to Highway 50 will be provided by a new Orange County highway. The road will be approximately 8 miles long and the right-of-way for the road will also be utilized for the pipeline which will extend from the Stanton Energy Center to the Orange County Plant.

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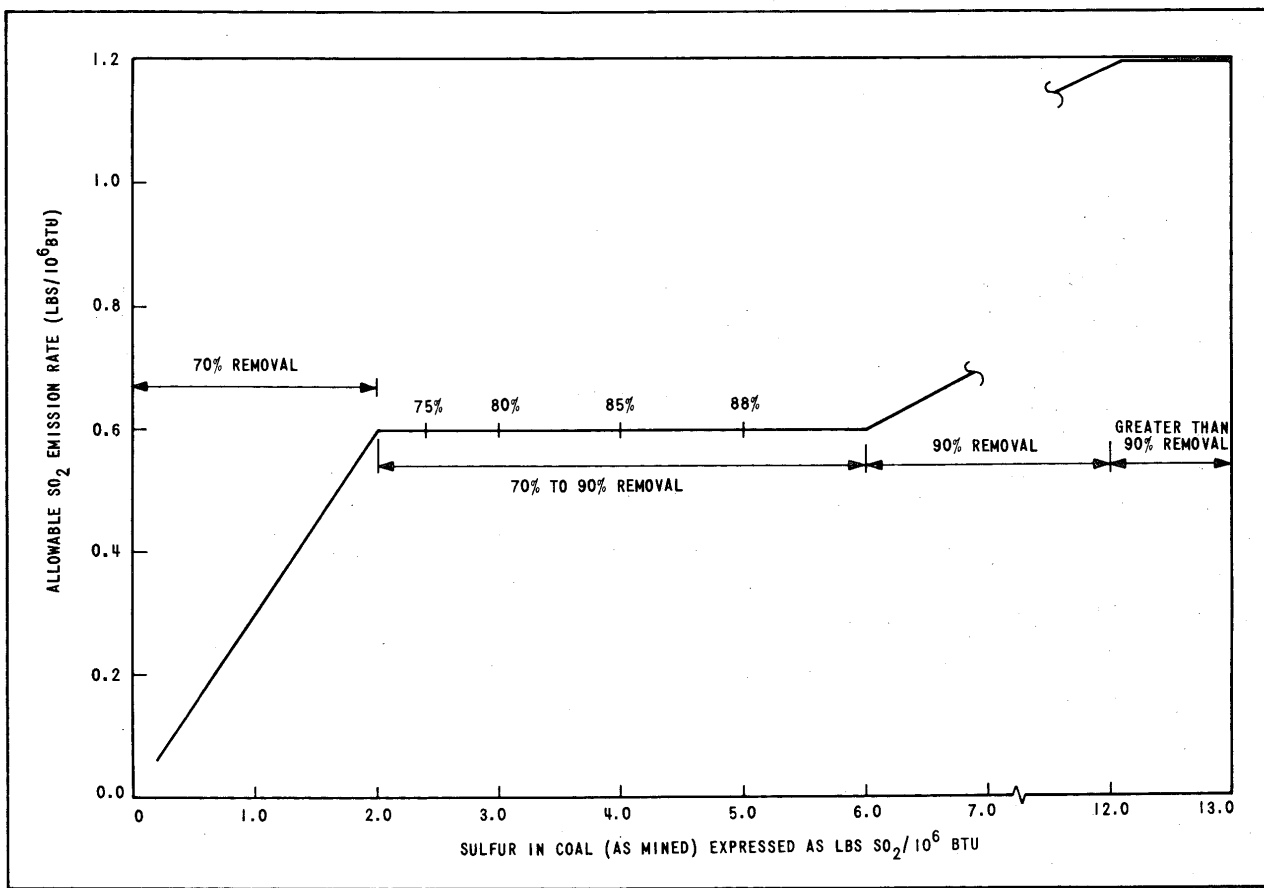


FIGURE 3.7B-1. ALLOWABLE EMISSION RATES
SO₂ EMITTED VS SULFUR IN COAL

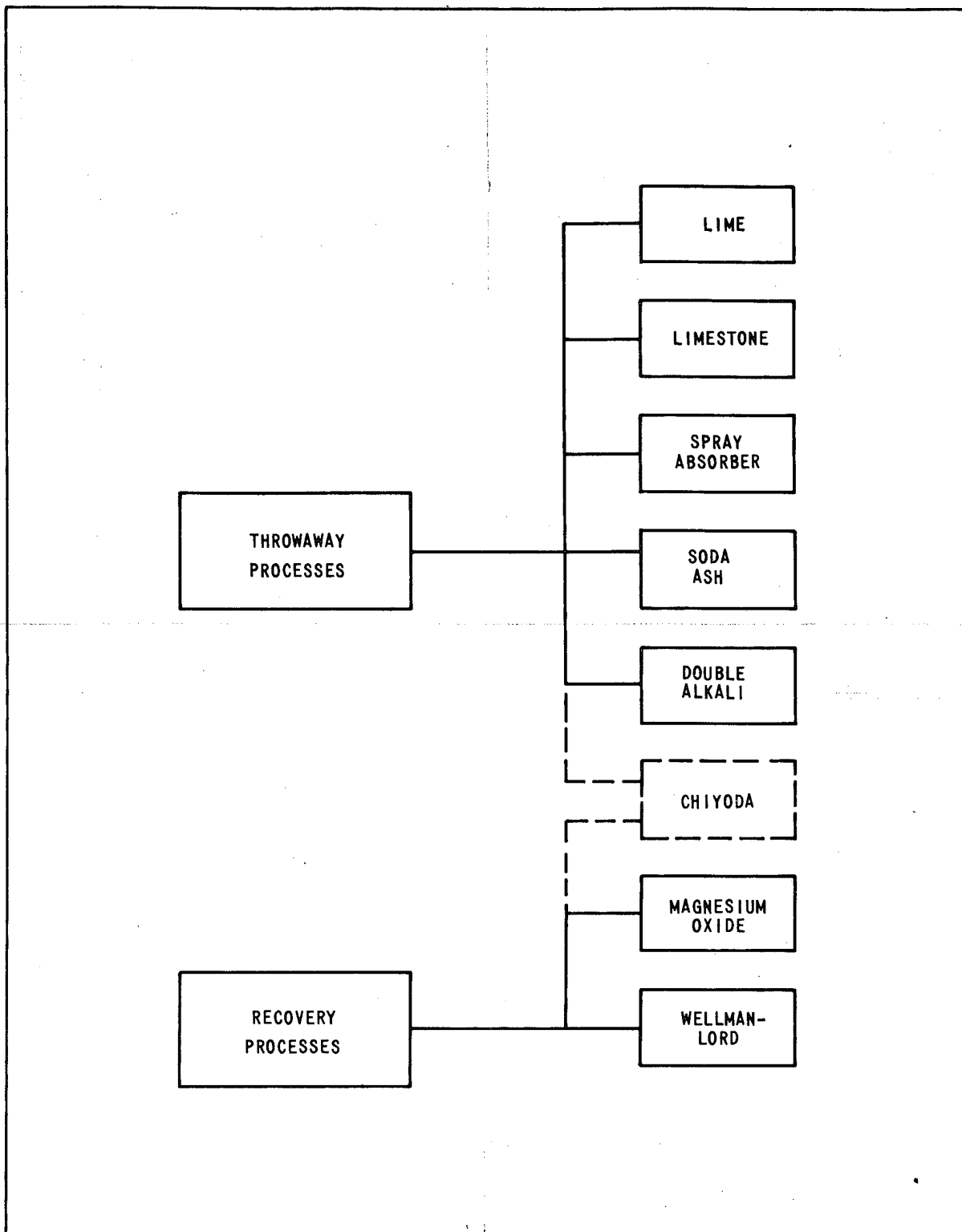


FIGURE 3.7B-2. DESULFURIZATION PROCESSES

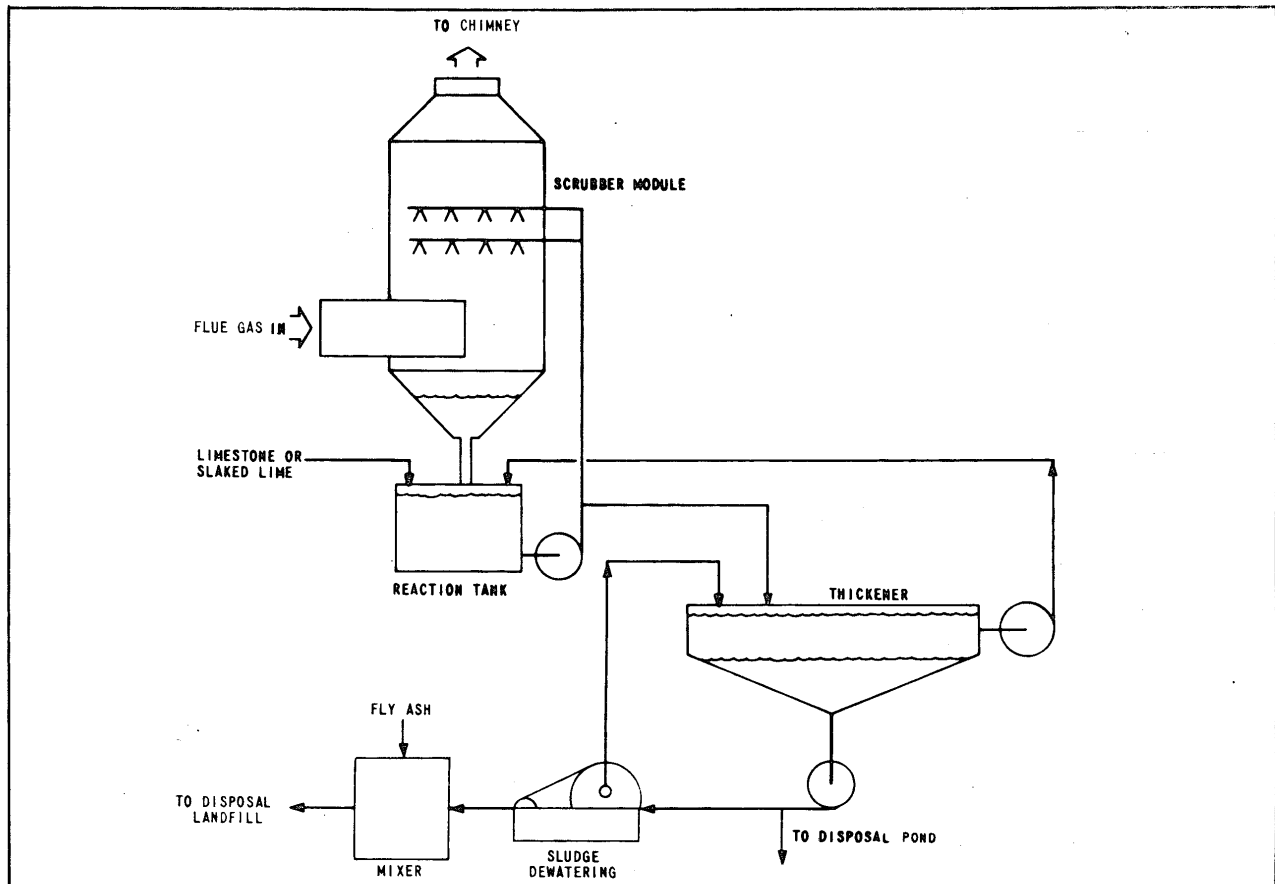


FIGURE 3.7B-3. LIME OR LIMESTONE PROCESS

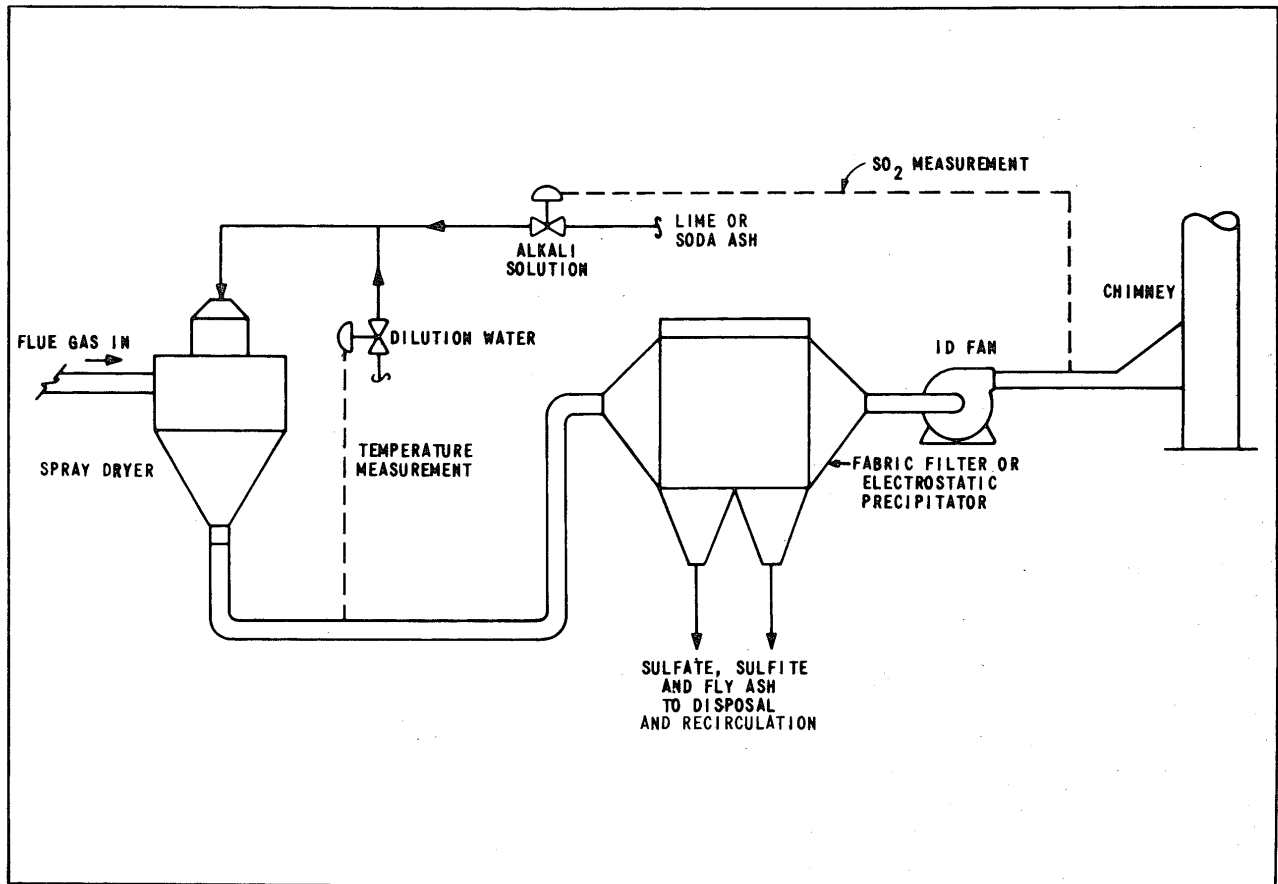


FIGURE 3.7B-4. SPRAY ABSORBER PROCESS

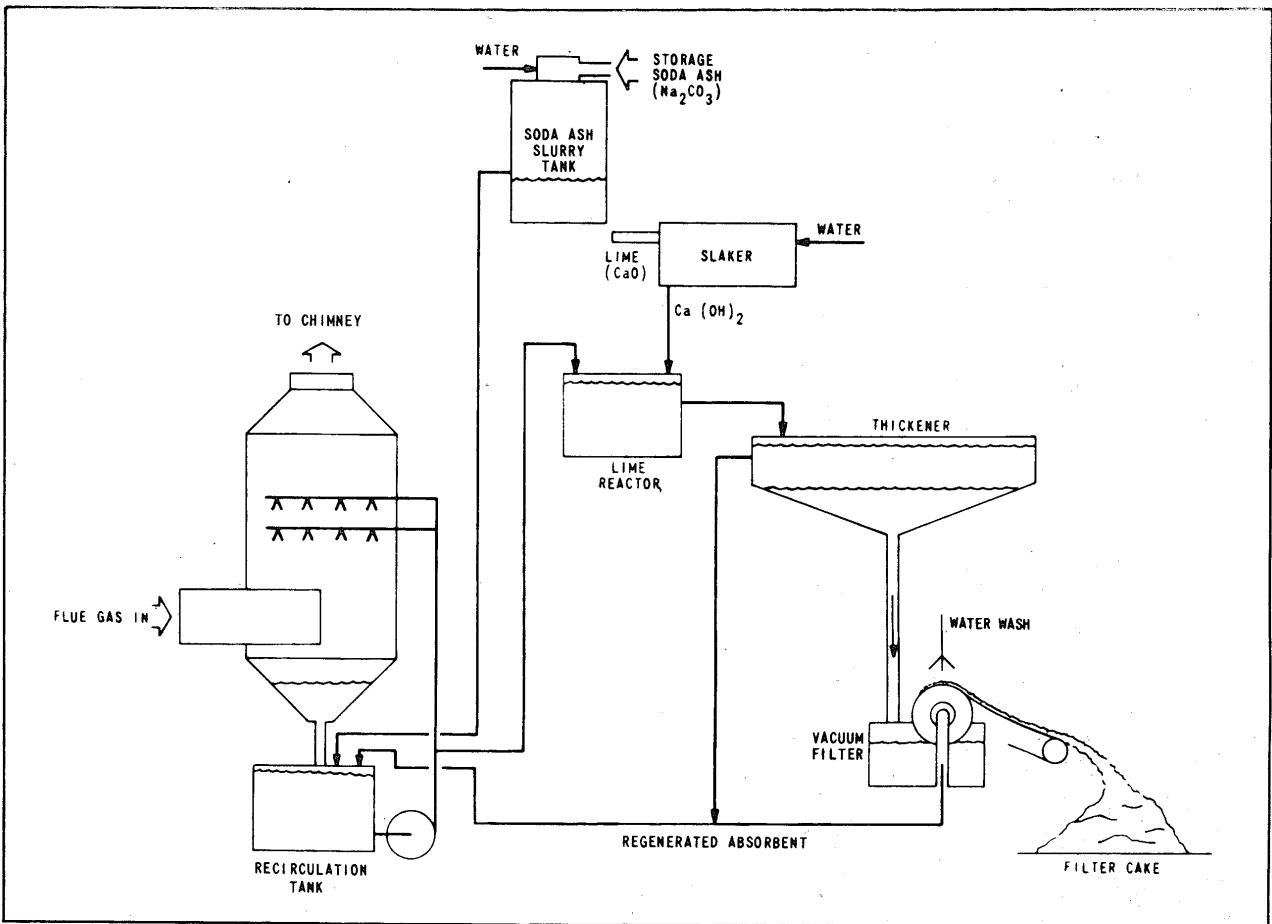


FIGURE 3.7B-5. DOUBLE-ALKALI PROCESS

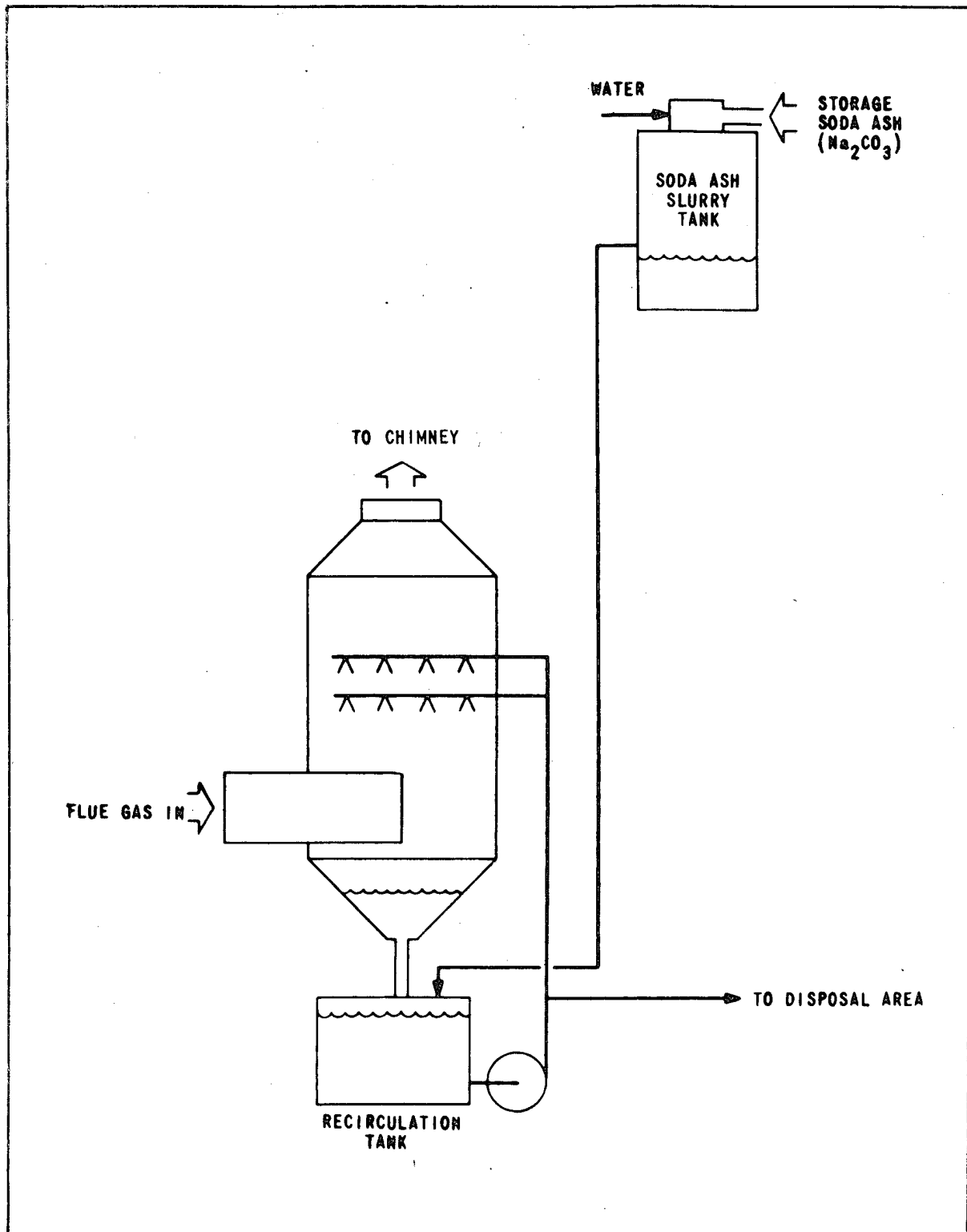


FIGURE 3.7B-6. SODA ASH PROCESS

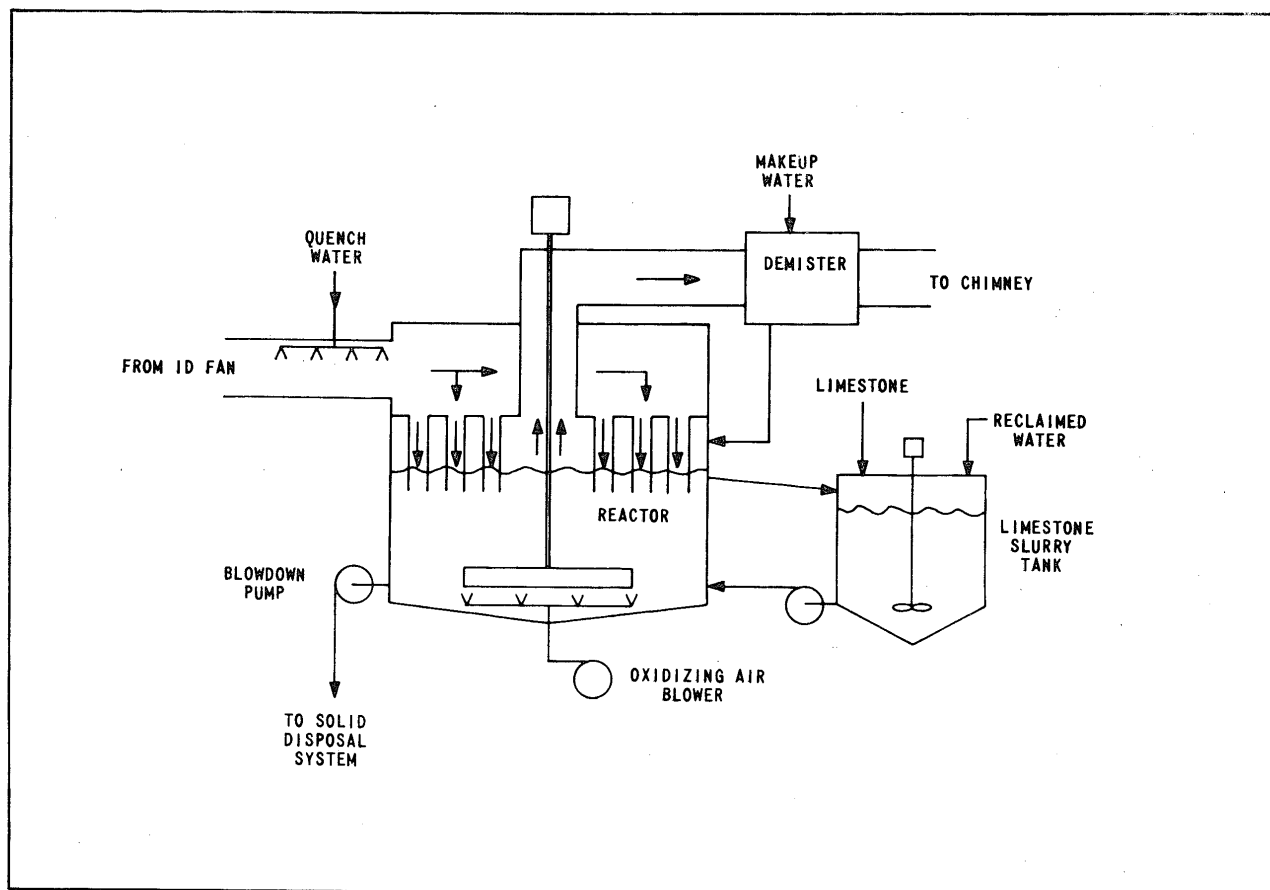


FIGURE 3.7B-7. FLUE GAS SPARGING (CHIYODA) PROCESS

3.8 DIRECTLY ASSOCIATED TRANSMISSION LINES

3.8.1 Route and Size

The existing Orlando Utilities Commission 115 and 230 kV transmission network is shown on Figure 3.8-1. The transmission lines associated with Stanton Energy Center Unit 1 will be routed north from the proposed power plant substation to the existing Orlando Utilities Commission Pershing Substation (No. 6) to Indian River Substation (No. 7) transmission line right-of-way. The Stanton Energy Center Substation (No. 16) will be located in Section 18, T23S, R32E as shown on Figure 3.8-2. A transmission line corridor approximately one half mile long and 590 feet wide will be required to connect the Stanton Energy Center Substation to the existing Pershing to Indian River line right-of-way in Section 7, T23S, R32E.

Existing transmission lines located on the Pershing to Indian River transmission line right-of-way from Pershing Substation east (approximately 3 miles) to Section 7, T23S, R31E are as follows.

- (1) Pershing to Rio Pinar - 230 kV (north circuit on double circuit lattice steel towers).
- (2) Pershing to Indian River - 230 kV (south circuit on double circuit lattice steel towers).
- (3) Pershing to Indian River - 115 kV (double circuit on guyed wood H-frame structures).

Existing transmission lines located on the Pershing to Indian River transmission line right-of-way in the vicinity of the proposed Stanton Energy Center are as follows.

- (1) Pershing to Indian River - 230 kV (south circuit on double circuit lattice steel towers).
- (2) Pershing to Indian River - 115 kV (double circuit on guyed wood H-frame structures).

The existing Pershing to Indian River 230 kV transmission line will be looped into the proposed Stanton Energy Center Substation resulting in the following directly associated transmission lines.

- (1) Stanton Energy Center to Indian River - 230 kV (existing south circuit on double circuit lattice steel towers).
- (2) Stanton Energy Center to Pershing - 230 kV (existing south circuit on double circuit lattice steel towers).

A new 103 foot wide right-of-way contiguous to the north edge of the existing Pershing to Indian River right-of-way will be required from Section 7, T23S, R32E to its intersection with the existing Florida Power Corporation Rio Pinar line right-of-way in Section 7, T23S, R31E (approximately 5 1/2 miles). The Stanton Energy Center to Rio Pinar line will exit the proposed power plant substation to the north for a distance of approximately one half mile at which point it will be routed west to the existing Florida Power Corporation Rio Pinar line right-of-way. This line will be the south 230 kV circuit on new galvanized lattice steel towers.

With the installation of the Stanton Energy Center to Rio Pinar line as stated above, the existing Pershing to Rio Pinar 230 kV line is not required. The existing Pershing to Rio Pinar line will be extended, utilizing the open space on the north side of the existing 230 kV double circuit tower from a point in Section 7, T23S, R31E to the proposed Stanton Energy Center Substation. The only new right-of-way required for this circuit will be that connecting the Stanton Energy Center Substation to the Pershing-Indian River line right-of-way.

An elevation of the transmission corridor, looking north, as it leaves the Stanton Energy Center Substation is shown on Figure 3.8-3. An elevation of the transmission corridor, looking west, at a location north of the Stanton Energy Center site, is shown on Figure 3.8-4. An elevation of the transmission corridor, looking west, just east of the intersection of the Pershing to Indian River transmission line right-of-way and the Rio Pinar transmission line right-of-way is shown on Figure 3.8-5.

The maintenance road in the existing right-of-way will be used to maintain the new transmission lines. The plant access road and the makeup water and return water pipelines will parallel the transmission lines from a point where they exit the site and to a point 2 miles west along the existing Pershing to Indian River corridor as shown on Figures 3.8-2 and 3.8-4.

3.8.2 Land Use Impact

The land adjacent to the existing transmission corridor which will be widened, consists mostly of native or improved pasture and wetlands. Two residences exist along the south side of the transmission right-of-way. Since the expansion of the right-of-way will be to the north, those residences will not be affected. One orange grove borders the north side of the corridor.

The transmission corridor consists of three basic sections. The first section is the half mile portion exiting north from the site. This section will be approximately 590 feet wide. No wetlands exist in this area. Only scattered, sparse trees exist in this corridor and these trees will be removed.

The second section of the transmission corridor is the 2 miles paralleling the existing transmission corridor and containing the new transmission towers and the plant access road, water supply pipeline and return water pipeline. This corridor will consist of the 220 foot existing right-of-way plus a new right-of-way 260 feet wide which will be contiguous with the northern edge of the existing right-of-way. This new right-of-way will cross approximately 2,000 feet of wetlands. The wetland trees as well as other scattered trees in the corridor will be cleared.

The third section of the transmission corridor is the 3.5 miles from the point where the plant access road and pipelines turn north to the intersection of the Florida Power Corporation Rio Pinar transmission line with the Pershing to Indian River transmission corridor. This corridor will consist of the 220 foot existing right-of-way plus a new 103 foot wide

right-of-way which will be contiguous with the northern edge of the existing right-of-way. This new right-of-way will cross approximately 5,700 feet of wetlands, the Little Econlockhatchee River and an orange grove. The orange grove and Little Econlockhatchee River will be spanned by the transmission lines. The trees in the wetlands as well as other scattered trees will be cleared.

3.8.3 Beneficial Uses

A portion of the transmission corridor will have multiple uses. This portion is the one half mile long exit corridor going north from the site and the 2 mile length of corridor immediately west of the exit corridor. This portion of the corridor will be parallel to the plant access road and the makeup water supply and return water pipelines. The remaining 3-1/2 miles of new transmission corridor will be used for transmission lines only.

3.8.4 Visibility

The transmission corridor is located approximately 4 miles south of Cheney Highway and 3.5 miles north of the Bee Line Expressway. The new transmission lines will not be visible from Cheney Highway and rarely visible, at a long distance, from the Bee Line Expressway.

The only other road that is frequently traveled and passes under the transmission lines is the access road to the sanitary landfill adjacent to the Stanton Energy Center Site.

3.8.5 Associated Transmission Structures

The new transmission lines will be supported on the existing galvanized steel transmission towers and on new galvanized steel transmission towers along the existing corridor. The new corridor, which exits the site to the north, will utilize new galvanized lattice steel structures as shown on Figure 3.8-3. The steel towers will be approximately 110 feet tall with the tower base dimensions being approximately 22 feet by 30 feet. The average horizontal span between towers will be approximately 1,000 feet. Front and side elevations of a typical tower are shown on Figure 3.8-6.

The only new substation required will be the Stanton Energy Center Substation located onsite. The substation will be a low profile, rigid bus design utilizing galvanized steel structures. The electrical arrangement will consist of a breaker-and-a-half scheme. Initial development will consist of an area approximately 400 feet by 400 feet. The ultimate substation development will be approximately 600 feet by 800 feet. The ultimate substation area will be fenced and surfaced with crushed stone during Unit 1 construction. A side elevation of the proposed Stanton Energy Center Substation is shown on Figure 3.8-7.

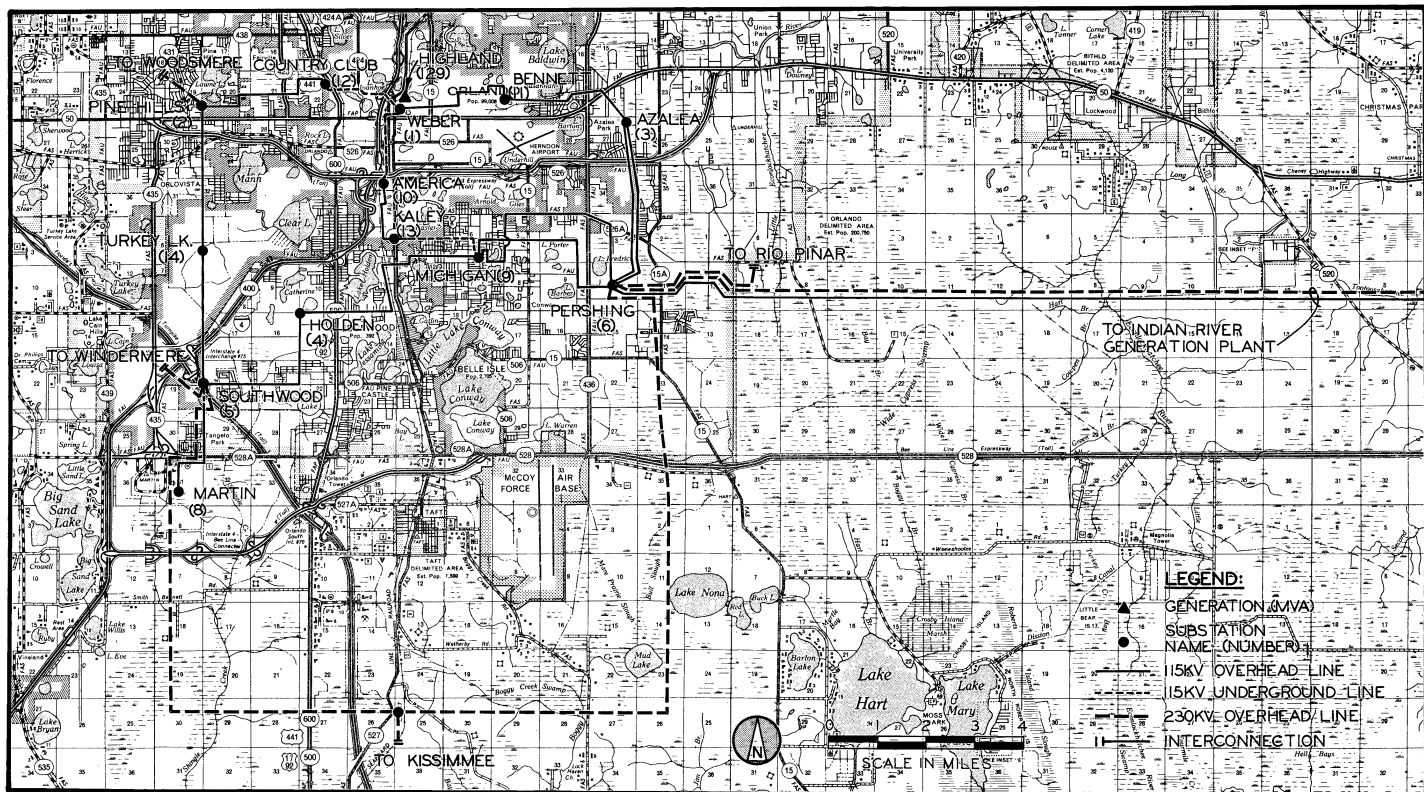


FIGURE 3.8-1. EXISTING OUC ELECTRIC TRANSMISSION NETWORK

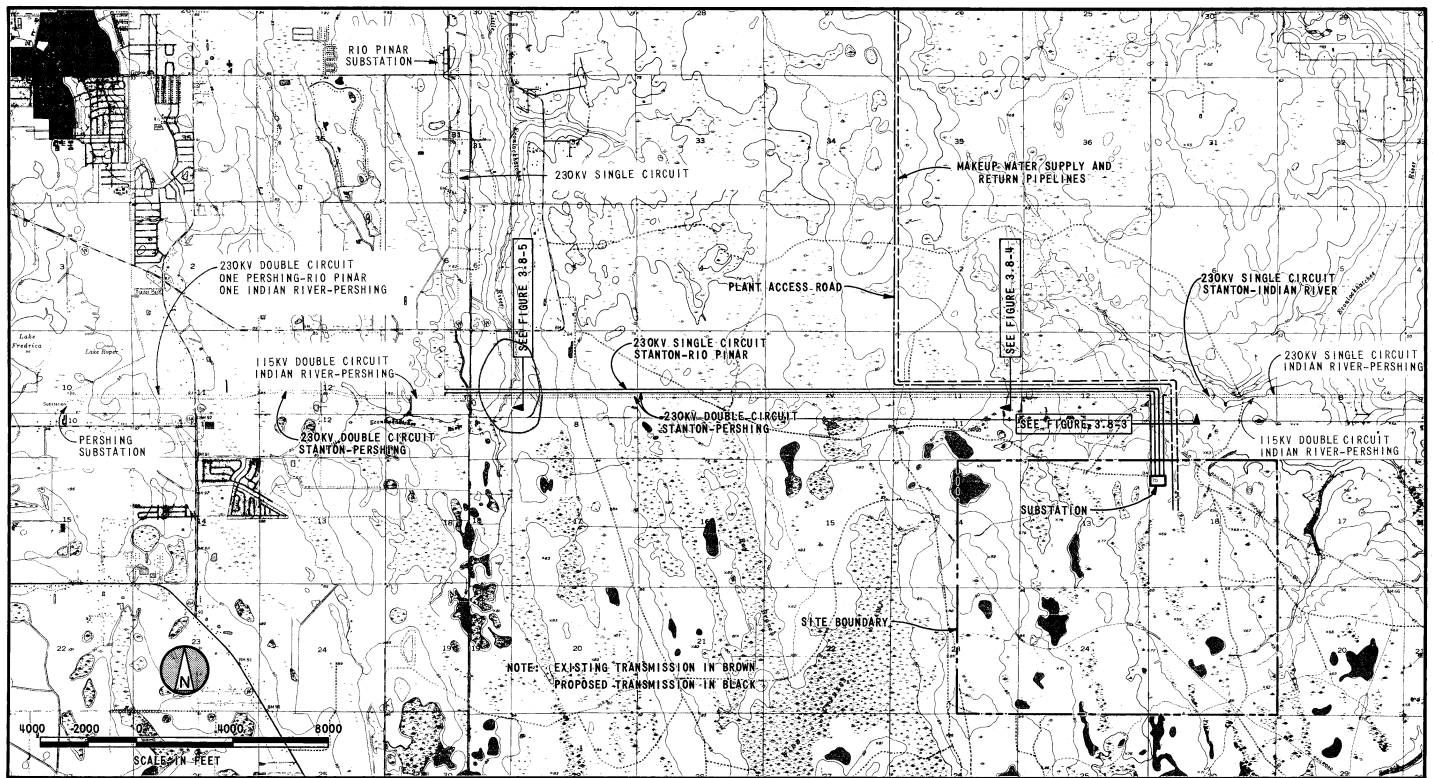


FIGURE 3.8-2. STANTON ENERGY CENTER
UNIT 1 ASSOCIATED
TRANSMISSION FACILITIES

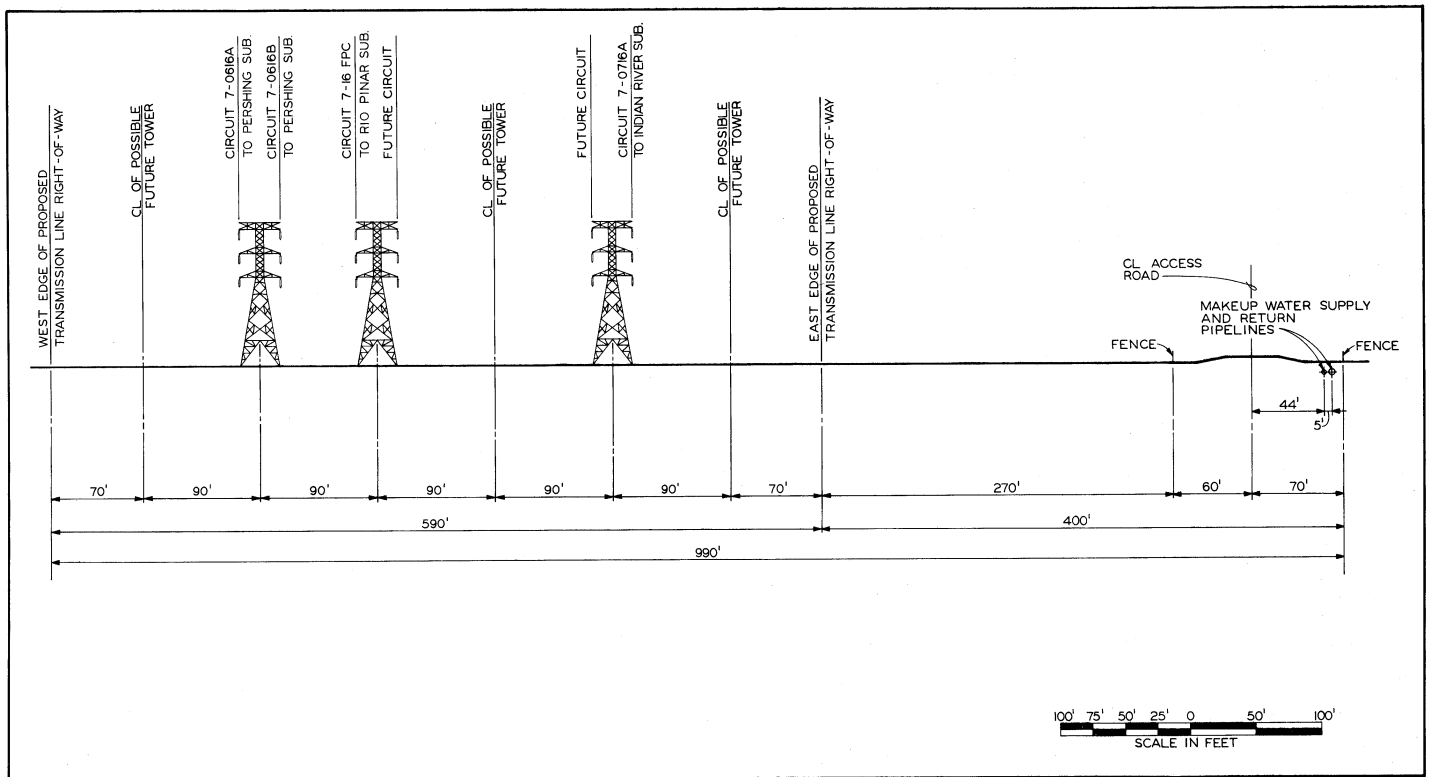


FIGURE 3.8-3. TRANSMISSION CORRIDOR ELEVATION EXITING SITE LOOKING NORTH

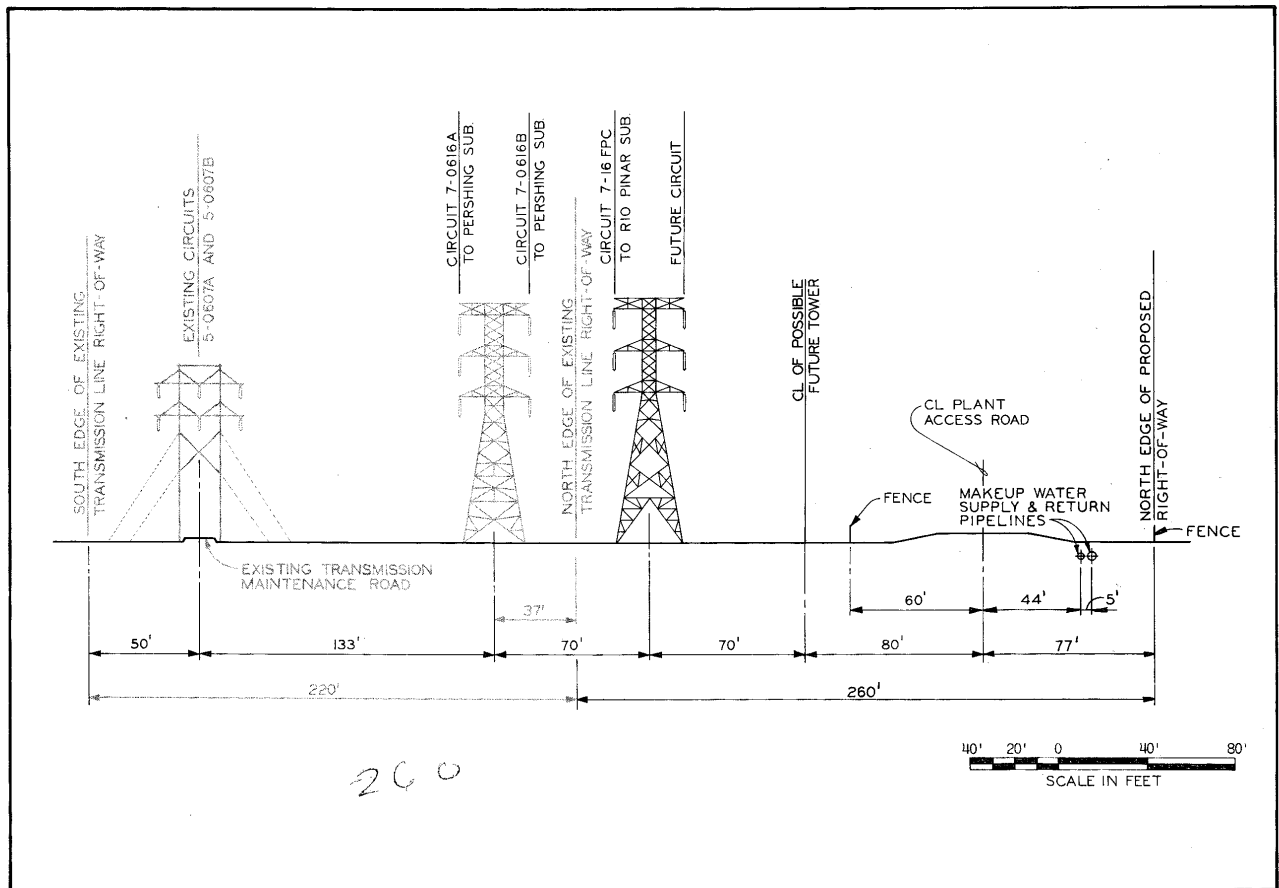


FIGURE 3.8-4. TRANSMISSION CORRIDOR ELEVATION
NORTH OF SITE LOOKING WEST

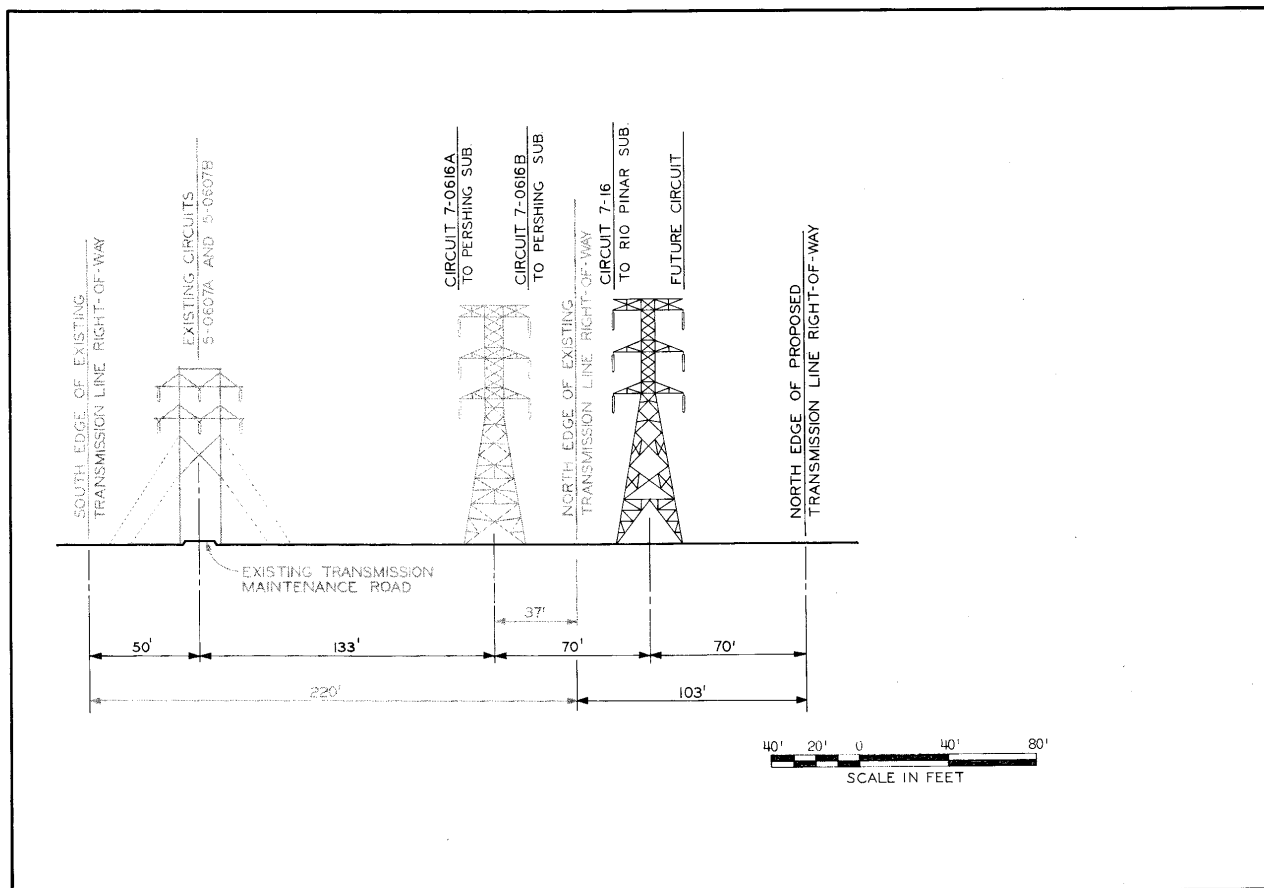


FIGURE 3.8-5. TRANSMISSION CORRIDOR ELEVATION
EAST OF RIO PINAR INTERSECTION
LOOKING WEST

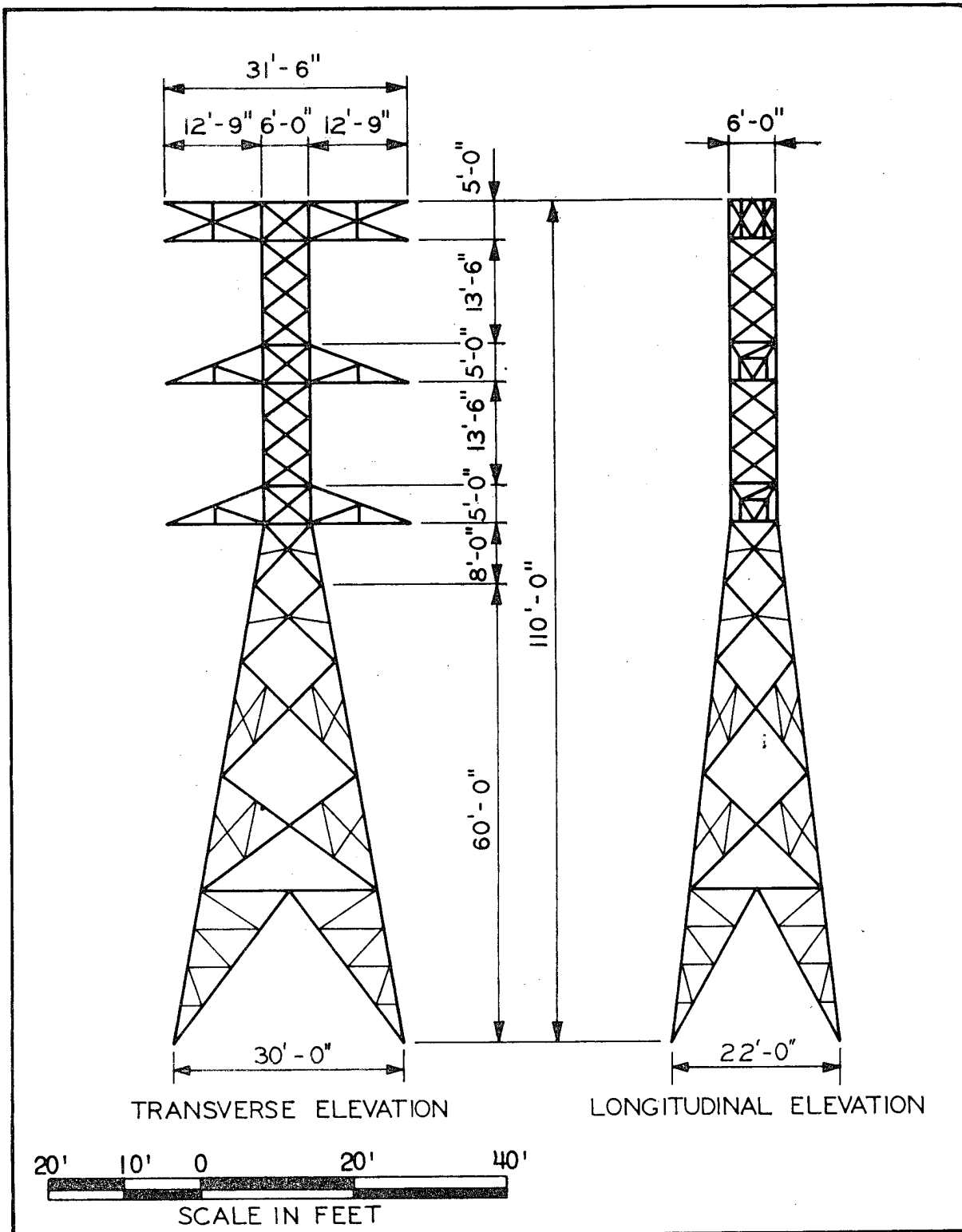


FIGURE 3.8-6. TYPICAL 230KV LATTICE STEEL TRANSMISSION TOWER

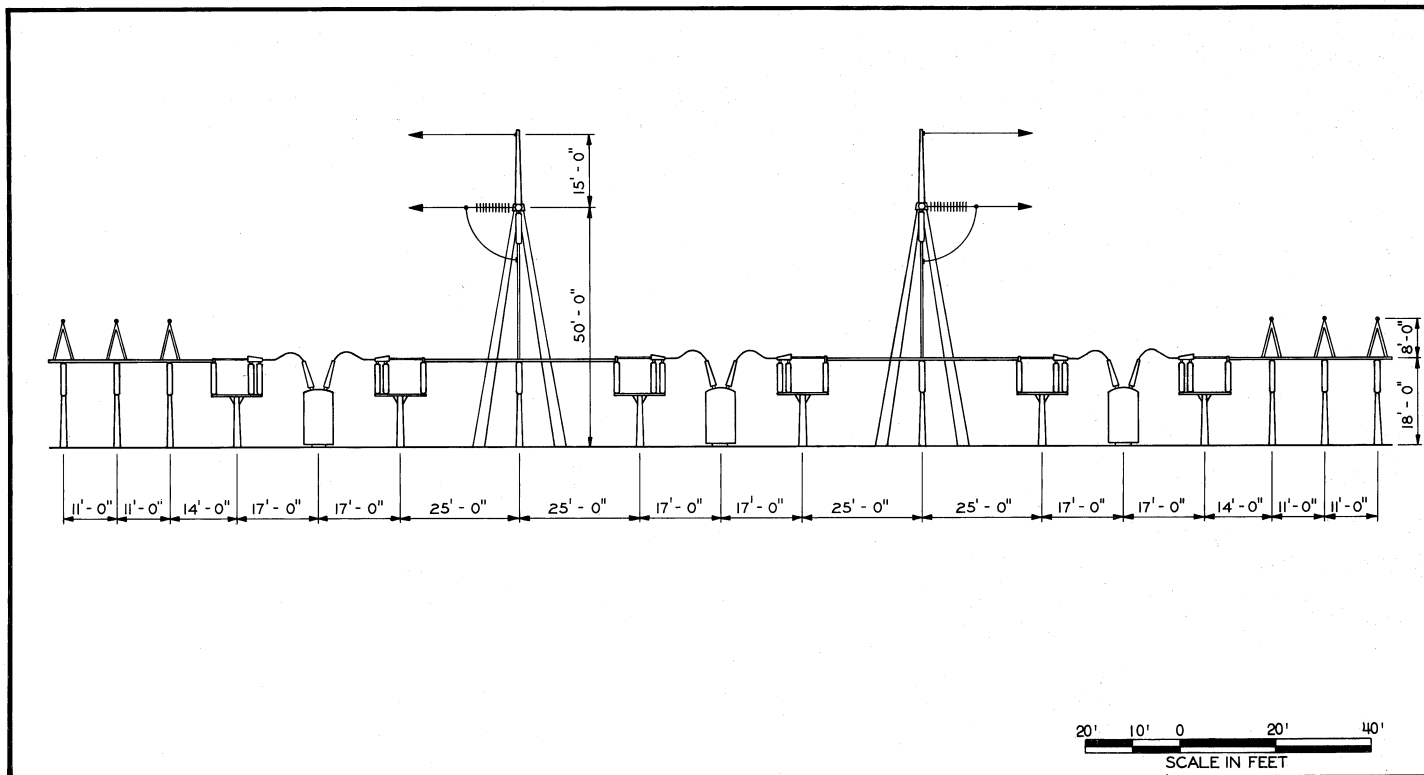


FIGURE 3.8-7. STANTON ENERGY CENTER SUBSTATION
ELEVATION LOOKING WEST

3.9 DIRECTLY ASSOCIATED FACILITIES

Directly associated facilities include railroads, access and plant roads, fencing and security, limestone handling facilities, makeup and return water pipelines, and lime handling facilities as described in the following sections. Associated transmission facilities are described in Section 3.8.

3.9.1 Railroads

A system of railroad tracks will be required for coal delivery and transportation of materials and equipment for construction and maintenance. The routing of the railroad to the site and the arrangement of the railroad on-site are shown in Figures 3.9-1 and 3.9-2, respectively. A spur will originate at a turnout from the Seaboard Coast Line (SCL) Railroad mainline approximately one mile west of the Orlando International Airport. The new spur will be approximately 18 miles in length from the SCL turnout to the coal loop at the site.

The railroad to the site will be routed in the modified corridor shown on Figure 3.9-1. The rail corridor consists of 800 feet either side of a centerline originating at the south boundary of the site at State Plane Coordinates (SPC) 1,502,160N; 448,140E; proceeding south, under the Bee Line Expressway to SPC 1,490,030N; 448,100E; turning southwest and proceeding to SPC 1,485,880N; 443,860E; turning west and proceeding to SPC 1,486,150N; 443,400E; turning southwest and proceeding to SPC 1,468,520N; 405,000E; turning northwest and proceeding to SPC 1,478,160N; 392,480E; turning west and running within 3,000 feet either side of the centerline proceeding to SPC 1,477,990N; 379,420E.

The railroad corridor modification is located southeast of Mud Lake, Lake Nona, and Red Lake and west of State Route 15. It consists of a triangular area approximately 3.25 miles long by 0.42 miles wide at its widest point. This area contains approximately 425 acres of land. The original affected segment included four culverts; four pipe culverts within the corridor modification will be used to maintain existing drainage patterns. Three of the pipe culverts will prevent surface water ponding on

3.9-1

either side of the railroad berms and the fourth will permit surface runoff to drain to the southeast. No significant changes in surface drainage patterns will result from the modification.

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The railroad spur will be a single track line, elevated above the 100-year flood elevation by an embankment. At locations where the railroad interrupts natural drainage patterns, culverts or trestle drainage structures will be provided. Wetland and swamp crossings will utilize precast concrete pile trestles in addition to embankment construction. Additional openings will be provided as required for wildlife crossings. A typical railroad section is shown in Figure 3.9-3. A typical railroad trestle detail is shown in Figure 3.9-4.

The railroad spur will cross several roads. Where the railroad spur crosses Boggy Creek Road near its intersection with Weatherby Road, Boggy Creek Road will be relocated along the south side of the railroad right-of-way. A grade crossing with Weatherby Road will be required. All railroad road crossings, with the exception of the Bee Line Expressway crossing, will be at grade. The new railroad spur will be constructed under the Bee Line Expressway through an existing interchange. The clearance at the existing interchange is less than that recommended by the American Railway Engineering Association. As a result, new bridges will be constructed to replace the existing bridges to furnish adequate clearance. A section of the Bee Line Expressway at the interchange is shown in Figure 3.9-5.

On-site railroad construction will consist of a coal delivery loop and plant access railroad. The coal delivery loop will be elevated to approximately 10 feet above grade. The loop will be elevated to minimize the depth that the coal unloading system structure must extend into the ground water table. The railroad will be constructed over coal unloading hoppers located within the embankment. A portion of the loop will have a dual track to allow for rail delivery of limestone (scrubber additive) and railcar storage. The limestone unloading system will be similar to the coal handling system unloading facilities. The coal and limestone unloading equipment will be located adjacent to each other in a common building.

The plant access rail will be provided by an extension of the coal delivery spur into the generation facilities immediate area. Rail spurs will be constructed to provide access to the following.

- (1) Generator transformer, turbine generator, and condenser areas.
- (2) Permanent turbine room access bay.
- (3) Boiler construction (remove as construction progresses).
- (4) Materials laydown area.
- (5) Fuel oil storage.
- (6) Lime unloading hopper.

Construction of these spurs will be completed in conjunction with site preparation and construction of the plant access road.

Railroad embankments will be constructed from on-site borrow material or material obtained along the right-of-way. All road and railroad embankment slopes will be seeded to establish grass and provide erosion control. Whenever possible, all slopes will be constructed to no steeper than 3 horizontal on 1 vertical.

3.9.2 Access and Plant Roads

A new Orange County road, named Alafaya Trail Extension, will be constructed from State Highway 50, Cheney Highway, south from the intersection of State Highways 50 and 520. This new road is being constructed by Orange County to serve a new industrial facility being constructed by the Martin-Marietta Corporation, the new Orange County Easterly Subregional Wastewater Treatment Plant, and the Curtis H. Stanton Energy Center. Just southwest of the planned location of the Orange County Plant, the new road turns east along section lines and extends east to the main site entrance of the Stanton Energy Center. Because of this new Orange County road, construction of the main plant access road, as certified, is no longer necessary. In addition to serving as the main plant access road, the new county road will also define the route for the makeup water supply and cooling tower blowdown return pipelines. These parallel lines will follow the new county road from Stanton Energy Center to the Orange County Plant and will not extend to the Iron Bridge Facility in Seminole County. Alternate access to the site from the new county road will be provided by a short access road within the joint-facilities corridor.

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The main plant road onsite will have an embankment section as shown on Figure 3.9-8, and will provide access to construction parking lots as well as the plant entrance at the construction and permanent security facilities. The roadway will terminate at the main plant perimeter loop road. The main plant access road is expected to be paved initially, except for that portion serving the administration area. This unpaved portion will eventually be paved prior to start-up of Unit 1.

The operations and visitor parking lots will initially have space for 150 and 20 vehicles, respectively. Each lot will be surfaced with a lime-rock base. Prior to Unit 1 start-up, a 4-inch thick bituminous pavement

will be applied to the two lots. The construction parking areas will have a crushed rock surface sprayed with a dust palliative. The main construction parking lot will be sized to accommodate 650 vehicles, while a separate construction management lot will accommodate 80 to 100 vehicles.

The main plant perimeter loop road, including cooling tower and batch plant access roads, will be as shown on Figure 3.9-8. The remaining lesser travelled service roads will also be as shown on Figure 3.9-8. The construction laydown area roads will be similar in width to low density service roads; however, they will have a thinner limerock base.

Road embankments will be slightly elevated above existing grade to ensure proper drainage from the road surface and will be constructed from local material obtained along the road right-of-way or on-site. A limerock base coarse will provide a stable subgrade for the road surface. All road surface elevations will be above the 100-year flood elevation.

Culvert pipe or box culvert drainage structures will be provided at interfaces with existing drainage patterns to ensure proper drainage of storm runoff.

3.9.3 Fencing and Security

Fencing and security will provide for the physical enclosure of secured areas and allow for the monitoring of incoming and outgoing traffic. A security fence will enclose the main plant and construction areas as shown on Figure 3.9-7. Fencing may also be installed around special construction areas such as the electrical laydown areas where required.

The security fence will enclose the main plant area and allow only limited access. An entrance at the construction guard station will be maintained during construction. Outdoor construction lighting will be provided for security. The security facilities, parking lots, and entrance road within 300 feet of the gate will be lighted.

The permanent security building will serve to monitor the passage of visitors and operations personnel to and from the plant. A manually-actuated power operated gate will be provided which could be operated from within the security building or by key from the fence exterior.

3.9.4 Limestone Handling

The additive for the flue gas desulfurization system at Stanton Energy Center will be limestone. The source of supply has not been determined at this time. Potential sources involve the use of both truck and rail delivery of the limestone. Therefore, provisions for delivery by both methods will be included at the plant. Truck delivery will require 15 trucks of 24 tons each per day for five days per week. Railcar delivery will require 18 railcars of 100 tons each per week.

The limestone handling system will be capable of unloading, stocking, reclaiming and long term reserve storage. Figure 3.9-9 shows a schematic of the limestone handling process, Figure 3.9-10 shows the layout of the limestone handling facilities and Figure 3.9-11 shows a perspective of the limestone handling facilities. Limestone delivered by rail will be received by a bottom dump-type unloading facility located adjacent to the coal train unloading facility. As the train is being unloaded, the limestone will be conveyed to a stockout pile located southeast of the Crusher Building. This pile will be used for active storage. Limestone delivered by truck will be dumped directly into the stockout area. A large reserve limestone pile of 38,000 tons (120 days for Unit 1) will be maintained just south of the stockout area. Reclaimed limestone will be conveyed to the scrubber additive storage day bin prior to being ground and mixed with water to produce the additive slurry.

RFM-1

Fugitive dust generated by the handling and storage of limestone will be controlled by the use of water spray suppression, enclosed stockout conveyor, totally enclosed reclaim conveyor, and a bag filter at the day silos and shuttle conveyor. The limestone unloading facility receiving hopper will be adjacent to the coal unloading facility within a building. The limestone receiving hopper will be equipped with a water spray dust suppression system. The main stockout conveyor shown on Figure 3.9-11 will be enclosed with a roof and sides and a steel-grate floor except where it passes over roads or other facilities. Solid floors will be provided for such areas. The limestone reclaim conveyor will be totally enclosed with a solid floor because it passes over other plant facilities or service areas.

RFM-1

This conveyor discharges onto a belt-type shuttle conveyor which distributes the limestone to the day silos. At this transfer point, a dust collection hood operating at negative pressure will be provided. The exhaust from this hood will be routed through the bag filter system which controls the exhaust from the day silos during filling.

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Table 3.9-1 lists the release points and control methods for the limestone handling facilities. Estimated emission levels for the release points are presented in Section 5.5.

3.9.5 Makeup and Return Water Pipelines

A makeup water pipeline and a return water pipeline will connect the Stanton Energy Center to the Orange County Easterly Subregional Wastewater Treatment Plant. The corridor in which the pipeline will be routed is shown on Figure 3.9-6. The makeup pipeline will consist of a 36 inch fiberglass reinforced plastic pipe and will be used to supply Orange County Plant effluent to the site for use as cooling tower makeup. The return pipeline will consist of 10 inch fiberglass reinforced plastic pipe and will be used to return excess plant wastewater to the Orange County Plant.

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RFM-1

The pipelines will be routed in a common trench and will parallel the new county road for 4 miles from the site to the Orange County Plant. The new county road connects to the Stanton Energy Center site near the north-western corner of Section 18, T23S, R32E. From the site the road extends north about 2,550 feet to a point of intersection within the existing OUC transmission right-of-way at State Plane Coordinates N 1,515,389 and E 449,068. The road turns northwest at this point for about 4,115 feet to a point of intersection at State Plane Coordinates N 1,518,343 and E 445,550. From this point the road runs due west along a section line for approximately 5,340 feet to a point of intersection at State Plane Coordinates N 1,518,335 and E 440,593. The road turns north-northwest at this point to a true azimuth of approximately 338 degrees for about 5,330 feet to a point of intersection at State Plane Coordinates N 1,523,299 and E 438,695. At this point the road turns nearly due west with the pipelines extending to a point at SPC N 1,523,424 and E 434,444. The pipelines turn due south to enter

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the Orange County Easterly Subregional Wastewater Treatment Plant. The new county road continues northward from this location to its intersection with State Highway 50. The total length of the pipeline corridor from the Stanton Energy Site to the Orange County Plant is approximately 4 miles.

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3.9-6a

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3.9.6 Lime Handling and Storage

Pebble lime will be used as an additive to condition the scrubber sludge/flyash mixture. The lime will be received by truck or by railcar dumping into an enclosed receiving hopper. A rail/truck unloading facility is served by the plant maintenance rail spur near the Coal Crusher Building as shown on Figure 3.1-4. The lime will be transported from the hopper to a storage silo by a pressurized pneumatic system. The silo will vent through a fabric bag filter system with a removal efficiency of at least 99 per cent. From the storage silo, the lime will be conveyed to a pulverizer and then to the sludge/flyash mixers.

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3.9.7 Radioactive Level Detection Systems

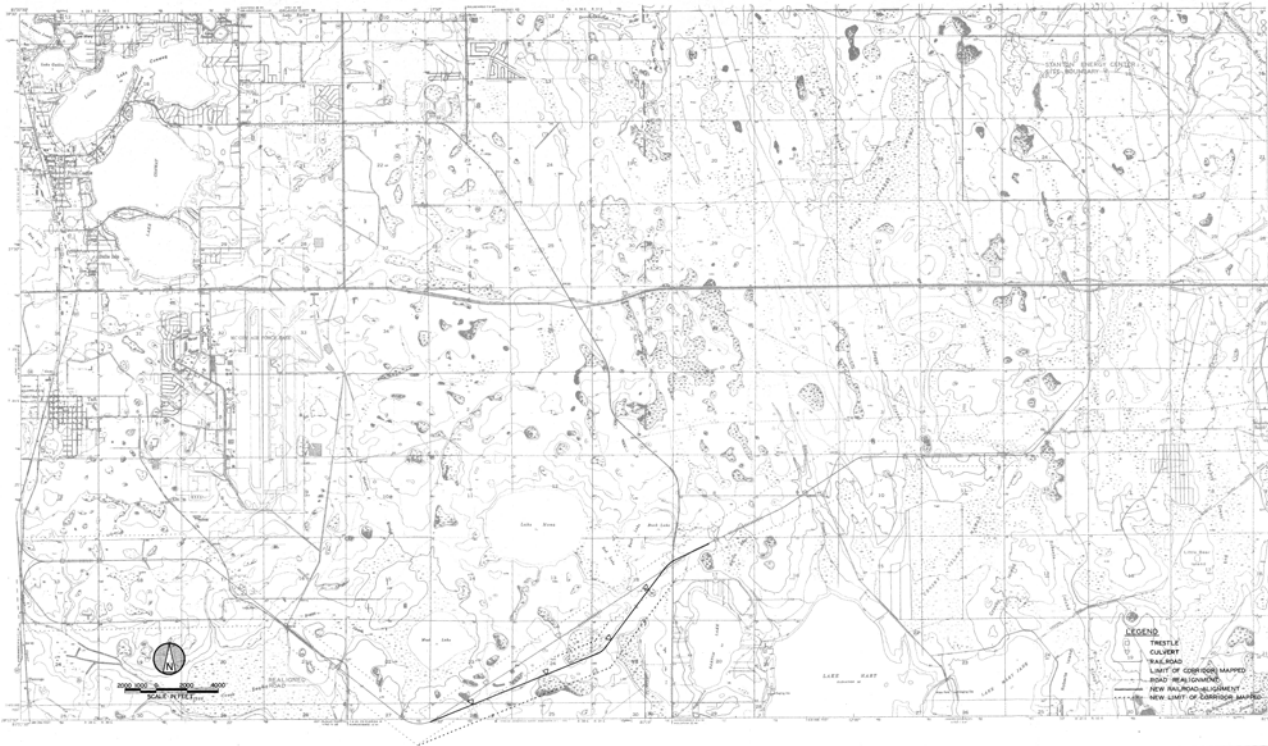
Radioactive devices will be used to monitor levels of bulk materials, liquids, and combustion wastes. Coal silos, main steam line moisture collection pots, and fly ash hoppers under the electrostatic precipitators are the principal system applications of these devices. The radioactive materials used in these devices are regulated by the Florida Department of Health and Rehabilitative Services. Completed applications for licenses for radioactive materials are included as Appendix 3.9A.

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TABLE 3.9-1. FUGITIVE LIMESTONE DUST EMISSIONS CONTROL

<u>Source of Emissions</u>	<u>Dust Control Method</u>	<u>Control Efficiency per cent</u>	
Bottom Car Dumper	Water Spray and Building Enclosure	97	5
Stockout Conveyor	Enclosed	90 99+	RFM-1
Active Storage			
Load In	Telescopic Chute	85	
Load Out	Dozer	50	
Wind Erosion	Crusting	80	
Reserve Storage			
Load In	Dozer	50	
Load Out	Dozer	50	
Wind Erosion	Crusting	80	
Reclaim Conveyor	Enclosed*	99 +	RFM-1
Storage Day Bin	Bag Filter	99+	

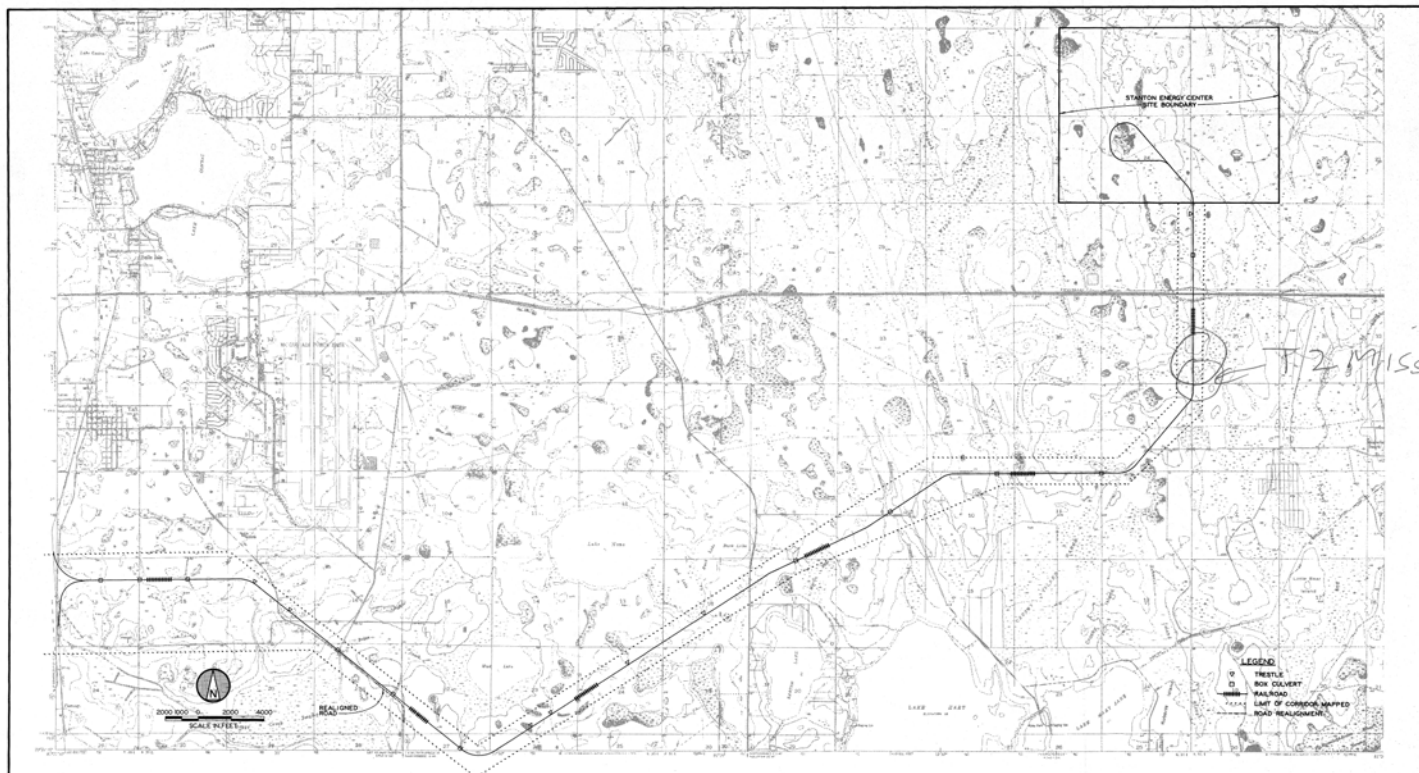
*With solid floor to protect other plant facilities and work areas. RFM-1



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FIGURE 3.9-1. ROUTING OF RAILROAD TO SITE

New



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FIGURE 3.9-1. ROUTING OF RAILROAD TO SITE

ouc-4

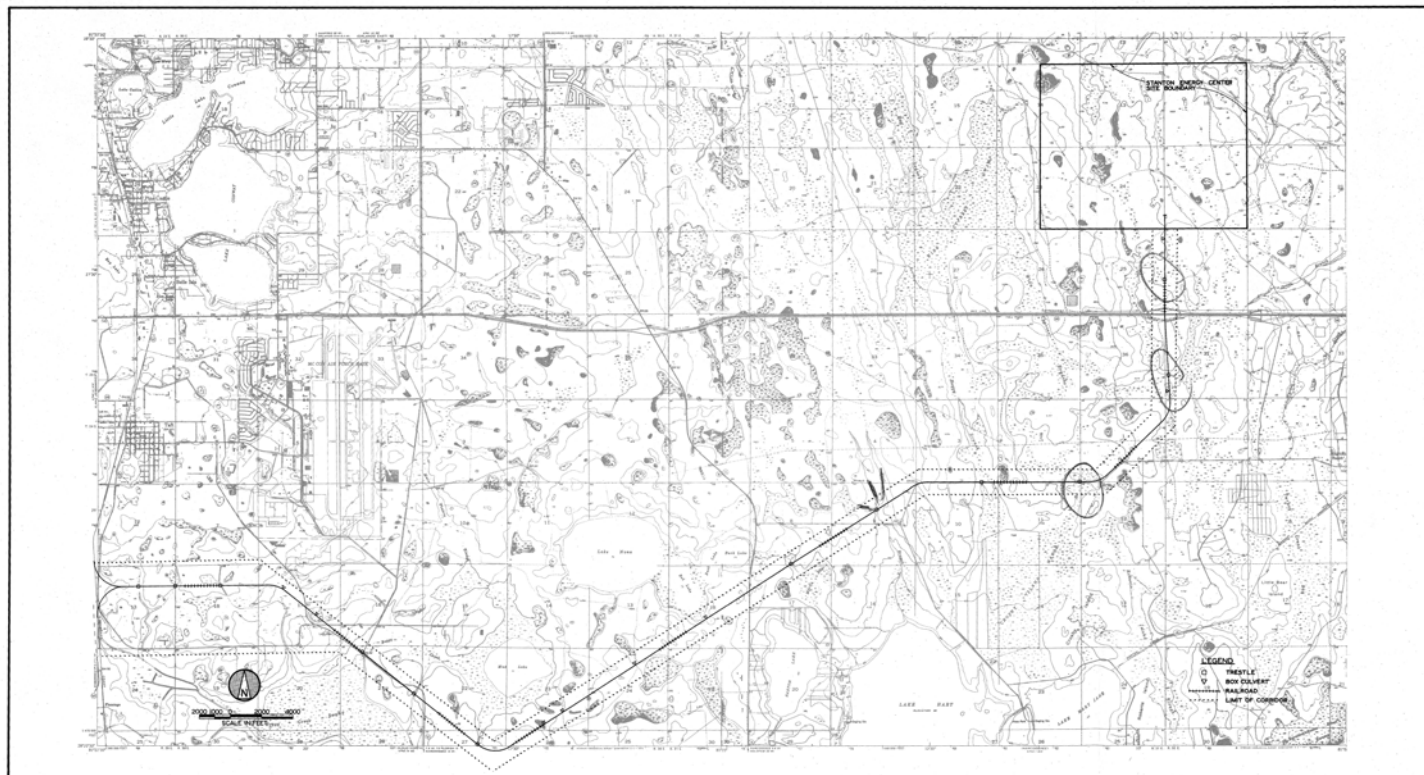


FIGURE 3.9-1. ROUTING OF RAILROAD TO SITE

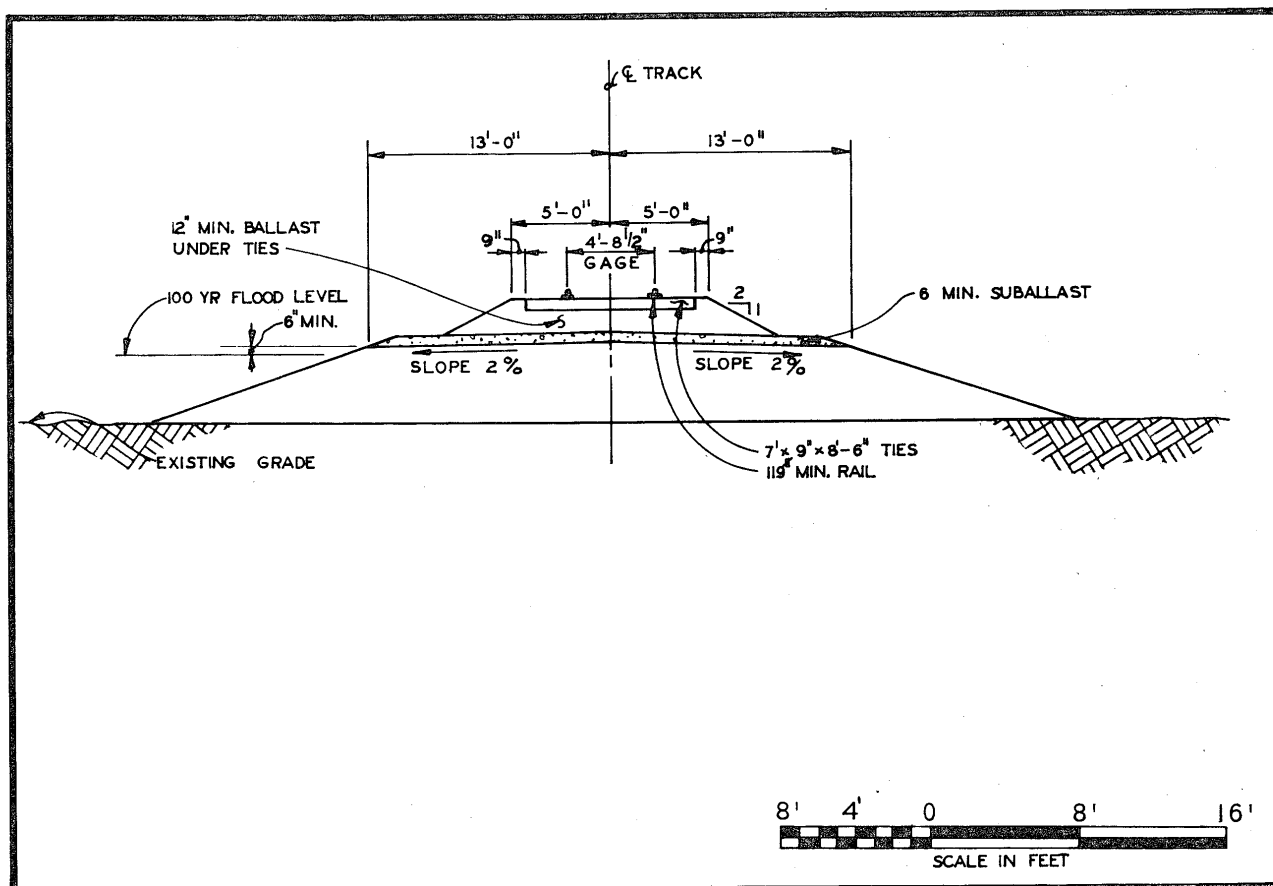


FIGURE 3.9-3. TYPICAL RAILROAD SECTION

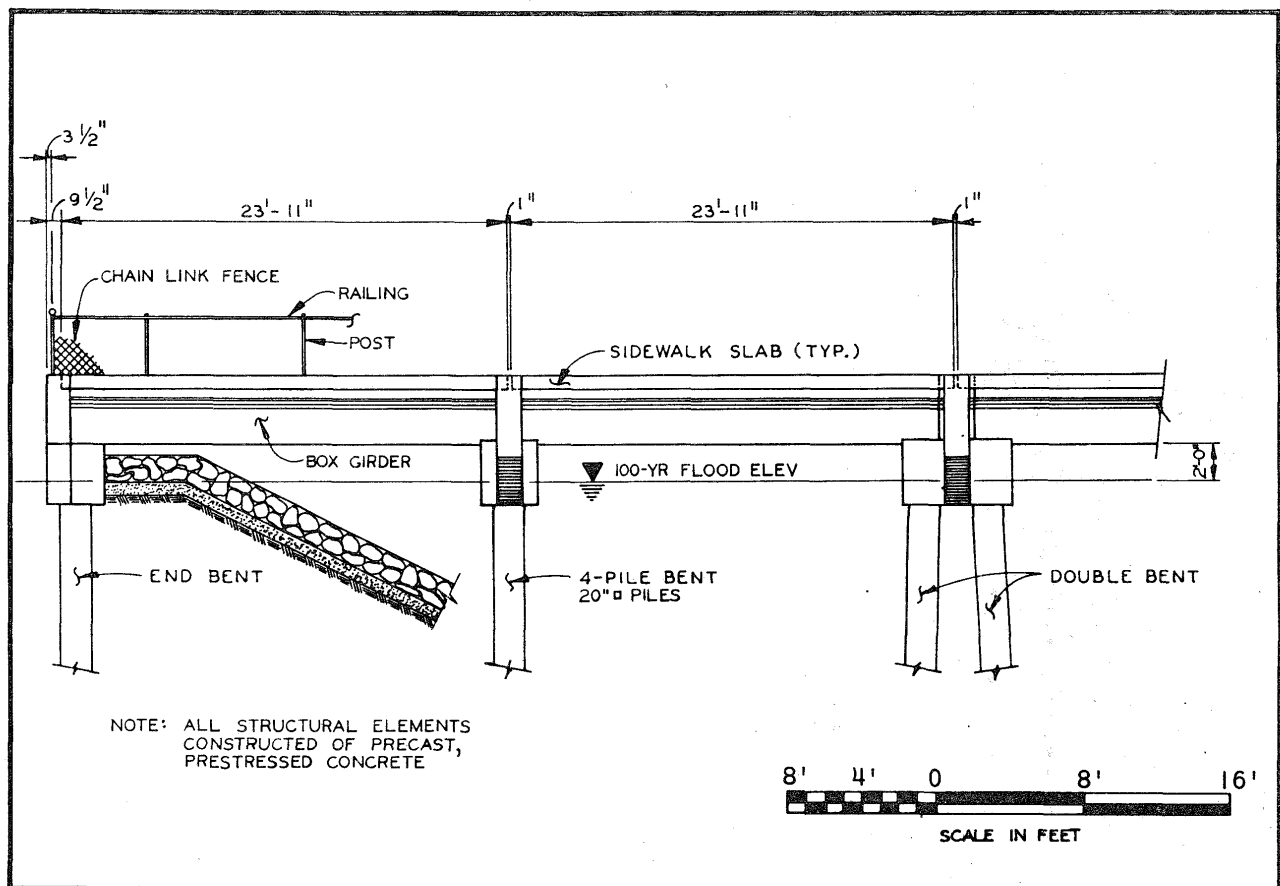


FIGURE 3.9-4. TYPICAL RAILROAD
TRESTLE DETAIL

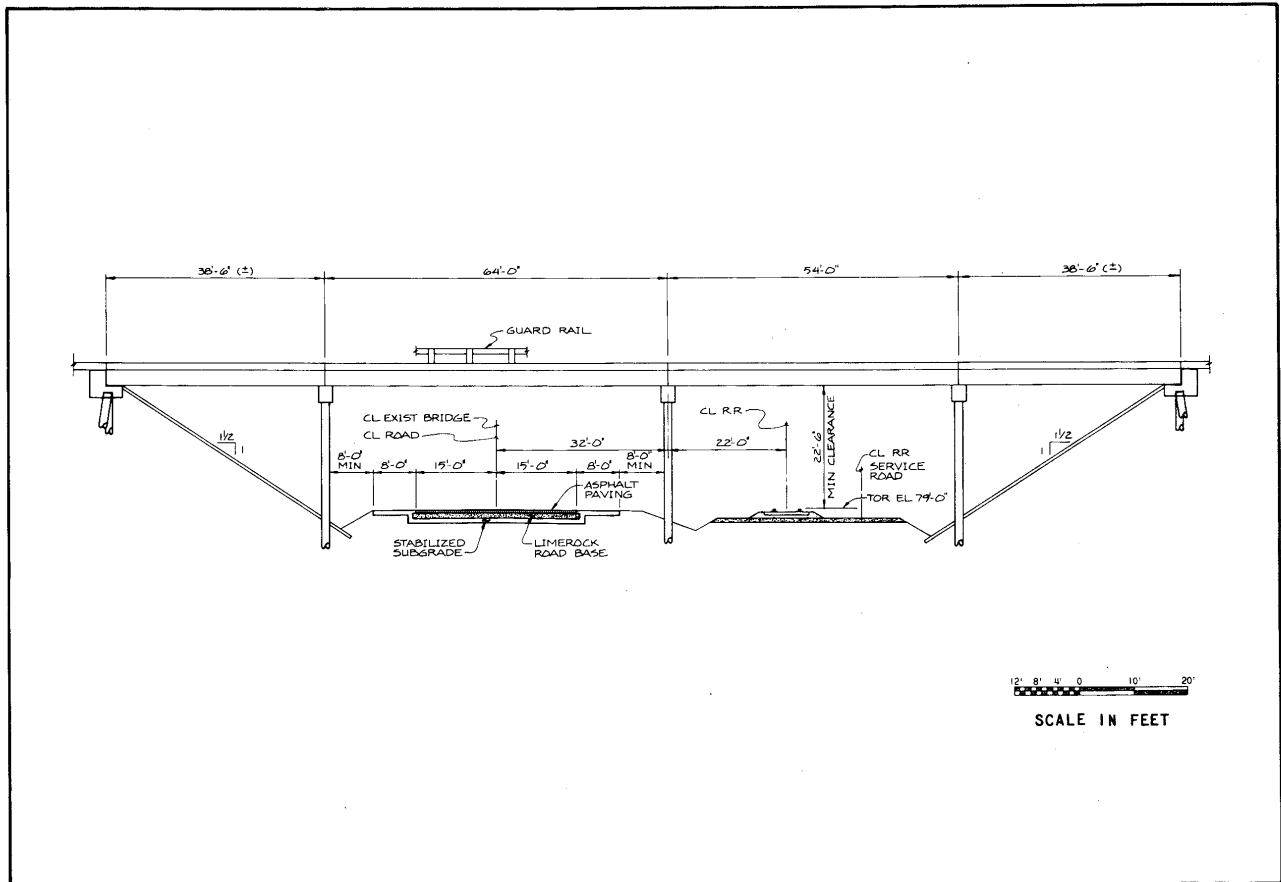


FIGURE 3.9-5. BEE LINE EXPRESSWAY
RAILROAD UNDERPASS

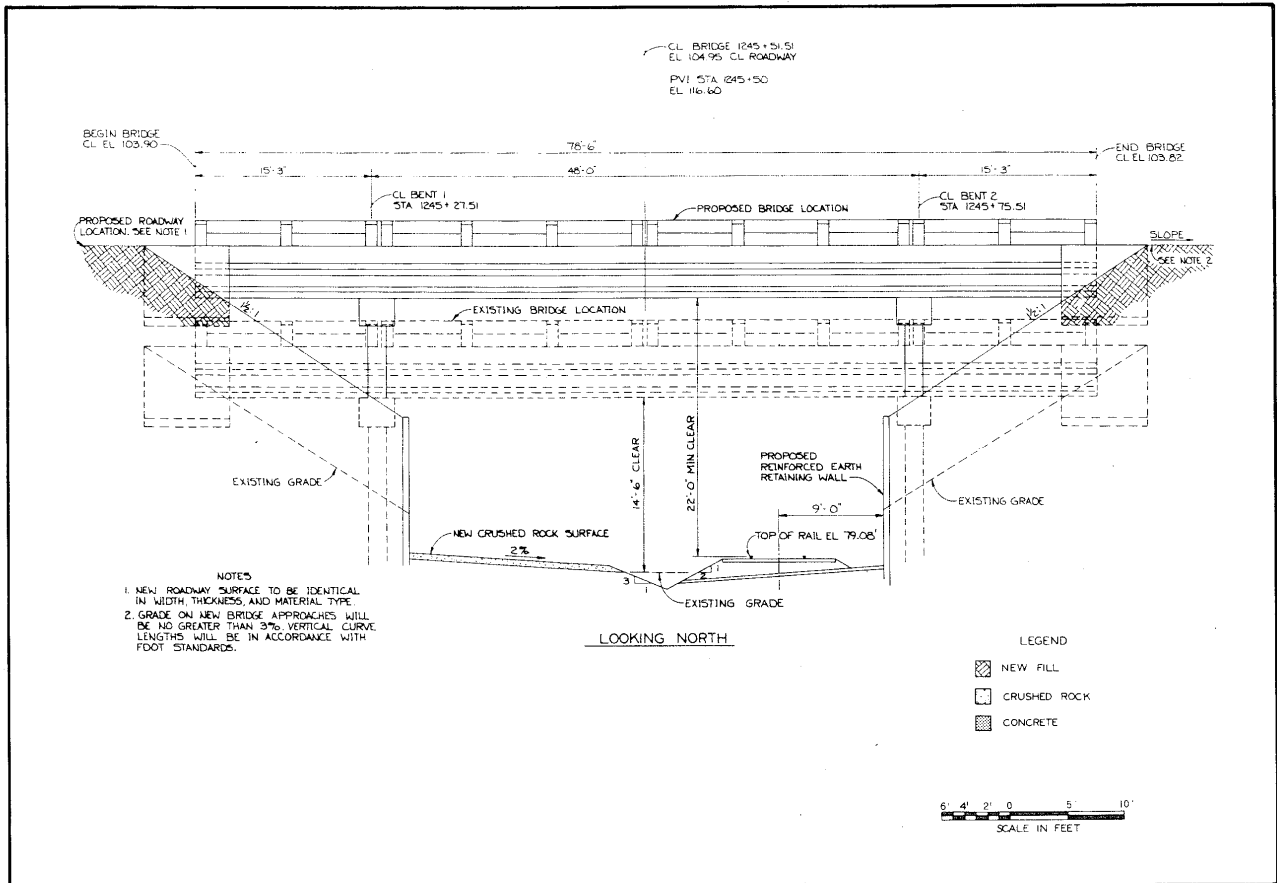


FIGURE 3.9-5. BEE LINE EXPRESSWAY
RAILROAD UNDERPASS

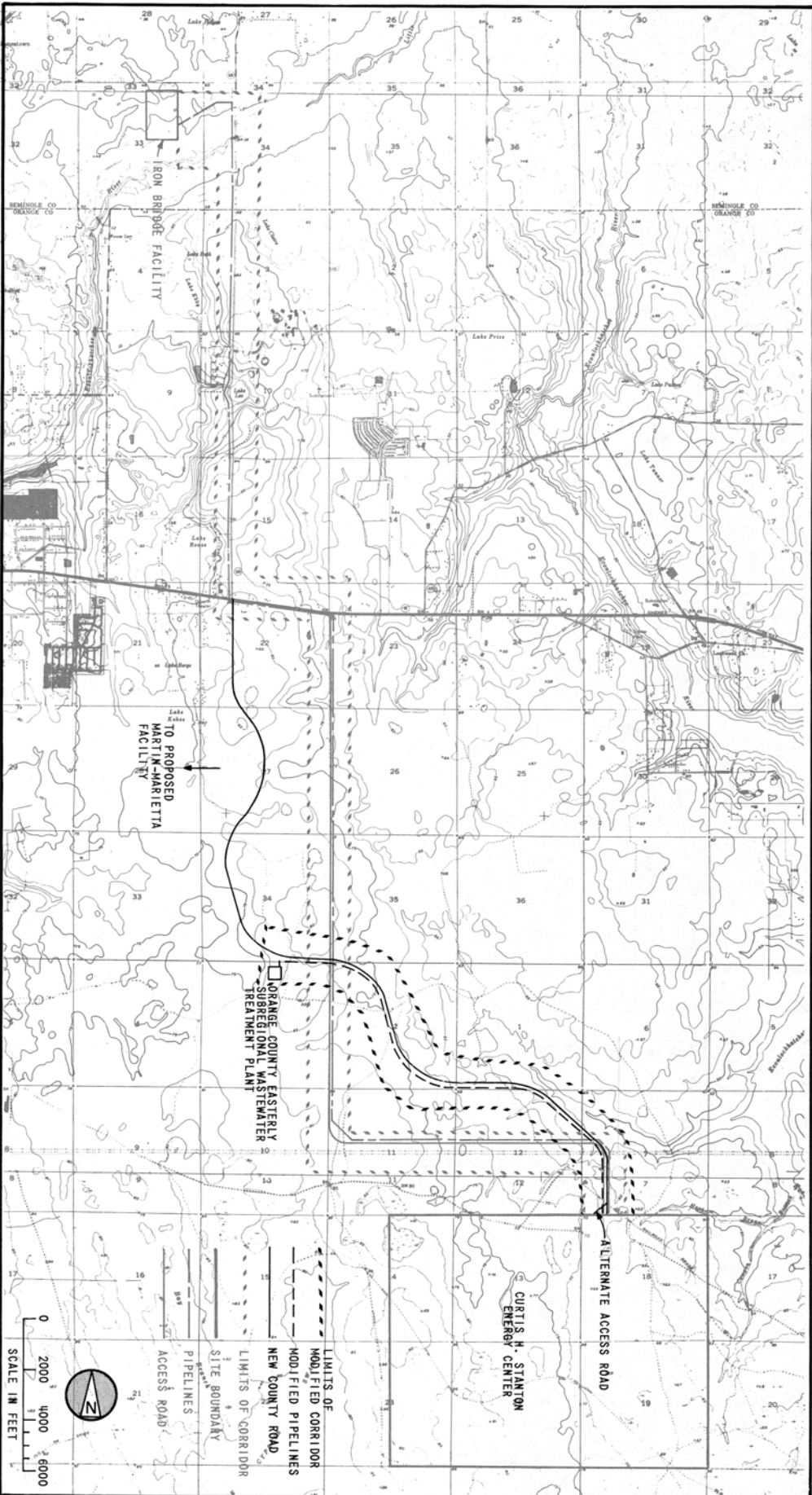


FIGURE 3.9-6. PROPOSED MODIFIED PIPELINE CORRIDOR AND NEW COUNTY ROAD

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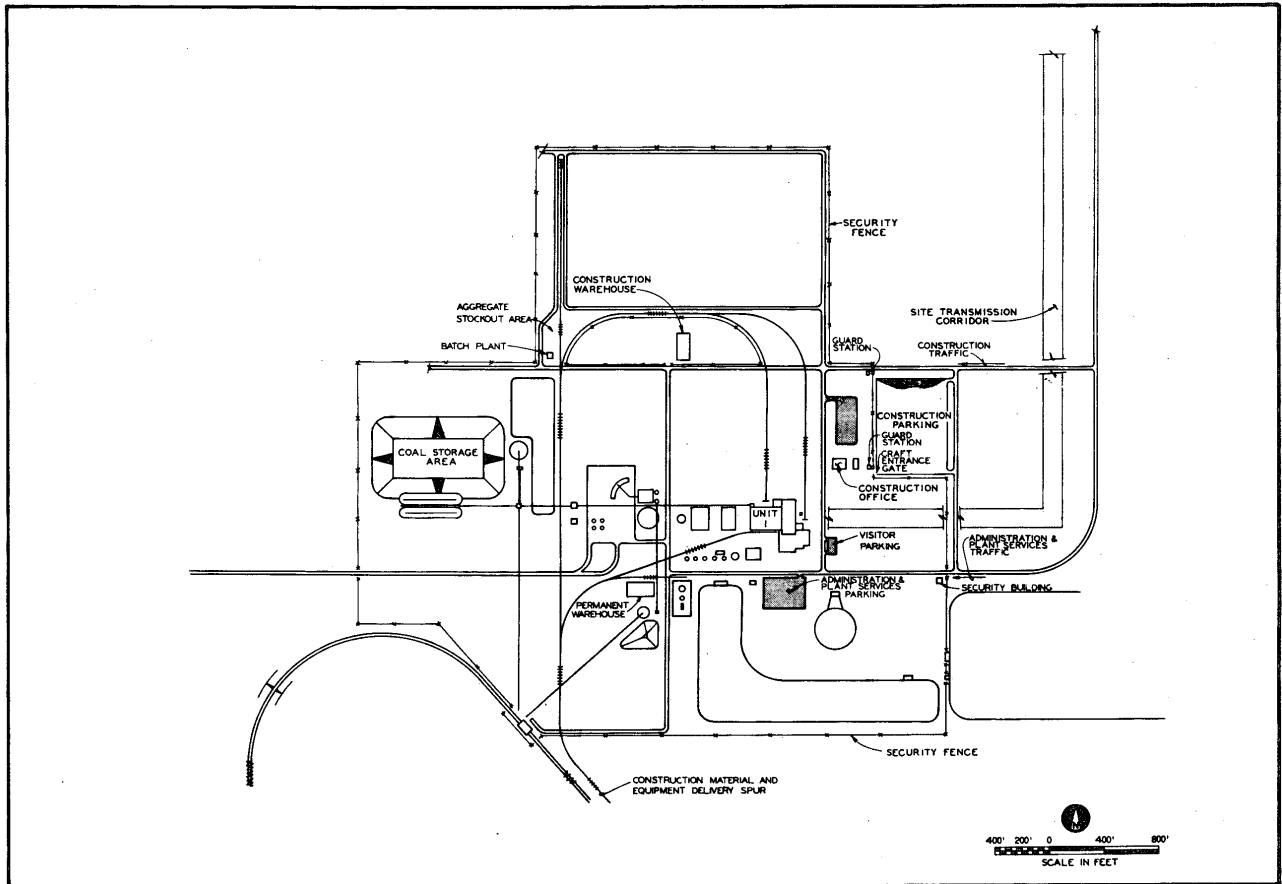


FIGURE 3.9-7. SITE ROADS AND SECURITY

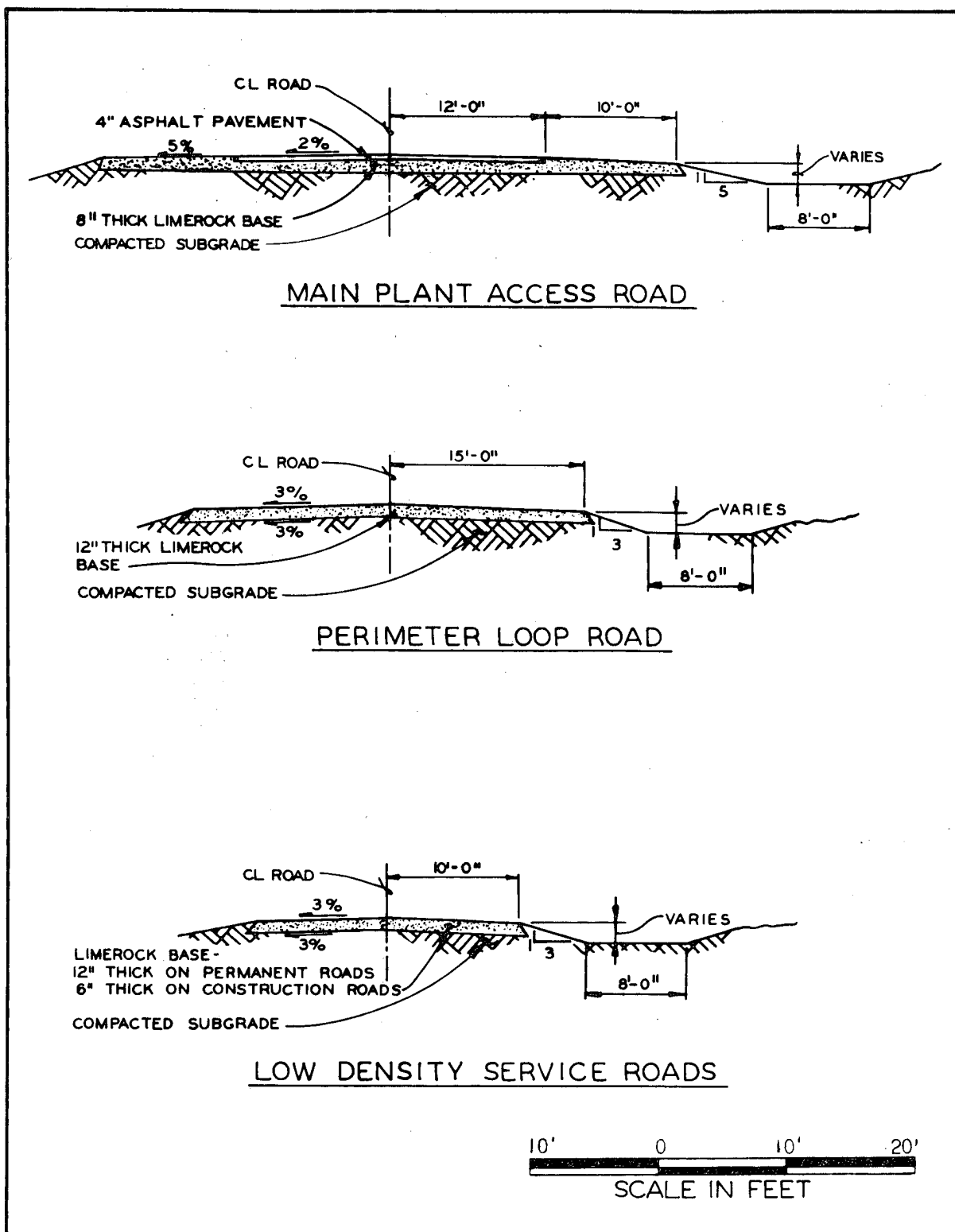


FIGURE 3.9-8. TYPICAL ROAD SECTIONS

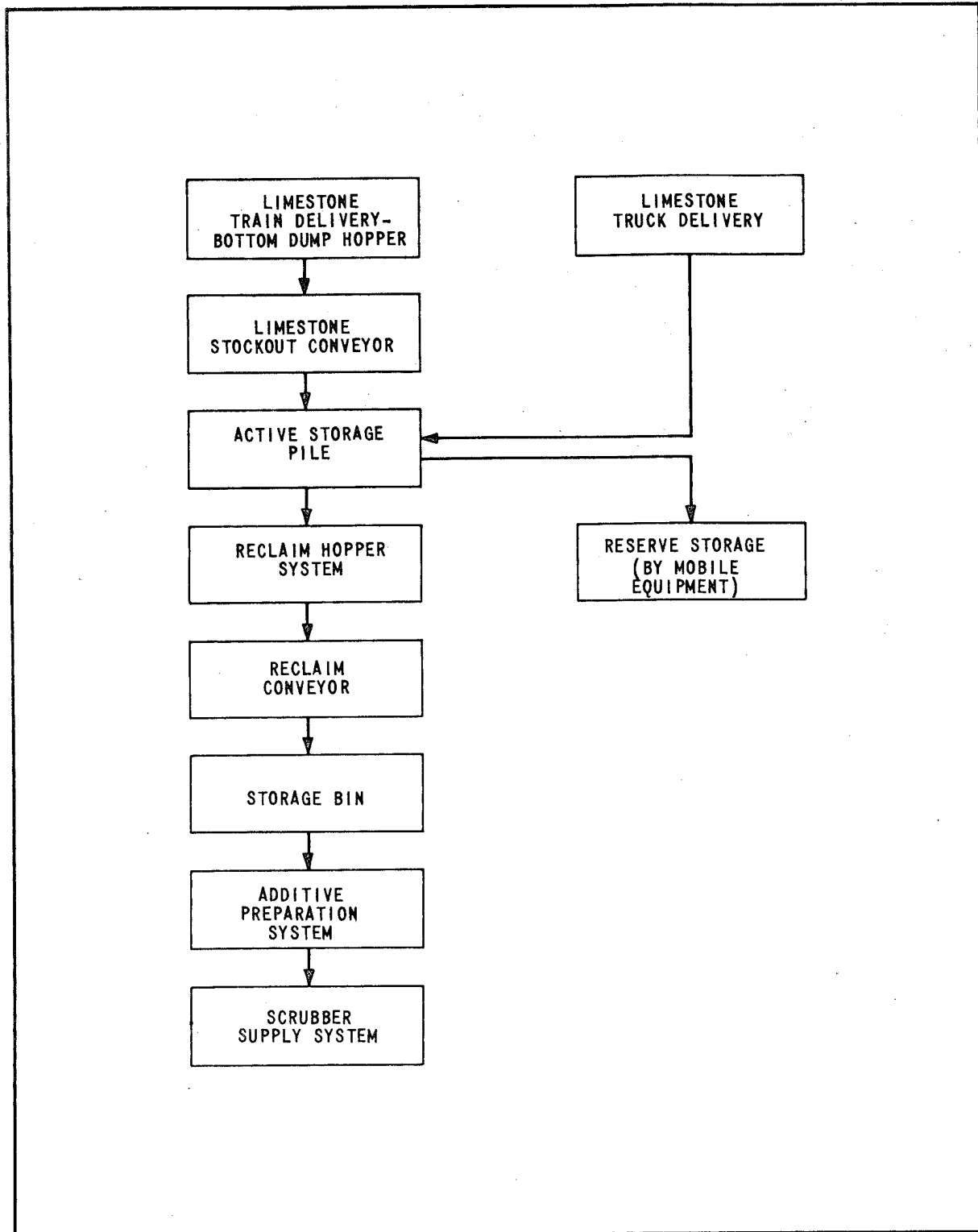


FIGURE 3.9-9. LIMESTONE HANDLING SYSTEM

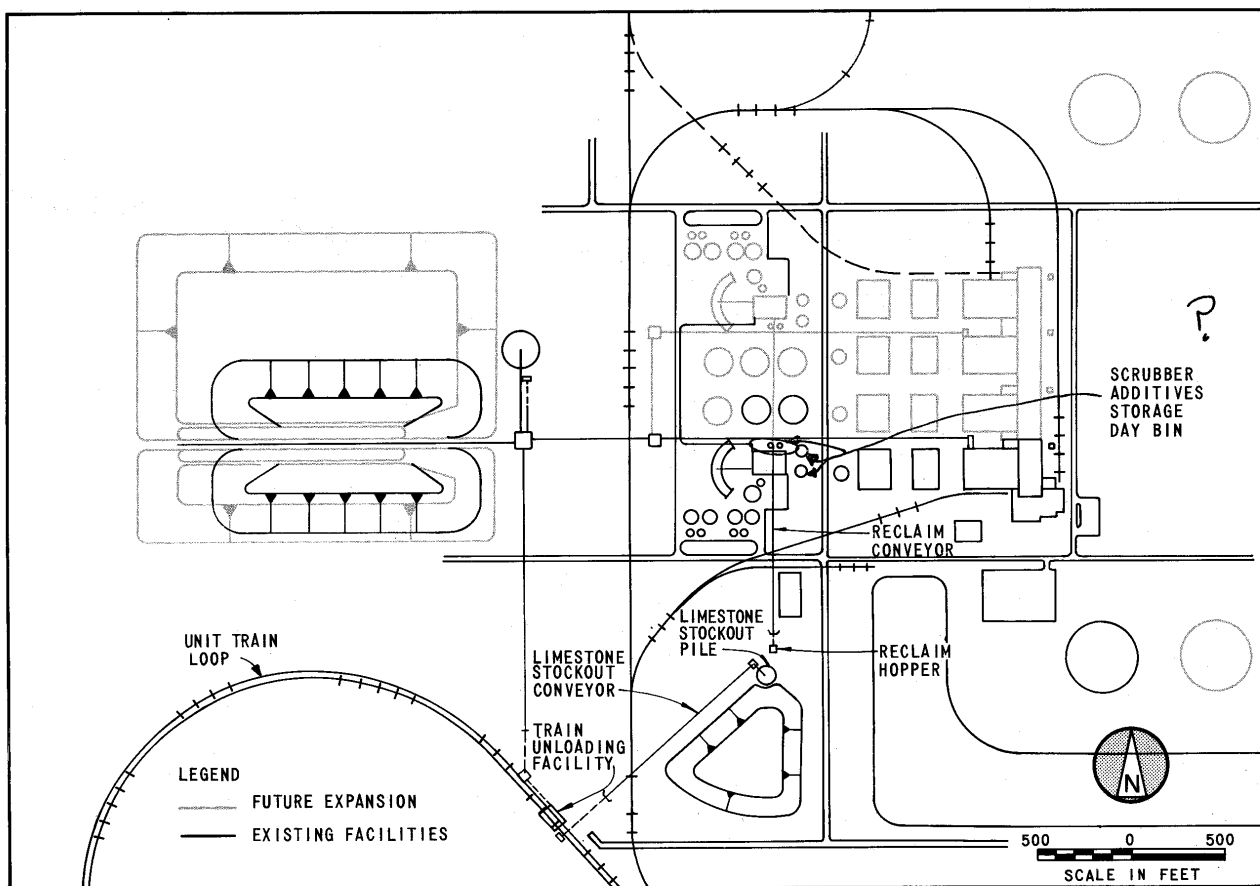


FIGURE 3.9-10. SCRUBBER ADDITIVE
HANDLING SYSTEM LAYOUT

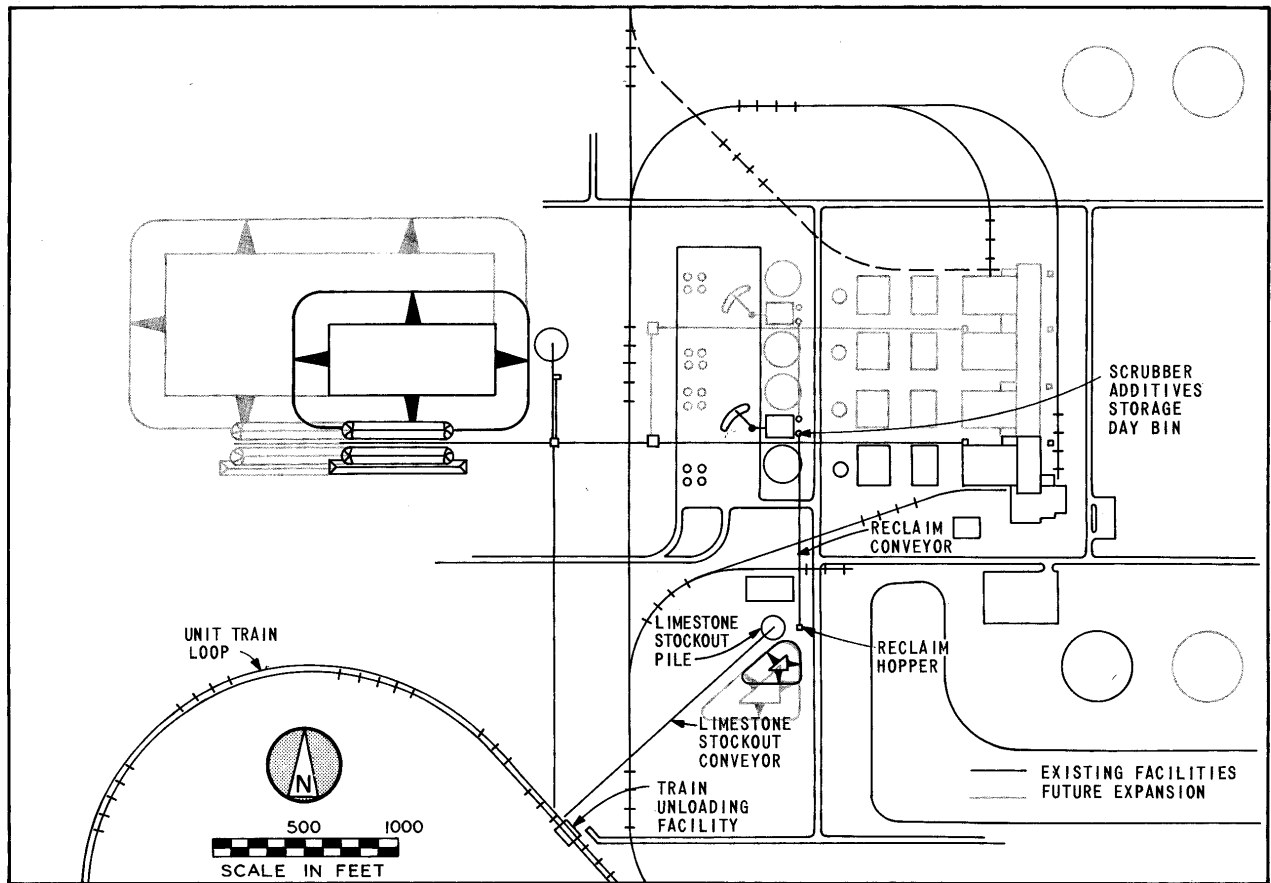
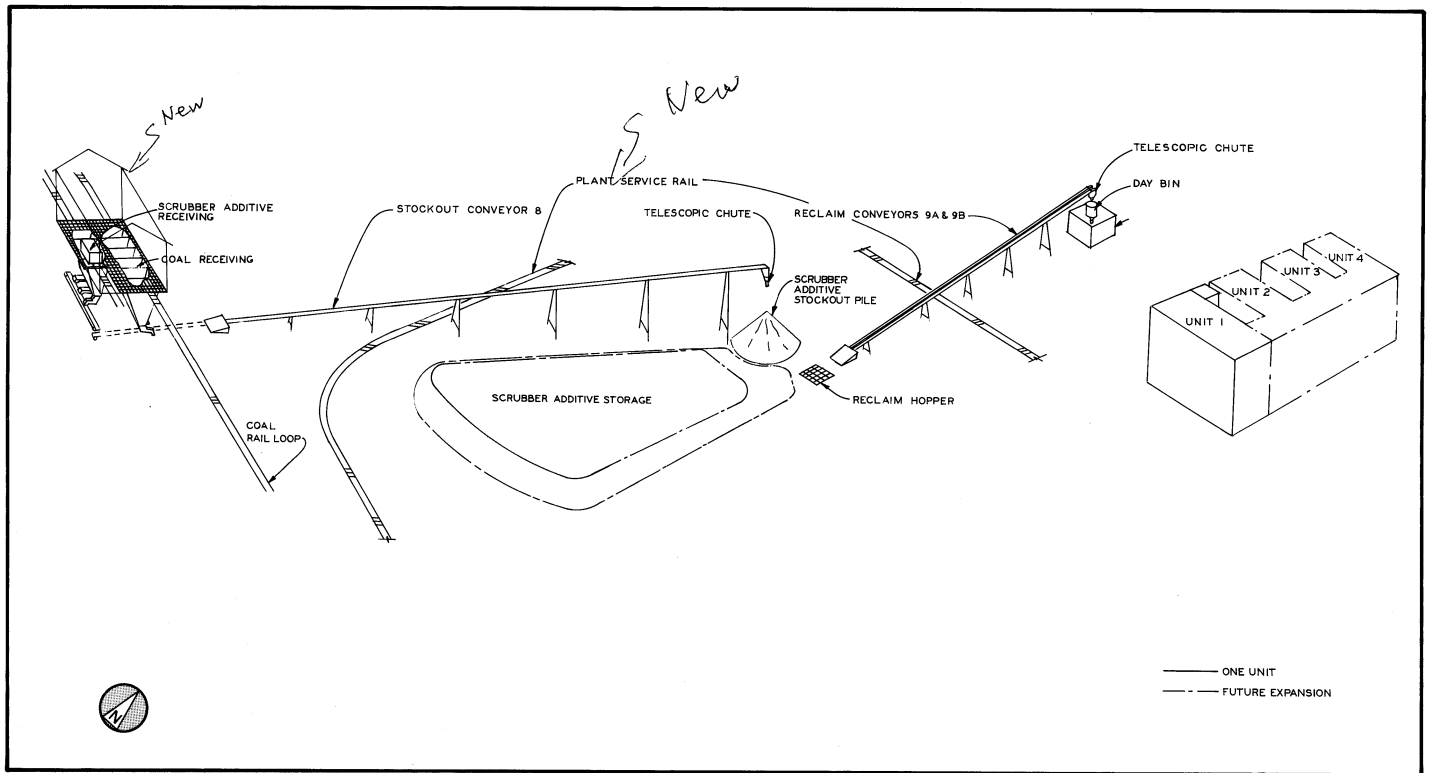


FIGURE 3.9-10. SCRUBBER ADDITIVE HANDLING SYSTEM LAYOUT



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FIGURE 3.9-11. PERSPECTIVE OF SCRUBBER
ADDITIVE HANDLING SYSTEM

OUR
x7

APPENDIX 3.9A
APPLICATION
FOR
RADIOACTIVE MATERIALS LICENSE
FLORIDA
DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES

Request for Modification 1
092383

NON-HUMAN USE

STATE OF FLORIDA
DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES
RADIATION CONTROL
APPLICATION FOR RADIOACTIVE MATERIALS LICENSE

INSTRUCTIONS—Complete Items 1 through 16 if this is an initial application or if application is for renewal of a license. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail four copies to: Department of HRS, 1317 Winewood Blvd., Tallahassee, FL 32301. Upon approval of an application, the applicant will receive a "Radioactive Materials License" issued pursuant to statutory and implementing regulatory authority and subject to all applicable rules, regulations and orders of all appropriate regulatory agencies now or hereafter in effect and to any conditions specified in the license.

1. (a) NAME AND STREET ADDRESS OF APPLICANT. (Institution, firm, company, person, etc.) Orlando Utilities Commission 500 South Orange Avenue, P. O. Box 3193 Orlando, Florida 32802	(b) STREET ADDRESS(ES) AT WHICH RADIOACTIVE MATERIAL WILL BE USED. (If different from 1 (a)) Curtis H. Stanton Energy Center Orange County, Florida Phone No. _____
2. FEE ENCLOSED FOR: ☒ New License application ☐ Amendment request	OFFICE USE ONLY: Fee category: _____ Amount paid: _____
3. (a) PREVIOUS LICENSE NUMBER(S) — (If this is an application for renewal of a license, please give number.) (b) HAVE YOU EVER BEEN DENIED A LICENSE No ☒ Yes ☐ (c) HAS YOUR LICENSE EVER BEEN SUSPENDED OR REVOKED No ☒ Yes ☐ If yes, describe details on additional sheet.	
4. INDIVIDUAL USER(S). (Name and title of individual(s) who will use or directly supervise use of radioactive materials. State training and experience in Items 6 & 7 or documentation attached) To be named later	5. RADIOLOGICAL SAFETY OFFICER (Name of person designated as radiation safety officer. If other than individual user, attach resume of his training and experience as in Items 6 & 7) To be named later

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 (Use supplemental sheets if necessary)

6. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle Answer)	FORMAL COURSE (Circle Answer)
a. Principles and practices of radiation protection			Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments			Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No
d. Biological effects of radiation			Yes No	Yes No

7. EXPERIENCE WITH RADIATION. (Actual use of radioactive materials or equivalent experience.)

RADIOACTIVE MATERIALS	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE

8. (a) RADIOACTIVE MATERIALS. (Element and mass number of each.) Cs 137 Ra 226	(b) CHEMICAL AND/OR PHYSICAL FORM Isotope RaSO ₄	(c) MAXIMUM AMOUNT YOU WILL POSSESS AT ANY ONE TIME (If sealed source(s), also state number of sources and maximum activity per source.) 57 sources - 100 mc maximum 10 sources - 10 mc maximum
--	--	--

9. DESCRIBE PURPOSE FOR WHICH RADIOACTIVE MATERIALS WILL BE USED. (If radioactive material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)

See attached table

10. RADIATION DETECTION INSTRUMENTS. (Use supplemental sheets if necessary.)

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm ²)	USE (Monitoring, surveying, measuring)
N/A					

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.

N/A

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. (For film badges, specify method of calibrating and processing, or name of supplier. State frequency of exchange.)

N/A

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc.
Explanatory sketch of facility is attached.
(Circle answer) ☒ Yes ☐ No

N/A

14. RADIATION PROTECTION PROGRAM.

N/A

15. WASTE DISPOSAL

N/A

CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT ALL INFORMATION CONTAINED IN THIS APPLICATION, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

Applicant named in Item 1

Date: _____

By: _____

Typed name and title of certifying official

NOTE: Any misrepresentation of any material fact found to have been made in securing a license pursuant to this application shall constitute

ATTACHMENT 1

APPLICATION FOR RADIOACTIVE MATERIALS LICENSE

Item	Purpose	Radioactive Material	Chemical or Physical Form	Expected Activity Per Source	Number of Sources	Number of Detectors	Manufacturer	Source Model No.	Detector Type	Detector Model No.	Detector Sensitivity	Detector Window Thickness
1	Precipitator Hopper High Level Switches	Cs 137	Isotope	100 mc Maximum	24	48	Later ¹	Later	Ion Chamber	Later	Later ²	NA
2	Economizer Hopper High Level Switches	Cs 137	Isotope	100 mc Maximum	4	8	Later ¹	Later	Ion Chamber	Later	Later ²	NA
3	Air Heater Hopper High Level Switches	Cs 137	Isotope	100 mc Maximum	2	4	Later ¹	Later	Ion Chamber	Later	Later ²	NA
4	Coal Unloading Hopper Low Level Switches	Cs 137	Isotope	100 mc Maximum	6	6	Later ¹	Later	Ion Chamber	Later	Later ²	NA
5	Coal Reclaim Hopper Low Level Switches	Cs 137	Isotope	100 mc Maximum	2	3	Kay-Ray	7062B	Ion Chamber	Later	Later ²	NA
6	Limestone Reclaim Hopper Low Level Switches	Cs 137	Isotope	100 mc Maximum	2	2	Kay-Ray	7062B	Ion Chamber	Later	Later ²	NA
7	Coal Crusher Hopper Low Level Switches	Cs 137	Isotope	100 mc Maximum	2	2	Kay-Ray	7062B	Ion Chamber	Later	Later ²	NA
8	Plant Coal Surge Hopper Low Level Switches	Cs 137	Isotope	100 mc Maximum	2	2	Kay-Ray	7062B	Ion Chamber	Later	Later ²	NA
9	Scrubber Slurry Density Monitors	Cs 137	Isotope	100 mc Maximum	5	5	Later ¹	Later	Geiger Mueller Tube	Later	Later ³	NA
10	Scrubber Sludge Density Monitors	Cs 137	Isotope	100 mc Maximum	6	6	Later ¹	Later	Geiger Mueller Tube	Later	Later ³	NA
11	Scrubber Thickener Influent Sludge Density Monitor	Cs 137	Isotope	100 mc Maximum	2	2	Later ¹	Later	Geiger Mueller Tube	Later	Later ³	NA
12	Pulverizer Coal Feeder Coal Inlet Monitor	Radium 226	RaSO ₄ (dehydrated)	10 mc Maximum	10	10	Stock	RA-01	Geiger Mueller Tube	TGM Detector Co. #1J334X		NA

¹Manufacturer will be Kay-Ray, Texas Nuclear, or Ohmart.²Typically .25 Mr/Hr, expected range - .2 Mr/Hr to 1 Mr/Hr.³Typically 5 Mr/Hr.

3.10 ONSITE DRAINAGE SYSTEM

Runoff from areas of the site not disturbed by construction activities or plant operations will be directed to the natural drainage systems within the area. Runoff from areas of the site disturbed by construction activities or plant operations will be collected in an engineered system of ditches and ponds as described in the following subsections. A site arrangement showing onsite drainage patterns is shown on Figure 3.10-1.

As described in Subsection 2.5.1, Surface Water Hydrology, the predominant mode of flooding in the vicinity of the site is by sheet flow. The 100-year flood elevations vary from approximately 60 feet, msl at the northeast corner of the plant site, to approximately 90 feet, msl at the southwest. The flood prone areas are shown on Figure 2.5-6. Compacted fill material will be deposited within the plant site so that all major plant facilities are located above the 100-year flood elevation.

3.10.1 Makeup Water Supply Storage Pond

Runoff from the central plant area (excluding the coal storage area, substation, combustion waste storage area, and construction laydown area north of the loop road) will be collected in an engineered ditch system and directed to the unlined makeup water supply storage pond as shown on Figure 3.10-1. Runoff retained within the pond will evaporate, exfiltrate, or be used as cooling tower makeup. Some of the water that seeps out of the pond will rise to the surface on the downstream side of the embankment and be directed to natural drainage systems within the area through the utilization of an embankment toe ditch. The pond will have a surface area of approximately 93 acres and will be surrounded by an embankment having a crest elevation of 80.0 feet, msl. The pond interior will be excavated to an average bottom elevation of 62.0 feet, msl except for a 150-foot wide strip adjacent to the embankment which will be left at existing grade. Excavated material obtained from the pond interior will be used as embankment and/or general site fill. A typical cross section of the makeup water supply storage pond embankment is shown on Figure 3.10-2.

The construction runoff of Unit 1 will be collected for approximately 3-1/2 years before unit operation. The storage capacity of the makeup water supply storage pond will be adequate to retain surface runoff from

3.10-1a

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disturbed areas of the site, and direct pond precipitation for up to 4 years, assuming a total 4-year precipitation of 230 inches. This 4-year total represents the precipitation with a recurrence interval of approximately 25 years. Under these conditions, the maximum potential water surface elevation within the pond would be approximately 77.0 feet. If average annual precipitation were to occur during the entire four years of Unit 1 construction, accumulating to a total of 204 inches, it is estimated that the water surface elevation within the pond would approach an elevation of approximately 72.3 feet. The ratio of total annual surface runoff to total annual precipitation (hereafter denoted as annual runoff ratio) varied from 0.20 for years experiencing average rainfall amounts up to 0.35 for years experiencing total precipitation significantly greater than the annual average.

During Unit 1 operation, the makeup water supply storage pond will be maintained at an operating elevation of 72 feet. It is estimated that at this elevation, the total annual pond losses due to evaporation and seepage will nearly equal total annual site runoff and direct pond precipitation during a year having total precipitation of about 51 inches (mean annual precipitation). At this normal operating level, the pond would still be capable of retaining, without discharge, site runoff and direct precipitation from a 100-year, 24-hour precipitation event. The water surface elevation within the pond will be maintained by makeup from the Orange County Easterly Subregional Wastewater Treatment Plant. In the event the makeup system from the Orange County Plant becomes temporarily inoperable, the makeup water supply storage pond would continue to furnish makeup water to the circulating water system until repairs have been made.

The basis for the determination of the makeup water supply pond size is shown in Appendix 3.10A.

3.10.2 Coal Storage Area Runoff Pond

Surface runoff from the coal storage area will be collected in a lined coal storage area runoff pond (CSA runoff pond), as shown on Figure 3.10-1. The one unit coal pile will have a surface area of approximately 15.4 acres, while the surrounding coal yard area will have an area of 39.6 acres. The

3.10-2

coal pile and yard area are assumed to have pervious surfaces and represent 24 per cent and 60 per cent of the total coal storage area, respectively, which includes the coal pile, coal yard and CSA runoff pond. The CSA runoff pond will have a surface area of approximately 10.4 acres (16 per cent of coal storage area), with an embankment length of 4,100 feet and is designed to retain without discharge the surface runoff and direct pond precipitation from a 24-hour event having a recurrence interval of 10 years. The 10-year, 24-hour precipitation event is considered to be 7.5 inches as indicated in Section 2.6. The capacity of the CSA runoff pond was determined by assuming an average of 50 per cent (3.75 inches) of the design precipitation would occur as surface runoff. This corresponds to a runoff curve number (U.S. Soil Conservation Service) of 67. Runoff from precipitation exceeding the 10-year, 24-hour event will be directed to the recycle basin.

The maximum design water surface elevation within the CSA runoff pond is 79.5 feet, msl. This elevation would result from surface runoff and direct pond precipitation during a 10-year, 24-hour event or greater. The pond bottom will be at Elevation 75 feet, msl and will consist of a one-foot thick layer of compacted material providing cover for a 6-inch thick highly impermeable liner. Soil-cement will be utilized to provide slope protection. A section of the proposed CSA runoff pond embankment is shown on Figure 3.10-3.

Runoff and direct precipitation retained within the CSA runoff pond will be directed to the recycle basin to be used as makeup for the flue gas desulfurization and ash handling systems. Controlled drainage of the CSA runoff pond to the recycle basin will be accomplished through the use of a buried pipeline.

3.10.3 Recycle Basin

The recycle basin, shown on Figure 3.10-1, will be lined to control seepage loss. The recycle basin is designed to provide for the temporary storage of effluents from the neutralization basin and wastewater from the

miscellaneous plant drains. The recycle basin will also receive intermittent flows from the coal storage area runoff pond and the active combustion waste area runoff pond. The recycle basin will provide makeup to the desulfurization and ash handling systems. Blowdown from the cooling tower will provide makeup to the recycle basin as required to maintain proper water surface elevation.

The recycle basin will have a surface area of approximately 15 acres with an embankment length of 5,200 feet. The operating water surface elevation within the recycle basin will be 75 feet, msl corresponding to an average depth of 5 feet. The pond bottom will be at Elevation 70 feet, msl and will consist of a 1-foot thick layer of compacted material providing cover for a 6-inch thick highly impermeable liner. Soil-cement will be utilized to provide slope protection. A section of the proposed recycle basin embankment is shown on Figure 3.10-4. | 5

Compacted site fill will be placed to Elevation 80 feet, msl within the area. The site fill material will be sloped away from the perimeter of the recycle basin to prevent surface runoff from entering the basin. Surface runoff from the area will be directed to the makeup water supply storage pond. | 5

3.10.4 Active Combustion Waste Area Runoff Pond

Surface runoff from the active portion of the combustion waste storage area will be directed to the lined active combustion waste area runoff pond (ACWA runoff pond) shown on Figure 3.10-1. Runoff from both the developed and undeveloped portions of the combustion waste storage area will be directed to natural drainage systems within the area. The developed portion of the waste storage area is defined as a formerly active portion which has been reclaimed by covering with topsoil and reestablished with vegetation. The undeveloped portion is that which has not yet been utilized for combustion waste storage. The undeveloped portion of the area will be reseeded subsequent to site borrow operations.

Approximately 312 acres have been allocated for combustion waste storage. This area will be developed in active increments of approximately

PLANT NAME stanton UNIT 1

UTILITY	<u>orlando O.C.</u>	NAME PLATE CAP. mw	<u>425</u>
COUNTY	<u>Orange</u>	ANN. GENERATION mwh	
TOWN	<u>orlando</u>	HEAT RATE mm btu/h	
LONG/LAT GRW	<u>81° 09' 40" 28° 28' 50"</u>	CONSTRUCTION DATE	
LONG/LAT UTM	<u>484000E 3150500W</u>	ON-LINE DATE	<u>Nov 1986</u>
AQCR REG.		RETIREMENT DATE	<u>130</u>
RIVER BASIN		No. UNITS	<u>1 (unit 2 online 1994)</u>

UNIT DATA

	1	2	3	4	5	6
STATUS	<u>P</u>					
FIRING CAPAB.						
FUEL	<u>C</u>					
UNIT CAPACITY mw						
UNIT FACTOR	<u>53.6</u>					
HEAT RATE mm btu/h						
FUEL CONS. #/h	<u>154-191</u>	<u>(750,000 - 1,100,000 tons/year)</u>				
BOILER MFR.						
STACK DATA						
HEIGHT ft						
DIAMETER ft						
EXIT VEL. ft/s						
EXIT TMP. °F						
SO2 CONTROL						
TYPE	<u>limestone scrubbing (1800 tons/wk by rail & truck)</u>					
EFFICIENCY						
PARTIC. CONTROL						
TYPE	<u>col. s. b. esp</u>					
EFFICIENCY						

FUEL DATA

	OIL	COAL
% SULFUR		<u>.71 - 3.1</u>
% ASH		<u>7.0 - 11.0</u>
HEAT CONTENT		<u>11,000-13,500 btu/lb</u>
SOURCE		<u>wash sec. or washed Appl.</u>

WATER SUPPLY

	COOLING	BOILER	ASH TRANSPORT
SOURCE			
MINIMUM 7-Q-10			
TYPE SYSTEM			
INTAKE cfs			
DISCHARGE cfs			
CONSUMPTION cfs			
DISCH. POINT			
DISCH. PH			
DISCH. SS ppm			
DELTA T			
HEAT REJECTION (btu x 10 ⁹)/h			

Coal Transportation — UNIT Trains, 70-100 100-ton cars, 2-3 trains/wk
 Seaboard Coastline RR — spur 800 ft corridor
 single track, elevated above 100 ft flood by embankment
 w. trestles & wildlife openings 2-20 miles
 8 mile plant access road

POT. CSP
 receiving considered

- 2 -

(Con't)

(80 acres in 15 acre cells)
for unit 1 sub. p.
312 acre claw sub. p.

ORIG. VOLUME ft³
 ORIG. CAPAC. t ash
 REMAINING VOL. ft³
 REMAINING CAPAC. t ash
 FILL DATE
 vol. reg.

Retirement
5,220 AF for 30 years
plant 1: for

BASAL AREA ft² _____ STORAGE CAPAC. t _____
HEIGHT ft _____ SUPPLY days _____

ALLOWABLE SO₂ EMISSION (lbs/mm btu)

PERMIT NUMBER _____
EFFECTIVE DATE _____
REISSUE DATE _____
EXPIRATION DATE _____
RECEIVING WATER _____

DATA

ESP → Fly Ash $\xrightarrow[4.6K]{\text{VACUUM}}$ Silo

Boiler hopper $\xrightarrow[2.4]{\text{vac}}$ Silo

FGD Hyd. $\rightarrow$ [Dewatering] $\rightarrow$ Silo

Waterwater

pulverizer rejects 3.8K

Boiler ash 14.9K $\rightarrow$ Hyd

Trans. Tank

Dewatering bins

TRUCK $\rightarrow$ SW DISP

pulverizer

~~Pulverizer~~
~~reflects~~

[illegible]

1945 1950 1955 1960 1965 1970 1975 1980 1985 1990

[illegible]

RETIRED DATE

15 acres. The ACWA runoff pond is designed to collect surface runoff from the active combustion waste storage area and direct precipitation from a 24-hour event having a 100-year recurrence interval (10.8 inches). The capacity of the runoff pond was determined by assuming an average of 90 per cent or 9.72 inches of the design precipitation would occur as surface runoff. The surface area of the runoff pond will be approximately 5.0 acres. | 5

Because of the relatively low relief in the area the maximum potential water surface elevation within the active combustion waste area runoff pond caused by a 100-year, 24-hour event was limited to 83 feet, msl. Existing grade at this location is approximately 88 feet. The pond bottom will be at Elevation 78 feet and will consist of a 1-foot thick layer of compacted material covering a 6-inch thick impermeable liner. Soil-cement will be utilized to provide slope protection. A section of the proposed active combustion waste area runoff pond embankment is shown on Figure 3.10-5. A low berm will be constructed to Elevation 89 feet around the perimeter of the ACWA runoff pond to prevent the inflow of surface runoff from undisturbed areas. Surface runoff from undisturbed areas surrounding the ACWA runoff pond will be directed to natural drainage systems within the area. | 5

Runoff and direct precipitation retained within the ACWA runoff pond will be directed to the recycle basin to be used as makeup for the desulfurization and ash handling systems. Controlled drainage of the ACWA runoff pond to the recycle basin will be accomplished through the use of a buried pipeline.

3.10.5 Construction Laydown Area

The construction laydown area north of the loop road, as shown on Figure 3.10-1, will be graded to direct runoff to a ditch and embankment system located on the north side of the area. The ditch system is designed to retain the annual runoff and direct precipitation resulting from a year with total precipitation having a 10-year recurrence interval. Runoff collected will either evaporate or exfiltrate from the ditch system. Runoff from precipitation exceeding the 10-year annual precipitation will be directed to the general site drainage system in the area. | 5

3.10-5

Issue

15 acres. The ACWA runoff pond is designed to collect surface runoff from the active combustion waste storage area and direct precipitation from a 24-hour event having a 100-year recurrence interval (10.8 inches). The capacity of the runoff pond was determined by assuming an average of 90 per cent or 9.72 inches of the design precipitation would occur as surface runoff. The surface area of the runoff pond will be approximately 4.0 acres.

The maximum potential water surface elevation within the active combustion waste area runoff pond caused by a 100-year, 24-hour event is 88 feet. Existing grade at this location is approximately 89 feet. The pond bottom will be at Elevation 81 feet and will consist of a 1-foot thick layer of compacted material covering a 6-inch thick impermeable liner. Soil-cement will be utilized to provide slope protection. A section of the proposed active combustion waste area runoff pond embankment is shown on Figure 3.10-5. A low berm will be constructed to Elevation 90 feet around the perimeter of the ACWA runoff pond to prevent the inflow of surface runoff from undisturbed areas. Surface runoff from undisturbed areas surrounding the ACWA runoff pond will be directed to natural drainage systems within the area.

Runoff and direct precipitation retained within the ACWA runoff pond will be directed to the recycle basin to be used as makeup for the desulfurization and ash handling systems. Controlled drainage of the ACWA runoff pond to the recycle basin will be accomplished through the use of a buried pipeline.

3.10.5 Construction Laydown Area

The construction laydown area north of the loop road, as shown on Figure 3.10-1, will be graded to direct runoff to a ditch and embankment system located on the north side of the area. The ditch system is designed to collect the surface runoff and direct precipitation from a 24-hour event having a 100-year recurrence interval (10.8 inches). Runoff collected will either evaporate or exfiltrate from the ditch system. Runoff from precipitation exceeding the 100-year, 24-hour event will be directed to the general site drainage system in the area.

The maximum design water surface elevation within the runoff retention area is 79.5 feet. The top elevation of the embankment and grade elevation of the site fill material will be at Elevation 80 feet. The average bottom elevation of the ditch system will be 73 feet, resulting in an average water depth at design capacity of 6.5 feet. A section of the proposed construction laydown area runoff retention system is shown on Figure 3.10-6. The capacity of the runoff retention area was determined by assuming an average of 60 per cent of the design annual precipitation would occur as surface runoff. The surface area of the runoff retention system will be approximately 7.7 acres. This represents about 15 per cent of the total contributing drainage area (50 acres).

3.10.6 Substation

The substation location is shown on Figure 3.10-1. The substation area will be raised above the 100-year flood elevation by the placement of compacted fill material. The top of this material will be covered with a layer of crushed stone and graded nearly level to promote percolation. Storm water runoff from the substation area will be directed to natural drainage systems within the area. Foundations of structures supporting equipment containing oil will be curbed to provide for cleanup of potential spills.

The maximum design water surface elevation within the runoff retention area is 77 feet, corresponding to the top elevation of the embankment and grade elevation of the site fill material. The average bottom elevation of the ditch system will be 73 feet, resulting in an average water depth at design capacity of 4 feet. A section of the proposed construction laydown area runoff retention system is shown on Figure 3.10-6. The capacity of the runoff retention area was determined by assuming an average of 40 per cent (4.32 inches) of the design precipitation would occur as surface runoff. This corresponds to a runoff curve number of 52. The surface area of the runoff retention system will be approximately 5.7 acres. This represents about 6 per cent of the total contributing drainage area (90 acres).

3.10.6 Substation

The substation location is shown on Figure 3.10-1. The substation area will be raised above the 100-year flood elevation by the placement of compacted fill material. The top of this material will be covered with a layer of crushed stone, graded nearly level to promote percolation. A perimeter ditch and embankment system will be constructed around the substation. This system will be designed to retain the runoff and direct precipitation from a 24-hour event having a 100-year recurrence interval.

No. 1.

**ORLANDO UTILITIES COMMISSION
CURTIS H. STANTON ENERGY CENTER
UNIT 1**

SITE CERTIFICATION APPLICATION

VOLUME 3

SITE CERTIFICATION
APPLICATION

ORLANDO UTILITIES COMMISSION
CURTIS H. STANTON ENERGY CENTER
UNIT 1

VOLUME 3

APPLICATION FOR CERTIFICATION OF A PROPOSED
ELECTRICAL POWER GENERATING PLANT SITE

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5.0 ENVIRONMENTAL EFFECTS OF PLANT OPERATION

5.1 EFFECTS OF OPERATION OF HEAT DISSIPATION SYSTEM

5.1.1 Temperature Effect on Receiving Body of Water

There will be no discharge of heated effluent from the Stanton Energy Center to any natural body of water. Consequently, there will be no thermal impacts on the aquatic environment.

5.1.2 Thermal Limits

The pretreatment standards are presented in Subsection 5.2.1. Temperature of the effluent returned to the Iron Bridge Facility may not exceed 40 C (104 F). The plant will not have any difficulty in meeting the pretreatment limit.

5.1.3 Effects on Aquatic Life

No withdrawals of water will be made from any river, stream, or other surface water. Therefore no problems with the entrainment or impingement of aquatic organisms will occur. Since there will also be no discharges from the plant, aquatic flora and fauna will not be effected by any chemical effluents.

5.1.4 Effects and Implication of Entrainment

This subsection is not applicable to the proposed plant.

5.1.5 Biological Effects of Modified Circulation

This subsection is not applicable to the proposed plant.

5.1.6 Plant Operation Effects

See Subsection 5.1.7.

5.1.7 Effects of Off-Stream Cooling

The following subsections discuss the environmental effects associated with using natural draft cooling towers to reject the plant's waste heat. Environmental concerns result from the cooling tower's water evaporation, blowdown, and drift and from the possible effects of mixing the cooling tower plume with the stack plant emissions.

5.1.7.1 Cooling Tower Water Evaporation. One environmental effect from cooling tower evaporation is the possibility of causing fog. Fog occurs when the air reaches its saturation point with regard to water. Should the atmospheric air have a small saturation deficit, the cooling tower plume may mix with the air, causing a visible plume. The large amount of water evaporated by the cooling tower (3,560 gpm at maximum load, 2,370 gpm at average load), and the high relative humidity of the area, may frequently result in the formation of a visible plume from the cooling tower. The formation of a visible plume is not a problem unless it reaches the ground, causing visibility problems on roads, navigable waters and airports. Since the cooling tower will be approximately 430 feet tall, it is expected that the visible plume from the cooling tower will not reach the ground. The conclusion is substantiated by observation of natural draft cooling tower plumes in the United States and England. Further evaluations of possible increased ground fogging were made using the computer program ORFAD (Oak Ridge Fog and Drift Code). The results of this computer program using 1974 and 1975 weather data from Orlando indicates that the operation of the natural draft cooling tower will create no additional hours of ground fog. Therefore, it is expected that the evaporation of water in the cooling tower will have no environmental effects on fogging. | 5

5.1.7.2 Cooling Tower Blowdown. The cooling tower blowdown will be used as scrubber and ash handling system makeup water or returned to the Iron Bridge Facility. Since the cooling tower blowdown will not be discharged to any receiving body of water, it will have no environmental effects.

5.1.7.3 Cooling Tower Drift. The cooling tower will be guaranteed by the manufacturers to have a drift rate of 0.005 per cent of the circulating water flow or less. Therefore, the maximum expected water emitted from the Unit 1 tower as drift will be 10 gpm. Cooling tower drift will have the same chemical properties as the water in the cooling towers. The normal operating concentration of total dissolved solids in the cooling tower water is 2,667 mg/liter. The concentrations of the chemical constituents of the total dissolved solids are estimated as follows.

Calcium	317 mg/l
Magnesium	72 mg/l
Sodium	448 mg/l
Bicarbonate	244 mg/l
Chloride	766 mg/l
Sulfate	716 mg/l
Silicon dioxide	135 mg/l
Iron	5 mg/l
Nitrate	44 mg/l
Phosphorus	20 mg/l

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The above information was used in a computer program to predict the annual drift deposition. The computer program used is the Saline Drift Code developed by Johns Hopkins University. The results of the computer analysis for Unit 1 are shown on Figure 5.1-1. The results are based on an annual average of Orlando weather data for years 1974 through 1978.

The data on Figure 5.1-1 are isopleths of cooling tower drift solids deposition expressed in terms of pounds per acre per year. The isopleths on Figure 5.1-1 show that the maximum expected annual average solids deposition offsite from the Unit 1 cooling tower is between 1 and 2 lb/acre/yr. The maximum expected deposition onsite on undeveloped area near the cooling tower is approximately 24 lb/acre/year from Unit 1.

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The evaluation of the environmental effects of the cooling tower drift must include the natural background salt deposition. Because this information is not available for the site, estimates of the background salt deposition have been based on studies at Chalk Point.⁽²⁾ The Chalk Point Plant and the Stanton Energy Center are located at similar distances from the

ocean. Based on background measurements at Chalk Point, background salt deposition at Stanton Energy Center is estimated to be 10 to 15 lbs per acre per year. Total maximum salt deposition on the undeveloped site area near the tower is estimated to be 34 to 39 lb/acre/yr.

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The evaluation of the environmental effect of the addition of the cooling tower drift of Unit 1 to background salt deposition is based on studies at Chalk Point. The results of studies with sandy soils at Chalk Point⁽²⁾ suggest that depositions of 1,070 lb/acre/yr of salt can cause some accumulation in the soil. Other experiments indicate that smaller deposition rates cause no accumulation.⁽³⁾ Since the greatest expected deposition at Stanton Energy Center is less than 5 per cent of this, no soil accumulation of salt is expected from the operation of Unit 1 cooling tower.

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Chalk Point studies of crops indicate that the threshold deposition rates of salt at which effects are observed is about 220 lb/acre/yr.⁽⁴⁾ This is much greater than the expected maximum onsite deposition of 39 lb/acre/yr at the Stanton Energy Center. Studies on the effects of deposition on trees include dogwood, Virginia pine, tulip poplar, Norway spruce, white ash and California privet.⁽⁴⁾ Observable effects were demonstrated with dogwood. The studies indicate that a deposition rate of chloride of approximately 21 lb/acre/yr could affect the dogwood tree. The expected maximum chloride deposition on trees including background at Stanton Energy Center Unit 1 is approximately 15 lb/acre/yr for a small area near the cooling tower. This is below the threshold for dogwoods, the most salt sensitive tree tested. The dogwood tree is not present on the site; the site vegetation is dominated by species exhibiting greater tolerances to salt and should not be significantly affected.

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Based on the above evaluation, the salt deposition from Unit 1 cooling tower is not expected to have any adverse effect on onsite or offsite soils, plant life and trees.

Potential cooling tower drift deposition rates for the 4 unit development are illustrated by Figure 5.1-2. The isopleths on this figure are based on the assumption that the three additional cooling towers would operate similarly to the Unit 1 tower.

5.1-4

5.1.7.4 Cooling Tower-Stack Plume Mixing. The environmental effects that result from the mixing of the cooling tower plume and the stack plume are uncertain. However, it is expected that no appreciable impacts will occur. The emission from the stack will consist of saturated flue gas saturated with water. Since the flue gas is already saturated, contact with the cooling tower plume is expected to not cause any change.

5.1.8 References

- (1) C. L. Mulchi, D. C. Wolf, J. A. Armbruster, G. McClung, and L. W. Douglas, in "Cooling Tower Environment-1978," PPSP-CPCTP-22, WRRRC Special Report No. 9, May 1978, pp. III-39 to III-5.
- (2) R. W. McCormick, D. C. Wolf, G. McClung, and J. E. Foss, in "Cooling Tower Environment-1978," PPSP-CPCTP-22, WRRRC Special Report No. 9, May 1979, pp I-111 to I-130.
- (3) B. A. Francis, "Effect of Simulated Cooling Tower Drift on Woody Species," PPSP-CPCTP-17, WRRRC Special Report No. 5, July 1977.
- (4) The Johns Hopkins University, "Environmental Assessment of Chalk Point Cooling Tower Drift and Vapor Emission," PPSP-CPCTP-28, March 1979.

5.2 EFFECTS OF CHEMICAL AND BIOCIDES DISCHARGES

5.2.1 Industrial Wastewater Discharges

No discharges of wastewater will be made to navigable waters. There will be only one effluent stream from the Curtis H. Stanton Energy Center and it will be transported to the Orange County Easterly Subregional Wastewater Treatment Plant.

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The U.S. Environmental Protection Agency requires that wastewater discharges from fossil-fuel fired power plants to publicly owned sewage treatment works (POTW) meet pretreatment standards. The pretreatment regulations prohibit the power plant discharge from causing interference with the receiving POTW. The pretreatment regulations also contain more specific effluent limitations. The effluent limitations applicable to the Stanton Energy Center Unit 1 are as follows.

- (1) Discharges cannot contain pollutants which create a fire or explosion hazard.
- (2) Discharges cannot cause corrosive structural damage to the POTW.
- (3) Discharges cannot contain solid or viscous pollutants in amounts which will cause obstruction to the flow in sewers or other interference with the operation of the POTW.
- (4) Discharges may not contain heat in amounts which will inhibit biological activity in the POTW resulting in interference with the proper operation of the POTW. In no event can the discharge exceed 40 C (104 F).

The discharge to the POTW must also comply with the effluent limitations applicable to steam electric generating plants except for the heat and chlorine limitation. However, if the POTW's wastewater discharge (NPDES) permit specifies a per cent removal of an incompatible pollutant which is in the power plant's discharge, then the allowable amount of that pollutant in the power plant's discharge will be correspondingly reduced in stringency. The relaxation in standards does not apply to pollutants which are prohibited from being discharged under the new source standards.

The effluent from the Stanton Energy Center to the Orange County Plant will consist primarily of cooling tower blowdown. If required for water management purposes, wastewater from the plant floor drain system will also be returned to the Orange County Plant, after routing through oil separation devices. The expected quality of the blowdown is described in detail in Section 3. This wastewater will meet the EPA prescribed limitations for influent to a POTW and will not interfere with proper operation of the POTW.

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The wastewater will be separately treated at the Orange County Plant and blended with the normal plant effluent not being sent to the Stanton Energy Center. The only discernible effect of the wastewater from the Stanton Energy Center will be an increase in the concentration of total dissolved solids in the Orange County Plant effluent although the total amount of solids being discharged from the Orange County Plant will only be increased slightly.

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5.2.2 Leachate

There are three main potential sources of leachate at the site; seepage from the coal storage area, seepage from the combustion wastes storage area, and seepage from the scrubber additive storage area. The approximate locations of these areas are shown on Figure 3.1-4. These three sources and an assessment of the impacts of the leachate are described in the following sections.

5.2.2.1 Coal Storage Area. The coal storage area will encompass an area of about 52 acres with Unit 1. The coal pile itself will be approximately 15.4 acres in area by about 40 feet high. A lined coal storage area runoff pond of about 10.4 acres will collect the rainfall runoff water from the coal pile and surrounding area. The coal pile itself, the collection ditch system, and surrounding areas will be unlined.

Data from literature and the EPA Development Document indicates that rainfall contacting coal will tend to leach out certain constituents.⁽¹⁾

The leachate from a coal pile will vary appreciably as to the substance leached and concentration depending upon the coal source used and transient circumstances.

Table 5.2-1 lists values given for coal pile runoff of several coal sources from the EPA Development Document. Runoff concentrations vary quite widely, as might be expected. Some runoff is acidic, while others are neutral to alkaline. Iron is usually present and other metals may be present in small amounts including copper and aluminum. Dissolved ions that are normally present in ground water, including sodium, calcium, and chloride, may also be leached. The presence of pyritic sulfur has considerable bearing; the higher sulfur coals have the most potential for contamination.

Precipitation on the coal pile will flow several ways. A portion of the rainfall will flow off the surface of the pile and will be transported to the coal storage area runoff pond via a runoff ditch system. This rainwater will only contact the top layer of the coal pile and is expected to have minimal contamination. A portion of the rainfall will tend to seep into the coal pile due to the porous structure of the coal pile. A portion of this seepage will remain in the coal and evaporate from the coal pile during non-rainfall periods or will evaporate when the coal enters the boiler. A portion of the seepage will penetrate through the coal pile to the underlying supporting soil. It is this water that has potential for leachate contamination. The seepage will then either flow laterally to the collection ditches and be transported to the coal storage area runoff pond or will percolate to the underlying water table aquifer.

The potential for impact to the ground water is a function of the quantity of water which is able to infiltrate to the water table. The permeability of the site area soil is estimated to be about 1×10^{-4} cm/sec. Due to a low hydraulic gradient, lateral movement of water through the water table aquifer is quite slow, on the order of 56 gpm through the entire site area. The water that percolates to the ground water beneath the coal pile will partially mix with the existing ground water flow and slowly move in a generally easterly direction. It is expected that the

ground water quality will meet the State of Florida water quality criteria beyond the zone of discharge.

Coal pile leachate which flows laterally to the collection ditches will be routed to the coal storage area runoff pond where it is diluted with surface runoff in the collection ditch system from surrounding areas, and direct precipitation on the pond. Water from the coal storage area runoff pond will be directed to the recycle basin for use in other plant systems as discussed in Section 3.

5.2.2.2 Combustion Wastes Storage Area. Combustion wastes include bottom ash, pulverizer rejects, boiler hopper ash, fly ash, and flue gas scrubber solids.

Dewatered bottom ash and coal pulverizer rejects are hydraulically transported to dewatering bins. The dewatered material will be transported by truck to the combustion waste storage area. This material consists of about 15 per cent water and 85 per cent solids (larger particles and slag). The water entrained in the ash will be the same quality as water in the sluicing/conveying system.

Boiler hopper ash and fly ash will be pneumatically conveyed to a silo where it is held for mixing with scrubber sludge. Scrubber sludge will be dewatered to approximately 50 to 60 per cent solids and will then be mixed with the fly ash/boiler hopper ash to form a homogeneous mixture that is physically stable and therefore can be easily handled and stored. If alkalinity is present in the mixture from the fly ash, cementitious (hardening) reactions will also take place. In addition, lime will be added to the fly ash/scrubber sludge mixture for further fixation of the sludge. These reactions will increase the bearing strength, decrease the permeability, and reduce the quantity of leachable ions. Trucks will be used to haul the boiler hopper ash/fly ash/dewatered scrubber sludge mixture to the combustion waste storage area.

Combustion waste storage will be developed in approximately 15 acre active segments and piled to an estimated height of 68 feet. The pile will be shaped to prevent erosion and compacted to assure structural stability.

Combustion

waste material will be compacted which may produce a permeability as low as 1×10^{-6} cm/sec, therefore minimizing any leachate contamination of ground water. Runoff from the actively worked segment will be collected by a perimeter ditch system and routed to a temporary combustion waste disposal area runoff basin. Water from this basin will be pumped to the combustion waste runoff pond. From the combustion waste runoff pond, water will be drained to the recycle basin for use in other plant systems.

Due to the low permeability of the stabilized combustion waste itself and the use of lined runoff ponds, it is expected that significant amounts of contaminants will not enter the ground water aquifer.

5.2.2.3 Scrubber Additive Storage. Limestone will be used as the scrubber additive and will be stored onsite in an unlined pile about 4 acres in area by 25 feet high. Rainfall runoff from the pile will be collected and transported to the makeup water pond.

The scrubber additive will consist of approximately 85 per cent CaCO_3 , the remainder being inert material.

Limestone is naturally abundant in numerous rock formations in Florida. Some of the rainfall on the storage pile could be expected to percolate through the pile. Calcium carbonate is only slightly water soluble in any but acidic conditions. Under acidic conditions, metals in the inert portion of the scrubber additive pile could also possibly be leached. However, the limestone will rapidly neutralize any acidity in the rainfall. No adverse effects are foreseen from the minimal leachate expected from the scrubber additive storage pile.

5.2.3 Cooling Tower Blowdown

There will be no discharge of cooling tower blowdown to any surface or ground waters. A portion of the blowdown will be collected in the recycle basin and utilized in the flue gas desulfurization system. The remainder of the blowdown material will be returned to the Orange County Easterly Subregional Wastewater Treatment Plant.

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5.2.4 Reference

- (1) Development Document for Effluent Limitation, Guidelines, and New Source Performance Standards for the Steam Electric Power Generating Point Source Category, U.S. Environmental Protection Agency, October 1974.

TABLE 5.2-1. COAL PILE DRAINAGE CHEMICAL CHARACTERISTICS

Plant Code	Alkalinity mg/l	BOD ^a mg/l	COD ^b mg/l	TS ^c mg/l	TDS ^d mg/l	TSS ^e mg/l	Ammonia mg/l	Nitrate mg/l	Phosphorus mg/l	Turbidity mg/l	Acidity mg/l	Total Hardness mg/l	Sulfate mg/l	Chloride mg/l	Aluminum mg/l	Chromium mg/l	Copper mg/l	Iron mg/l	Magnesium mg/l	Zinc mg/l	Sodium mg/l	pH pH
3402	6	0	1,080	1,330	720	610	0	0.3	-	505	-	130	525	3.6	-	0	1.6	0.168	-	1.6	1,260	2.8
3401	0	0	1,080	1,330	720	610	0	0.3	-	505	-	130	525	3.6	-	0	1.6	0.168	-	1.6	1,260	2.8
3936	0	10	806	9,999	7,743	22	1.77	1.9	1.2	-	-	1,109	5,231	481	-	0.37	-	-	89	2.43	160	3
1825	-	-	85	6,000	5,800	200	1.35	1.8	-	-	-	1,850	861	-	-	0.05	-	0.06	174	0.006	-	4.4
1726	82	3	1,099	3,549	247	3,302	0.35	2.25	0.23	-	-	-	133	23	-	-	-	-	-	0.08	-	7.8
1729	-	-	-	-	-	-	-	-	-	-	-	-	6,837	-	-	-	-	0.368	-	-	-	2.7
3626	-	-	-	-	28,970	100	-	-	-	-	21,700	-	19,000	-	1,200	15.7	1.8	4,700	-	12.5	-	2.1
0107	0	-	-	45,000	44,050	950	-	-	-	-	27,810	-	21,920	-	825	0.3	3.4	93,000	-	23	-	2.8
5305	21.36	-	-	-	-	-	-	-	-	8.37	8.68	-	-	-	-	-	-	1.0	-	-	-	6.7
5305	14.32	-	-	-	-	-	-	-	-	2.77	10.25	-	-	-	-	-	-	1.05	-	-	-	6.6
5305	36.41	-	-	-	-	-	-	-	-	6.13	8.84	-	-	-	-	-	-	0.9	-	-	-	6.6

^aBOD - Biochemical Oxygen Demand^bCOD - Chemical Oxygen Demand^cTS - Total Solids^dTDS - Total Dissolved Solids^eTSS - Total Suspended Solids

SOURCE: Reference 1

5.3 IMPACTS ON WATER SUPPLY

5.3.1 Drinking Water

The Floridan aquifer is the only aquifer used for drinking water purposes that will be affected by the plant. The configuration of the potentiometric surface of the Floridan aquifer will be affected by water withdrawals from the water-supply wells on the site. The effects are described in Section 5.3.3, Ground Water.

The non-artesian aquifer is not suitable for drinking water unless it is chemically treated. The effects on the quality, quantity, and piezometric surface in the non-artesian aquifer are described in Section 5.2.2, Leachate and 5.3.3, Ground Water.

5.3.2 Surface Water

There are no major surface waters on the Stanton Energy Center site. Headwaters of the Hart and Cowpen Branches of the Econlockhatchee River exist within the buffer zone east of the plant facilities.

The proposed site drainage system will be designed to comply with all federal, state, and local regulations regarding the concept of zero discharge. Runoff from areas of the site not disturbed by construction activities or plant operations will be directed to the natural drainage systems within the area. Runoff from areas of the site disturbed by construction activities or plant operations will be collected in an engineered system of ditches and ponds as described in Section 3.10.

The proposed site area is located primarily in the Econlockhatchee River drainage basin, as shown on Figure 2.5-2. A relatively small portion of the site lies within the Ajay-East Tohopekaliga Canal drainage basin.

The site drainage system will intercept that part of the natural surface runoff corresponding to areas of the site disturbed by construction or plant operation. Undisturbed areas of the site will continue to contribute surface runoff to existing drainage basins. Table 5.3-1 indicates the total plant area within each drainage basin as well as those portions of plant area which will be considered disturbed and undisturbed based on Unit 1 operation.

The amount of total drainage area occupied by disturbed areas may be calculated to be 24 and 7 per cent for the Hart Branch and Cowpen Branch drainage basins, respectively. For Green Branch, the unnamed tributary, and the Econlockhatchee River, measured just downstream from Cowpen Branch, disturbed areas occupy less than one per cent or less, of the total drainage areas. The percentage of each drainage basin occupied by disturbed plant areas indicates the amount by which surface runoff to the stream will be reduced due to the site runoff collection system.

The proposed plant operations are not expected to affect water quality within the area. Undisturbed plant areas will remain in their natural state and runoff water quality characteristics are expected to remain unchanged.

5.3.3 Ground Water

This section describes the intersections between the ground water aquifers and the plant facilities. The description is based on empirical analyzes using data from published or open file reports and from onsite studies. When possible, calculations have been completed using measured or anticipated values for variables. Descriptions of the existing ground water environment are presented in Section 2.5, and descriptions of the plant and associated facilities are presented in Section 3.

The quality, quantity and configuration of the piezometric surface of the ground water in the non-artesian aquifer will be influenced by leachate seeping from the material storage areas and the water storage ponds. The effects of the seepage on water quality are discussed in Subsection 5.2.2. The piezometric surface in the aquifer will increase due to seepage from the site water storage facilities. The estimated amount of seepage for each water storage facility is given in Table 5.3-2. The changes in the configuration of the piezometric surface of the non-artesian aquifer will be monitored through the installation of site piezometers as described in Section 6. The changes are anticipated to be greatest in the areas of greatest seepage and infiltration and to decrease radially from these areas.

The effect of seepage on ground water quantities and on the configuration of the piezometric surface will be short term and temporary. When plant operation ceases, water storage ponds will be breached and abandoned which will eliminate further seepage into the ground water. The ground water piezometric surface will return to pre-operational configuration within a short period of time after plant operations are ceased.

The configuration of the potentiometric surface of the ground water in the Floridan aquifer will be affected by withdrawal of water from two of the three water-supply wells on the site. When each of two wells will be pumping at a constant discharge rate of 850 gpm, the drawdown will be approximately 5.5 feet at the location of the wells and will reduce to less than 1 foot at 2 miles from the wells. Major water-supply wells near the site are shown on Figure 5.3-2. The effect on these surrounding water-supply wells will depend on their construction and proximity to the site wells. Additional drawdown at the Cocoa Well Field, six miles southeast of the plant wells, is calculated to be less than one foot. Since the drawdown from the wells will be minimal, the effect on surrounding water supply wells will be minimal.

The effects of drawdown will be short term and temporary. The potentiometric surface will rapidly return to approximately its original condition whenever the water-supply wells on the site are not pumped.

5.3.4 Bibliography

- Schiner, G. R. and Hayes, E. C., "Potentiometric Surface Map of the Floridan Aquifer in the St. Johns River Water Management District and Vicinity, Florida, September, 1980." U.S. Geological Survey Open-File Report 81-136, 1980.
- U.S. Geological Survey, Water Resources Data for Florida, Volume 1, Northeast Florida, 1980.

The effect of seepage on ground water quantities and on the configuration of the piezometric surface will be short term and temporary. When plant operation ceases, water storage ponds will be breached and abandoned which will eliminate further seepage into the ground water. The ground water piezometric surface will return to pre-operational configuration within a short period of time after plant operations are ceased.

The configuration of the potentiometric surface of the ground water in the Floridan aquifer will be affected by withdrawal of water from two of the three water-supply wells on the site. When each of two wells will be pumping at a constant discharge rate of 850 gpm, the drawdown will be approximately 7 feet at the location of the wells and will reduce to less than 1 foot at 35 miles from the wells. The effect of the drawdown on the potentiometric surface as a function of distance is shown on Figure 5.3-1. The cone of depression around the wells will be extremely flat. Major water-supply wells within this 35 mile range where drawdown effects may be greater than one foot are shown on Figure 5.3-2. The effect on these surrounding water-supply wells will depend on their construction and proximity to the site wells. Additional drawdown at the Cocoa Well Field, six miles southeast of the plant wells, is calculated to be on the order of 2 feet. Additional drawdown around the numerous springs northwest of Orlando is calculated to be on the order of 1 foot. Since the drawdown from the wells will be minimal, the effect on surrounding water supply wells will be minimal.

The effects of drawdown will be short term and temporary. The potentiometric surface will rapidly return to approximately its original condition whenever the water-supply wells on the site are not pumped.

5.3.4 Bibliography

- Schiner, G. R. and Hayes, E. C., "Potentiometric Surface Map of the Floridan Aquifer in the St. Johns River Water Management District and Vicinity, Florida, September, 1980." U.S. Geological Survey Open-File Report 81-136, 1980.
- U.S. Geological Survey, Water Resources Data for Florida, Volume 1, Northeast Florida, 1980.

TABLE 5.3-1. COMPARISON OF TOTAL DRAINAGE AREA TO DISTURBED/UNDISTURBED PLANT AREAS*

<u>Drainage Basin</u>	<u>Total Drainage Area acres</u>	<u>Total Plant Area Within Each Drainage Basin acres</u>	<u>Disturbed Plant Area Within Each Drainage Basin acres</u>	<u>Undisturbed Plant Area Within Each Drainage Basin acres</u>
Econlockhatchee River	52,942**	3,241	460	2,781
Unnamed tributary north of site	4,992	257	3	254
Hart Branch	1,280	984	310	674
Cowpen Branch	1,792	1,305	130	1,175
Green Branch	2,688	695	17***	678
Ajay-East Tohopekaliga Canal	109,440	39	0	39

*During initial plant operation.

**Measured just downstream of confluence with unnamed tributary.

***Includes 15 acres active combustion waste storage.

TABLE 5.3-2. AVERAGE EXPECTED SEEPAGE FROM PLANT FACILITIES*

Seepage Source (Facility)	Surface	Embankment	Bottom	Embankment	Total Seepage	
	Area (acres)	Length (feet)	Seepage (gpd)	Seepage (gpd)	(gpd)	(gpd/acre)
Coal Storage Area	10.4	4,100	860	430	1,290	124
Runoff Pond			(4,100)	(655)	(4,755)	(457)
Recycle Basin	15.0	5,200	3,640	600	4,240	283
			(10,400)	(3,225)	(13,625)	(908)
Makeup Water Supply	93.0	10,000	133,650	8,530	142,180	1,530
Storage Pond			(243,770)	(21,200)	(264,970)	(2,850)
Active Combustion Waste	5.0	1,900	400	200	600	120
Area Runoff Pond			(2,280)	(420)	(2,700)	(540)

*Numbers in parenthesis indicate maximum value based on maximum design water surface elevation.

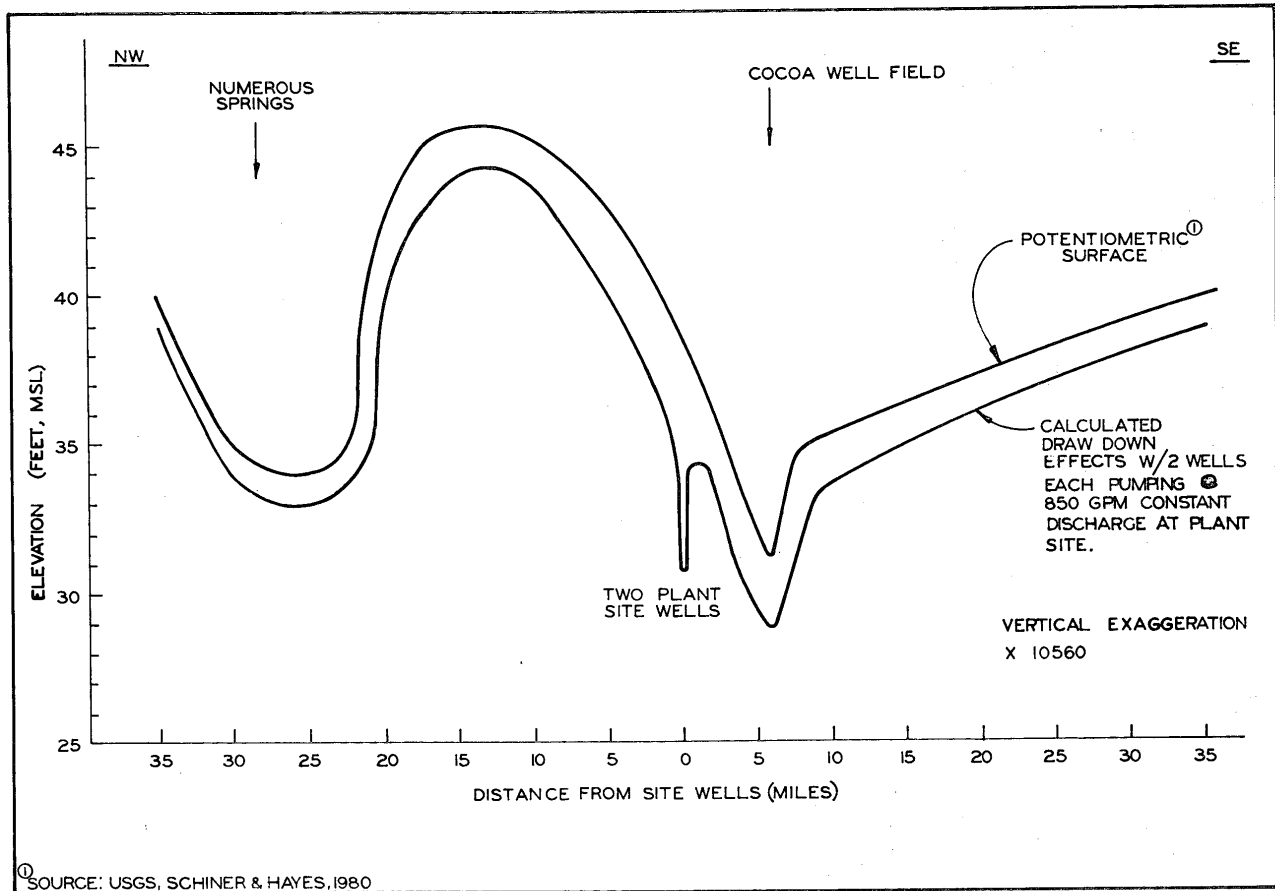
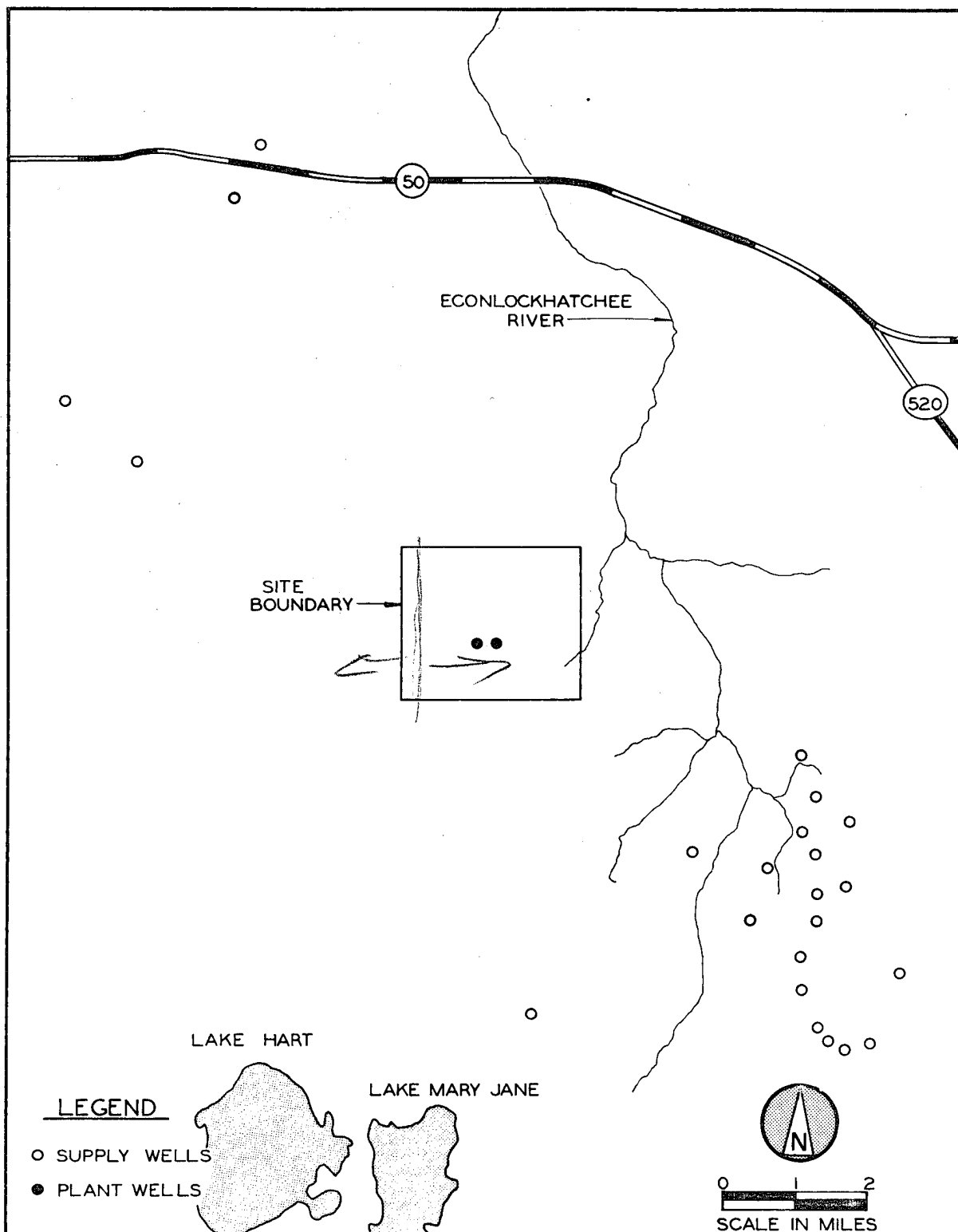
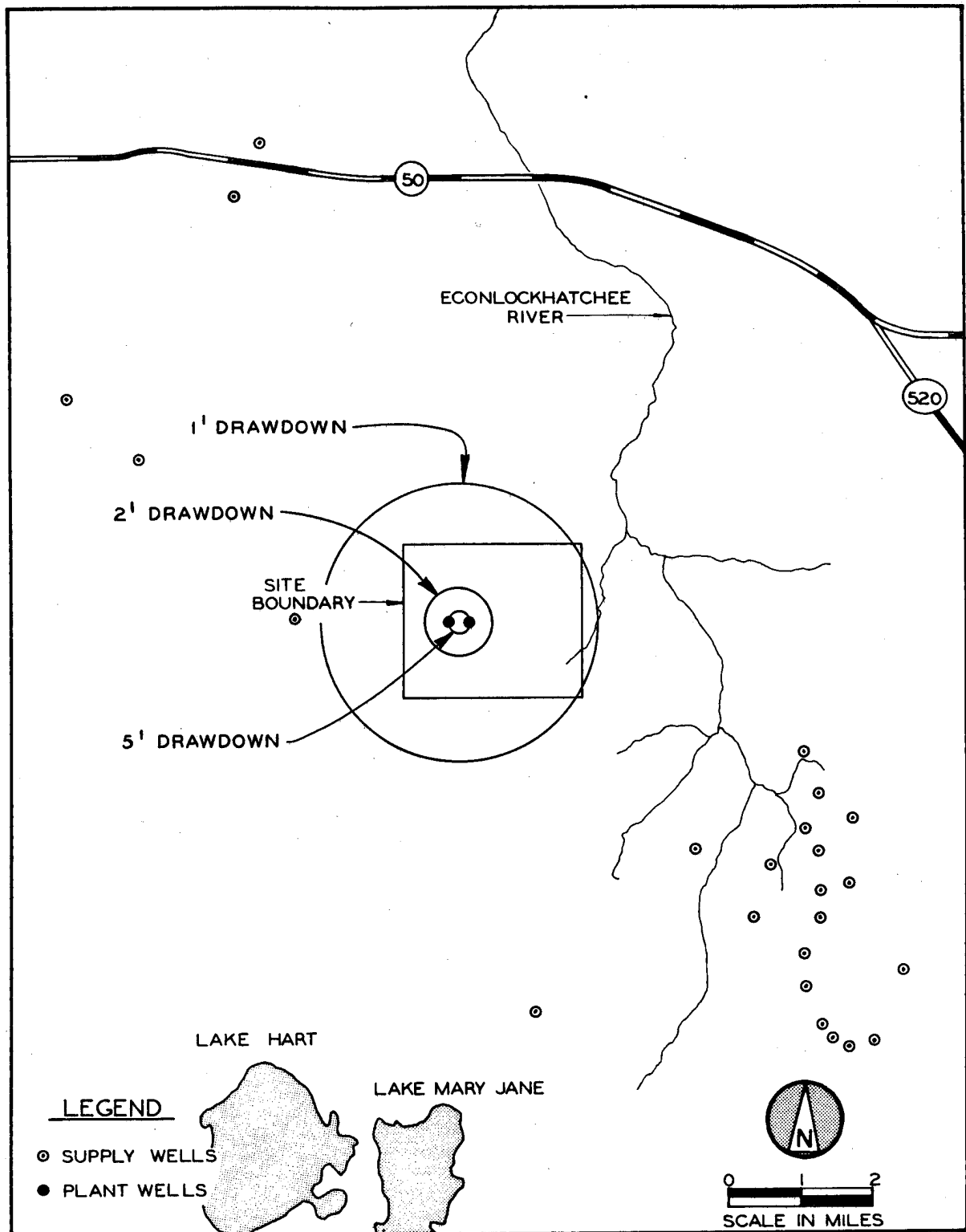


FIGURE 5.3-1. CALCULATED EFFECT OF WATER WITHDRAWAL ON THE POTENTIOMETRIC SURFACE IN THE FLORIDAN AQUIFER



SOURCE: USGS, 1980

FIGURE 5.3-2. WATER SUPPLY WELLS IN THE AREA SURROUNDING THE SITE



SOURCE: USGS, 1980

EFFECT OF PLANT WATER WITHDRAWAL ON THE
POTENTIOMETRIC LEVEL OF THE FLORIDAN
AQUIFER AT 1700 gpm

5.4 SANITARY AND OTHER WASTE DISCHARGES

Sanitary and other wastewaters will not be discharged to surface waters. During construction, site sanitary wastes from construction offices, the change building, and warehouses will be treated in an activated sludge, extended aeration, sewage treatment plant. Effluent will be chlorinated and routed to the water supply pond. Portable toilets, maintained by an outside contractor, will be used by the work force and for outlying locations. No significant ground water impact is expected from this wastewater.

After Unit 1 is constructed, treated sanitary wastes will continue to be routed to the water supply pond for use as cooling tower makeup. Again, no significant ground water effects are expected from this wastewater.

All other plant wastewaters not discussed herein will be reused in other plant systems, as discussed in Section 3, and will be stored in sealed ponds or basins. Therefore, no impacts are expected to surface or ground water.

5.5 AIR QUALITY IMPACTS

The air quality impacts resulting from the operation of the Stanton Energy Center include the direct effects on pollution levels in the power plant vicinity and the further effects of those pollutants, in the estimated quantities, on human health and welfare. Sections 5.5.1 through 5.5.4 describe the air quality impacts of Unit 1. Section 5.5.5 includes the air quality impact assessment for both Units 1 and 2. This combined assessment will be used to support the PSD permit application.

5.5.1 Description of Pollutant Emissions

5.5.1.1 Steam Generator Emissions. The Stanton Energy Center will be a base-load station and will operate at various levels depending on system demand. Heat input rates and emission rates are summarized for selected operating levels in Table 5.5-1. The sulfur dioxide (SO₂) emission rates correspond to 1.14 pound sulfur dioxide per MBtu heat input. Particulate (TSP) and nitrogen oxides (NO_x) emissions correspond to the New Source Performance Standards (NSPS). Carbon monoxide (CO) emissions are based on the emission factor recommended by EPA.⁽¹⁾

The exhaust gases from the generating unit boiler will be emitted to the atmosphere through a ground-supported stack located about 530 feet west of the main boiler structure. A "good engineering practice" (GEP) stack height of 467 feet was calculated from the Stanton Energy Center plot layout and preliminary building dimensions. A general discussion of the GEP stack height determination is included in Appendix 5.5A.

The exit conditions for the stack and stack plume are presented in Table 5.5-2. The proposed chimney diameter and exit velocity are designed to provide optimum venting of flue gases during maximum operating conditions.

5.5.1.2 Emissions From Other Station Sources. In addition to emissions from the main boiler stack, there will be emissions from other sources.

One type of minor particulate emissions will be drift (small water droplets) from the cooling towers. Because of the efficiencies of modern drift eliminators, the quantity of water lost as drift is an extremely small percentage of the circulating water flow. In addition, dissolved and suspended solids constitute only a small fraction of total droplet mass. Section 5.1.7.3 contains a more detailed discussion of the effects of cooling tower drift.

Fugitive dust is another source of particulate emissions associated with the operation of a coal-fired power plant. Fugitive dust emissions are defined as pollutants which escape from a process due to materials handling, transfer, or storage. Sources of these emissions at a coal-fired power plant may include the exhaust from various dust collectors as well as activities associated with the unloading, handling, and storage of coal and limestone. The fugitive dust sources included in this analysis are the train unloading facility, transfer building, crusher building, plant transfer area, plant coal silo, active coal pile, and limestone pile. Their locations within the plant site are depicted in Figure 5.5-1. The site arrangement differs slightly from the one presented in Section 3.1.

The modeled fugitive dust emissions are the result of various "worst case" assumptions. The fugitive emissions from the various dust collectors are based on a maximum continuous outlet emission of 0.02 grains per cubic foot during operation. The fugitive dust emission rates associated with handling coal and limestone are based on a paper entitled, Fugitive Emissions from Coal-Fired Power Plants presented at the 72nd Annual Meeting of the Air Pollution Control Association⁽²⁾. This paper is a literature search of fugitive dust emission rates for various material handling operations. The fugitive emissions estimated in the analysis for the Stanton Energy Center are the result of using the maximum recommended uncontrolled emissions factor and the maximum estimated tons of material handled. Within a recent Air Pollution Control Association paper, the railcar unloading emission factor given in Reference 2 is discussed.^(2A) Because of the testing methodology used to develop the emission factor, the appropriateness of this factor is questionable. The recent paper recommends an emission

factor of almost a magnitude less. For this analysis, a railcar unloading factor of twice the value recommended in Reference 2A is used. In cases where ranges of emission are given, the highest factor is used. The emissions are therefore considered to be quite conservative.

The active storage pile fugitive emissions are divided into three categories: load-in, load-out, and wind erosion. The coal load-in emissions are based on receiving a coal unit train (10,000 tons) during a

"worst case" day. Coal load-out emissions are based on reclaiming enough coal (4,300 tons) for Unit 1 to operate at 100 per cent for 24 hours. The wind erosion estimates are the result of using the highest emission factor with a coal pile sized for two units (24,000 tons). Limestone load-in is based on delivery of 400 tons daily. Load-out is based on the daily maximum limestone consumed (990 tons) by Unit 1 operating at 100 per cent load using worst-case coal. Wind erosion estimates are calculated for a one unit limestone storage pile (38,100 tons).

Various fugitive dust controls will be used throughout the plant site. The modeled emissions rates are adjusted to account for the various mitigating measures. Descriptions of these control methods are given in Sections 3.2, 3.7, and 3.9 of this application.

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5.5.2 Description of Other PSD Sources

Sources that are within 50 kilometres of the proposed site and on the PSD inventory list supplied by EPA Region IV are addressed in this analysis. These sources will be identified in the analysis but included in the dispersion modeling study only if determined to be necessary.

A review of the PSD inventory list produced four sources within 50 kilometers of the proposed site. These sources are as follows.

- (1) Coal preparation plant at Sanford (Florida Power & Light).
- (2) Incinerator at Lake Buena Vista (Reedy Creek Improvement District).
- (3) Tank facility at Midway (Trans Gulf Pipeline).
- (4) Petroleum facility at Kissimmee (Trans Gulf Pipeline).

There are no other new PSD applications on file for this general area.

It was determined that these four PSD sources need not be included in the modeling study because of the nature of their emissions. The following brief descriptions are the basis for this determination.

Coal preparation plant at Sanford (Florida Power & Light)--This PSD application is based on a variance from the State for the Sanford Unit 4 to increase particulate emissions. The increased emissions are the result of a one-year test burn of a coal-oil fuel mixture. This variance should expire prior to operation of the Stanton Energy Center.

"worst case" day. Coal load-out emissions are based on reclaiming enough coal (4,300 tons) for Unit 1 to operate at 100 per cent for 24 hours. The wind erosion estimates are the result of using the highest emission factor with a coal pile sized for two units (24,000 tons). Limestone load-in is based on delivery of 400 tons daily. Load-out is based on the daily maximum limestone consumed (990 tons) by Unit 1 operating at 100 per cent load using worst-case coal. Wind erosion estimates are calculated for a one unit limestone storage pile (38,100 tons).

Various fugitive dust controls will be used throughout the plant site. The modeled emissions rates are adjusted to account for the various mitigating measures. Descriptions of these control methods are given in Section 3.7 of this application.

5.5.2 Description of Other PSD Sources

Sources that are within 50 kilometres of the proposed site and on the PSD inventory list supplied by EPA Region IV are addressed in this analysis. These sources will be identified in the analysis but included in the dispersion modeling study only if determined to be necessary.

A review of the PSD inventory list produced four sources within 50 kilometers of the proposed site. These sources are as follows.

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Coal preparation plant at Sanford (Florida Power & Light)--This PSD application is based on a variance from the State for the Sanford Unit 4 to increase particulate emissions. The increased emissions are the result of a one-year test burn of a coal-oil fuel mixture. This variance should expire prior to operation of the Stanton Energy Center.

Therefore, the increased emissions resulting from the variance will not be included in the analysis as PSD increment consumers.

Incinerator at Lake Buena Vista (Reedy Creek Improvement District)--

This is a municipal waste facility located near the Walt Disney World Complex. The incinerator will be capable of reducing 100 tons per day of municipal solid waste and generating high-temperature hot water from the off-gas.

When compared to the proposed Stanton Energy Center, the incinerator has a much lower stack height and lower pollutant emission rates. In addition, the incinerator is located approximately 40 kilometres from the proposed Stanton Energy Center. Based on these considerations, the impact of the incinerator is expected to be insignificant in the area of the proposed power plant's maximum impact. Therefore, the incinerator is not included in the analysis as a PSD increment consumer.

Tank facility at Midway (Trans Gulf Pipeline)--The tank facility at Midway was subsequently determined by EPA-Region IV not to be a PSD source.

Petroleum facility at Kissimmee (Trans Gulf Pipeline)--The pipeline facility has only hydrocarbon emissions specified within the PSD application. The controlled hydrocarbon emissions are given as 197 tons per year resulting from storage and loading losses. The facility will primarily handle gasoline, jet fuel, diesel fuel, and No. 2 fuel oil.

The proposed Stanton Energy Center is not expected to emit appreciable amounts of hydrocarbon, thus no modeling assessment was performed for the petroleum facility.

Because the four identified PSD sources were eliminated from further assessment, the remainder of the modeled impact analysis concerns only the proposed Stanton Energy Center.

5.5.3 Impacts of Stack and Fugitive Dust Emissions

The impacts of stack emissions on ambient air quality concentrations of SO₂, NO₂, TSP, and CO were evaluated using computer modeling methods

described in the Environmental Protection Agency's (EPA) document, "Guide-ine on Air Quality Models" (Proposed Revisions) October 1980.⁽³⁾ The primary objectives of the impact analysis were as follows.

- (1) Evaluation of compliance with PSD Class II increments.
- (2) Evaluation of compliance with Federal and State ambient air quality standards.
- (3) Assessment of the effects of Stanton Energy Center particulate emissions on the Seminole County particulate nonattainment area.

The Seminole County particulate nonattainment area and the Orange County ozone nonattainment area are the only nonattainment areas within 50 kilometres of the Stanton Energy Center site. Because the proposed plant is not expected to emit appreciable amounts of hydrocarbons or ozone, no assessment for ozone has been performed.

There are no PSD Class I areas within 100 kilometres of the proposed power plant and, therefore, no assessments against Class I increments have been made.

Because the proposed power plant facility is remote, PSD SO₂ increment assessments, as well as NO₂ and CO impact assessments, were performed using a single-source model. For this modeling, only emissions from the proposed plant were considered. The particulate nonattainment area (Seminole County) impact analysis and PSD particulate increment assessments were accomplished using a multiple-source model. The use of this model was necessary due to the various onsite particulate sources. For air quality standards compliance assessments, each pollutant impact was combined with background air quality values derived from the onsite air quality monitoring program. A discussion of the background air quality values is included in Section 2.8 of this application.

5.5.3.1 Modeling Methodology. Atmospheric dispersion analyses were performed using methods described in the EPA's modeling guidelines.⁽³⁾ Within the guidelines, EPA's PTMAX dispersion model is recommended as a screening model for determining the capacity factor which results in the highest predicted ground-level pollutant concentrations. The capacity factors

evaluated were 50, 75, and 100 per cent of the maximum boiler rating. The screening analysis indicated that the boiler operating at 100 per cent would result in the highest ground-level concentrations. This boiler condition was used for the remainder of the dispersion analyses. No site-specific meteorology is necessary for the PTMAX model.

The EPA modeling guideline also recommends the CRSTER Model for predicting ground-level sulfur dioxide (SO_2) and total suspended particulate (TSP) concentrations from sources located in uneven terrain. Although designated as the Single Source (CRSTER) Model, the computer program offers the capability of simultaneously considering up to 19 stacks, all located at a common point.

The computer model uses a modified form of the basic steady-state Gaussian plume equation with terrain adjustments made, provided the surrounding terrain is physically lower than the lowest modeled source height. (4) The simulation model calculates the highest and second-highest 1-hour, 3-hour, and 24-hour concentrations as well as the annual mean concentration at a set of 180 receptors (5 distances by 36 directions). Pollutant concentrations for each averaging time are computed for discrete, non-overlapping time periods (no running averages).

The CRSTER Model does not consider gravitational effects and chemical transformation of the plume constituents, nor does it incorporate any depletion mechanisms; e.g., rainout, washout, and dry deposition. It assumes that the pollutants exhibit the dispersive behavior of non-reactive gases.

The EPA modeling guideline suggests that the Industrial Source Complex (ISC) Model may be used to assess the impacts of fugitive dust emissions. The ISC Model is a steady-state Gaussian plume model which can be used to assess pollutant concentrations from a wide variety of sources associated with an industrial source complex. (5) This model can account for gravitational settling and dry deposition of particulates; downwash conditions; point area, line, and volume sources; plume rise as a function of downwind distance; separation of sources; and limited terrain adjustment.

5.5.3.2 Modeling Input Data.

Meteorological Data. The CRSTER and ISC Models are generally used with a complete year of hourly, sequential meteorological surface data and twice-daily mixing depths. The surface data and mixing depths are obtained from an observation station selected as being representative of the general area being modeled. This corresponds generally to the station closest to the point source being modeled which is in the same climatological regime. Meteorological surface data were obtained for nearby Orlando, Florida for 1974-1978. The twice-daily mixing depths were acquired for Tampa, Florida for the same time period. The full 5-year period of data was used with the CRSTER Model for predictions of SO₂, NO₂, and CO impacts. However, because of the extremely high operational cost of the ISC Model (and with EPA and DER approval), only one year of meteorological data was used to predict TSP impacts. The year used (1974) was the year that produced the highest impacts for the gaseous pollutant analyses.

Source Parameters. The emission rates, stack conditions, and source parameters for all stack and fugitive emissions are given in Tables 5.5-1 through 5.5-3. In addition, Figure 5.5-1 shows the particulate sources that were included in the modeling analyses. The particulate emissions from the various fabric filters are modeled as coming from non-buoyant point sources. The total emissions from the various fabric filters are based on a maximum continuous outlet emissions of 0.02 grains per cubic feet and the number of hours of operation. The coal handling equipment will operate 10 hours during the day to accommodate the quantity of coal required by one unit at maximum load capacity. The emissions from the train unloading facility, coal, and limestone storage pile activities are modeled as one 25-meters square area source, two 70-meters square area sources, and one 80-metre square area source, respectively. The load-in, load-out, and wind erosion emissions are assumed to be spread uniformly over the area sources. The combustion gas stack emissions are included in the ISC modeling to determine the combined particulate impact of stack plume and fugitive emissions.

Field studies have shown that significant wind erosion may occur when the wind speed exceeds 12 miles per hour.⁽⁶⁾ The ISC Model is capable of utilizing emission rates based on wind speed categories. This option is used to include wind erosion emissions only when wind speeds exceed 12 miles per hour.

Receptor Locations. The CRSTER Model predicts concentrations on a circular field of 180 receptors. The receptor array is defined by five

downwind ring distances and 36 radials (one of every 10 degrees by azimuth). Although the 36 azimuths are fixed, selection of the five distances are user-specified.

The EPA's PTMAX plume dispersion model was used as a guide in the selection of the CRSTER receptor ring distances. After the basic source parameters are input, the PTMAX model determines maximum 1-hour concentrations and the distances from the source at which they occur for each atmospheric stability class and specified wind speeds. These concentrations and distances are utilized to arrive at the final receptor array for the CRSTER modeling.

CRSTER receptor distances were selected to provide complete coverage of the expected maximum impact areas. Modeling for the maximum short-term ground-level concentrations was done for 100-metre intervals between the receptor ring distances of 0.6 and 2.0 kilometres. The modeling methodology for annual concentrations was based on a one kilometre interval between the distances of 1 and 10 kilometres. In both cases, additional receptors distances were selected to ensure that the highest and highest-second highest concentrations were not on the innermost or outermost receptor rings. Elevated receptors were not utilized due to level local terrain.

The ISC Model uses either a polar (r, θ) or a cartesian (x, y) coordinate system for defining receptors. The typical polar receptor array consists of 36 radials (one for every 10 degrees of azimuth) and five to ten downwind ring distances for a total of 180 to 360 receptors. Although similar to the CRSTER receptor network, the user is not restricted to a 10-degree angular separation of receptors. Receptor locations in the cartesian coordinate system may be given as Universal Transverse Mercator (UTM) coordinates or as X (east-west) and Y (north-south) coordinates with respect to a user-specified origin. Discrete receptor points corresponding to the locations of air quality monitors, elevated terrain or other points of interest may also be used with either coordinate system. If terrain effects are to be included in the calculations, the elevation of each receptor is also required.

A cartesian (X, Y) coordinate system was used to identify receptor locations for the fugitive dust analysis. The train unloading facility was arbitrarily chosen as the reference point for the coordinate system. Discrete receptors were placed at 100-metre intervals along the plant boundary. Because the majority of the fugitive dust particles will be settling out on the plant property, the maximum offsite TSP impacts are expected to occur at the site boundary. To assess the impact at the Seminole County particulate nonattainment area, receptors were placed along the southern edge of Seminole County. Seminole County is approximately 14 kilometres directly north of the proposed plant site.

5.5.3.3 Modeling Results. The object of the modeling analysis was to ensure that the PSD Class II increments and applicable air quality standards would be met during the operation of the proposed power plant. Maximum predicted short-term ground-level concentrations are predicted to occur within the site boundary. Only pollutant concentrations off-site are required to be assessed against the various air quality increments and standards. The predicted concentrations included in the modeling results are onsite values except for the 3-hour SO₂ concentrations. The EPA modeling guidelines allow for the use of the "highest, second-highest" predicted pollutant concentrations for assessing the predicted short-term impact against the allowable PSD increments and applicable air quality standards. EPA's guidance indicates that the "highest, second-highest" predicted value can be used in the assessment if at least 5 years of meteorological data are used for the modeling. The highest of second-highest concentration for a field of receptors is obtained in the following manner. Short-term concentrations are estimated for each site in a field of receptors; the highest estimated concentration at each receptor is discarded; and then the highest of the remaining concentration estimates from the field of receptor sites is identified. General EPA guidance requires that, if less than 5 years of meteorological data are used for the impact assessment, then the highest predicted value should be used rather than the "highest, second-highest."

Sulfur Dioxide Concentrations--Each year of the five years of meteorological data was utilized in the CRSTER model to determine the SO₂ impacts. Table 5.5-4 presents the maximum and "highest, second-highest"

SO₂ concentrations for each of the five modeled years. Included in the table are the locations, the Julian day, and time period.

Table 5.5-5 compares the predicted "highest, second-highest" ground-level SO₂ concentrations, as well as other pollutants, with the PSD Class II increments. The 3-hour SO₂ concentrations included in Table 5.5-5 represent the maximum predicted offsite concentrations.

The predicted 3-hour SO₂ concentrations consume the highest per cent of the PSD Class II increments. The dispersion results show the highest, second-highest offsite 3-hour SO₂ impact to be 271 micrograms per cubic metre at a point 1.8 kilometres south-southeast (azimuth 170 degrees) of the proposed stack location. This 3-hour impact consumes nearly 53 per cent of the available 3-hour increment. The highest, second-highest 24-hour SO₂ concentration is 50 micrograms per cubic metre and is predicted for a receptor 1.2 kilometres south-southeast (azimuth 170 degrees) of the proposed stack location. This 24-hour maximum impact is predicted to occur within the proposed plant boundary. The maximum annual SO₂ concentration is 3.3 micrograms per cubic metre and occurs 3 kilometres west of the proposed stack location.

Particulate Concentrations--The ISC Model was used to determine the combined particulate impact from the stack and various fugitive dust sources. The site arrangement used in locating the fugitive dust sources differs slightly from the arrangement in Section 3.1. The modeled sources are the same but their actual locations are changed slightly. These differences are not expected to result in any appreciable changes in the predicted concentrations. The maximum combined 24-hour particulate impact at the plant boundary is approximately 15 micrograms per cubic metre. The calculated TSP impacts and PSD increments are presented in Table 5.5-5. Table 5.5-6 presents the individual source contributions to the maximum TSP concentration. The Unit 1 stack emissions have only a negligible contribution at the maximum impact location. This is expected since the stack, with a higher release, results in further downstream transport and greater dilution prior to the plume reaching the ground. Also, the pollution control

equipment for the stack flue gas effectively limits particulate emissions. For comparison, the maximum 24-hour particulate concentration from the stack alone was calculated to be 2.2 micrograms per cubic metre. This maximum impact area occurs within the plant boundary. The maximum annual

particulate concentration from all particulate sources is approximately 1 micrograms per cubic metre. The 24-hour and annual maximum impacts on the Seminole County particulate nonattainment area are 2 and 0.1 micrograms per cubic metre, respectively. These values are within EPA's 24-hour and annual significance limits of 5 and 1 micrograms per cubic metre.

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The activities associated with the storage of limestone are shown to be the major contributors to the maximum 24-hour particulate concentration. As shown in Table 5.5-6, the predicted limestone impact is approximately 87 per cent of the total 24-hour particulate impact. This is because the emissions from the limestone storage pile represent a very conservative estimate. Worst case emissions with no gravitational settling of the limestone particles were used because no particle size distribution was available for airborne limestone dust as was available in the case of coal.

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Nitrogen Dioxide Concentrations--The annual predicted NO₂ concentrations were determined by using the ratio of NO₂ and SO₂ emissions and predicted SO₂ concentrations. The maximum annual NO₂ concentration predicted by the model is less than 2 micrograms per cubic metre. This is well below the annual standard of 100 micrograms per cubic metre.

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Carbon Monoxide Concentrations--The CRSTER Model was used to determine the 1-hour and 8-hour CO concentrations. Both the maximum predicted 1-hour and 8-hour CO concentrations are considerably less than 1 milligram per cubic metre. In comparison, the 1-hour and 8-hour standards are 10 and 40 milligrams per cubic metre.

In order to allow for a comparison with the state and federal air quality standards, baseline concentrations were developed for all pollutants being considered in the analysis. These baseline concentrations were developed from onsite monitored data for each appropriate averaging period. The predicted impacts from the proposed unit were then added to the baseline

values for comparison with the standards. The baseline concentrations are based on twelve months of onsite monitoring data.

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monitoring program and the determination of the baseline concentrations is given in Section 2.8.

The baseline concentrations, Unit 1 impacts, combined concentrations, and air quality standards are presented in Table 5.5-7. The table shows that all of the combined concentrations are well below the standards. Therefore, the Stanton Energy Center Unit 1 is expected to comply with all applicable ambient air quality standards.

Future generating units at the Stanton Energy Center site would consume relatively smaller percentages of the PSD Class II increments. This is because the building configuration for the additional units would result in taller GEP stack heights, not only for the additional units, but Unit 1 also. Future units could also have lesser impacts due to different fuel, elevated flue gas temperature, and the possibility of new more efficient pollution control equipment.

5.5.4 Impacts of Two Unit Facility for PSD

The two unit air quality impact assessment contained in this section is used as supporting documentation for the PSD permit application. The impacts of the two unit facility on ambient air quality concentrations of SO₂, NO₂, TSP, and CO were evaluated in a manner similar to the Unit 1 analysis. The Unit 1 impact analysis is described in Sections 5.5.1 and 5.5.4. These sections should be referred to for the general approach to the two unit impact assessment. Any modeling differences for the two unit analysis will be described in the following sections.

5.5.4.1 Modeling Methodology. Atmospheric dispersion analyses were performed using methods described in the EPA's modeling guidelines.⁽³⁾ This is the same approach used to determine the Unit 1 air quality impacts. Meteorological data for Tampa and Orlando, Florida for the period 1974 through 1978 were again utilized with the CRSTER and ISC dispersion models for assessing the air quality impacts.

5.5.4.2 Modeling Input Data. Unit 2 will be identical to Unit 1 and therefore the emission rates, stack conditions, and source parameters included in Tables 5.5-1 and 5.5-2 are the same with one exception, the stack height. The GEP stack height calculation, based on a two unit building configuration, results in a height of 550 feet for both units. The GEP stack determination is described in Appendix 5.5A.

The fugitive dust emissions will increase slightly because of the additional coal and limestone utilized by Unit 2. The fugitive emissions modeling parameters are given in Table 5.5-8. The total emissions from the various fabric filters are based on a maximum continuous outlet emissions of 0.02 grains per cubic feet and the number of hours of operation. A total of approximately 20 coal handling equipment hours will be needed by each piece of equipment to accommodate the quantity of coal required by two units. The coal load-in emissions are still based on receiving one coal unit train (10,000 tons) during a "worst case" day. Coal load-out emissions are based on reclaiming enough coal (8,600 tons) for Units 1 and 2 to operate at 100 per cent load for 24 hours. The wind erosion estimates are for a two unit active coal pile (24,000 tons). This is the same size pile used in the Unit 1 analysis.

All limestone requirements are doubled with the addition of Unit 2. Limestone load-in is based on delivery of 800 tons daily. Load-out is based on the daily maximum limestone consumed (approximately 1,970 tons) by Units 1 and 2 operating at 100 per cent load. Wind erosions estimates are calculated for a two unit limestone storage pile (76,200 tons).

The same emissions and receptor locations are used in the two unit particulate analysis with the exception of the limestone storage pile and Unit 2 stack. The limestone emissions are from the same general plant location but are uniformly spread over a larger area (100-metres square area source). All emissions locations included in the modeling analysis are given in Figure 5.5-1. The site arrangement differs slightly from the one presented in Section 3.1.

5.5.4.3 Modeling Results. The object of the modeling analysis was to ensure that the PSD Class II increments and applicable air quality standards would be met. As in the Unit 1 analysis, the highest, second-highest predicted concentrations were used to assess the air quality impact. If the onsite concentration is within the allowable increment, it is presented in the modeling results otherwise the offsite value is given.

Sulfur Dioxide Concentrations--Each year of the five years of meteorological data was utilized in the CRSTER model to determine the SO₂ impacts from Units 1 and 2. Table 5.5-9 presents the maximum and

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"highest, second-highest" SO₂ concentrations for each of the five modeled years. Included in the table are the locations, the Julian day, and time period. Table 5.5-10 compares the predicted ground-level pollutant concentrations with the PSD Class II increments. The 3-hour SO₂ concentrations included in Table 5.5-10 represent the maximum predicted offsite concentrations.

The predicted 3-hour SO₂ concentrations consume the highest percent of the PSD Class II increments. The dispersion results show the highest, second-highest offsite 3-hour SO₂ impact to be 509 micrograms per cubic metre at a point 1.8 kilometres south-southeast (azimuth 170 degrees) of the plant site. This 3-hour impact consumes nearly 99 percent of the available 3-hour increment. The highest, second-highest 24-hour SO₂ concentration is 92 micrograms per cubic metre and onsite. The next highest, second-highest 24-hour SO₂ concentration is 85 micrograms per cubic metre and is predicted at a receptor 0.8 kilometres south (azimuth 180 degrees) of the chimney location. This maximum impact is predicted to occur within the proposed plant boundary. The maximum annual SO₂ concentration is 5.5 micrograms per cubic metre and occurs 3.0 kilometres west of the proposed stack locations.

Particulate Concentrations--The ISC Model was used to determine the combined particulate impact from the two stacks plus the various fugitive dust sources. The site arrangement used in locating the fugitive dust sources differs slightly from the arrangement in Section 3.1. The modeled sources are the same but their actual locations are changed slightly. These differences are not expected to result in any appreciable changes in the predicted concentrations. The maximum combined 24-hour particulate impact at the plant boundary is approximately 27 micrograms per cubic metre. The calculated TSP impacts and PSD increments are presented in Table 5.5-10. Table 5.5-11 presents the individual source contributions to the maximum TSP concentration. The Units 1 and 2 stack emissions have only a negligible contribution at the maximum impact location. This is expected since the stacks have higher release points than the fugitive sources. In addition, the

pollution control equipment for the stack flue gases effectively limits particulate emissions. For comparison, the maximum 24-hour particulate concentrations from the Unit 1 and 2 stacks alone were calculated to be 4.2 micrograms per cubic metre. This maximum impact area occurs within the plant boundary. The maximum annual particulate concentration from all particulate sources is approximately 2 micrograms per cubic metre. The 24-hour and annual maximum impacts on the Seminole County

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particulate nonattainment area are 3.6 and 0.1 micrograms per cubic metre, respectively. These values are within EPA's 24-hour and annual significance limits of 5 and 1 micrograms per cubic metre.

The activities associated with the storage of limestone are shown to be the major contributors to the maximum 24-hour particulate concentration. As shown in Table 5.5-11, the predicted limestone impact is approximately 88 per cent of the total 24-hour particulate impact. This is because the emissions from the limestone storage pile represent a very conservative estimate. Worst case emissions with no gravitational settling of the limestone particles were used because no particle size distribution was available for airborne limestone dust as was available in the case of coal.

Nitrogen Dioxide Concentrations--The annual predicted NO₂ concentrations were determined by using the ratio of NO₂ and SO₂ emissions and predicted SO₂ concentrations. The maximum annual NO₂ concentration predicted by the model is less than 3 micrograms per cubic metre. This is well below the annual standard of 100 micrograms per cubic metre.

Carbon Monoxide Concentrations--The CRSTER model was used to determine the 1-hour and 8-hour CO concentrations. Both the maximum predicted 1-hour and 8-hour CO concentrations are considerably less than 1 milligram per cubic metre. In comparison, the 1-hour and 8-hour standards are 10 and 40 milligrams per cubic metre.

In order to allow for a comparison with the state and federal air quality standards, baseline concentrations were developed for all pollutants being considered in the analysis. These baseline concentrations were developed from onsite monitored data for each appropriate averaging period. The predicted impacts from the proposed units were then added to the baseline values for comparison with the standards. The baseline concentrations are based on twelve months of onsite monitoring data.

A complete description of the monitoring program and the determination of the baseline concentrations is given in Section 2.8.

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The baseline concentrations, Units 1 and 2 impacts, combined concentrations and air quality standards are presented in Table 5.5-12. The table shows that all of the combined concentrations are well below the standards. Therefore, the Stanton Energy Center, Units 1 and 2 are expected to comply with all applicable ambient air quality standards and PSD increments.

5.5.4.4 Effect on Soils and Vegetation. Emissions of SO_2 , NO_x , and particulates from the Stanton Energy Center will be below federal and state standards and no adverse impacts on vegetation are expected. No highly sensitive species to the emissions are known to occur onsite or in adjacent areas.⁽⁷⁾ No citrus or vegetable groves are onsite, or to any significance, in the site vicinity. A description of the site vegetation is included in Section 2.7 and Appendix 2.7A.

Sulfur and nitrogen are basic elements needed by plants. Injury occurs when excess amounts of these elements or their compounds cannot be metabolized or transferred out of the plant. The minimal dosage of a pollutant necessary to induce plant injury is the threshold value.

Injuries resulting from excess cellular accumulation of SO_2 , or NO_x are similar, although NO_x is believed to be less phytotoxic than SO_2 . These compounds when at or above threshold levels, can cause visible injuries such as chlorosis, premature senescence, necrosis, or abscission of leaves.⁽⁸⁾ Such injuries can also cause related problems like reduced growth or reproduction, loss of market value or quality, or plant death. Ambient concentrations of SO_2 and NO_x will be well below toxic levels reported for plants.

Particulate emissions from the Stanton Energy Center will be controlled using modern control technologies as described in Section 3.7. Very small concentrations of particulates will be deposited on plant surfaces within about a 12 mile radius of the Stanton Energy Center which are not expected to be harmful.

Emissions of SO_2 , NO_x , and particulates are expected to have no adverse effects on soils of the site vicinity. Excess amounts of these compounds

can cause a decrease in soil pH and the accumulation of toxic compounds, but such effects are unlikely. Some soils may benefit from the addition of a deficient element. (8)

5.5.4.5 Effect on Visibility. Current EPA guidance indicates that visibility assessments should be performed for mandatory PSD Class I areas within 100 kilometres of the proposed Stanton Energy Center. There are no Class I areas within 100 kilometres, therefore, no visibility assessments were performed.

5.5.5 References

- (1) U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors 3rd Edition AP-42, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, August, 1977.
- (2) Edwin L. Currier and Barry D. Neal, Fugitive Emissions from Coal-Fired Power Plants, Paper No. 79-11.4, proceedings 72nd Annual Air Pollution Control Association, Cincinnati, Ohio, June 24-29, 1979.
- (2A) Edward T. Brookman and Dennis J. Martin, A Technical Approach for the Determination of Fugitive Emissions Source Strength and Control Requirements, Paper No. 81-55.6, proceedings 74th Annual Air Pollution Control Association, Philadelphia, Pennsylvania, June 21-26, 1981.
- (3) U.S. Environmental Protection Agency, Guideline on Air Quality Models (Proposed Revisions), Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, Revised October, 1980.
- (4) U.S. Environmental Protection Agency, User's Manual for Single-Source (CRSTER) Model, EPA-450/2-77-013, Office of Air and Waste Management, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, July, 1977.
- (5) H. E. Cramer Co., Inc., Industrial Source Complex (ISC) Dispersion Model User's Guide, Volumes I and II. EPA-450/4-79-030, Prepared for U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, December, 1979.
- (6) U.S. Environmental Protection Agency, Development of Emission Factors for Fugitive Dust Sources, EPA-450/3-74-037, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, June, 1974.

- (7) U.S. Environmental Protection Agency, Susceptibility of Woody Plants to Sulfur Dioxide and Photochemical Oxidants. EPA-600/3-76-102, Office of Research and Development, Corvallis, Oregon, September 1976.
- (8) U.S. Environmental Protection Agency, Environmental Effects of Increased Coal Utilization: Ecological Effects of Gaseous Emissions from Coal Combustion. EPA-600/7-78-108, Office of Research and Development, Corvallis, Oregon, June 1978.

TABLE 5.5-1. HEAT INPUT AND EMISSION RATES--STANTON ENERGY CENTER UNIT 1

Operating Level per cent of rated capacity	Heat Input to Steam Generator MBtu/h	SO ₂ Emission Rate ^a g/s	TSP Emission Rate ^b g/s	NO _x Emission Rate ^c g/s	CO Emission Rate ^d g/s
50	2,121	304.9	8.0	160.7	12.3
75	3,113	447.5	11.8	235.8	18.0
100	4,183	601.4	15.8	316.9	24.2

^aBased on 1.14 lb SO₂/MBtu.

^bBased on 0.03 lb particulate/MBtu.

^cBased on 0.6 lb NO_x/MBtu.

^dBased on 1.0 lb CO/ton coal fired and low range heat content.

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TABLE 5.5-2. STACK CONDITIONS--STANTON ENERGY CENTER UNIT 1

<u>Operating Level</u> per cent of rated capacity	<u>Stack Height</u> ft	<u>Stack Diameter</u> ft	<u>Exit Velocity</u> ft/s	<u>Volumetric Flgw Rate</u> ft ³ /min	<u>Exit Temperature</u> F
50	467	19	35.5	603,787	124.8
75	467	19	52.4	890,618	125.6
100	467	19	70.7	1,202,867	126.5

TABLE 5.5-3. MODELING SOURCE PARAMETERS FOR ONE UNIT FACILITY

Point Sources				
<u>Location</u>	<u>Release Height</u>	<u>Exit Diameter</u>	<u>Exit Velocity</u>	<u>Particulate Emission Rate</u>
	m	m	m/s	g/s
Transfer Building	33.53	1.07	20.3	0.35
Crusher Building	38.10	0.73	20.3	0.16
Plant Transfer Area	45.72	0.77	20.3	0.18
Plant Coal Silo	45.72	1.15	20.3	0.41
Unit 1 Stack	142.3	5.79	21.5	15.8

Area Sources				
<u>Location</u>	<u>Release Height</u>	<u>Area Width</u>	<u>Particulate Emission Rate</u>	
	m	m	<u>With Wind Erosion</u>	<u>Without Wind Erosion</u>
			g/s/m ²	g/s/m ²
Coal Storage Pile	12.19	70	0.00008	0.00003
	12.19	70	0.00008	0.00003
Limestone Storage Pile	5.00	80	0.00005	0.00002
Unloading Facility	3.00	25	--	0.00025

TABLE 5.5-3. MODELING SOURCE PARAMETERS FOR ONE UNIT FACILITY

Point Sources				
<u>Location</u>	<u>Release Height</u>	<u>Exit Diameter</u>	<u>Exit Velocity</u>	<u>Particulate Emission Rate</u>
	m	m	m/s	g/s
Unloading Facility	3.05	1.17	17.17	0.56
Transfer Building	33.53	1.35	14.75	0.63
Crusher Building	38.10	0.97	8.06	0.21
Plant Coal Silo	45.72	1.00	10.00	0.28
Unit 1 Stack	142.3	5.79	21.5	15.8

Area Sources			Particulate Emission Rate	
<u>Location</u>	<u>Release Height</u>	<u>Area Width</u>	<u>With Wind Erosion</u>	<u>Without Wind Erosion</u>
	m	m	g/s/m ²	g/s/m ²
Coal Storage Pile	12.19	70	0.00008	0.00003
	12.19	70	0.00008	0.00003
Limestone Storage Pile	5.00	80	0.00005	0.00002

TABLE 5.5-4. MAXIMUM PREDICTED SO₂ GROUND-LEVEL CONCENTRATIONS FROM ONE UNIT FOR VARIOUS AVERAGING TIMES

Year	3-Hour*					24-Hour				Annual		
	Conc. μg/m ³	Dir. deg	Dist. km	Day	Time Period local	Conc. μg/m ³	Dir. deg	Dist. km	Day	Conc. μg/m ³	Dir. deg	Dist. km
1974												
Highest	551	180	1.7	51	12-15	83	180	1.3	51	2.2	270	3.0
Highest 2nd Highest	271	170	1.8	124	09-12	50	170	1.2	120	--	--	--
1975												
Highest	241	40	1.9	166	12-15	51	80	1.7	157	2.2	270	3.0
Highest 2nd Highest	183	250	1.9	146	09-12	34	120	2.1	180	--	--	--
1976												
Highest	283	180	1.7	157	09-12	69	130	0.9	200	2.0	360	3.0
Highest 2nd Highest	231	360	1.5	180	09-12	41	360	1.8	134	--	--	--
1977												
Highest	235	40	1.9	252	09-12	66	320	0.9	229	2.7	360	3.0
Highest 2nd Highest	182	40	1.9	253	12-15	40	10	2.0	166	--	--	--
1978												
Highest	262	210	2.0	145	12-15	68	340	0.8	190	3.3	270	3.0
Highest 2nd Highest	222	320	2.0	191	06-09	48	350	0.8	180	--	--	--

*Offsite predicted concentrations.

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TABLE 5.5-5. COMPARISON OF PSD CLASS II INCREMENTS WITH PREDICTED GROUND-LEVEL POLLUTANT CONCENTRATIONS FROM ONE UNIT

<u>Pollutant</u>	<u>PSD Class II Increments</u>	<u>Predicted Concentrations</u>	<u>Per Cent Increment Consumed</u>		
SO ₂ µg/m ³					
Annual	20	3	15	4	5
24-hour	91	50	55		
3-hour	512	271	53		
TSP µg/m ³					
Annual	19	1	5	3	
24-hour	37	15	41		
NO ₂ µg/m ³					
Annual	--	1.8	--		
CO mg/m ³					
8-hour	--	<<1	--		
1-hour	--	<<1	--		

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TABLE 5.5-5. COMPARISON OF PSD CLASS II INCREMENTS WITH PREDICTED GROUND-LEVEL POLLUTANT CONCENTRATIONS FROM ONE UNIT

<u>Pollutant</u>	<u>PSD Class II Increments</u>	<u>Predicted Concentrations</u>	<u>Per Cent Increment Consumed</u>
SO ₂ µg/m ³			
Annual	20	2.4	12
24-hour	91	36	40
3-hour	512	262	51
TSP µg/m ³			
Annual	19	1.2	6
24-hour	37	15	41
NO ₂ µg/m ³			
Annual	--	1.8	--
CO mg/m ³			
8-hour	--	<<1	--
1-hour	--	<<1	--

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TABLE 5.5-6. INDIVIDUAL SOURCE CONTRIBUTIONS TO THE MAXIMUM 24-HOUR
PARTICULATE CONCENTRATION

<u>Source</u>	<u>Particulate Concentration</u> $\mu\text{g}/\text{m}^3$	<u>Per Cent of Total</u>	
Unloading Facility	0.50	3.4	5
Transfer Building	0.12	0.8	
Crusher Building	0.05	0.3	
Plant Transfer Area	0.02	0.1	
Plant Coal Silo	0.02	0.1	
Unit 1 Stack	0.00	0.0	5
Coal Storage Pile	1.23	8.3	
Limestone Storage Pile	<u>12.90</u>	<u>87.2</u>	
Total	14.8	100	

TABLE 5.5-7. MAXIMUM TOTAL EXPECTED GROUND-LEVEL CONCENTRATIONS VERSUS AMBIENT AIR QUALITY STANDARDS

Pollutant	Federal		Florida	Baseline Concentration	Predicted Impacts for Unit 1	Total Expected Ground-level Concentrations	Per Cent of Most Stringent Standard			
	Primary	Secondary								
SO ₂ µg/m ³										
Annual	80	--	60	14	3	17	28	1		
24-hour	365	--	260	44	50	94	36		4	5
3-hour	--	1,300	1,300	124	271	395	30			
TSP µg/m ³										
Annual	75	60	60	34	1	35	58	1		
24-hour	260	150	150	105	15	120	80			
NO ₂ µg/m ³										
Annual	100	100	100	11	2	13	13	3	4	
CO mg/m ³										
8-hour	10	10	10	5	<<1	5	50			
1-hour	40	40	40	11	<<1	11	28	1		

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TABLE 5.5-8. MODELING SOURCE PARAMETERS FOR TWO UNIT FACILITY

Point Sources				
<u>Location</u>	<u>Release Height</u>	<u>Exit Diameter</u>	<u>Exit Velocity</u>	<u>Particulate Emission Rate</u>
	m	m	m/s	g/s
Transfer Building	33.53	1.07	20.3	0.69
Crusher Building	38.10	0.73	20.3	0.33
Plant Transfer Area	45.72	0.77	20.3	0.36
Plant Coal Silo	45.72	1.15	20.3	0.81
Unit 1 Stack	167.6	5.79	21.5	15.8
Unit 2 Stack	167.6	5.79	21.5	15.8

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Area Sources			Particulate Emission Rate	
<u>Location</u>	<u>Release Height</u>	<u>Area Width</u>	<u>With Wind Erosion</u>	<u>Without Wind Erosion</u>
	m	m	g/s/m ²	g/s/m ²
Coal Storage Pile	12.19	70	0.00011	0.00005
	12.19	70	0.00011	0.00005
Limestone Storage Pile	5.00	100	0.00006	0.00003
Unloading Facility	3.00	25	--	0.00025

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TABLE 5.5-9. MAXIMUM PREDICTED SO₂ GROUND-LEVEL CONCENTRATIONS FROM TWO UNITS FOR VARIOUS AVERAGING TIMES

Year	3-Hour*					24-Hour				Annual		
	Conc. µg/m ³	Dir. deg	Dist. km	Day	Time Period local	Conc. µg/m ³	Dir. deg	Dist. km	Day	Conc. µg/m ³	Dir. deg	Dist. km
1974												
Highest	1,084	180	1.7	51	12-15	162	180	1.3	51	3.4	270	3.0
Highest 2nd Highest	509	170	1.8	124	09-12	65**	170	1.8	120	--	--	--
1975												
Highest	414	40	1.9	166	12-15	84	80	1.8	157	3.7	10	3.0
Highest 2nd Highest	329	250	2.1	144	12-15	58	28	0.8	225	--	--	--
1976												
Highest	530	180	1.7	157	09-12	127	130	0.9	200	3.3	360	3.0
Highest 2nd Highest	405	360	1.7	180	09-12	74	180	1.1	157	--	--	--
1977												
Highest	405	40	1.9	252	09-12	120	320	0.9	22	4.4	360	3.0
Highest 2nd Highest	312	40	1.9	253	12-15	72	190	0.9	168	--	--	--
1978												
Highest	458	210	2.0	145	12-15	125	340	0.9	190	5.5	270	3.0
Highest 2nd Highest	407	320	2.0	222	09-12	85	350	0.8	180	--	--	--

*Offsite predicted concentrations.

**Offsite predicted concentration, onsite concentration is 92 micrograms per cubic metre.

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TABLE 5.5-10. COMPARISON OF PSD CLASS II INCREMENTS WITH PREDICTED GROUND-LEVEL POLLUTANT CONCENTRATIONS FROM TWO UNITS

<u>Pollutant</u>	<u>PSD Class II Increments</u>	<u>Predicted Concentrations</u>	<u>Per Cent Increment Consumed</u>		
SO ₂ µg/m ³					
Annual	20	6	30	4	5
24-hour	91	85	93		
3-hour	512	509	99		
TSP µg/m ³					
Annual	19	2	11		
24-hour	37	27	73		
NO ₂ µg/m ³					
Annual	--	2.9	--	3	
CO mg/m ³					
8-hour	--	<<1	--		
1-hour	--	<<1	--		

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TABLE 5.5-11. INDIVIDUAL SOURCE CONTRIBUTIONS TO THE MAXIMUM 24-HOUR PARTICULATE CONCENTRATIONS (TWO UNITS)

<u>Source</u>	<u>Particulate Concentration</u> $\mu\text{g}/\text{m}^3$	<u>Per Cent of Total</u>
Unloading Facility	0.50	1.8
Transfer Building	0.23	0.8
Crusher Building	0.11	0.4
Plant Transfer Area	0.04	0.1
Plant Coal Silo	0.04	0.1
Unit 1 Stack	0.00	0.0
Unit 2 Stack	0.00	0.0
Coal Storage Pile	2.37	8.7
Limestone Storage Pile	<u>23.76</u>	<u>87.7</u>
Total	27.1	100

5

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TABLE 5.5-12. MAXIMUM TOTAL EXPECTED GROUND-LEVEL CONCENTRATIONS FROM TWO UNITS VERSUS AMBIENT AIR QUALITY STANDARDS

Pollutant	Federal		Florida	Baseline Concentration	Predicted Impacts for Units 1 and 2	Total Expected Ground-level Concentrations	Per Cent of Most Stringent Standard			
	Primary	Secondary								
SO ₂ µg/m ³										
Annual	80	--	60	14	6	20	33		1	4
24-hour	365	--	260	44	85	129	50			5
3-hour	--	1,300	1,300	124	509	653	50			4
TSP µg/m ³										
Annual	75	60	60	34	2	36	60			
24-hour	260	150	150	105	27	132	88		1	4
NO ₂ µg/m ³										
Annual	100	100	100	11	3	14	14		3	
CO mg/m ³										
8-hour	10	10	10	5	<<1	5	50			4
1-hour	40	40	40	11	<<1	11	28			
										1

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TABLE 5.5-12. MAXIMUM TOTAL EXPECTED GROUND-LEVEL CONCENTRATIONS FROM TWO UNITS VERSUS AMBIENT AIR QUALITY STANDARDS

Pollutant	Federal		Florida	Baseline Concentration	Predicted Impacts for Units 1 and 2	Total Expected Ground-level Concentrations	Per Cent of Most Stringent Standard
	Primary	Secondary					
SO ₂ mg/m ³							
Annual	80	--	60	14	3	17	28
24-hour	365	--	260	44	59	103	40
3-hour	--	1,300	1,300	124	434	558	43
TSP mg/m ³							
Annual	75	60	60	34	2	36	60
24-hour	260	150	150	105	27	132	88
NO ₂ mg/m ³							
Annual	100	100	100	11	3	14	14
CO mg/m ³							
8-hour	10	10	10	5	FF1	5	50
1-hour	40	40	40	11	FF1	11	28

5.6 EFFECTS OF OPERATION AND MAINTENANCE OF DIRECTLY ASSOCIATED TRANSMISSION SYSTEM

5.6.1 Effects of Operation and Maintenance

The right-of-way will be maintained by keeping trees cut and trimmed so they will not interfere with the line operation. The existing maintenance road along the right-of-way will be mowed periodically.

There is no plan for the use of herbicides or pesticides in maintaining the right-of-way or maintenance road.

The new transmission lines have been routed along and parallel to existing facilities to minimize the impact on land resources and scenic values. Land adjacent to the transmission right-of-way is generally being used for pasturing and that use can continue with the installation of the new facilities. The new transmission lines will be located approximately four miles south of Cheney Highway and 3-1/2 miles north of the Beeline Expressway. The facilities will not be visible from Cheney Highway and rarely visible at a long distance, from the Beeline Expressway.

The maximum anticipated audible noise level, at the right-of-way edge during wet weather, has been calculated to be 45.2 dB(A) (Ref 1 μ V/m). This value is less than the Bonneville Power Administration recommendation of 52 dB(A) at the edge of the right-of-way. The maximum induced current, associated with a large farm vehicle directly under the transmission lines, has been calculated to be 2.77 mA. This value is lower than the 5 mA maximum allowed by the National Electric Safety Code. Fences along and transverse to the new transmission lines will be grounded as a safety precaution. The maximum ozone generation has been calculated to be 62.8 ppb for eight hours of exposure. This value is less than the EPA recommendation of 100 ppb for eight hours exposure.

5.6.2 Effects of Public Access

The new transmission facilities will generally be maintained using an existing access road. The new facilities will not increase the exposure of directly associated transmission line corridors to the public. The new

access road to the power plant could be used to maintain a portion of the new transmission facilities. This access road is discussed in Section 3.9.

5.7 ASSOCIATED FACILITIES AND OTHER EFFECTS

5.7.1 Effect of Associated Facilities

Associated facilities other than the transmission line corridor include the railroad, the access road, and the pipelines to and from the Iron Bridge Road Water Pollution Control facility.

5.7.1.1 Railroad-Noise Impacts of Unit Trains. The noise levels associated with the operation of unit trains are generated by two sources, locomotives and freight cars.

The peak noise emissions from the cars vary from 70 dB(A) at 10 miles per hour to 85 dB(A) at 50 miles per hour as measured 100 feet from the centerline of the track.⁽²⁾ For rail cars moving at less than 45 mph, the Federal noise level standard is 88 dB(A), but at greater speeds, the standard is 93 dB(A).^(4,5)

The peak noise generated by the locomotive originates from its horn, diesel engine, and the auxiliaries. Diesel engine and auxiliary peak noise levels will vary between 95 dB(A) and 105 dB(A).⁽²⁾

For locomotives manufactured before December 31, 1979, the federal sound level standard is 96 dB(A) at 100 feet from the centerline of the track. This standard applies regardless of grade, load, speed or acceleration. Since January 1, 1980, the maximum permitted level for newly manufactured locomotives is 90 dB(A) at 100 feet.^(4,5)

Welded rail along portions of rail routes will result in appreciably lower train noise levels by eliminating the noise of wheels crossing joints.

The existing railroads between Jacksonville and Taft, where the proposed spur interconnects, already carry significant amounts of traffic. The addition of unit coal trains to existing traffic will result in insignificant elevations of noise levels adjacent to the present tracks.

From Taft to the proposed generating station site, the proposed spur will pass through relatively undeveloped areas except for the western portion near McCoy Air Force Base and Orlando International Airport. Baseline noise levels in the undeveloped rural areas are expected to be

similar to those measured on the site during pre-construction monitoring. Along the spur where present baseline noise levels are low ($L_{eq} = 45$ dBA and $L_{dn} = 51$ dBA), the contribution of unit trains to noise levels will be slight. The impacts of unit trains on noise levels near the proposed spur are shown by Table 5.7-1. Two noise level values are shown: L_{eq} is a 24-hour statistical average noise level value and L_{dn} is a similar 24-hour statistical average with a 10 dBA penalty assigned to nighttime noises. Although peak noise emissions from diesel locomotives and trains can exceed 100 dBA, these emissions are short-term and do not affect any given location significantly. The L_{eq} and L_{dn} parameters account for time-varying emissions and provide means of statistically adding the train contribution to the baseline noise levels.

Acceptable levels of noise for residential areas have been established for both L_{eq} and L_{dn} . Noise levels of 55 dB(A) as L_{dn} should not be exceeded in residential areas or 55 dB(A) as L_{eq} in outdoor areas with limited time uses.⁽⁶⁾ The overall combined noise level (L_{eq}) will be lower than 55 dBA at distances of more than 34 metres (112 feet) from the track centerline. The combined L_{dn} will be lower than 55 dBA at distances of more than 165 metres (541 feet) from the track centerline. Figure 5.7-1 illustrates that the contributions of trains to the combined noise levels in both L_{eq} and L_{dn} decrease rapidly with distance from the track. At 10 metres (33 feet) the train noise dominates; at about 108 metres (354 feet) the train and baseline are about equivalent in effect; and at 1,000 metres (3,280 feet) the baseline noise dominates with little effect from the train.

Although a diesel locomotive horn can generate up to 110 dB(A) at 100 feet from the track, it is considered a safety or warning signal and is not included in train noise impact analyses.

5.7.1.2 Access Road. After the plant is in operation, the access road will be utilized by approximately 163 workers travelling to and from the site. The road also will be used by a few trucks and other vehicles delivering supplies and services. These transportation activities will increase

slightly the noise level along the route as well as contribute some air pollutants. Because the number of vehicles associated with the operation of the plant will be relatively small, there should be few, if any, adverse environmental impacts.

5.7.1.3 Pipelines. It is unlikely that any environmental impacts would result from the operation of the pipelines between the Stanton Energy Center and the Iron Bridge Facility. The pipeline will be buried underground, and it will share a common corridor with the access road for 8 miles of its total 12 mile length. Such a design will minimize the disturbance to the environment by using one corridor for two facilities.

5.7.2 Other Plant Operation Effects

5.7.2.1 Noise. Operation of the Stanton Energy Center will result in an increase in noise levels in the area.

Noise level estimations for operation of the proposed generating station were derived from data and information in equipment specifications, current plant layout drawings, and references listed at the end of the section.

Noise levels of principal operation noises were assembled to estimate operation noise contributions in the vicinity of the site. These noise levels are given in Table 5.7-2. These source acoustic emissions were combined with baseline noise levels as inputs for the sound pressure level contour program. This program considered characteristic air resistance, sound pressure level decrease resulting from wave divergence, directivity and height of the sound source, and atmospheric absorption. Computations were performed for each octave band independently and then combined to obtain overall sound pressure levels.

Figures 5.7-2 and 5.7-3 illustrate the predicted contours of the L_{eq} and L_{dn} during plant operation. The L_{eq} (24 hour) is the 24-hour A-weighted sound level having acoustic energy equivalent to the accumulated time-varying noise for the same 24-hour period. The L_{dn} was calculated by combining daytime L_{eq} (0700 to 2200) and the nighttime L_{eq} (2200 to 0700) plus a 10 dBA penalty for nighttime. Evaluation of these results indicates that expected impacts resulting from operation noise caused by Unit 1 will be insignificant.

5.7.2.2 Operational Impacts on Red-Cockaded Woodpecker. It is anticipated that operational impacts will not have a significant effect on red-cockaded woodpeckers. There will be some loss of foraging range for Clan A in the solid waste disposal area. This estimated loss is included in the total for the construction phase of the proposed power plant.

The major operational impacts having potential influence on the population will be increased human activity and noise. These influences should have no effect on resident clans.

Impacts related to the development of the proposed site will affect the red-cockaded woodpecker. Although the short-term (5 to 10 years) impacts may decrease the number of clans on site, the positive effects of a sound management plan may offset these initial losses. By excluding logging and allowing natural reseeding in pine forest, the quality of foraging habitat within the preserved areas could be significantly increased during the next 20 to 30 years.

Because of the status of the red-cockaded woodpecker and the potential effects of the proposed power plant, informal discussions were held with the United States Fish and Wildlife Service and the Florida Game and Fresh Water Fish Commission to develop alternatives to alleviate impacts. During this process, various alternatives were considered. Among those considered were possible relocation of selected clans, purchasing offsite lands that contain colonies, selection of an alternate site, alternative site arrangements, and development of an onsite management and impact-monitoring program. The last three alternatives were selected as viable. Various plant design alternatives were reviewed, primarily by Orlando Utilities Commission, Black and Veatch, and ESE personnel. Objectives considered during this evaluation process were as follows.

- (1) To avoid as many cavity trees as practical.
- (2) To minimize the effects on the better-quality foraging habitat.
- (3) To reduce impacts in areas with the greatest concentration of colonies.

Because of these considerations, various modifications were made in the site arrangement. The major benefit from these modifications will be

to reduce impacts in Section 19, which contains five active colonies. In addition, cavity trees that would have been removed in Colony Areas A (1 tree), B (2 trees), C (3 trees), and D (2 trees) were avoided.

It seems unlikely that land use on the proposed site will change significantly in the near future. Extensive logging currently is being performed in many surrounding areas. These logging activities are scheduled to occur on site in the near future. It is apparent that current forestry practices would not eliminate this species. However, surveys conducted in surrounding areas in which extensive logging activities have occurred revealed a much lower density of red-cockaded woodpeckers in comparison to the southern portion of the site and lands immediately south of the proposed project. In addition, one colony area to the east of the site has been removed by logging activities during the current year.

A management and monitoring plan will be adopted to ensure long-term presence of red-cockaded woodpeckers on site. The following is a summary of the recommended management plan. The major emphasis for management of red-cockaded woodpeckers onsite will consist of protection of colonies and provision for adequate foraging range. In order to meet this goal, the following procedures are recommended:

- (1) Maintain all remaining cavity trees (active and inactive).
- (2) Protect colony sites, including surrounding trees, to ensure future replacement cavity trees and to serve as a support stand.
- (3) Maintain other potential stands for future colony sites.
- (4) Provide at least 200 acres of foraging habitat for each onsite clan.
- (5) Conduct a regular, prescribed burning program (2 to 3 years).
- (6) Provide continuous habitat between colonies and foraging habitat and between adjoining clans.
- (7) Prohibit any logging from exclusive areas to be managed for red-cockaded woodpeckers.
- (8) Allow all disturbed areas within these exclusive zones to reseed naturally with longleaf pine.

As part of this management plan, monitoring studies on red-cockaded woodpeckers were initiated during October, 1980. These studies will be continued through the pre-construction phase to determine baseline conditions and during the construction phase of the proposed power plant to determine construction impacts. It is advisable to conduct post-construction monitoring; however, at the end of the construction phase monitoring, an assessment and recommendation will be made for further monitoring during plant operation. Information to be gathered during the baseline phase will include determination of home range for four onsite clans, evaluation of the quality of foraging habitat, and collection of information on reproduction of all nine onsite clans. During construction activities, home range for these same four clans will be determined. All onsite clans will be monitored for reproduction during this phase.

In summary, the short-term (construction) impacts of the proposed power plant on red-cockaded woodpeckers are likely to be negative. However, 2,105 acres, which presently contain nine active colonies, will be protected and managed for this species. Once construction is completed, the long-term impacts will be positive. The remaining colonies will have a relatively stable and protected environment, and the surrounding region will be provided with an area managed for red-cockaded woodpeckers. In addition, the presence of the power plant in this area may preclude any extensive development and, therefore, afford some protection to offsite clans. This may be particularly relevant to those four clans located immediately south of the proposed site.

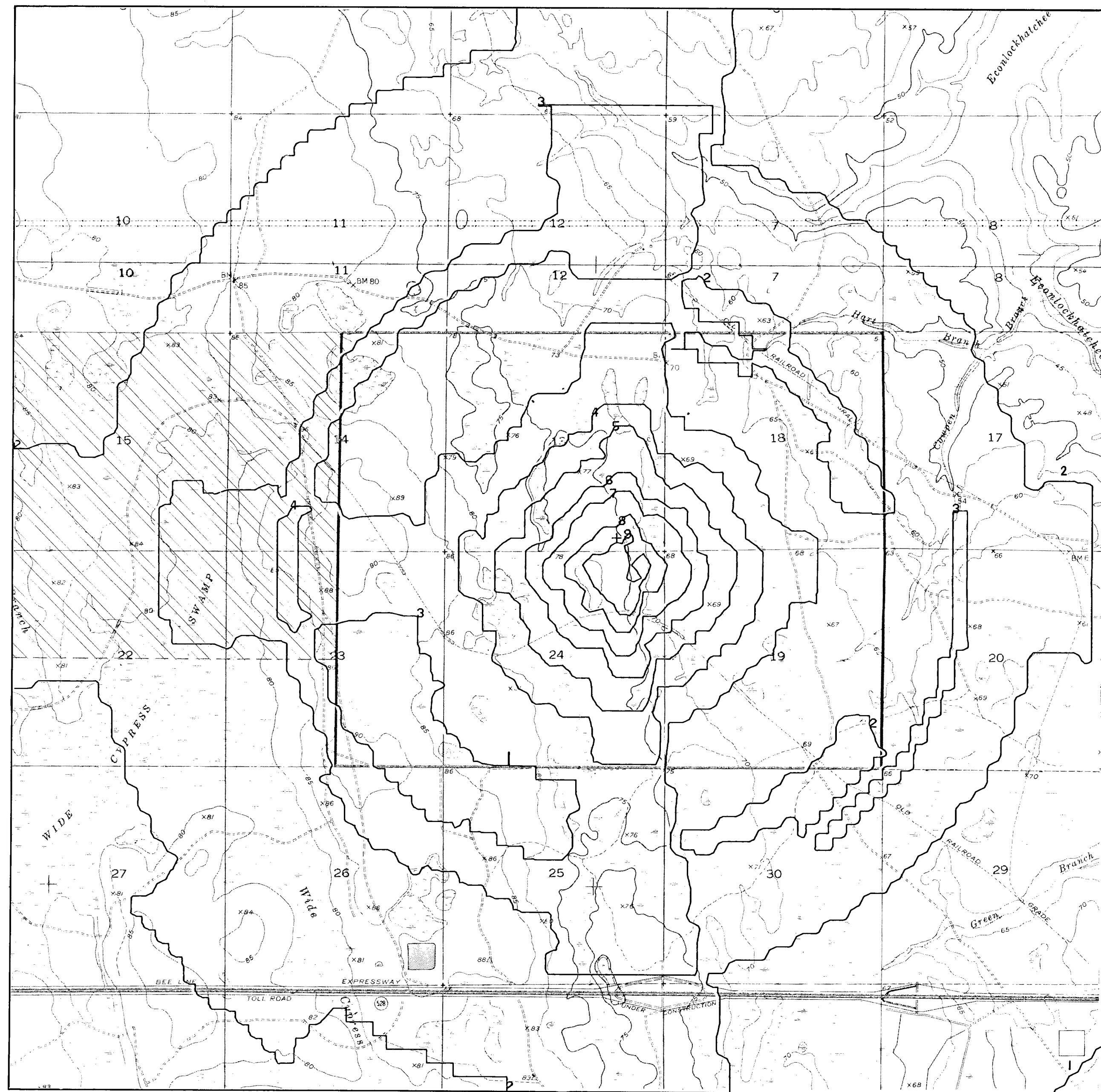
Appendix 5.7A contains the management plan for the red-cockaded woodpecker developed in cooperation with the U.S. Fish and Wildlife Service and the Florida Game and Freshwater Fish Commission.

5.7.2.3 Aviation Lighting. Aviation lighting will be required on the stack and on the natural draft cooling tower. Strobe lights for daytime marking and either strobe lights or red aviation lights for nighttime marking will be used. These lights will be visible to area residents and travelers and will have a negative impact on the visual qualities of the area.

5.7.3 References

- (1) Edison Electric Institute, Electric Power Plant Environmental Noise Guide, New York 1978.
- (2) Wyle Laboratories, Assessment of Noise Environments Around Railroad Operations, Report WCR 73-5, July 1973.
- (3) Wyle Laboratories, Transportation Noise and Noise from Equipment Powered by Internal Combustion Engines, NTID 300.13, December 1971.
- (4) U.S. Environmental Protection Agency, Railroad Noise Emission Standards (Title 40, Code of Federal Regulations, Chapter I, Part 201, 41 FR 2184, January 14, 1976; amended at 45 CFR 1263, January 4, 1980).
- (5) U.S. Department of Transportation, Federal Railroad Administration, Railroad Noise Emission Compliance Regulations (Title 49, Code of Federal Regulations, Chapter II, Part 210, issued at 42 FR 42343, August 23, 1977).
- (6) U.S. Environmental Protection Agency, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare With an Adequate Margin of Safety. Report 550/9-74-004, Washington, D.C., March 1974.

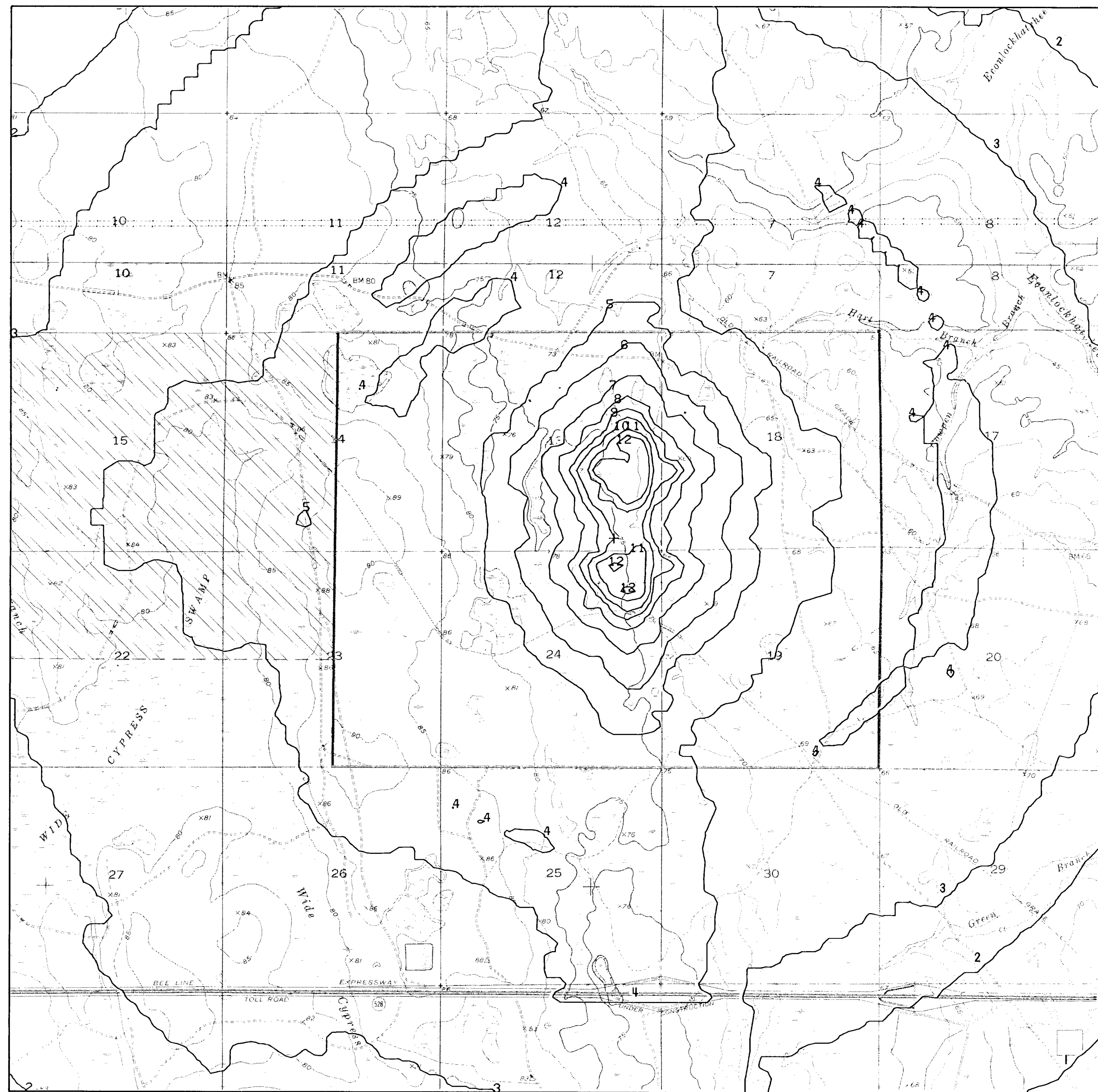
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CONTOUR VALUES	
CONTOUR NO.	LBS/ACRE/YEAR
1	0.12
2	0.29
3	0.58
4	1.17
5	2.2
6	5.3
7	11.0
8	24.0
9	48.0

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FIGURE 5.1-1. ESTIMATED ANNUAL DEPOSITION OF SOLIDS
BY COOLING TOWER DRIFT FROM 1 UNIT



CONTOUR VALUES	
CONTOUR NO.	LBS/ACRE/YEAR
1	0.58
2	0.89
3	1.16
4	2.3
5	5.8
6	11.0
7	27.0
8	53.0
9	77.0
10	95.0
11	142.0
12	190.0

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APPENDIX 5.7A
MANAGEMENT PLAN FOR THE RED-COCKADED WOODPECKER

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1.0 INTRODUCTION

Impacts related to the development of the Curtis H. Stanton Energy Center will affect certain wildlife species. One of these species, the red-cockaded woodpecker (Picoides borealis), is currently classified as endangered by the United States Fish and Wildlife Service and designated as threatened by the Florida Game and Fresh Water Fish Commission. Because of these classifications and the potential for adverse effects associated with the development of the energy center, an investigation was undertaken to develop a management plan for this species.

Wood (1981) reported that there were 1,225 red-cockaded woodpecker colonies in Florida. Of this total, seven colonies were in Orange County; five of these colonies were in the southwestern portion of the county and two in the eastern portion. None of these reported colonies were previously known to occur on the site. However, during this study, 21 unreported active colonies were located on the site or in the immediate vicinity of the project area. Nine of these active colonies occurred on the site.

This report presents the results of the study to develop recommendations for the management of the red-cockaded woodpecker on the Curtis H. Stanton site. The objectives of this investigation were to:

1. Identify the distribution and abundance of this woodpecker on the proposed site and on corridors proposed for associated facilities;
2. Map existing colony sites and cavity trees on the site as well as in the immediate vicinity;
3. Conduct monitoring studies during pre-construction activities;
4. Map potential colony sites and foraging habitat;
5. Develop a management plan for the preservation of existing clans on the site; and
6. Propose monitoring studies for the construction phase.

A glossary of ecological terms related to red-cockaded woodpeckers is supplied in Section 7.0.

2.0 METHODS

2.1 DESCRIPTION OF PROJECT

The Curtis H. Stanton Energy Center site is located approximately 13 miles east-southeast of Orlando, Florida, in central Orange County. The site contains 3,280 acres which are currently undeveloped and used for livestock grazing. Vegetation of the site consists of several types of wetland communities, xeric oak scrub, and upland pine flatwoods.

Initial site development will consist of one 415-MW (net) coal-fueled, steam-electric generating unit. Ultimate development will consist of four units of similar or larger size.

The project facilities that require significant land areas and disturbance of such land include: central generating complex, coal handling and storage facilities, natural draft cooling towers, flue gas cleaning equipment, substation, scrubber additive handling and storage facilities, cooling tower makeup water supply pond, on-site railroad loop, and combustion waste storage.

Initial development for one unit will require development of approximately 990 acres of the site. An additional 110 acres will be required for full site development. The remaining 2,180 acres will be maintained in a relatively natural state.

Off-site facilities associated with the Curtis H. Stanton Energy Center include a railroad spur (from the site to Taft, Florida), transmission lines, an access road, and pipelines for water supply and wastewater return. The railroad spur interconnects the Seaboard Coast Line at Taft, Florida, with the site on the south side. The transmission lines exit the site on the north; one line interconnects with an existing 230-kv line which runs east and west just north of the site, and the other line will parallel the existing 230-kv line on widened rights-of-way. The access road exits the site on the north side and generally follows existing rights-of-way or land division lines northward to State

Highway 50. The pipelines for water supply and wastewater return generally parallel the access road, but extend north of Highway 50 to connect to the Iron Bridge Road Regional Water Pollution Control Facility, the source of makeup water supply.

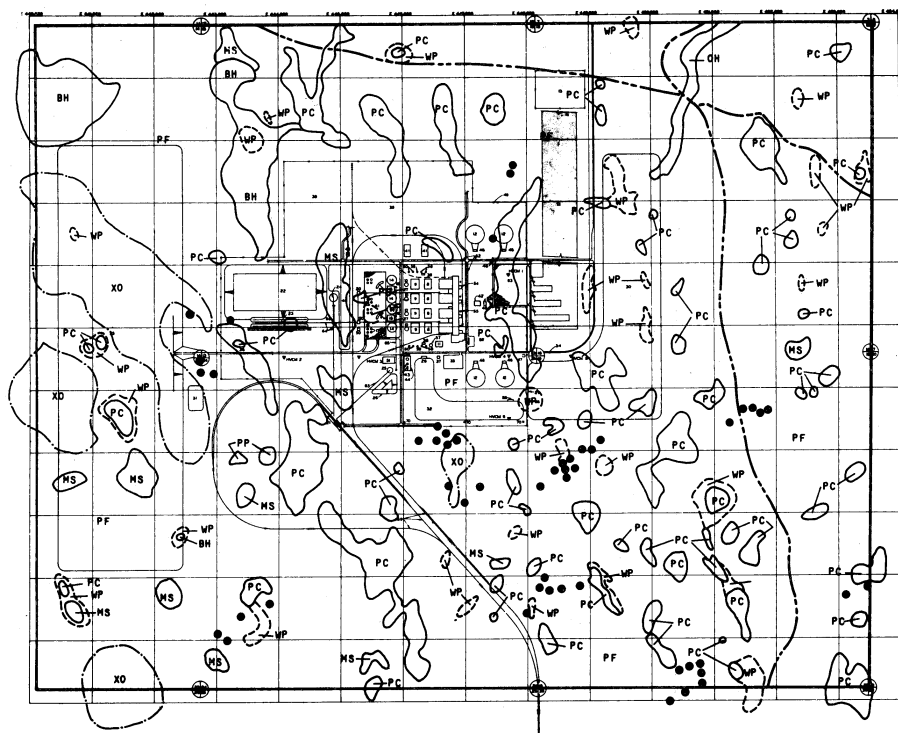
The water supply for cooling tower makeup will be stored on the site in a 113-acre pond which will also receive site rainfall runoff. Combustion wastes will be combined on the site and stored in a landfill near the western boundary of the site. The landfill will be reclaimed in segments throughout the project life. Only about one-fourth of the combustion waste storage area is allocated to Unit 1. However, most of the area will be disturbed initially since it will serve as a borrow area for site fill material.

Project facilities have been located to avoid disturbing wetlands and cavity trees of the red-cockaded woodpecker as much as possible. Figure 2-1 illustrates the degree to which these areas have been considered in site arrangement.

2.2 DESCRIPTION OF STUDY AREA

The natural vegetative communities on the Stanton site are typical of the region. Nearly level flatwoods predominate, with scattered wetlands and low ridges on the western portion and in the center of the site. The wetlands, aligned in a north-south direction, are isolated; most of the drainage is by sheet flow in a northeast direction toward the Econlockhatchee River. The low ridges, which support oak scrub, are also aligned in a north-south direction. Intermediate between these low ridges and wetlands (cypress stands) are longleaf pine flatwoods.

Longleaf pine (Pinus palustris) is the characteristic tree species in the flatwoods. The mean density was 48 trees per acre; the range was 14 to 77 trees per acre in fourteen 3.7-acre sample plots. Basal area ranged from 2 to 25 square feet per acre (ft²/acre). The extremely open canopy permits development of a rich understory of shrubs and



KEY

- CAVITY TREE
- UNIMPROVED ROADS
- SITE BOUNDARY

COMMUNITY TYPES

- BH - BAY HARDWOOD SWAMP
- MS - MIXED SWAMP
- OH - OAK HARDWOOD SWAMP
- PC - POND CYPRESS SWAMP
- PF - PINE FLATWOODS
- PP - POND PINE SWAMP
- WP - WET PRAIRIE
- XO - XERIC OAK SCRUB

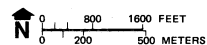


Figure 2-1

SITE ARRANGEMENT IN RELATION TO RED-CKADED WOODPECKER CAVITY TREES

SOURCE: BLACK & VEATCH, 1981.

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herbaceous species. Saw palmetto (Serenoa repens) was the most abundant shrub in the flatwoods; staggerbush (Lyonia fruticosa) and shiny lyonia (Lyonia lucida) were also common. Wiregrass (Aristida stricta) dominated the herbaceous layer, but was accompanied by a diverse array of forbs.

The flatwoods occur on Leon soils, which have a fine, sandy, gray surface soil and a dark brown to black organic pan beginning at a depth of 14 to 30 inches. Leon soils have developed from thick unconsolidated beds of sand under conditions of poor to very poor drainage. Consequently, the soils are unusually acidic and low in available nutrients; water drains rapidly except where organic pans occur under the surface.

Flat topography, the extensive impermeable pan, and sandy soil cause most of the flatwoods to flood in the rainy summer months (average monthly rainfall is 7.4 inches from June through September) and cause extreme dryness in winter and spring when the amount of precipitation is low (average monthly rainfall is 2.7 inches from October through May). The extreme dryness of the flatwoods and the highly flammable litter create a condition conducive to frequent fires. Fire and cattle grazing have maintained the species composition and open structure of the flatwoods on site. Observation reveals that the site has been subjected to numerous fires, both deliberate (to improve grazing) and accidental. Wildfire burned approximately 25 percent of the site in December 1980.

2.3 HABITAT CHARACTERISTICS

Core samples were taken from cavity trees as well as representative trees from surrounding stands of pine to determine the age of the trees. In cavity trees, other data collected included diameter at breast height (DBH); height of tree, crown, and cavity; and compass orientation of cavities. Basal area and number of potential cavity trees in each colony were also determined.

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Aerial photographs were used to classify stands of pines based on estimated density and percentage of old-aged timber (80 years and older). Density estimates were obtained from seventy-two 3.7-acre plots on aerial photographs. In addition, estimates of old-aged timber were calculated from 36 of these sample plots. Fourteen of these plots were surveyed in the field for density, DBH, and number of old-aged trees. Density estimates, basal area, and class distribution were based on the 14 surveyed plots.

2.4 DISTRIBUTION OF COLONIES

A three-step procedure was undertaken to determine the distribution and number of red-cockaded woodpeckers on the site. This process consisted of aerial photographic interpretations, low-altitude helicopter surveys, and ground truthing. Format and methods for this procedure, recommended by Mr. Richard Thompson of the United States Fish and Wildlife Service, were successful during the current study.

2.4.1 Aerial Photographic Interpretation

Aerial photographs (1 inch = 400 feet) were used to determine potential habitats (colony sites) prior to flyovers. The imagery was arranged by photographic flight line. Interpretations were then performed along each of these flight lines. The Stanton site was surveyed with the aid of a 2X and 4X Stereoscope (Leitz MS-27) and by visual inspection. Within each stand of pines, individual trees as well as understory and ground cover were inspected.

Criteria used to determine potential colony sites included:

1. Stands containing trees with flattened or sparse crowns and with no underlying branches--trunk long in proportion to crown.
2. Large-diameter pines in forests of smaller trees.
3. Stands or individual trees with deformed or curved trunks.
4. Stands containing trees with light-toned crowns.

5. Pine forest occurring in areas of slightly higher elevation than the surrounding terrain with several to 100 large well-formed pines. A further, subtle distinction, the presence of more bare soil and more widely scattered palmetto, is indicative of better quality sites.

The shadow cast by the trees was the most useful indicator of these criteria. The areas judged to be the most promising stands contained varying combinations of these factors. However, all areas that contained Characteristics 1 and 3 were identified for helicopter survey and ground truthing (see Figure 2-2). Areas containing densely stocked pines, trees with relatively long, well-formed canopies, and a dense understory were excluded. Scrub oak communities were also excluded.

2.4.2 Helicopter Surveys

Helicopter surveys were conducted over the entire site following the photographic interpretation. One cavity tree had been observed on the site during initial field (ground) surveys. To obtain a visual reference, this cavity tree was inspected from the helicopter prior to flying the first transect. Subsequently, the site was systematically surveyed for cavity trees. Flight paths were conducted between 50 and 100 feet above ground level (AGL), at speeds between 25 and 40 miles per hour (mph) (indicated airspeed), and approximately 1/8 mile apart.

Many of the criteria used to determine potential colony sites during aerial photographic interpretation were also applicable during the helicopter surveys. In addition, two distinctive features were useful in identifying actual cavity trees from the air. First, tree trunks with an overall reddish tint indicated bark scaling activities of red-cockaded woodpeckers. These trees with reddish trunks were visually inspected from close range. The second feature used to identify cavity trees was a characteristic white glaze. This characteristic was most evident when the helicopter was hovering directly over the tree.

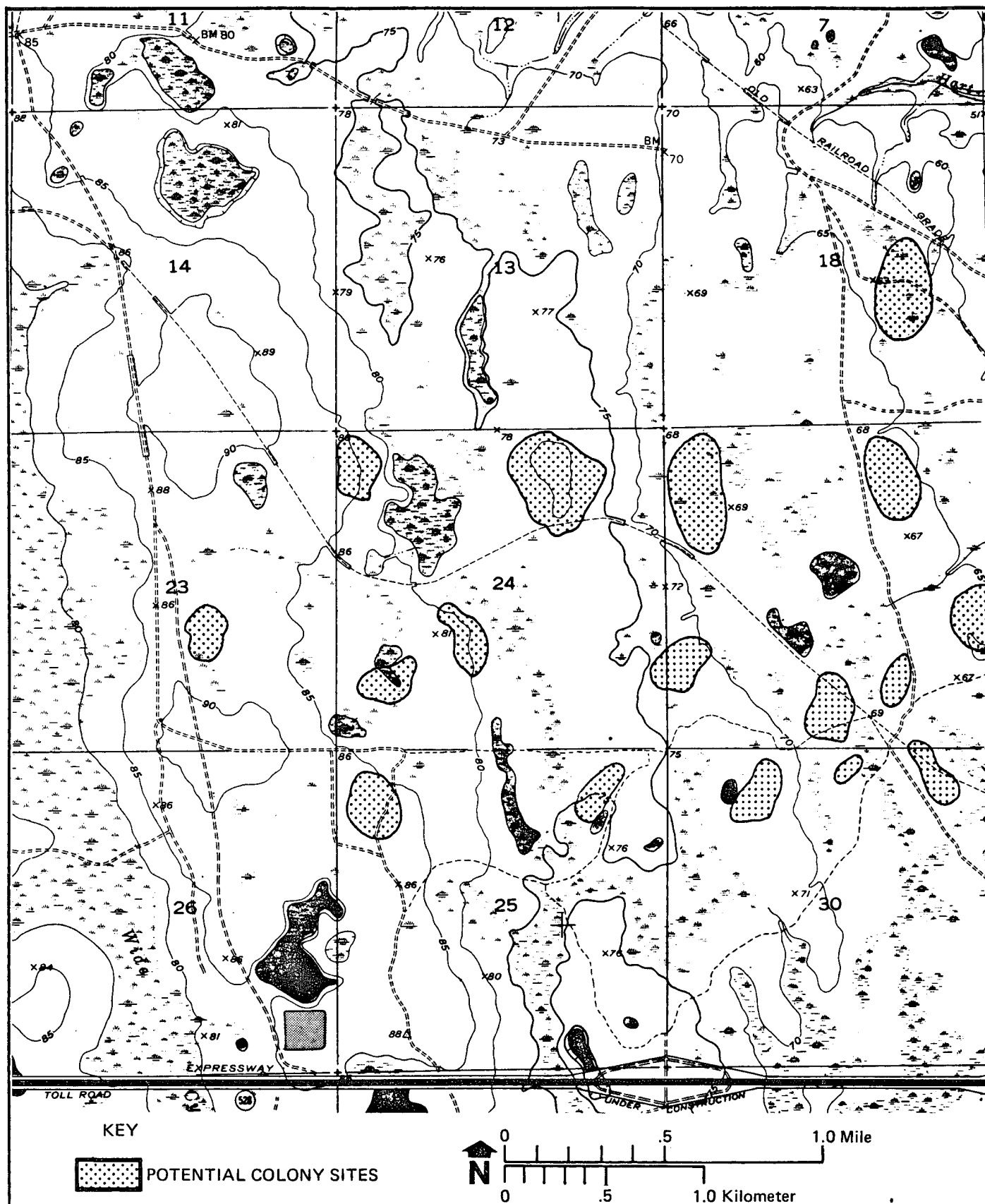


Figure 2-2
LOCATION OF POTENTIAL RED-CKOADED
WOODPECKER COLONIES IN THE AREA
OF THE PROPOSED SITE

SOURCE: ESE, 1981.

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2.4.3 Ground Truthing

Following aerial flyovers, all locations were ground truthed to determine the status of each cavity tree. Surrounding pine trees were also surveyed for cavities. All identified potential colony sites were surveyed for evidence of red-cockaded woodpeckers. Criteria used for determining the status of each cavity tree followed those outlined by Jackson (1977).

A variety of techniques was employed to determine the number of birds in each clan. The primary method included visiting colony areas during evening roosting of birds and after emergence from cavity trees in the morning. A tape recording of agonistic interactions between clans was obtained from Mr. Steve Nesbitt of the Florida Game and Fresh Water Fish Commission. This recording was played in colony areas during the early morning and late evening to congregate clan members. During each of these activities, two to four observers conducted a census of clan members. A second method consisted of banding on-site red-cockaded woodpeckers during the winter of 1981.

Ground-truthing methods were used to survey the proposed site and associated facilities. All of Sections 13, 14, 18, 19, 24, 25, and 30 were surveyed. Density and spacing of colonies were based on these surveyed sections. Surveys along proposed corridors were approximately 0.4-mile wide. However, if potential colony sites were identified during field surveys, additional areas outside these corridors were also surveyed.

Site access was the only major problem encountered in collecting these data. All corridors and the entire proposed site were eventually surveyed. Access could not be obtained to those sections immediately east of the proposed site; therefore, photographic interpretation and flyovers were the only methods employed in these areas. In other directions, photographic interpretation and ground truthing were

conducted. The surveyed area was extended to include a 0.5-mile radius from the Stanton site boundaries.

2.5 MONITORING STUDIES

The red-cockaded woodpecker is currently being monitored during the pre-construction phase of the proposed power plant to determine baseline conditions; monitoring will continue during the construction phase and part of the first year of operation of the proposed power plant to determine construction impacts. It may be advisable to conduct post-construction monitoring. At the end of the current monitoring program, an assessment and recommendation will be made for further monitoring during plant operation. Information being gathered during the baseline phase includes determination of home range for five on-site clans, evaluation of foraging habitat, and collection of information on reproduction of all on-site clans. Pre-construction monitoring has not been completed at this time. During construction activities, home range for five clans will be determined. All clans will be monitored for reproduction. The following paragraphs describe the pre-construction and construction monitoring programs.

2.5.1 Pre-Construction Phase Monitoring

During January and February 1981, 18 red-cockaded woodpeckers from eight clans were uniquely color banded using methods described by Nesbitt et al. (1981). The Florida Game and Fresh Water Fish Commission accomplished the banding with assistance of ESE personnel.

Of the five clans selected for intensive study during the baseline phase, four were chosen because their foraging habitats will receive the greatest impact from plant construction. In addition, the only impacts affecting cavity trees will occur in colony areas occupied by three of these four clans. The fifth clan will not be directly affected by plant construction.

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Home range is being determined by following clan members from the roost tree in the morning until mid-afternoon (1500 hours). On selected days during each seasonal survey, clans are being observed for the entire day. Seasonal home range will be determined during the summer and fall/winter period. Studies conducted to date have indicated a substantial difference in habitat utilization during the fall period compared to late winter (see Paragraph 3.3). Actual home range size varied little during the fall/winter sampling, but habitat utilization was substantially different. To further evaluate this difference in habitat utilization, home range determination for each clan will be conducted as follows: 50 hours of observation per clan during July, 25 hours of observation per clan during October, and 25 hours of observation per clan during February.

On each day of observation, the location of the clan will be plotted at 5-minute time intervals on an aerial photograph (1 inch = 400 feet). All observations will be summarized on one aerial photograph. Grid locations will be coded for computer statistical analysis. Home range will be determined by connecting peripheral points and calculating the total acreage within this boundary. The grid system will also be used to determine a range of values for use (high, medium, low) within the foraging habitat. Home range size and configuration will be compared by season as well as yearly.

Fledging success will be determined by visiting colonies during the late spring and early summer. All active cavity trees for each on-site clan will be inspected for nesting activity during May and June, the peak of the breeding season. Nesting activity includes the presence of red-cockaded woodpeckers in the cavity during the day or indication of the presence of nestlings. Inspection of cavity trees will be conducted once during each week beginning in mid-May and continuing through

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mid-June 1981. The later time period is subject to change depending on observed behavior. During the later phases of nesting activity, clans will be monitored during foraging activity to determine the number of birds fledged. The purpose of these studies is to determine reproductive success, which will be based on the number of birds fledged per clan.

2.5.2 Construction Phase Monitoring

Monitoring during the construction phase will be similar in scope to pre-construction monitoring. A minimum of 72 hours of home-range monitoring per clan will be performed during the first year of the construction phase. Subsequent evaluation of home range will be conducted during the last year of construction activities and part of the first year of operation. An additional 72 hours of monitoring per clan will be performed during this last phase. The same five clans will be monitored during this activity to evaluate possible home range shifts, clan interaction, or other potential changes in clan daily activity.

Reproductive success will be evaluated during the nesting season using the method described for pre-construction monitoring. If possible, all clans will be monitored for reproductive success during the pre-construction phase and each year of construction activity.

Long-term monitoring of red-cockaded woodpeckers on the Stanton site is not included in this plan of study. However, the approach to evaluate the long-term effects should include a complete monitoring study as described in this document. The study would include 1 year of monitoring range movements of five clans and fledging success for all on-site clans. Methods and sampling scheme should be consistent with the present study. The long-term study should be accomplished between the 5th and 7th year after completion of construction.

3.0 RESULTS AND DISCUSSION

3.1 POPULATION OF THE AREA

Investigations in the general area of the proposed power plant and along corridors for associated facilities revealed 22 active or inactive colonies of red-cockaded woodpeckers (Figure 3-1). Of these 22 colonies, one was clear-cut during 1981, one was inactive, and the remaining 20 were active colonies. One active colony (not shown in Figure 3-1) was located approximately 3 miles east of the proposed site. In addition, two red-cockaded woodpeckers were sighted off the site and probably represented an additional clan (see Figure 3-1). Other potential habitats existed throughout the area; however, most of these areas could not be surveyed.

Of the areas surveyed, the greatest concentration of active colonies occurred in Sections 19 and 23 of the proposed site and the two sections (25 and 30) south of the site. This combined area contained 11 active colonies. Within this area, Section 19 had the highest concentration (5 colonies). Of these 11 active colonies, 10 were located within areas of potential habitat identified during aerial photographic interpretation.

The Stanton site contained 9 active colonies with an estimated 26 red-cockaded woodpeckers. In addition, the home range of one clan located off the site (Clan K) appeared to include portions of the proposed site. This clan consisted of two birds during the winter. The number of birds in all off-site colonies has not been determined; however, each colony contained at least one active cavity tree. In four of the colonies located south of the site, 11 red-cockaded woodpeckers were observed. Other red-cockaded woodpeckers were sighted in the remaining off-site colonies; however, the number of birds in these clans has not been determined.

3.2 HABITAT

3.2.1 Foraging Habitat

The stand condition of flatwoods on the Stanton site varied depending on a number of factors, including soil and moisture conditions, frequency

KEY:

- A - T COLONY IDENTIFICATION
 * OBSERVED TWO RED-COCKADEDS

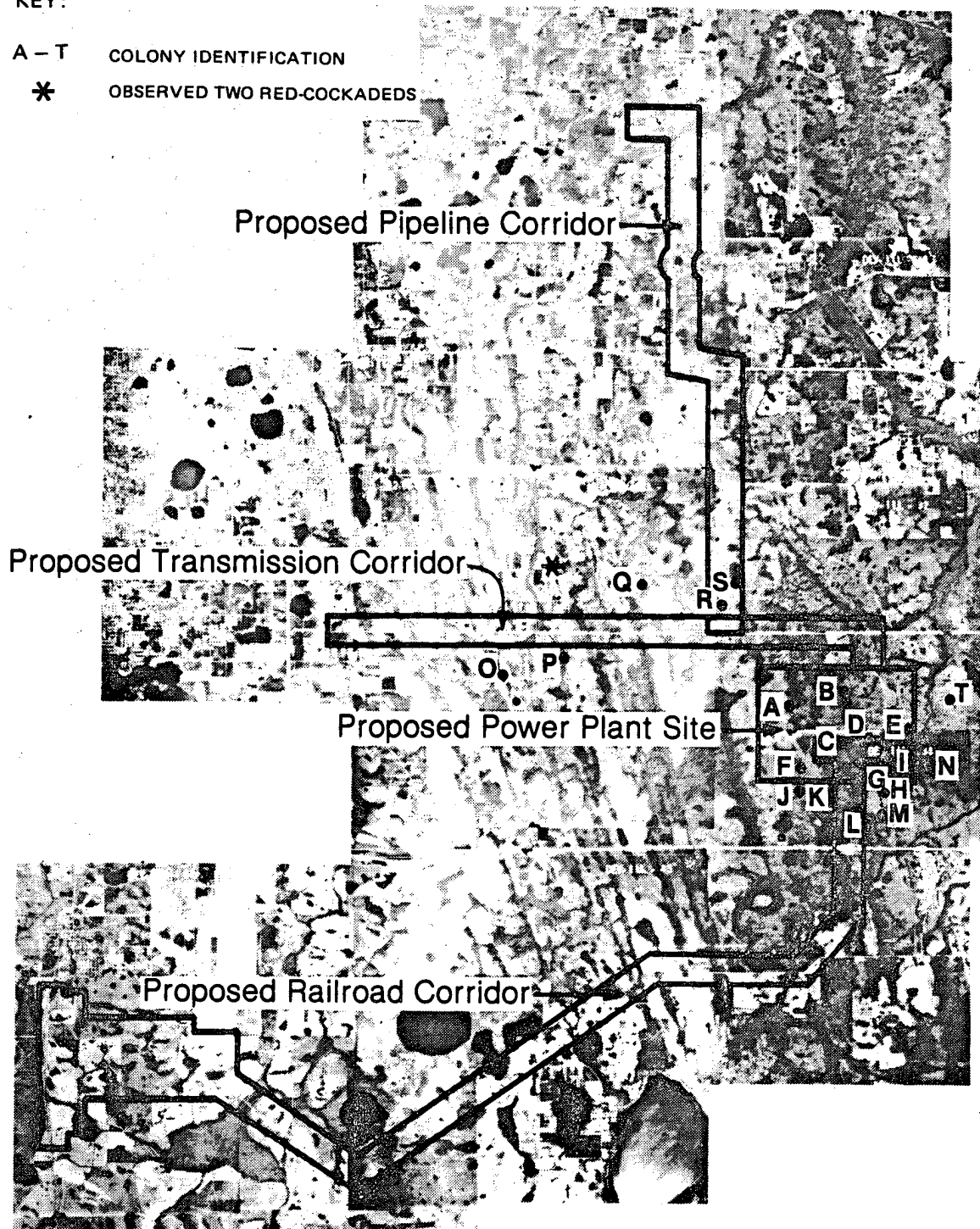


Figure 3-1
AERIAL PHOTOGRAPH SHOWING LOCATIONS OF
RED-COCKADED WOODPECKER COLONIES

SOURCE: ESE, 1981.

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of fire, and logging history. In comparison to studies reporting on other parts of the red-cockaded woodpecker's range, on-site foraging habitat appeared to be poor quality. Ligon (1971) suggested that old timber provides better foraging habitat than second-growth stands. Wood (1975) indicated that denser stands of pine with higher basal areas were also preferred foraging habitat. Based on these factors, it appears that Stands 1, 3, 6, and 10 contain the better quality foraging habitat, while some of the poorer areas occur in Stands 2, 5, and 11. Table 3-1 presents data descriptions of each identified stand (see Figure A-2 in Appendix A). It is also apparent that regeneration is low in most areas of the Stanton site.

Table 3-2 describes winter home range for five clans plus the habitat within each respective range. Mean basal area of pine in these winter ranges was not substantially different ($9.1 \text{ ft}^2/\text{acre}$ to $13.4 \text{ ft}^2/\text{acre}$). However, total basal area ranged from a high of 3,269 square feet in 319 acres of pines for Clan B to a low of 1,121 square feet in 123 acres for Clan C. Home range for Clans A and B contained the largest area of wetlands. Mean density of pines including all classes was similar for each of the respective home ranges. Second-growth timber varied from 54 percent of total trees in Clan D's range to 94 percent of Clan A's range.

Comparison of total basal area of flatwoods in each range indicated a similarity between Clans A and B and between Clans C and D, with Clan G intermediate between the two. Percentage of second-growth timber in each range was similar for Clans A, B, and C and for Clans D and G.

3.2.2 The Colony

Seventy-one cavity trees, representing nine active colonies, were located on the Stanton site. Of this total, 26 were being used as either roost or nest cavities (only during nesting season). This represents an average of 2.9 active cavity trees per clan. Twenty-two active cavity trees were observed for off-site clans. Observations on the Stanton site indicated a mean of 7.9 cavity trees per colony

Table 3-1. Data Description of Pine Stands Identified on the Proposed Site

Stand Number	Acres	DBH* Classes			Total (trees/ acre)	Basal Area (ft ² /acre)	Second-Growth Timber (%)
		<2	2-7 (trees/acre)	7-13			
1	119	5.2	52.8	50.3	108.3	25	92
2	378	9.3	4.6	10.1	24.0	5	71
3	289	13.3	4.4	28.7	46.4	16	42
4	290	2.2	31	18.5	51.7	10	88
5	437	1	4.8	8.2	14	2	93
6	180	2.9	24.2	49.9	77.0	21	96
7	126	11.9	8.7	13.4	34.0	6	90
8	314	1.4	9.3	19.3	30.0	7	93
9	104	1.6	24.5	20.2	46.3	10	93
10	217	2.7	14.2	52.5	69.4	20	93
11	424	2.2	10.8	12.4	25.4	5	93
Average	262	4.9	17.2	25.8	47.9	10	87

* DBH = Diameter at breast height (inches).

Source: ESE, 1981.

Table 3-2. Composition of Red-Cockaded Woodpecker's Winter Home Range

Clan	Total Area (acres)	Pine Flatwoods			Second-Growth Timber (%)	Cypress Dome/ Bayhead (acres)	Wet Prairie (acres)	Pond Pine (acres)
		Acres	Basal Area (ft ² /acre)	Density/ Acre				
A	380	296	11.2 (3,315)	40	94	72	4	8
B	350	319	10.2 (3,269)	38	92	21	10	0
C	127	123	9.1 (1,121)	30	84	4	0	0
D	138	115	12.4 (1,411)	46	62	20	3	0
E	233*	--	9	41	--	--	--	--
F	233*	--	13	55	--	--	--	--
G	169	153	13.4 (2,050)	46	54	15	1	0
H	233*	--	13.0	49	--	--	--	--
I	233*	--	10	52	--	--	--	--
Average	233	201	11.3	45	77	26	4	2

* Home-range estimates based on average for five surveyed clans.

† () indicates total estimated basal area.

Source: ESE, 1981.

(range 4 to 13) including start-hole, active, and abandoned cavities. The mortality rate for active cavity trees during the current study was 7 percent.

Basal area of the nine on-site colonies ranged from 5 ft²/acre to 40 ft²/acre, with a mean near 20 ft²/acre. Thompson and Baker (1971) indicated a mean of 50.3 ft²/acre (range 10 to 140 ft²/acre) for longleaf timber type collected from 148 sites.

Areal extent of surveyed colonies was variable, ranging as high as 42.8 acres to a low of 2.1 acres. The 42-acre area is considerably larger than the maximum (16 acres) reported by Thompson and Baker. Within colonies, 486 feet was the minimum average distance between active cavity trees, mean distance for all cavity trees was 587 feet, with a range of 100 feet to 1,050 feet. The open character (in terms of basal area and stem density) and the relatively widely spaced cavity trees are reflected in the large area occupied by each colony.

As shown in Table 3-3, colonies on the Stanton site exhibited characteristics that varied somewhat from those reported in more northern areas. Observations of nearby off-site colonies indicated a similarity to those on the Stanton site. Surveyed colonies exhibited larger size, less basal area, and lower height of cavity than other reported colonies. However, comparison of cavity tree data, consolidated by Shapiro (1981), in the Three Lakes Wildlife Management Area indicated a similarity in character with those on the Stanton site. Cavity orientation (see Figure A-1 in Appendix A) and other features of cavity trees (i.e., resin wells, plates, etc.) did not appear substantially different from previous reports.

Figure 3-2 graphically displays inter-colony spacing for the proposed site and those colonies to the immediate south. Density of colonies in this area was 1 per 345 acres. Within this area, Section 19 had the highest concentration with an average of 1 colony per 128 acres. The

Table 3-3. Comparison of Red-Cockaded Woodpecker Colonies on the Stanton Site with Other Reported Colonies

Characteristic	Stanton Site			Other Reported Colonies		
	Mean	Range	Sample Size	Mean	Range	Sample Size
<u>Colony</u>						
Size (acres)	13.2	2.1 to 42.8	9	1.4	0.01 to 16	148 ⁽¹⁾
Basal Area* (ft ² /acre)	19	5 to 40	9	50	10 to 140	148 ⁽¹⁾
Number of Cavity Trees	7.9	4 to 13	71	3.61	1 to 11	148 ⁽¹⁾
Distance Between Active Cavity Trees (ft)	587	100 to 1,050	27	228	33 to 660	187 ⁽²⁾
<u>Cavity Trees†</u>						
Age (years)	110	88 to 140	29	83		401 ⁽¹⁾
Tree Height (ft)	36.9	23 to 50	71	68.8		551 ⁽¹⁾
Height to Crown (ft)	25.9	17 to 44	71	38.1		235 ⁽³⁾
Height to First Cavity (ft)	18.0	5 to 30	71	27.1		187 ⁽²⁾
Diameter** (inches)	10.7	5.9 to 13.1	71	15.3		557 ⁽¹⁾
Number of Cavities per Tree	1.2	1 to 3	71	1.5		560 ⁽¹⁾

* Basal Area (BA) = cross-sectional area of trees at breast height.

† Includes active, inactive, and start-hole cavity trees.

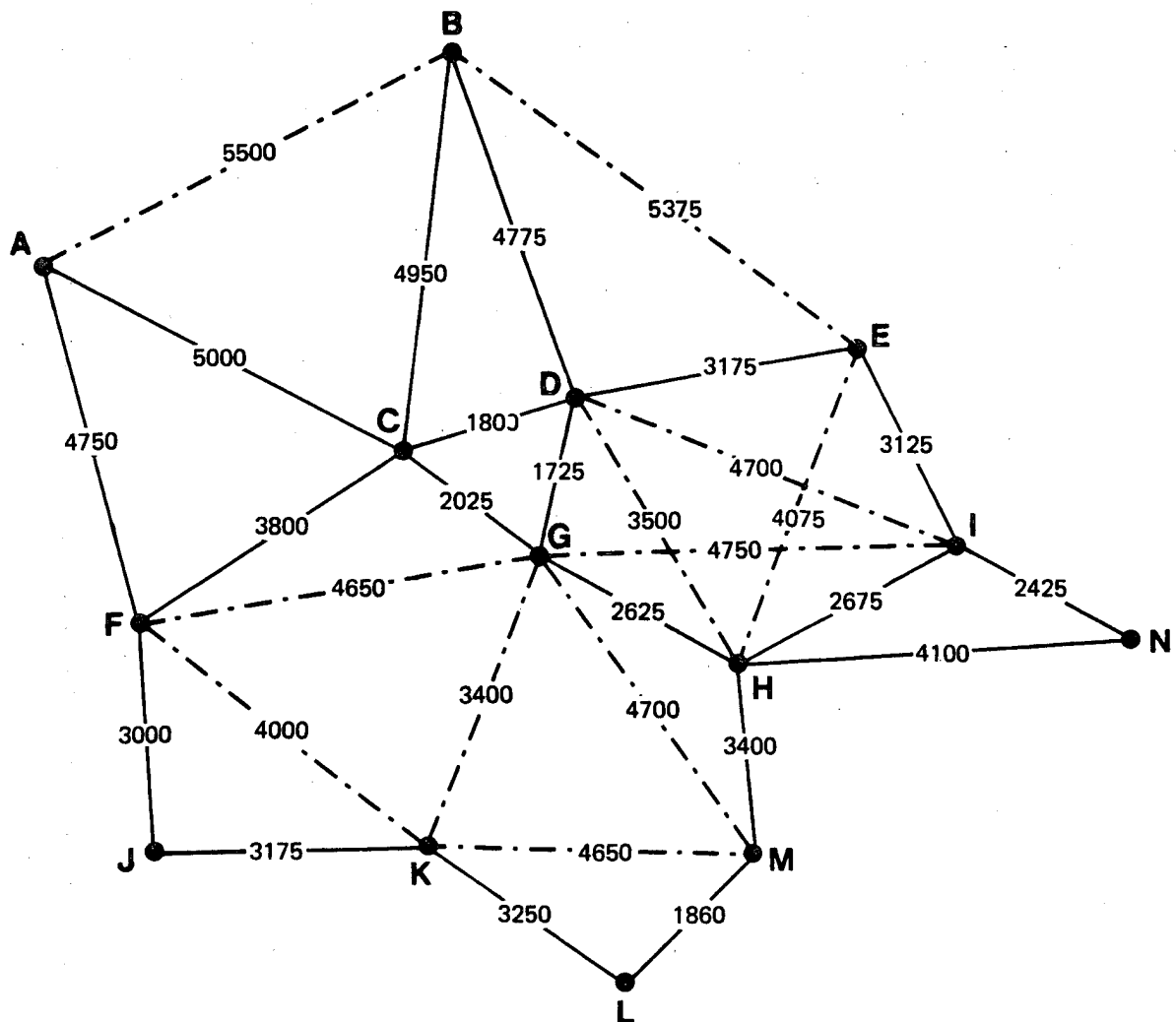
** Diameter at breast height (DBH).

Sources: Stanton Site—ESE, 1981.

Other Reported Colonies—⁽¹⁾Thompson and Baker, 1971.

⁽²⁾Hopkins and Lynn, 1971.

⁽³⁾Lay and Swepston, 1973.



KEY

— DISTANCE (ft) TO NEAREST NEIGHBORS

- - - DISTANCE (ft) TO OTHER COLONIES

● COLONY CENTERS

Figure 3-2
INTER-COLONY SPACING IN THE VICINITY
OF THE PROPOSED SITE

SOURCE: ESE, 1981.

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density of colonies in the current study is within those estimates reported from other portions of the red-cockaded woodpecker's range. In Oklahoma, Wood (1975) observed a fairly uniform distribution of clans (1 clan per 324 acres) in virgin pine-hardwood forest. Recent work by Hovis (1981) in the Appalachian National Forest has determined 39 active colonies per 8,000 acres or 1 colony per 205 acres. According to Hooper and Lennartz (1981), colonies in South Carolina may approach a somewhat higher density, with estimates of 1 colony per 112 acres.

Colony spacing within the study area was not distributed uniformly; however, there was a tendency for colony centers of two neighboring clans to be equally spaced from any one colony. The average minimum distance between centers of adjoining colonies was 2,748 feet (range 1,720 to 4,750 feet). Mean distance to the colony center and the two nearest neighbors was 2,964 feet.

3.3 TERRITORIAL BEHAVIOR

The number of birds observed in each on-site clan is listed in Table 3-4. The average for these clans plus those clans in Sections 25 and 30 was 2.9 birds, with a range of 2 to 5 birds. The sex ratio for 18 banded birds was 8 males to 10 females. The number of birds observed roosting in each colony area is also listed in Table 3-4. Nesting activities were observed in eight of the nine reported clans on the Stanton site.

Winter home range has been partially determined for five on-site clans. These five clans were followed for a total of 190 hours, with an average of 7.5 hours of observation per sampling episode. Estimated mean home range during this period was 233 acres, with ranges from 126 acres to 380 acres. Home range for Clans A, B, and G included both on-site and off-site lands, whereas the home range of Clans C and D was confined entirely to the site (see Figure 3-3).

Table 3-4. Description of Red-Cockaded Woodpecker Clans Within the Vicinity of the Proposed Site

Clan*	Number of Birds†	Number of Birds Roosting in Colony Area†	Banded Members		Nesting Activity	Reproduction**	
			Male	Female		Nestlings	Fledglings
A	2	2	--	1	+	+	2
B	2	2	1	1	+	+	1
C	3	2	2	1	+	+	2
D	3	4	1	2	+	+	1
E	4	4	1	--	+	+	1
F	3	3	--	--	+	+	2
G	2	3	1	1	-	-	0
H	5	4	1	4	+	+	0
I	2	2	1	--	+	-	0
J	3	3	--	--	UD	UD	UD
K	2	2	--	--	UD	UD	UD
L	2	2	--	--	UD	UD	UD
M	4	4	--	--	UD	UD	UD
Total	37	37	8	10	8	7	9
Average	2.9	2.9	--	--	--	--	--

* Clans A through I located on the proposed site.

† Winter observation only.

** + = Observed.

- = None observed.

UD = Undetermined.

Source: ESE, 1981.

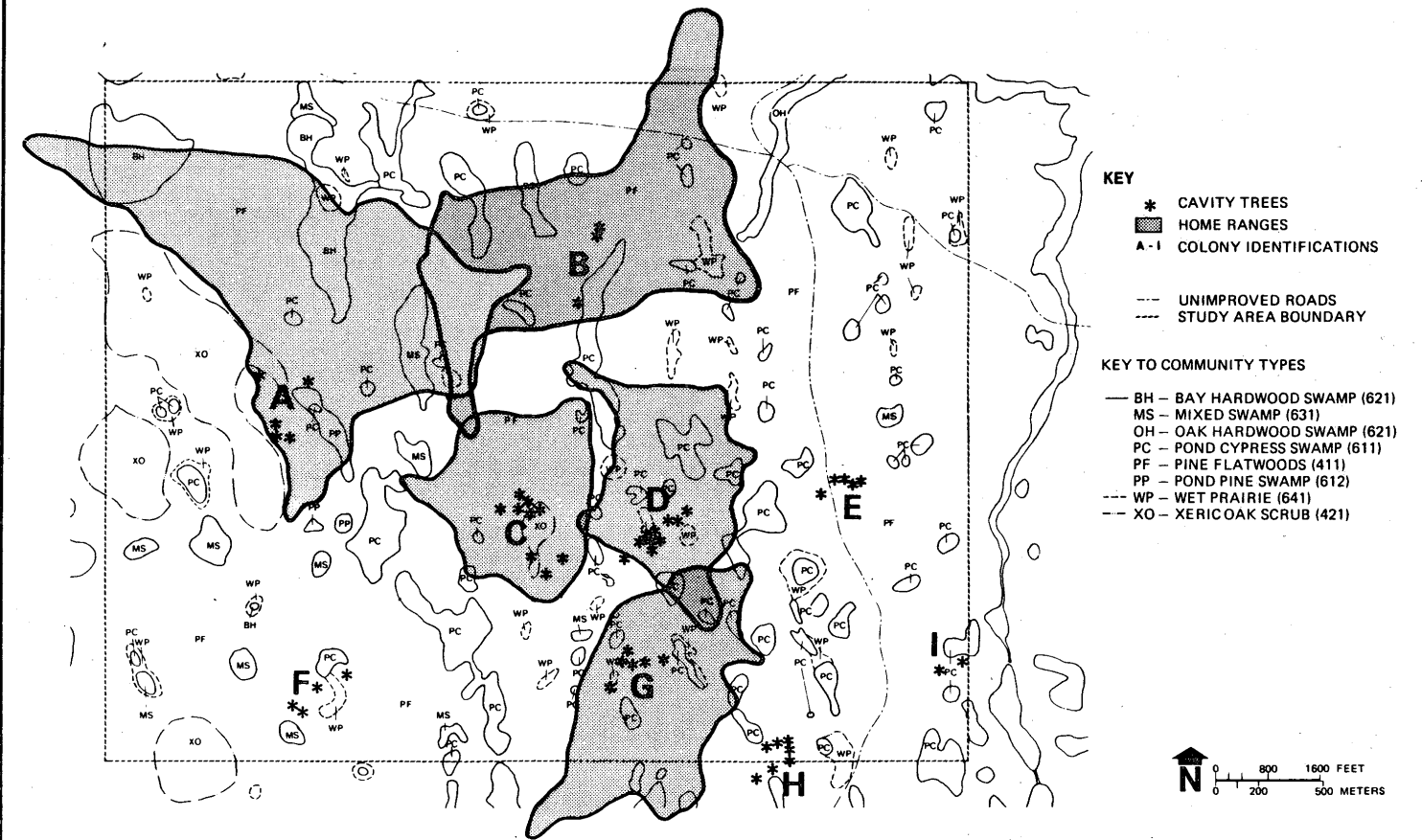


Figure 3-3
RED-CKOADED WOODPECKER COLONIES AND WINTER
HOME RANGES ON THE PROPOSED SITE

SOURCE: ESE, 1981.

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As indicated in Table 3-4, clan members did not necessarily roost in the same colony. During October and November 1980, one bird roosting in Colony D foraged part of each day with both Clan C and Clan D.

Subsequent sampling during late winter revealed that one male bird roosting in Colony D spent each day foraging with Clan C. This bird was accepted by clan members with little agonistic behavior; however, the bird assumed a subordinate role at specific feeding sites. A similar relationship existed with one female roosting in Colony G and foraging with Clan H. Although range data were not collected on Clan H, during specific interactions between these two clans, this female was observed with Clan H. This bird was not observed foraging with Clan G.

Nesbitt et al. (1978) reported a similar situation involving one male red-cockaded woodpecker roosting and foraging with separate clans. The article suggested that this bird was shifting clan affiliation. It may be that the previous two instances for the Stanton site red-cockaded woodpeckers represent a similar occurrence of shifting clan affiliation; in the case of the female bird, it may indicate that she did not possess a strong affiliation for any one clan.

Clan activity during daily foraging movements was similar to that reported by Nesbitt et al. (1981). This included a congregation period in the morning accompanied by much vocalization and flying about the colony area. Subsequently, clans generally moved off in one unit to forage.

Normally clan members followed a regular pattern during foraging movements on a given day. This pattern was variable but usually consisted of a foraging trip away from the colony in the morning with a return to the colony later in the day. Clan members were not observed roosting during this period; they either traveled through the colony area or engaged in cavity tree maintenance for short periods. There were instances, however, where clans did not return to the colony until

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roosting. The greatest distance one clan was observed from its colony area was 1.1 miles.

Pine flatwood was the predominate habitat used; however, during the fall, a significant percent of foraging activities occurred in cypress domes. During October and November 1980, the clans observed spent approximately 80 percent of their foraging time in pine flatwoods and 20 percent in cypress domes. Only 3 percent of Clan C's home range was cypress dome; however, this clan utilized cypress domes at a rate of 26 percent of observed foraging time during the fall. Late winter utilization of cypress domes decreased to less than 1 percent by all surveyed clans. Nesbitt et al. (1978) reported a similar, although not as extensive, use of cypress domes during the fall.

As previously indicated, a relatively hot fire burned through approximately 25 percent of the Stanton site during early December 1980. This burn occurred in 41 percent of winter home ranges for Clans A, B, C, and D. No evidence of fire was observed in Clan G's winter range. During surveys conducted in January and February 1981, approximately 80 percent of foraging time for Clans A, C, and D occurred in burned areas. In contrast, Clan G used available habitat in a relatively uniform manner. Because of extended range movements resulting from frequent territorial disputes, no discernible pattern was evident in Clan B's range.

Intrusion of clans from adjoining territories seemed to be the most common factor interrupting foraging movements. Agonistic encounters between clans are depicted in Figure 3-4. The clans observed most frequently in territorial disputes were Clans A and B. These two pairs also have the greatest overlap of home range (55 acres). In all observed instances, Pair A was the intruder. In one instance, Pair B was observed to travel approximately 0.4 mile from a foraging site, interact with Clan A for approximately 25 minutes, then return to the vicinity of the previous foraging site. Observed instances of agonistic encounters

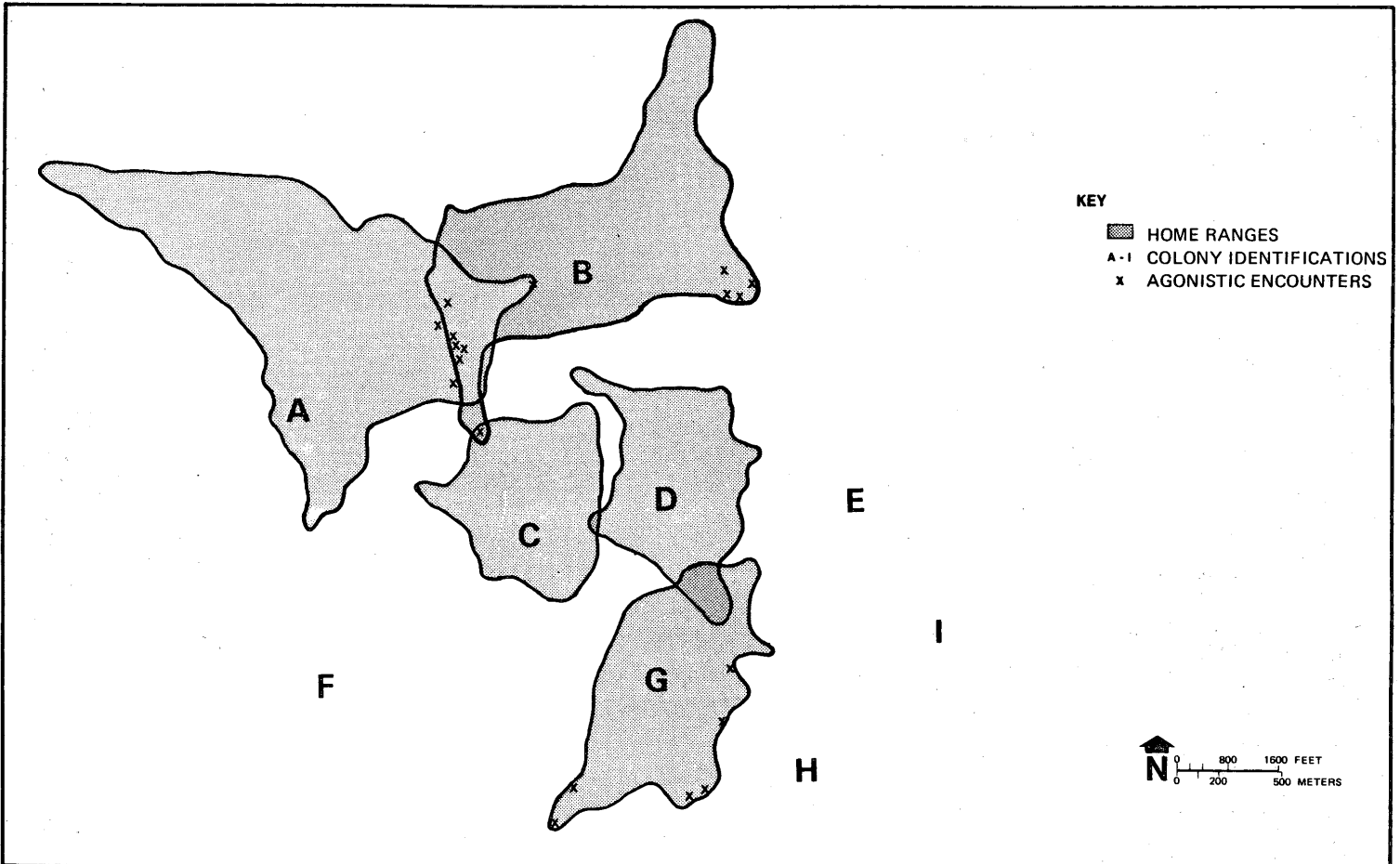


Figure 3-4

AGONISTIC ENCOUNTERS OF CLANS ON THE PROPOSED SITE

SOURCE: ESE, 1981.

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between other clans were less frequent. Of the remaining clans, Pair G had the most observed encounters.

Ligon (1971) suggested that home range may be influenced by interclan pressure, as well as size of the clan and type of habitat utilized. During the current study, Clans C, D, and G had the smallest home ranges. The distance between the centers of the colonies of these three clans was significantly less than the distance between the centers of Colonies A and B and their nearest neighbors. Total basal area of preferred foraging habitat for Clans A and B was nearly twice as large as that of Clans C, D, and G. The percentage of old-aged timber in the home ranges of Clans D and G was also substantially higher than that of Clans A, B, and C.

During the 1981 nesting season, 78 percent (7 of 9 clans) of the on-site clans produced nestlings. Two clans (G and I) were apparently barren. Nesting activity was observed in Clan I; however, there were no indications that any young hatched. Nestlings were recorded in Clan H, but disappeared during the later stages of development. In the remaining six clans, nine birds were fledged. The fledging rate for these six clans was 1.5 birds per nest. Six of the eight clans nested in the male roost tree. Clan B's nest tree had been used as the female roost during the winter. It was not determined whether Clan F's nest tree was a roost tree for a male or a female.

4.0 IMPACTS

4.1 SUMMARY OF IMPACTS

The proposed project will have the following impacts: loss of cavity trees, loss of foraging habitat, loss of potential replacement cavity trees, and development of management practices. These impacts will influence the population of red-cockaded woodpeckers in the general area of the proposed site. Additional information is also provided on the availability of unoccupied potential foraging habitats. The actual effects that these factors will have on population size and on individual clans cannot be determined precisely because of the lack of information available. The only conclusive data available on range and colony alteration pertain to one clan in central Florida which sustained a 12.5-percent loss of foraging habitat and loss of one active cavity tree. Apparently, according to Nesbitt et al. (1981), this clan was able to survive and reproduce in the same range for 2 years.

4.2 CONSTRUCTION IMPACTS

The proposed project provides for the construction and operation of one coal-fired combustion unit and turbine; three additional units will be completed during the life of the power plant. The construction and operation of the proposed project will have a variety of environmental impacts. The most significant impacts that relate to the red-cockaded woodpecker will occur during initial clearing operations for plant construction.

Construction of Unit 1 beginning in 1983 will require a total of 960 acres. Clearing operations to accommodate Units 2, 3, and 4 will include an additional 138 acres. The total area to be cleared will be about 1,100 acres. Of this total area, 312 acres will be required for the development of the solid waste storage area. This clearing of 312 acres will occur during the construction of Unit 1. Solid waste disposal for Unit 1 will require about 80 acres to be filled in 15-acre active disposal area cells.

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Impacts during plant construction which will affect the red-cockaded woodpecker include limited cavity tree removal and loss of some foraging habitat. Twenty-six active cavity trees and 45 start-hole or abandoned cavity trees are associated with the nine clans on the site. Table 4-1 shows each clan has an average of 2.9 active cavity trees, with an additional 5.0 start-hole trees or abandoned cavity trees.

Clearing of vegetation will result in the loss of five cavity trees (Table 4-1). These trees include one active cavity tree, three cavity trees with start holes, and one abandoned cavity tree. From a population point of view, this represents an overall loss of 7 percent of all available cavity trees, including 4 percent of all active cavity trees and 9 percent of all start-hole or abandoned cavity trees (see Figure 4-1).

During the construction phase of the proposed plant, the anticipated loss of foraging habitat is approximately 450 acres (43 percent of the total area proposed for clearing) for on-site clans (Clans A, B, C, D, E, F, G, H, and I), or 24 percent of the foraging habitat used by the population on site. The foraging range of clans with colonies located off site will not be directly affected by plant construction. Four clans (Clans E, F, H, and I) have colonies on site located near the site boundary. It is estimated that portions of their present home range include off-site lands. The estimated on-site foraging ranges for Clans H and I and those portions of the estimated ranges for Clans E, F, H, and I that occur off site will not be affected significantly by construction of the plant and associated facilities (e.g., railroad).

The largest loss of foraging range (38 to 58 percent) will occur in Clans A, B, C, and D, with smaller losses occurring in Clans E, F, and G (see Table 4-1 and Figure 4-2). Apparently, there are potentially suitable and unoccupied foraging areas (approximately 150 acres) on the northern portion of the proposed site and just off site. There are no known active colonies within 1 mile north of the site. There is also

Table 4-1. Description of Construction Impacts on Red-Cockaded Woodpeckers

Clan	Total Number of Cavity Trees	Total Number of Cavity Trees Affected		Foraging Range	
		Active	Other*	Total (acres)	Loss from Construction Impacts (%)
A	7	0	0	380	42
B	6	0	1	350	38
C	11	0	2	127	58
D	13	1	1	138	49
E	7	0	0	233†	10
F	8	0	0	233†	12
G	8	0	0	169	4
H	7	0	0	233†	0
I	4	0	0	233†	0
Total	71	1	4	2,096	--
Average	7.9	--	--	233	24

* Abandoned and start-hole cavity trees.

† Home-range estimate based on the average for five surveyed clans.

Source: ESE, 1981.

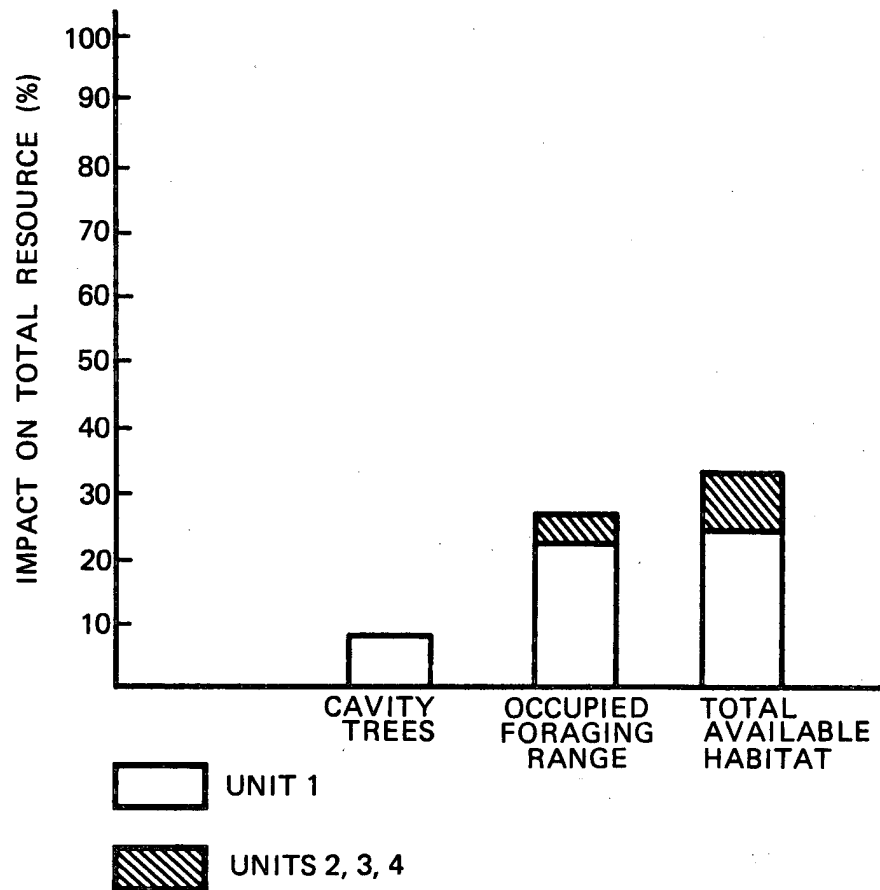


Figure 4-1
CONSTRUCTION IMPACTS ON
RED-COCKADED WOODPECKERS

SOURCE: ESE, 1981.

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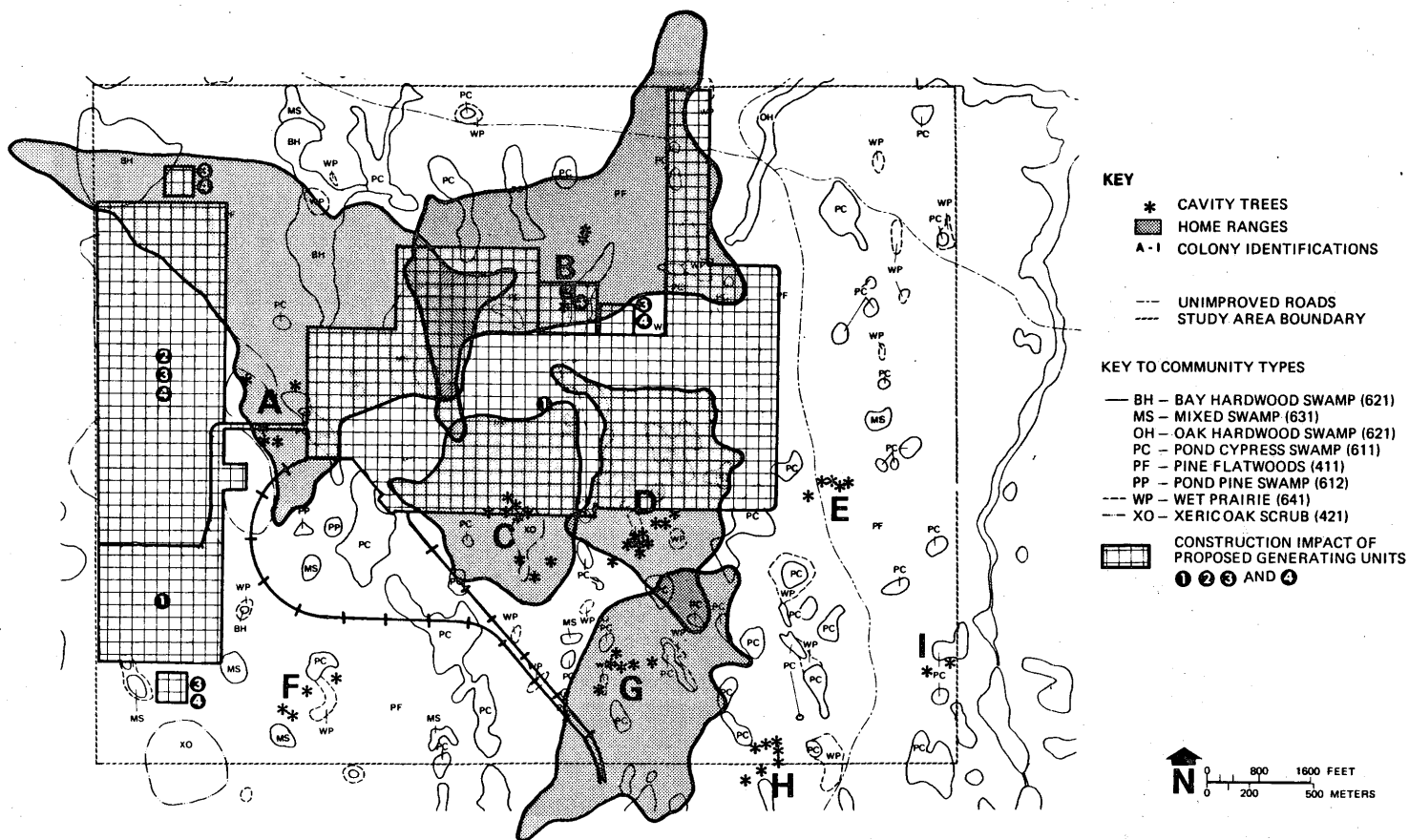


Figure 4-2
AREAS OF CONSTRUCTION IMPACTS ON RED-CKADED WOODPECKERS

SOURCE: ESE, 1981.

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some apparently unoccupied foraging habitat (approximately 100 acres) available to the southwest of Clans C and D. However, it cannot be determined whether any of these clans (A, B, C, and D) will use this habitat.

The estimated number of potential replacement cavity trees (75 years or older) was determined for each clan. The only colony currently occupying an area with a relatively limited number of potential replacement cavity trees is associated with Clan B. Colony B appears to have 27 suitable replacement trees within the colony area. Of this total, six trees will be lost during plant construction. Other clans that will lose a portion of their colony area include Clans A, C, and D. Each of these colonies contains a relatively large number (more than 25) of potential replacement cavity trees. Losses from construction will not be greater than 4 or 5 potential cavity trees for each of these clans.

As indicated in Section 3.0, 20 active colonies have been identified in the general vicinity of the proposed power plant. Eleven of these colonies occur off site (see Figure 3-1). Two of these colonies are located near the proposed railroad corridor; two other colonies are situated on the transmission corridor. None of these proposed corridors will result in the loss of active cavity trees. Both corridors, however, will impact foraging range for these four clans. The impacts on foraging range in these clans will be similar to the effects on Clan G (i.e., 4-percent loss). Other colonies in the area are located more than 0.5 mile from the various corridors and should not be influenced by these associated facilities.

4.3 UNAVOIDABLE ADVERSE IMPACTS

As has been stated in the section on construction impacts, 1,100 acres of the site will be cleared during plant construction and operation. Within this acreage, an estimated 33 percent of available foraging habitat (pine flatwoods) will be lost because of plant construction (see Table 4-2). As indicated in Table 4-2, the greater impacts will occur

Table 4-2. Construction Impacts on Pine Stands Identified on the Proposed Site

Stand Number	Acres	Total (trees/acre)	Basal Area (ft ² /acre)	Second-Growth Timber (%)	Loss from Construction (%)
1	119	108.3	25	92	19
2	378	24.0	5	71	15
3	289	46.4	16	42	5
4	290	51.7	10	88	3
5	437	14	2	93	61
6	180	77.0	21	96	12
7	126	34.0	6	90	69
8	314	30.0	7	93	39
9	104	46.3	10	93	34
10	217	69.4	20	93	37
11	424	25.4	5	93	50
Average	262	47.9	10	87	33

* DBH = Diameter at breast height (inches).

Source: ESE, 1981.

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in Stands 5 and 11. These stands contain less basal area and density of pines than other areas. Based on surveyed home ranges for five clans and estimated home ranges for the remaining four, 456 acres of occupied habitat will be lost unavoidably due to plant construction. Five cavity trees will also be removed during plant construction. This will involve one active cavity tree. There will also be some loss of potential replacement cavity trees.

These are short-term, unavoidable adverse impacts and may cause some clans to leave the area. The extent of possible movements of these clans off the site cannot be determined.

The long-term effects of the proposed action may offset some of these initial losses. The proposed action will provide a relatively stable and protected environment for on-site red-cockaded woodpeckers. A total of 2,000 acres will be managed exclusively for this species. Because of logging activities in this area, most sections on the site support neither the density nor the basal area of pine trees that could be expected. With proper management, the quality of foraging habitat could be improved in the preserved areas. By excluding logging activities and allowing natural reseedling, the density and basal area within the preserved area could be substantially increased.

4.4 OPERATIONAL IMPACTS

It is anticipated that operational impacts will not have a significant effect on red-cockaded woodpeckers. There will be some loss of foraging range for Clan A in the solid waste disposal area. This estimated loss is included in the total for the construction phase of the proposed power plant.

The major operational impacts having potential influence on the population will be increased human activity and noise. These influences should have no effect on resident clans.

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4.5 CONSIDERATIONS THAT OFFSET ENVIRONMENTAL EFFECTS

Impacts related to the development of the proposed site will affect the red-cockaded woodpecker. Although the short-term (5 to 10 years) impacts may decrease the number of clans on site, the positive effects of a sound management plan may offset these initial losses. By excluding logging and allowing natural reseeding in pine forest, the quality of foraging habitat within the preserved areas could be significantly increased during the next 20 to 30 years.

Because of the status of the red-cockaded woodpecker and the potential effects of the proposed power plant, informal discussions were held with the United States Fish and Wildlife Service and the Florida Game and Fresh Water Fish Commission to develop alternatives to alleviate impacts. During this process, various alternatives were considered. Among those considered were possible relocation of selected clans, purchasing off-site lands that contain colonies, selection of an alternate site, alternative site arrangements, and development of an on-site management and impact-monitoring program. The last three alternatives were selected as viable. Various plant design alternatives were reviewed, primarily by Orlando Utilities Commission, Black & Veatch, and ESE personnel. Objectives considered during this evaluation process were:

1. To avoid as many cavity trees as practical.
2. To minimize the effects on the better-quality foraging habitat.
3. To reduce impacts in areas with the greatest concentration of colonies.

Because of these considerations, various modifications were made in the site arrangement. The major benefit from these modifications will be to reduce impacts in Section 19, which contains five active colonies. In addition, cavity trees that would have been removed in Colony Areas A (four trees), B (two trees), C (five trees), and D (two trees) were avoided.

It seems unlikely that land use on the proposed site will change significantly in the near future. Extensive logging currently is being performed in many surrounding areas. Without the proposed project, these logging activities would be scheduled to occur on site in the near future. One colony area to the east of the site has been removed by logging activities during the current year. It is apparent that current forestry practices within this region would not eliminate the species. However, surveys conducted in surrounding areas in which extensive logging activities have occurred revealed a much lower density of red-cockaded woodpeckers than the southern portion of the site and lands immediately south of the proposed project, which have not been disturbed.

5.0 MANAGEMENT PLAN

5.1 INTRODUCTION

A management and monitoring plan will be adapted to ensure long-term presence of red-cockaded woodpeckers on site. The following description relates recommended procedures for the proposed management plan (see Methods section for details on monitoring studies). The major emphasis of this plan is protection of existing colonies and provision for adequate foraging range.

Approximately 2,000 acres will be managed for the benefit of the red-cockaded woodpecker. This acreage will include both existing colonies and approximately 222 acres of foraging habitat for each on-site clan. Within the managed area, there are 1,753 acres of pine flatwoods, 217 acres of cypress dome, and 29 acres of wet prairie.

As indicated in Section 3.0, the mean basal area in pine flatwoods for the entire site is approximately 10 ft²/acre. The United States Fish and Wildlife Service (1979) recommends that a basal area of 40 to 60 ft²/acre and a stem density of less than 200 stems per acre represent better quality foraging habitat for red-cockaded woodpeckers. Because of relatively unproductive soils and other factors, it may not be possible to attain these conditions on the Stanton site. However, with a proper timber management plan, the basal area and stem density for on-site flatwoods could be substantially increased during the next 20 to 30 years. In addition, cypress domes apparently constitute an important feeding site for on-site red-cockaded woodpeckers, particularly during the fall. These forests are greatly stressed by frequent muck fires. With a better controlled fire program, these detrimental effects could be substantially reduced.

5.2 RECOMMENDATIONS

To meet the above-stated goals, the following procedures are recommended:

1. Maintain all remaining cavity trees (active and inactive);
2. Protect colony sites, including surrounding trees, to ensure future replacement cavity trees and to serve as a buffer zone;
3. Construct two artificial start holes for each cavity tree removed during construction activities;
4. Thin colony sites for habitat management purposes only;
5. Maintain other potential stands for future colony sites;
6. Manage approximately 2,000 acres of foraging habitat for on-site clans;
7. Conduct a regular, prescribed burning program;
8. Provide contiguous habitat between colonies and foraging habitat and between adjoining clans;
9. Prohibit indiscriminate logging and other detrimental disturbances in exclusive areas to be managed for red-cockaded woodpeckers;
10. Allow all previously disturbed areas (pre-construction activities) within the managed area to reseed naturally with longleaf pine; and
11. Conduct on-site monitoring of territorial behavior of clans during pre-construction and construction phases of the proposed power plant.

Any variation in the above procedures must be approved by a qualified biologist.

5.3 IMPLEMENTATION

The following schedule is proposed to implement the procedures recommended in Paragraph 5.2.

1. Construction contractors will be briefed as required on their legal obligations under the Endangered Species Act and regulations of the Florida Game and Fresh Water Fish Commission. This briefing will include information and limits of construction activities which meet compliance with stated impacts described in this document. Construction activities will be monitored by Orlando Utilities Commission.

Construction activities are described in the Site Certification Application (SCA) for the State of Florida. The area disturbed by the proposed action will be consistent with the area displayed in Figure 4-2.

2. All colony areas and buffer zones will be conspicuously marked prior to construction. Endangered species posters will be attached to active cavity trees. Potential replacement cavity trees and younger pines within each colony area will be retained. No harvesting of pines will be scheduled for colony areas except for habitat management purposes. A 200-foot buffer zone will be established around each active cavity tree during construction activities. Currently all cavity trees are located in open stands of pines with relatively few second-growth pines or hardwoods. Thus, there should be no immediate need for stand improvements (thinning) in colony sites. Attempts should be made, however, to promote a basal area of 50 to 80 ft²/acre in colony areas. Abandoned cavity trees and dead snags in the managed area will not be disturbed to provide roosting and nesting sites for competitive species.
3. Prescribed burns should be conducted on a regular basis in both colony sites and foraging habitat. Prior to prescribed burns, a 6-foot buffer zone around each cavity tree should be cleared of excess resin, litter, and other debris. Burns should be scheduled from August to February so as not to interfere with the nesting season (March through July). Local foresters should be consulted on the time of year and weather conditions appropriate for burning. During normal fire schedule, prescribed burns should be conducted on a 2- to 3-year rotation. Burns will be controlled in order to prevent extensive muck fires in cypress domes and to preclude hot burns in pine flatwoods.

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It is recommended that no more than one-half of the 2,000 acres be burned during any yearly cycle. Within this yearly burn cycle, it is advisable to burn approximately one-fourth of the site during the October/November period with the remaining portion to be burned during the January/February period.

As discussed in Section 3, production of seedling pines is low in many stands on the Stanton site. To stimulate pine regeneration, a fire suppression period should be scheduled for at least 4 years. The fire suppression period should be initiated following a year of peak cone production in on-site flatwoods. However, during this peak production year, a burning cycle should be completed by late August. Subsequently, the suppression period would follow for the next 4 years. Following this period, the fire schedule should be conducted on the normal 2- to 3-year rotation.

Many of these recommendations were obtained from the Florida District Forest Ranger. It is recommended that he/she be consulted on the appropriate sequence of the previously stated fire schedule.

4. No unapproved timber harvesting within the managed area will be scheduled. Stands of pine will be allowed to mature and die. The United States Fish and Wildlife Service (1979) recommends a 50-percent balance between older age classes and younger stands of pines. As previously stated, the burning program will be manipulated in order to stimulate natural regeneration. This action will produce better quality foraging habitat and a more even distribution of age classes.
5. Pesticides toxic to wildlife will not be used in any part of the clans' home ranges.

6. Potential replacement colony sites have been mapped. These potential sites within the managed area will be protected from future development. Burning and rotation should follow procedures outlined for present colony sites.
7. Monitoring studies will be conducted during the pre-construction and construction phases of the proposed action. Monitoring activities will consist of collecting baseline data for 1 year, including evaluation of home-range and reproductive success. Range data will be collected for a minimum of 140 hours per clan. Reproductive success will be evaluated during two nesting seasons.

Construction monitoring will include evaluation of home-range and reproductive success. As indicated in Section 2.0, the evaluation of home range will be conducted during the first and third years of the construction phase. The third year of monitoring will include the initial period of plant operation. Monitoring for range data purposes will consist of 140 hours of observation per clan during the construction phase.

Reproductive success will be evaluated during each year of construction. The major activity affecting red-cockaded woodpeckers (land clearing) will occur during the first year of construction. However, the peak of construction activities will occur during the third year.

Clans A, B, C, D, and H have been selected for home range study. The first four clans will receive the greater impacts from the proposed action. No habitat alteration will occur in Clan H's home range; therefore, any impacts would reflect only indirect influence from the proposed action. Reproduction will be monitored for all on-site clans. In the event that monitored colonies are deserted, surrounding areas on the site, as

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well as some adjoining lands, will be surveyed. A number of areas apparently suitable for red-cockaded woodpeckers but which did not contain colonies have been located. These areas would be surveyed.

6.0 SUMMARY

In summary, nine clans of red-cockaded woodpeckers were located on the Stanton site. The short-term (construction) impacts of the proposed power plant on these clans are likely to be negative. However, various alternatives to alleviate impacts were implemented by the Orlando Utilities Commission. Among these were redesign of site arrangement and development of an appropriate management plan. Approximately 2,000 acres, which currently contain nine active colonies, will be protected and managed for this species. Once construction is completed, the long-term impacts will be positive. The remaining colonies will have a relatively stable and protected environment, and the surrounding region will be provided with an area managed for red-cockaded woodpeckers. In addition, the presence of the power plant in this area may preclude any extensive development and, therefore, afford some protection to off-site clans. This may be particularly relevant to those four clans located immediately south of the proposed site.

7.0 GLOSSARY

The following list, compiled by Jackson and Thompson (1971), is a glossary of ecological terms used in association with the red-cockaded woodpecker.

Cavity: An excavation used by red-cockaded woodpeckers for roosting or nesting at some time during the life of the colony.

Cavity Tree: A tree containing one or more red-cockaded woodpecker cavities.

Clan: All the red-cockaded woodpeckers that inhabit a colony at a given point in time; generally a mated pair of red-cockaded woodpeckers, their offspring, and their associated helpers.

Colony: The area prescribed by an aggregation of start holes and roost, nest, and old cavities habitually used by a clan.

Glaze: The covering of resin surrounding a red-cockaded woodpecker cavity entrance or on an adjacent tree facing a cavity; results from deliberate excavation of resin wells by the birds.

Nest Cavity: A cavity used by a pair of red-cockaded woodpeckers as a place in which to raise their young, usually the roosting cavity of a male.

Nest Tree: A tree containing a nesting cavity.

Old Cavity: An enlarged cavity with deteriorating glaze receiving little or no current use.

- Plate: The exposed wood surrounding a red-cockaded woodpecker cavity entrance.
- Range: The area surrounding a nest cavity required by a clan to fulfill life-cycle requirements. This may include the colony, support stand, breeding territory, seasonal foraging area, or other definable units.
- Resin Well: A hole, generally circular, in the bark of a cavity tree or a tree adjacent to a cavity tree from which resin exudes.
- Roost Cavity: A cavity used by a red-cockaded woodpecker only as a shelter, particularly at night and during inclement weather.
- Start Hole: The beginning of a cavity; may never be finished, but if completed, excavation is usually over a period of several months.
- Support Stand: That stand of timber in the immediate vicinity of a colony which may be ecologically definable on the basis of topography, vegetative types, land use patterns, stand conditions, or other logical entities.

BIBLIOGRAPHY

- Baker, W.W., Thompson, R.L., and Engstrom, R.T. 1980. The Distribution and Status of Red-Cockaded Woodpecker Colonies in Florida: 1969-1978. *Florida Field Naturalist*, 8(2):41-45.
- Hooper, R.G. and Lennartz, M.R. 1981. Foraging Behavior of the Red-Cockaded Woodpecker in South Carolina. *The Auk: A Quarterly Journal of Ornithology*. 98(2):321-334.
- Hopkins, M.L. and Lynn, T.E., Jr. 1971. Some Characteristics of Red-Cockaded Woodpecker Cavity Trees and Management Implications in South Carolina. In: *The Ecology and Management of the Red-Cockaded Woodpecker*, pp. 140-169, R.L. Thompson, Editor. Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior, and Tall Timbers Research Station, Tallahassee, Florida.
- Hovis, J. 1981. Personal Communication. Department of Wildlife Resources, University of Florida, Gainesville, Florida.
- Jackson, J.A. 1977. Determination of the Status of Red-Cockaded Woodpecker Colonies. *Journal of Wildlife Management*, 41:448-452.
- Jackson, J.A. and Thompson, R.L. 1971. A Glossary of Terms Used in Association with the Red-Cockaded Woodpecker. In: *The Ecology and Management of the Red-Cockaded Woodpecker*, pp. 187-188, R.L. Thompson, Editor. Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior, and Tall Timbers Research Station, Tallahassee, Florida.
- Lay, D.W. and Swepston, D. 1973. Red-Cockaded Woodpecker Study. Job Completion Report, Federal Aid Project No. W-80-R-16, East Texas Deer Study.
- Leighty, R.G. 1960. Soil Survey of Orange County, Florida. U.S. Department of Agriculture, Soil Conservation Service, Washington, D.C.
- Ligon, J.D. 1971. Some Factors Influencing Numbers of the Red-Cockaded Woodpecker. In: *The Ecology and Management of the Red-Cockaded Woodpecker*, pp. 30-43, R.L. Thompson, Editor. Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior, and Tall Timbers Research Station, Tallahassee, Florida.
- Nesbitt, S.A., Gilbert, D.T., and Barbour, D.B. 1978. Red-Cockaded Woodpecker Fall Movements in a Florida Flatwoods Community. *The Auk: A Quarterly Journal of Ornithology*. 95:145-151.

BIBLIOGRAPHY
(Continued, Page 2 of 2)

- Nesbitt, S.A., Harris, B.A., Jerauld, A.E., and Brownsmith, C.B. 1981. Report of the Investigation of Red-Cockaded Woodpeckers in Charlotte County, Florida. Conducted under contract between the Florida Game and Fresh Water Fish Commission and the Florida Department of Transportation.
- Shapiro, A. 1981. Personal Communication. Florida Game and Fresh Water Fish Commission, Tallahassee, Florida.
- Thompson, R.L. and Baker, W.W. 1971. A Survey of Red-Cockaded Woodpecker Habitat Requirements. In: The Ecology and Management of the Red-Cockaded Woodpecker, pp. 170-186, R.L. Thompson, Editor. Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior, and Tall Timbers Research Station, Tallahassee, Florida.
- Wood, D.A. 1981. Personal Communication. Florida Game and Fresh Water Fish Commission, Tallahassee, Florida.
- Wood, D.A. 1975. Status, Habitat, Home Range, and Notes on the Behavior of the Red-Cockaded Woodpecker in Oklahoma. M.S. Thesis. Oklahoma State University, Stillwater, Oklahoma.

APPENDIX A

ADDITIONAL DATA

Table A-1. Description of Cavity Trees

Colony	Number of Cavity Trees			DBH* of Cavity Trees (inches)		Tree Height (feet)	Height to Cavity (feet)	
	Active	Starts	Abandon	Mean	Range		Mean	Range
A	2	3	2	12.1	10.4 to 13.1	43.4	13	6 to 22
B	2	3	1	8.6	5.9 to 11.2	35.0	11	5 to 22
C	2	7	2	11.0	9.7 to 13.6	37.5	19	13 to 25
D	4	6	3	11.1	8.5 to 13.0	39.5	14	6 to 21
E	4	2	1	10.5	8.7 to 11.5	31.6	17	12 to 24
F	3	2	3	9.9	7.9 to 11.4	40.6	18	12 to 26
G	3	2	3	11.5	11.0 to 12.6	42.0	23	13 to 30
H	4	2	1	10.9	10.0 to 11.3	36.2	17	10 to 29
I	2	1	1	10.7	10.4 to 11.0	40.5	20	13 to 26
Total 9	26	28	17	—	—	—	—	—
Average —	2.9	3.1	1.9	10.7	—	36.9	18	5 to 30

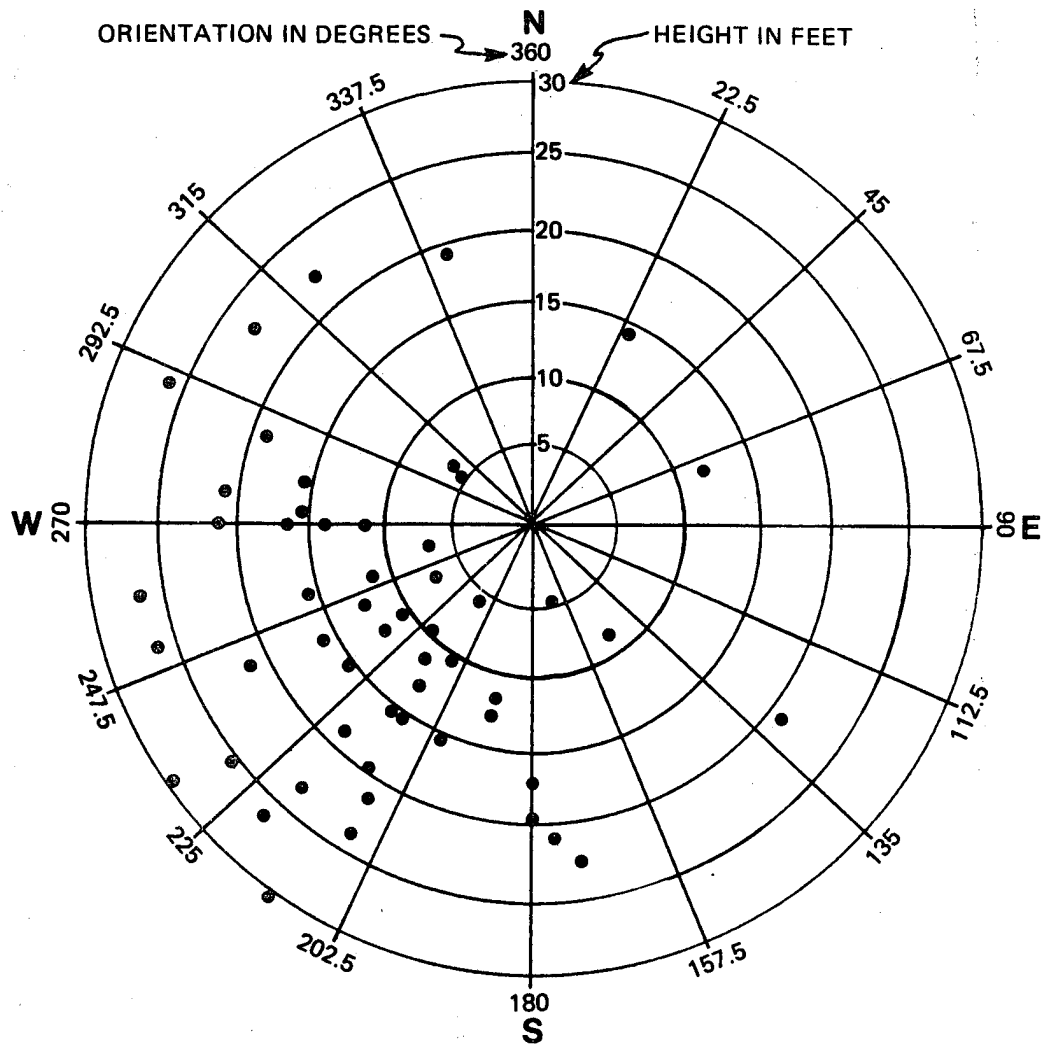
* DBH = Diameter at Breast Height.

Source: ESE, 1981.

Table A-2. Age Class Distribution of Pine Stands Identified on the Proposed Site

Stand Number	Acres	Age Classes in Years					Total (trees/acre)
		<15	15-30	30-40	40-50	80>	
		(trees/acre)					
1	119	5	18	61	15	9	108
2	378	9	5	3	--	7	24
3	289	13	5	1	--	27	46
4	290	2	25	17	1	6	51
5	437	1	5	8	--	1	14
6	180	3	10	40	21	3	77
7	126	12	3	16	--	3	34
8	314	1	10	12	5	2	30
9	104	2	25	3	14	3	47
10	217	8	--	2	55	5	70
11	424	2	4	17	1	2	26

Source: ESE, 1981.



KEY

• CAVITIES

NOTE: INCLUDES START-HOLE, ACTIVE, AND ABANDONED CAVITIES.

Figure A-1
ORIENTATION AND HEIGHT OF CAVITIES
ON THE PROPOSED SITE

SOURCE: ESE, 1981.

CURTIS H. STANTON
ENERGY CENTER

Management Plan for
Red-Cockaded Woodpeckers

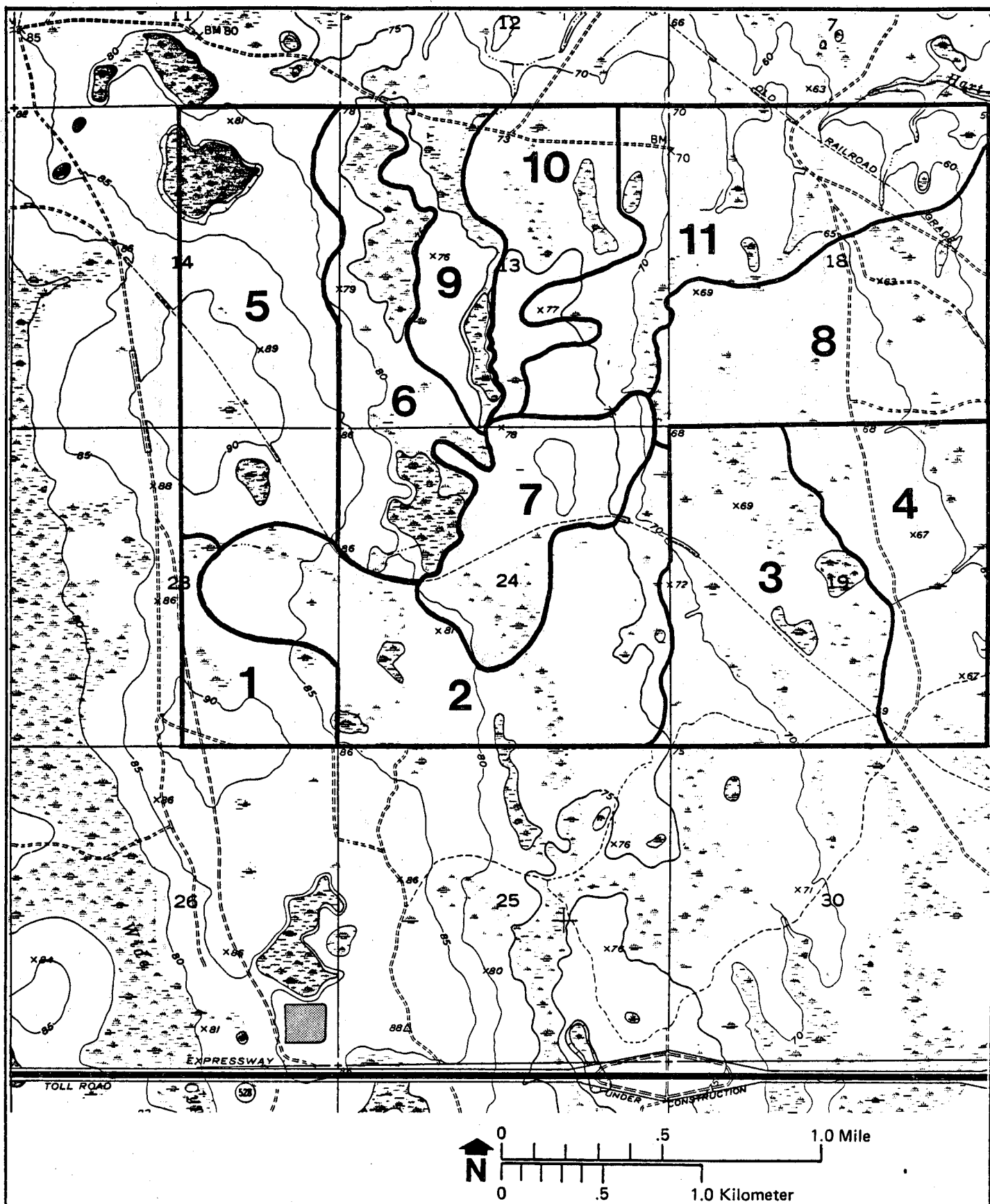


Figure A-2
IDENTIFIED PINE STANDS ON THE PROPOSED SITE

SOURCE: ESE, 1981.

CURTIS H. STANTON
ENERGY CENTER

Management Plan for
Red-Cockaded Woodpeckers

TABLE 5.7-1. IMPACTS OF UNIT TRAINS ON NOISE LEVELS NEAR PROPOSED RAILROAD SPUR

	<u>Distance From Centerline of Track (Metres)</u>				
	<u>10</u>	<u>34</u>	<u>120</u>	<u>320</u>	<u>510</u>
L_{eq} (dBA)					
Baseline*	45	45	45	45	45
Train Contribution	60	54.5	48	42.5	39
Combined Noise	60	55	47	47	46
	<u>10</u>	<u>42</u>	<u>165</u>	<u>320</u>	<u>510</u>
L_{dn} (dBA)					
Baseline*	51	51	51	51	51
Train Contribution	66	59.5	52.5	48.5	45
Combined Noise	66	60	55	53	52

*Based on Noise Survey of Proposed Site.

TABLE 5.7-2. OPERATION NOISE SOURCES

Noise Source	$L_{W(eq)}^*$ (dB)	$L_{W(dn)}^{**}$ (dB)
Safety Valve Vent	119	125
Cooling Tower Rim	115	121
Cooling Tower Stack	100	106
Station Transformers	118	124
Ventilating Fans	102	108
Coal Yard Equipment	112	112
Deaerator Vent	105	111
Stacker-Reclaimer	109	115
P.A. System	104	107
Boiler Feed Pump	98	104
Main Condenser	106	112
Coal Crushers	108	114
Limestone Crushers	100	106
Precipitator Rappers	91	97
Turbine-Generator-Exciter	108	114
Transfer Tower	101	107
Combustion Waste Loading	115	115
Combustion Waste Storage	115	115
Coal Unloading	93	99
Combustion Waste Transfer***		
Unit Train Delivery***		

* $L_{W(eq)}$ refers to the average sound power over a 24-hour period. Note that these levels are not A-weighted.

** $L_{W(dn)}$ refers to the average sound power over a 24-hour period, with a 10 dB penalty assigned to noise between the hours of 2200 and 0700.

***Line sources.

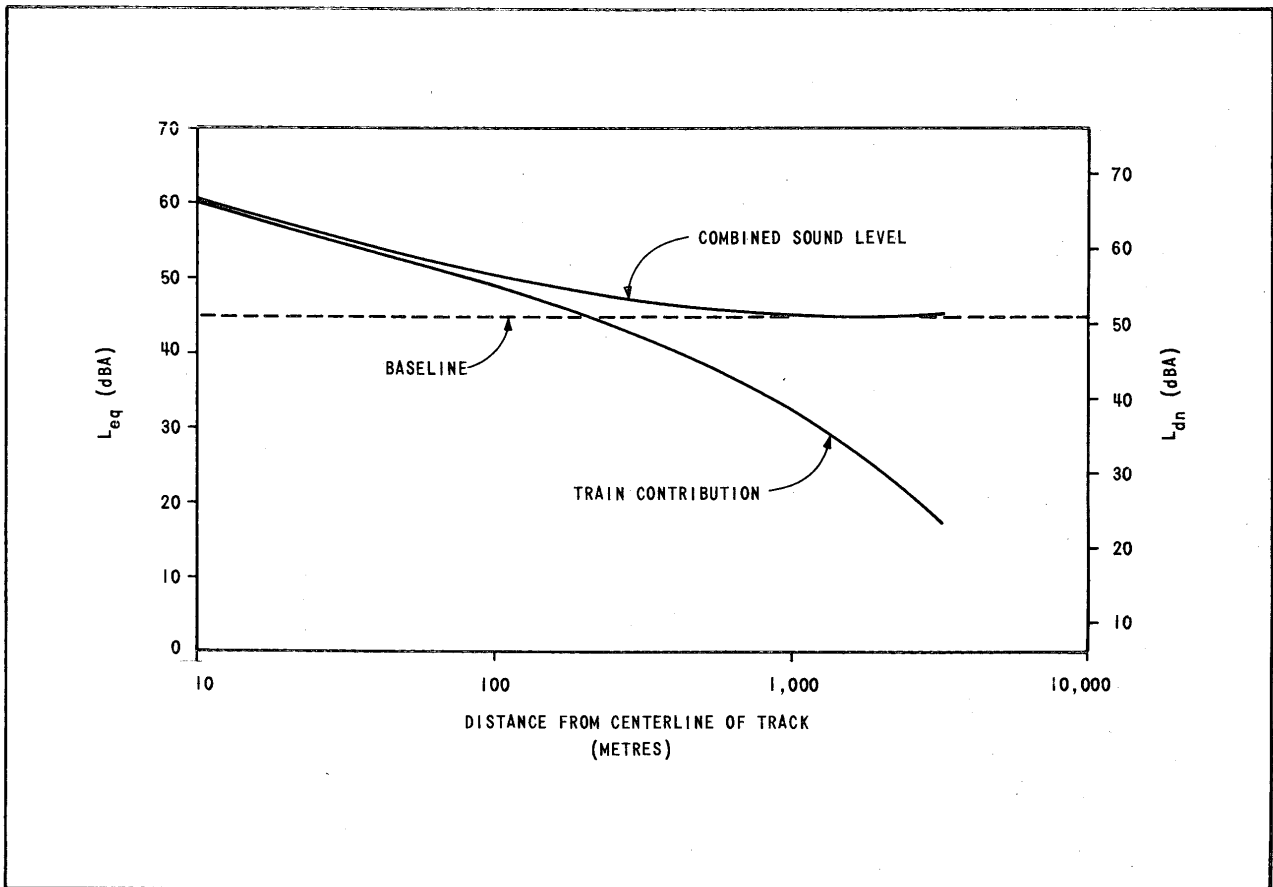


FIGURE 5.7-1. IMPACTS OF UNIT TRAINS ON NOISE LEVELS NEAR PROPOSED RAILROAD SPUR

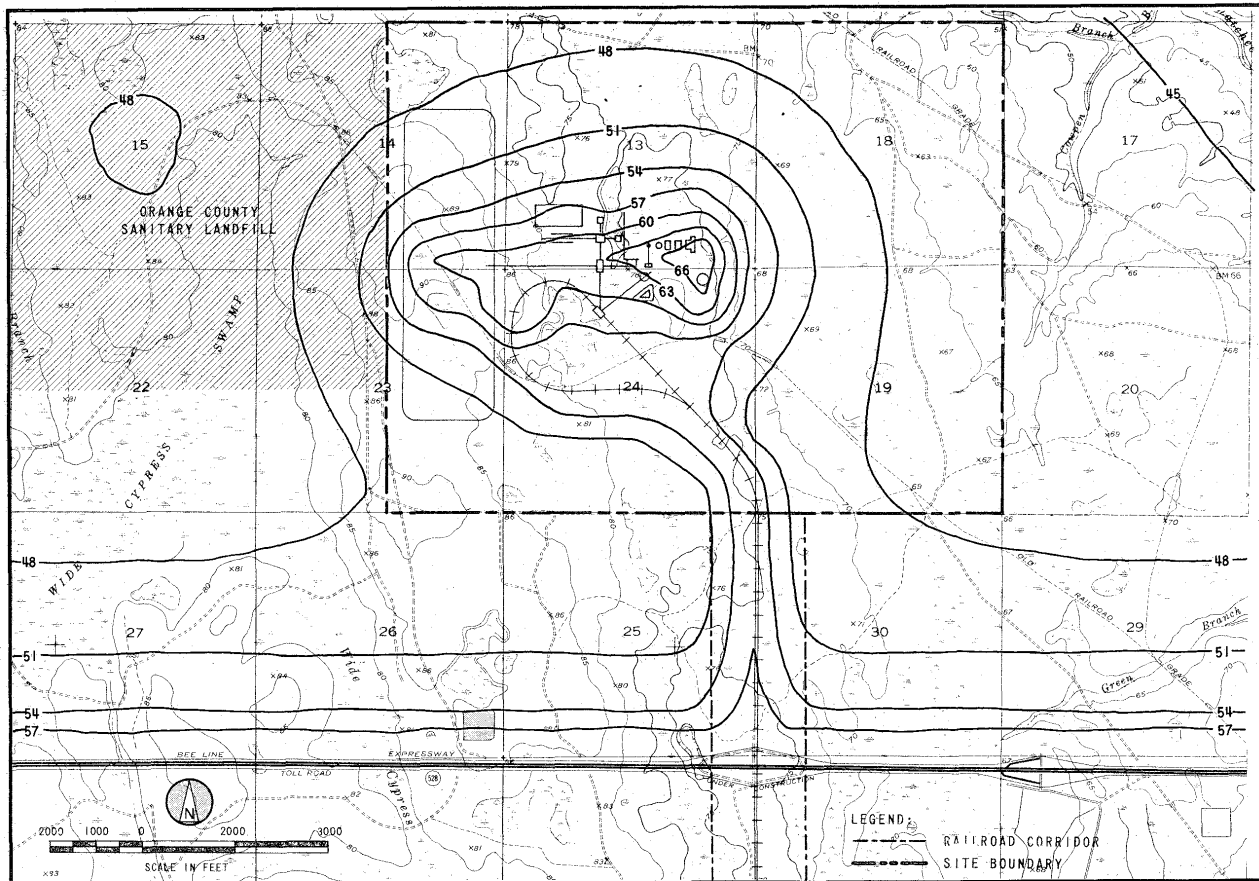


FIGURE 5.7-2. PREDICTED L_{eq} (dBA) CONTOURS DURING OPERATION OF THE PROPOSED CURTIS H. STANTON ENERGY CENTER

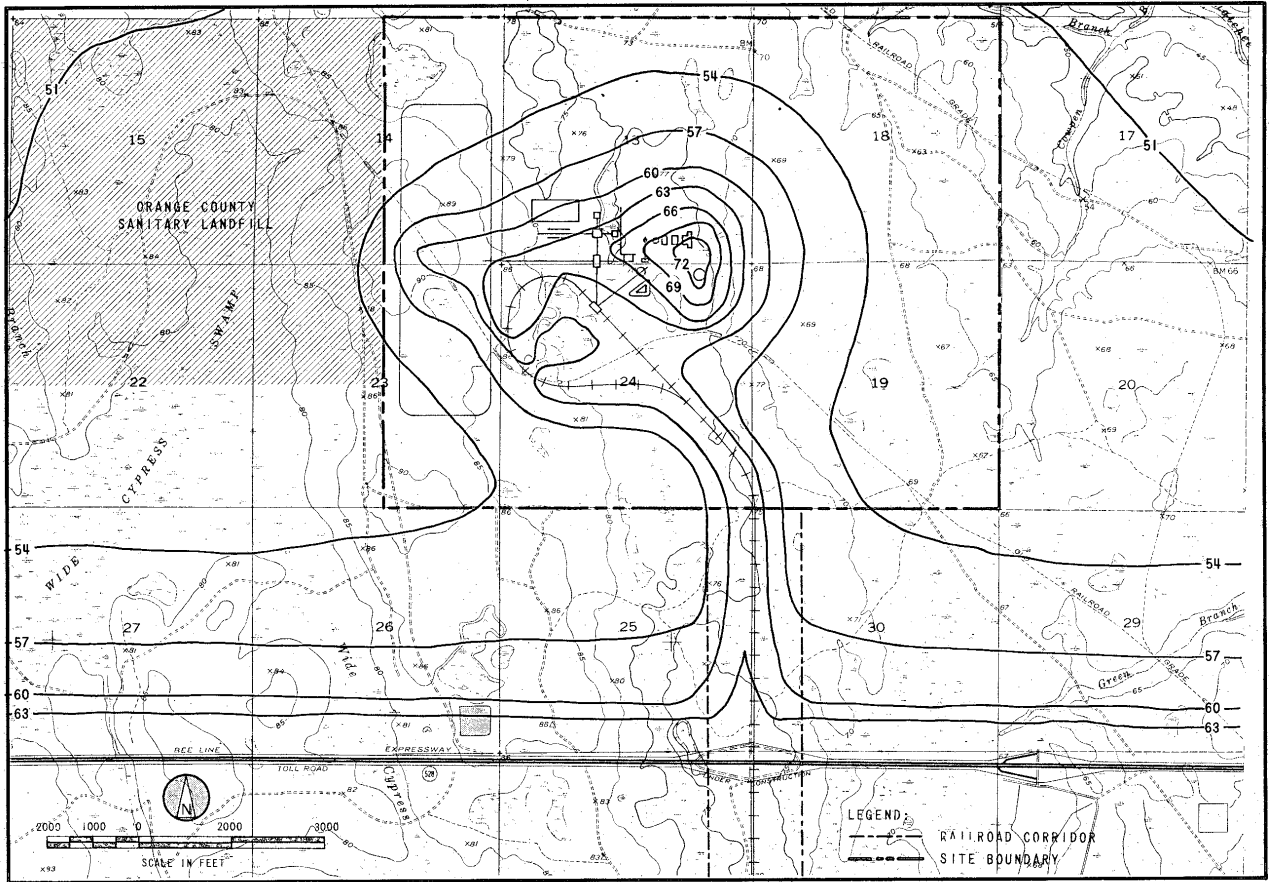
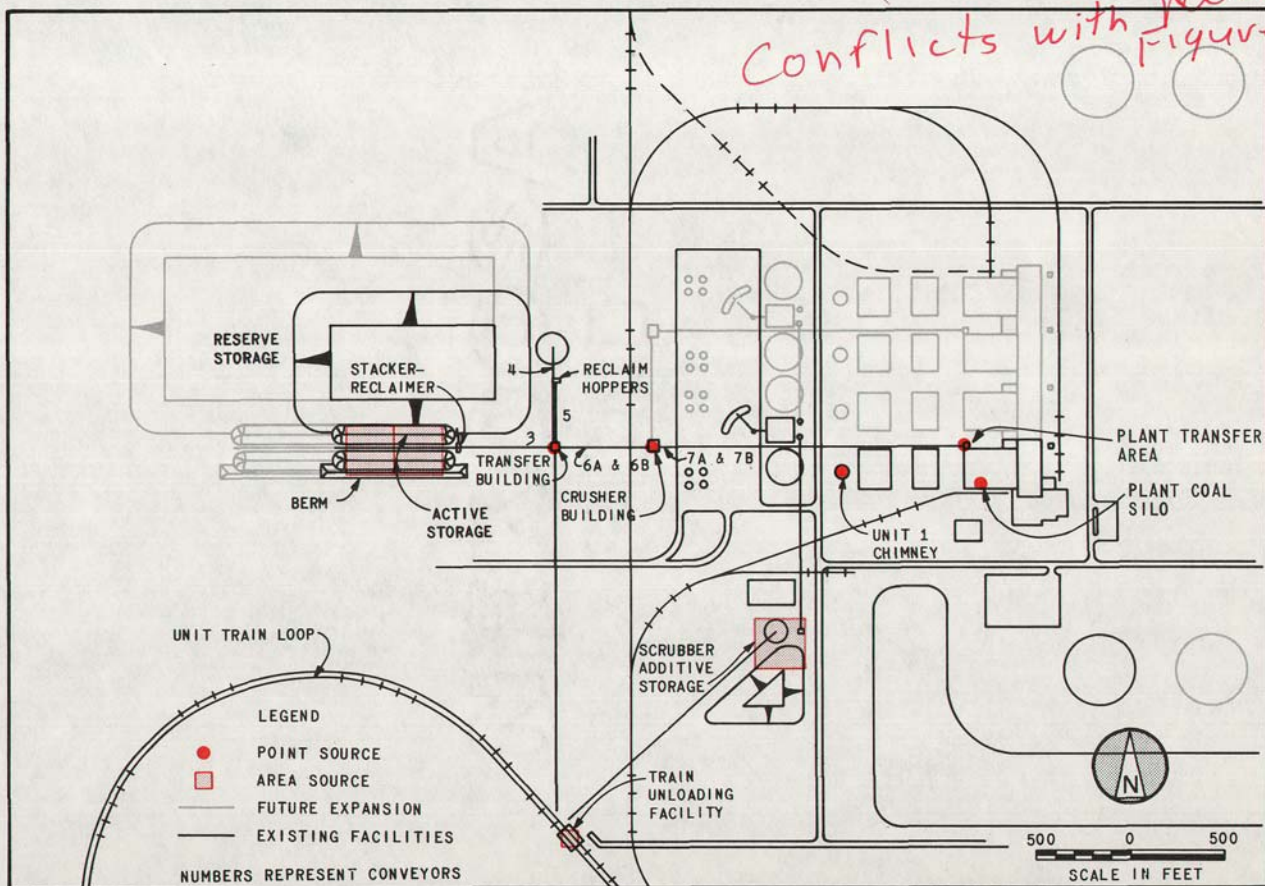


FIGURE 5.7-3. PREDICTED UNIT I $L_{dn}(dBA)$ CONTOURS DURING OPERATION OF THE PROPOSED CURTIS H. STANTON ENERGY CENTER



AMENDMENT 5
030382

FIGURE 5.5-1. PARTICULATE SOURCES INCLUDED
IN THE IMPACT ANALYSIS

APPENDIX 5.5A
DETERMINATION OF GEP CHIMNEY HEIGHT--
STANTON ENERGY CENTER

APPENDIX 5.5A
DETERMINATION OF GEP CHIMNEY HEIGHT--
STANTON ENERGY CENTER

5.5A.1 INTRODUCTION

"Good Engineering Practice" (GEP) chimney height is a value based on power plant site arrangement, building and layout dimensions, and guidelines of the United States Environmental Protection Agency (EPA) as published in the Federal Register of January 12, 1979. The value obtained is the maximum height of a proposed chimney which can be used in dispersion modeling for predicting ground-level concentrations of air pollutants. This GEP chimney height may also be a desirable minimum which would prevent excessive ground-level concentrations as a result of downwash turbulence from adjacent buildings. A chimney may be constructed taller than GEP height, but only GEP height can be assumed in dispersion modeling.

5.5A.2 METHODOLOGY

The following discussion describes the methodology for determining GEP chimney height for the Stanton Energy Center Unit 1 alone and Units 1 and 2 together. The EPA guidelines published in the Federal Register of January 12, 1979, indicated that GEP chimney height is equal to the height of the building plus 1.5 times the building height or width, whichever is less. This basic formula is further described and explained in the Technical Support Document for Determination of Good Engineering Practice Stack Height.⁽¹⁾ The support document indicates that both height and width of the building are determined from the frontal area of the structure, projected onto a plane perpendicular to the wind direction. This approach is based on the assumption that the chimney is located within the "immediate vicinity" of the larger buildings. "Immediate vicinity" is defined for moderately tall cubical buildings as five times the building height or width, whichever is less.

5.5A.3 RESULT

Figures 5.5A-1 and 5.5A-2 show the plot plan and building dimensions used to determine the GEP stack height for Unit 1 alone and Units 1 and 2 together. The calculated GEP stack height for Unit 1 alone is 467 feet. The GEP stack height calculation, based on a two unit building configuration, results in a height of 550 feet for both units.

5.5A.4 REFERENCES

- (1) U.S. Environmental Protection Agency, Technical Support Document for Determination of Good Engineering Practice Stack Height (Draft), Office of Air Quality Planning and Standards, Monitoring and Data Analysis Division, Research Triangle Park, North Carolina, July, 1978.

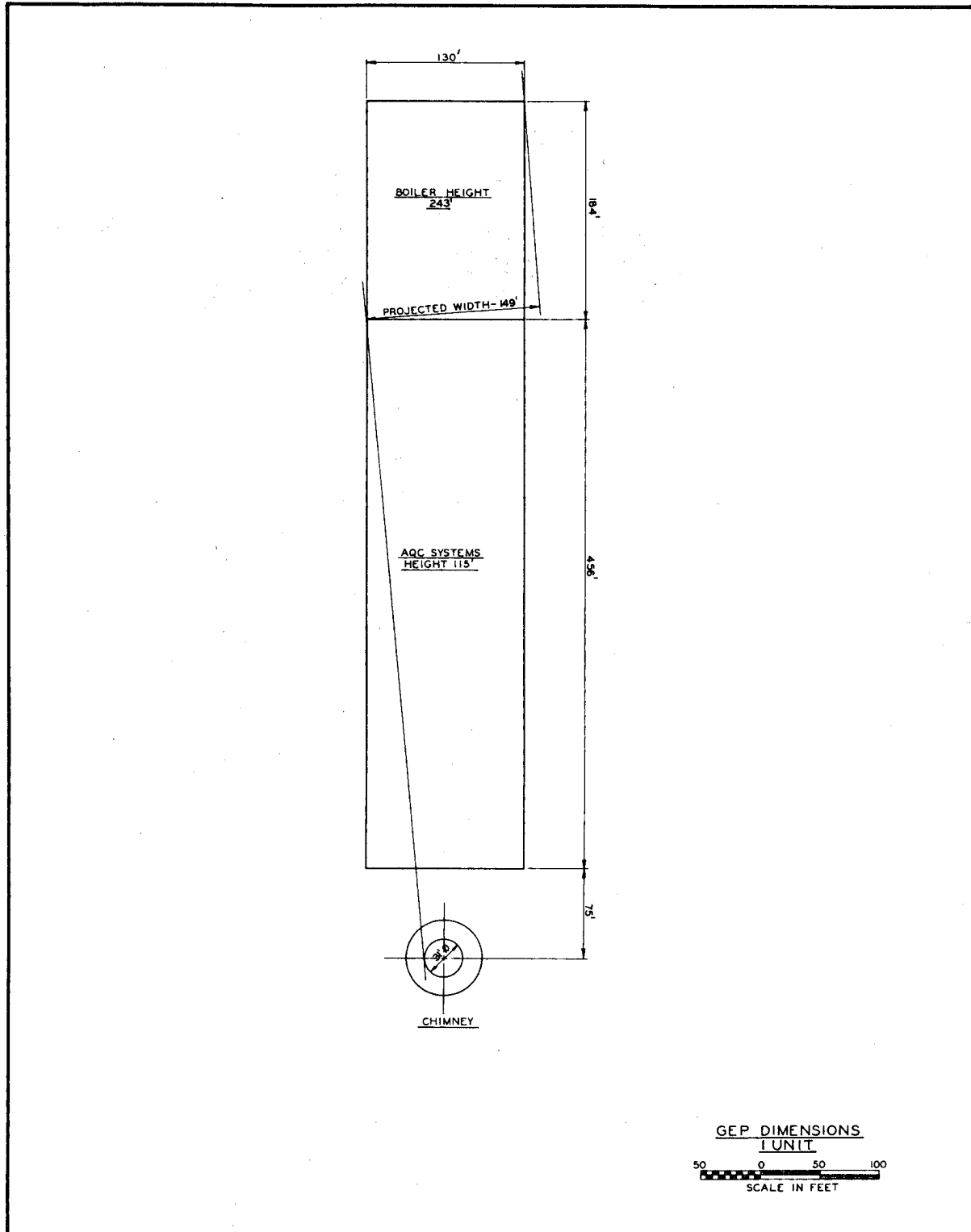


FIGURE 5.5A-1. BUILDING LAYOUT FOR
GEP STACK HEIGHT
CALCULATION-1 UNIT

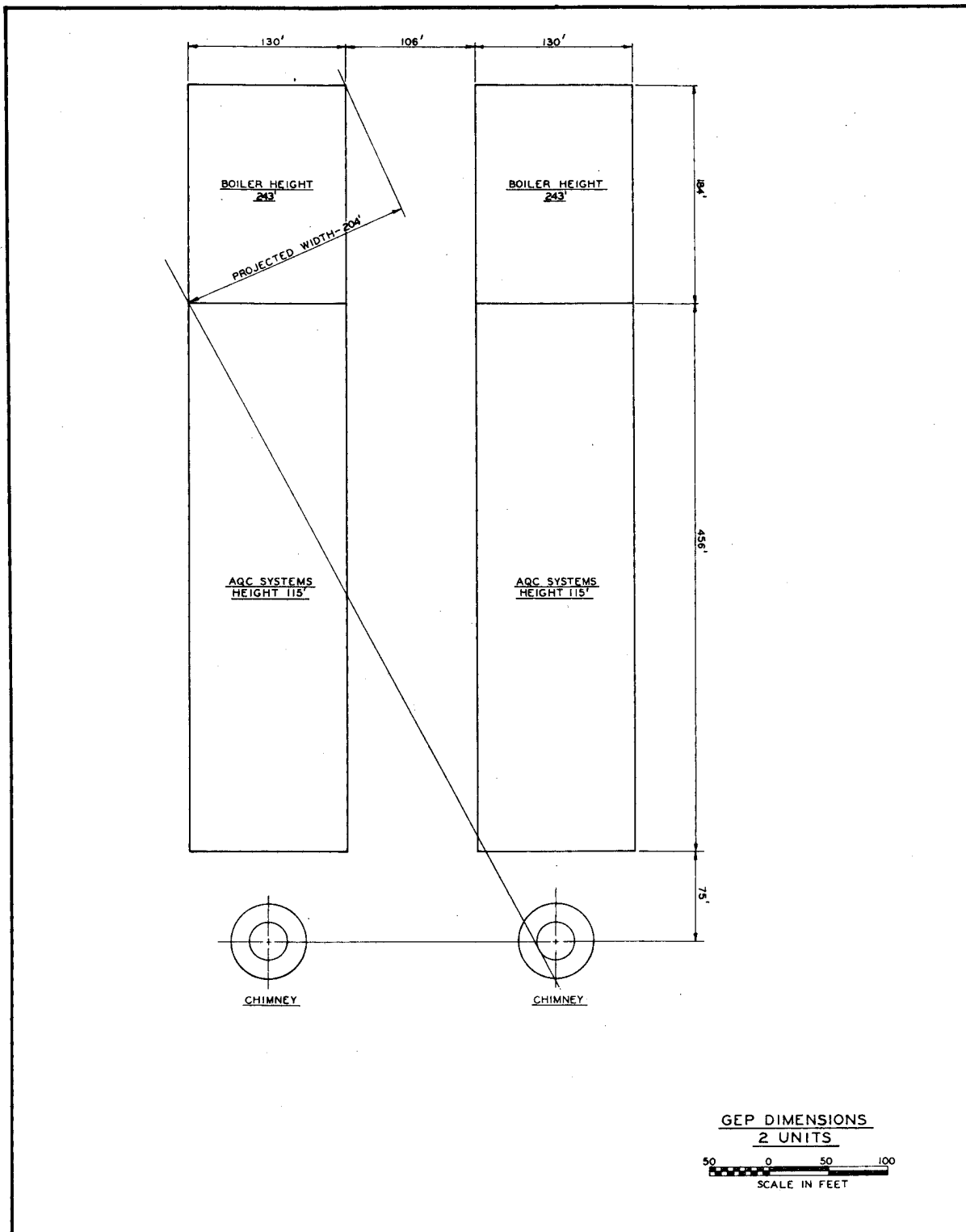


FIGURE 5.5A-2. BUILDING LAYOUT FOR
GEP STACK HEIGHT
CALCULATION-2UNITS

5.8 RESOURCES COMMITTED

The operation of the Stanton Energy Center will result in the irreversible and irretrievable commitment of some resources. These resources include ground water, coal, and fuel oil.

5.8.1 Ground Water

Two 850 gpm onsite wells will be used for potable water, general plant uses, and steam cycle makeup. The average consumption of well water will be approximately 325 acre-feet per year for one unit, and an estimated 1,283 acre-feet per year for four similar units at a 51 per cent capacity factor.

5.8.2 Fuel

Coal will be the principal fuel for the Stanton Energy Center. The exact source of coal has not been identified, but based on a heating value range of 11,000 to 13,500 Btu/lb, the annual coal consumption rate for one unit would be 750,000 to 910,000 tons per year at a 53.6 per cent capacity factor.

Fuel oil will be used for initial light-off and low-load flame stabilization. An estimated 80,000 gallons of No. 6 fuel oil per year will be required.

The use of coal and fuel oil represents an irretrievable commitment of fossil fuels. This commitment of fuel will be at least partially offset by the reduction of oil required in other Peninsular Florida power plants as described in Section 7.1.

5.9 VARIANCE

Cooling water makeup supply will be obtained from the Orange County Easterly Subregional Wastewater Treatment Plant. As shown by Table 3.4-1, the concentration of total nitrogen in this water is lower than the applicable ground water quality standard for nitrate nitrogen. Consequently, no variance or exemption from compliance with the nitrate nitrogen limitation is necessary.

RFM-1

No other variances or exemptions have been identified at this time as being required for the Stanton Energy Center.

ORLANDO UTILITIES COMMISSION

**CURTIS H. STANTON ENERGY CENTER
UNIT 1**

SITE CERTIFICATION APPLICATION

VOLUME 1

**SITE CERTIFICATION
APPLICATION**

**ORLANDO UTILITIES COMMISSION
CURTIS H. STANTON ENERGY CENTER
UNIT 1**

VOLUME 1

REQUEST FOR MODIFICATION OF CERTIFICATION 1
SUMMARY DESCRIPTION OF CHANGES TO APPLICATION

On December 14, 1982, the Honorable Bob Graham, Governor, signed the Certification Order granting certification pursuant to Chapter 403, Part II, Florida Statutes, for the location, construction, and operation of the Curtis H. Stanton Energy Center, Unit 1, its associated facilities, and its directly associated transmission lines as proposed in the amended application and evidence of record, subject to the Conditions of Certification attached to the Order.

The design concepts for several features of the project have been changed. In accordance with Section 17-17.211 F.A.C. adopted 5/9/83, a Request for Modification of Certification is submitted. This request is a result of changes in six components of the certified facility. The related substantive revisions of the Site Certification Application for the Curtis H. Stanton Energy Center Unit 1 are summarized in the following paragraphs.

- Railroad Corridor. A small portion of the railroad corridor has been changed to accommodate realignment of the railroad spur to avoid newly planned residential developments. Section 2.3 of the application has been revised to demonstrate that the Florida Department of State has reviewed the modification and has found that no archaeological or historic sites have been recorded within the added corridor area. A new Exhibit 2.3-2 has been added to demonstrate these findings. Section 2.7 has been modified to incorporate the results of field surveys of affected terrestrial ecosystems, wetlands, and endangered or threatened species. A new Figure 2.7-7a has been added to illustrate the vegetative communities of the modified railroad corridor. Section 3.9, Subsection 3.9.1, has been revised to describe the railroad corridor as modified. Figure 3.9-1 has also been revised to show the extent and nature of the corridor modification.
- Fugitive Dust Control. Section 3.2, Subsection 3.2.4, has been revised to more accurately describe the measures to be installed

or used to reduce fugitive coal dust emission levels. Table 3.2-2 has been revised to correspond with planned coal dust control facilities. Section 3.7, Subsection 3.7.2.1, has been changed to correspond to facilities for fugitive dust control to be installed. Subsection 3.9.4 and Table 3.9-1 have been revised to correspond to those specific measures currently planned for fugitive dust control for limestone handling facilities. Section 5.5, Subsection 5.5.1, has been revised to include all fugitive dust control references in the application.

- Radioactive Level Detectors. Section 3.9 has been revised by the addition of Subsection 3.9.7 to include the planned installation and use of a number of devices based on emission and interception of radioactivity to detect levels of fluids, bulk materials, or waste products in various plant systems. Appendix 3.9A has been added to provide completed application forms for radioactive materials licenses as they would be submitted to the Florida Department of Health and Rehabilitative Services, Radiation Control.
- Main Plant Access Road. Section 2.2, Subsection 2.2.2.1, has been modified to express correct relationships between the transmission lines and a new Orange County road and the modified pipeline route.

Section 3.9, Subsection 3.9.2, has been changed to reflect that vehicular access to the Stanton Energy Center will be provided by a new Orange County road. The main plant access road shown in the amended application will not be constructed. Figure 3.9-6 has been revised to illustrate the route of the new Orange County road.

- Water Supply Source. Chapters 2.0 and 3.0 have been revised in several sections to reflect that makeup cooling water supply will be obtained from the Orange County Easterly Subregional Wastewater Treatment Plant instead of from the Iron Bridge Road Regional

Water Pollution Control Facility in Seminole County. Subsection 3.1.3 has been changed to indicate that the Orange County Plant will receive and treat cooling tower blowdown and plant drainage in excess of power plant needs. Sections 2.2 and 3.3, Subsections 2.2.3, 3.3.1, and 3.3.2 have been revised to reflect the change in the source of makeup cooling water. Table 3.3-2 and Figure 3.3-1 have also been changed to reflect this change. Section 3.4 has been revised to account for the change in cooling water supply source and quality. Table 3.4-1 has been changed to provide an estimate of the chemical analysis of the Orange County Plant effluent. Table 3.4-2 has been revised to reflect the chemical analysis of the circulating cooling water based on the Orange County Plant effluent as makeup. Section 3.5, Subsection 3.5.1, has been revised to recognize the Orange County Plant as the source of makeup water and to provide a revised estimate of chemical treatment requirements.

Section 5.1, Subsection 5.1.7.3, has been revised in view of the changes in the quality of the cooling water makeup supply. The Orange County Plant effluent contains lower concentrations of dissolved solids than the Iron Bridge Facility effluent and will undergo complete advanced treatment including nitrate removal. Based on this improved quality, the circulating water analysis shows lower total dissolved solids which reduces deposition of salts by cooling tower drift. Figures 5.1-1 and 5.1-2 have been revised to show lower contour values for the salt deposition isopleths. Section 5.9 has been modified to delete the request for a variance or exemption from the ground water standard for nitrate nitrogen.

- Makeup and Return Water Pipelines. Section 2.2, Subsection 2.2.2.1, Section 2.5, Subsection 2.5.16, and Section 3.9, Subsection 3.9.1, have been modified to show a new and shorter pipeline route which is a result of the new Orange County road and the change in the source of cooling water makeup. Figure 3.9-6 has been revised to

show the modified pipeline route in relation to the new Orange County road and the Orange County Plant. Section 2.7, Subsections 2.7.7.7, 2.7.7.8, and 2.7.7.9 have been deleted and Figure 2.7-9 has been deleted. Subsection 2.7.8 has been revised to delete references to Figure 2.7-9.

INTRODUCTION

This Site Certification Application is being submitted by Orlando Utilities Commission for the Curtis H. Stanton Energy Center. It is intended to serve the following purposes.

- Site Certification Application for Unit 1 of the Curtis H. Stanton Energy Center.
- Site Certification Application for Ultimate Site Development of the Curtis H. Stanton Energy Center.
- Application for a Prevention of Significant Deterioration (PSD) permit for Units 1 and 2 of the Curtis H. Stanton Energy Center as required by the Clean Air Act.
- Joint Application (U.S. Army Corps of Engineers and Florida Department of Environmental Regulation) for dredge and fill permit for site development and construction of all associated facilities for Unit 1 of the Curtis H. Stanton Energy Center as may be required by the Clean Water Act.

For purposes of the PSD permit, the two-unit application is for phased construction. The applicant understands that construction of Unit 1 must commence within 18 months after receiving PSD approval and that Unit 2 construction must commence within 18 months of the scheduled commence construction date. The Unit 2 scheduled commence construction date for purposes of this PSD phased construction permit application is July 1, 1990.

Best Available Control Technology (BACT) has been demonstrated by the applicant in this Site Certification Application for Unit 1. The BACT for Unit 2 is currently proposed as identical to Unit 1. However, the applicant understands that the PSD permit for Unit 2 will be reopened for a new determination of BACT prior to the commencement of Unit 2 construction.

As provided for under recent amendments to the Florida Electrical Power Plant Siting Act, a separate Need for Power document has been submitted to the Florida Public Service Commission. That document is intended to establish the need for Unit 1 only of Curtis H. Stanton Energy Center.

The need for Unit 2 and subsequent units will be demonstrated when required for their construction. Information previously requested by the Florida Department of Environmental Regulation in Sections 1.0 and 8.2 of the Site Certification Application have been omitted from this document since it is contained in the separate Need for Power document.

The pertinent applicant information is provided in the following pages.

PERTINENT APPLICANT INFORMATION

Legal Name

Orlando Utilities Commission

Mailing Address

P. O. Box 3193
Orlando, Florida 32802

Address of Official Headquarters

500 S. Orange Avenue
Orlando, Florida 32801

Business Entity

The applicant is an independent authority engaged in the generation and distribution of electric power to persons within the service area.

Name and Title of Chief Executive Officers

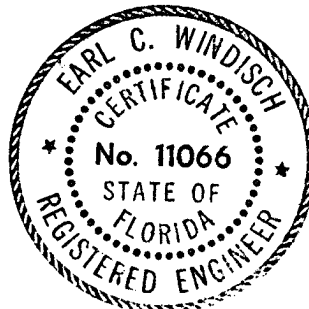
Grace C. Lindblom	- President
H. E. Johnson	- First Vice-President
W. M. Sanderlin	- Second Vice-President
William D. Frederick, Jr.	- Mayor
Charles J. Hawkins	- Immediate Past President
C. H. Stanton	- Executive Vice-President and General Manager

Name, Title, Address, and Phone Number of Official Representative Responsible For Obtaining Certification and To Whom Questions Concerning the Application Should Be Addressed

B. E. Shoup, Director, Environmental Divisions
500 S. Orange Avenue
Orlando, Florida 32801

Professional Engineer Submitting Application

Earl C. Windisch, Florida Registration Number 11066



Site Location

The preferred site for Curtis H. Stanton Energy Center is located in Orange County, Florida.

Nearest Incorporated City

Orlando, Florida

Latitude and Longitude

The preferred site is located at 28°28'50"N latitude and 81°09'40"W longitude.

Coordinates

The Universal Transverse Mercator (UTM) coordinates are:

3150500 North
484000 East

Proposed Nameplate Generating Capacity

Curtis H. Stanton Energy Center Unit 1 turbine will have a nameplate generating capacity of 425 megawatts (MW), and is scheduled for commercial operation in November 1986. Unit No. 2 turbine will have an approximate nameplate generating capacity of 425 MW, and is tentatively scheduled for commercial operation in January 1994. Units 3 and 4 have not been sized or scheduled at this time. Ultimate site development is planned to be around 2,000 MW.

DIRECTIONS FOR INSERTING REQUEST FOR MODIFICATION-1, SEPTEMBER 23, 1983

Remove

Insert

Volume I

Table of Contents, pages TC-2, TC-3, TC-4, TC-10, TC-11, TC-15, TC-16, TC-17, TC-20, and TC-21

Table of Contents, pages TC-2, TC-3, TC-4, TC-4a, TC-10, TC-11, TC-15, TC-16, TC-17, TC-20, and TC-21

Text, pages 2.2-2, 2.2-3, and 2.2-5

Text, pages 2.2-2, 2.2-3, and 2.2-5

Text, page 2.3-1

Text, pages 2.3-1 and 2.3-1a

Exhibit 2.3-2

Text, page 2.5-9

Text 2.5-9

Text, page 2.7-31, 2.7-32, 2.7-33 and 2.7-34

Text, pages 2.7-31, 2.7-31a, 2.7-31b, and 2.7-32 (pages 2.7-33 and 34 will be blank)

Figure 2.7-7a

Figure 2.7-9

Volume II

Table of Contents, pages TC-2, TC-3, TC-4, TC-10, TC-11, TC-15, TC-16, TC-17, TC-20, and TC-21

Table of Contents, pages TC-2, TC-3, TC-4, TC-4a, TC-10, TC-11, TC-15, TC-16, TC-17, TC-20, and TC-21

Text, page 3.1-2

Text, pages 3.1-2 and 3.1-2a

Text, page 3.2-4

Text, pages 3.2-4 and 3.2-5

Table 3.2-2

Table 3.2-2

Text, 3.3-1, 3.3-2, 3.3-3, and 3.3-6

Text, 3.3-1, 3.3-2, 3.3-3, and 3.3-6

Table 3.3-2

Table 3.3-2

Figure 3.3-1

Figure 3.3-1

Text, pages 3.4-1, 3.4-2, and 3.4-4

Text, pages 3.4-1, 3.4-2, and 3.4-4

Tables 3.4-1 and 3.4-2

Tables 3.4-1 and 3.4-2

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Text, page 3.5-1

Text, page 3.7-1

Text, page 3.7-1

DIRECTIONS FOR INSERTING REQUEST FOR MODIFICATION-1, SEPTEMBER 23, 1983

Remove

Insert

Volume II (Continued)

Text, pages 3.9-1, 3.9-3, 3.9-5,
and 3.9-6

Text, pages 3.9-1, 3.9-1a, 3.9-3,
3.9-5, 3.9-6, 3.9-6a, and 3.9-7

Table 3.9-1

Table 3.9-1

Figures 3.9-1 and 3.9-6

Figures 3.9-1 and 3.9-6

Appendix 3.9A

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Text, page 3.10-2

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Volume III

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TC-4, TC-4a, TC-10, TC-11, TC-15,
TC-16, TC-17, TC-20, and TC-21

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Text, pages 5.1-3 and 5.1-4

Figures 5.1-1 and 5.1-2

Figures 5.1-1 and 5.1-2

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Text, page 5.2-1, 5.2-2, 5.2-5

Text, page 5.5-3

Text, page 5.5-3

Text, pages 5.9-1, 5.9-2, 5.9-3,
and 5.9-4

Text, page 5.9-1

DIRECTIONS FOR INSERTING AMENDMENT 5, MARCH 3, 1982

<u>Remove</u>	<u>Insert</u>
<u>Volume I</u>	
Table of Contents, pages TC-4, TC-14, TC-15, and TC-18	Table of Contents, pages TC-4, TC-14, TC-15, and TC-18
Text, pages 2.1-1, 2.1-2	Text, pages 2.1-1, 2.1-2
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Text, pages 2.4-1, 2.4-2, 2.4-3	Text, pages 2.4-1, 2.4-1a, 2.4-2, 2.4-3
Figure 2.4-5	Figure 2.4-5
Text, pages 2.5-12, 2.5-14	Text, pages 2.5-12, 2.5-14
Figure 2.5-13	New Figure 2.5-10a and Figure 2.5-13
Text, page 2.7-31	Text, page 2.7-31
Figure 2.7-7	Figure 2.7-7
<u>Volume II</u>	
Table of Contents, pages TC-4, TC-14, TC-15, and TC-18	Table of Contents, pages TC-4, TC-14, TC-15, and TC-18
Text, pages 3.1-2, 3.1-3	Text, pages 3.1-2, 3.1-3
Figures 3.1-3, 3.1-4, 3.1-5	Figures 3.1-3, 3.1-4, 3.1-5
Table 3.2-2	Table 3.2-2
Figures 3.2-1, 3.2-2, 3.2-3	Figures 3.2-1, 3.2-2, 3.2-3
Text, pages 3.3-4, 3.3-5	Text, pages 3.3-4, 3.3-5
Table 3.3-2	Table 3.3-2
Figure 3.3-1	Figure 3.3-1
Text, pages 3.4-2, 3.4-3	Text, pages 3.4-2, 3.4-3
Table 3.4-2	Table 3.4-2

Remove

Insert

Volume II (Continued)

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Figure 3.6-1

Text, pages 3.7-1, 3.7-2, 3.7-3,
and 3.7-4

Tables 3.7-1, 3.7-2, 3.7-9 (3 pages)

Figure 3.7-1

Text, pages 3.9-1, 3.9-2, 3.9-6

Table 3.9-1

Figures 3.9-1, 3.9-5, 3.9-10, and
3.9-11

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3.10-4, 3.10-5, and 3.10-6

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3.10A-5, and 3.10A-6

Tables 3.10A-1, 3.10A-2, 3.10A-5

Figures 3.10A-1, 3.10A-2, 3.10A-3

Text, pages 4.1-3, 4.1-4, 4.1-5

Text, (Appendix 4.1A) pages
4.1A-4, 4.1A-7, 4.1A-13, 4.1A-14,
4.1A-15, 4.1A-16, and 4.1A-21

Tables 15-2, 15-3, 15-4, 15-5,
and 15-6

Figures 15-1, 15-3, 15-4, and
15-8, 15-9, 15-11, 15-12, and
15-15

Text, page 4.4-1

Text, page 3.6-2, 3.6-3

Figure 3.6-1

Text, pages 3.7-1, 3.7-1a, 3.7-2,
3.7-3, and 3.7-4

Tables 3.7-1, 3.7-2, 3.7-9 (3 pages)

Figure 3.7-1

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Table 3.9-1

Figures 3.9-1, 3.9-5, 3.9-10, and
3.9-11

Text, pages 3.10-1, 3.10-1a, 3.10-2,
3.10-3, 3.10-4, 3.10-5, and 3.10-6

Figures 3.10-1, 3.10-2, 3.10-3,
3.10-4, 3.10-5, and 3.10-6

Text, pages 3.10A-1, 3.10A-4,
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Amendment 4 provides revisions, corrections, and additions of information for the Curtis H. Stanton Energy Center--Unit 1 Site Certification Application submitted to the Florida Department of Environmental Regulation by the Orlando Utilities Commission. Some of the changes have resulted from the normal evolution of engineering design details, while others are the direct result of Florida Department of Environmental Regulation comments of July 23, 1981. Amendment 4 makes several editorial corrections and the following substantive revisions.

- (1) Revised acreage numbers for onsite facilities.
- (2) Revised discussion of plant service water use and pumpage of the Floridan aquifer.
- (3) Revised pond and basin sizes and seepage rates as shown in Figure 5.3-2.
- (4) Added a "worst case" unwashed Illinois Basin coal to BACT analysis.
- (5) Revised air emissions and air quality impact numbers to reflect "worst case" unwashed Illinois Basin coal.
- (6) Revised description of bottom ash handling.
- (7) Revised description of railroad spur crossing of Boggy Creek Road.
- (8) Revised size of makeup water supply pond and estimated liner costs in Section 5.9, Variance Request.
- (9) Revised lists of parameters to be used in ground water quality monitoring programs.

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1.0 PURPOSE OF PROPOSED FACILITY AND ASSOCIATED TRANSMISSION

Recent amendments to the Florida Electrical Power Plant Siting Act require a separate Need for Power Document to be submitted to the Florida Public Service Commission. This new document contains the materials previously required in Section 1.0 and 8.2 of a site certification application. Since this separate document has been prepared and submitted for the Curtis H. Stanton Energy Center Unit 1 project, the information formerly included in this section has not been repeated here.

APPENDIX 7.2C GRAVITY MODEL TO ALLOCATE THE INMIGRATING POPULATION

The approach taken to determining the likely locations of new resident workers is to derive a set of probabilities of location preferences from the populations and commuting distances to the plant site of towns and cities within a 75 mile commuting distance.

Commuting distance is a factor primarily because of the greater transportation costs associated with increased distance, although the amount of time required to commute daily may also be important in making a location decision.

Town size, as measured by population, is considered to be a factor because larger towns generally offer more services and amenities than smaller towns. It is assumed that workers and their families would prefer to reside in or near larger towns or cities, all else being equal. This approach is based on a gravity model similar to that used in both the physical and social sciences.

$$P_i = \frac{\frac{\text{Pop}_i}{D_i^2}}{\frac{\text{Pop}_1}{D_1^2} + \dots + \frac{\text{Pop}_n}{D_n^2}}$$

where P_i = probability that new resident workers would prefer to locate in town (i) relative to other towns within a 75 mile commuting distance.

Pop_i = the latest available (1976) population of town (i).

D_i = commuting distance from town (i) to the site.

n = total number of towns within a 75 mile commuting distance.

This formula expresses the relatively greater attractiveness of larger towns than small towns, and of towns closer to the site than at greater commuting distances; it also indicates that a small town close to the site may be as attractive as a larger town more distance from the site.

Because there are often several small towns within a 75 mile commuting distance of a site which would exert little attraction were they relative

to or at greater distances than larger neighboring towns, certain exclusion criteria can be used to eliminate from consideration towns which would not be expected to experience any appreciable effects. The criteria adopted in this assessment are to consider all towns regardless of size within 5 air miles of a site; to exclude all towns with existing populations less than 500 between 10 and 20 air miles from the site, and to exclude cities with existing populations less than 10,000 between 20 and 50 air miles or 75 highway miles from the site. In addition, cities outside of the 4-County Study Area were excluded due to the alternative construction employment opportunities that exist and will continue to exist in the closer regional trade centers serving these areas.

For each town considered, application of the formula yields the percent of new resident workers that would choose to locate in that town.

APPENDIX 7.2D
PROJECTED ECONOMIC ACTIVITY WITH STANTON ENERGY CENTER
UNIT 1: OPERATION PHASE

Projections of the Study Area economy during operation of the Stanton Energy Center Unit 1 were accomplished by modifying the projections of certain exogenous variables as well as the estimated coefficients of some of the stochastic equations to reflect the primary impacts of operation. Projections of indirect (primary and secondary) impacts on the Study Area economy are shown in Table 7.2D-1 for the operation and phase of the project.

7.3 INCREMENTAL IMPACTS OF ADDITIONAL UNITS

The construction and operation of additional Stanton Energy Center units will also result in direct and indirect socioeconomic impacts. Units 2, 3 and 4 will provide an adequate long-term supply of electricity that is both reliable and economical. They will also indirectly affect economic activity in the Orlando area.

The ultimate capacity of the Stanton Energy Center will be 2,000 megawatts with average annual production projected to be about 10,500 gigawatt hours.

Each additional unit is expected to have construction impacts very similar to those of Unit 1. The local labor supply available at the time of construction will determine the number of construction workers to be imported and so the population impact. Employment, payroll and local expenditure impacts will be very similar to those of Unit 1 except that no additional land will be purchased.

Operating impacts of each additional unit will be slightly less than those of Unit 1. Some of the operating crew will be common to all units resulting in payroll increased of 35, 74 and 101 per cent with the addition of Units 2, 3 and 4.

To the extent that the construction of additional units represents the most economical method of supplying adequate power, gross revenues will be as low as possible and so will payments in lieu of taxes.

As generating capacity is added to the Stanton Energy Center in the future, the beneficial effect of using treated effluent for cooling tower makeup water supply will increase. At the maximum anticipated generating capacity of 2,000 MW, the total average annual reduction in volume of effluent will reach 14,783 gpm or a 32 per cent decrease from the maximum permitted discharge of 46,000 gpm assuming the Iron Bridge Facility is used.

The addition of each unit will also increase coal requirements adding to the traffic congestion caused by unit-coal-train movement. When ultimate site capacity is developed, train traffic from Jacksonville will increase 50 to 100 per cent from existing levels.

TABLE 7.2D-1. PROJECTED ECONOMIC ACTIVITY IMPACTS OF STANTON ENERGY CENTER UNIT 1: OPERATION PHASE 1986-2016*

Year	Population	Total Labor Force	Employment	Unemployment Rate per cent	Personal Income \$1,000	Wages and Salaries \$1,000
1986**	37	25	80	0	1,428	258
1987**	110	75	241	-0.1	4,265	3,758
1990	110	75	241	-0.1	4,265	3,758
1995	110	75	241	-0.1	4,265	3,758
2000	110	75	241	-0.1	4,265	3,758
2005	110	75	241	-0.1	4,265	3,758
2010	110	75	241	0	4,265	3,758
2015	110	75	241	0	4,265	3,758
2016	110	75	241	0	4,265	3,758

Year	Real Wage Rate \$/h	Profit and Proprietors' Income \$1,000	Transfer Payments \$1,000	Contributions for Social Insurance \$1,000	Disposable Income \$1,000	Retail Sales \$1,000
1986**	0	218	0	48	1,278	1,722
1987**	0	652	0	145	3,816	5,149
1990	0	652	0	145	3,816	5,149
1995	0	652	0	145	3,816	5,149
2000	0	652	0	145	3,816	5,149
2005	0	652	0	145	3,816	5,149
2010	0	652	0	145	3,816	5,149
2015	0	652	0	145	3,816	5,149
2016	0	652	0	145	3,816	5,149

Year	State Sales Tax \$1,000	Business Index \$1,000	Bank Deposits \$1,000	Federal Income Tax \$1,000	Local Government Revenues \$1,000
1986**	50	0	363	150	77
1987**	206	0	1,084	449	230
1990	206	0	1,084	449	230
1995	206	0	1,084	449	230
2000	206	0	1,084	449	230
2005	206	0	1,084	449	230
2010	206	0	1,084	449	230
2015	206	0	1,084	449	230
2016	206	0	1,084	449	230

*All dollar amounts in constant \$1980.

**Projected impacts in 1986 and 1987 include impacts resulting from construction and operation. Impacts shown for those years represent only that portion of the total impact attributable to operation activities.

80 ALTERNATIVE
SITES AND TUBES

8.0 ALTERNATE ENERGY SOURCES AND SITES

This chapter includes descriptions of site selection studies and alternate fuels analyses. Section 8.1 consists of an Executive Summary of the site selection study. The information previously requested for Section 8.2 is now included in the Need for Power Document as prescribed by recent amendments to the Florida Electrical Power Plant Siting Act.

8.1 ASSESSMENT OF ALTERNATE SITES

8.1.1 Introduction

In 1979, the Orlando Utilities Commission conducted a site selection study to identify potential sites for a new coal-fueled electric generating station. This study was based on the premise that the site should be able to support at least 1,200 MW of generating capacity and that the first 400 MW unit should be available for initial operation in 1986.

This section of the Site Certification Application summarizes the site selection study and presents technical/economic and environmental information concerning the five candidate sites including the preferred site.

8.1.2 Project Schedule

In the initial stages of the project planning, a simplified schedule was developed to identify eleven (11) major prerequisites to permitting, construction, and operation of a power plant. The schedule originally planned for initial operation of the plant in early 1987.) This schedule was subsequently revised to provide for initial operation in 1986, when the economic savings to OUC's customers and the need to support the national energy policy to reduce oil consumption became more apparent. The 1987 schedule is identified as the original schedule while the 1986 schedule is the revised schedule on Figure 8.1-1. The revised schedule has turned out to be impractical and the original schedule is the current schedule.

8.1.3 Site Selection Plan

✓ Following authorization to proceed with a power plant site selection study, OUC management formed an inter-departmental committee chaired by the Manager of Electric Operations and staffed by representatives from the Electric Generation, Environmental, and System Planning Divisions of the Orlando Utilities Commission. The Committee outlined the project as a four-phased activity as follows.

- I. Organization and Data Acquisition.
- II. Literature/Map Search.
- III. Reconnaissance and Evaluation.
- IV. Final Report.

The five primary considerations in any power plant siting project are as follows.

- (1) Availability of cooling water.
- (2) Transportation of fuel, equipment and materials.
- (3) Transmission of energy to the service area.
- (4) Environmental impacts of construction and operation.
- (5) Public acceptance of the project.

The first major decision was to establish the geographical limits of the search area. To allow consideration of salt water cooling as a possible option, the Atlantic and Gulf coasts were set as East and West boundaries. Considering transmission economics, the North and South boundaries were set reasonably close to the OUC service area. This, in effect, established a twelve county search area in a band running through central Florida between the two coasts. County lines as search area boundaries were arbitrarily chosen for convenience. The search area is shown in Figure 8.1-2. This initial map work was based on U.S.G.S. maps of 1:500,000 scale.

8.1.3.1 Phase I - Organization and Data Acquisition. Phase I consisted primarily of data acquisition:

- (1) Selecting maps of appropriate feature highlights (e.g. topography, transportation, etc.), and various scales.
- (2) Collecting geophysical data.
- (3) Obtaining Federal, State and local protected lands boundary information (parks, recreational areas, forests, wildlife areas, etc.).
- (4) Gathering land use planning data.
- (5) Obtaining agricultural data.

After establishing the search area and completing data acquisition, the areas to be pre-empted from consideration were determined. The initial

exclusions were the environmentally sensitive areas and the urban areas shown on Figure 8.1-3. It was further determined that important agricultural production areas and wetland zones should be excluded. Figure 8.1-4 is a composite of the pre-empted areas.

This left for consideration, the clear areas of Figure 8.1-4. The final element of Phase I, the establishment of candidate zone criteria provided manageable data for detailed analysis and yet provided sufficient resolution to support discrete site identification.

8.1.3.2 Phase II - Literature and Map Search. Phase II was basically a search of the data gathered during Phase I, organized by developing overlays for the next larger scale map (1:250,000). This identified the preferred areas for siting. The transportation and transmission corridors were located and are shown on Figure 8.1-5.

The analysis at this level yielded twenty candidate zones of irregular configuration, varying in total area from 30 to 50 square miles. These zones are outlined on Figure 8.1-6 and identified by arabic numerals 1 through 20.

Up to this point, the study dealt with gross area maps and data suitable for the intended purpose of macroanalyses of the total search area. The next step required more detailed data to identify potential plant sites within the identified candidate zones. Accordingly, for further studies, the U.S.G.S. 7-1/2 minute map series (1:24,000) was utilized. A site size criterion of 3,000 acres $\pm$ 20 per cent was established and applied with the basic requirements (water source, transportation, transmission, etc.), to yield an inventory of 22 potential sites. Sites were identified by suffixing an alphabetical letter to the zone number (e.g. 20A). Some zones produced several sites and a few produced none. See Figure 8.1-7.

Early in Phase II, state regulatory officials were informed of this power plant siting activity. An informal meeting was held, at Orlando Utilities Commission's request, in Tallahassee on May 8, 1979 to exchange information and to initiate an early interchange of ideas relative to site selection. The intention was to solicit specific comments and guidance

during the course of site selection. The search area and several of the zones under consideration were identified and it was agreed that OUC would keep the agencies abreast of activities by informal meetings as the selection process progressed.

8.1.3.3 Phase III - Reconnaissance and Evaluation. The initial elements of Phase III consisted of a comparative assessment process in which the 22 potential sites were evaluated from published technical data (topographic, photographic, demographic and geophysical) until the sites were either rejected (with justification), or given candidate status.

The initial effort was to identify five to ten candidate sites prior to field reconnaissance. To assist in reaching this point, a qualified biologist was consulted to characterize the environmental acceptability of the potential sites in rather general terms. The latest available U.S. Geological Survey 7-1/2 minute topographic maps were utilized, and current aerial photographs were obtained and analyzed. The available cooling, process, and potable water sources were identified. Present and planned land uses were determined from published data, or conversation with knowledgeable agencies (county planners, regional planning councils, etc.). Eight potential sites were assigned "tentative" candidate site status.

Field reconnaissance by fixed wing aircraft overflights was initiated. Current residential development at one site and agricultural production (of a secondary nature) at two other sites were discovered. These sites were placed low on the "tentative" list.

At this point, the environmentally attractive constraint of utilizing sewage treatment plant effluent for cooling tower makeup was applied, eliminating the three most distant sites, leaving five. (Coincidentally, those eliminated were the same three mentioned above.)

More overflights were conducted; each site was visited and traveled via jeep trails and on foot (by OUC personnel, environmental and engineering consultants); geological and hydrological data was thoroughly researched; representatives of the appropriate agencies within the political subdivisions involved were contacted and discussions held; and the state

regulatory agencies were again contacted (under the auspices of the Department of Environmental Regulation, Power Plant Siting Section of the Bureau of Permitting).

The common difficulty in power plant siting activities is that one or more otherwise promising candidates must be rejected in the interest of practical objectivity. This study was no exception, having gone through several such iterations just to arrive at the final list of candidates. The rigorous application of prudence in judgment reduced the tentative list to four at one point. This challenged the committee to research the more favorably characterized potential sites and select another to assure a reasonably broad spectrum of acceptable candidates for inclusion in the ranking process.

The final evaluation of the resulting list was an integrated analysis of the consequential factors relative to siting (both objective and subjective) which, when weighted by importance and graded, gave a common base score. The end product was a ranking of the candidate sites in order of preference: (Figure 8.1-8).

<u>Candidate Zone</u>	<u>Potential Site</u>	<u>Geographic Reference</u>
20	A	Econlockhatchee South
3	A	Southeast Orange County
1	C	Lake Harney Southeast
19	A	Econlockhatchee North
2	A	Shingle Creek

8.1.3.4 Phase IV - Final Report. Phase IV was basically the narrative and graphic production effort required to yield the final report. It is viewed as a communication tool which will support the implementation of the Orlando Utilities Commission's 1986 coal project.

8.1.4 Plant Requirements

8.1.4.1 General. The four subjects under this section were treated to the degree required to assure a reasonably accurate determination of the relative influence of each on site selection.

8.1.4.2 Land Requirements. Acreage allocations for this project have been made conservatively, since the achievement of maximum effectiveness in both the environmental protection and power production systems design can substantially affect the land area requirements. Table 8.1-1 contains a preliminary estimate of site space requirements.

Variations in site acreage requirements will occur due to differences in coal fuel characteristics; site suitability for solid waste disposal; configuration of natural and man-made boundaries; etc.

The acreage shown for ash and sludge storage is based upon the use of coal with relatively favorable percentages of ash and sulfur. The use of high sulfur fuel and/or fuel with higher ash content could substantially increase the required storage area shown.

8.1.4.3 Water Requirements. During Phase III of the site selection study, OUC management, citing an anticipated growth of regulatory interest in conservation of water resources, suggested adoption of the limiting criteria of siting in an area where the use of sewage treatment plant effluent (STPE) as cooling water makeup is viable. It was further noted that though this had not previously been a formal constraint, thinking, in some measure, had been influenced by the advantages of utilizing STPE.

Management's direction to the Committee was to pursue informal discussions with the City of Orlando regarding use of STPE.

Informal discussions with the city centered around questions relative to using STPE which could affect siting (e.g., flow rates, surge capacities, cycle of operation, quality, constituents, withdrawal from river versus pipeline transmission, waste water return considerations).

The OUC design consultant was requested to provide conservatively oriented makeup water requirements based on the use of sewage treatment plant effluent for cooling applications. The resulting 8 million gallons per day per 400 MW unit (approximate), was based upon use of wet scrubber type air quality control facilities for SO₂ removal in connection with the burning of Wyoming and West Virginia coal fuels, as well as for plants designed to operate using Illinois fuel. Current expected water usage for the facility as designed would average about 4 million gallons per day for Unit 1.

The quantities computed in connection with application of wet scrubber removal systems for Wyoming and West Virginia coal-fired plant units represent the probable maximum requirements, and therefore were conservative regardless of the system utilized. Later conceptual design studies have established wet scrubbers as most suited for the proposed plant.

Potable and boiler makeup requirements will be about 0.4 million gallons per day for each 400 MW unit and will come from deep wells.

8.1.4.4 Fuel Source and Transportation. A rather extensive coal supply study was performed by the consultant, Black & Veatch, in support of this and the Lakeland project. A brief summary of the more significant considerations during this siting study follows.

The primary domestic coal resources available to the Orlando Utilities Commission are the Southern Appalachian Basin (East Kentucky, Southern West Virginia, Virginia, Tennessee, Alabama, and Georgia) and the Illinois Basin (Illinois, Indiana, and West Kentucky). Secondary coal sources include the lignite fields in the Gulf Coal Province (Alabama, Mississippi, Arkansas, Louisiana, and Texas) and the coals from the San Juan Basin of New Mexico. Due to the recent increases in long haul unit coal train tariff rates, and their low heating value, coals of Wyoming and Montana are not competitive at an inland Florida site.

All coal shipments will probably be received by rail. If bulk cargo ship deliveries to Port Canaveral are possible, the short distance (about 30 miles) could make truck delivery economically competitive with rail.

The environmental impact caused by a significant number of truck movements would be the subject of a rather thorough investigation prior to commitment to such an option.

All rail movements could originate from each of the domestic coal producing regions except the San Juan Basin, which would be cost prohibitive. The Illinois Basin and the Alabama portion of the Southern Appalachian Basin offer the potential of low cost barge transportation down the Ohio and Mississippi River systems to New Orleans or the Black Warrior River system to Mobile, Alabama.

At the present time, there are only two large facilities receiving coal shipments by ocean-going barge in the state of Florida. These facilities are located at Tampa Bay (Tampa Electric Company) and Crystal River (Florida Power Corporation). Facilities have been proposed for Jacksonville, Port Canaveral, Ft. Pierce, and Port Manatee. These projects have received media coverage and do offer some promise. Their present status, however, is somewhat indeterminate.

Rail service to the area is by the Florida East Coast (FEC) Jacksonville to Miami main line, following generally the Atlantic shoreline, and by the Seaboard Coast Line (SCL) Jacksonville to Orlando and Tampa main line, passing to the west of the region. Both lines are strong with present trackage and signaling adequate for unit train service.

The rail spur serving the Econlockhatchee South site (Site 20A) from the FEC System would branch from the main line at a point to the west of the Indian River plant and run directly west on the north side of the existing Indian River-Orlando transmission line corridor. The routing would parallel this corridor to the east edge of the plant site. Rail spur service from the SCL system would branch from the SCL main line at a point about 3 miles south of Taft and run easterly, skirting the south boundary of Orlando International Airport and associated residential-commercial development. The routing would generally parallel the Bee Line Expressway to a point directly south of the site. At this point, the routing would turn north and, crossing the expressway, run to the site.

Alternative rail spur alignments branching from the existing SCL trackage at Oviedo and running south to the sites were examined and rejected in favor of the above alignment. The condition of the 17-mile Sanford to Oviedo branch line is unsuitable for the heavy loadings imposed by unit coal train service. This line would require extensive reconstruction and upgrading, which is not cost effective as measured against the cost of the base alignment.

Use of a coal slurry pipeline is now being proposed which would connect the coal fields of east Kentucky and West Virginia with several Florida utilities. Such pipelines are very capital intensive and their competitive position with rail movements is contingent on long distances (greater than 500 miles) and large annual volumes (greater than 5 million tons). Aside from economic considerations, flexibility in selection of future coal suppliers is limited. Slurry pipeline transportation is a "family affair" in which the coal producers, consumers, and pipeline owner/operator must agree to work together over a long period of time. Due to the small size of the coal shipped (less than 1/16-inch top size) via slurry pipelines, dewatering and storage can present operating problems. One of the primary claims for the slurry pipeline has been its low escalation rate compared to rail transportation. Now that the capital markets are receiving interest premiums due to inflationary expectations, the economic benefits may not be as great as they were a few years ago, when interest rates were lower.

8.1.4.5 Transmission. An adequate reliable electric transmission system is a necessary part of any large central station generating facility. While generally not the leading consideration in a site study, planning associated with the siting of large generating plants must include an assessment of the effects of the new plant on the existing and planned transmission network and an evaluation of alternative plans for addition of transmission facilities associated with the project.

The Orlando Utilities Commission is a member of the Florida Electric Power Coordinating Group (FCG), a voluntary association of Florida utilities.

The FCG, working through member committees, coordinates planning and operating functions as an aid in providing adequate reliable power supply to the state. They further sponsor independent studies aimed at solving common problems and achieving common goals within the Florida utility industry. Additionally, OUC is a member of the Florida Subregion of the Southeastern Electric Reliability Council (SERC) a regional electric reliability council.

Transmission lines in the Florida Subregion used principally for bulk power are 230 kV. In recent years, however, several 500 kV lines have been constructed and several more are included in long range plans for the region. The existing OUC bulk power transmission system includes lines operating at 115 kV and 230 kV. The 115 kV lines basically form a network and supply distribution substations in the Orlando area. The 230 kV lines are used to bring power into the Orlando area and to tie major source substations to provide increased system reliability. The lines are all overhead with the exception of some pipe type and extruded dielectric cables in the 115 kV network.

The OUC 230 kV bulk power transmission system includes interconnections with Florida Power Corporation at three points and with Florida Power and Light Company at one point. This system also includes a recently energized tie with Kissimmee at Taft and one with Lakeland scheduled for 1981 construction.

The Econlockhatchee South site is located adjacent to the existing OUC transmission line corridor between the Indian River plant and Pershing substation. The site is approximately 5 miles west of the existing Florida Power and Light Company, 230 kV Brevard-Sanford transmission line.

8.1.5 Environmental Considerations

Environmental considerations were a predominant factor from initiation to completion of the site selection process. Phase I of the siting project concentrated on developing a comprehensive listing of environmentally sensitive areas so that they might be excluded from consideration, and the

"Public Acceptance" factor has a strong implication of environmental acceptability. An early decision of the Siting Committee was to provide a large area for plant development to assure environmentally compatible land uses.

Field reconnaissance of the 22 sites identified during the study concentrated heavily on environmental assessment and extended the information obtained from topographic maps and aerial photographs. Criteria applied included the amount of wetland present, the amount of forested areas and cypress domes that would be affected, the proximity to sensitive wildlife areas, the distance to population concentrations, the availability of a water source, the distance to adequate transportation facilities, and the presence of any known archaeological sites or other cultural resources.

As a result of the evaluations, five sites were identified to be environmentally acceptable in addition to satisfying other site selection factors. Certainly, many of the other sites could be utilized as a power plant site, but environmental impacts would have been greater on a comparative basis.

The decision to utilize sewage treatment plant effluent as a source of cooling water was made predominantly on an environmental basis. The location of the preferred site, Econlockhatchee South, adjacent to the Orange County landfill operation is an environmental plus from a land use basis.

8.1.6 Evaluation and Ranking of Potential Sites

The objective of the ranking process was to evaluate each potential site until it was either rejected as a viable site or received a rank indicating its preferential order.

The methodology chosen by Orlando Utilities Commission (OUC) to accomplish this objective consisted of four steps.

The first step screened all potential sites using general broad based information. The purpose of this step was to eliminate those sites which did not offer some assurance of being acceptable to the regulating bodies and the general public.

The second step added the restraint of requiring the use of sewage treatment plant effluent for cooling water purposes.

The third step evaluated each remaining site in much more detail. This redefined all the criteria used in the first step more stringently. The purpose of this step was twofold: (1) Was the general evaluation in the first step so broad that a factor which would make the site unacceptable overlooked? (2) Additionally, what would be the preferential order of the remaining sites?

The fourth step weighted the various factors and components.

8.1.6.1 Step I - General Screening of Potential Sites. This screening evaluated each potential site based on the following criteria.

A. Water Supply - What would be the source of the primary water supply?

- (1) Salt Water - S
- (2) Surface Water - SF
- (3) Ground Water - G
- (4) Sewage Treatment

Plant Effluent -STPE

The initial restricting criteria would be that any site having ground water as the only water supply available would be unacceptable. This restriction was based on the general premise that ground water would be of high quality and to use that water for cooling purposes would not be the most beneficial use of that water supply.

B. Existing land use - What is the present primary land use characteristic?

- (1) Agriculture - AG
- (2) Residential Development - R
- (3) Open Land - O

The initial restricting criteria would be that if the present primary land use is agricultural, residential or a combination of these, the site would be unacceptable. This is because those

users would be considered to be a better beneficial use of the land than a power plant would be.

- C. Ecology - How would the construction of the plant, all necessary access lanes, and long term operation of the plant affect the ecosystems of the area?

These effects were determined as the result of analytical judgments concerning the impact on the terrestrial and aquatic ecosystems for each site, and both ecosystems as they relate to site accessibility.

The judgment scale was as follows.

Acceptable - Construction and operation would not be unduly harmful.

Marginal - Effects of construction and operation are unclear.

Unacceptable - Construction and operation would be unduly harmful.

The restricting criteria would be that if any site receives an unacceptable rating for terrestrial ecosystems, aquatic ecosystems or accessibility, the site would be unacceptable. In addition, any site which received two marginal ratings would be unacceptable.

The results of Step I are shown on Table 8.1-2. This step determined sites 1A, 1B, 1D, 1E, 2B, 3B, 4A, 4B, 5A, 7A, 8A, 8B, 10A, 17A and 18A to be unacceptable.

8.1.6.2 Step II - Cooling Water Constraints. The initial screening was an overview of all potential sites with only general restrictions. At this time, the specific restriction that the plant utilize sewage treatment plant effluent for cooling water was imposed. This constraint was imposed primarily because it is environmentally sound and is an effective form of resource recovery.

Secondly, it may benefit the regional waste treatment facility by reducing the volume of its effluent discharge. Secondary treatment may

provide adequate quality for power plant cooling water makeup. In addition, it may benefit the sewage plant by reducing volumes of wastewater to be treated at certain stages and by reducing effluent flow. Even with this constraint, five potential sites remain, indicating it to be not unduly restrictive.

Reviewing Table 8.1-2 shows that this constraint makes sites 6A and 16A unacceptable.

8.1.6.3 Step III - Screening of Remaining Sites. In previous steps, the thrust of screening was to determine if there were any general reasons why a site should be rejected. This step evaluated each remaining site in depth to determine if there were any previously overlooked reasons to reject a site, as well as to quantify each of the factors used in determining the preferential order of remaining sites.

The factors quantified were as follows:

(1) Technical/Economic

Because all remaining sites are within a 20 mile radius, it was assumed that operational costs will not significantly vary. It was also assumed that there will be no significant difference in plant design or equipment. This means the only variable to be considered was the cost of fully developing each site to its maximum potential. All cost estimates have been developed by Black & Veatch based on 1979 dollars, which were then escalated at an average rate of 8 per cent per year. Using the least expensive site as a base and relating all other sites to it, each site was assigned a numerical value between 0 and 100. The best site, i.e., least expensive, is the site with the highest value assigned to it.

(2) Hydrology

(a) Water Supply - Potable and plant service water requirements will be 0.4 million gallons per day and will be taken from the Floridan Aquifer. It is assumed that this is not a site specific variable. Other water use (non-potable) will be eight (8) to twenty four (24) million gallons per day. This

will be sewage treatment plant effluent. Because the point of supply for potable and non-potable water is the same for all potential sites, the only aspect of water supply which will vary by site is cost, which is considered under the technical/economic factor.

- (b) Water Quality - It was assumed that all wastes would be returned to the sewage plant. Therefore, this factor becomes a function of the potential to degrade ground or surface waters. The degradation of ground water could occur from the leachate which would come from the coal pile and solid waste disposal areas. It is assumed that all sites would be designed to protect against this leaching and therefore, it would not be a site variable. Surface waters could be degraded by contaminated ground water, storm water runoff, or flood runoff. Ground water would be protected, as previously discussed. Storm water runoff from contaminated areas will be collected and treated. This leaves flood runoff as the potential source of degrading the surface waters. The flood potential can be quantified by measurement of the land area which would be inundated by a 100-year flood. This does not consider areas which have standing water after a heavy rain. Such areas of standing water will either percolate into the ground as a non-contaminate, or, if in an area with contaminates, such as the coal pile, it will be collected and treated. A numerical value between 0 and 100 was assigned by equating the site with zero flood potential equal to 100, and letting any site with 25 per cent or more of its land area susceptible to flooding equal 0. The other sites are ranked linearly between those bounds.

(3) Geology

- (a) General - All sites have the same basic geology and subsurface conditions which, though not exactly identical, are not significant site variables.

(b) Seismology - Seismic risk design criteria for a coal-fired plant is based on the Uniform Building Code (UBC). The UBC includes Florida in its seismic Zone 0, indicating no seismic damage would be expected and, it is therefore not a site specific variable.

(4) Air Quality

Under existing regulatory requirements, air quality will not be allowed to be significantly degraded. Therefore, this would not be site specific in any tangible way. There is an intangible consideration which is the potential impact which can be quantified by the distance from the center of the site to the nearest edge of the nearest urban or environmentally sensitive area. A numerical value between 0 and 100 was assigned by equating a distance of 0 miles to 0, and 5 or more miles to 100, and ranking the other sites linearly between these bounds.

(5) Land Use

Existing land use was considered in the general screening of all sites and was grounds for site rejection. The purpose of this procedure was to determine the future land use around each site. The best site would be the one determined to have the least growth around it. This can be given a numerical value by rating the sites subjectively for the possibility of being in areas expected to be developed within 10 years. Ratings were assigned as follows.

<u>Development Level in Ten Years</u>	<u>Value</u>
Fully	25
75 per cent	50
50 per cent	75
25 per cent or less	100

(6) Archaeological

It was assumed that there are no major areas of archaeological significance on any of the sites. So this was not a site specific variable. It should be noted that this assumption was based on the idea that if any such areas are found, they could be studied and documented or the plant could be built there without disturbing them.

(7) Socio-Economic

This was a function of the short term impact on an area due to the influx of large construction forces and then long term operating personnel. This was site specific to some degree and was measured by the distance to labor forces and the ability of the area to absorb the additional permanent population. The best site would be within commuting distance for both construction and operating forces. Because all potential sites are within 25 miles of Orlando, it was anticipated that construction forces would not impact the area. In addition, the growth from other sources in central Florida is such that the additional people required to staff the site would have a negligible effect on that growth.

(8) Ecosystems

(a) Terrestrial Ecosystems - This was site specific and related to existing habitat. The best site would be land covered with only scrub pines and palmettos. The worst would be an area heavily forested with mixed hardwoods and cypress domes.

(b) Aquatic Ecosystems - This was site specific and related to existing wetlands. The best site would be high and dry and the worst would have large areas which are normally wet. Both of these criteria have been assigned a numerical value with the rating being from the standpoint of the site being adaptable to the facility.

<u>Rate</u>	<u>Value</u>
Excellent	100
Good	80
Fair	60
Poor	40
Marginal	20

(9) General Site Acceptability

This is site specific and is more intuitive than objective. It cannot be quantitatively measured but very definitely provides an accurate summary of the intuitive judgments of the committee members. These judgments were made by those most closely associated with the project, and most able to sense and assess the attitudes and opinions of all the entities that will participate in the final determination of site acceptability. There were some specific considerations which influenced these judgments. For example, the Shingle Creek site would be visible from Sea World and other area attractions, as well as from the major highways which carry the majority of the tourists visiting the area. The plant would become one of the first impressions people would get of the area, and in a tourist oriented economy that cannot be ignored. Another example is that both Econlockhatchee sites are close to the Orange County landfill. While refuse burning is not presently planned for the first unit, growth and development of refuse burning technology is expected to make this fuel source economically viable and significant by the time future units are added. The base data and raw score for each factor derived as discussed in this step is shown on Table 8.1-3 and Table 8.1-4.

8.1.6.4 Step IV - Weighting of Components. There are two major components considered in the weighting process. They are the cost component, i.e. technical/economic, and the environmental component, which consists of all the other factors.

Each major component is assigned a value of 100, with the environmental factors assigned weights as follows.

Hydrology - Water Quality	5
Air Quality	15
Future Land Use	5
Ecology	
Terrestrial Ecosystems	25
Aquatic Ecosystems	25
General Site Acceptability	<u>25</u>
Environmental Total	100

The weight assigned to the hydrology factor was small because existing technology and prudent design will minimize any potential impact.

The air quality factor was assigned a higher weight because emission control is constantly changing with the development of new technologies.

The weight assigned to the future land use factor was small because development in the site areas is not presently encouraged by the counties. In addition, it is OUC's intent to have a large enough site to provide a buffer zone between the actual plant facilities and any potential development.

The terrestrial and aquatic ecosystems were assigned high weight values because most of the ecosystems present will be disturbed. Since this is undesirable, they carry more weight. General site acceptability is assigned a high weight because it represents a summary of the difficult-to-quantify yet highly-significant factors in the siting process. The results of this work are shown on Table 8.1-5.

The raw score values come from Table 8.1-4, with the adjusted score being the assigned weight times the raw score. The final weighting compares the value of the technical/economic component to the value of the environmental component. To do this, a sensitivity analysis was prepared, shown on Table 8.1-6. This analysis indicated that varying the weights from 40 percent technical/economic and 60 per cent environmental, to 60 per

cent technical/economic and 40 per cent environmental, does not change the relative ranking of the sites.

Therefore, the sites listed in the order of preference are as follows.

- (1) Econlockhatchee South
- (2) Southeast Orange County
- (3) Lake Harney Southeast
- (4) Econlockhatchee North
- (5) Shingle Creek

8.1.7 Candidate Site Profiles

These descriptive profiles capsulize the more significant features of the five candidate sites. Where appropriate, each subject addressed has been treated in greater detail in other sections of this study. This section is designed to give a concise, but comprehensive overview of each candidate site.

The topography of the five candidate sites and vicinities is shown on Figure 8.1-9 through 8.1-13 which are based on portions of USGS topographic quadrangle maps at a scale of 1:24,000.

8.1.7.1 Econlockhatchee South - Site 20A

<u>Item</u>	<u>Description</u>
Nearest Town:	Union Park
Surface Waters:	Econlockhatchee River
USGS 1:24,000 map:	Narcoossee Northwest
Range & Township:	R31E, T23S R32E, T23S (Orange County)
Water Supply:	
Cooling:	Sewage treatment plant effluent (Approximately 12 miles away)
Process & Potable:	Floridan Aquifer
Fuel Transportation:	Two rail routes appear feasible: from the Florida East Coast Railroad (FEC) branching to the west in

Item

Description

Highways:

Transmission Lines:

Geophysical:

Land Use:

the vicinity of the Indian River Plant and extending across the St. John's River along the existing transmission corridor; and from the Seaboard Coast Line Railroad (SCL) by extending east out of Taft, then north to the site, crossing SR 528.

SR 528 (Beeline Expressway) is about 1 mile south of and parallel to the south boundary of this site. SR 50 is approximately 5 miles north. SR 15A is roughly 7 miles west and SR 520 is about 9 miles east.

The Econlockhatchee South site is located adjacent to the existing OUC transmission line corridor between the Indian River Plant and Pershing Substation. The site is approximately 5 miles west of the existing Florida Power & Light Company 230 kV Brevard-Sanford transmission line.

Sloping from a maximum elevation of 90 feet in the southwest to 45 feet (at the Econlockhatchee River) in the northeast corner, this site has the greatest elevation change of the candidates. Sinkholes were less numerous on this site than the others. The water table, as with the other east Orange County sites, is within 5 feet of the ground surface. The Upper Floridan Aquifer is estimated to be 250 feet below the surface. Bedrock consisting of the Ocala Group Limestone is at the 275 to 300 foot depth sloping to the southeast.

This area has been used as livestock range. A half section and an adjacent quarter section on the western edge of this site and joining the Orange County Solid Waste Disposal area has been platted into residential lots, but not recorded.

Item

Description

Demography:

There is no development on these lots or any other portion of the site. Hunters' stands were noted at two or three locations on the site. The future possibility of resource recovery through refuse derived fuel lends significance to the fact that the closest active neighbor (as mentioned above), is the Orange County Solid Waste Disposal Facility. Situated about 15 miles east and slightly south of downtown Orlando, this site is fairly well removed from population centers. The closest rural roads extending south of SR 50 between Bithlo and Union Park terminate around 3 miles from the site. To the south lies the Deseret Ranch. Cape Orlando is on the east side of the Econlockhatchee River and 3 to 5 miles away. Orlando International Airport is approximately 6 miles to the southwest.

Exclusion Areas:

Designated urban development associated with the City of Orlando is the closest exclusion area and is 7 to 8 miles away. (Florida Department of Transportation designation.)

Ecosystems:

Terrestrial Habitats:

Pine Flatwoods:

Pine flatwoods comprise the largest vegetation association on the site. These are relatively flat areas dotted primarily with long-leaf pine and an understory of saw-palmetto, wax myrtle, gallberry, cordgrass, wire grass, and other grasses. Oak saplings (live, water, and laurel) also occur in these areas.

There is evidence that fires have occurred in portions of the pine flatwood areas. Additional disturbance has occurred by the passage of vehicles

Item

Description

through the site. Survey markers also are visible through sections of site, and a very limited amount of clearing of vegetation has been carried out.

Pine flatwoods provide moderate quality habitat utilized primarily by small mammals, several species of reptiles and amphibians, and some birds. A list of vertebrates potentially found in a pine flatwood habitat is given in Table 8.1-7.

Cypress Domes and Strands:

There are a number of cypress domes and strands in low, wet areas on the site. These dome communities are underlined with an impervious clay lens or pan which retains water within the confined area of the dome. A rounded dome appearance results because taller cypress trees occur in the center with progressively smaller trees radiating toward the perimeter. Pond cypress characteristically occurs in the center of the domes as well as in strands along wet areas. Other species of flora commonly associated with the domes included wax myrtle, black gum, slash pine, common buttonbush, sweet bay, red maple, longleaf pine, holly, saw grass, and pickerelweed.

Cypress domes and strands represent a rather unique and valuable habitat. They are a combination of terrestrial and aquatic habitat which attract and support a variety of land birds, waterfowl, small mammals, reptiles and amphibians.

Item

Description

Mixed Cypress -
Hardwood Swamps:

These areas, consisting of a mixture of cypress and hardwoods such as oaks, maples and gums, are found mainly along several small streams and drainage ditches which are on the site. Small isolated depressed areas which predominately have strands of hardwoods around and in them with an occasional cypress in the wetter interior are also present.

These areas provide very productive habitats which are utilized by diverse species of wildlife. The hardwoods supply food in the form of nuts and acorns for a variety of birds and mammals. Deer also utilize this type of habitat, as well as the alligator, raccoon, and opossum. The wet areas of this association are used by ducks, wading birds, and various other waterfowl.

Leaves and other plant materials that fall into the water serve as an energy source for the growth of plankton, insects, snails, and minnows, which in turn support populations of fish, reptiles, amphibians, birds and mammals.

Mixed cypress - hardwood swamp areas represent a very high quality habitat which is utilized by a wide diversity of wildlife, and is an important component of the natural food chain.

Freshwater Marshes: These are wet areas largely covered by grasses, rushes, and sedges. There are a number of freshwater marshes scattered over the site. Maiden-cane, cordgrass, and pickerelweed are common in these areas. Waterlilies and bladderworts also are present. Various shrubs and vines grow around the drier edges of the marshes, such as cattails,

Item

Description

buttonbush, swamp loosestrife, and others. Bulrush, rushes, and saw-grass are also present.

Freshwater marshes are important as natural water purification systems. Water runoff from soils and rocks often has elevated concentrations of minerals and possibly organic material. Plants growing in marshes where the runoff collects remove most of the minerals and organic materials before the water returns to the ground water.

This type of habitat primarily is utilized by a variety of wading birds, reptiles, and amphibians. It does not support as great a diversity of species of wildlife as wooded areas.

Aquatic Habitat:

There are several small streams on the site which provide limited aquatic habitat. Minnows were observed in these streams, and the water is utilized by snakes, frogs, and other reptiles and amphibians. Plankton and benthic organisms grow in such streams and provide an important link in the food chain. Drainage ditches on the site also represent a type of aquatic habitat.

The most significant aquatic habitats on the site are the swamps, freshwater marshes, and cypress dome areas. These areas are a combination of aquatic and terrestrial habitat. The growth of plankton and other aquatic organisms occur in these habitats which are essential food sources for other organisms. There does not appear to be any aquatic habitat on the site capable of supporting a significant fishery. The Econlockhatchee River and the Hart Branch and Cowpen Branch tributaries are located east of the site. The Wide

<u>Item</u>	<u>Description</u>
	Cypress Swamp is west of the site. These areas contain the most extensive aquatic habitat in the vicinity of the site.
Environmental Quality:	The highest quality and most productive habitats on the site are the heavily wooded swamp areas, the freshwater marshes, and the cypress domes. There is not an excessive amount of any of these habitats on the site. Within the state of Florida, virtually any candidate site would contain one or more of these habitats. The environmentally sensitive areas associated with the Wide Cypress Swamp and the Econlockhatchee River have been avoided.

8.1.7.2 Southeast Orange County - Site 3A

<u>Item</u>	<u>Description</u>
Nearest Town:	Cocoa
Surface Waters:	Second Creek, Jim Creek
USGS 1:24,000 Maps:	Narcoossee Northeast, Lake Poinsett Northwest
Range and Township:	R33E, T24S
Water Supply:	
Cooling:	Sewage treatment plant effluent (approximately 24 miles away)
Process & Potable:	Floridan Aquifer
Fuel Transportation:	Service from FEC railway could originate in the vicinity of the Indian River Plant following the existing transmission line right-of-way across the St. John's River, then turn south. This, in addition to the river crossing would require crossing SR 520 and SR 528. A less encumbered route would be an extension of the SCL east out of Taft, although more trackage would be required.

<u>Item</u>	<u>Description</u>
Highways:	SR 528 (Beeline Expressway), parallels the north boundary of this site about 2 miles to the north. SR 520 and the southern extension of SR 528 into Cocoa are approximately 5 miles to the east.
Transmission Lines:	The Southeast Orange County site is located approximately 7 miles south of the existing OUC transmission line corridor between the Indian River Plant and Pershing Substation, and approximately 16 miles east of the existing OUC 230 kV Taft-Pershing transmission line. This site is approximately 3 miles southwest of the existing Florida Power and Light 230 kV Brevard-Sanford transmission line.
Geophysical:	Geologically, this site and Econlockhatchee North and South are approximately equivalent, each being situated 275 to 300 feet above the Ocala Group Limestone bedrock with quite similar surficial deposits. Several secondary artesian aquifers from 60 to 150 foot depths would typify ground water conditions with the Upper Floridan Aquifer at about 250 feet. The water table will be around 5 feet below surface level. This site slopes quite gently to the east, generally, with some drainage to the north into Second Creek. The site is relatively high (average elevation approximately 67 feet MSL). Much more rapid elevation changes begin about 1 to 2 miles east of the site. Second and Jim Creeks join about 3-1/2 miles to the northeast flowing to the St. John's River marsh near the Beeline-SR 520 intersection. A number of sinkholes were noted on this site. Flat, open rangeland predominates this site. Clearing requirements could be minimized.

<u>Item</u>	<u>Description</u>
Land Use:	This site is on and totally surrounded by Deseret Ranch properties. It is presently being used as rangeland. About 3 miles west of the site, the City of Cocoa draws part of its water supply from deep wells. This site is the most remote of the candidates and also approximates one of the locations identified by Florida Power Corporation as a possible power plant site. (10 year site plan, 1979).
Demography:	Other than a few scattered farm residents about 5 miles to the northeast, the closest population centers are Christmas, approximately 8-1/2 miles to the north and Cape Orlando (Rocket City) about 7 miles to the north and slightly west. The site is 17 miles from Cocoa (population, approximately 17,000) and 25 miles from downtown Orlando.
Exclusion Areas:	The only exclusion area in the vicinity of this site is the Tosohatchee State Preserve, the closest approach of which is approximately 4 miles from the site.
Ecosystems:	
Terrestrial Habitats:	
Pine Flatwoods:	Pine flatwoods occur throughout most of the site. The composition of this association is the same as described for the Econlockhatchee South site. Armadillo, quail, and deer were observed in these areas. A list of vertebrates occurring in pine flatwoods is given in Table 8.1-7.

<u>Item</u>	<u>Description</u>
Cypress Domes and Strands:	There are a number of cypress domes and strands on this site. They vary in size from over an acre to a few hundred square feet. Very dense growths of

Item

Description

longleaf pines occur in the drier areas of some of the domes. These areas appeared to be good habitats for a variety of wildlife species. Vertebrates associated with this type of habitat are listed in Table 8.1-7.

Mixed Cypress -
Hardwood Swamps:

There are very dense stands of mixed cypress-hardwoods in the wet areas along Second Creek and associated tributaries on the site. These are high quality habitats which support a wide diversity of wildlife species. Numerous deer tracks were observed in these areas. Smaller mammals, a variety of reptiles and amphibians, and numerous species of birds also are found in this type of habitat. Table 8.1-7 contains a list of vertebrates known to inhabit these areas.

Freshwater Marshes:

There are a number of freshwater marshes on this site, particularly in the southwestern portion. These areas are important habitats for wading birds, frogs, snakes, alligators, and various small mammals. Little blue heron were observed in one marsh on the site. Vertebrates associated with this type of habitat are listed in Table 8.1-7.

Ruderal:

Ruderal areas are those areas that have been disturbed by agricultural, commercial, or urban activities. There are two ruderal areas on this site.

One is an abandoned railroad that runs from the southwest to the northeast diagonally across the site. The right-of-way has been cleared and wooden ties remain in some sections. Bare areas of sandy soil are evident along much of the rail route. Saw palmetto, gallberry, and oak saplings

Item

Description

flank most of the cleared corridor. The old railroad route represents only a small percentage of total habitat on the site. Small mammals, a few reptiles and amphibians, and some species of birds probably utilize the area.

The second ruderal area is a cleared fence line corridor which extends north and south across the site. This cleared corridor passes through some heavily wooded areas as well as pine flatwoods. This cleared corridor probably is utilized by wildlife more than the abandoned railroad route because there is a greater diversity of floral species. A list of vertebrates that utilize ruderal habitats is given in Table 8.1-7.

Aquatic Habitats:

Second Creek and several small tributaries provide some aquatic habitats on the site. These are rather small bodies of water, but they support the growth of microscopic aquatic organisms, benthic organisms, and a few species of fish. Minnows were observed in the streams. Frogs, snakes, and small mammals also use these streams, as well as various species of bird.

The marshes, swamp areas, and cypress domes also provide aquatic habitat on the site.

Item

Description

Environmental
Quality:

The wetland areas and associated wooded areas provide high quality habitat. This site supports a variety of wildlife as evidenced by the observation of deer, quail, wading birds, and armadillo. The habitat on the site has experienced some disruption by the construction and operation of the railroad. The corridor was cleared of vegetation,

<u>Item</u>	<u>Description</u>
	and many stumps remain on the site where trees were cut during logging operations.
	Other habitat has been disturbed by the cleared fence line corridor.

8.1.7.3 Lake Harney Southeast - Site 1C

<u>Item</u>	<u>Description</u>
Nearest Town:	Geneva
Surface Waters:	Lake Harney, St. Johns River
USGS 1:24,000 Maps:	Geneva
Range and Township:	R30E, T20S (Volusia County)
Water Supply:	
Cooling:	Sewage treatment plant effluent (Approximately 19 miles away)
Process & Potable:	Floridan Aquifer
Fuel Transportation:	A recently abandoned railroad bed is about 6 miles north of this site (rails have been removed). Rebuilding this abandoned route and then extending it into the site would be the most likely approach. Service could be obtained either from Florida East Coast out of Edgewater or the Seaboard Coastline system out of Enterprise.
Highways:	Florida SR 46 is within one-half mile of the southern portion of this site, and intersects Interstate 95 at Mims, approximately 10 miles to the east.
Transmission Lines:	The Lake Harney site is located approximately 15 miles north of the existing OUC transmission line corridor that connects the OUC Indian River Plant and Pershing Substations, and is approximately 20 miles northeast from the OUC Azalea

<u>Item</u>	<u>Description</u>
Geophysical:	substation. The existing Florida Power and Light Company 230 kV Kennedy-Volusia transmission line is located approximately 5 miles east of the site. This rather flat candidate site is 10 to 15 feet above Lake Harney to the southeast. Several sinkholes were noted. The site slopes gently to the west (towards Lake Harney). Bedrock is 75 to 100 feet deep (Avon Park Limestone) and dips to the east. The water table is probably less than 5 feet below surface level.
Land Use:	The western edge of this site has several acres of citrus which could, for the most part, be avoided by construction, and leased back. The major portion of this site is open rangeland. Very few livestock were noted during a site visit. Several hunters' stands were noted in lightly wooded areas. Two ranch residences were noted near the southeast portion of this site. Lake Harney supports moderate recreational use. A number of recreational type cottages and some permanent residences exist on the southwest shore of the lake. The taller structures of the plant would be visible from the lakeshore and SR 46.
Demography:	Geneva, about 6 miles away and across Lake Harney is the closest of several small agriculturally based communities (Geneva, Snow Hill, Chuluota, Mims, Scottsmeer), located around the site. Populations range up to around 1,500. The site is about halfway (15 miles), between Titusville (Pop. 32,000) and Sanford (Pop. 23,000), and about 25 miles from downtown Orlando.

Item

Description

Exclusion Areas:

The only exclusion area in the site vicinity is the Farnton Wildlife Management Area to the north and east of the site and about a mile away at the closest point.

Ecosystems:

Terrestrial Habitats:

Pine Flatwoods:

There are extensive areas of pine flatwoods on the site. The understory of saw palmetto, wax myrtle, grasses, and other plants is very dense in many areas. There are only a few wet areas scattered through the pine flatwoods. Two wild turkeys were observed adjacent to a dirt road in the flatwoods. A large nest was observed in a dead pine tree. It is not certain what species of birds used the nest. Because of the proximity of the site to Lake Harney and St. Johns River, a rather broad diversity of bird species are probably attracted to the vicinity.

Cypress Domes and Strands:

Several cypress domes and strands were observed on the site. These communities were not extensive, but they represent high quality habitat.

Mixed Cypress - Hardwood Swamps:

There are several drainage ditches on the site which have associated mixed cypress-hardwood swamp areas. In some sections, there are very dense stands of hardwoods. These areas are high quality habitat.

Freshwater Marshes:

A few marsh areas are evident on the site. These areas are covered with cordgrass, maidencane, pickerelweed and other grasses, rushes and sedges. Most of the freshwater marshes are interfaced with pine flatwood communities. A little blue heron

ItemDescription

was observed in a marsh on the site. These marshes provide valuable habitat and serve as a natural water purification system.

Aquatic Habitat:

There is a good flow of water in the drainage ditches on the site. Limited aquatic habitat is provided by the ditches. Minnows were not seen in the ditch waters.

More productive aquatic habitat is associated with the freshwater marshes, cypress domes, and swamp areas. Populations of plankton and other aquatic organisms develop which are important as food sources for larger life forms. St. Johns River and Lake Harney are major aquatic habitats in the vicinity of the site.

Environmental
Quality:

The heavily wooded swamp areas and freshwater marshes are the most significant and productive habitat on the site. The rather extensive pine flatwoods provide a larger, but less valuable habitat. The wetlands and drainage ditches constitute a rather minor aquatic habitat.

8.1.7.4 Econlockhatchee North--Site 19AItemDescription

Nearest Town:

Union Park

Surface Waters:

Econlockhatchee River

USGS 1:24,000 maps:

Oviedo Southwest, Narcoossee Northwest

Range and Township:

R31E, T23S

R32E, T23S

Water Supply:

Cooling:

Sewage treatment plant effluent (approximately
10 miles away)

<u>Item</u>	<u>Description</u>
Process and Potable:	Floridan Aquifer
Fuel Transportation:	Since this site is situated immediately to the north of Site 20A, the rail routing options are the same as previously described for that site.
Highways:	SR 50 is about 3-1/2 miles to the north. SR 528 (Beeline Expressway) is approximately 4-1/2 miles to the south.
Transmission Lines:	Transmission considerations are the same as for Econlockhatchee South (20A). The Econlockhatchee North site is located adjacent to the existing OUC transmission line corridor that connects the OUC Indian River Plant and Pershing Substations. It is located approximately 20 miles southeast from the OUC Azalea Substation. The site is approximately 4 miles west of the existing Florida Power & Light Company 230 kV Brevard-Sanford transmission line.
Geophysical:	This site is immediately north of the Econlockhatchee South site (20A), but differs to some degree in topography, being at generally lower elevations. An unnamed but significant tributary to the Econlockhatchee River meanders easterly across the site resulting in a somewhat more complex system of natural drainage. There are several rather large areas of relatively flat rangeland. Subsurface conditions are similar to the other east Orange County sites with the water table being less than five feet below the surface, Upper Floridan Aquifer around 250 feet, and bedrock in the 275 to 300 foot range.

<u>Item</u>	<u>Description</u>
Land Use:	Livestock range is the only known use of this area other than for seasonal hunting (some rather dilapidated small cabin type trailers were noted near the Econlockhatchee River tributary). Immediately northeast of the site are some citrus groves. The proximity of this site to the Orange County Landfill being nearly equivalent to that of Econlockhatchee South is a positive land use consideration factor. Adjacent to the transmission line right-of-way and on the southern portion of this site is a residential structure with several outbuildings.
Demography:	The only significant demographic difference between this site and Econlockhatchee South is this site's proximity to the SR 50 Union Park-Bithlo populace.
Exclusion Areas:	Designated urban areas east of Orlando (same as for Econlockhatchee South).
Ecosystems:	
Terrestrial Habitats:	
Pine Flatwoods:	Pine flatwoods are distributed throughout the site. The composition of the pine flatwoods is the same as described for the adjacent Econlockhatchee South site. These areas, however, are not as extensive as on the North site. The stands of saw-palmetto comprising the dominant component of the understory are particularly dense. The pine flatwoods provide habitat for a number of species of small mammals, reptiles, amphibians, and birds. A list of vertebrates that occur in this type of habitat is given in Table 8.1-7.

ItemDescription

Cypress Domes
and Strands:

A number of cypress domes and strands were observed in low, wet areas on the site. A description of these is the same as given for the Econlockhatchee South site. Vertebrates found in this type of habitat are given in Table 8.1-7.

Mixed Cypress--
Hardwood Swamps:

There are very heavy stands of mixed cypress and hardwoods on this site. The areas generally are along the Econlockhatchee River and its tributaries on the site. These areas provide high quality habitat that supports a wide diversity of wildlife species. Deer, many small mammals, snakes and other reptiles, amphibians, and a variety of birds utilize this type of habitat. A list of vertebrates associated with this type of habitat is given in Table 8.1-7. There is significantly more cypress-hardwood habitat on this site than the adjacent site to the south.

Freshwater Marshes: There are extensive areas of freshwater marshes on this site. The marsh areas are more widespread than indicated on aerial photographs taken during March, 1970. These wet areas with growths of maidencane, cordgrass, pickerelweed, waterlilies, cattail, and associated vegetation are sensitive environmental areas. Habitat is provided for a diversity of wildlife species, including small mammals, wading birds, and other waterfowl. During a site visit, ducks were observed in a marsh. The freshwater marshes also are important in improving water quality before it returns to the groundwater system.

ItemDescription

Vertebrates common to freshwater marshes are listed in Table 8.1-7.

Aquatic Habitat:

The Econlockhatchee River and associated tributaries provide a major aquatic habitat on the site. These habitats support the growth of plankton, benthic organisms, and a few fish species. Minnows were observed in a tributary on the site. Deer, a variety of other animals, and birds are attracted to these areas. Young alligators were seen on the site in a tributary of the Econlockhatchee. The marsh, swamp, and cypress dome areas also provide aquatic habitat. These areas support the growth of plankton, other microorganisms, and a diversity of wildlife species.

Environmental
Quality:

The extensive freshwater marshes and mixed cypress-hardwood areas represent very productive and high quality habitat. Because of the many sensitive environmental areas on this site, any action which would adversely affect them should be carefully evaluated.

8.1.7.5 Shingle Creek--Site 2AItemDescription

Nearest Town:

Kissimmee

Surface Waters:

Shingle Creek

USGS 1:24,000 maps:

Kissimmee, Lake Jessamine

Range and Township:

R29E, T24S

Water Supply:

Cooling:

Sewage treatment plant effluent (approximately
30 miles away)

<u>Item</u>	<u>Description</u>
Process and Potable:	Floridan Aquifer
Fuel Transportation:	Seaboard Coastline's main line into Kissimmee would be the point of turnout into this site, near the southeast corner. This spur would cross U.S. 441, 17, 92, and SR 527. Other more distant routes (south of Kissimmee), are possible, but are unlikely to offer any offsetting advantage.
Highways:	This site is bounded on the east by U.S. Highways 441, 17, and 92, with the Florida Turnpike about one mile further to the east. Interstate 4 is about 5 miles west of the site. U.S. 192 is 4 miles south of the site, and SR 428's westerly extension is about 5 miles north.
Transmission Lines:	The Shingle Creek site is located adjacent to the existing OUC 230 kV Southwood-Taft-Pershing transmission line. The site is approximately 5 miles west of the new 230 kV Taft Substation and is adjacent to the 230 kV Taft-McIntosh line to be constructed in 1981.
Geophysical:	From a geophysical standpoint, this site offers some advantage over the other candidates. Excepting the rather rapid slope at Shingle Creek, this site is the most consistently flat of all. It is perched rather high (average elevation about 90 feet MSL), and the water table is 20 to 30 feet beneath the surface. Bedrock at this site (Avon Park Limestone) is 150 feet deep.
Land Use:	This area is presently in use as livestock range. There is some evidence that the central plain of this site (east of Shingle Creek) has, at one time, been under cultivation. A cabin apparently designed for recreational use was noted in the

Item

Description

forested area along Shingle Creek. A concern of plant aesthetics design would be the visual proximity of this site to major tourist attractions along Interstate 4, southwest of Orlando. Residential development in Orange County currently extends to within 2 miles of the site. The southern boundary of this site is also the Orange-Osceola County line. Commercial/industrial development in Osceola County presently extends to the county line. Development priorities would probably be more germane at this site than at the others.

Demography:

Perhaps one of the weaker attributes of this candidate is its proximity to existing population centers and its situation relative to future demographic development. Kissimmee is 3 miles to the south; Lake Buena Vista and Disney World are 6 miles west; Vineland is 5 miles northwest; Sea World is 3 miles north; and Taft is 5 miles northeast.

Exclusion Areas:

The closest exclusion areas are the urban extensions of Kissimmee and Orlando, each about 2 miles away.

Ecosystems:

Terrestrial Habitats:

Pine Flatwoods:

Pine flatwoods constitute a major terrestrial habitat on the Shingle Creek site. These areas generally extend to the east and west of Shingle Creek which runs north and south through the western portion of the site. Marsh areas, cypress domes, and strands are dispersed throughout the pine flatwoods. Longleaf pines and saw-palmettos are the dominant vegetation. The description of

Item

Description

Cypress Domes
and Strands:

pine flatwoods given for the Econlockhatchee South site is applicable. These areas provide habitat for a variety of wildlife as shown in Table 8.1-7.

Cypress domes and strands are scattered throughout the site. They particularly are apparent in low areas of the pine flatwoods. They provide a quality habitat, both terrestrial and aquatic, which is utilized by a number of species of birds, mammals, reptiles and amphibians. Table 8.1-7 lists vertebrates known to inhabit this type of habitat. The Shingle Creek site is particularly rich in cypress domes and strands that provide quality habitat as characterized by well established cypress trees in the wet centers of the domes and a diversity of dense vegetation extending to the drier portions of the domes. A list of vertebrates associated with this type of habitat is given in Table 8.1-7. A gopher tortoise (Gopherus polyphemus) was observed in the pine flatwoods. This reptile is classified as a threatened species by the Florida Committee on Rare and Endangered Plants and Animals.

Mixed Cypress--
Hardwood Swamps:

There are very dense stands of cypress and hardwood in the swamp area along Shingle Creek. These areas are very high quality habitat and extend north and south across the site. Several drainage canals also have associated cypress--hardwood areas. A significant environmental impact would result if these areas were adversely affected by the construction and operation of a generating station.

Item

Description

Freshwater Marshes: Freshwater marshes are rather abundant on this site. Several are scattered throughout the pine flatwoods, and there are extensive marsh areas west of Shingle Creek. These areas represent valuable habitat as well as a natural water purification system. Several species of wading birds were observed in marshes on the site including the little blue heron. A list of other vertebrates that occur in freshwater marshes is given in Table 8.1-7.

Ruderal: There is a transmission line corridor that extends east and west across the northern portion of the site. Some small areas near the western boundary of the site appear to have been used for crop production. These disturbed areas provide habitat for various species of vertebrates as shown in Table 8.1-7.

Aquatic Habitat: Shingle Creek, drainage ditches, and wetlands provide aquatic habitats on the site. Shingle Creek appears capable of supporting a significant fishery. A small house was observed near Shingle Creek with a boat in the yard suggesting the possibility of fishing activities. All of the aquatic habitats support populations of plankton and other aquatic organisms important to the food chain.

Environmental
Quality:

The Shingle Creek site has rather extensive areas of high quality habitat. The densely vegetated sections of Shingle Creek are particularly valuable habitat for a wide diversity of wildlife. The freshwater marshes are also very productive habitat as well as the cypress domes and strands.

8.1.7.6 Environmental Comparisons of Candidate Sites. The following discussions present the major environmental issues and concerns associated with the five candidate sites.

Endangered and Threatened Species

One threatened vertebrate species, the gopher tortoise (Gopherus polyphemus), was observed at the Shingle Creek site during field visits. In addition, the little blue heron (Florida caerula), was observed during field visits to the sites. The Florida Committee on Rare and Endangered Plants and Animals has listed this bird as "a species of special concern."

Approximately 61 species of plants and animals which could potentially occur in the study area are considered to be endangered, threatened, or rare. These include 32 species of birds, 10 species of mammals, 7 species of reptiles, 2 species of amphibians, and 10 species of plants. These species are listed in Table 8.1-7, Sensitive Animal and Plant Species Potentially Present in the Study Area.

Ambient Air Quality

No major air pollution sources appear to be close enough to any of the candidate sites to significantly influence air quality. The Econlockhatchee North and South sites are near the Orange County landfill, and it is conceivable that during certain earth moving operations at the landfill, particulate concentration at the sites could increase.

Orange County is designated as a nonattainment area for ozone. The operation of a coal-fired generating station will not contribute to the ozone concentration.

Environmental Acceptability of Candidate Sites

One of the five candidate sites appears to be environmentally unacceptable, the Econlockhatchee North site. This site has extensive swamp and

freshwater marsh areas, as well as dense hardwoods associated with the Econlockhatchee River and tributaries on site. The construction and operation of a generating station would have potential adverse impacts on these valuable and sensitive habitats. The amount of quality habitat that would be affected is a major consideration.

The Econlockhatchee South site contains some heavily wooded areas and wetlands. The quantity of habitat that would be impacted by a generating station project is not excessive. The most environmentally sensitive areas in the vicinity of the site, the Wide Cypress Swamp and the Econlockhatchee River, have been avoided.

There are a number of areas of high quality habitat on the Southeast Orange County site. The habitat on this site appears to be more productive than the Econlockhatchee South site. More wildlife, including deer, quail, wading birds, and armadillo, were observed on this site.

The Shingle Creek site contains some very sensitive areas. The swamps associated with Shingle Creek appear to be highly productive habitats. There is a wide diversity of vegetation capable of supporting a variety of wildlife species. Shingle Creek also represents a significant aquatic habitat.

The Lake Harney Southeast site has rather extensive areas of pine flatwoods as well as more productive areas of freshwater marshes and cypress-hardwood swamps. It is likely that more species and numbers of birds are in the vicinity of this site than the others. Birds are attracted to Lake Harney and the St. Johns River.

Finally, the Econlockhatchee South, Southeast Orange County, Shingle Creek, and Lake Harney Southeast sites appear to be the most environmentally acceptable sites for the construction and operation of a generating station.

8.1.8 Proposed Site

The candidate site designated as Econlockhatchee South--Site 20A, was determined to be the most economically feasible and environmentally acceptable site. Figure 8.1-14 illustrates the location of this site in relation

to Orlando and the Iron Bridge Road Regional Water Pollution Control Facility. This site has been designated the Curtis H. Stanton Energy Center.

TABLE 8.1-1. SPACE ALLOCATIONS FOR 1986 COAL-FUELED POWER PROJECT

<u>Site Usage</u>	<u>Acres</u>
Power Block and Substation Facilities	75
Coal Handling and Storage Facilities	150
Coal Delivery and Plant Railroad Trackage	30
Scrubber Additive Handling and Storage Facilities	15
Plant Waste (Ash and Sludge) Handling and Transient Storage Facilities	15
Ash and Sludge Storage Facilities	750
Water Supply Storage Impoundment	60
Drainage and Wastewater Impoundments	50
Cooling Towers and Buffer Zones	40
Roads	15
Construction Area	75
Exclusionary and Buffer Space	<u>1,000</u>
	2,285 (minimum)

TABLE 8.1-2. ECOLOGY

<u>Site</u>	<u>Hydrology</u>	<u>Land Use</u>	<u>Terrestrial Ecosystems</u>	<u>Aquatic Ecosystems</u>	<u>Accessibility</u>
1A	SF/STPE/G	0	M	M	A
1B	SF/G	0	UA	UA	A
1C	SF/STPE/G	0	A	A	A
1D	SF/STPE/G	0	M	M	A
1E	SF/STPE/G	AG/R	M	M	A
2A	SF/STPE/G	0	M	A	A
2B	SF/STPE/G	R	M	A	A
3A	G/STPE	0	M	A	A
3B	G/STPE	R	A	A	A
4A	SF/G	AG	A	M	A
4B	SF/G	0	M	A	UA
5A	G	0	A	M	A
6A	SF/G	0	A	A	A
7A	SF/G	0	A	A	UA
8A	SF/G	AG	A	A	M
8B	G/SF	0	M	A	M
10A	G	R	M	A	A
16A	SF/G	0	A	A	A
17A	SF/STPE/G	R	UA	UA	A
18A	STPE/G	0	M	M	A
19A	STPE/G	0	A	M	A
20A	STPE/G	0	A	A	A

KEY:

A - Acceptable
 AG - Agriculture
 G - Ground Water
 M - Marginal
 O - Open Land

R - Residential Development
 SF - Surface Water
 STPE - Sewage Treatment Plant Effluent
 UA - Unacceptable

TABLE 8.1-3. BASE DATA FOR CANDIDATE SITES

	Site 1C <u>Lake Harney SE</u>	Site 2A <u>Shingle Creek</u>	Site 3A <u>Southeast Orange</u>	Site 19A <u>Econlockhatchee N.</u>	Site 20A <u>Econlockhatchee S.</u>
Technical/Economic (millions)	1,669	1,636	1,676	1,650	1,645
Hydrology-Water Quality	9 per cent	2.8 per cent	0	2.6 per cent	1.1 per cent
Air Quality	2 miles	2 miles	4 miles	8 miles	8 miles
Land Use (Future)	25 per cent	Fully	25 per cent	25 per cent	25 per cent
Ecology					
Terrestrial Ecosystems	Excellent	Fair	Good	Fair	Excellent
Aquatic Ecosystems	Good	Fair	Good	Poor	Good
General Site Acceptability	Excellent	Marginal	Excellent	Fair	Excellent

TABLE 8.1-4. RAW SCORES FOR CANDIDATE SITES

	Site 1C <u>Lake Harney SE</u>	Site 2A <u>Shingle Creek</u>	Site 3A <u>Southeast Orange</u>	Site 19A <u>Econlockhatchee N.</u>	Site 20A <u>Econlockhatchee S.</u>
Technical/Economic	98	100	97.6	99.1	99.4
Hydrology-Water Quality	64	88.8	100	89.6	95.6
Air Quality	40	40	80	100	100
Land Use (Future)	100	25	100	100	100
Ecology					
Terrestrial Ecosystems	100	60	80	60	80
Aquatic Ecosystems	80	60	80	40	80
General Site Acceptability	100	20	100	60	100

TABLE 8.1-5. CANDIDATE SITE EVALUATIONS

	Weight (per cent)	Site 1C Lake Harney SE		Site 2A Shingle Creek		Site 3A Southeast Orange		Site 19A Econlockhatchee North		Site 20A Econlockhatchee South	
		Raw	Adj.	Raw	Adj.	Raw	Adj.	Raw	Adj.	Raw	Adj.
		No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Technical/Economic	100	98	98	100	100	97.6	97.6	99.1	99.1	99.4	99.4
Hydrology											
Water Quality	5	64	3.2	88.8	4.4	100	5	89.6	4.5	95.6	4.8
Air Quality	15	40	6	40	6	80	12	100	15	100	15
Land Use (Future)	5	100	5	25	1.2	100	5	100	5	100	5
Ecology											
Terrestrial Ecosystems	25	100	25	60	15	80	20	60	15	80	20
Aquatic Ecosystems	25	80	20	60	15	80	20	40	10	80	20
General Site Acceptability	25	100	25	20	5	100	25	60	15	100	25
Total Environmental	100	--	84.2	--	46.6	--	87.0	--	64.5	--	89.8

TABLE 8.1-6. CANDIDATE SITE EVALUATION SENSITIVITY ANALYSIS

	Lake Harney SE		Shingle Creek		Southeast Orange		Econlockhatchee N.		Econlockhatchee S.	
	Adj. No.	Final No.	Adj. No.	Final No.	Adj. No.	Final No.	Adj. No.	Final No.	Adj. No.	Final No.
50 Per Cent Technical/Economic	98	49	100	50	97.6	48.8	99.1	49.6	99.4	49.7
50 Per Cent Environmental	84.2	42.1	46.6	23.3	87.0	43.5	64.5	32.2	89.8	44.9
50/50 Total	--	91.1	--	73.3	--	92.3	--	81.8	--	94.6
45 Per Cent Technical/Economic	98	44.1	100	45	97.6	43.9	99.1	44.6	99.4	44.7
55 Per Cent Environmental	84.2	46.3	46.6	25.6	87.0	47.8	64.5	35.5	89.8	49.4
45/55 Total	--	90.4	--	70.6	--	91.7	--	80.1	--	94.1
40 Per Cent Technical/Economic	98	39.2	100	40	97.6	39.0	99.1	39.6	99.4	39.8
60 Per Cent Environmental	84.2	50.5	46.6	28.0	87.0	52.2	64.5	38.7	89.8	53.9
40/60 Total	--	89.7	--	68.0	--	91.2	--	78.3	--	93.7
55 Per Cent Technical Economic	98	53.9	100	55	97.6	53.7	99.1	54.5	99.4	54.7
45 Per Cent Environmental	84.2	37.9	46.6	21.0	87.0	39.2	64.5	29.0	89.8	40.4
55/45 Total	--	91.8	--	76.0	--	92.9	--	83.5	--	95.1
60 Per Cent Technical/Economic	98	58.8	100	60	97.6	58.6	99.1	59.5	99.4	59.6
40 Per Cent Environmental	84.2	33.7	46.6	18.6	87.0	34.8	64.5	25.8	89.8	35.9
60/40 Total	--	92.5	--	78.6	--	93.4	--	85.3	--	95.5

TABLE 8.1-7. SENSITIVE ANIMAL AND PLANT SPECIES POTENTIALLY PRESENT IN THE STUDY AREA

Common Name	Scientific Name	FCREPA Status*	Comment
<u>BIRDS</u>			
Wood Stork	<u>Mycteria americana</u>	E**	Breeding colony in southwest Orange County (72-73).
Florida Everglade Kite	<u>Rostrhamus sociabilis plumbeus</u>	E	May no longer be present.
Peregrine Falcon	<u>Falco peregrinus</u>	E	May not be present.
Ivory-billed Woodpecker	<u>Campephilus principalis</u>	E	Possible 1975 sighting; not likely to occur.
Red-cockaded Woodpecker	<u>Picoides borealis</u>	E	Flatwoods; cypress areas.
Louisiana Waterthrush	<u>Seiurus mutacilla</u>	R	
American Redstart	<u>Steophaga rutucilla</u>	R	
Bachman's Warbler	<u>Vermivora bachmanii</u>	E	Very rare migrant? Hardwood swamp.
Kirtland's Warbler	<u>Dendroica kirtlandii</u>	E	Very rare migrant? Flatwoods.
Florida Grasshopper Sparrow	<u>Ammodramus savannarum floridanus</u>	E	Southern portion of counties; flatwoods.
Southern Bald Eagle	<u>Haliaeetus l. leucocephalus</u>	T	
Osprey	<u>Pandion haliaetus</u>	T	
Southeastern American Kestrel	<u>Falco sparverius paulus</u>	T	Study area in breeding range.
Audubon's Caracara	<u>Caracara cheriway auduboni</u>	T	Variety of habitats; may not be present.
Florida Sandhill Crane	<u>Grus canadensis pratensis</u>	T	Variety of habitats.
Least Tern	<u>Sterna albifrons antillarum</u>	T	
Florida Scrub Jay	<u>Aphelocoma c. coerulescens</u>	T	Scrubby flatwoods.
White-tailed Kite	<u>Elanus caeruleus majusculus</u>	R	Pasture; crop lands.
Short-tailed Hawk	<u>Buteo brachyurus fuliginosus</u>	R	Study area in summary range; flatwoods and cypress.
White Ibis	<u>Eudocimus albus</u>	S	Cypress and hardwood swamp.
Little Blue Heron	<u>Florida caerulea</u>	S	Cypress and hardwood swamp.

(1 of 4)

TABLE 8.1-7 (Continued). SENSITIVE ANIMAL AND PLANT SPECIES POTENTIALLY PRESENT IN THE STUDY AREA

Common Name	Scientific Name	FCREPA Status*	Comment
Great Egret	<u>Casmerodius albus</u>	S	Cypress and hardwood swamp.
Snowy Egret	<u>Egretta thula</u>	S	Cypress and hardwood swamp.
Louisiana Heron	<u>Hydranassa tricolor</u>	S	Cypress and hardwood swamp.
Black-crowned Night Heron	<u>Nycticorax nycticorax</u>	S	Cypress and hardwood swamp.
Yellow-crowned Night Heron	<u>Nyctanassa violacea</u>	S	Cypress and hardwood swamp.
Least Bittern	<u>Ixobrychus exilis</u>	S	Fresh marsh.
Coopers Hawk	<u>Accipiter cooperii</u>	S	Study area within range.
Florida Burrowing Owl	<u>Athene cunicularia floridana</u>	S	Study area within range; pasture; cropland.
Southern Hairy Woodpecker	<u>Picoides villosus audubonii</u>	S	Study area within range; variety of forest areas.
Merlin	<u>Falco columbarius</u>	U	Study area within winter range; pine; oak; pasture, cropland.
White Breasted Nuthatch	<u>Sitta carolinensis carolinensis</u>	S	Very old records; variety of habitats.
<u>PLANTS</u>			
Pygmy Fringe-tree	<u>Chionanthus pygmaeus</u>	E	Restricted to Florida scrub habitats; apparently well south of study area.
Highlands Scrub Hypericum	<u>Hypericum cumulicola</u>	E	Restricted to Florida.
Lewton's Polygala	<u>Polygala lewtonii</u>	E	An endemic of Florida scrub.
Scrub Plum	<u>Prunus geniculata</u>	E	An endemic of Florida scrub.
Curtis Milkweed	<u>Asclepias curtissii</u>	T	An endemic of Florida scrub.
Buckthorn	<u>Bumelia lycioides</u>	R	
Scrub Buckwheat	<u>Eriogonum floridanum</u>	R	

TABLE 8.1-7 (Continued). SENSITIVE ANIMAL AND PLANT SPECIES POTENTIALLY PRESENT IN THE STUDY AREA

Common Name	Scientific Name	FCREPA Status*	Comment
Hartwrightia	<u>Hartwrightia floridana</u>	R	
Fall-flowering Ixia	<u>Nemastylis floridana</u>	R	
Spoon-flower	<u>Peltandra sagittifolia</u>	R	
<u>FISH</u>			
None			
<u>AMPHIBIANS</u>			
Florida Gopher Frog	<u>Rana aerolata aesopus</u>	T	Possibly in marshy areas.
Striped Newt	<u>Notophthalmus perstriatus</u>	R	Possible in marshy areas.
<u>REPTILES</u>			
Short-tailed Snake	<u>Stilosoma extenuatum</u>	E	Possibly in pine-oak habitat.
Gopher Tortoise	<u>Gopherus polyphemus</u>	T	Possibly in pine-oak or scrubby flatwood habitats.
Sand Skink	<u>Neoseps reynoldsi</u>	T	Possibly in pine-oak habitat.
Florida Scrub Lizard	<u>Sceloporus woodi</u>	R	Possibly in pine-oak habitat.
American Alligator	<u>Alligator mississippiensis</u>	S	Possible in wetlands.
Eastern Indigo Snake	<u>Drymurchon corais couperi</u>	S	Variety of habitats.
Spotted Turtle	<u>Clemmys guttata</u>	R	May no longer be present; marshes.

TABLE 8.1-7 (Continued). SENSITIVE ANIMAL AND PLANT SPECIES POTENTIALLY PRESENT IN THE STUDY AREA

Common Name	Scientific Name	FCREPA Status*	Comment
<u>MAMMALS</u>			
Florida Panther	<u>Felis concolor coryi</u>	E	
Shermans Fox Squirrel	<u>Sciurus niger shermani</u>	T	Study area within range; variety of wooded habitats.
Florida Mouse	<u>Peromyscus floridanus</u>	T	Scrubby flatwoods; cypress.
Florida Black Bear	<u>Ursus americanus floridanus</u>	T	Variety of habitats.
Big Brown Bat	<u>Eptesicus fuscus</u>	R	Study area within range; unlikely.
Florida Longtailed Weasel	<u>Mustela frenata peninsulae</u>	R	Variety of habitats.
Southeastern Shrew	<u>Sorex longirostris longirostris</u>	R	Study area within range; hardwood swamps.
Hoary Bat	<u>Lasiurus cinereus</u>	R	
Southeastern Big-eared Bat	<u>Plecotus rafinesquii</u>	R	Study area within range.
Round-tailed Muskrat	<u>Neofiber alleni</u>	U	Study area within range; fresh marsh.

*FCREPA--Florida Committee on Rare and Endangered Plants and Animals.

**E--Endangered, R--Rare, T--Threatened, S--Species of special concern, U--Undetermined status.

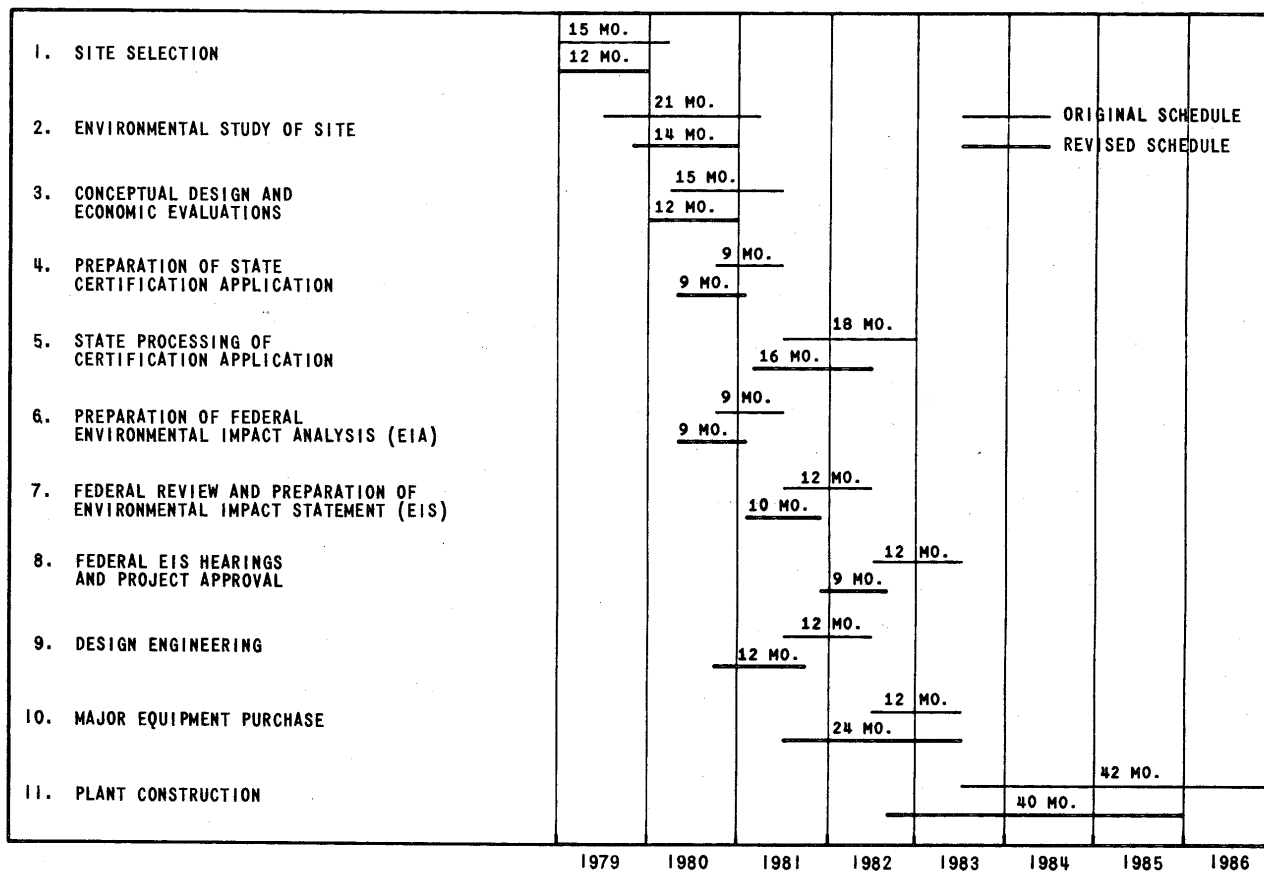


FIGURE 8.1-1. POWER PLANT SCHEDULE
USED FOR SITING ANALYSIS

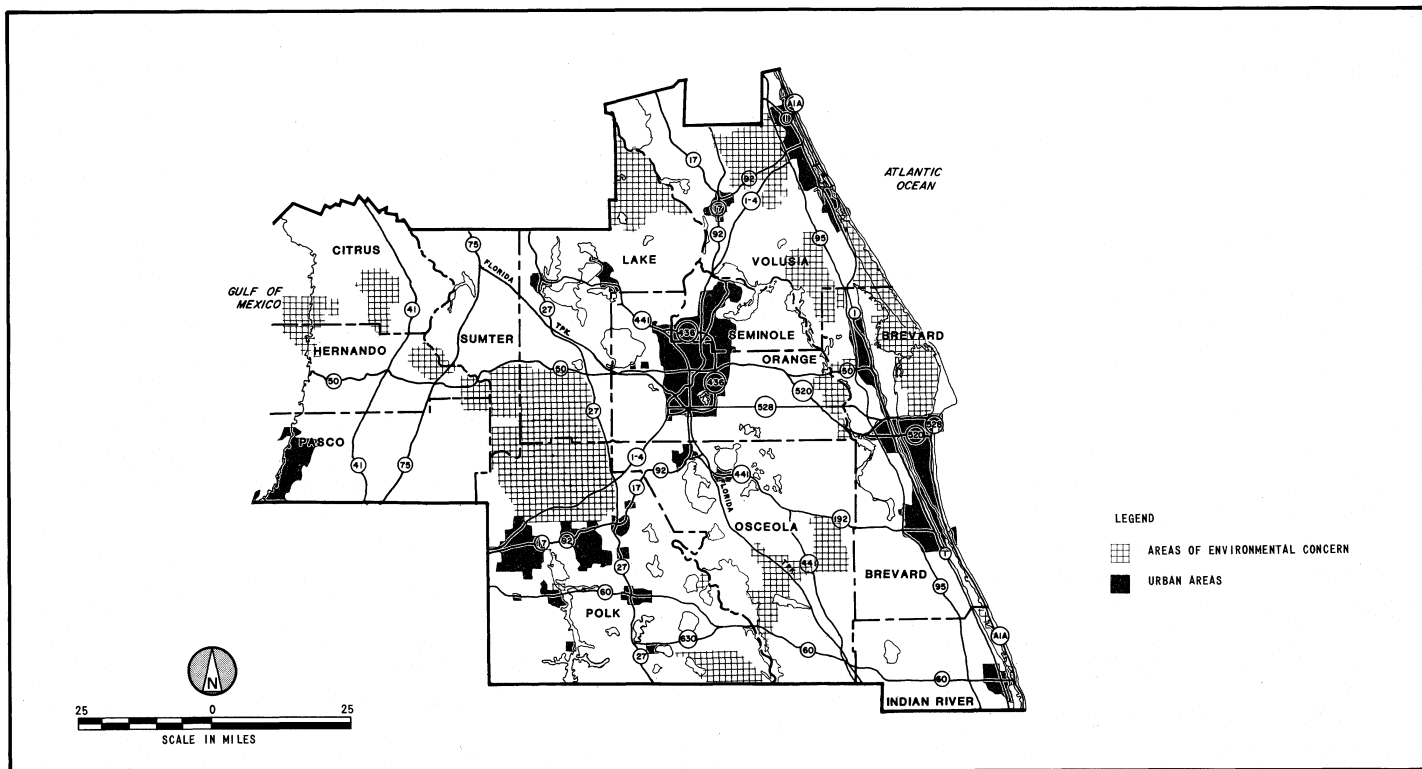


FIGURE 8.1-3. INITIAL EXCLUSION AREAS FOR POWER PLANT SITING

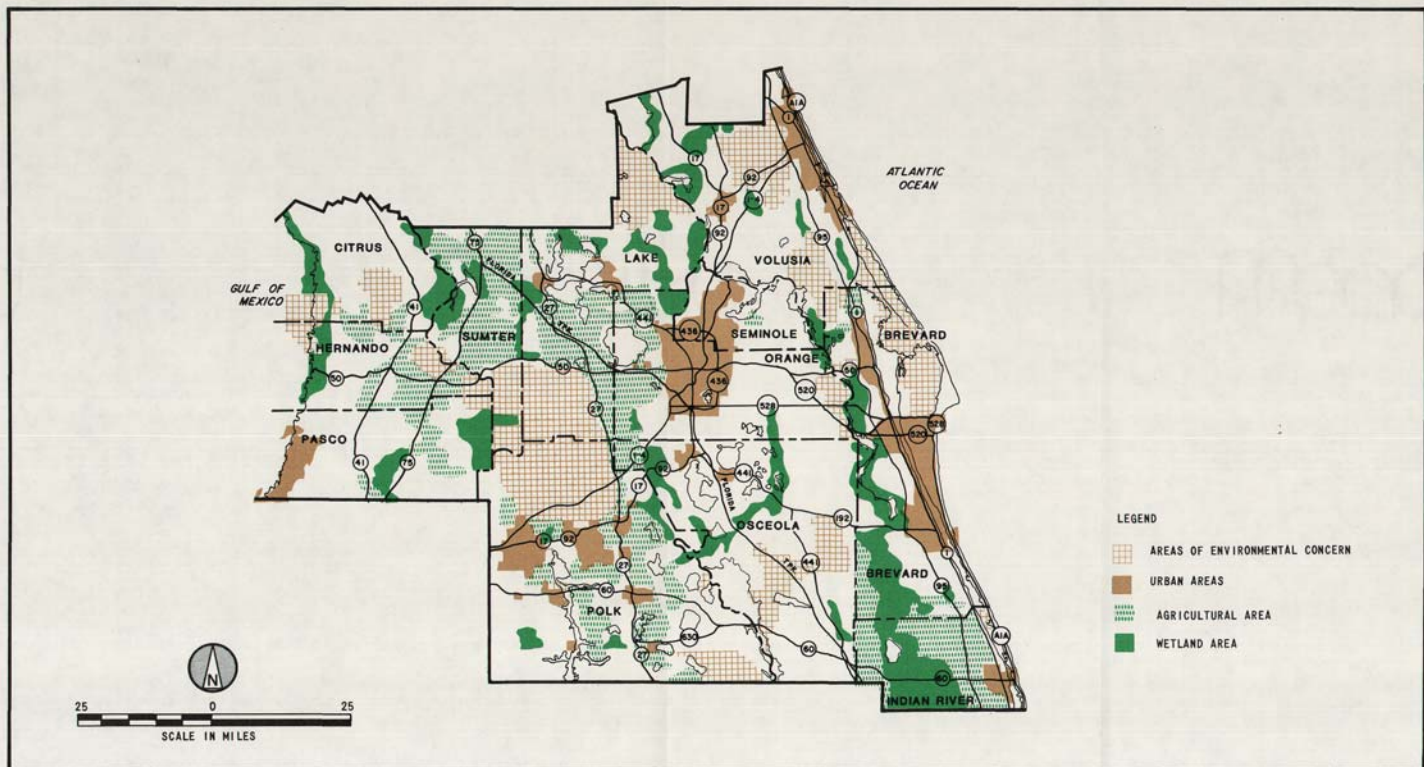


FIGURE 8.1-4. AREAS EXCLUDED FROM POWER PLANT SITING CONSIDERATION

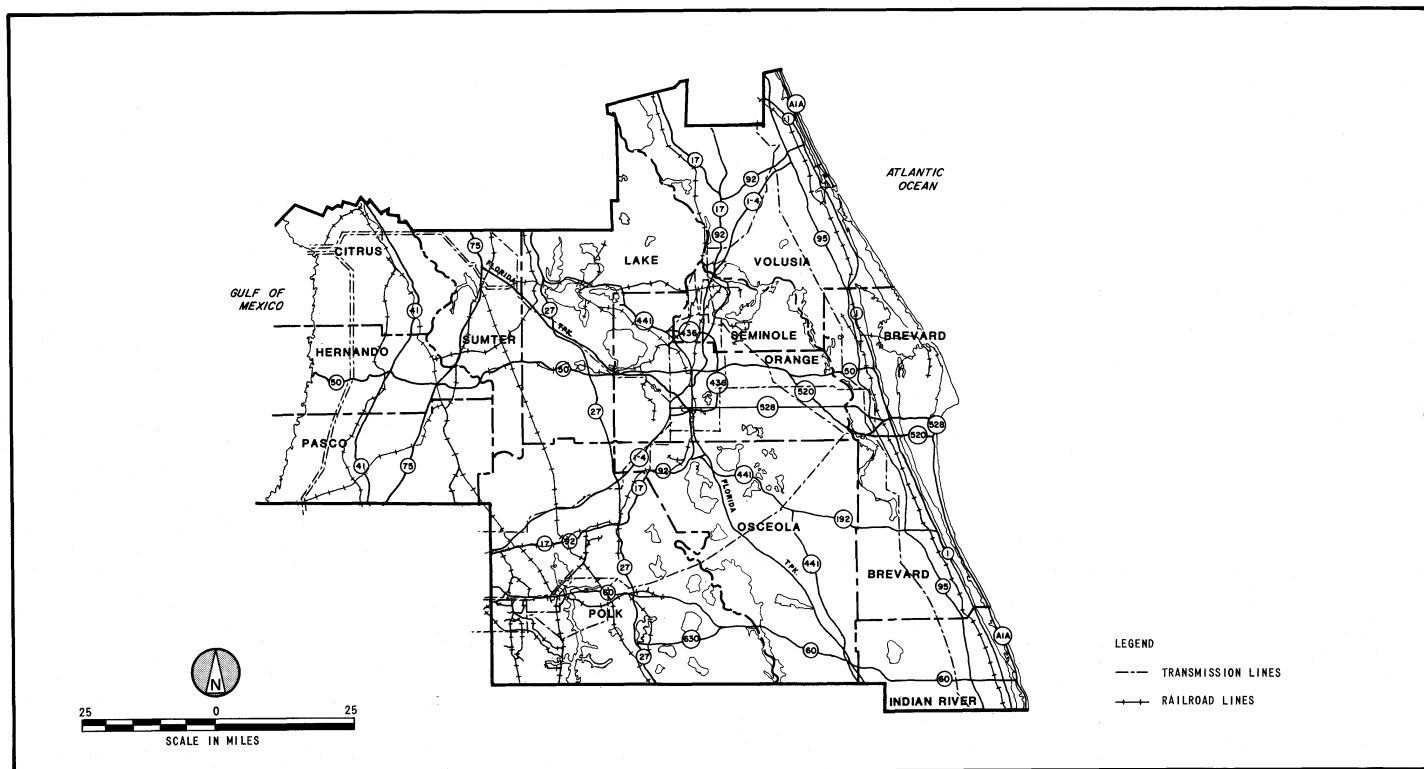


FIGURE 8.1-5. EXISTING TRANSMISSION LINES AND RAILROADS

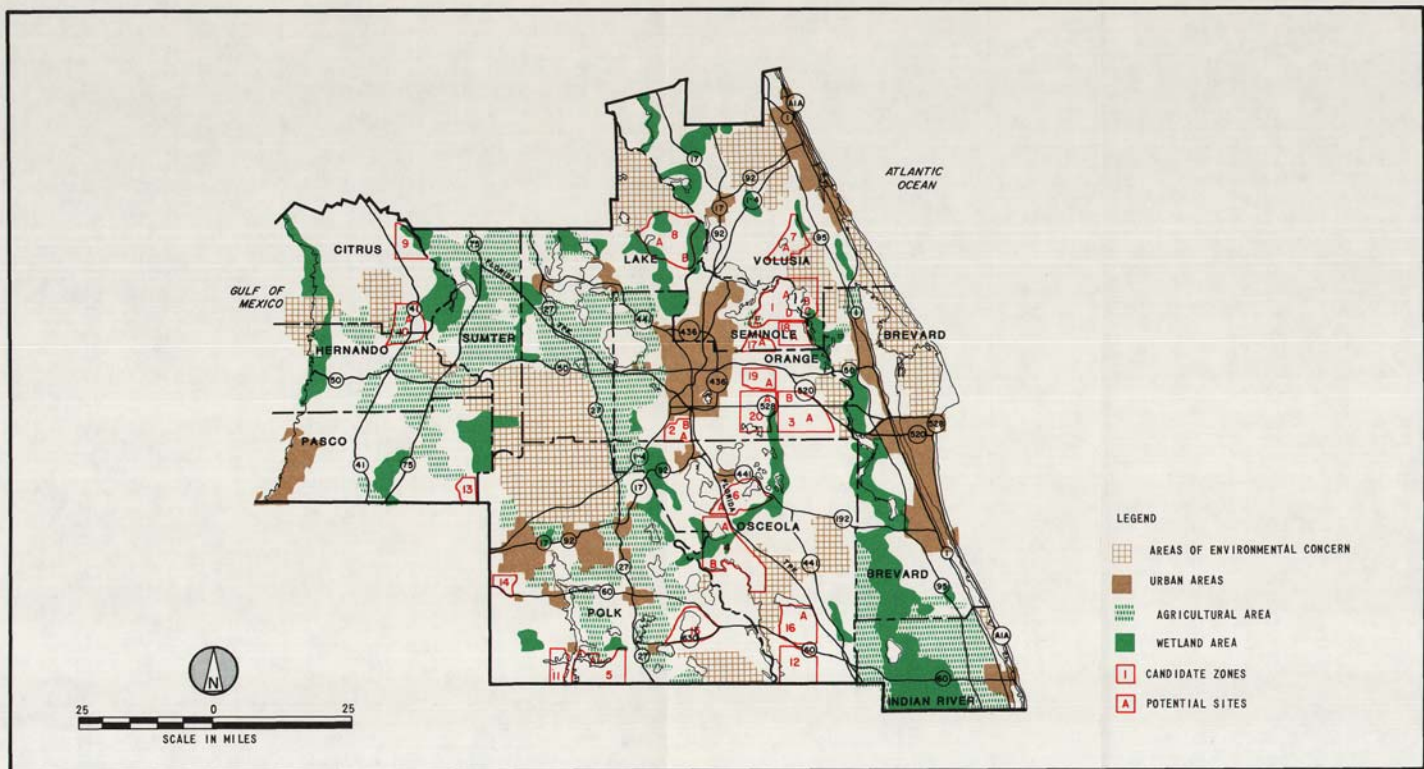


FIGURE 8.1-6. CANDIDATE ZONES AND POTENTIAL SITES IN RELATION TO EXCLUSION AREAS

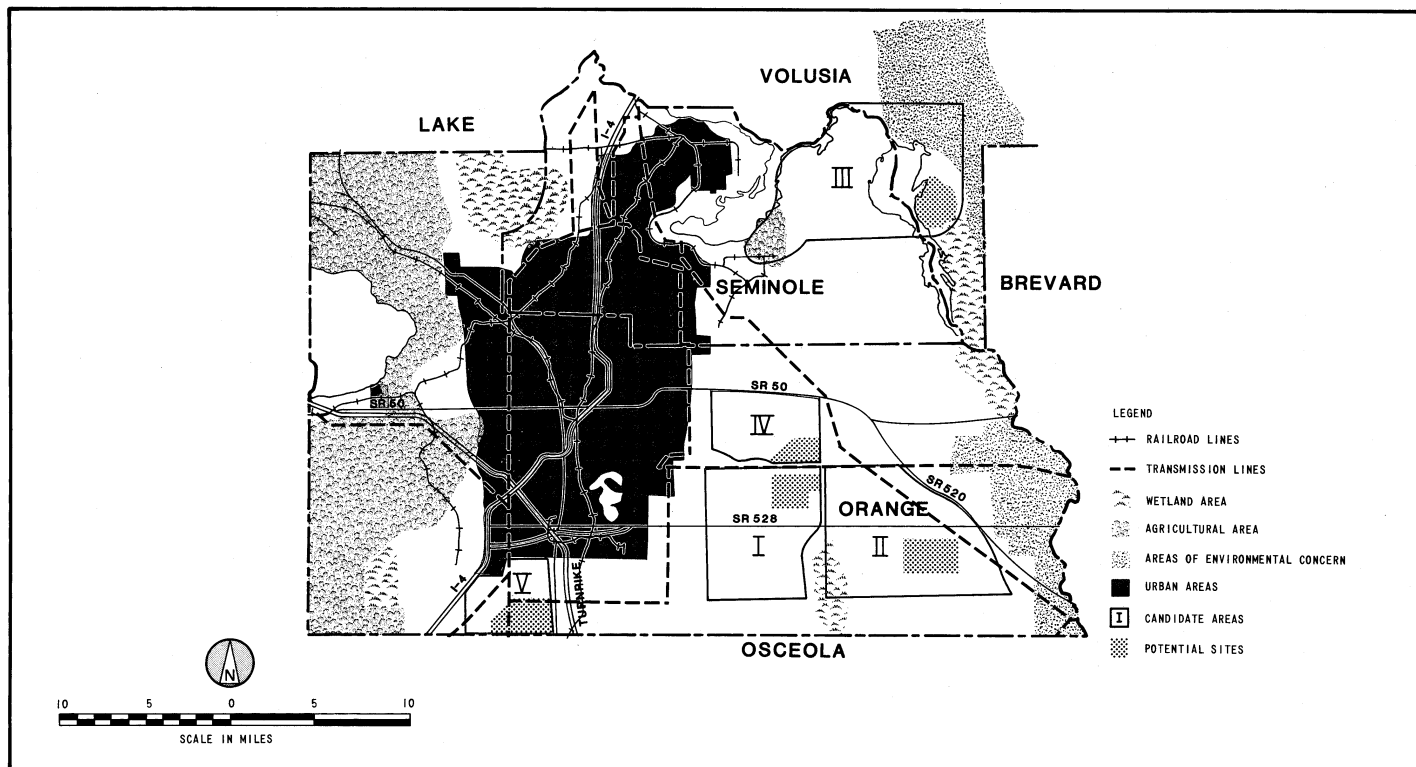


FIGURE 8.1-8. CANDIDATE POWER PLANT SITES

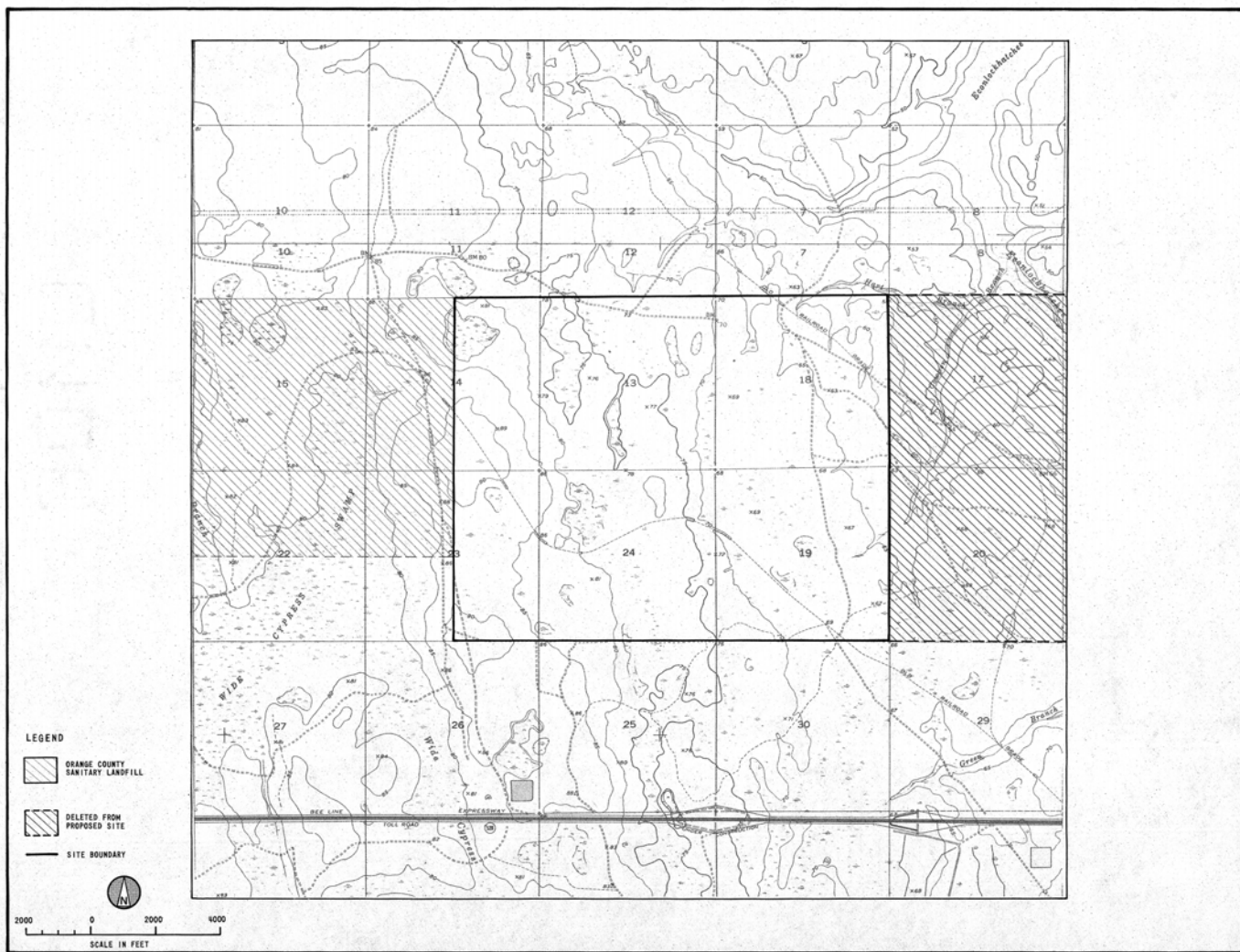


FIGURE 8.1-9. CANDIDATE SITE 20A-ECONLOCKHATCHEE SOUTH

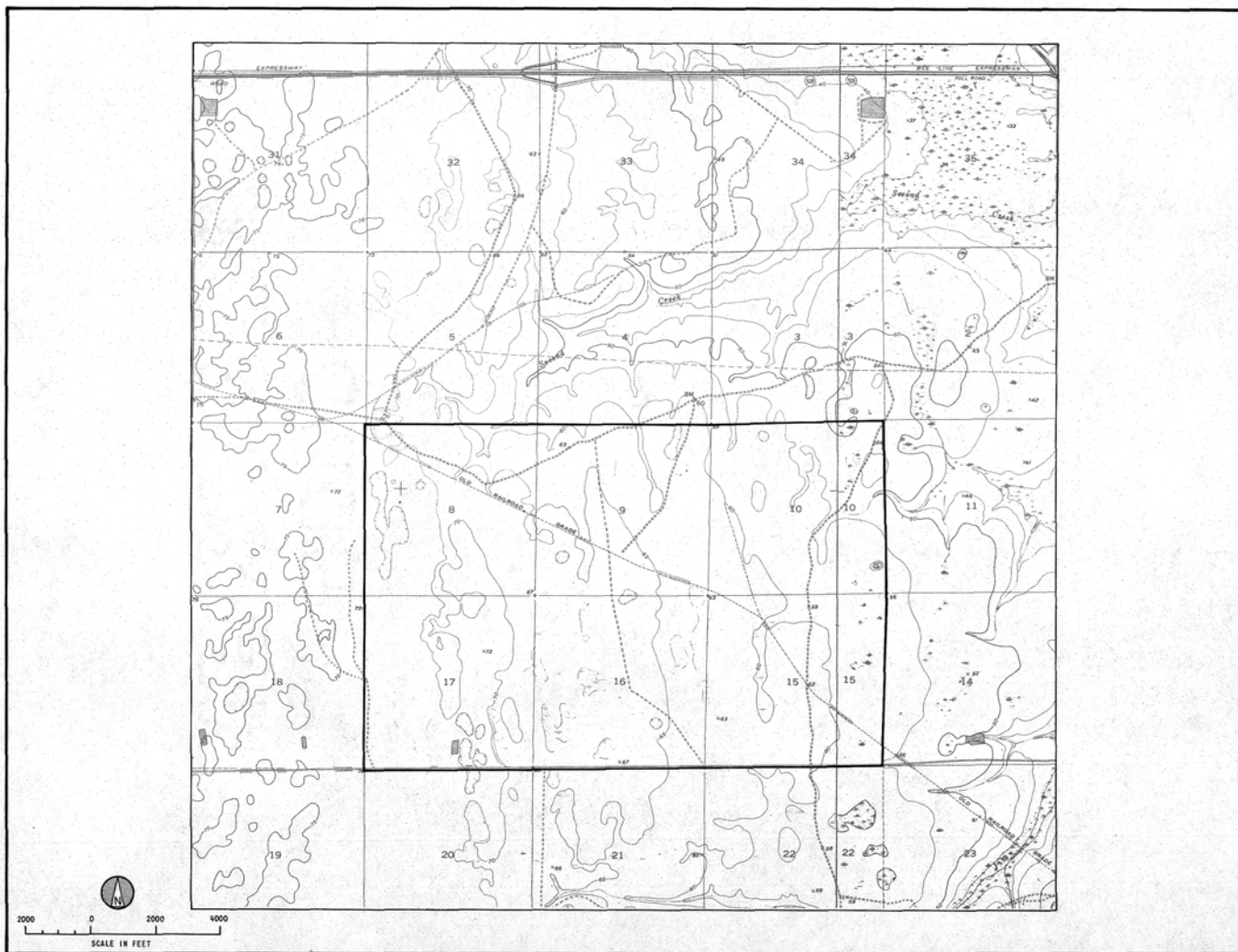


FIGURE 8.1-10. CANDIDATE SITE 3A SOUTHEAST ORANGE COUNTY

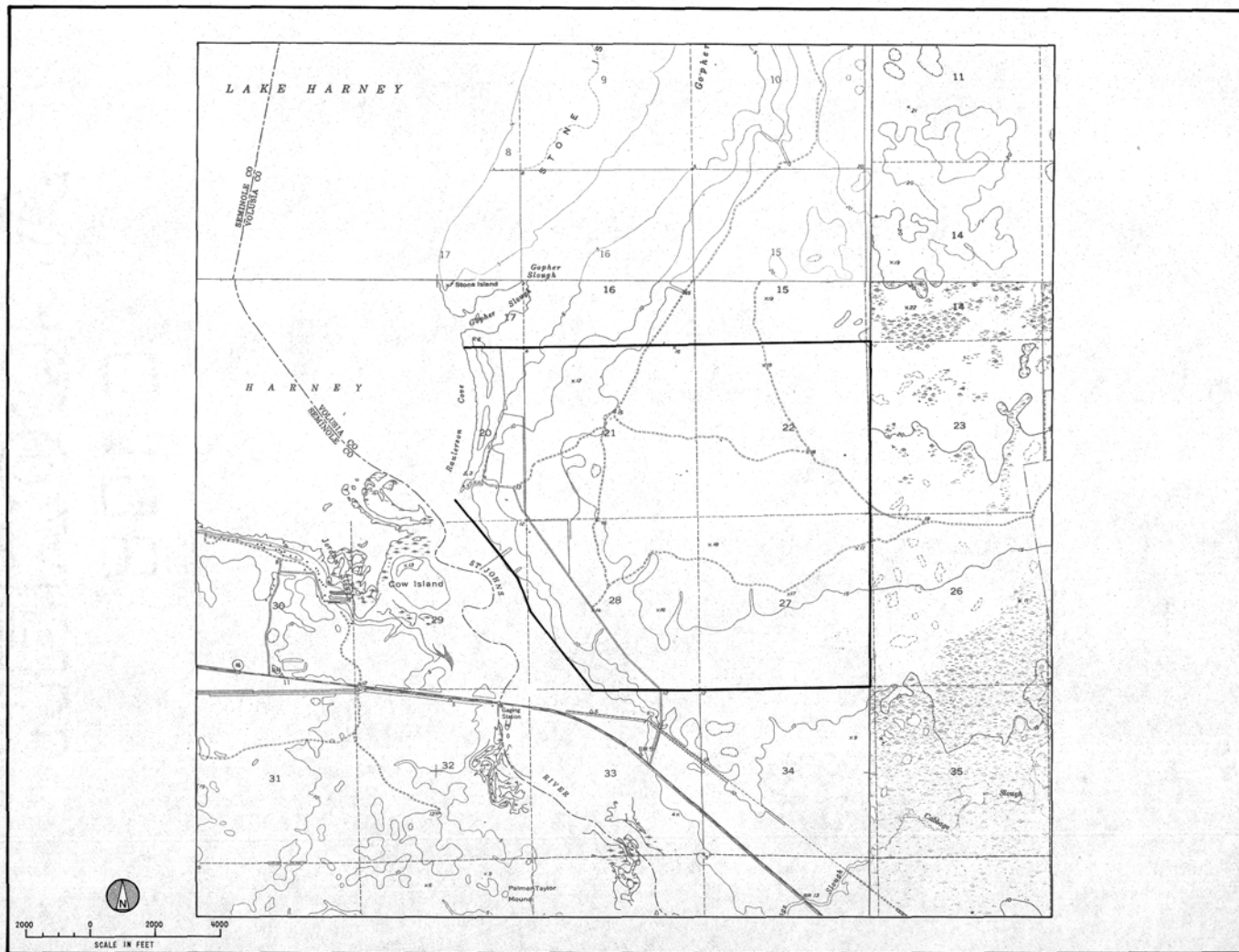


FIGURE 8.1-11. CANDIDATE SITE 1C LAKE HARNEY SOUTHEAST

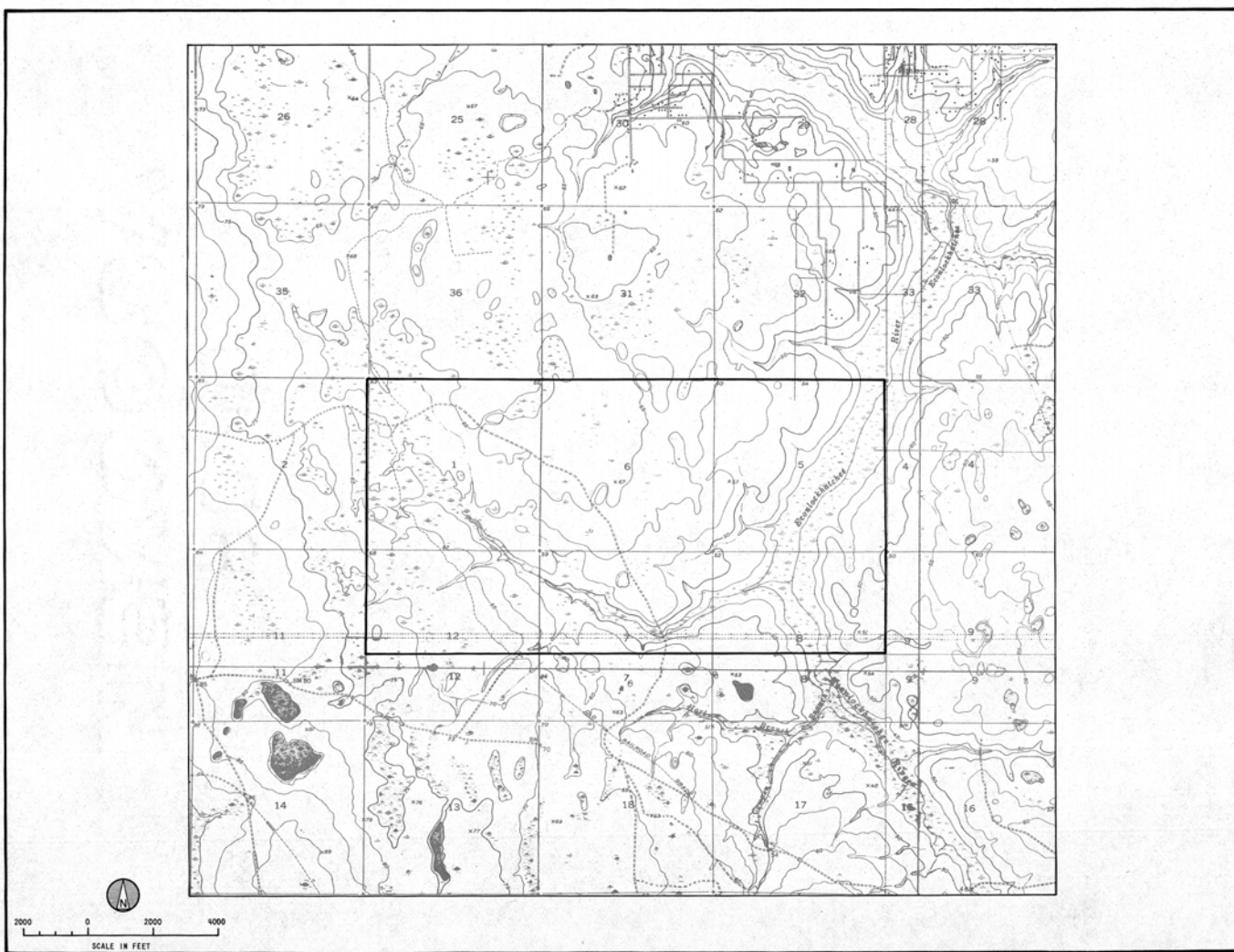


FIGURE 8.1-12. CANDIDATE SITE 19A
ECONLOCKHATCHEE NORTH

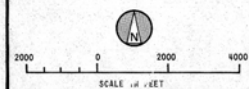


FIGURE 8.1-13. CANDIDATE SITE 2A SHINGLE CREEK

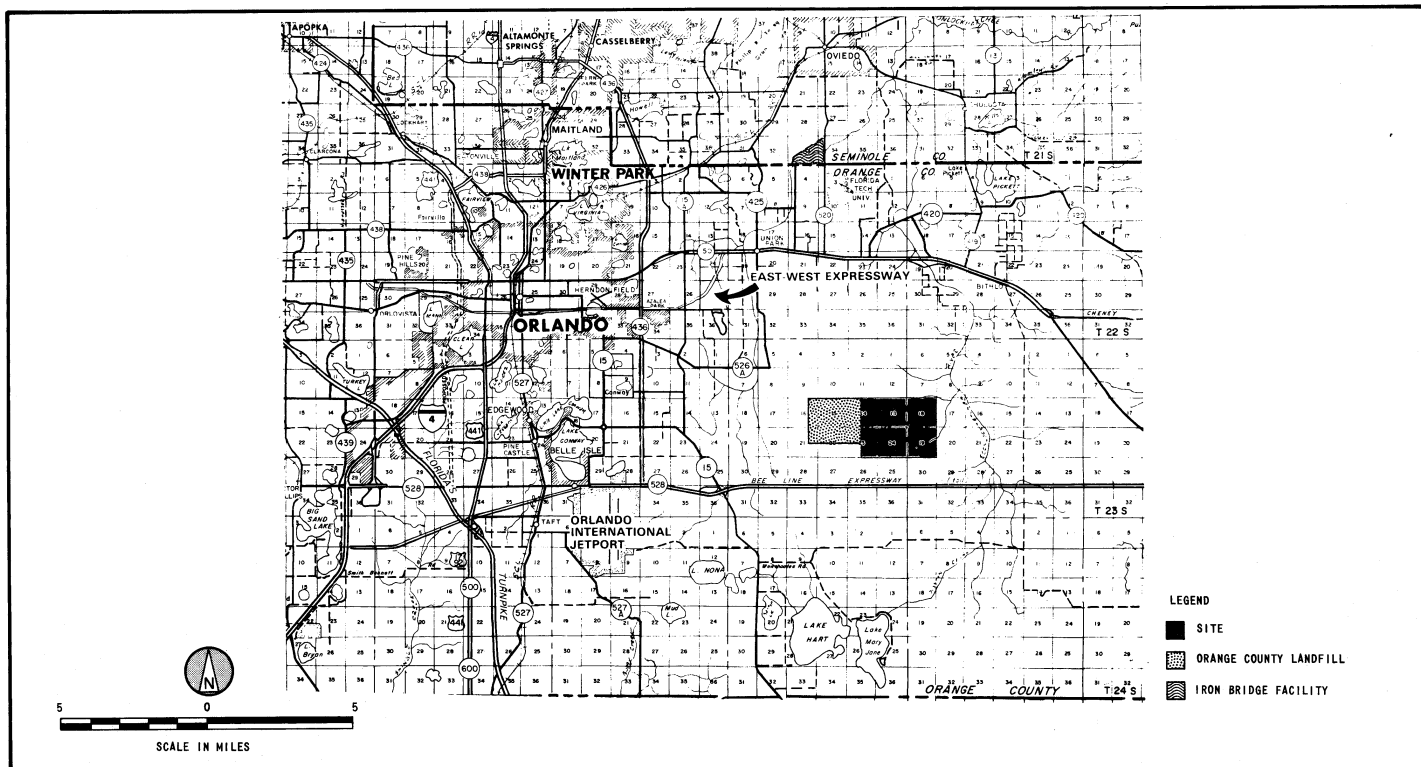


FIGURE 8.1-14. PROPOSED POWER PLANT SITE

8.2 ALTERNATIVE FUELS ANALYSIS

Recent amendments to the Florida Electrical Power Plant Siting Act have prescribed a separate Need for Power Document to be submitted to the Public Service Commission. This new document contains those materials previously in Section 1.0 and 8.2 of the Site Certification Application. The alternative fuel analysis for the Curtis H. Stanton Energy Center Unit 1 is presented in a separate Need for Power Document which was submitted to the Public Service Commission at the same time this Application was submitted to the Department of Environmental Regulation. The reviewer is directed to that document for any information which would previously have been included in Section 8.2.

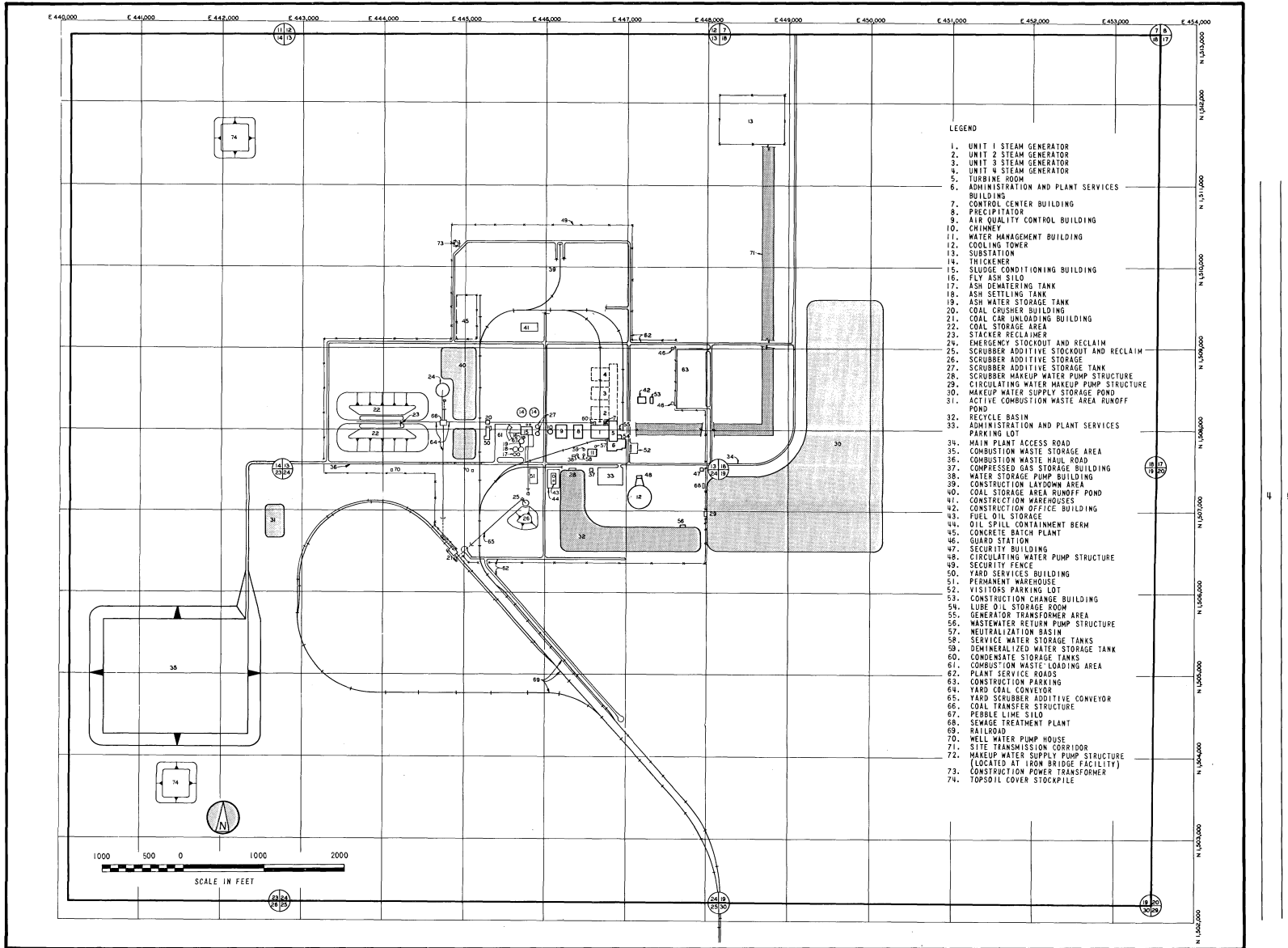
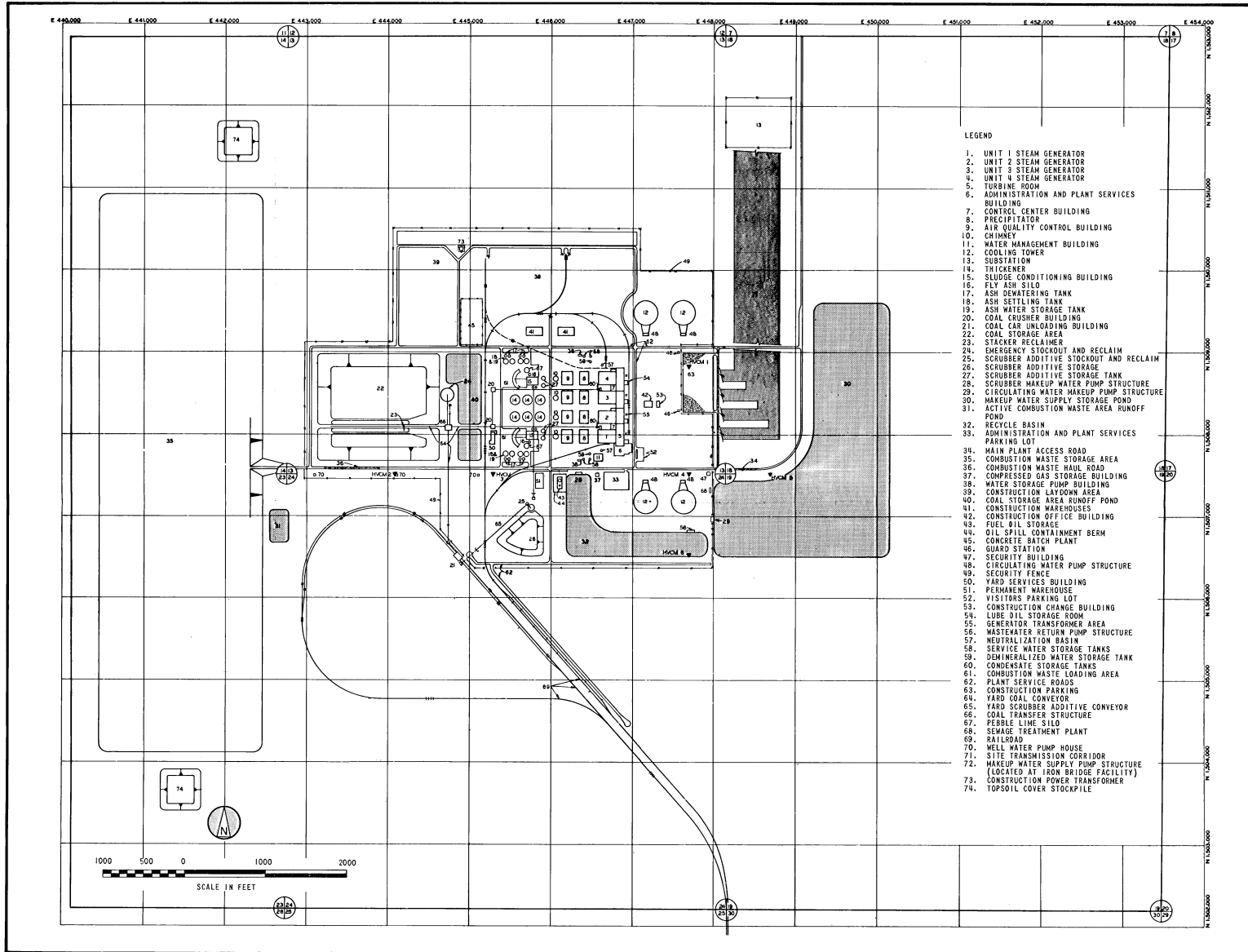
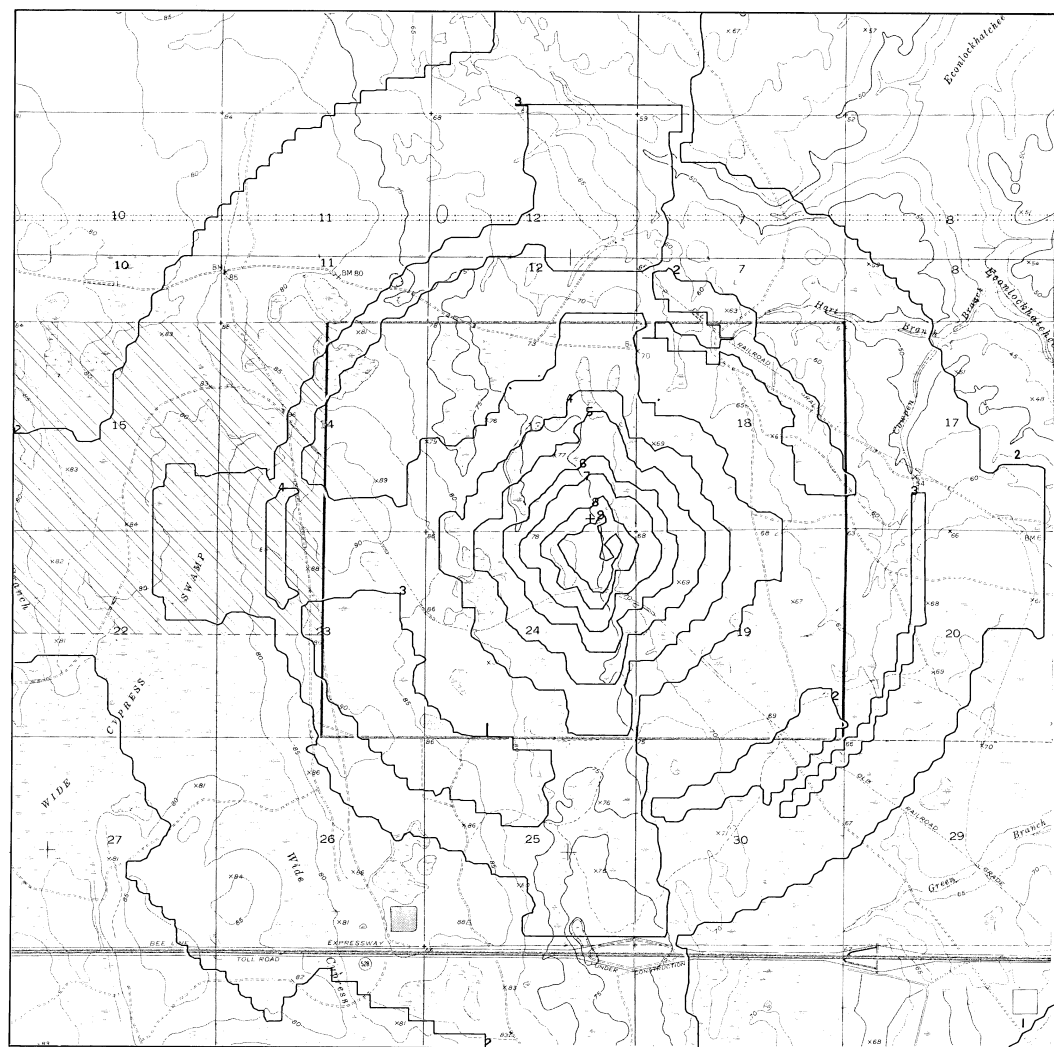


FIGURE 2.1-3. CURTIS H. STANTON ENERGY CENTER
FACILITIES ARRANGEMENT-UNIT I



AMENDMENT 4
123181
AMENDMENT 5
030382

FIGURE 2.1-4. CURTIS H. STANTON ENERGY CENTER
FACILITIES ARRANGEMENT-4 UNITS

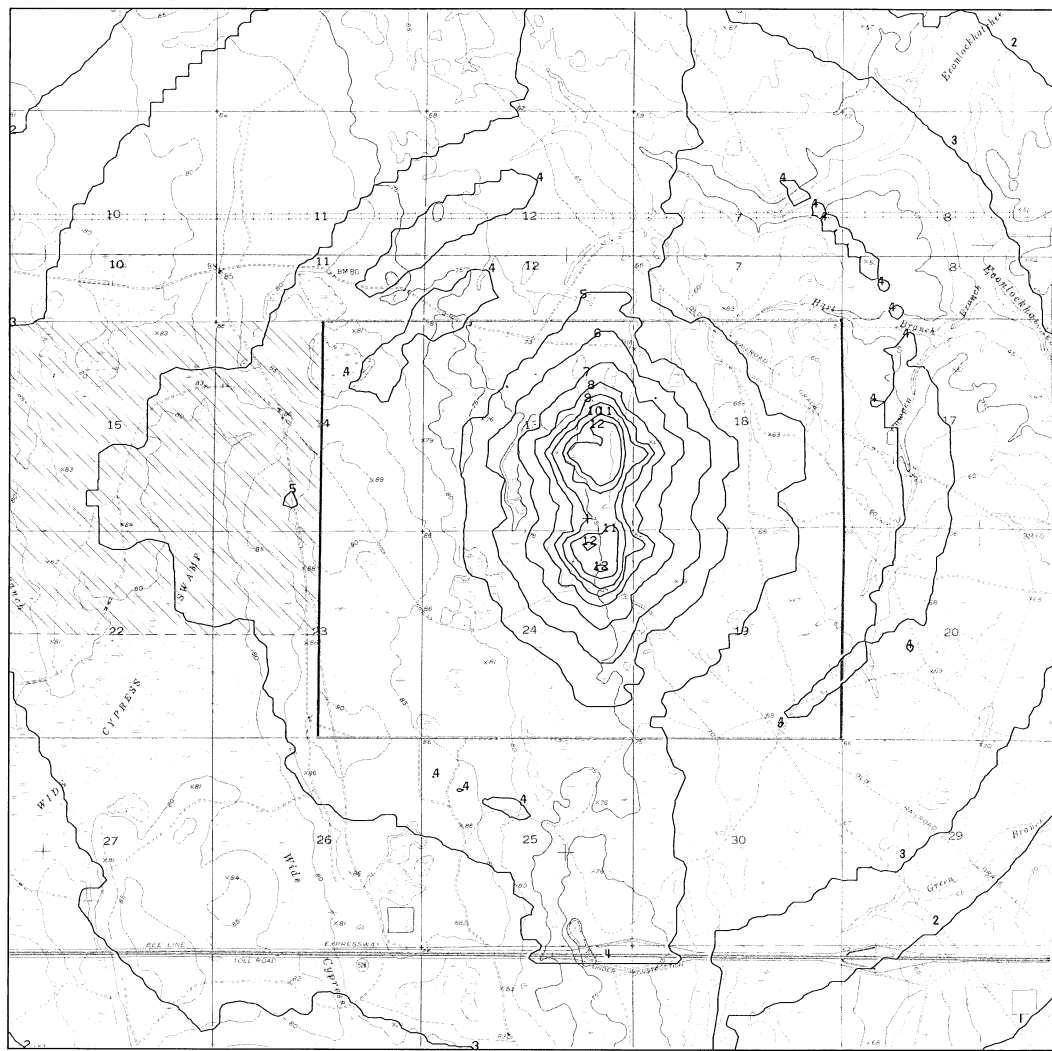


CONTOUR VALUES	
CONTOUR NO.	LBS/ACRE/YEAR
1	0.12
2	0.29
3	0.58
4	1.17
5	2.2
6	5.3
7	11.0
8	24.0
9	48.0

5 RFM-1

AMENDMENT 5
030382
REQUEST FOR MODIFICATION 1
092389

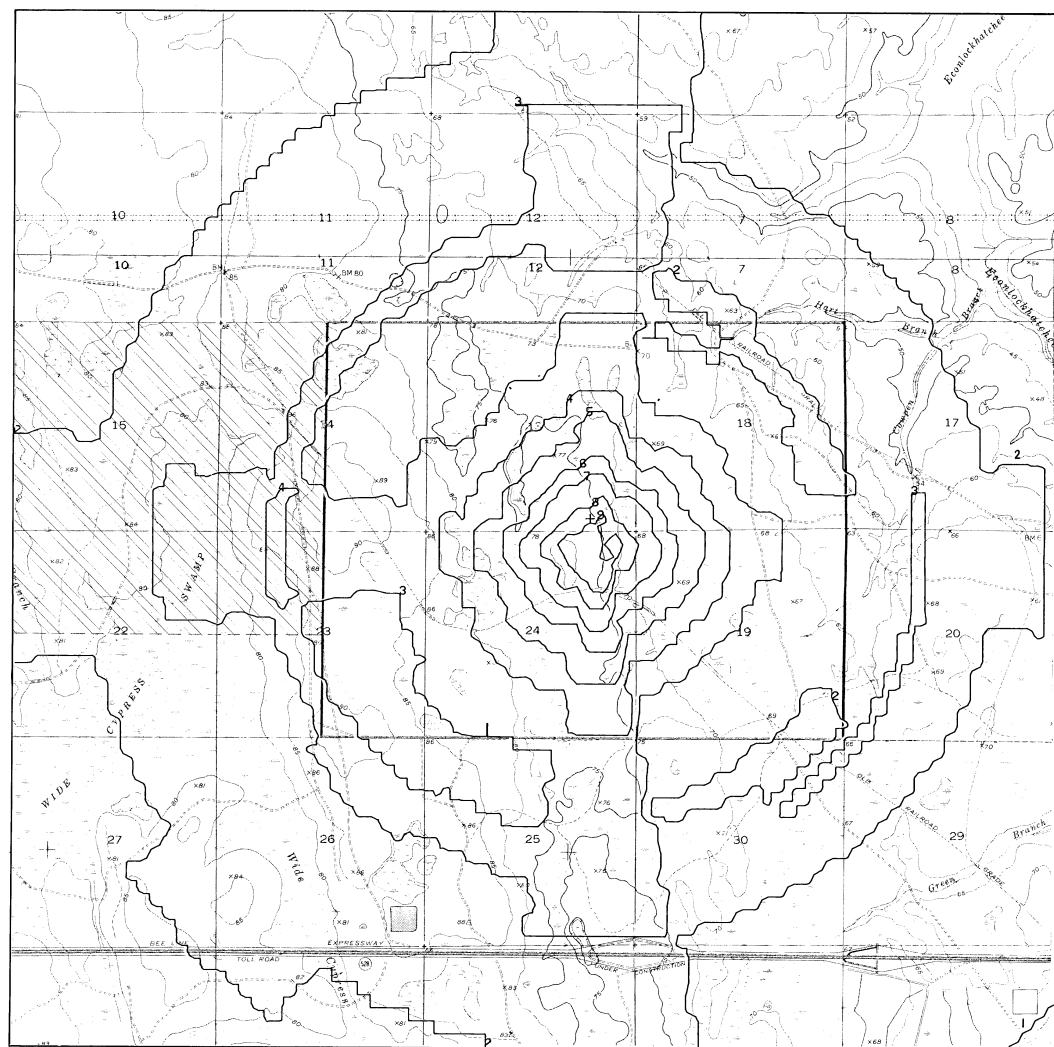
FIGURE 5.1-1. ESTIMATED ANNUAL DEPOSITION OF SOLIDS
BY COOLING TOWER DRIFT FROM 1 UNIT



CONTOUR VALUES	
CONTOUR NO.	LBS/ACRE/YEAR
1	0.58
2	0.89
3	1.16
4	2.3
5	5.8
6	11.0
7	27.0
8	53.0
9	77.0
10	95.0
11	142.0
12	190.0

5 RFM-1

FIGURE 5.1-2. POTENTIAL ANNUAL DEPOSITION OF SOLIDS BY COOLING TOWER DRIFT FROM 4 UNITS

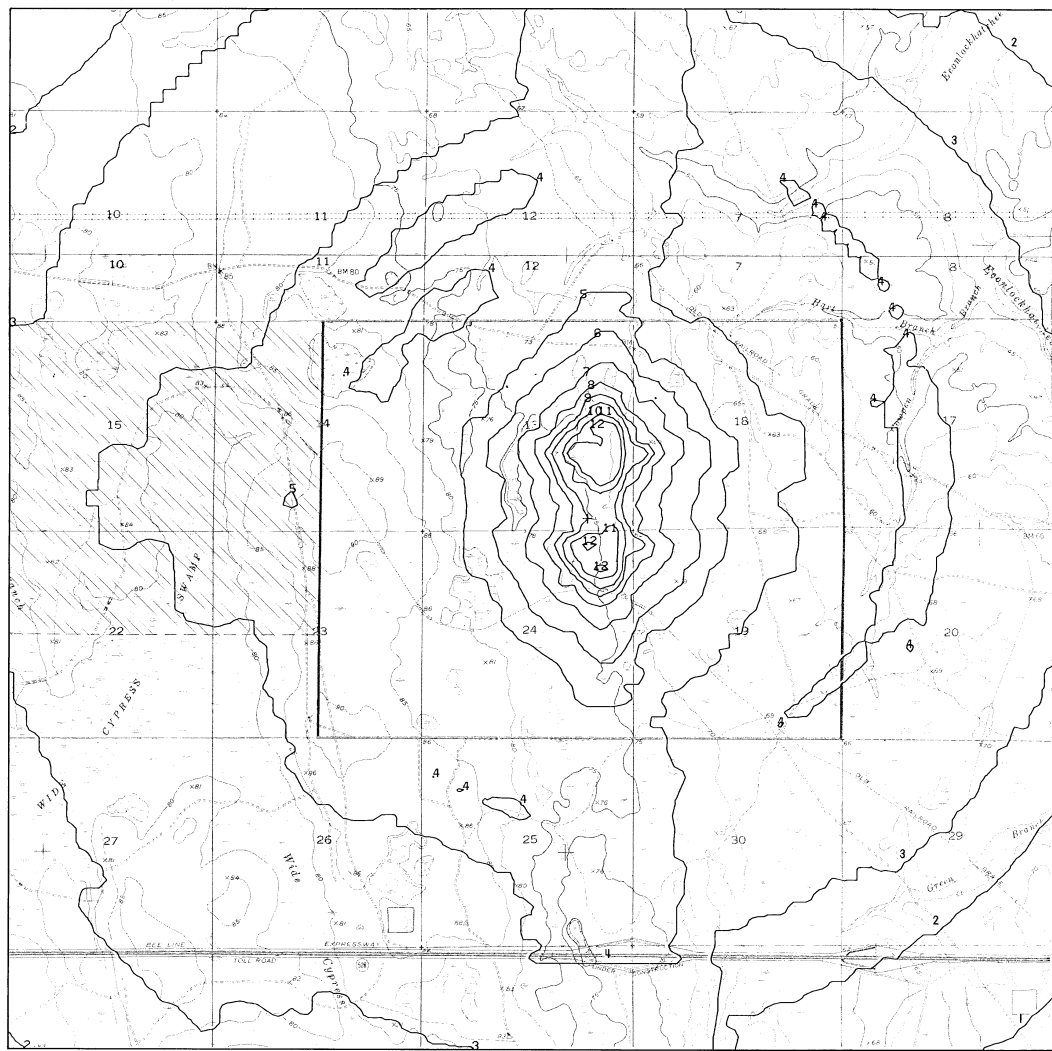


CONTOUR VALUES	
CONTOUR NO.	LBS/ACRE/YEAR
1	0.12
2	0.29
3	0.58
4	1.17
5	2.2
6	5.3
7	11.0
8	24.0
9	48.0

5 RFM-1

FIGURE 5.1-1. ESTIMATED ANNUAL DEPOSITION OF SOLIDS BY COOLING TOWER DRIFT FROM 1 UNIT

AMENDMENT 5
030382
REQUEST FOR MODIFICATION 1
092389



CONTOUR VALUES	
CONTOUR NO.	LBS/ACRE/YEAR
1	0.58
2	0.89
3	1.16
4	2.3
5	5.8
6	11.0
7	27.0
8	53.0
9	77.0
10	95.0
11	142.0
12	190.0

5 RFM-1

FIGURE 5.1-2. POTENTIAL ANNUAL DEPOSITION OF SOLIDS BY COOLING TOWER DRIFT FROM 4 UNITS