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

CONTENTS

CONTENTS (Continued)

CONTENTS (Continued)

CONTENTS (Continued)

Amendment 5
030382
Request for Modification-1
092383

CONTENTS (Continued)

4

Amendment 4
123181

CONTENTS (Continued)

CONTENTS (Continued)

CONTENTS (Continued)

CONTENTS (Continued)

LIST OF TABLES

LIST OF TABLES (Continued)

Amendment 4
123181
Request for Modification-1
092383

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF FIGURES

LIST OF FIGURES (Continued)

Amendment 1
060581
Amendment 5
030382
Request for Modification-1
092383

LIST OF FIGURES (Continued)

5

LIST OF FIGURES (Continued)

LIST OF EXHIBITS

LIST OF APPENDICES

Amendment 2
082181
Request for Modification-1
092383

5.0 EFFECTS OF OPERATION

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 <u>Cooling Tower Drift</u>. 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 5 RFM-1
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

5 RFM-1

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. 5 RFM-1
The maximum expected deposition onsite on undeveloped area near the cooling tower is approximately 24 lb/acre/year from Unit 1. 5 RFM-1

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. |5 |RFM-1

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 |5 soil accumulation of salt is expected from the operation of Unit 1 cooling tower.

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/ |5 |RFM-1 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.

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.

5.1.7.4 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, WRRC 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, WRRC 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, WRRC 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 BIOCIDE 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. RFM-1

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. RFM-1 RFM-1

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. RFM-1 RFM-1

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). 4
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 5
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, cementatious (hardening) reactions will also take place. In addition, lime will be added to 5
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 5
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 possible 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. RFM-1

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

[a]BOD - Biochemical Oxygen Demand

[b]COD - Chemical Oxygen Demand

[c]TS - Total Solids

[d]TDS - Total Dissolved Solids

[e]TSS - 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. 3

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 3
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. 3

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 4
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 5
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 5
from the wells will be minimal, the effect on surrounding water supply 4
wells will be minimal.

The effects of drawdown will be short term and temporary. The poten-
tiometric surface will rapidly return to approximately its original condi-
tion whenever the water-supply wells on the site are not pumped. 4

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.

4

4

4

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*

Drainage Basin	Total Drainage Area	Total Plant Area Within Each Drainage Basin	Disturbed Plant Area Within Each Drainage Basin	Undisturbed Plant Area Within Each Drainage Basin	
	acres	acres	acres	acres	
Econlockhatchee River	52,942**	3,241	460	2,781	
Unnamed tributary north of site	4,992	257	3	254	3
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.

Amendment 4
123181

TABLE 5.3-2. AVERAGE EXPECTED SEEPAGE FROM PLANT FACILITIES*

Seepage Source (Facility)	Surface Area (acres)	Embankment Length (feet)	Bottom Seepage (gpd)	Embankment Seepage (gpd)	Total Seepage (gpd)	Total Seepage (gpd/acre)
Coal Storage Area Runoff Pond	10.4	4,100	860 (4,100)	430 (655)	1,290 (4,755)	124 (457)
Recycle Basin	15.0	5,200	3,640 (10,400)	600 (3,225)	4,240 (13,625)	283 (908)
Makeup Water Supply Storage Pond	93.0	10,000	133,650 (243,770)	8,530 (21,200)	142,180 (264,970)	1,530 (2,850)
Active Combustion Waste Area Runoff Pond	5.0	1,900	400 (2,280)	200 (420)	600 (2,700)	120 (540)

4

*Numbers in parenthesis indicate maximum value based on maximum design water surface elevation.

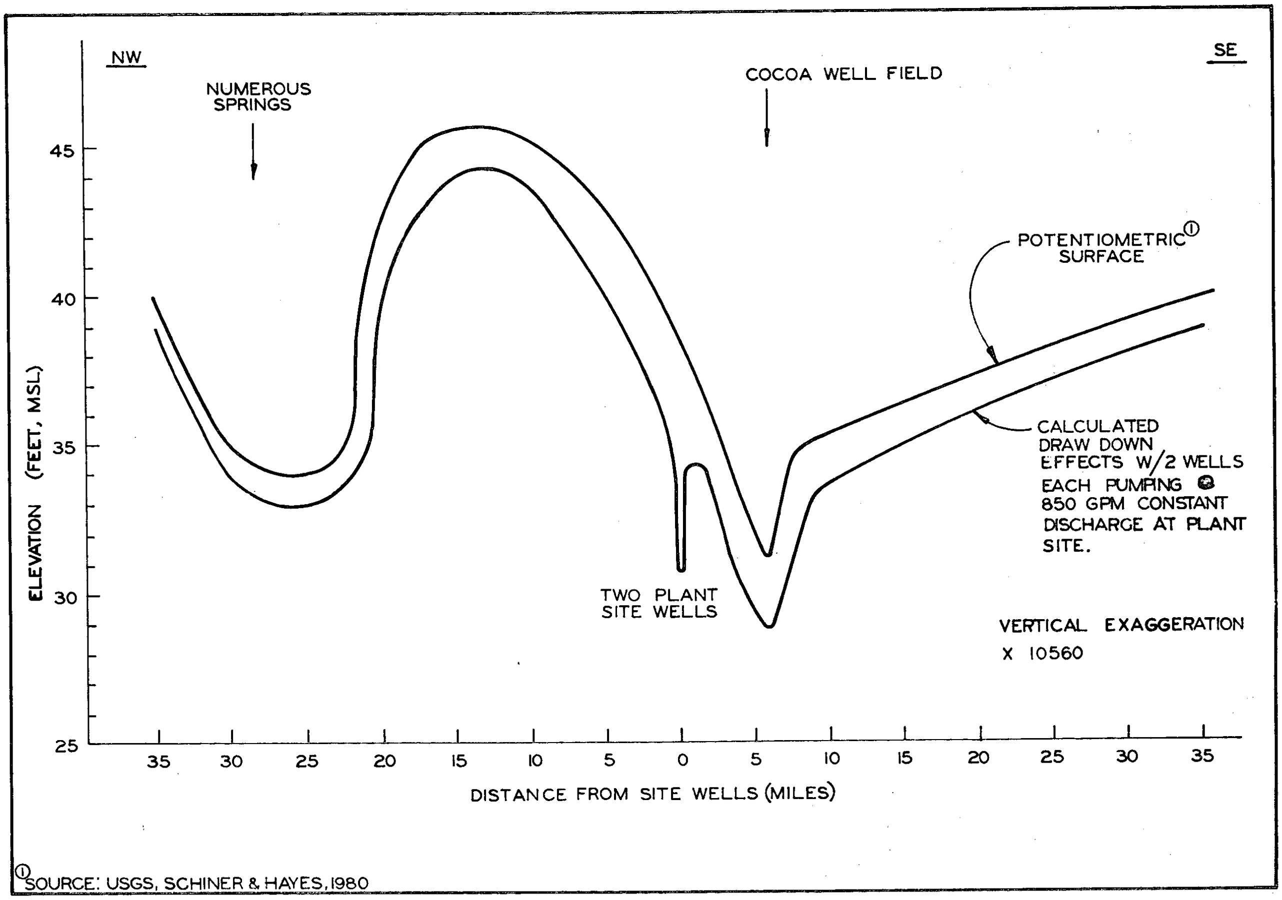
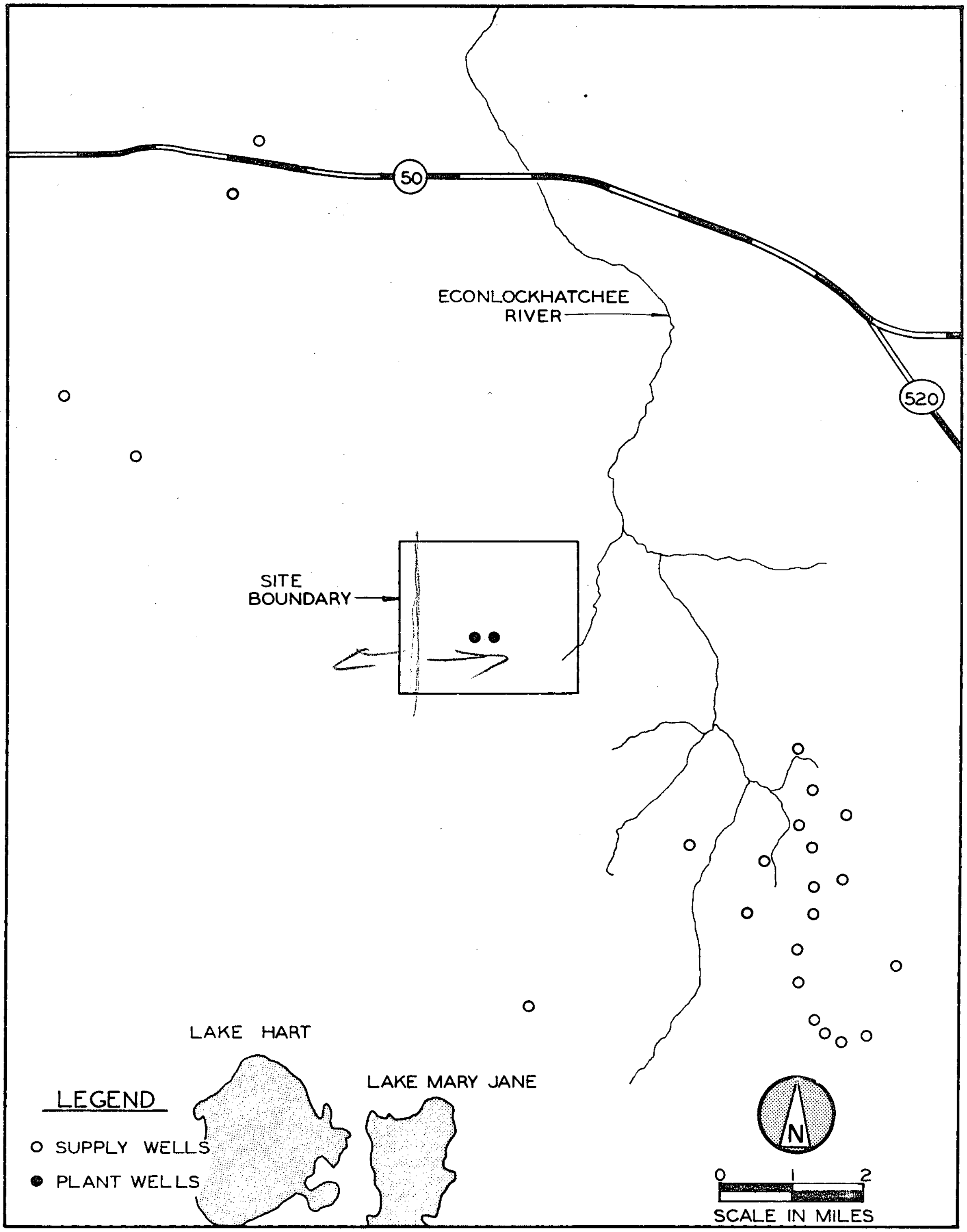
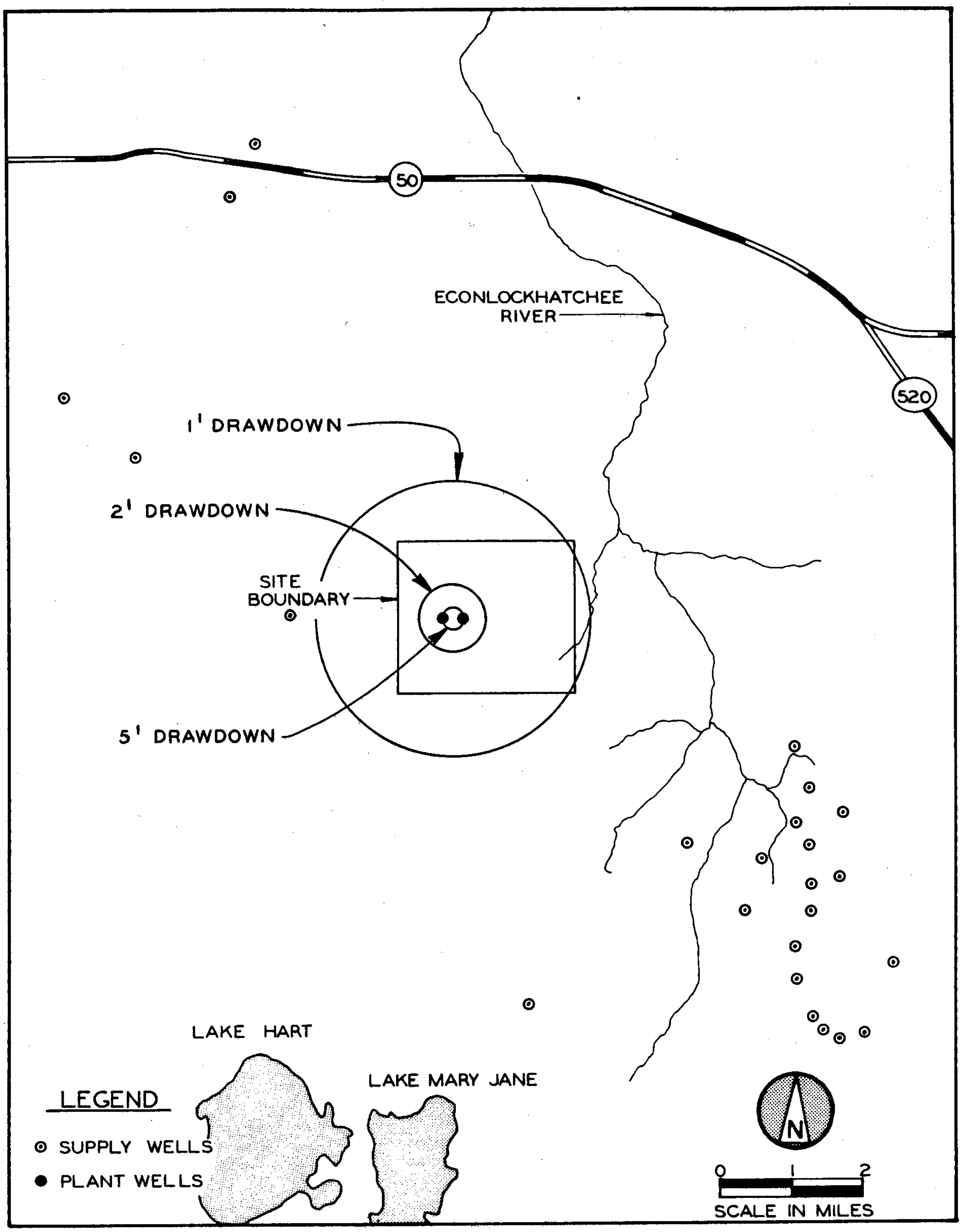


FIGURE 5.3-1. CALCULATED EFFECT OF WATER WITHDRAWAL ON THE POTENTIOMETRIC SURFACE IN THE FLORIDAN AQUIFER



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 (SO_2) emission rates correspond to 1.14 pound sulfur dioxide per MBtu heat input. Particulate 5
(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 trans- 5
fer 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. 5

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. 5
The fugitive dust emission rates associated with handling coal and limestone are based on a paper entitled, <u>Fugitive Emissions from Coal-Fired Power Plants</u> 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 5
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 5
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. RFM-1

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.

(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.

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 SO_2, NO_2, TSP, and CO were evaluated using computer modeling methods described in the Environmental Protection Agency's (EPA) document, "Guideine 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 SO_2 increment assessments, as well as NO_2 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 <u>Modeling Methodology</u>. 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 SO_2, NO_2, 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 5
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 method- 5
ology 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 Semi- 5
nole 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 <u>Modeling Results</u>. 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 5
standards. The predicted concentrations included in the modeling results are onsite values except for the 3-hour SO_2 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 meteorlogical 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 SO_2 impacts. Table 5.5-4 presents the maximum and "highest, second-highest"

SO_2 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 SO_2 concentrations, as well as other pollutants, with the PSD
Class II increments. The 3-hour SO_2 concentrations included in 5
Table 5.5-5 represent the maximum predicted offsite concentrations.

The predicted 3-hour SO_2 concentrations consume the highest per
cent of the PSD Class II increments. The dispersion results show the
highest, second-highest offsite 3-hour SO_2 impact to be 271 micrograms 4
per cubic metre at a point 1.8 kilometres south-southeast (azimuth 170 5
degrees) of the proposed stack location. This 3-hour impact consumes
nearly 53 per cent of the available 3-hour increment. The highest, 5
second-highest 24-hour SO_2 concentration is 50 micrograms per cubic 4
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. 5
The maximum annual SO_2 concentration is 3.3 micrograms per cubic metre 4
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 5
slightly. These differences are not expected to result in any apprec-
iable 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 negible 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

Amendment 4
123181
Amendment 5
030382

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. 5
The maximum annual

particulate concentration from all particulate sources is approximately 1 micrograms per cubic metre. The 24-hour and annual maximum 5
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.

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. 5
This is because the emissions from the limestone storage pile represent a very conservative estimate. Worst case emissions with no gravitional settling of the limestone particles were used because no particle size distribution was available for airborne limestone dust as was available 5
in the case of coal.

<u>Nitrogen Dioxide Concentrations</u>--The annual predicted NO_2 concentrations were determined by using the ratio of NO_2 and SO_2 emissions and predicted SO_2 concentrations. The maximum annual NO_2 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 3
metre.

<u>Carbon Monoxide Concentrations</u>--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. 1

A complete description of the

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 SO_2, NO_2, TSP, and CO were evaluated in a manner similiar 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 5
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

5.5.4.3 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 5
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 SO_2 impacts from Units 1 and 2. Table 5.5-9 presents the maximum and "highest, second-highest" SO_2 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 SO_2 concentrations included in Table 5.5-10 represent the 5 maximum predicted offsite concentrations.

The predicted 3-hour SO_2 concentrations consume the highest per cent of the PSD Class II increments. The dispersion results show the highest, second-highest offsite 3-hour SO_2 impact to be 509 micrograms 4 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 per 4 cent of the available 3-hour increment. The highest, second-highest 24-hour SO_2 concentration is 92 micrograms per cubic metre and onsite. 5 The next highest, second-highest 24-hour SO_2 concentration is 85 micrograms per cubic metre and is predicted at a receptor 0.8 kilometres 4 south (azimuth 180 degrees) of the chimney location. This maximum impact is predicted to occur within the proposed plant boundary. The maximum annual SO_2 concentration is 5.5 micrograms per cubic metre and 4 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 5 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 negible contribution at the maximum impact location. This is expected since the stacks have higher release points than the fugitive sources. In addition, the

Amendment 4
123181
Amendment 5
030382

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 5
area occurs within the plant boundary. The maximum annual particulate concentration from all particulate sources is approximately 2 micro- 5
grams per cubic metre. The 24-hour and annual maximum impacts on the Seminole County

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. 5

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. 5 This is because the emissions from the limestone storage pile represent a very conservative estimate. Worst case emissions with no gravitional 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. 5

Nitrogen Dioxide Concentrations--The annual predicted NO_2 concentrations were determined by using the ratio of NO_2 and SO_2 emissions and predicted SO_2 concentrations. The maximum annual NO_2 concentration predicted by the model is less than 3 micrograms per cubic metre. 3 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. 1

A complete description of the monitoring program and the determination of the baseline concentrations is given in Section 2.8.

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. | 4

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. 5

(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	Heat Input to Steam Generator	SO_2 Emission Rate[a]	TSP Emission Rate[b]	NO_x Emission Rate[c]	CO Emission Rate[d]	
per cent of rated capacity	MBtu/h	g/s	g/s	g/s	g/s	
50	2,121	304.9	8.0	160.7	12.3	
75	3,113	447.5	11.8	235.8	18.0	3 4 5
100	4,183	601.4	15.8	316.9	24.2	

[a]Based on 1.14 lb SO_2/MBtu.

[b]Based on 0.03 lb particulate/MBtu.

[c]Based on 0.6 lb NO_x/MBtu. 3

[d]Based on 1.0 lb CO/ton coal fired and low range heat content.

TABLE 5.5-2. STACK CONDITIONS--STANTON ENERGY CENTER UNIT 1

Operating Level per cent of rated capacity	Stack Height ft	Stack Diameter ft	Exit Velocity ft/s	Volumetric Flow Rate ft^3/min	Exit Temperature 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 Location	Release Height	Exit Diameter	Exit Velocity	Particulate Emission Rate	
	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	5
Plant Coal Silo	45.72	1.15	20.3	0.41	
Unit 1 Stack	142.3	5.79	21.5	15.8	

Area Sources Location	Release Height	Area Width	Particulate Emission Rate With Wind Erosion	Particulate Emission Rate Without Wind Erosion	
	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	
Unloading Facility	3.00	25	--	0.00025	5

TABLE 5.5-3. MODELING SOURCE PARAMETERS FOR ONE UNIT FACILITY

Point Sources Location	Release Height	Exit Diameter	Exit Velocity	Particulate Emission Rate
	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 Location	Release Height	Area Width	Particulate Emission Rate	
			With Wind Erosion	Without Wind Erosion
	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 SO_2 GROUND-LEVEL CONCENTRATIONS FROM ONE UNIT FOR VARIOUS AVERAGING TIMES

Year	3-Hour*					24-Hour				Annual		
	Conc.	Dir.	Dist.	Day	Time Period	Conc.	Dir.	Dist.	Day	Conc.	Dir.	Dist.
	μg/m^3	deg	km		local	μg/m^3	deg	km		μg/m^3	deg	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	--	--	--

4 5

*Offsite predicted concentrations.

TABLE 5.5-5. COMPARISON OF PSD CLASS II INCREMENTS WITH PREDICTED GROUND-LEVEL POLLUTANT CONCENTRATIONS FROM ONE UNIT

Pollutant	PSD Class II Increments	Predicted Concentrations	Per Cent Increment Consumed	
SO_2 μg/m^3				
Annual	20	3	15	4 5
24-hour	91	50	55	4 5
3-hour	512	271	53	4 5
TSP μg/m^3				5
Annual	19	1	5	5
24-hour	37	15	41	
NO_2 μg/m^3				
Annual	--	1.8	--	3
CO mg/m^3				
8-hour	--	<<1	--	
1-hour	--	<<1	--	

Amendment 3
103081
Amendment 4
123181
Amendment 5
030382

TABLE 5.5-5. COMPARISON OF PSD CLASS II INCREMENTS WITH PREDICTED GROUND-LEVEL POLLUTANT CONCENTRATIONS FROM ONE UNIT

Pollutant	PSD Class II Increments	Predicted Concentrations	Per Cent Increment Consumed	
SO_2 μg/m^3				
Annual	20	2.4	12	
24-hour	91	36	40	4
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	--	3
CO mg/m^3				
8-hour	--	<<1	--	
1-hour	--	<<1	--	

TABLE 5.5-6. INDIVIDUAL SOURCE CONTRIBUTIONS TO THE MAXIMUM 24-HOUR PARTICULATE CONCENTRATION

Source	Particulate Concentration $\mu g/m^3$	Per Cent of Total	
Unloading Facility	0.50	3.4	
Transfer Building	0.12	0.8	
Crusher Building	0.05	0.3	5
Plant Transfer Area	0.02	0.1	
Plant Coal Silo	0.02	0.1	
Unit 1 Stack	0.00	0.0	
Coal Storage Pile	1.23	8.3	
Limestone Storage Pile	12.90	87.2	5
Total	14.8	100	

TABLE 5.5-7. MAXIMUM TOTAL EXPECTED GROUND-LEVEL CONCENTRATIONS VERSUS AMBIENT AIR QUALITY STANDARDS

Pollutant	Federal Primary	Federal Secondary	Florida	Baseline Concentration	Predicted Impacts for Unit 1	Total Expected Ground-level Concentrations	Per Cent of Most Stringent Standard	
SO_2 $\mu g/m^3$								
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 $\mu g/m^3$								
Annual	75	60	60	34	1	35	58	1
24-hour	260	150	150	105	15	120	80	
NO_2 $\mu g/m^3$								
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

Amendment 1
060581
Amendment 3
103081
Amendment 4
123181
Amendment 5
030382

TABLE 5.5-8. MODELING SOURCE PARAMETERS FOR TWO UNIT FACILITY

Point Sources Location	Release Height	Exit Diameter	Exit Velocity	Particulate Emission Rate	
	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	5
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	

Area Sources Location	Release Height	Area Width	Particulate Emission Rate		
			With Wind Erosion	Without Wind Erosion	
	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	5

TABLE 5.5-9. MAXIMUM PREDICTED SO_2 GROUND-LEVEL CONCENTRATIONS FROM TWO UNITS FOR VARIOUS AVERAGING TIMES

Year	3-Hour*					24-Hour				Annual		
	Conc.	Dir.	Dist.	Day	Time Period	Conc.	Dir.	Dist.	Day	Conc.	Dir.	Dist.
	$\mu g/m^3$	deg	km		local	$\mu g/m^3$	deg	km		$\mu g/m^3$	deg	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.

5

TABLE 5.5-10. COMPARISON OF PSD CLASS II INCREMENTS WITH PREDICTED GROUND-LEVEL POLLUTANT CONCENTRATIONS FROM TWO UNITS

Pollutant	PSD Class II Increments	Predicted Concentrations	Per Cent Increment Consumed	
SO_2 μg/m^3				
Annual	20	6	30	4 5
24-hour	91	85	93	4 5
3-hour	512	509	99	4 5
TSP μg/m^3				5
Annual	19	2	11	5
24-hour	37	27	73	
NO_2 μg/m^3				
Annual	--	2.9	--	3
CO mg/m^3				
8-hour	--	<<1	--	
1-hour	--	<<1	--	

Amendment 3
103081
Amendment 4
123181
Amendment 5
030382

TABLE 5.5-11. INDIVIDUAL SOURCE CONTRIBUTIONS TO THE MAXIMUM 24-HOUR PARTICULATE CONCENTRATIONS (TWO UNITS)

Source	Particulate Concentration $\mu g/m^3$	Per Cent of Total	
Unloading Facility	0.50	1.8	
Transfer Building	0.23	0.8	
Crusher Building	0.11	0.4	5
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	23.76	87.7	5
Total	27.1	100	

TABLE 5.5-12. MAXIMUM TOTAL EXPECTED GROUND-LEVEL CONCENTRATIONS FROM TWO UNITS VERSUS AMBIENT AIR QUALITY STANDARDS

Pollutant	Federal Primary	Federal Secondary	Florida	Baseline Concentration	Predicted Impacts for Units 1 and 2	Total Expected Ground-level Concentrations	Per Cent of Most Stringent Standard
SO_2 $\mu g/m^3$							
Annual	80	--	60	14	6	20	33
24-hour	365	--	260	44	85	129	50
3-hour	--	1,300	1,300	124	509	653	50
TSP $\mu g/m^3$							
Annual	75	60	60	34	2	36	60
24-hour	260	150	150	105	27	132	88
NO_2 $\mu g/m^3$							
Annual	100	100	100	11	3	14	14
CO mg/m^3							
8-hour	10	10	10	5	<<1	5	50
1-hour	40	40	40	11	<<1	11	28

1 4 5 4 1 4 3 4 1

Amendment 1
060581
Amendment 3
103081
Amendment 4
123181
Amendment 5
030382

Amendment 3
103081

TABLE 5.5-12. MAXIMUM TOTAL EXPECTED GROUND-LEVEL CONCENTRATIONS FROM TWO UNITS VERSUS AMBIENT AIR QUALITY STANDARDS

Pollutant	Federal Primary	Federal Secondary	Florida	Baseline Concentration	Predicted Impacts for Units 1 and 2	Total Expected Ground-level Concentrations	Per Cent of Most Stringent Standard
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 3
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 μV/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 5
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 5
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 5
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 manu-
factured locomotives is 90 dB(A) at 100 feet.[4,5] 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 5
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 5
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 tress 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 tress), 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. 2

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). 5

(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.

APPENDIX 5.7A

MANAGEMENT PLAN FOR THE RED-COCKADED WOODPECKER 2

Amendment 2
082181

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

LIST OF TABLES

LIST OF FIGURES

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 (<u>Pinus palustris</u>) 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 (ft^2/acre). The extremely open canopy permits development of a rich understory of shrubs and

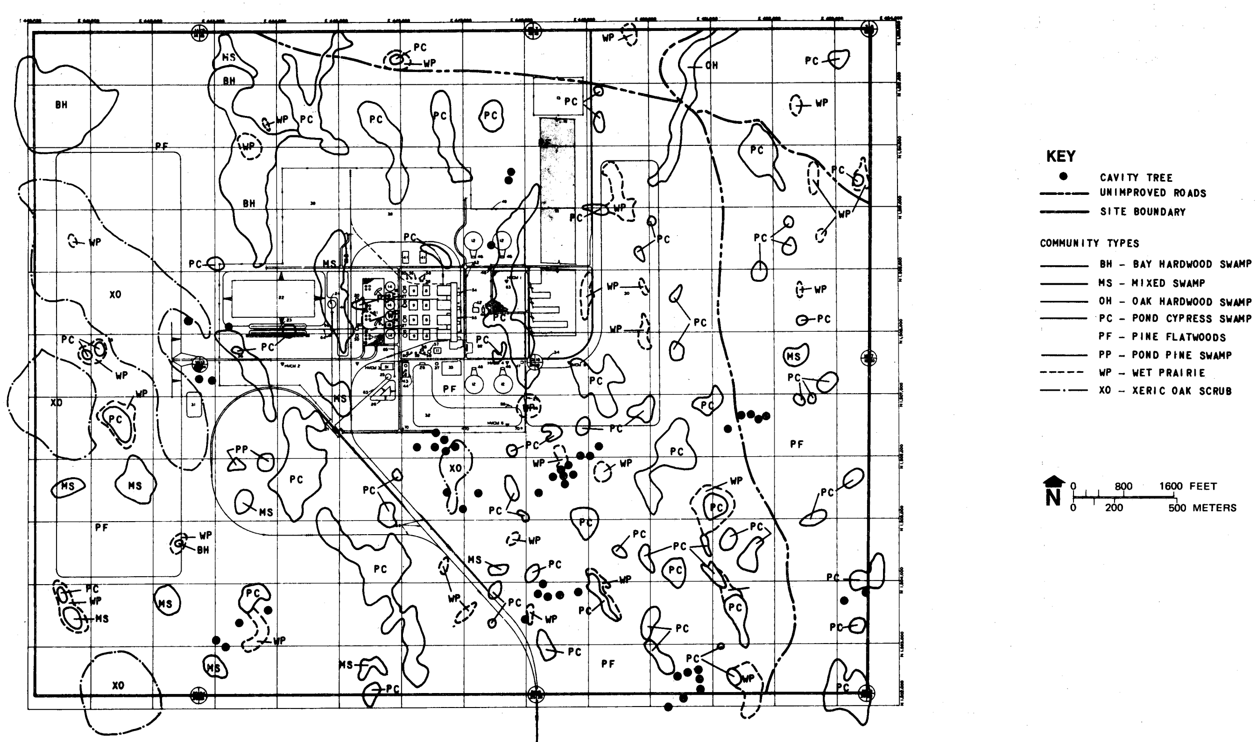


Figure 2-1

SITE ARRANGEMENT IN RELATION TO RED-COCKADED WOODPECKER CAVITY TREES

SOURCE: BLACK & VEATCH, 1981.

CURTIS H. STANTON ENERGY CENTER

Management Plan for Red-Cockaded Woodpeckers

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.

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.

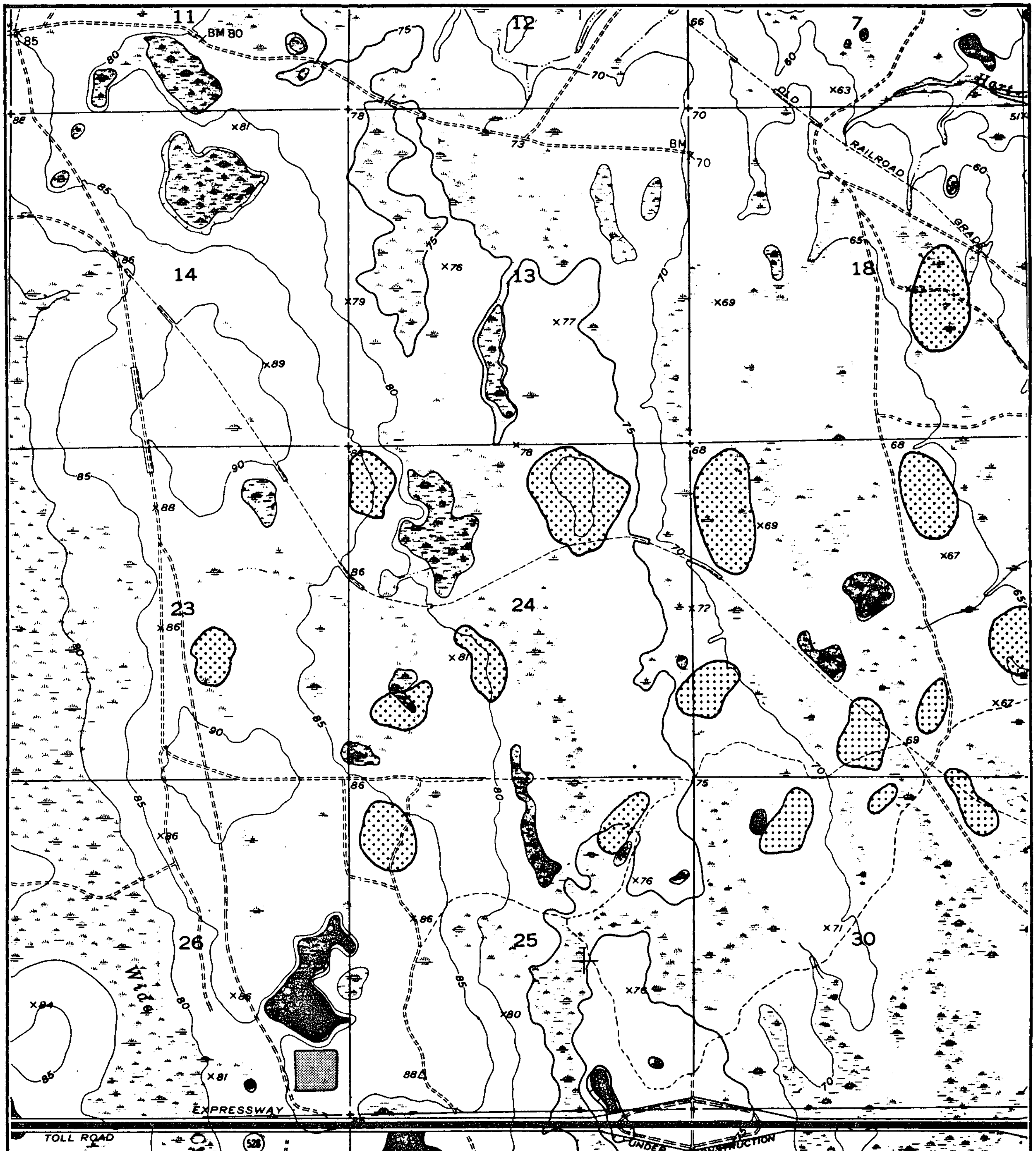
5. Pine forest occurring in areas of slightly higher elevation than the surrounding terrain with several to 100 large well-formed pines. A further, subtle distinction, the presence of more bare soil and more widely scattered palmetto, is indicative of better quality sites.

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.



KEY

POTENTIAL COLONY SITES

N

0 .5 1.0 Mile

0 .5 1.0 Kilometer

Figure 2-2
LOCATION OF POTENTIAL RED-COCKADED WOODPECKER COLONIES IN THE AREA OF THE PROPOSED SITE
SOURCE: ESE, 1981.

CURTIS H. STANTON ENERGY CENTER

Management Plan for Red-Cockaded Woodpeckers

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.

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 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

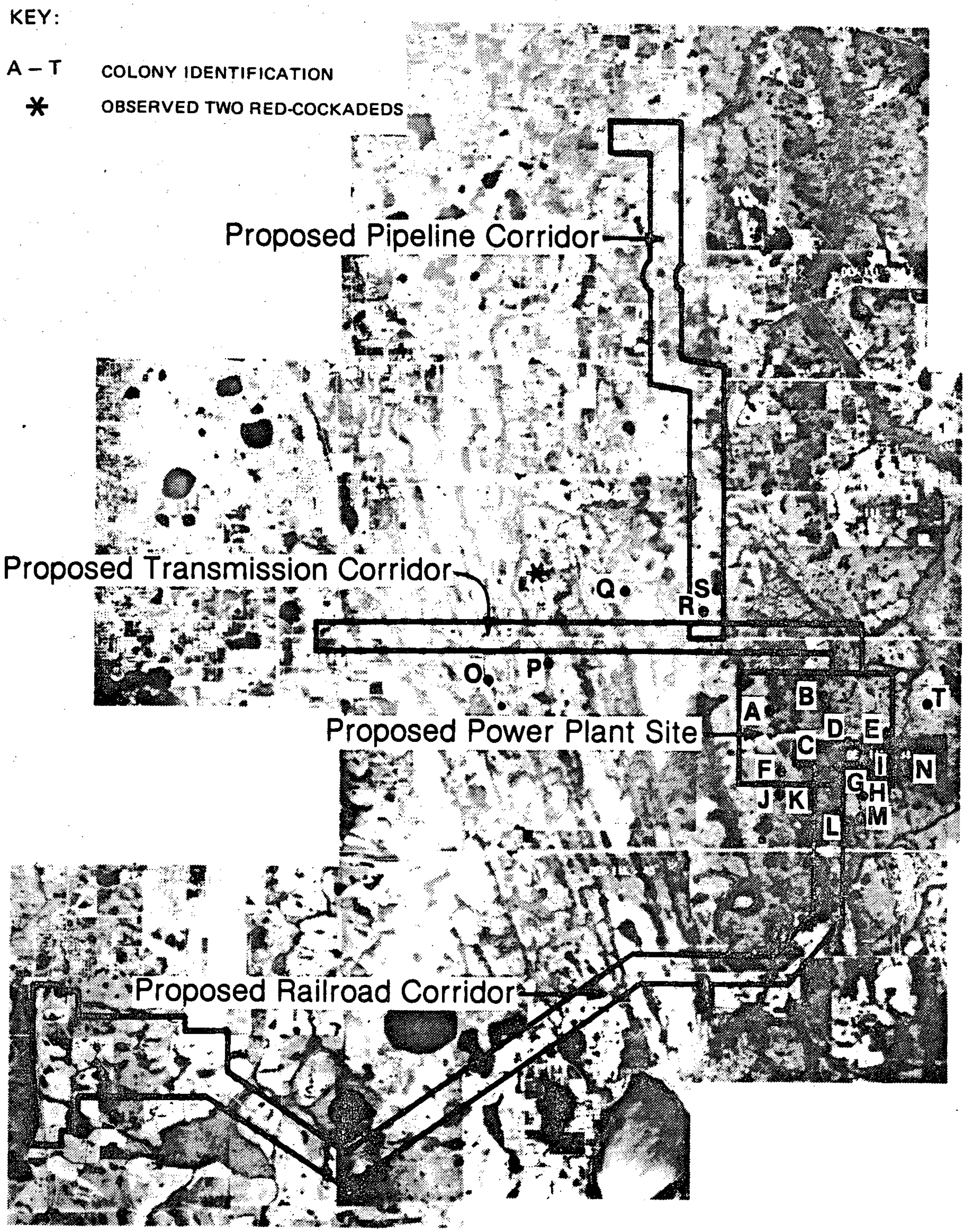


Figure 3-1 **AERIAL PHOTOGRAPH SHOWING LOCATIONS OF RED-COCKADED WOODPECKER COLONIES** **SOURCE: ESE, 1981.**	**CURTIS H. STANTON ENERGY CENTER** **Management Plan for Red-Cockaded Woodpeckers**

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 ft^2/acre to 13.4 ft^2/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 (trees/acre) <2	2-7	7-13	Total (trees/acre)	Basal Area (ft^2/acre)	Second-Growth Timber (%)
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 Acres	Pine Flatwoods Basal Area (ft^2/acre)	Pine Flatwoods Density/ Acre	Pine Flatwoods Second-Growth Timber (%)	Cypress Dome/ Bayhead (acres)	Wet Prairie (acres)	Pond Pine (acres)
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 ft^2/acre to 40 ft^2/acre, with a mean near 20 ft^2/acre. Thompson and Baker (1971) indicated a mean of 50.3 ft^2/acre (range 10 to 140 ft^2/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
Colony						
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)
Cavity Trees†						
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.

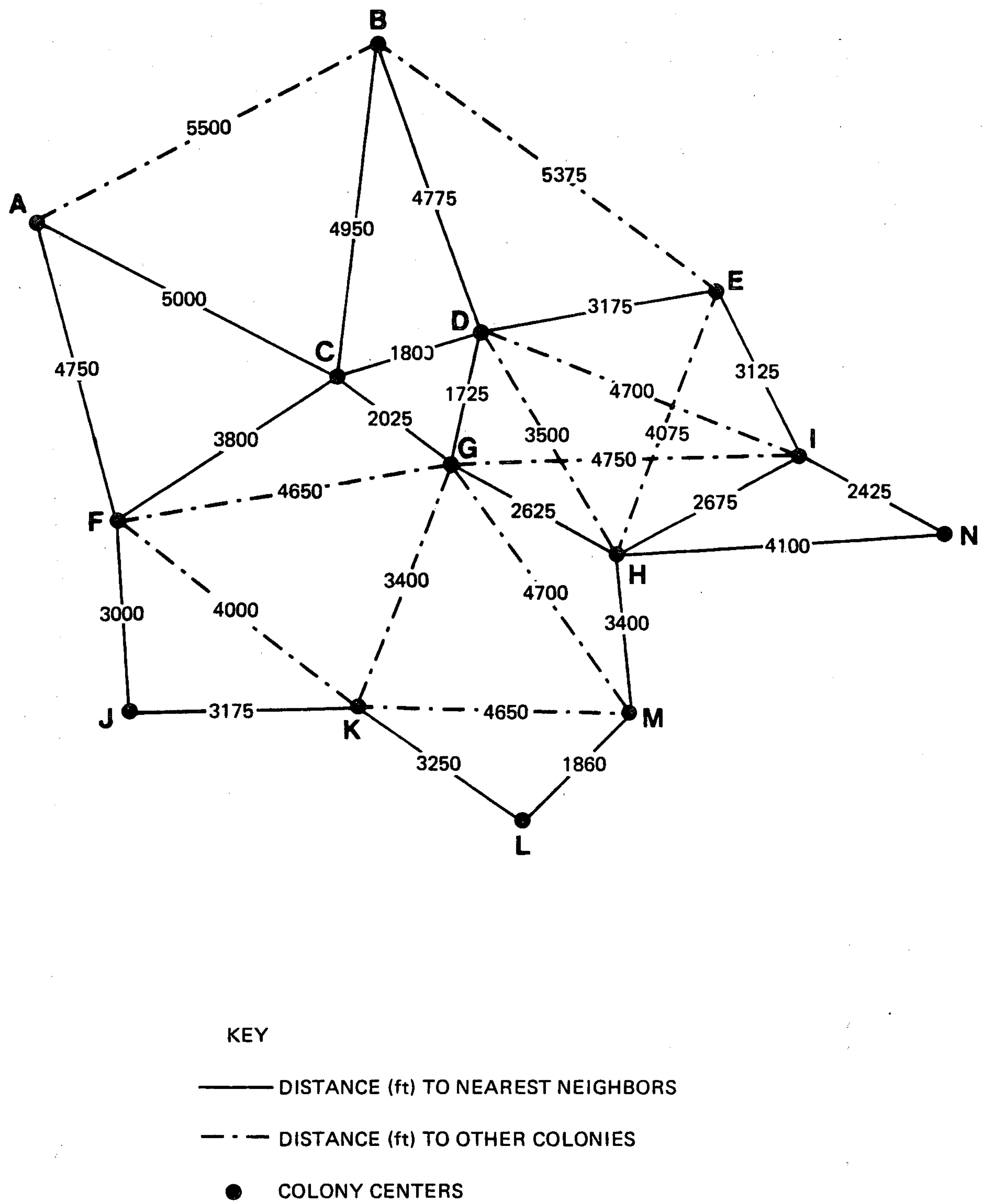


Figure 3-2

INTER-COLONY SPACING IN THE VICINITY OF THE PROPOSED SITE

SOURCE: ESE, 1981.

CURTIS H. STANTON ENERGY CENTER

Management Plan for Red-Cockaded Woodpeckers

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 Appalachicola 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		Reproduction**		
			Male	Female	Nesting Activity	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.

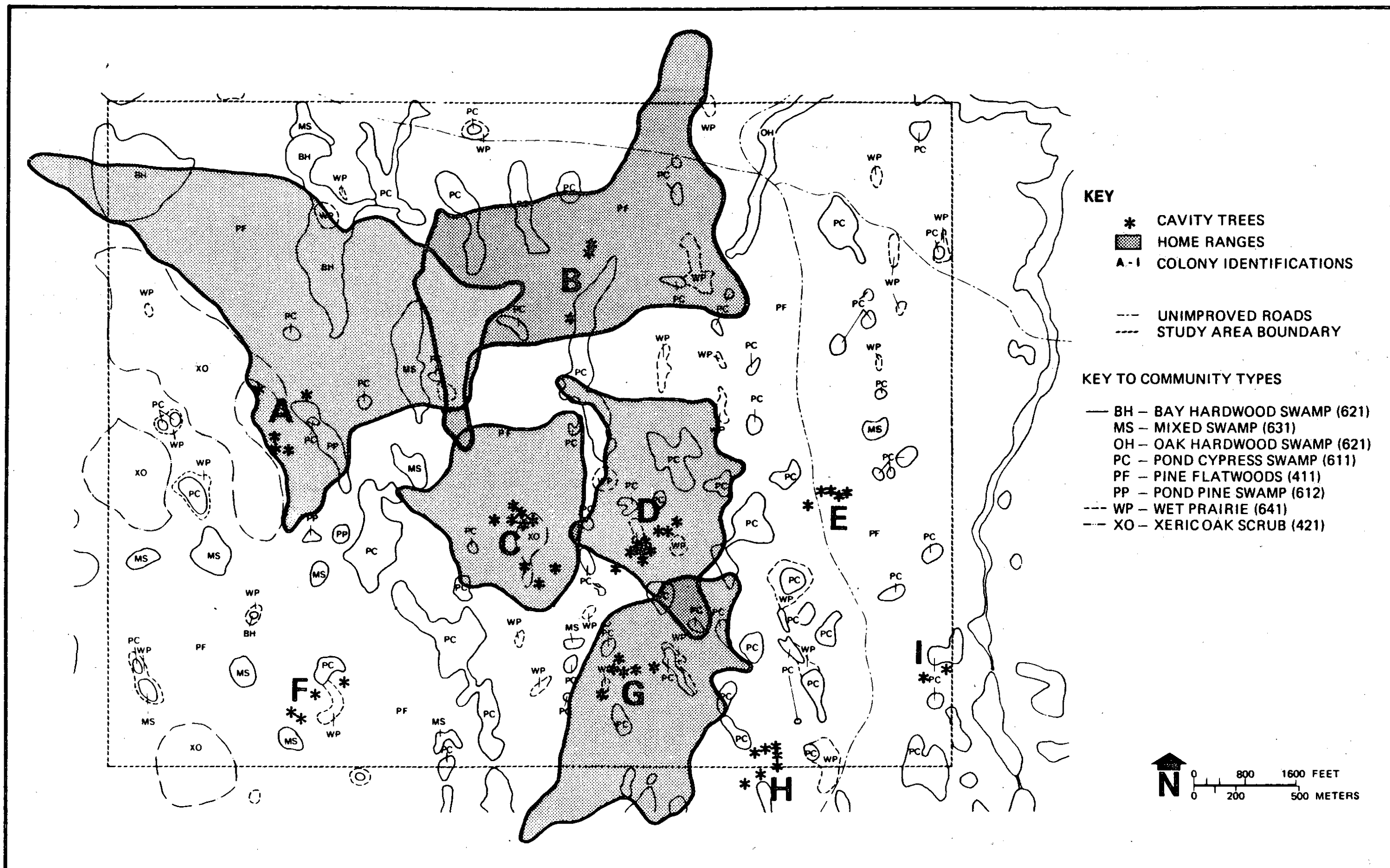


Figure 3-3

RED-COCKADED WOODPECKER COLONIES AND WINTER HOME RANGES ON THE PROPOSED SITE

SOURCE: ESE, 1981.

CURTIS H. STANTON ENERGY CENTER

Management Plan for Red-Cockaded Woodpeckers

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 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

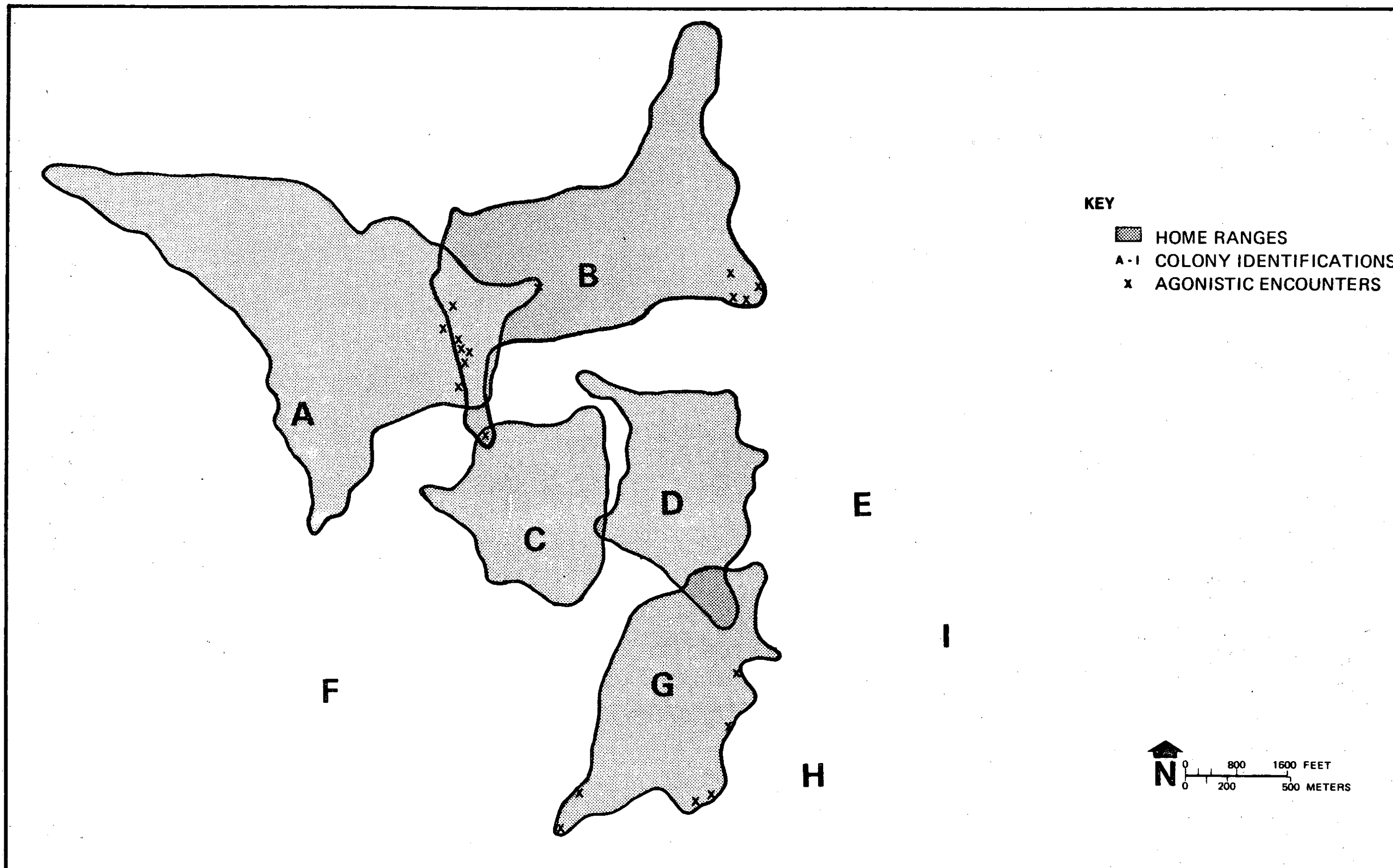


Figure 3-4

AGONISTIC ENCOUNTERS OF CLANS ON THE PROPOSED SITE

SOURCE: ESE, 1981.

CURTIS H. STANTON ENERGY CENTER

Management Plan for Red-Cockaded Woodpeckers

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 5
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.

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: Active	Total Number of Cavity Trees Affected: Other*	Foraging Range: Total (acres)	Foraging Range: 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.

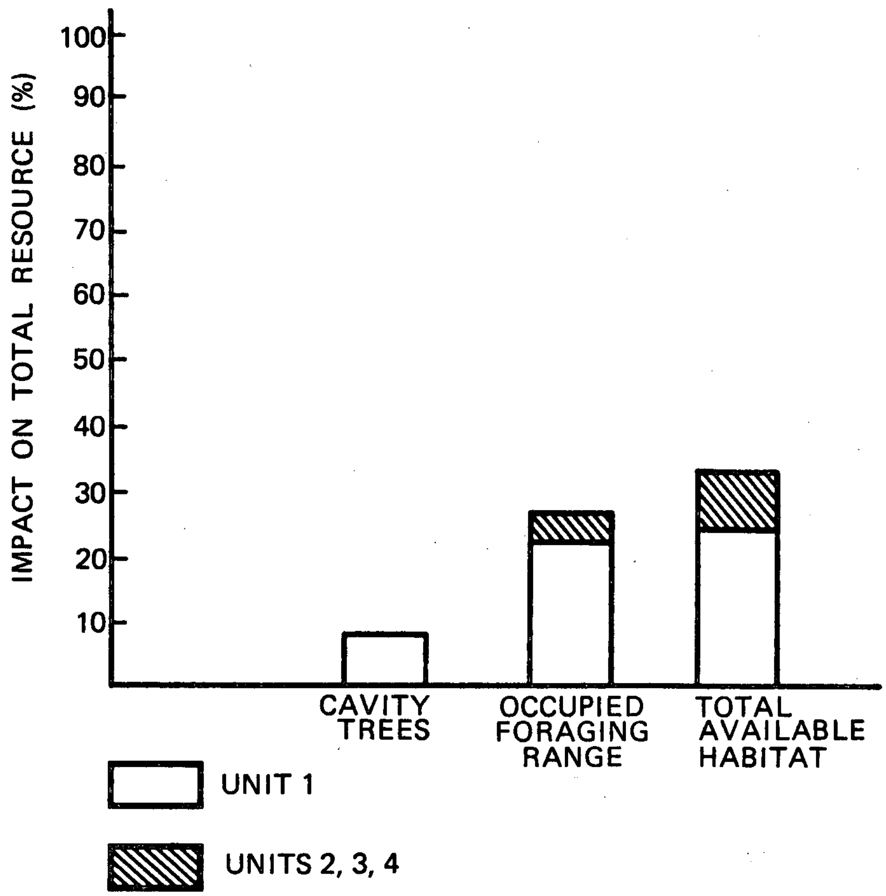


Figure 4-1

CONSTRUCTION IMPACTS ON RED-COCKADED WOODPECKERS

SOURCE: ESE, 1981.

CURTIS H. STANTON ENERGY CENTER

Management Plan for Red-Cockaded Woodpeckers

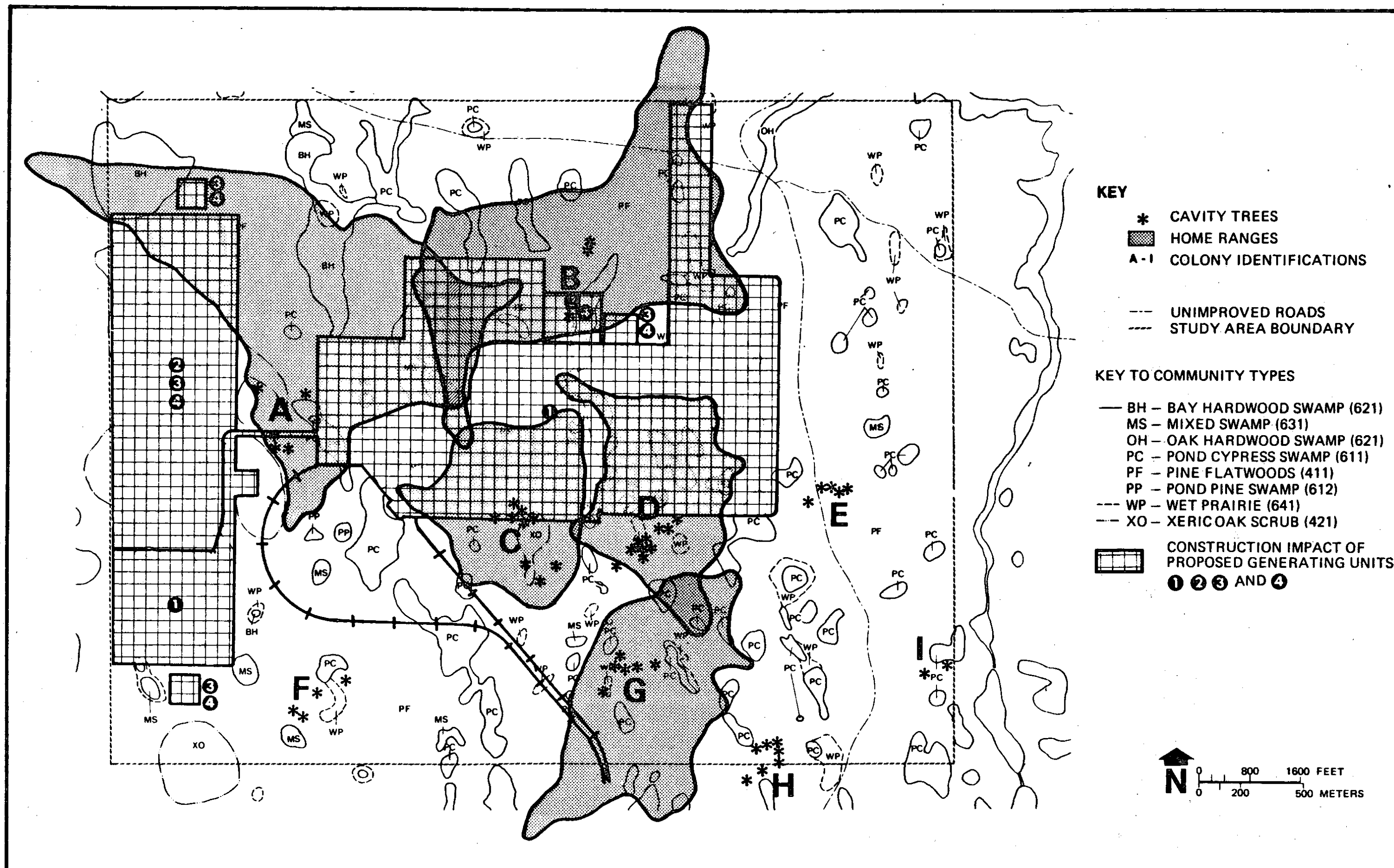


Figure 4-2

AREAS OF CONSTRUCTION IMPACTS ON RED-COCKADED WOODPECKERS

SOURCE: ESE, 1981.

CURTIS H. STANTON ENERGY CENTER

Management Plan for Red-Cockaded Woodpeckers

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.

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 reseeding, 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.

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 ft^2/acre. The United States Fish and Wildlife Service (1979) recommends that a basal area of 40 to 60 ft^2/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 ft^2/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.

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 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.

<u>Plate</u>: The exposed wood surrounding a red-cockaded woodpecker cavity entrance.

<u>Range</u>: 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.

<u>Resin Well</u>: A hole, generally circular, in the bark of a cavity tree or a tree adjacent to a cavity tree from which resin exudes.

<u>Roost Cavity</u>: A cavity used by a red-cockaded woodpecker only as a shelter, particularly at night and during inclement weather.

<u>Start Hole</u>: The beginning of a cavity; may never be finished, but if completed, excavation is usually over a period of several months.

<u>Support Stand</u>: 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: Active	Starts	Abandon	DBH* of Cavity Trees (inches): Mean	Range	Tree Height (feet)	Height to Cavity (feet): 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

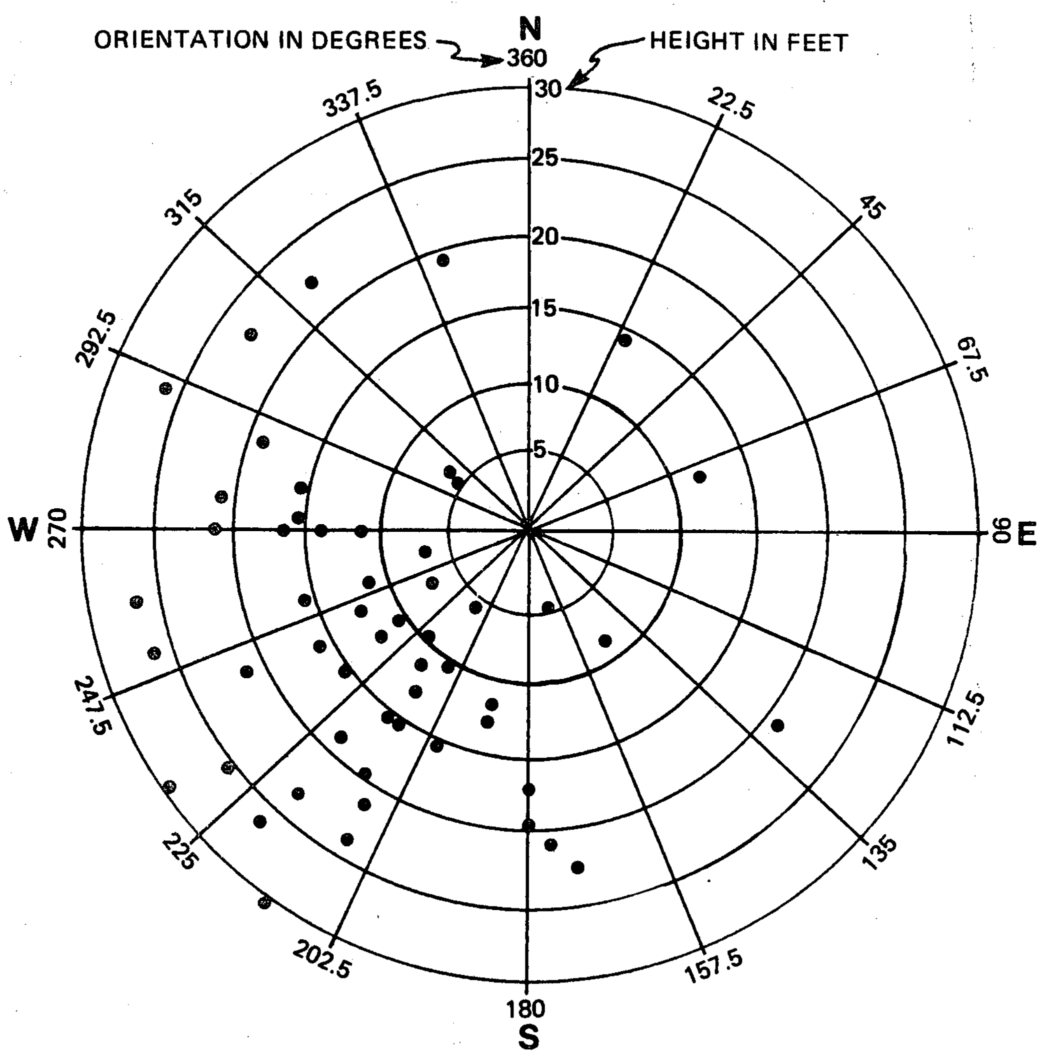
* DBH = Diameter at Breast Height.

Source: ESE, 1981.

Table A-2. Age Class Distribution of Pine Stands Identified on the Proposed Site

Stand Number	Acres	Age Classes in Years (trees/acre) <15	15-30	30-40	40-50	80>	Total (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**

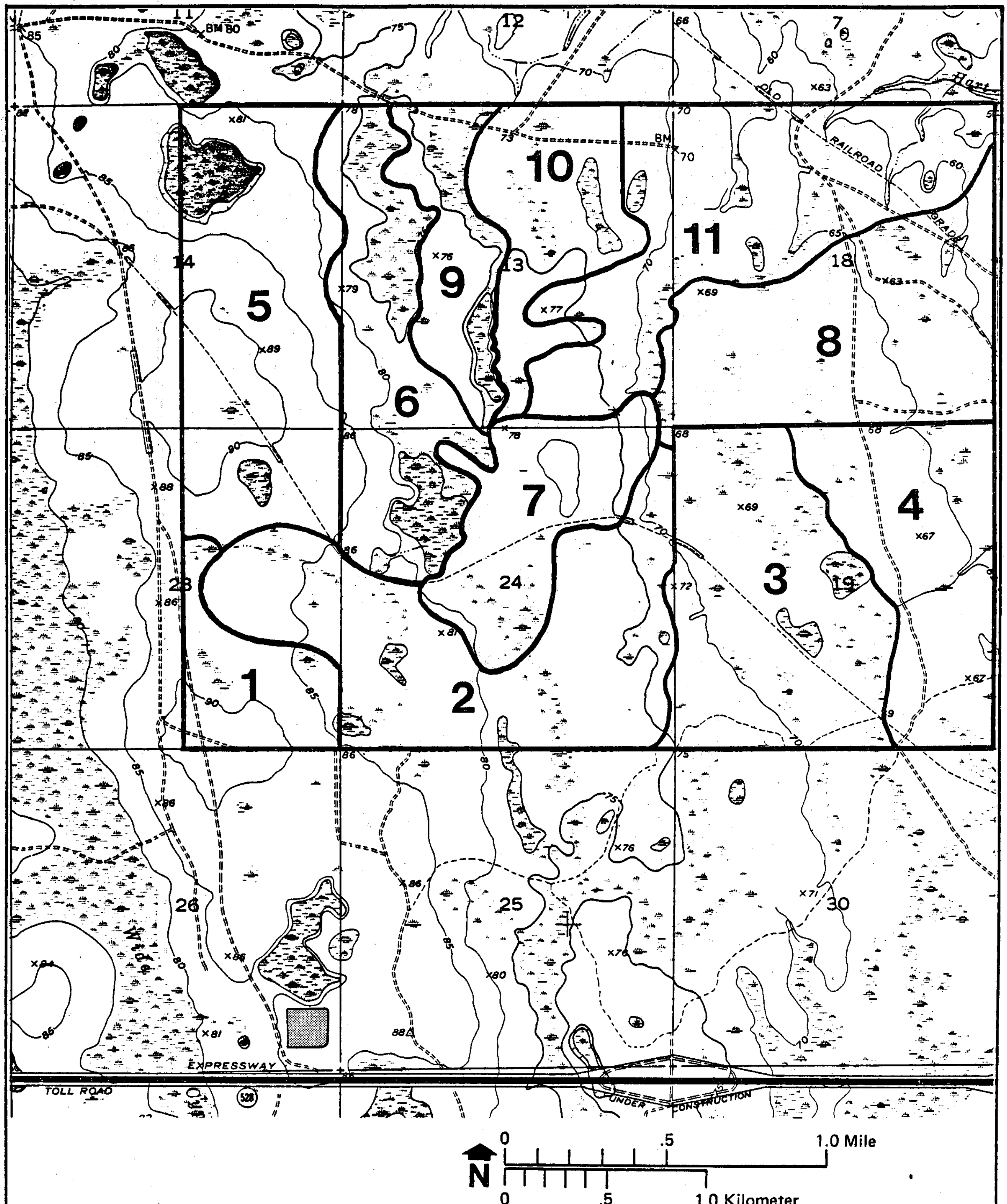


Figure A-2
IDENTIFIED PINE STANDS ON THE PROPOSED SITE

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

	Distance From Centerline of Track (Metres)				
	10	34	120	320	510
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
	10	42	165	320	510
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 <u>not</u> 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.

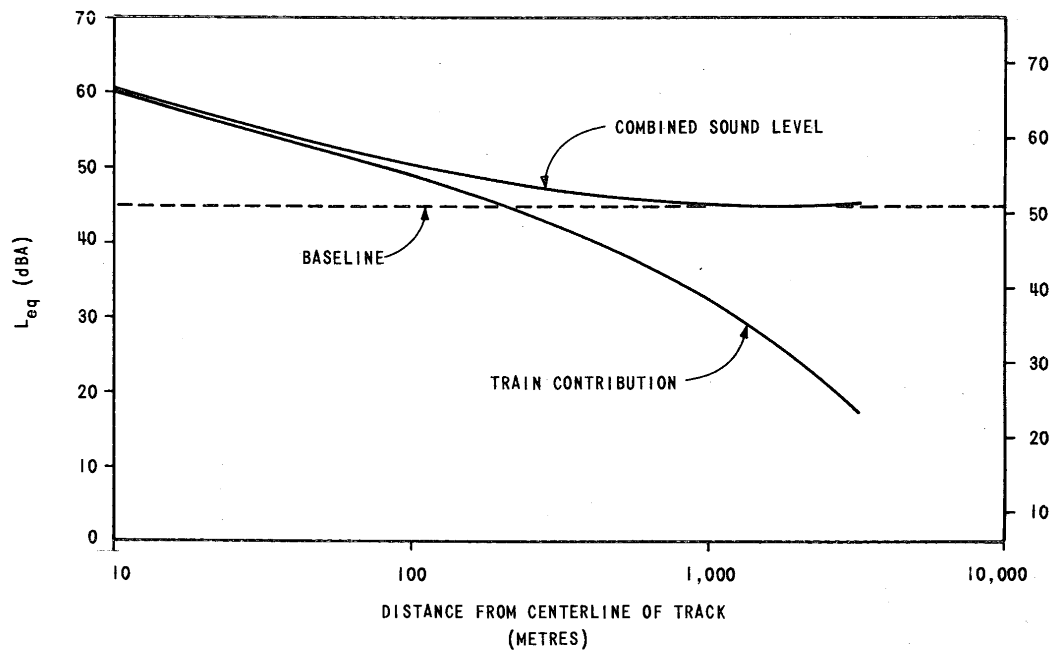


FIGURE 5.7-1. IMPACTS OF UNIT TRAINS ON NOISE LEVELS NEAR PROPOSED RAILROAD SPUR

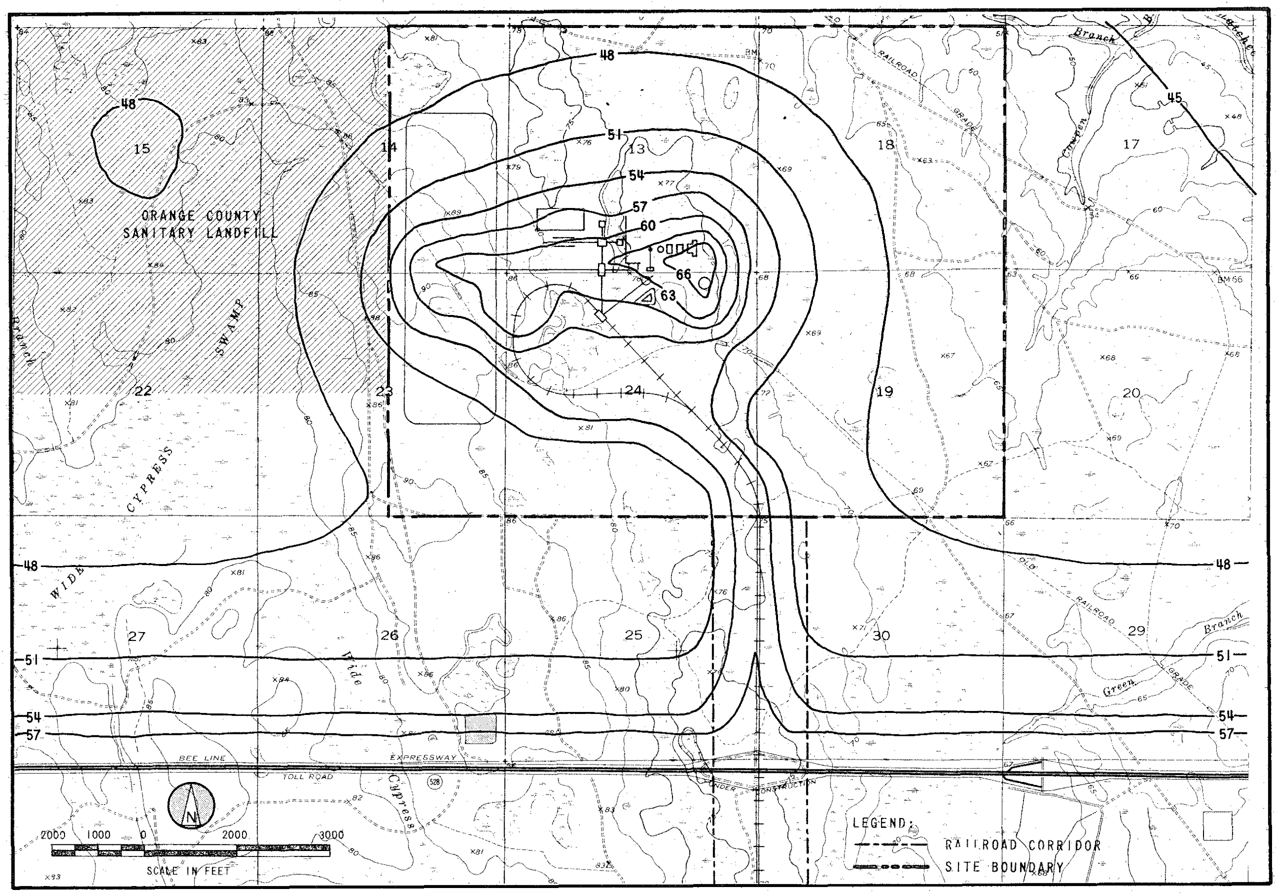


FIGURE 5.7-2. PREDICTED L_{eq} (dBA) CONTOURS DURING OPERATION OF THE PROPOSED CURTIS H. STANTON ENERGY CENTER

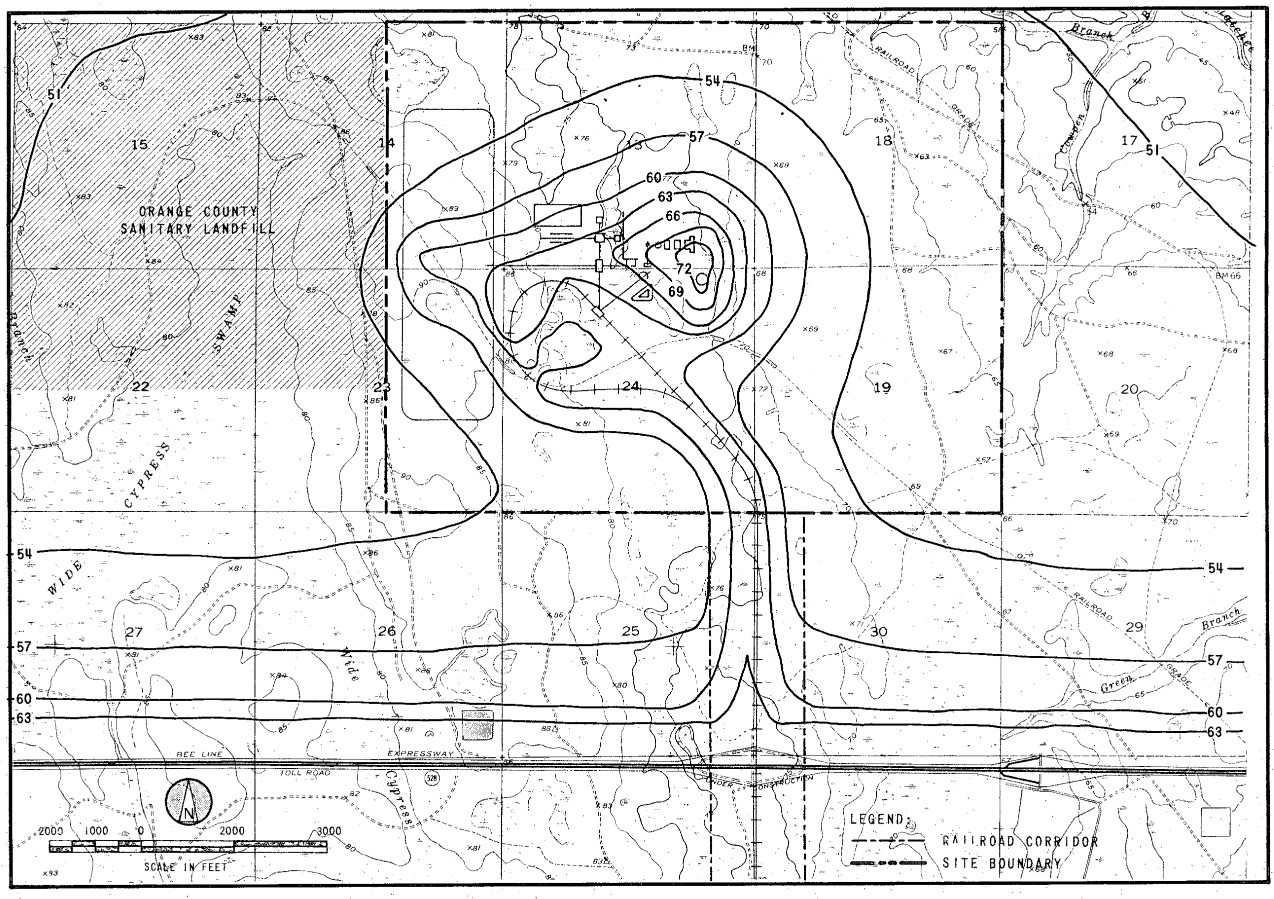
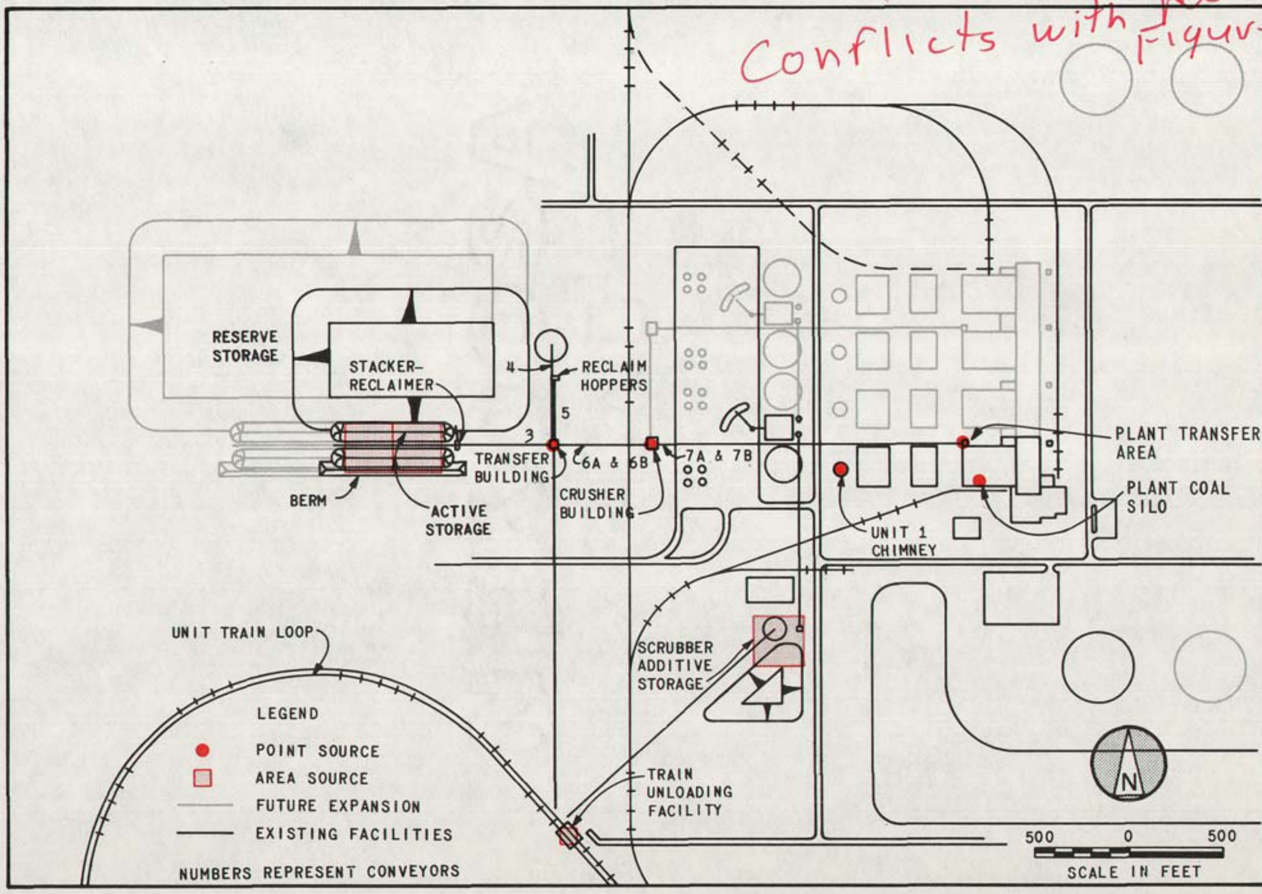


FIGURE 5.7-3. PREDICTED UNIT I L_{dn}(dBA) CONTOURS DURING OPERATION OF THE PROPOSED CURTIS H. STANTON ENERGY CENTER

Conflicts with Revised Figure 3.9-10



5

5

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 Janury 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.

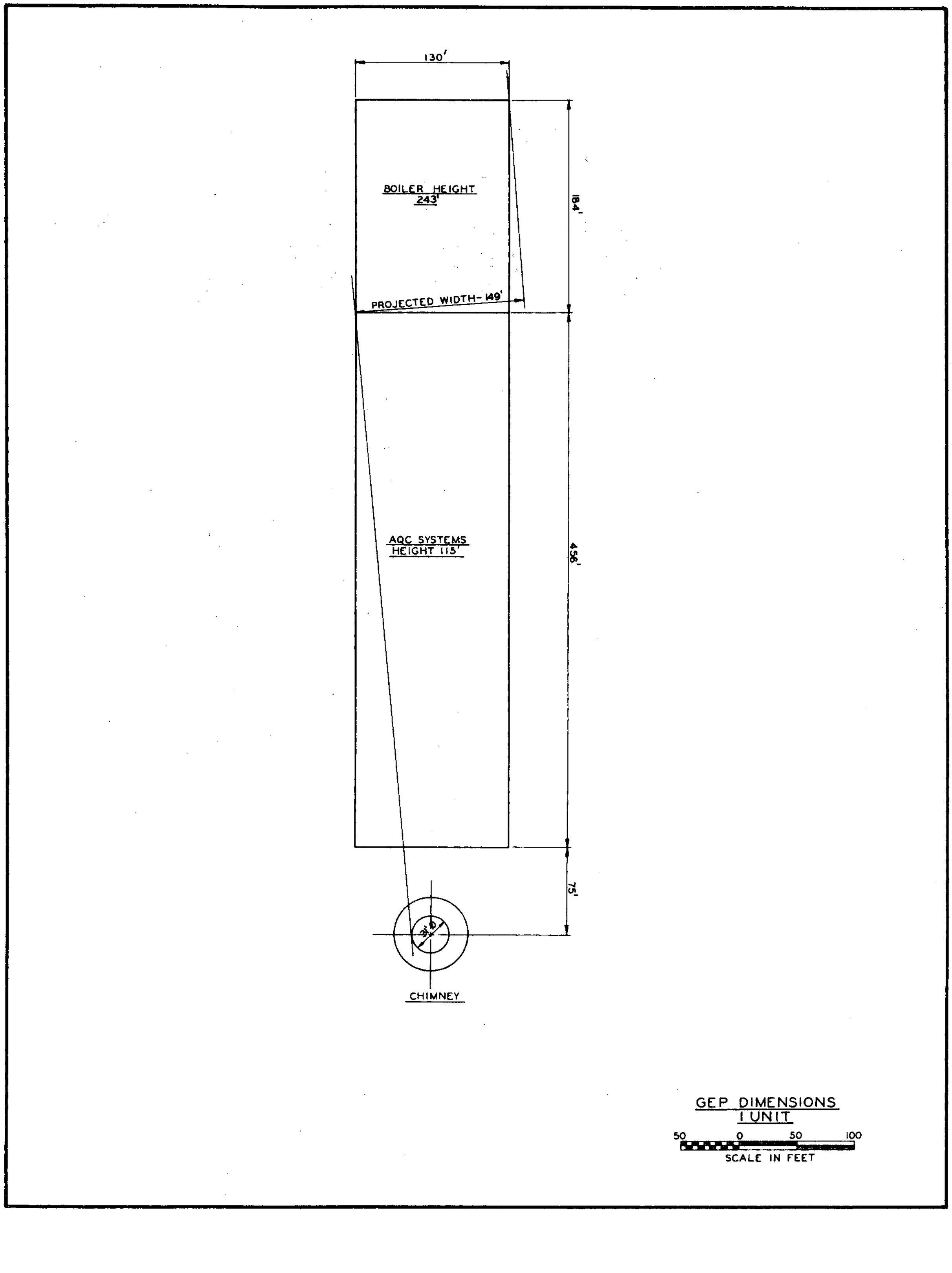


FIGURE 5.5A-1. BUILDING LAYOUT FOR GEP STACK HEIGHT CALCULATION-1 UNIT

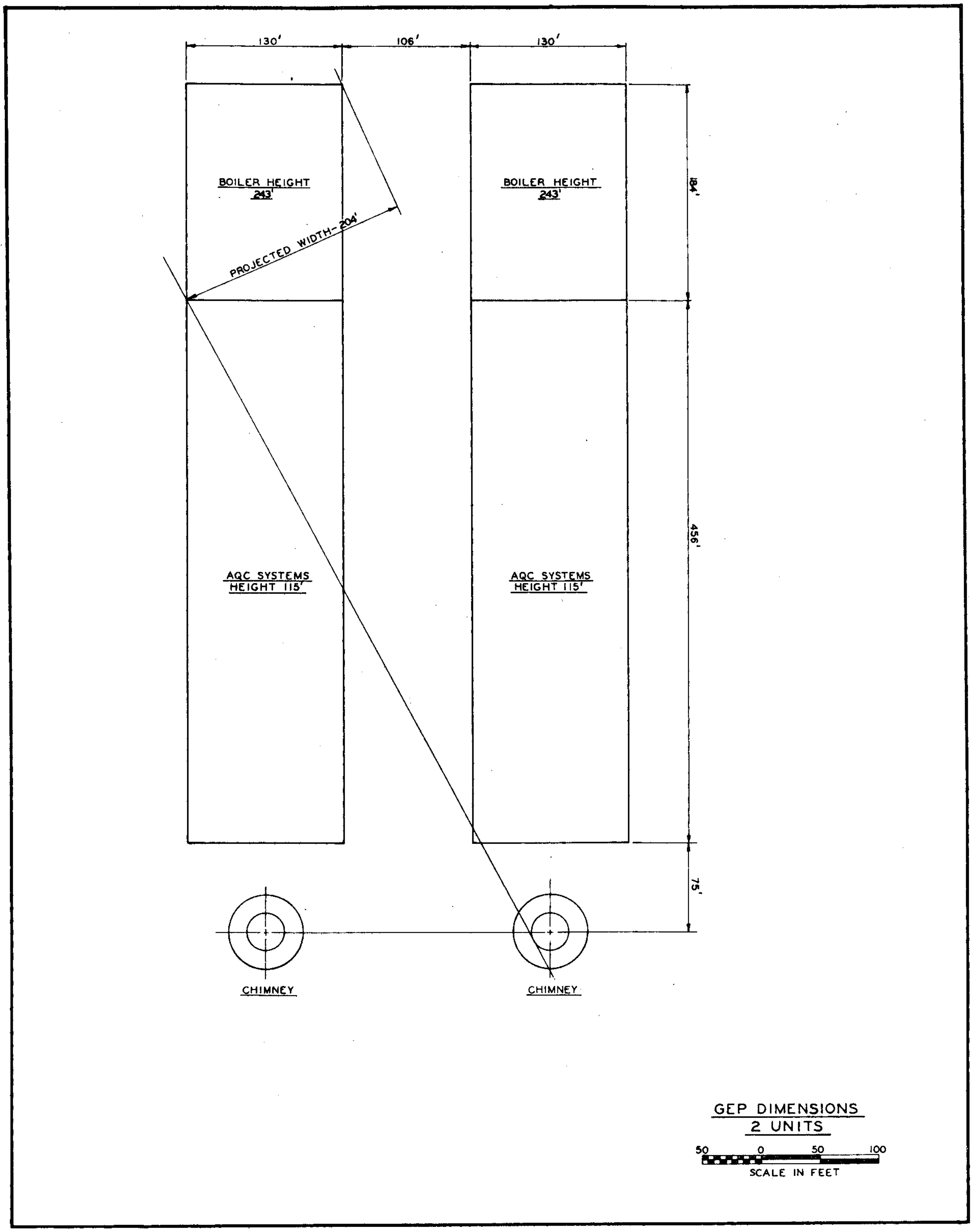


FIGURE 5.5A-2. BUILDING LAYOUT FOR GEP STACK HEIGHT CALCULATION-2UNITS

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.