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APPENDICES

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Appendix 2E	Short-Term (Accident) Diffusion for the Exclusion Area Boundary and Low Population Zone
Appendix 2F	Short-Term (Accident) Diffusion for the Control Room and Onsite Locations

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LIST OF FIGURES

2.1 SUMMARY

Data are presented in this section which provide a basis for the selection of design criteria for hurricane, tornado, flood and earthquake protection, and to state the adequacy of concepts for controlling routine and accidental release of radioactive liquids and gases to the environment. Field programs to investigate geology, seismology, hydrology, have been completed. A meteorological field program was in effect until mid 1970. A modified program will continue throughout the nuclear unit operation. Additional information on site characteristics and meteorology is provided in licensing correspondence concerning Turkey Point Units 3 & 4 compliance with 10 CFR Part 50 Appendix I. [(1)] [(2)]

The site is on the shore of Biscayne Bay, about 25 miles south of Miami, Florida. The area immediately surrounding the site is low and swampy, very sparsely populated and unsuited for construction without raising the elevation with fill. The nearest farming area lies in the northwest quarter of a five mile arc from the site.

The immediate area surrounding the nuclear units is flat and rises very gently from sea level at the shoreline of Biscayne Bay to an elevation of about 10 ft. above Mean Sea Level (MSL) at a point some 8 to 10 miles west of the site. To the east, 5 to 8 miles across Biscayne Bay, is a series of offshore islands running in a northeast-southwest direction between the Bay and the Atlantic Ocean, the largest of which is Elliott Key. These islands are undeveloped with the exception of a few part time residents scattered throughout the Keys. A Dade County public park is located eight tenths of a mile north of the northern containment (Unit 3) and is occupied on a day time transient basis.

(1) Letter L-76-212, "Appendix I Evaluation", dated June 4, 1976 from R.E. Uhrig of Florida Power and Light to D. R. Muller of the USNRC.
(2) Letter L-76-358, "Appendix I Additional Information", dated October 14, 1976 from R. E. Uhrig of Florida Power and Light to G. Lear of USNRC Branch No. 3.

Air movement at the site prevails almost 100 per cent of the time. Prevailing winds are out of the southeast. The atmosphere in the area is generally unstable with diurnal inversions occurring fairly frequently. Inversions are almost invariably accompanied by continually shifting wind directions most of which are from the off-shore quadrants.

The Miami area has experienced winds of hurricane force periodically, and the plant may be subjected to flood tides of varying heights. External flood protection is described in Appendix 5G.

Circulating water and intake cooling water discharged from Units 1, 2, 3 and 4 flows to a closed cooling system as described in Section 2.3.3 of the Environmental Report Supplement submitted to the AEC on November 8, 1971, with interim flow to Biscayne Bay and Card Sound, in accordance with the Final
Judgement, Civil Action No. 70-328-CA in the United States District Court for the Southern District of Florida of September 10, 1971 (Appendix 6 in the Environmental Report Supplement).

The normal direction of natural drainage of surface and ground water in the area of the site is to the east and south toward Biscayne Bay and will not affect off-site wells. The Pre-Operational Surveillance Plan, which is a radiological background study of the Turkey Point area, was initiated prior to initial startup of Unit 3. Samples of air, soil, water, marine life, vegetation, etc. in the area were collected and studied.

The site has underlying limestone bedrock on which has been placed compacted

limestone rock fill to elevation + 18 MLW. The major structures have been founded on this fill. The bedrock beneath is competent with respect to

foundation conditions for the nuclear units. The area is in a seismologically quiet region, as all of Florida is classified Zone 0 (the zone of least probability of damage) by the Uniform Building Code, published by International Conference of Building Officials. Despite the lack of any substantiating earthquake history, the units have been designed for an earthquake of .05g and all safety features have been checked to determine that no loss of function will occur in case of an earthquake of .15g horizontal ground acceleration.

The following specialists in environmental sciences have participated in developing site information:

First Research Corporation of Miami, Fla.	Population and Land Use (Sections 2.4 and 2.5)
Professor Homer W. Hiser Mr. Harold P. Gerrish Professor Harry V. Senn All from Radar Meteorological Laboratory, University of Miami, Institute of Marine Science	Climatology Section 2.6
Mr. Richard O. Eaton, P.E., Hydraulic Engineer Mr. Theodore E. Haeussner, Hydraulic Engineer U. S. Corps of Engineers Mr. J. W. Johnson, University of California	Hurricane Flooding and Wave Run Up Section 2.6 and Appendix 2B
Mr. Lester A. Cohen Mr. John A. Frizzola Meteorologists, Brookhaven National Laboratory	Meteorology, On Site and Diffusion Section 2.6 and Appendix 2A
Dames & Moore, Atlanta, Georgia Professor John A. Stevens, Associate Professor Civil Engineering, University of Miami	Hydrology, Geology, Seismology and Foundations Sections 2.7, 2.9, 2.10, 2.11
Dr. William S. Richardson, Associate Professor of Oceanography, University of Miami Institute of Marine Science Dr. Donald W. Pritchard and Dr. James Carpenter, both of Johns Hopkins University, Chesapeake Bay Institute Dr. Robert Dean University of Florida Marine Acoustical Services, Oceanographers of Miami	Hydrology, Biscayne Bay and Oceanography Sections 2.7, 2.8 and Appendix 2C
Dr. George W. Housner, Consultant California Institute of Technology	Earthquakes Section 2.11

Dr. James B. Lackey, Professor Emeritus, University of Florida	Ecology: Plankton
Dr. Charles B. Wurtz, LaSalle College	Invertebrates
Dr. Joseph Davis, University of Florida	Marine botany
Dr. Edwin S. Iverson	Vegetation (bay)
Dr. C. P. Idyll	Fish & food chain
Dr. Durbin Tabb	
Dr. E. J. Ferguson Wood	
Mr. Richard Nugent All of the University of Miami, Institute of Marine Science	
Dr. Roger Yorton, University of Florida	Chemistry, Bay Water
Bechtel Associates, Gaithersburg, Md.	General
Bechtel Corporation, Various U.S. offices	
Southern Nuclear Engineering, Inc. Dunedin, Florida; Washington, D.C.	
Westinghouse Electric Corporation Atomic Power Division, Pittsburgh, Pa.	
Ebasco Services Incorporated, New York, NY	Subsurface Conditions Section 2.9.4
Conestoga-Rovers & Associates US Headquarters in Niagara Falls, NY	Site Conceptual Model (Ref: Report No. 051293-2) Section 2.10

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2.1.1 DESIGN CRITERIA

Performance Standards

Criterion: Those systems and components of reactor facilities which are essential to the prevention or to the mitigation of the consequences of nuclear accidents which could cause undue risk to the health and safety of the public shall be designed, fabricated, and erected to performance standards that will enable such systems and components to withstand, without undue risk to the health and safety of the public the forces that might reasonably, be imposed by the occurrence of an extraordinary natural phenomenon such as earthquake, tornado, flooding condition, high wind or heavy ice. The design bases so established shall reflect: (a) appropriate consideration of the most severe of these natural phenomena that have been officially recorded for the site and the surrounding area and (b) an appropriate margin for withstanding forces greater than those recorded to reflect uncertainties about the historical data and their suitability as a basis for design. (GDC 2)

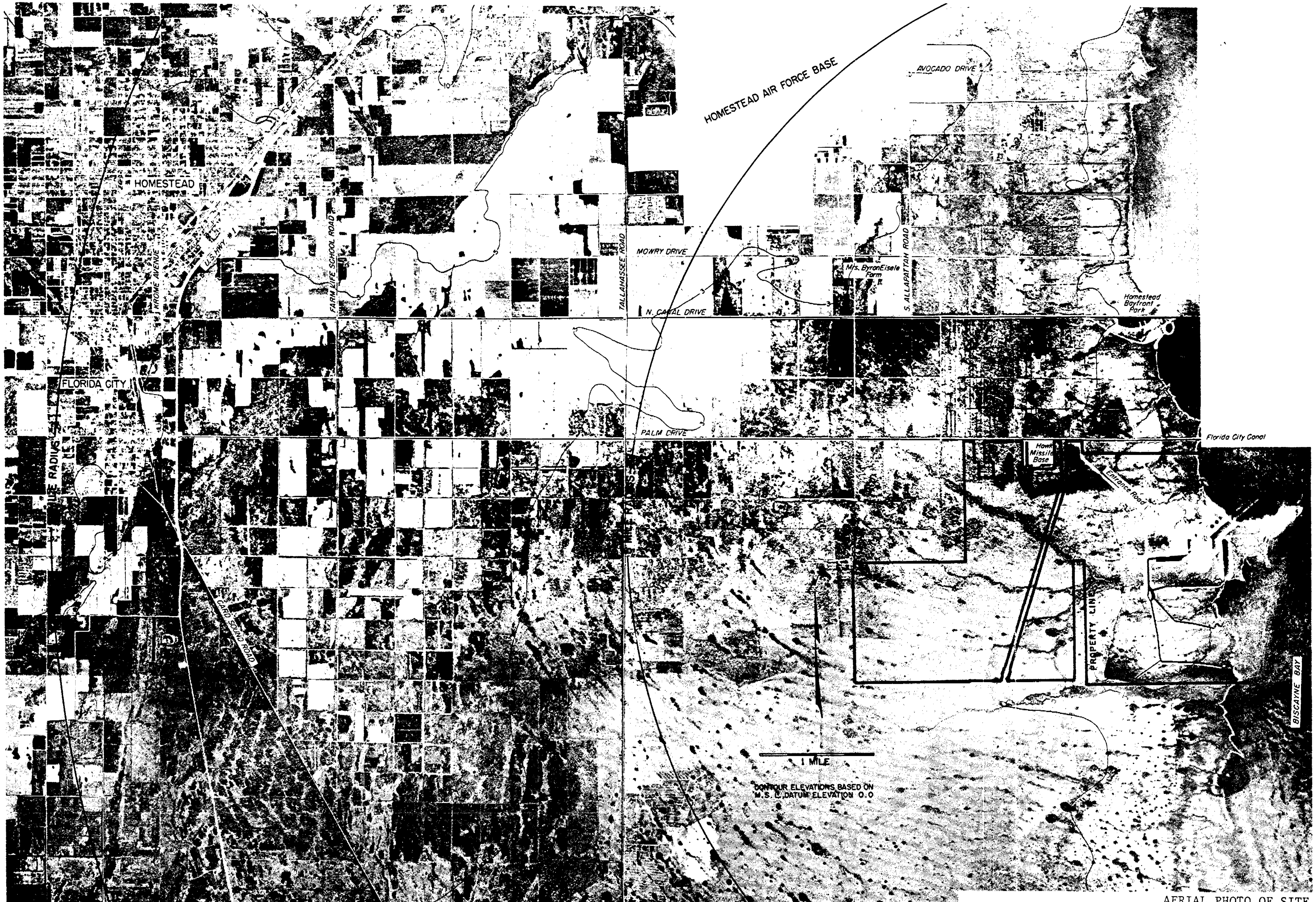
The forces that might be imposed by postulated extraordinary natural phenomenon such as earthquakes, storms and flooding have been analyzed and used in the design as discussed in detail in Section 5.

2.2 LOCATION

The site lies on the west shore of Biscayne Bay, in Sections 27, 28, 29, 31, 32, 33 and 34, Township 57 South, Range 40 East, Dade County, Florida, at latitude 25°-26'-04" North and longitude 80°-19'-52" West. This location is approximately 25 miles south of Miami, eight miles east of Florida City, and nine miles southeast of Homestead, Florida. Its location is shown on Figures 2.2-1, and 2.2-2 with the site plan shown on Figure 2.2-3.

The site comprises 3300 acres, more or less, owned by Florida Power & Light Company. The only access road is completely controlled by Florida Power & Light Company. The site has been developed to accommodate both nuclear and fossil-fired units.

GENERAL LOCATION MAP
FIG. 2.2-1



AERIAL PHOTO OF SITE

FIG. 2.2-2

FINAL SAFETY ANALYSIS REPORT

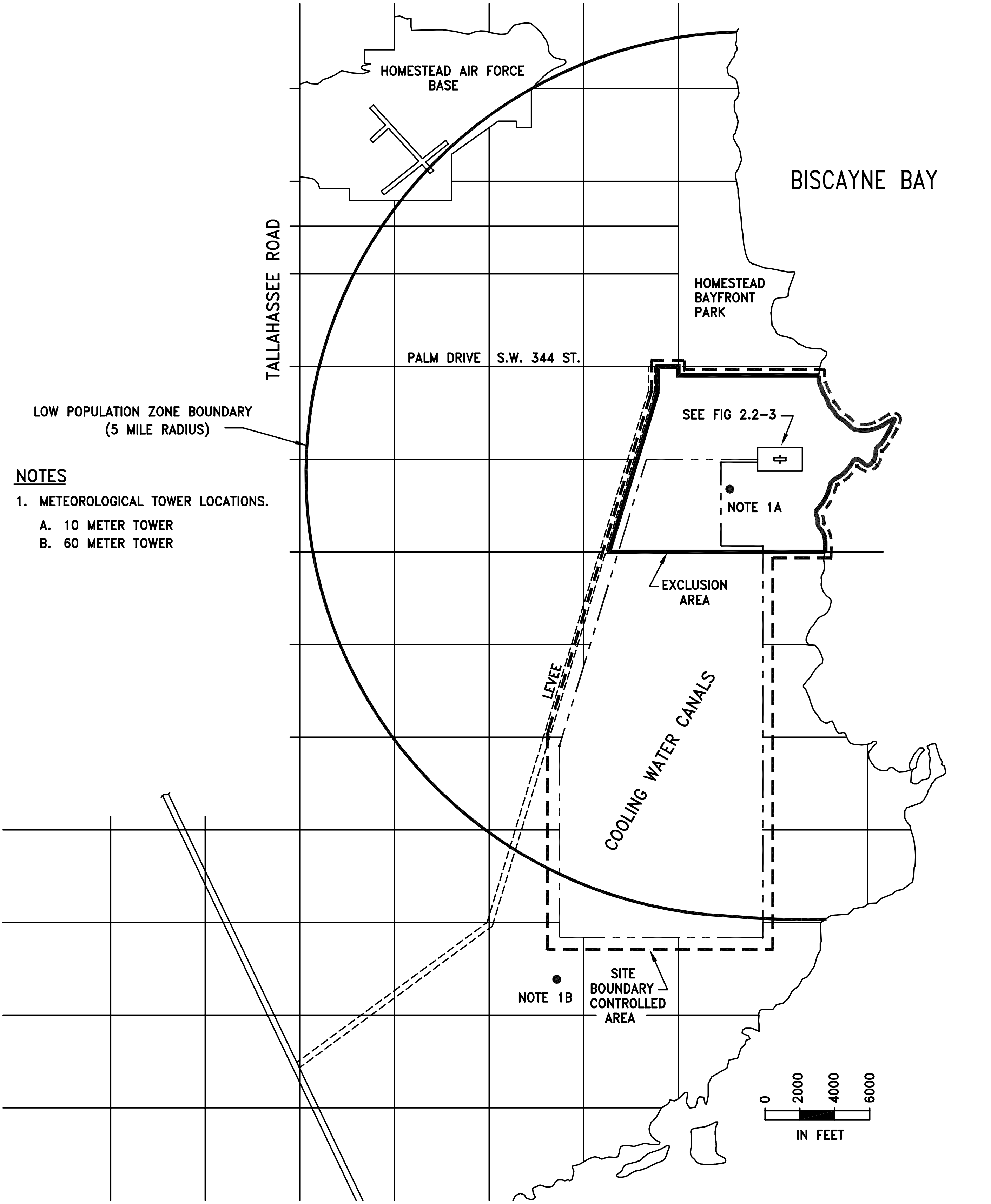
FIGURE 2.2-3

REFER TO ENGINEERING DRAWING

5610-C-2

REV. 16 (10/99)

FLORIDA POWER & LIGHT COMPANY **TURKEY POINT PLANT UNITS 3 & 4**
GENERAL SITE FEATURES **FIGURE 2.2-3**



09/09/2002

FLORIDA POWER & LIGHT COMPANY
TURKEY POINT NUCLEAR UNITS 3 & 4

SITE AREA MAP

FIGURE 2.2-4

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2.3 TOPOGRAPHY

The surface of the land in the Turkey Point area is flat and slopes very gently from an elevation of sea level at the shoreline up to an elevation of about 10 ft at a point some eight to nine miles inland.

The entire Dade County, Florida area is quite flat with the highest level on a ridge in the Miami area which parallels the shoreline. This ridge reaches an elevation of about 20 ft at its high point.

The land in and around the site comprises mangrove swamps from along the shoreline, extending inland three to four miles. Open fields extend westward from the edge of the swamp.

2.4 POPULATION DISTRIBUTION

This section presents updated population estimates for the area surrounding the Turkey Point Nuclear Power Plant. The population estimates for the 10 mile area surrounding the Turkey Point Nuclear Power Plant is based on information from the state of Florida Radiological Emergency Management Plan and is based on 1997 data. The 1990 population estimates for the 50 mile area surrounding the Turkey Point nuclear units is based on 1990 US Census figures. The 1995 population estimates are based on population changes from the 1980 Census and 1985 Dade County Traffic Analysis Zones (TAZs) data, and projections to 1995.

2.4.1 POPULATION WITHIN 10 MILES

In 1997 the Turkey Point Nuclear Power Plant, located in Dade County, Florida, has an estimated 139,833 people who reside within 10 miles of the plant. Figure 2.4-1 and Table 2.4-1 show the sector distribution of the resident population within 10 miles. All of the resident population within 10 miles of Turkey Point live between 5 and 10 miles.[1,3]

Cities, Towns and Settlements

Most of the area within 10 miles of the plant is in Dade County. A small portion of the 10-mile area, south and southeast of the plant, is in Monroe County. The largest population center within 10 miles is the city of Homestead in Dade County. The city of Homestead lies west, west-northwest and northwest of the plant. Most of its area is located between 5 and 10 miles of the plant, except for a small portion which extends beyond 10 miles from the plant.

Florida City lies immediately south of Homestead. Approximately 90% of Florida City's land area is within 10 miles of the plant.

The remainder of Turkey Point's 10-mile area is unincorporated. Most of the area south and southwest of the plant consists primarily of marshland and glades, and contains no resident population. The area west and northwest within 5 miles of Turkey Point consists mainly of agricultural land. Homestead Bayfront Park and the Biscayne National Park Headquarters are located approximately two miles north-northwest of the plant. There are no permanent residents within 5 miles of the plant. Northwest of the plant between 5 and 10 miles is the Homestead Air Reserve Base. Most of the Base is located in sector NW 5-10.

All of the residential development within 10 miles has occurred in sectors W 5-10 through N 5-10. The population in these sectors is concentrated on either side of US Highway 1, from Homestead/Florida City to the southern Miami suburbs.

That portion of Monroe County within Turkey Point's 10-mile radius includes the northern tip of Key Largo. Virtually all of the residents in this area can be found at the Ocean Reef Club. The Ocean Reef Club is a privately-owned community, used both as year-round and seasonal residences. The distinction between a year-round and seasonal residence is not clear, since many people may reside at the Club for six months out of the year. About 5,500 residents at the Club were estimated to be located within 10 miles of the plant.

Population by Annular Sectors

The most heavily populated annular sector within 10 miles of Turkey Point is sector WNW 5-10, with an estimated 44,013 residents. This annular sector includes the majority of Homestead's population, as well as a densely developed area off U.S. Highway 1 on the outskirts of Homestead, known as Leisure City.

Population by Annuli

The annuli within 5 miles of the plant contain very few residents. All of the

resident population is situated in the 5- to 10-mile annulus, with a total population of 139,833.

Population by Sectors

Of the six sectors which have resident population, sector WNW has the highest population, with 44,013 people. The second highest is sector NW, with a total of 25,346 residents. This sector includes most of the residential developments at Homestead Air Reserve Base and dense developments off U.S. Highway 1, primarily along the southeast side of the highway.

Projected Future Population

The population within 10 miles of the Turkey Point plant is projected to increase by a little more than 4% over the next 5 years.

Growth in the vicinity of Homestead is expected to increase at a slightly faster rate than the 10-mile area as a whole. These projections are based on 1980 Census, 1985 TAZ, and 1990 Census figures.[1,12,13,19]

There are several new and expanding residential developments in the 10-mile area which may account for a portion of the area's moderate growth in the past and its projected growth in the future. The largest new development identified during a 1988 field study was Keys Gate at the Villages of Homestead, where 6,200 units are planned over a 12-year period.[33] This residential development is located in sector WNW 5-10. Sector NNW 5-10 includes the Cutler Landings and Hartford Square developments with a combined total of approximately 1,600 units. Another new development in sector N 5-10 is Lakes by the Bay, off of Old Cutler Road.[41] Sectors S, SSW, SW, and WSW out to 10 miles are not projected to be developed. This area includes primarily swamp land.

2.4.2 POPULATION WITHIN 50 MILES

The 1990 Census information estimated that approximately 2,613,535 people reside within 50 miles of the plant.[1] Figure 2.4-3 and Table 2.4-3 show the sector distribution of the resident population within 50 miles, in rose and tabular form, respectively.

Cities, Towns and Settlements

Four counties fall within 50 miles of the plant: Dade, Monroe, Broward and Collier. Dade County is entirely within the 50-mile boundary. A large majority of Monroe and Broward Counties also lie within the area, while only a small portion of Collier County falls in the 50-mile area. The largest population center within 50 miles of the plant is the City of Miami in Dade County. It extends out over the northern, northwestern, and northeastern sectors. The 1990 resident population in the City of Miami was 358,548.[1] The city experienced a population growth of about 3% over its 1980 population of 346,865.[13] A more substantial growth occurred in the area of Key Largo, in Monroe County, located in the southern and southwestern sectors. The population of Key Largo in 1990 was estimated at 11,336.[1] This is a 52% growth over the 1980 population of 7,447.[13] The largest city in Broward County, with a population of 143,444[1] in 1990, located within 50 miles of the plant is Fort Lauderdale. The population in this city experienced a 6% decrease over the 1980 population of 153,279 based on Census information.[13] Collier County contains no population within 50 miles of the plant.

Most of the area west and southwest of the plant between 10 and 50 miles consists primarily of marshland and glades, and contains little population. The eastern, southeastern, and northeastern sectors consist primarily of Atlantic Ocean. Aside from boaters and park visitors, there is no resident population in these sectors.

Population by Annular Sectors

The most heavily populated annular sector within 50 miles of Turkey Point is sector N 20-30, with an estimated 430,335 residents in 1990. This annular sector includes the majority of Miami's population, and Miami Beach.

Population by Annuli

The 20- to 30-mile annulus contains the largest population, with 902,461 residents. The second highest annulus with a population of 707,175 is from 30 to 40 miles. Again, this is due primarily to the intensive development north of the plant in the area of Miami and its suburbs.

Population by Sectors

Of the 11 sectors which have resident population, sector N has the highest population, with 1,330,570. The second highest is sector NNE, with a total of 972,816 residents. These sectors contain all of Miami's residents.

Projected Future Population

The population between 10 and 50 miles of the Turkey Point plant is projected to increase by approximately 11% over the next five years. The Census population from 1980 and 1990 as well as the percent growth rate for the four counties located within 50 miles is presented below.

County	1980 Census Data	1990 Census Data	% Growth (10 Years)
Broward	1,018,257	1,255,488	+23.3
Collier	85,971	152,099	+76.92
Dade	1,625,724	1,937,094	+19.15
Monroe	63,188	78,024	+23.48
TOTAL	2,793,140	3,422,705	+ 22 Average

Collier County does not contribute any population in the 50 mile area and, therefore, its growth rate does not affect these projections.

2.4.3 TRANSIENT POPULATION FOR YEARS 1990 AND 1995

The transient population includes both seasonal visitors staying at overnight accommodations and daily transients. Daily visitors may include persons attending special events and visiting local attractions. Persons attending colleges and major employment facilities constitute daily transients as well. However, many of the daily visitors are also residents in the area, and it is difficult to determine how many of these visitors are also residents.

The population figures presented in this report are based on the estimates from known events in the EPZ. The estimated peak 1990 number of transients expected within 10 miles of Turkey Point was about 21,019. This is presented in Figure 2.4-5 and Table 2.4-5, in rose and tabular form, respectively. The resultant 1995 transient population within 10 miles is presented in Figure 2.4-6 and Table 2.4-6. The transient population in the 50-mile area was not determined in this study. The transient population components are listed below.

Tourists and Seasonal Visitors

The Turkey Point 10-mile area does not experience a significant influx of transient visitors during the winter months. The area does not particularly cater to tourists, since the lack of usable shoreline (i.e., sandy beaches) has prevented the development of major resort facilities. The largest influx of seasonal residents can be found at the Ocean Reef Club in Key Largo. The Ocean Reef Club is a private resort located on the northern tip of Key Largo in Monroe County. It is in annular sector SSE 5-10. The resort has about 1,200 single-family, multi-family, and tourist accommodations.[12,23] In 1988, the Ocean Reef Club was the only resort within 10 miles of Turkey Point.

There are a number of hotel/motel accommodations within 10 miles of Turkey Point in Dade County, most of these being in the Homestead/Florida City area. There are also several campgrounds in the area for visitors using recreational vehicles. The number of seasonal visitors staying at private residences in the 10-mile area was estimated based on the percentage of seasonal units as published in the 1980 U.S. Census of Housing.(14) Since the nature of the area

has not changed significantly in the past few years, this approach was deemed to be appropriate for the Turkey Point area. The total number of overnight tourist and seasonal visitors within 10 miles of the plant was estimated to be 7,396 in 1990. In 1995, the number of seasonal visitors was projected to increase to 8,129. Many of the residents at the Club are accounted for as permanent residents and are included in Section 2.4.1. The remaining were considered to be seasonal residents.

Major Attractions and Events

The Homestead Bayfront Park and Biscayne National Park are the two major recreational parks in the Turkey Point 10-mile area. Both parks, located adjacent to one another are in annular sectors N 1-2 and NNW 1-2. Homestead Bayfront Park is a large recreational park south of the North Canal on Biscayne Bay which also includes a marina. Over 6,000 visitors may attend this park during one week.[37] On the northern side of the Canal is the Biscayne National Park Headquarters. Biscayne National Park includes much of the shoreline from Turkey Point north to Key Biscayne, Biscayne Bay and a number of outer islands. Elliot Key, one of the park's islands, includes a recreational area with a visitor center and camping facilities. In 1987, almost 608,000 visitors attended Biscayne National Park.[36] The Homestead MotorSports Complex, located approximately 5.1 miles west of the plant, currently plans to host at least five major events each year, in addition to several dozen smaller events throughout the year. The complex has a maximum capacity of 65,000 people. Table 2.4-7 shows the estimated 1990 and 1995 population associated with the recreational facilities identified within 10 miles of Turkey Point. A ballpark is located approximately 8 miles west of the plant.

The population associated with major special events is listed in Table 2.4-8. The largest events are those associated with the Homestead MotorSports Complex during major events each year. These events attract about 65,000 visitors. In addition, Homestead Frontier Days attracts about 50,000 visitors during two weeks in January and February. During the two weeks, a number of special attractions are open to the public including the Homestead Rodeo, BMX National Bicycle Race and the Antique Car Show.[18] These individual events

attract thousands of visitors to the area. It is difficult to distinguish between those visitors that live inside the 10-mile radius and those that live outside of it. For the purposes of this study, the peak one-day attendance associated with the Homestead Rodeo has been included in the daily transient population, assuming that 50% of the visitors live beyond the 10-mile radius.

Population at Major Industrial Facilities

Major employment facilities within 10 miles of the plant were identified in 1988 from industrial directories.[7,8] Facilities with at least 50 employees were included in this population segment. Table 2.4-9 lists the employment facilities identified. The Homestead Air Reserve Base was the largest employer in the Turkey Point 10-mile area, employing about 1,900 non-military personnel in 1988.[20] This number was substantially reduced following Hurricane Andrew in 1992. It is reasonable to assume that many of the employees within 10 miles are probably also residents of the area. For this reason, it was assumed that about half of the employees live beyond the plant's 10-mile radius and would therefore contribute to the transient population segment.

Population at Major Colleges

Miami-Dade Community College has a branch within the Turkey Point 10 mile radius. The estimated student population is about 2,100 students. The Homestead Branch also employed about 70 personnel. In addition to Miami-Dade Community College, Florida International University conducts classes at the Homestead Branch. The estimated Student and staff population includes those from Florida International University. As with employees, students attending colleges in the area were included in the transient population segment assuming that 50% of them live beyond the 10-mile area.

2.4.4 LOW POPULATION ZONE

There are no residents within the Turkey Point low population zone (LPZ), based on 1990 Census data. Homestead Bayfront Park is the closest recreational area to the plant and is about two miles north of the plant. About 900 visitors may be present during a peak day at the park. Immediately north is the Biscayne National Park Headquarters in annular sectors N 1-2 and NNW 1-2.

2.4.5 POPULATION CENTER

The closest population center of 25,000 residents or more, is the city of Homestead. Homestead has a 1990 population of about 26,866.[1] Homestead's political boundary is about five miles from the plant at its closest point.[26] However, no resident population exists at this distance from the plant. The nearest populated area of the city of Homestead lies about 7.0 miles west of the plant.

2.4.6 POPULATION DENSITY

The cumulative population densities within 10 miles and 50 miles of the Turkey Point plant are presented in Tables 2.4-11 and 2.4-12, respectively. Sector
WNW has the highest cumulative population density with an average of 1,885 persons/square mile in the 10-mile area and sector N in the 50-mile area with 2,711. A large portion of the city of Homestead is located within the WNW sector in the 10-mile area and a large portion of Miami is in the N sector. The cumulative population densities presented in Tables 2.4-11 and 2.4-12 show that in 1990, of the six sectors within 10 miles which contain residents, five annular sectors exceed 500 persons/square mile. Sixteen annular sectors in the 50-mile area exceed 500 persons/square mile.

2.4.7 METHODOLOGY FOR ESTIMATING THE 1990/1995 RESIDENT POPULATION

The methodology used to estimate the 1990 and project the 1995 resident population within 10 miles of the Turkey Point Nuclear Power Plant are outlined below:

1. 1990 population and 1980 population and housing information was collected from the U.S. Census Bureau,[1,12,13,14] and the State of Florida Division of Population Studies.[3,4] In addition, the 1985 population by Traffic Analysis Zone was obtained from the Metro-Dade Transit Agency.[19,25]

2. U.S. Geological Survey (USGS) maps[2] and Census Bureau maps[1] were obtained. The site's reactor center was used as the centerpoint for both the 10- and 50-mile area population estimates.
Computer-generated

circles at distances of 1, 2, 3, 4, 5, and 10 miles from the plant were overlayed onto maps for the 10-mile estimate and at 10, 20, 30, 40, and 50 miles for the 50-mile estimate. These computer generated circles were also divided into 22.5 degree sectors representing the 16 cardinal compass points.

3. The final 1990 resident population distribution for the 10- and 50-mile areas was estimated and disaggregated to sectors based on 1990 Census tract boundaries for Dade, Monroe, Broward, and Collier counties. The total population within each Census Tract was disaggregated to sectors based on the estimated percentage of population within each sector, as determined through further breakdown of Census Blocks.

4. The 1995 resident population within 10 miles was projected based on the growth trends of the 10-mile area in the past 5 to 10 years. The 1985 Traffic Analysis Zone boundaries falling within each 1990 Census Tract were examined to estimate the 1985 population within each Census Tract. The growth rate between 1985 and 1990 was then calculated. An average growth rate for each sector was then calculated based on the Census Tracts included within a particular sector. The only exception to this was a slightly different methodology used for the Western sector, where TAZ and Census Tract boundaries could not be easily correlated with each other. In this case, the average growth rate of the combined populations of Homestead and Florida City, based on the 1980 and 1990 Census, was applied since these two municipalities make up essentially all of the population within the Western sector.

   The 1995 resident population for the 10- to 50-mile area was projected based on the average growth rate of the counties within 50 miles of the plant, as determined through 1980 and 1990 U.S. Census figures. A calculated growth rate of 11% was applied to the 1990 estimate, for developing the 1995 projections. The same distribution used for 1990 was applied to the 1995 projections.

2.4.8 METHODOLOGY FOR ESTIMATING THE 1990/1995 TRANSIENT POPULATION

The transient population within 10 miles of the plant was estimated based on the number of seasonal overnight visitors and daily visitors. Overnight visitors include seasonal residents, and persons on vacation staying at hotels/motels, campgrounds or with friends. Daily visitors may include those persons attending special events, visiting major attractions, working in the area, or attending major colleges.

In 1988, a field and telephone survey was conducted for the 10-mile area to identify facilities and events associated with the transient population. At that time, the transient population was also projected to 1993 based on the overall growth rate of the 10-mile area. The 1990 transient population presented in this report is based on the information collected in 1988. The 1990 figures were interpolated from the 1988 and 1993 estimates. The 1995 projections for the transient population were also based on the 1988 data, and extend the 1993 projections for two additional years. Each component of the transient population is discussed in more detail below. The methodologies described below outline the procedures carried out during the 1988 study. Where appropriate, additional explanations are provided based on 1990 data.

Overnight Population

The number of seasonal visitors staying at hotels and motels within 10 miles of the plant was calculated based on the number of units at each facility and the specific location of them. The total number of units was multiplied by an average occupancy rate of 2.0 persons per room to calculate the total population associated with these overnight accommodations. Sources used to identify these tourist accommodations included telephone directories,[11] Chamber of Commerce publications,[21,22] and a field survey conducted in 1988.[5]

The number of seasonal visitors at the Ocean Reef Club on Key Largo was calculated based on the estimated number of units at the Club and using an average occupancy factor of 2.0 persons per unit. Approximately half of these residents were counted by the 1990 U.S. Census as permanent residents. The remaining residents were considered seasonal for the purposes of this study.

Since the 10-mile area within Dade County does not provide much in the way of tourist amenities, the number of visitors staying at private residences was not considered to be significant. According to the 1980 U.S. Census of Housing, approximately 0.5% of all housing units in the area were used by seasonal visitors.[14] This same percentage was applied to the 1990 resident estimates to calculate the number of seasonal visitors staying at private residences.

Transient Population at Recreational Attractions and Events

In order to estimate the population at the two major recreational areas within 10 miles of the plant, Biscayne National Park and Bayfront Park, personnel at each of these facilities were contacted.[36,37] At Biscayne National Park, the yearly attendance level was divided by 365 days to estimate a daily attendance at the park. The number of visitors at Elliot Key was estimated based on the yearly number of persons counted at the Visitor Center, the maximum capacity of boat tours to the island[42] and the number of campsites available. At Bayfront Park, a weekly visitor total was divided by seven days to estimate the daily attendance at the park.

The Homestead Motor Sports Complex is located just outside the 5-mile radius of the plant. The capacity of the Homestead MotorSports Complex (HMC) is approximately 65,000 people, and is estimated to hold at least 5 sanctioned events annually.

The capacity of the Homestead Baseball Stadium is approximately 9500.

The highest average daily attendance for a single event (Rodeo) during Homestead Frontier Days in Homestead was used to calculate the daily transient population associated with this major recreational event. Since many of the visitors to this yearly event may also be residents, it was assumed that 50% of these visitors contribute to the transient population and the other 50% are already accounted for in the resident or overnight population.

Transient Population at Major Employment Facilities

The largest employers in the 10-mile area have been listed in Table 2.4-9, along with the number of employees at these facilities as determined during the 1988 field study.[7,8] It is reasonable to assume that many of these

employees are probably also residents of the area. For this reason, it was assumed that about half of the employees live beyond the plant's 10-mile radius and would therefore contribute to the transient population segment. The employee population was allocated to annular sectors based on the particular location of each facility.

Transient Population at Major Colleges

The number of students attending colleges within 10 miles of the plant was obtained by contacting each facility.[45,46,] Since students attending college may travel some distance, it was assumed that, as with employees, of the students attending college in the area, 50% of them live beyond the 10-mile area, and therefore, contribute to the total transient population estimate.

2.4.9 POPULATION PROJECTIONS FOR YEARS 2000, 2005, 2010, AND 2013

The 1990 population for the 10- and 50-mile areas surrounding the Turkey Point Nuclear Power Plant were estimated based on the 1990 US Census figures. The 1995 population was generally based on the change between 1980 and 1990, and projected to 1995. For long term population estimates, the County-wide projections for each of the counties within 50 miles of the plant were used to estimate the population in the years 2000, 2005, 2010 and 2013. The methodology used is described below. The results are presented in the Tables 2.4-13 through 2.4-16.

Methodology for Projecting the Population

Population projections were collected from the Dade County Planning Commission, the Broward County Planning Council and the Monroe County Planning Office. The projected growth rates were applied using the 1990 Census as a base, rather than the 1995 projections performed previously, since the Census data is a widely accepted standard.

In Dade County, projections were available for the years 2000, 2005 and 2010. The County population for the year 2013 was projected from the change between the 2005 and 2010 figures. The County population growth projections were applied to the Dade County 1990 US Census Tracts within 50 miles of the plant. The same distribution as 1990 and 1995 was used for the subsequent years.

In Broward County, projections were available for the years 2000, 2005 and 2010. The change between 2005 and 2010 was used to project the County population to the year 2013. However, the projections were developed prior to

the 1990 US Census and the County's previously projected population for 1990 was approximately 5% higher than the actual 1990 US Census count. The Broward County Planning Council is currently in the process of reconciling this discrepancy. For the purposes of this study, the projections developed by the County prior to the Census count were reduced by 5%, based on this difference. The resultant growth projections were applied to the Broward County 1990 US Census Tracts within 50 miles of the plant. The same distribution as 1990 and 1995 was used for the future projections.

In Monroe County, projections were available for the years 2000, 2010 and 2020. The 2005 population was interpolated from the 2000 and 2010 populations, and the 2013 population was interpolated from the 2010 and 2020 figures. The County growth projections were applied to the Monroe County 1990 US Census Tracts within 50 miles of the plant. The only exception was the area of Key Largo within 10 miles of the plant at the Ocean Reef Club. Key Largo experienced a substantial population increase between 1980 and 1990 (based on the US Census), and the 1995 population projection was based on a higher growth rate than the County as a whole. Therefore, although the same methodology was used, the 1995 projected population was used as the starting point instead of 1990. The same distribution as 1990 and 1995 was used for the future projections.

2.4.10 REFERENCES

1. 1990 Census of Population - Census Tract and Maps Block Data, Bureau of the Census; received from Florida State University.

2. United States Geological Survey topographic maps; revised 1988.

3. "Number of Households and Average Household Size in Florida - April 1, 1986", Population Studies Bulletin No. 79, Stanley K. Smith and Jane Bucca, February 1987.

4. "Counties Population Estimates by Age, Sex and Race - April 1, 1986", Population Studies Bulletin No. 81, Stanley K. Smith and Vachir Ahmed, April 1987.

5. Field survey of 10-mile radius around Turkey Point Nuclear Power Plant, February 1988.

6. Florida Department of Transportation, Topographic Bureau, aerial photographs of Turkey Point 10-mile area, 1985.

7. Directory of Florida Industries 1986-1987, The Florida Chamber of Commerce Management Corporation, Tallahassee, Florida.

8. Florida Manufacturers Register - 1987, Manufacturers News, Chicago, Florida.

9. "Guide to Florida Campgrounds", Jim Stachowicz, Windward Publishing, Miami, Florida, 1981.

10. Florida Applied Demographics, Tallahassee, Florida.

11. Telephone Directory for Homestead; Southern Bell, 1987-1988.

12. 1980 U.S. Census Population and Housing Counts by Enumeration District, Florida State University Computing Center.

13. "1980 Census of Population - General Population Characteristics", Florida PC80-1-B11 Bureau of the Census, U.S. Department of Commerce, issued August 1982.

14. "1980 Census of Housing - General Housing Characteristics", Florida, Bureau of the Census, U.S. Department of Commerce.

15. "Tourism: Lodging", The Florida Almanac 1986-87; edited by Del Marth & Marth.

16. 1987 State Profile - Woods & Poole Economics, May 1987.

17. 1986 Florida Statistical Abstract, Bureau of Economic and Business Research, University of Florida, 1986.

18. Florida Media Guide, January-June 1988; Florida Department of Commerce, Division of Tourism, Tallahassee, Florida.

19. Information Officer, Metro Dade Planning Commission, Miami, Florida, Personal Communication, December 1987 and February 1988.

20. "Recreation-Housing Facts", Greater Homestead Economic Development Corporation, Homestead Chamber of Commerce.

21. Homestead/Florida City Chamber of Commerce, Personal Communication, February 1988.

22. AAA Tour Book - Florida, 1988.

23. Club Attendant, Ocean Reef Club, Key Largo, Personal Communication, February 1988.

24. Ocean Reef Club Properties, Services, Location and Housing Map.

25. Metro-Dade Transit Agency, TAZ and district map and letter dated January, 1988.

26. Trakker's Map of Miami Area Florida Street Map, Trakker Maps, Inc., 1987 Edition.

27. Manager, Grandma Newton's Bed and Breakfast, Personal Communication, February 1988.

28. Manager, Kent Motel, Homestead, Personal Communication, February 1988.

29. Manager, Deluxe Inn Motel, Leisure City, Florida, Personal Communication, February 1988.

30. Manager, Econo-Lodge, Personal Communication, February 1988.

2.4.10 REFERENCES (Cont'd)

31. Manager, Park Motel, Personal Communication, February 1988.

32. Manager, Lucy's Motel, Personal Communication, February 1988.

33. Manager, Keys Gate at the Village of Homestead, Homestead, Personal Communication, February 1988.

34. Manager, San Remo Townhomes, Homestead, Florida, Personal Communication, February 1988.

35. Manager, Hartford Square, Personal Communication, February 1988.

36. Supervisory Park Ranger, Biscayne National Park, Personal Communication, February 1988.

37. Manager, Homestead Bayfront Park and Marina, Personal Communication, February 1988.

38. Manager, Royal Colonial Mobile Home Estates, Personal Communication, February 1988.

39. Manager, Goldcoaster Mobile Home and Travel Trailer Park, Personal Communication, February 1988.

40. Manager, Cutler Landings, Personal Communication, February 1988.

41. Manager, Lakes By the Bay, Florida Personal Communication, February 1988.

42. Boat Captain, Biscayne Aqua Center, Personal Communication, February 1988.

43. Management Information Services, Florida Department of Education, Tallahassee, Florida, Personal Communication, February 1988.

44. Branch Manager, American Red Cross, Greater Miami Chapter, Personal Communication, March 1988.

45. Student Information. Miami Dade Community College, Homestead Branch, Personal Communication, March 1988.

46. Student Information, Florida International University, Homestead Branch, Personal Communication, May 1998.

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TABLE 2.4-1

RESIDENT POPULATION
WITHIN 10 MILES
OF TURKEY POINT PLANT*

DIRECTION	0-1	1-2	2-3	3-4	4-5	5-10	TOTAL 0-10
	DISTANCE (MILES)						
N	2,635	2,500	0	0	0	25,052	30,187
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	5,500	5,500
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	14,129	14,129
WNW	0	0	0	0	0	44,013	44,013
NW	0	0	0	0	0	25,346	25,346
NNW	0	0	0	0	0	20,658	20,658
TOTAL	2,635	2,500	0	0	0	134,698	139,833

* Based on the State of Florida 1997 resident population distribution within 10 miles of Turkey Point (Figure 2.4-1).

TABLE 2.4-2

1995 PROJECTED RESIDENT POPULATION
WITHIN 10 MILES
OF TURKEY POINT PLANT

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TABLE 2.4-3

1990 RESIDENT POPULATION
WITHIN 50 MILES
OF TURKEY POINT PLANT*

	DISTANCE (MILES)					
DIRECTION	0-10	10-20	20-30	30-40	40-50	TOTAL 0-50
N	15,799	213,226	430,335	350,347	320,863	1,330,570
NNE	0	9,746	429,713	349,676	183,681	972,816
NE	0	0	0	0	0	0
ENE	0	0	0	0	0	0
E	0	0	0	0	0	0
ESE	0	0	0	0	0	0
SE	0	0	0	0	0	0
SSE	1427	0	0	0	0	1,427
S	0	1,223	333	0	0	1,556
SSW	0	726	9,826	6,876	1,591	19,019
SW	0	0	0	0	45	45
WSW	0	0	0	58	190	248
W	10,641	521	0	0	0	11,162
WNW	37,006	15,205	0	0	23	52,234
NW	24,813	8,699	0	0	0	33,512
NNW	15,993	142,481	32,254	218	0	190,946
TOTAL	105,679	391,827	902,461	707,175	506,393	2,613,535

* Based on the 1990 U.S. Census.

TABLE 2.4-4

1995 PROJECTED RESIDENT POPULATION
WITHIN 50 MILES
OF TURKEY POINT PLANT*

	DISTANCE (MILES)					TOTAL
DIRECTION	0-10	10-20	20-30	30-40	40-50	0-50
N	16,115	236,681	477,672	388,885	356,158	1,475,511
NNE	0	10,818	476,981	388,140	203,886	1,079,826
NE	0	0	0	0	0	0
ENE	0	0	0	0	0	0
E	0	0	0	0	0	0
ESE	0	0	0	0	0	0
SE	0	0	0	0	0	0
SSE	1,783	0	0	0	0	1,783
S	0	1,358	370	0	0	1,727
SSW	0	806	10,907	7,632	1,766	21,111
SW	0	0	0	0	50	50
WSW	0	0	0	64	211	275
W	11,812	578	0	0	0	12,390
WNW	38,856	16,878	0	0	26	55,760
NW	24,838	9,656	0	0	0	34,494
NNW	16,633	158,154	35,802	242	0	210,831
TOTAL	110,037	434,929	1,001,732	784,963	562,097	2,893,758

* Based on the growth rate calculated for the 10-mile area, as well as the average growth rate for the counties within 50 miles as determined from 1980 and 1990 Census information for the 10- to 50-mile area.

TABLE 2.4-5

1990 PEAK SEASONAL AND DAILY VISITORS
WITHIN 10 MILES
OF TURKEY POINT PLANT

DISTANCE (MILES)

DIRECTION	0-1	1-2	2-3	3-4	4-5	5-10	TOTAL 0-10
N	0	698	0	0	0	85	783
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	284	284
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	1,350	1,350
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	92	92
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	3,489	3,489
WNW	0	0	0	0	0	10,609	10,609
NW	0	0	0	0	0	2,690	2,690
NNW	0	1,602	0	0	0	120	1,722
TOTAL	0	2,300	0	0	0	18,719	21,019

TABLE 2.4-6

1995 PROJECTED PEAK SEASONAL AND DAILY VISITORS
WITHIN 10 MILES
OF TURKEY POINT PLANT

DIRECTION	DISTANCE (MILES) 0-1	1-2	2-3	3-4	4-5	5-10	TOTAL 0-10
N	0	780	0	0	0	94	874
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	319	319
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	1,350	1,350
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	103	103
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	3,916	3,916
WNW	0	0	0	0	0	11,968	11,968
NW	0	0	0	0	0	3,148	3,148
NNW	0	1,795	0	0	0	134	1,929
TOTAL	0	2,575	0	0	0	21,032	23,607

TABLE 2.4-7

VISITORS TO RECREATIONAL FACILITIES
WITHIN 10 MILES
OF TURKEY POINT PLANT

Facility Name	Sector	DAILY VISITORS TO RECREATIONAL AREAS		
		1988 Study	1990 Estimate[3]	1995 Estimate[3]
Biscayne National Park	N 1-2/ NNW 1-2/ E 5-10	1,600[1]	1,680	1,880
Homestead Bayfront Park and Marina	NNW 1-2	860	904	1,014
Coral Castle	WNW 5-10	100[2]	105	118
TOTAL		2560	2,689	3,012

NOTES:

1. Includes about 270 visitors to Elliot Key Island.

2. Since no information was available, the number of visitors has been assumed.

3. Estimates based on 1988 and 1993 projection figures determined in the 1988 study.

TABLE 2.4-8

VISITORS TO MAJOR SPECIAL EVENTS
WITHIN 10 MILES
OF TURKEY POINT PLANT

Special Event	Location	Sector	Time	PEAK ONE DAY ATTENDANCE 1988 Study	1990 Estimate[1]	1995 Estimate[1]
HOMESTEAD:						
Homestead Frontier Days	Harris Field	WNW5-10	Jan. 23- Feb. 7	16,500	17,340	19,440
- Antique Car Show	Harris Field	WNW5-10	Jan. 23- Jan. 24			
- BMX National Bicycle Race	BMX Track	WNW5-10	Jan. 30			
- Rodeo	Harris Field	WNW5-10	Feb. 5-7			
Homestead Motor- 65,000[2] Sports Complex (HMC)	HMC Track	WNW 5	Various[2]			

NOTES:

1. Estimates based on 1988 and 1993 projected figures determined in the 1988 study.

2. Maximum capacity of MotorSports Complex for various events scheduled throughout the year.

TABLE 2.4-9

MAJOR EMPLOYMENT FACILITIES
WITHIN 10 MILES
OF TURKEY POINT PLANT

		NUMBER OF EMPLOYEES
Homestead	Sector	1988 Study
Atlantic Fertilizer & Chemical Co.	NW 5-10	65
Coca Cola Bottling Company of Homestead	W 5-10	50
Florida Rock & Sand	SW 5-10	175
South Dade News Leader	WNW 5-10	100
Homestead Reserve Base (Civilian)	NW 5-10	1,900
TOTAL POPULATION 1988		2,290
POPULATION ESTIMATE 1990		2,407[1]
PROJECTED POPULATION ESTIMATE 1995		2,700[1]

NOTES:

1. Estimates based on 1988 and 1993 projected figures determined in the 1988 study.

TABLE 2.4-10

MAJOR COLLEGES
WITHIN 10 MILES
OF TURKEY POINT PLANT

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TABLE 2.4-11

CUMULATIVE POPULATION DENSITY BY ANNULAR SECTOR
WITHIN 10 MILES
OF TURKEY POINT PLANT*

CUMULATIVE POPULATION 1990

Annulus Miles	N	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
0-1	0	0	0	0	0	0	0	0	0	0	0
0-2	0	0	0	0	0	0	0	0	0	0	0
0-3	0	0	0	0	0	0	0	0	0	0	0
0-4	0	0	0	0	0	0	0	0	0	0	0
0-5	0	0	0	0	0	0	0	0	0	0	0
0-10	15,799	1,427	0	0	0	0	10,641	37,006	24,813	15,993	105,679

CUMULATIVE POPULATION DENSITY
PER SQUARE MILE

Annulus Miles	N	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Annular Average
0-1	0	0	0	0	0	0	0	0	0	0	0
0-2	0	0	0	0	0	0	0	0	0	0	0
0-3	0	0	0	0	0	0	0	0	0	0	0
0-4	0	0	0	0	0	0	0	0	0	0	0
0-5	0	0	0	0	0	0	0	0	0	0	0
0-10	805	73	0	0	0	0	542	1,885	1,264	815	538

CUMULATIVE POPULATION DENSITY COMPARED WITH
A DENSITY OF 500 PERSONS/PER SQUARE MILE

Annulus Miles	N	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Annular Average
0-1	-500	-500	-500	-500	-500	-500	-500	-500	-500	-500	-500
0-2	-500	-500	-500	-500	-500	-500	-500	-500	-500	-500	-500
0-3	-500	-500	-500	-500	-500	-500	-500	-500	-500	-500	-500
0-4	-500	-500	-500	-500	-500	-500	-500	-500	-500	-500	-500
0-5	-500	-500	-500	-500	-500	-500	-500	-500	-500	-500	-500
0-10	+305	-427	-500	-500	-500	-500	+42	+1,385	+764	+315	+38

* Excluding sectors NNE through SE which are in the Atlantic Ocean.

TABLE 2.4-12

CUMULATIVE POPULATION DENSITY BY ANNULAR SECTOR
WITHIN 50 MILES
OF TURKEY POINT PLANT*

CUMULATIVE POPULATION 1990

Annulus Miles	N	NNE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Annular Total
0-10	15,799	0	1,427	0	0	0	0	10,641	37,006	24,813	15,993	105,679
0-20	229,025	9,746	1,427	1,223	726	0	0	11,162	52,211	33,512	158,474	497,506
0-30	659,360	439,459	1,427	1,556	10,552	0	0	11,162	52,211	33,512	190,728	1,399,967
0-40	1,009,707	789,135	1,427	1,556	17,428	0	58	11,162	52,211	33,512	190,945	2,107,142
0-50	1,330,570	972,816	1,427	1,556	19,019	45	248	11,162	52,234	33,512	190,945	2,613,535

CUMULATIVE POPULATION DENSITY
PER SQUARE MILE

Annulus Miles	N	NNE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Annular Average
0-10	805	0	73	0	0	0	0	542	1,885	1,264	815	538
0-20	2,916	124	18	16	9	0	0	142	665	427	2,018	576
0-30	3,731	2,487	8	9	60	0	0	63	296	190	1,079	721
0-40	3,214	2,512	5	5	56	0	0	36	166	107	608	610
0-50	2,711	1,982	3	3	39	0	1	23	106	68	389	484

CUMULATIVE POPULATION DENSITY COMPARED WITH
A DENSITY OF 500 PERSONS/PER SQUARE MILE

Annulus Miles	N	NNE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Annular Average
0-10	+305	-500	-427	-500	-500	-500	-500	+42	+1,385	+764	+315	+38
0-20	+2,416	-376	-482	-484	-491	-500	-500	-358	+165	-73	+1,518	+76
0-30	+3,231	+1,987	-492	-491	-440	-500	-500	-437	-204	-310	+579	+221
0-40	+2,714	+2,012	-495	-500	-445	-500	-500	-464	-334	-393	+108	+110
0-50	+2,211	+1,482	-497	-497	-461	-500	-499	-477	-394	-432	-111	-16

* Excluding sectors NE through SE which are in the Atlantic Ocean.

TABLE 2.4-13

2000 RESIDENT POPULATION
WITHIN 50 MILES
OF TURKEY POINT PLANT*

	DISTANCE (MILES)						
DIRECTION	0-5	5-10	10-20	20-30	30-40	40-50	TOTAL 0-50
N	0	18,438	248,834	502,201	410,369	378,939	1,558,781
NNE	0	0	11,374	501,476	408,877	216,927	1,138,654
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	1,890	0	0	0	0	1,890
S	0	0	1,381	376	0	0	1,757
SSW	0	0	819	11,093	7,763	1,796	21,471
SW	0	0	0	0	0	51	51
WSW	0	0	0	0	66	215	281
W	0	12,418	608	0	0	0	13,026
WNW	0	43,186	17,745	0	0	26	60,957
NW	0	28,957	10,152	0	0	0	39,109
NNW	0	18,663	166,275	37,640	254	0	222,832
TOTAL	0	123,552	457,188	1,052,786	827,329	597,954	3,058,809

* Based on county-wide growth projections obtained from the Dade County Planning Commission, the Broward Planning Council and the Monroe County Planning Office.

TABLE 2.4-14

2005 RESIDENT POPULATION
WITHIN 50 MILES
OF TURKEY POINT PLANT*

	DISTANCE (MILES)						
DIRECTION	0-5	5-10	10-20	20-30	30-40	40-50	TOTAL 0-50
N	0	19,673	265,506	535,849	436,459	400,160	1,657,647
NNE	0	0	12,136	535,074	435,525	229,075	1,211,810
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	1,953	0	0	0	0	1,953
S	0	0	1,426	388	0	0	1,814
SSW	0	0	846	11,459	8,019	1,856	22,180
SW	0	0	0	0	0	53	53
WSW	0	0	0	0	68	222	290
W	0	13,250	649	0	0	0	13,899
WNW	0	46,079	18,475	0	0	27	64,581
NW	0	30,897	10,832	0	0	0	41,729
NNW	0	19,914	177,415	40,162	271	0	237,762
TOTAL	0	131,766	487,285	1,122,932	880,342	631,393	3,253,718

* Based on county-wide growth projections obtained from the Dade County Planning Commission, the Broward Planning Council and the Monroe County Planning Office.

TABLE 2.4-15

2010 RESIDENT POPULATION
WITHIN 50 MILES
OF TURKEY POINT NUCLEAR PLANT*

DIRECTION	DISTANCE (MILES) 0-5	5-10	10-20	20-30	30-40	40-50	TOTAL 0-50
N	0	20,853	281,437	568,000	460,218	416,784	1,747,292
NNE	0	0	12,864	567,179	460,367	238,696	1,279,106
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	2,015	0	0	0	0	2,015
S	0	0	1,472	401	0	0	1,873
SSW	0	0	873	11,826	8,276	1,915	22,890
SW	0	0	0	0	0	54	54
WSW	0	0	0	0	70	229	299
W	0	14,045	688	0	0	0	14,733
WNW	0	48,844	19,583	0	0	28	68,455
NW	0	32,751	11,482	0	0	0	44,233
NNW	0	21,109	188,060	42,572	287	0	252,028
TOTAL	0	139,617	516,459	1,189,978	929,218	657,706	3,432,978

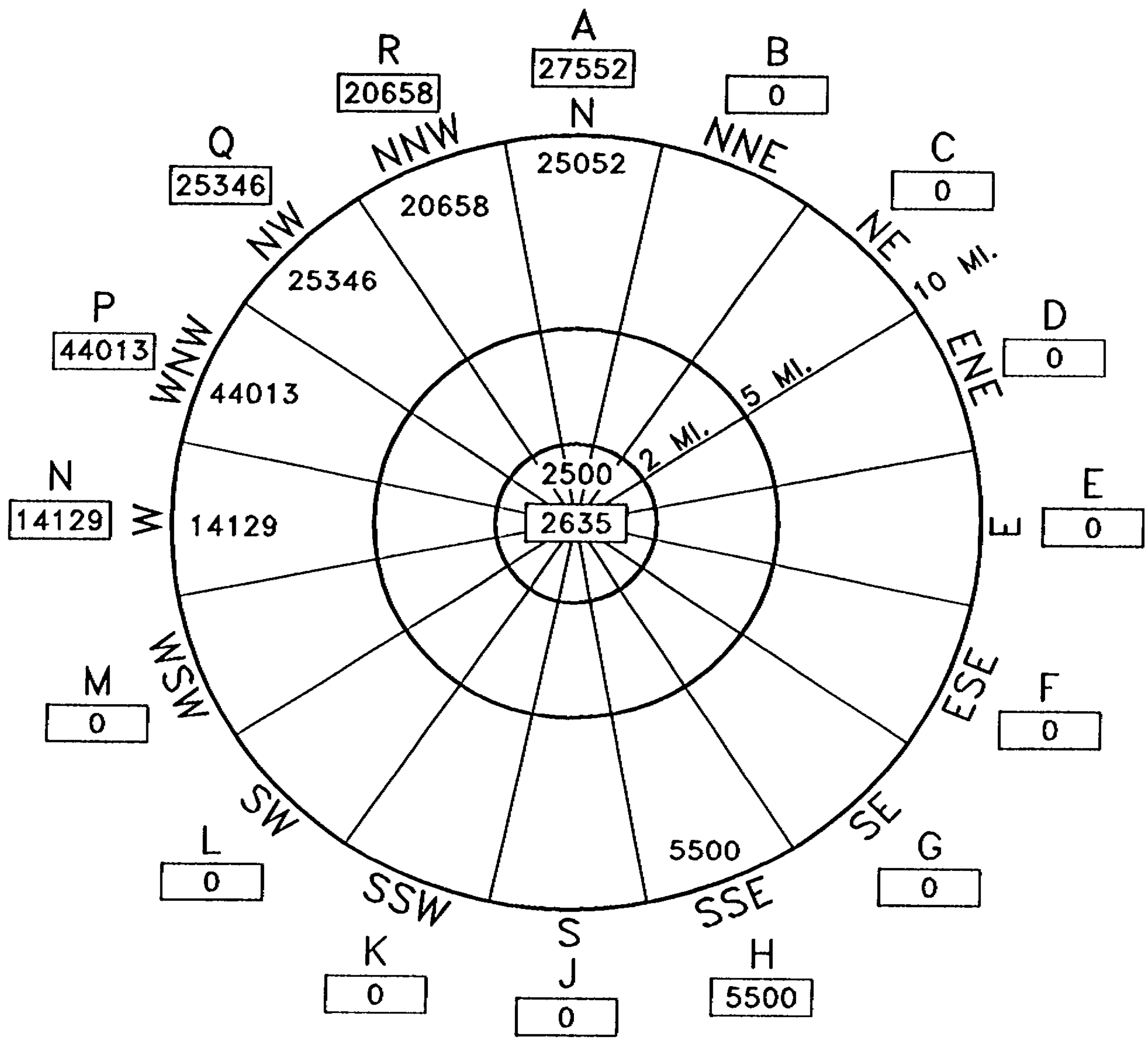
* Based on county-wide growth projections obtained from the Dade County Planning Commission, the Broward Planning Council and the Monroe County Planning Office.

TABLE 2.4-16

2013 RESIDENT POPULATION
WITHIN 50 MILES
OF TURKEY POINT PLANT*

	DISTANCE (MILES)						
DIRECTION	0-5	5-10	10-20	20-30	30-40	40-50	TOTAL 0-50
N	0	21,604	291,568	588,448	475,240	427,391	1,804,251
NNE	0	0	13,327	587,597	476,118	244,664	1,321,706
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	2,082	0	0	0	0	2,082
S	0	0	1,521	414	0	0	1,935
SSW	0	0	902	12,216	8,549	1,915	23,582
SW	0	0	0	0	0	56	56
WSW	0	0	0	0	72	236	308
W	0	14,551	713	0	0	0	15,264
WNW	0	50,602	20,288	0	0	29	70,919
NW	0	33,930	11,895	0	0	0	45,825
NNW	0	21,869	194,830	44,104	298	0	261,101
TOTAL	0	144,638	535,044	1,232,779	960,277	674,291	3,547,029

* Based on county-wide growth projections obtained from the Dade County Planning Commission, the Broward Planning Council and the Monroe County Planning Office.



POPULATION TOTALS			
RING MILES	RING POPULATION	TOTAL MILES	CUMULATIVE POPULATION
0–2	5,135	0–2	5,135
2–5	–	0–5	5,135
5–10	134,698	0–10	139,833

139,833*

Total Segment Population – 0 to 10 Miles
* Includes Transient Population
(within 2 mile ring, there are no permanent residents)

REV. 16 (10/99)

FLORIDA POWER & LIGHT COMPANY
TURKEY POINT PLANT UNITS 3 & 4

1997 RESIDENT POPULATION
WITHIN 10 MILES OF
TURKEY POINT PLANT

FIGURE 2.4-1

FILE: FTM00268.DWG

FINAL SAFETY ANALYSIS REPORT

FIGURE 2.4-2

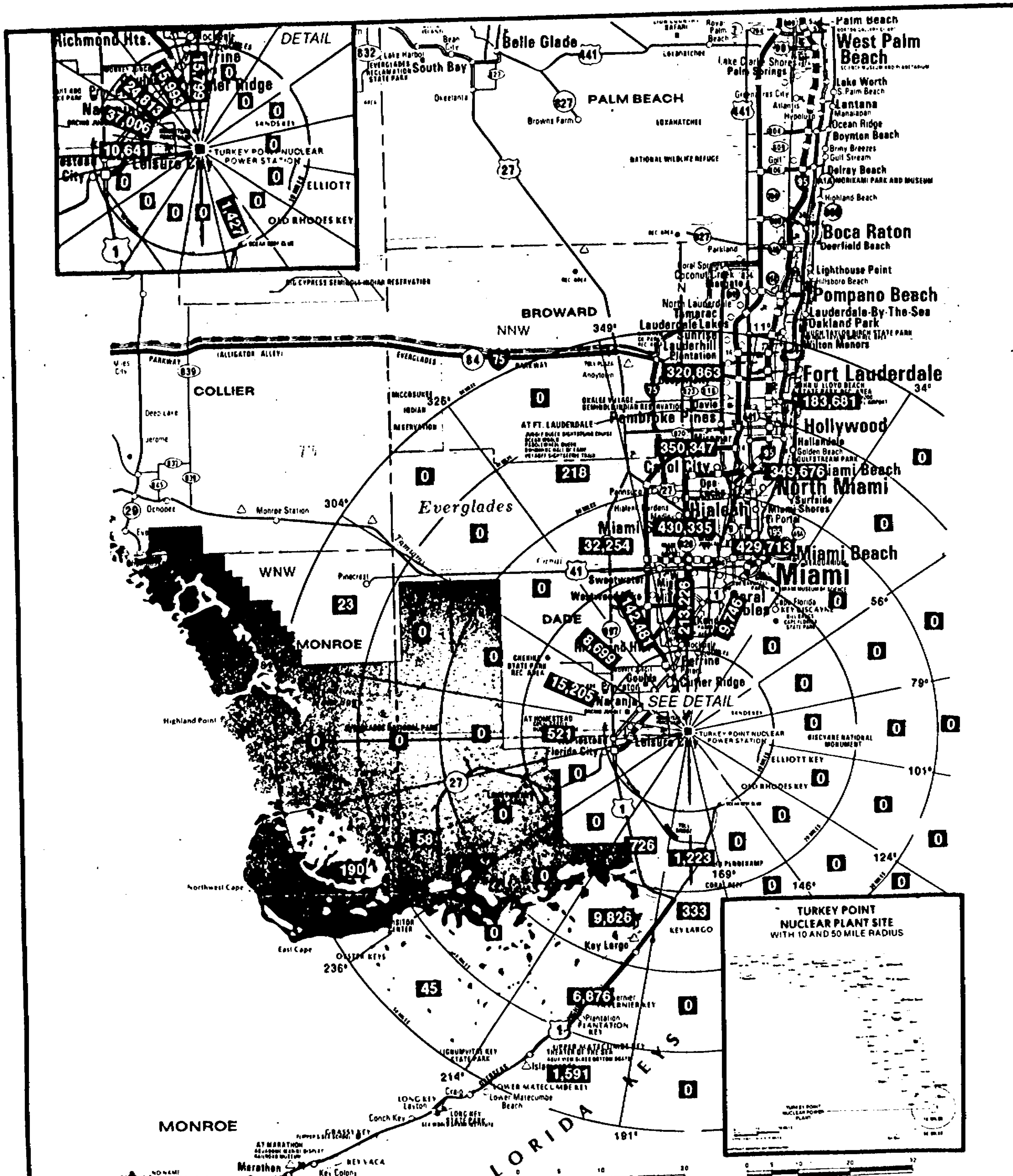
DELETED

Rev. 16 (10/99)

FLORIDA POWER & LIGHT COMPANY
TURKEY POINT PLANT UNITS 3 & 4

1995 PROJECTED RESIDENT
POPULATION WITHIN 10 MILES
OF TURKEY POINT PLANT

FIGURE 2.4-2

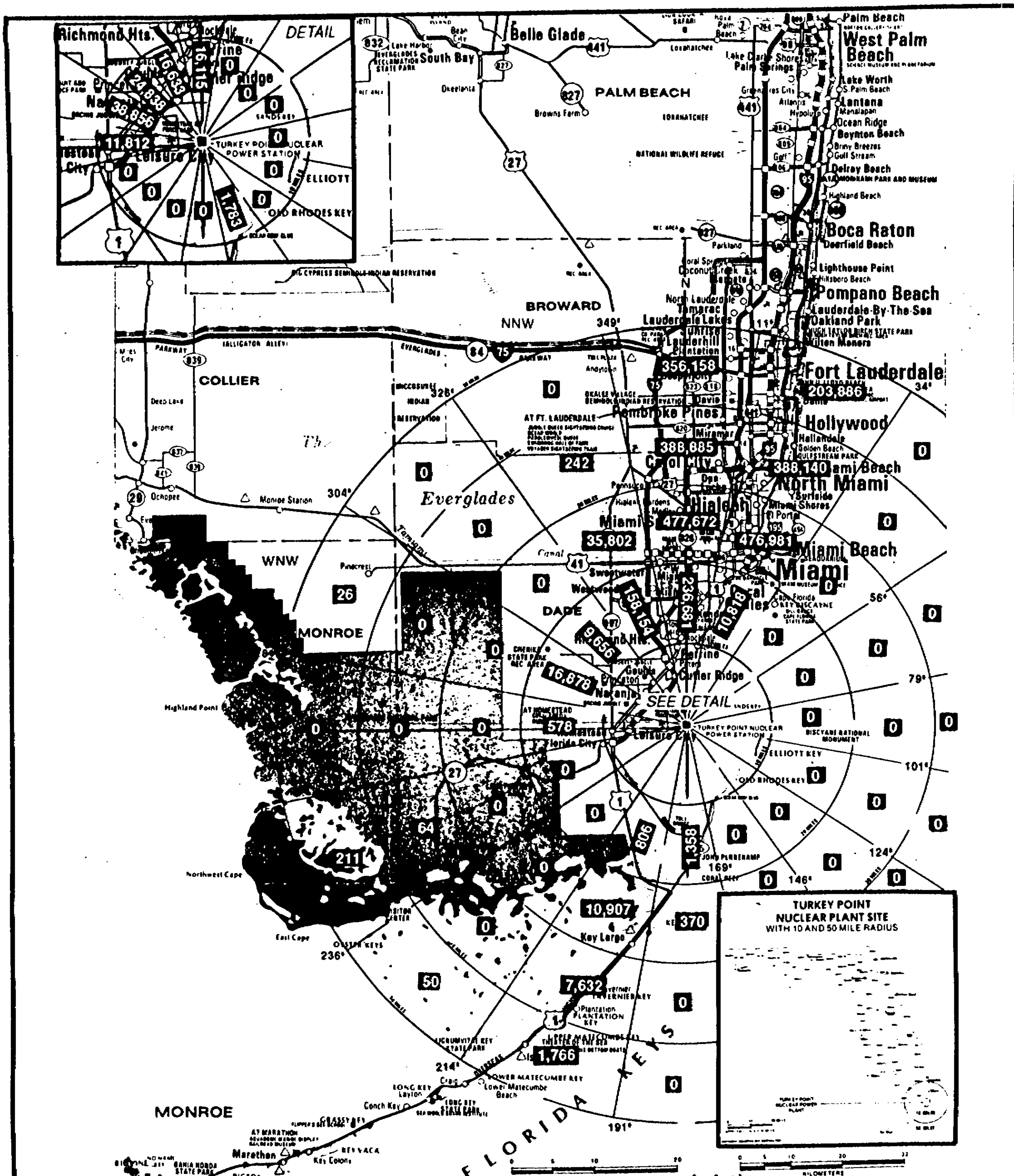


REV. 10 (7/92)

FLORIDA POWER & LIGHT COMPANY
TURKEY POINT PLANT UNITS 3&4

1990 RESIDENT POPULATION
WITHIN 50 MILES
OF TURKEY POINT PLANT

FIGURE 2.4-3

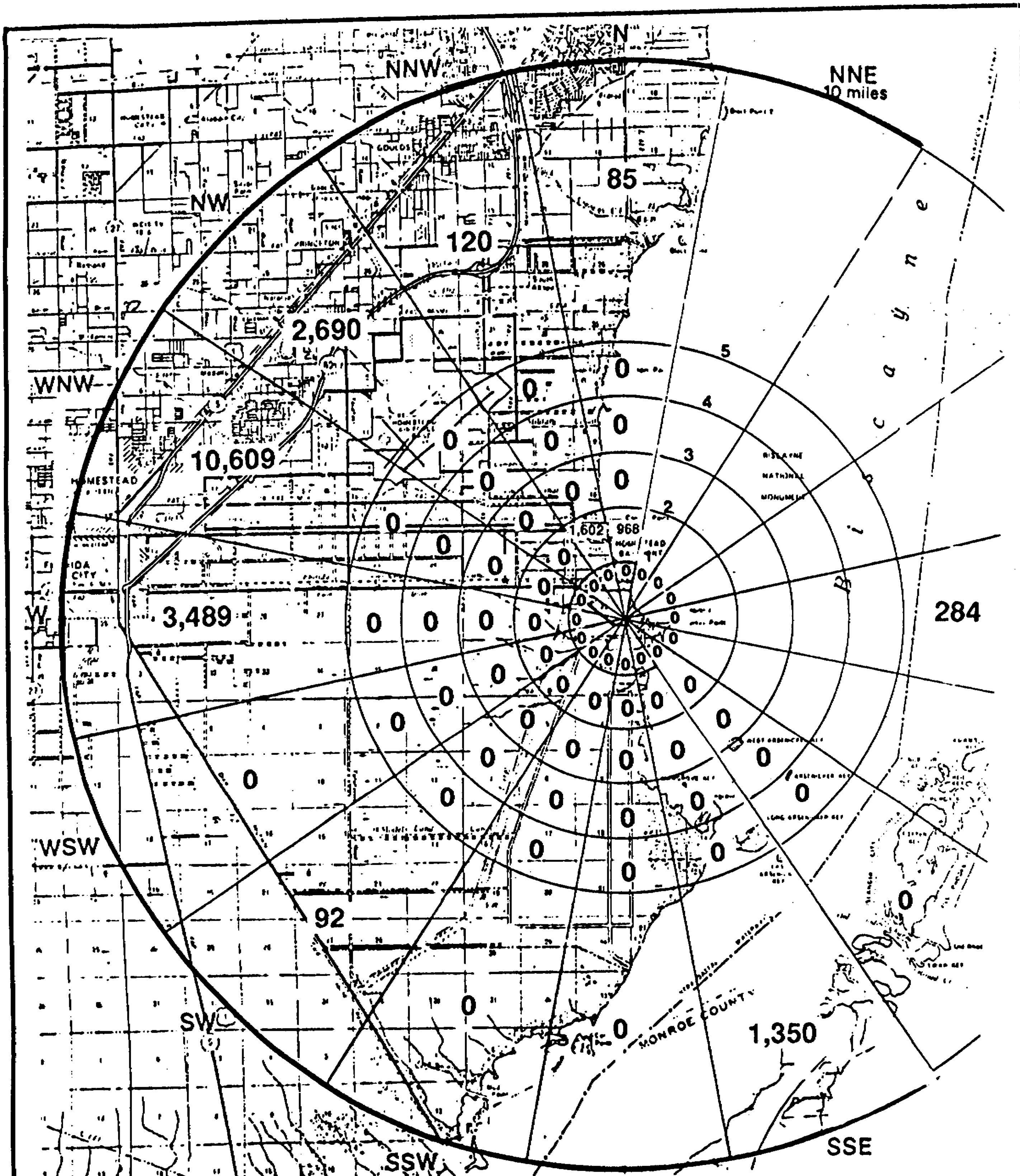


REV. 10 (7/92)

FLORIDA POWER & LIGHT COMPANY
TURKEY POINT PLANT UNITS 3&4

1995 PROJECTED RESIDENT POPULATION WITHIN 50 MILES OF TURKEY POINT PLANT

FIGURE 2.4-4

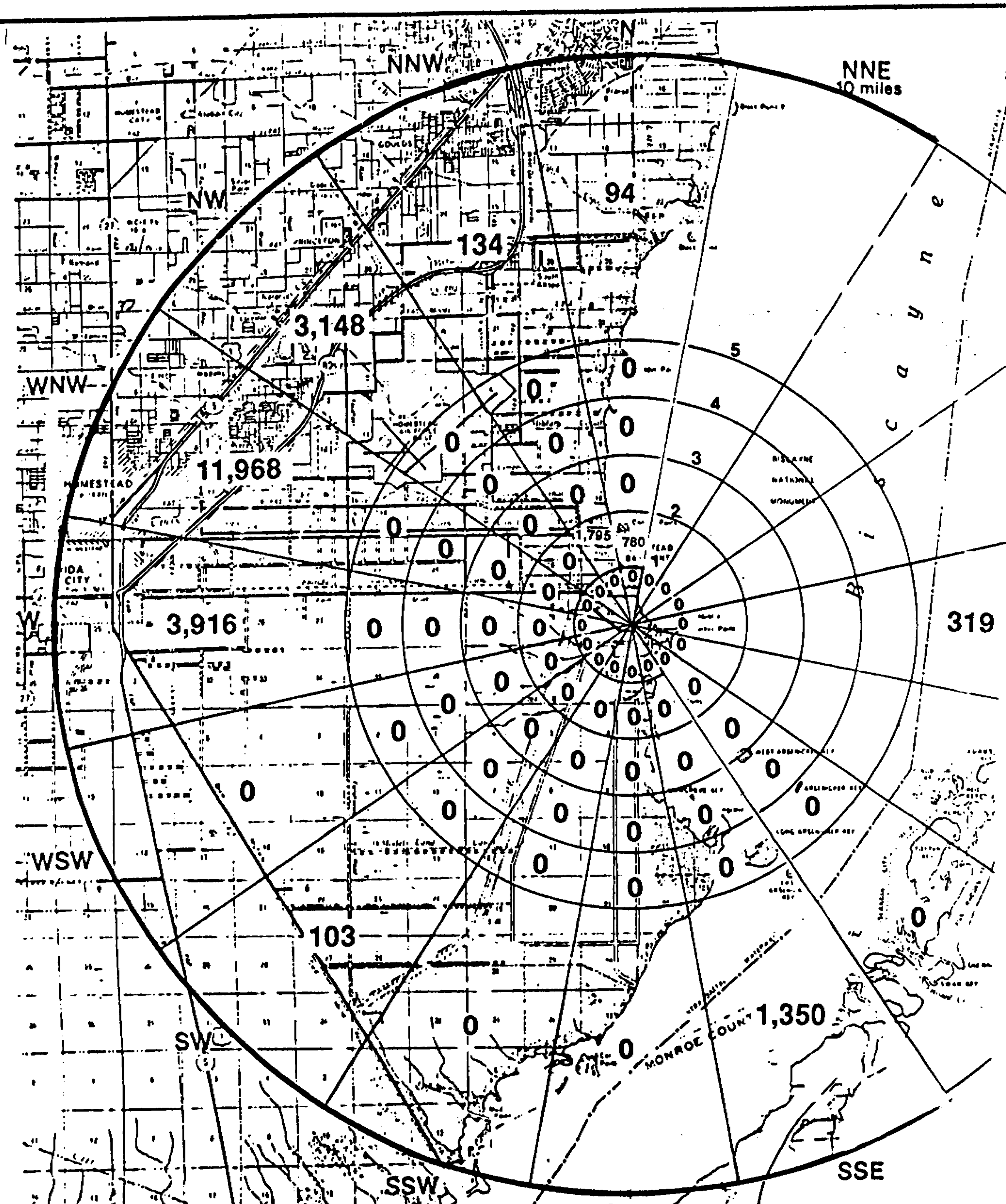


REV. 10 (7/92)

FLORIDA POWER & LIGHT COMPANY
TURKEY POINT PLANT UNITS 3&4

1990 PEAK SEASONAL AND DAILY VISITORS WITHIN 10 MILES OF TURKEY POINT PLANT

FIGURE 2.4-5



REV. 10 (7/92)

FLORIDA POWER & LIGHT COMPANY
TURKEY POINT PLANT UNITS 3&4

1995 PROJECTED PEAK SEASONAL AND DAILY VISITORS WITHIN 10 MILES OF TURKEY POINT PLANT

FIGURE 2.4-6

2.5 LAND USE

The information in this section pertains to studies conducted of the land use of counties adjacent to Turkey Point Units 3 and 4 around the times of construction. This information is for historical purposes only. Current land use information is contained within the Turkey Point Radiological Emergency Plan.

2.5.1 REGIONAL LAND USE

Dade County

An analysis of Dade County's economic base is presented as an introduction to the discussion of land use patterns. In spite of the continuing diversification of its economic base, Dade County's economy is dominated by tourism. It is currently estimated that Dade County is visited by a total of approximately 5 million visitors, on a year-round basis.

Since tourism involves a great number of people making varying expenditures in a variety of ways, its impact upon the economy of an area is extremely difficult to measure and analyze statistically. One of the most reliable methods is to relate total number of lodging units to the ratio of tourist expenditures per lodging unit. It is estimated that on a statewide basis, an average of $9,360 per lodging unit was expended annually by Florida tourists in 1967. Based on these factors, it can be concluded that about $1.7 billion is currently being spent by tourists in Dade County annually. As Dade County's wealth increases, and as it constructs new and improved tourist facilities and services, tourism should remain one of the major foundations of Dade County's economic structure.

As to the overall industrial growth, one of the most notable characteristics in Dade County is the continuing development of manufacturing activities. Table 2.5-1, presents a breakdown of total nonagricultural employment in the county, by type of industry. As indicated, manufacturing accounted for 15.6 percent of total nonagricultural employment in 1967.

According to the Dade County Development Department, the county is already the home of 3,233 manufacturing plants (1966 figure). It is of special

significance that 1,670 of these plants have moved into the area in the past 12 years. In fact, the number of manufacturing firms has increased by 106.8 percent in 12 years from 1,563 in 1954 to 3,233 in 1966. Manufacturing employment has increased at an even greater rate during the period.

Dade County manufacturing is essentially of the light industry type. This is generally the case in young, rapidly growing areas during their early years of industrial development. Table 2.5-2, lists Dade County's manufacturing firms by 20 industrial groups as of 1954 and 1966. This table indicates the

concentration of manufacturing and light industries, such as furniture and fixtures, aluminum products, apparel, and food products.

As is also indicated in Table 2.5-1, those industrial categories which are most directly influenced by tourism such as trade and services, occupy a significant position within the overall industrial framework of Dade County. These two categories (trade and services) combined accounted for 47.9 percent of total nonagricultural employment in Dade County during 1967. The remainder of nonagricultural employment in the county is allocated to government (13.0 percent), transportation, communications and public utilities (11.1 percent), finance, insurance and real estate (6.6 percent), and contract construction (5.8 percent).

While tourism and manufacturing have enjoyed notable development in Dade County, it is significant that agriculture's contribution to the county's economy has also increased. Acreage devoted to agriculture has increased in recent years in spite of the fact that a phenomenally expanding residential and commercial consumption of land has transformed dairy farms, truck farms and avocado groves into residential subdivisions, industrial plants and shopping centers in an extremely short period of time.

The state of Florida is widely known as an agricultural state through wide publicity of its citrus industry and winter truck farming, while little recognition is given to the county's agricultural wealth. The agricultural importance of Dade County, particularly the South Dade or Homestead-Redland district, which includes over 90 percent of the grove and crop land in the county, was indicated by the agricultural census of 1964. According to the latest census, the value of farm products sold in Dade County in 1964 was $48.2 million. The most important crops are tomatoes, snap beans, potatoes, limes, avocados, mangoes, and pole beans. From 1960 through 1964, value of farm products sold in Dade County rose from $46.7 million to $48.2 million. Although the increase was slight, it acquires relevance when compared to the unrelenting expansion of the urban area at the expense of agricultural land which has characterized the county's growth.

Consideration must be given to those aspects specifically relating to the existing and projected pattern of land use in Dade County. The findings of the "Land Use Inventory and Analysis" by the Metropolitan Dade County Planning Department in 1960 are summarized in Table 2.5-3. According to the survey, Dade County's legal boundaries encompass a total area of 2,356 square miles, of which 1,373 square miles are classified as area not subject to development. The area not subject to development includes the entire western half of the county (the Everglades National Park and the Southern Florida Flood Control District), in addition to territorial waters extending three miles out into the Atlantic Ocean.

The inland portions of this area not subject to development are uninhabited and do not exhibit any man-made uses other than existing canals and surface transportation facilities. As it pertains to the coastal waters, they constitute a center of attraction for boating and fishing enthusiasts, particularly in the tourist-oriented northern sectors of the county.

Some commercial fishing also takes place in Biscayne Bay and its adjoining waters. Total commercial fish catch during 1966 in Dade County amounted to 2,193,690 pounds, with a total valuation of $914,310. Relative to the state as a whole, Dade County's fishing industry is of very little significance, as denoted by the fact that the figures quoted represent but 1.1 percent and 2.8 percent of the respective state totals. Biscayne Bay is also the navigational route of access to the Port of Miami facilities in downtown Miami. During the period October 1966 to September 1967, the port handled 2,168 vessels (both passenger and cargo). Traffic at the Port of Miami is projected to increase considerably with the deepening of the access channel and the completion of a new port at Dodge Island.

The survey of land uses by the Metropolitan Dade County Planning Department in the area subject to development (broken down as urban and non-urban) is detailed in Table 2.5-4. There are 10 land use categories indicated: residential; commercial; tourist (which includes hotels and motels); industrial; institutional; parks and recreation; transportation; vacant or undeveloped; agricultural; and water areas, such as small lakes, canals and ponds scattered throughout the total land area. Most of the categories are self-explanatory. The institutional land is utilized for all public and semi-public structural uses, such as libraries, government buildings, hospitals, etc.

The largest single land use category in the county is agricultural, which accounts for a total of approximately 60,000 acres of land. As indicated previously, an overwhelming portion of the land which is dedicated to agriculture in the county is found towards the southern portions in the Homestead-Redland district. The importance of agriculture to the overall economy of the county has also been outlined in the preceding paragraphs.

Residential is the predominant type of urban land use and, in terms of total

acreage in use, it is surpassed only by agriculture on an overall basis (urban and non-urban areas combined) In the urban and non-urban land areas combined, 48,646 acres (representing 7.8 percent of the acreage) were used for residential purposes in 1960. Housing in the Miami area traditionally followed the narrow ridge of high land which stretches along the Atlantic Ocean between Biscayne Bay and the Everglades. The post war era brought about a considerable spread of settlement, not only northward and southward along this ridge, but also westward, penetrating into the Everglades flat land. The largest housing additions were absorbed by the urban core around the City of Miami and on the ocean side north of Miami Beach. During the last ten years, suburban areas in the far northern and southern parts of the county have been subject to intensive residential development.

Industrial uses in the county, accounting for 5,051 acres in 1960, centered in the Hialeah-Miami International Airport area. Other significant concentrations of industry exist in or near the downtown Miami sector and in the northeastern sector of the city bordering the Florida East Coast Railroad tracks. There are scattered industrial concentrations along U. S. Highway 1 in the southern portions of the county. A major industrial concern (Aerojet General) has established operations in this portion of the

county after completion of the 1960 survey. Including land reserved for future expansion, the entire Aerojet operation occupies 73,000 acres of land in the area immediately to the west of the Homestead-Florida City urban complex.

Commercial concentrations are most evident in or near the central core of the City of Miami. There is also an almost uninterrupted pattern of commercial strip development along U. S. Highway 1, extending from the northern county line as far south as Homestead. Although tourist land use categories account for an insignificant portion of total acreage in the county, it must be realized that this classification includes only land occupied by hotels, motels, etc. Even if the amount of land in use for public parks and recreational areas is added, the resultant amount would not be properly indicative of the true importance of tourism to the overall county's economy. A substantial portion of the residential, commercial and industrial development in the county has been motivated by the increased demand generated by a constant influx of tourists. As a general rule, the majority of the tourist-oriented facilities in the county are located on the coastal resort areas of Miami, and in the resort communities of Miami Beach, North Miami Beach and Key Biscayne.

As shown in Table 2.5-4, in the urban area of 200 square miles or 127,382 acres, 29,815 acres (23.4 percent of the total) were vacant in 1960. An additional 2,837 acres (2.2 percent of the total urban area) were being farmed. Most of the vacant and agricultural land in the urban area lies in the fringe sectors; there is very little land remaining available for development in the inner sectors of the urban area. Of the total non-urban

land area of 783 square miles, 42.6 percent or 212,977 acres were vacant and undeveloped. The land is largely high pine land which does not involve expensive draining or filling. An additional 208,455 acres or 41.7 percent of the non-urban areas' undeveloped land consisted of glades and marsh land.

As the pattern of population and commercial growth in Dade County continues to expand outward from the inner cores into the unincorporated areas, it is anticipated that there will be a substantial intensification of land use in the fringe areas. An analysis of the proposed general land use master plan for Metropolitan Dade County, presenting the Planning Commission's 1985 estimate of land use distribution in the county, indicates that the pattern of development during the ensuing 20 years will not bring about any substantial changes in the existing distribution of uses in the county.

Westerly expansion anticipated to take place in residential construction will be implemented at the expense of agricultural land. In spite of this, agriculture should continue to be a leading contributor to overall economic progress in the area. Areas earmarked for future industrial development lie towards the western portions of the county. Tourist and recreational areas will prevail in the eastern coastal areas. Future commercial concentrations will be positioned near major transportation routes so as to maximize accessibility from surrounding areas.

Broward County

Broward County abuts Dade County to the north. There is much similarity in the two counties from the standpoint of their economic structures and their patterns of land use. However, Broward is dependent upon tourism

as a supporting economic activity to a larger extent than Dade. It is estimated that 2.3 million tourists visited Broward County during 1967 and that these tourists spent approximately $527 million. Most of the county's tourist-oriented facilities, as is the general rule along the southeastern coast of Florida, are located towards the eastern coastal areas.

Agriculture is another significant income producing activity in Broward County. The leading crop is winter vegetables and the Pompano Beach area in the northern sector of the county has approximately 10,000 acres dedicated to this type of farming.

Prior to 1950, Broward County was almost wholly dependent upon these two income producing activities -- agriculture and tourism. Neither of these activities were able to establish a stable economic base. Since 1950, the substantial growth of population experienced by the county has, in turn, generated an increasing demand for new housing, services retail and recreational facilities. Naturally, this was accompanied by a broadening of the county's industrial base.

Table 2.5-5, contains the Florida Industrial Commission's estimates of nonagricultural employment in Broward County during 1967 and shows that nonagricultural employment totaled 125,200 in 1967. Of this total, 88.3 percent were engaged in non-manufacturing activities and 11.7 percent engaged in manufacturing activities. Broward County is experiencing gains in manufacturing employment and it is anticipated that manufacturing activities will become an even more important part of the economy of Broward County in ensuing years. Currently, the largest concentration of industry, predominantly of the light type, occurs in the

vicinity of Port Everglades (just south of the City of Fort Lauderdale) and in the western portions of the county.

As is the case in Dade County, other important industrial categories, in terms of employment, are those which are most directly connected to the tourist trade. These categories are wholesale and retail trade and services, accounting for a combined total of 50.3 percent of nonagricultural employment. The remainder of the nonagricultural employment in Broward County is allocated to the following categories: government, 15.4 percent; contract construction, 10.9 percent; finance, insurance and real estate, 6.5 percent; and transportation, communications and public utilities, 5.2 percent.

Monroe County

Monroe County abuts Dade County to the south. Although the bulk of its territory lies in the western half of the end of the Florida peninsula, this area forms part of the Everglades National Park and is not subject to development. The majority of the county's population resides in a series of small islands -- known as the Keys -- which extend in a southwesterly arc from the eastern half of the peninsula. The Keys portion of Monroe County contains beaches and other resort attractions that have promoted extensive tourist industries. The largest city in Monroe County, Key West, is located at the end of the long strip of islands and is the site of a large submarine base upon which the economy of the county is also heavily reliant.

Although the economy of Monroe County still remains mainly tourist-oriented, it has become somewhat more diversified in recent years. The area has

developed certain light industries, most important of which is the seafood packing industry, established to accommodate the superb fishing (sport and commercial) which exists on the Keys. Monroe County accounted for approximately 25 percent ($8.5 million) of the value of the entire Florida commercial fish catch in 1967. Statistics indicate that more shrimp and shellfish are landed in Monroe County than in any other county in Florida. Although the figures quoted above apply to the county as a whole, it must be remembered that almost all of the income accrues to the Keys, since almost all of the fishing boats operate from this area.

Table 2.5-6, presents a breakdown of nonagricultural employment in Monroe County as of March, 1967. As indicated, those industries which are related to tourist activities (trade and services) account for a substantial portion of total employment in this area. Government is the largest single contributor to total employment. Manufacturing occupies a very insignificant position in the overall economic structure of the county and accounts for only 3.5 percent of total nonagricultural employment.

2.5.2 LOCAL LAND USE

Figures 2.5-1 and 2.5-2 indicate the generalized existing and projected (1985) land use pattern within 5 and 10 mile radii of the subject site. This

information is based upon the results of land use studies conducted by the Metropolitan Dade County Planning Commission.

As shown in Figure 2.5-1, approximately one-half of the total area within the 0 - 5 mile radius is formed by coastal waters in Biscayne Bay. Figure 2.5-1 also indicates that a substantial proportion of the land area in the 0 - 5 mile radius is vacant. Commercial and industrial uses are entirely lacking

in this area and residential uses are limited to three non-urban residential, structures. Two of these structures are located in Township 57, Range 40, Section 18, and the third one is in Township 57, Range 40, Section 7. There is a distance of 3.8 miles between the subject site and the nearest residence. (As mentioned previously, these residences are not utilized for permanent occupancy.)

The only significant type of land use in the 0 - 5 mile radius is agriculture, occupying an area of approximately 5 square miles. All of the agricultural land is located in the northwestern quarter of the 0 - 5 mile arc and is mostly used for truck crop farming. This northwestern quarter also includes a recreational area, the Homestead Bayfront Park, located approximately one mile directly to the north of the subject site, and a portion of Homestead Air Force Base. Most of the land area in the southwestern quarter of the 0 - 5 mile arc consists of glades and marsh land, and, therefore, is not suitable for agriculture or any other form of land use.

The initial survey was conducted in 1966, the findings of which were presented in conjunction with the Preliminary Safety Analysis Report. These findings were updated in June, 1968 by means of a second detailed survey of the area within the 0 - 5 mile radius and the results show no significant deviations in the pattern of land use from those of the survey two years before. The following uses exist within the 0 - 5 mile radius:

1. Deleted

2. Homestead Air Force Base transmitter and water tank installations in T-57, R-40, S-7.

3. A total of four machinery houses, one at each of the respective gauging stations in the Military Canal, Mowry Canal, North Canal, and Florida City Canal. (These canals, aligned in an east-west direction, transverse the northwestern quarter of the 0 - 5 mile arc.)
4. A total of five barns, four of which are located in T-57, R-40, S-18, and one in T-57, R-40, S-6.
5. A total of approximately 15 sheds and shacks used for storage of agricultural equipment and tools, and other miscellaneous storage purposes. These are distributed as follows: 2 in T 57, R-40, S-6; 6 in T-57, R-40, S-18; 3 in T-57, R-39, S-24; and 4 in T-57, R-40, S-7.

As it is indicated in Figure 2.5-1, the pattern of land use becomes more diverse in the 5 - 10 mile radius. Nevertheless, there is still a substantial proportion of vacant and agricultural land in this area. The Homestead Air
Force Base, as shown in Figure 2.5-1, is situated just outside the 5 mile radius and occupies a land area of approximately 800 acres. Although not shown in Figure 2.5-1, there is also a Navy installation in the 5 - 10 mile radius, located approximately 7 miles southwest of the site in T-58, R-39, S-22. This installation contains no personnel and is currently being used as a motor pool.

Extensive residential development exists in the peripheral areas of the 10 mile arc. (This area encompasses most of the Homestead-Florida City urban complex.) Commercial and industrial uses are also evident in this area, particularly alongside U. S. Highway 1. To the east, the 5 - 10

mile radius also encompasses the offshore Elliott Key. Excepting approximately 60 part-time residences scattered throughout the Keys, this area remains undeveloped.

Based on the projections of the Metropolitan Dade County Planning Commission, and on the most probable future developments, it appears that the area within the 0 - 5 mile radius will not undergo any residential, commercial or industrial development during the 20 year projection period. Most certainly, the proportion of land dedicated to agriculture in this area will have increased by the end of the 20 year projection period, as suburban expansion continues to absorb good farming land in other sectors of the county.

In the 5 - 10 mile radius, it is anticipated that there will be an intensification in the expansion of residential uses, sprawling from the Homestead-Florida City complex. This will naturally come as a result of the

increases in population that will take place in the area. This residential expansion will be accompanied by additional commercial development and industrial uses; however, these uses are anticipated to remain concentrated in the same areas that they occupy at present.

The projected land use map, shown in Figure 2.5-2, reflects the potential development of the offshore keys into a residential/tourist area (the Islandia Project). There is now a plan approved by Congress to convert the key into a National Park area.

TABLE 2.5-1

Nonagricultural Employment*

Dade County, Florida

1967 Annual Average

	Number	% of Total
Total Nonagricultural Employment	409,300	100.0%
Manufacturing	63,700	15.6
Contract Construction	23,600	5.8
Transportation, Communication and Utilities,	45,400	11.1
Trade	109,900	26.8
Finance, Insurance and Real Estate	27,100	6.6
Services and Miscellaneous	86,500	21.1
Government	53,100	13.0

*Includes only establishments covered by the Unemployment Compensation Law having four or more employees.

Source: Florida Industrial Commission
First Research Corporation

Table 2.5-2

Manufacturing Firms By Industrial Group

Dade County, Florida

1954 - 1966

	Number of Firms		Increase 1954-1966	
	1954	1966	Absolute	Percent
Food Products	183	279	96	52.5%
Tobacco Products	0	8	8	-
Textile Products	9	35	26	288.9
Fabric Products	215	411	196	91.2
Wood Products	67	78	11	16.4
Furniture and Fixtures	169	327	158	93.5
Paper Products	17	49	32	188.2
Printing and Publishing	196	373	177	90.3
Chemical Products	63	157	94	149.2
Petroleum Products	3	17	14	466.7
Rubber Products	0	88	88	-
Leather Type Products	24	55	31	129.2
Glass, Clay and Stone Products	111	212	101	91.0
Primary Metals	10	43	33	330.0
Fabricated Metal Products	218	356	138	63.3
Machinery Products	50	157	107	214.0
Electrical Products	22	112	90	409.1
Transportation Products	40	170	130	325.0
Professional and Scientific Products	21	47	26	123.8
Miscellaneous Products	145	259	114	78.6
TOTAL	1,563	3,233	1,670	106.8%

Source: Dade County Development Department
First Research Corporation

TABLE 2.5-3

Land Use Summary

Dade County, Florida

1960

Area Not Subject to Development	Area in Square Miles
Everglades National Park	650
Central and Southern Florida Flood Control District	368
Biscayne Bay	223
Atlantic Ocean	132
Subtotal	1,373
Area Subject to Development	
Urban Area	200
Non-Urban Area	783
Subtotal	983
TOTAL AREA OF DADE COUNTY	2,356

Source: Metropolitan Dade County Planning Department

TABLE 2.5-4

Land Use Summary

Area Subject to Development

Dade County, Florida

1960

	URBAN AREA		NON-URBAN AREA		TOTAL	
	Acreage	% of Total	Acreage	% of Total	Acreage	% of Total
Residential	44,248	34.8%	4,398	0.9%	48,646	7.8%
Commercial	4,398	3.5	428	0.1	4,826	0.8
Tourist	870	0.6	33	-	903	0.1
Industry	2,575	2.0	2,476	0.5	5,051	0.8
Institutional	3,835	3.1	918	0.2	4,753	0.8
Parks and Recreation	4,796	3.8	354	0.1	5,150	0.8
Transportation	31,516	24.6	10,714	2.1	42,230	6.7
Agriculture	2,837	2.2	57,453	11.5	60,290	9.6
Undeveloped						
Vacant	29,815	23.4	212,977	42.6	242,792	38.7
Glades and Marsh	98	0.1	208,455	41.7	208,553	33.3
Water	2,394	1.9	1,656	0.3	4,050	0.6
TOTAL	127,382	100.0%	499,862	100.0%	627,244	100.0%

Source: Metropolitan Dade County Planning Department

TABLE 2.5-5

Nonagricultural Employment*

Broward County, Florida

1967 Annual Average

	Number	% of Total
Total Nonagricultural Employment	125,200	100.0%
Manufacturing	14,700	11.7
Contract Construction	13,600	10.9
Transportation, Communication and Public Utilities	6,500	5.2
Trade	36,800	29.4
Finance, Insurance and Real Estate	8,200	6.5
Services and Miscellaneous	26,100	20.9
Government	19,300	15.4

*Includes only establishments covered by the Unemployment Compensation Law having four or more employees.

Source: Florida Industrial Commission
First Research Corporation

TABLE 2.5-6

Nonagricultural Employment*

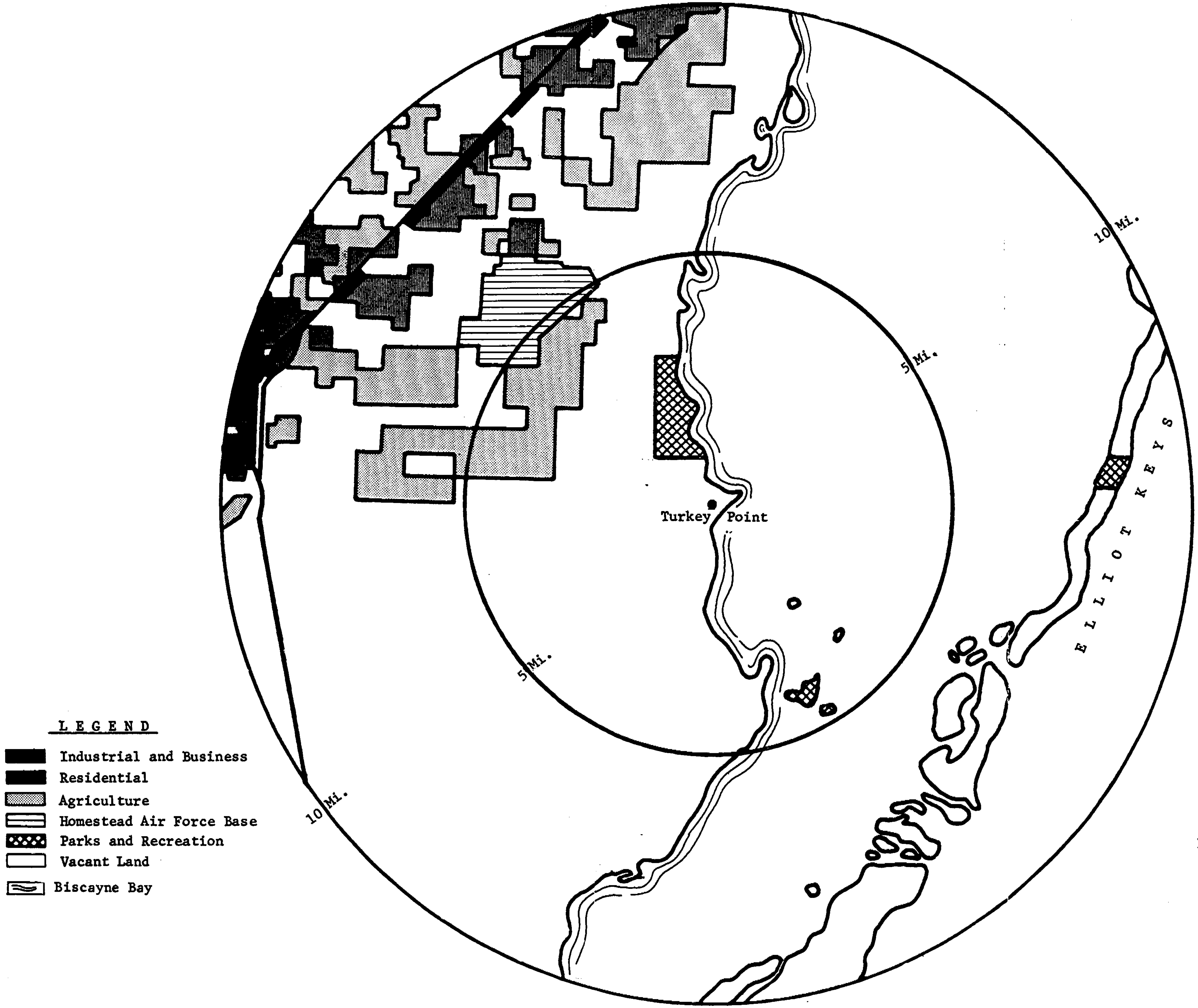
Monroe County, Florida

March 1967

	Number	% of Total
Total Nonagricultural Employment	12,440	100.0%
Manufacturing	440	3.5
Contract Construction	660	5.3
Transportation, Communication and Public Utilities	640	5.2
Trade	3,240	26.0
Finance, Insurance and Real Estate	460	3.7
Services and Miscellaneous	2,900	23.3
Government	4,100	33.0

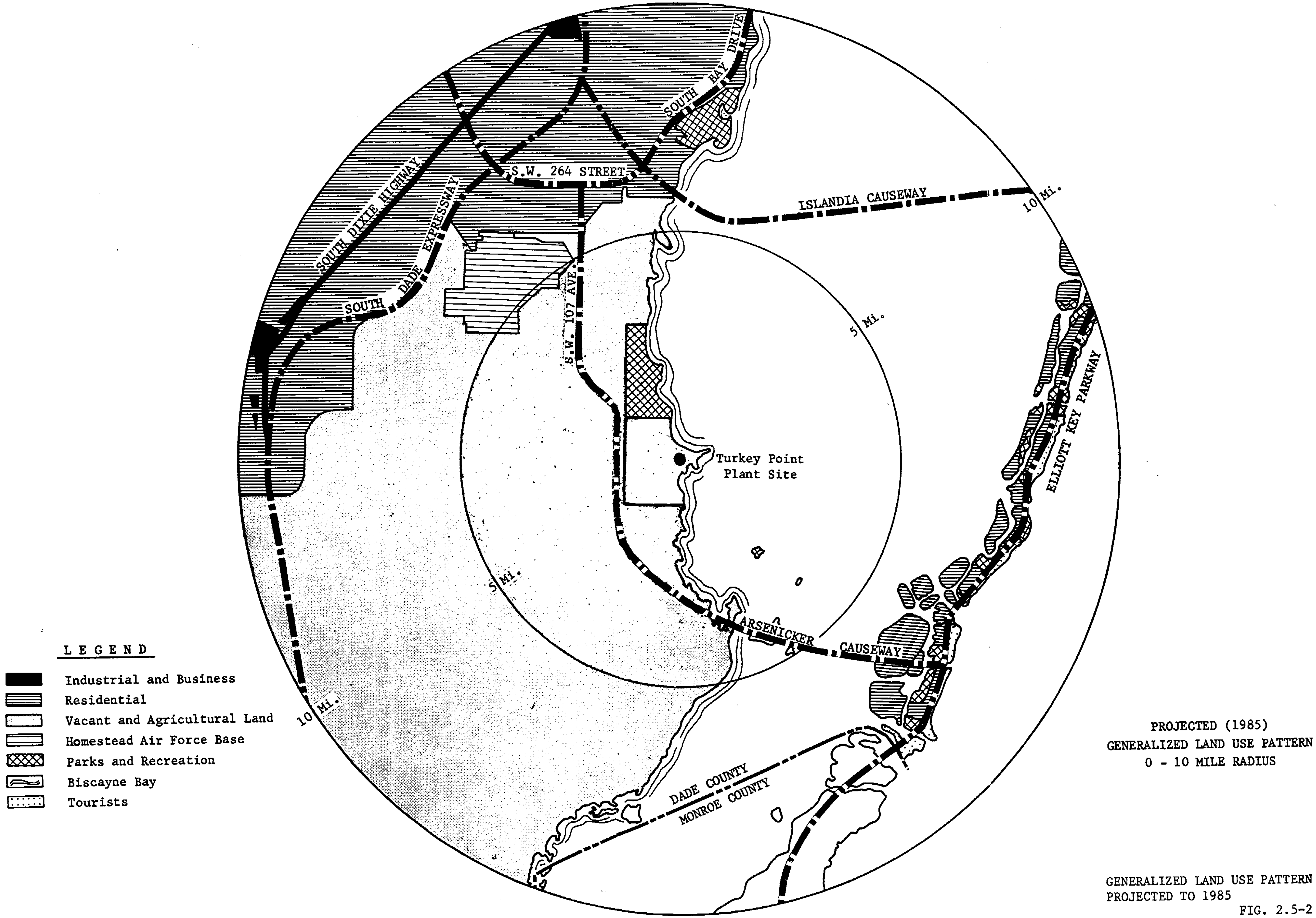
*Includes only establishments covered by the Unemployment Compensation Law having four or more employees.

Source: Florida Industrial Commission
First Research Corporation



EXISTING GENERALIZED
LAND USE PATTERN
0 - 10 MILE RADIUS

EXISTING GENERALIZED
LAND USE PATTERN
FIG. 2.5-1



GENERALIZED LAND USE PATTERN
PROJECTED TO 1985

FIG. 2.5-2

2.6 METEOROLOGY

The plant utilizes two towers to monitor meteorological conditions. The Land Utilization 10-meter meteorological tower is located just south of the plant and collects 10-meter data including temperature, wind speed, wind direction, and sigma theta values. This data is used primarily to supply plant meteorological conditions in support the Emergency Plan requirements. The South Dade 60-meter meteorological tower is located approximately 5.5 miles southwest of the plant and collects wind speed, wind direction, and air temperature at both 10 meter and 60 meter elevations. The data for the two elevations allows for characterization of both lower and upper meteorological conditions and for calculation of vertical temperature differences that provide the preferred means for determining atmospheric stability classes as they are effective indicators of worst-case stability conditions. This information is used primarily in the plant's radiological dose consequence analyses.

Meteorological data for years 2005-2009 was chosen to be most representative of current site conditions and used to support the performance of the radiological dose consequence analyses with the alternative source term for the plant's design basis accidents. The temperature data was biased to account for instrument drift in the vertical temperature differential measurements that were sometimes in excess of that allowed in Regulatory Guide 1.23, Rev 1, "Meteorological Monitoring Programs for Nuclear Power Plants," March 2007. This data was then used to determine the atmospheric dispersion factors (*X/Qs*) for both offsite and onsite applications. See Appendix 2E for a description of the offsite application titled "Short-Term (Accident) Diffusion for the Exclusion Area Boundary and Low Population Zone." See Appendix 2F for a description of the onsite application title "Short-Term (Accident) Diffusion for the Control Room and Onsite Locations." C26

The instrumentation in both meteorological towers has been modified to assure compliance with the requirements of Regulatory Guide 1.23. However, this set of biased meteorological data is not to be used for future licensing activities, i.e., one-time use, and thus is not presented here.

TABLE 2.6-1

CLIMATOLOGICAL DATA

DELETED

C26

Revised 04/17/2013

TABLE 2.6-2

CUMULATIVE PER CENT FREQUENCY OF INVERSIONS BASED 0-100 FT AT
MIAMI AIRPORT - 1960-1964 INCLUSIVE

DELETED C26

TABLE 2.6-3

MEAN TEMPERATURE LAPSE RATE (γ) IN o F/1000 FT WITHIN INVERSIONS
BASED 0-100 FT AT MIAMI AIRPORT 1960-1964 INCLUSIVE

DELETED C26

Revised 04/17/2013

TABLE 2.6-4

MEAN INCREASE IN SURFACE TEMPERATURE (A) IN oF TO PRODUCE AN ADIABATIC LAPSE RATE BELOW THE TOPS OF INVERSIONS BASED 0-100 FT AT MIAMI AIRPORT 1960-1964 INCLUSIVE

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TABLE 2.6-5

MEAN SURFACE TO 1000 MB WIND SPEED SHEAR IN KNOTS (ΔC)
AT TIMES WHEN INVERSIONS ARE BASED 0-100 FT AT
MIAMI AIRPORT 1960-1964 INCLUSIVE

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FINAL SAFETY ANALYSIS REPORT

FIGURE 2.6-1

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TURKEY POINT PLANT UNITS 3 & 4

WIND DIRECTION ROSES - DURING RAIN OR SHINE, HOMESTEAD AFB

FIGURE 2.6-1

FINAL SAFETY ANALYSIS REPORT

FIGURE 2.6-2

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TURKEY POINT PLANT UNITS 3 & 4

WIND DIRECTION ROSES - DURING RAIN OR SHINE, MIAMI AIRPORT

FIGURE 2.6-2

FINAL SAFETY ANALYSIS REPORT

FIGURE 2.6-3

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TURKEY POINT PLANT UNITS 3 & 4

WIND DIRECTION ROSES - DURING RAIN, HOMESTEAD AFB

FIGURE 2.6-3

FINAL SAFETY ANALYSIS REPORT

FIGURE 2.6-4

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TURKEY POINT PLANT UNITS 3 & 4

WIND DIRECTION ROSES - DURING RAIN, MIAMI AIRPORT

FIGURE 2.6-4

FINAL SAFETY ANALYSIS REPORT

FIGURE 2.6-5

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TURKEY POINT PLANT UNITS 3 & 4

FREQUENCY OF WIND DIRECTION
PERSISTENCE BY DIRECTION
HOMESTEAD AFB

FIGURE 2.6-5

FINAL SAFETY ANALYSIS REPORT

FIGURE 2.6-6

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TURKEY POINT PLANT UNITS 3 & 4

FREQUENCY OF WIND DIRECTION PERSISTENCE BY DIRECTION MIAMI AIRPORT

FIGURE 2.6-6

FINAL SAFETY ANALYSIS REPORT

FIGURE 2.6-7

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TURKEY POINT PLANT UNITS 3 & 4

FREQUENCY OF WIND SPEEDS BY DIRECTION, HOMESTEAD AFB

FIGURE 2.6-7

FINAL SAFETY ANALYSIS REPORT

FIGURE 2.6-8

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TURKEY POINT PLANT UNITS 3 & 4

FREQUENCY OF WIND SPEEDS BY DIRECTION MIAMI AIRPORT

FIGURE 2.6-8

FINAL SAFETY ANALYSIS REPORT

FIGURE 2.6-9

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TURKEY POINT PLANT UNITS 3 & 4

MEAN ANNUAL RAINFALL

FIGURE 2.6-9

FINAL SAFETY ANALYSIS REPORT

FIGURE 2.6-10

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TURKEY POINT PLANT UNITS 3 & 4

TEMPERATURE LASPE, SURFACE - 950 MB, MIAMI AIRPORT 7AM

FIGURE 2.6-10

FINAL SAFETY ANALYSIS REPORT

FIGURE 2.6-11

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TURKEY POINT PLANT UNITS 3 & 4

TEMPERATURE LASPE, SURFACE - 950 MB, MIAMI AIRPORT 7PM

FIGURE 2.6-11

FINAL SAFETY ANALYSIS REPORT

FIGURE 2.6-12

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TURKEY POINT PLANT UNITS 3 & 4

TROPICAL STORM PATHS 1886 - 1964

FIGURE 2.6-12

FINAL SAFETY ANALYSIS REPORT

FIGURE 2.6-13

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TURKEY POINT PLANT UNITS 3 & 4

YEARLY EXTREME WATER LEVELS, BISCAYNE BAY, NEAR HOMESTEAD, FLORIDA

FIGURE 2.6-13

2.7 HYDROLOGY (SURFACE WATER)

2.7.1 INTRODUCTION

Studies have been made of the surface drainage characteristics of the site and area. The studies included examination of topographic maps; interpretation of aerial photographs; aerial reconnaissance of the site and vicinity by helicopter; review of reports describing the drainage history of the area, flood control, and drainage projects; and review of storm and flood records.

2.7.2 AREA

The direction of natural drainage of the area is to the east and south toward Biscayne Bay. On the west, the drainage area is essentially limited by the Atlantic Coastal Ridge, a broad low ridge which extends from Miami to southwest of Florida City. The land slopes gradually from the coastal ridge, which is about 5 to 10 ft above MSL at Homestead, southeast toward the site which is at or near sea level. As the geologic history of the Florida Peninsula has been one of slow subsidence, the shallow tidal creeks and broad swales are submerged, and stream flow is extremely sluggish. The permeable limestone bedrock of the area has not allowed development of an integrated surface drainage system, as most of the rainfall is recharged directly to the ground-water reservoir.

There is no lake or perennial stream within the area. Yearly rainfall averages approximately 60 inches, about 75 percent of which occurs during the period from May through October. Roughly two-thirds of the rainfall is recharged to the ground-water system. In the absence of well defined

stream channels, run-off occurs in slow sheet-like flows toward the bay during periods of high precipitation. Evidence of the direction of drainage is shown by the curvilinear drainage lines and vegetation features which are apparent from the air, as seen in Figure 2.2-2. Manmade drainage and flood control canals direct some surface flow away from the site.

2.7.3 SITE

The plant site is located on mangrove-covered tidal flats adjacent to Biscayne Bay. The ground surface elevation is less than 1 foot above MSL. The normal tide range of the bay is about 2 feet, thus the entire site is inundated with sea water during high tide except for that part built up with compacted limestone rock fill. During low tides, brackish water drains sluggishly towards the bay through small, meandering, shallow drainage courses and tidal creeks which traverse the area. However, most of the site area remains under 1 to 3 inches of water, even at low tide. Vegetation consists of brackish water plants such as stunted mangrove and marsh grass. Some pockets of fresh water vegetation are found in circular mounded areas of decayed vegetation known as hammocks. Apart from some fresh water trapped in these areas, all of the surface water and shallow ground water in the vicinity of the site is highly saline because of tidal inundation and salt water intrusion.

2.7.4 SITE FLOODING

Tidal flooding during hurricanes places more water in a short period of time on the area than does rainfall. Therefore, tidal flooding is the major surface hydrologic feature of the area, and rainfall is the minor surface hydrologic feature.

The highest tide that has been measured nearest the site was measured at an elevation of 10.1 ft above MSL during Hurricane Betsy in September, 1965. This station where measurement was made is located 30 ft upstream of the salinity dam on the Florida City Canal. The site is located 1 mile east and 1 mile south of the salinity dam. It has been reported that debris marks from the flood tide associated with Hurricane Betsy were seen approximately 10 ft above sea level at the site.

Because of the low flat terrain, tidal floodwaters move inland several miles and cover large areas. Based on available information, dissipation of floodwaters by sheet flow and through natural and manmade drainage courses requires several days. The amount of infiltration of tidal floodwaters into inland ground-water supplies depends on the amount of water already in the shallow aquifer prior to inundation, with much greater infiltration occurring when prestorm water levels are below normal. During the hurricane period of June through October, the groundwater levels are generally at their highest, the storage capacity of the aquifer is filled, and additional ground-water recharge is at a minimum.

2.7.5 FLOOD CONTROL

Construction of flood control projects in the area reduced the possibility of tidal floodwater reaching agricultural and populated areas. Of special interest is Levee L-31 built by the Army Corps of Engineers, in cooperation with the Central and Southern Florida Flood Control District. This project includes a levee with a crest elevation of about 7 ft above MSL,

running in a north-south direction from a point 9 miles north to a point miles southwest of the site. It passes approximately 2 miles west of the site. The levee and its appurtenant works are designed to provide surface salinity control and flood protection against most non-hurricane storm tides and are not designed to prevent flooding from very severe storms. For storms with extreme high tides of unusually long duration, there would be little reduction in the extent and depth of flooding. However, for a storm of the intensity and duration of Hurricane Betsy, 1965, inland movement of tidal floodwaters would be somewhat reduced, and it is estimated that flooding would be limited to less than 2 miles west of the levee, i.e., 4 miles west of the site. Based on published storm tide frequency studies, it is estimated that a 7 ft tide may occur once every 20 to 25 years.

2.7.6 SUMMARY

Under normal conditions, surface water drains very slowly toward the bay. Near the shoreline, this drainage is influenced by tidal conditions. During hurricanes, large inland areas are covered by floodtides. A small part of such floodwater may reach the ground-water table in the areas of ground-water use. The amount depends on prestorm ground-water table levels. Flood control measures substantially reduce the area subject to flood inundation for all but the most severe storms.

2.8 OCEANOGRAPHY

Card Sound mixing and flushing studies were carried out by the Coastal and Oceanographic Engineering Department of the University of Florida. These studies describe the capability of the Card Sound waters in the vicinity of the cooling water discharge to dilute and disperse the cooling water effluent. The report is issued as Appendix 2C to this section of the FSAR.

2.9 GEOLOGY

2.9.1 INTRODUCTION

A geologic program including a regional geologic survey, borings, test probings, geophysical survey, and other site studies, has been completed.

The geologic characteristics of the site and area have been investigated as follows:

(1) The regional and local geologic structure was identified, and information on the character and thickness of the formations underlying the area was developed. This was based on existing geological data, a study of maps and reports, and discussions with geologists working in the area.

(2) The subsurface conditions at the site were investigated with 50 test borings, ranging in depth from 10 ft to 188½ ft. Rock cores were ecovered from 17 of these borings. In addition, a series of 62 rock probings, a geophysical uphole velocity survey, a ground motion survey, and a downhole television camera survey in a special 24-inch diameter boring were made. Previous to the above work, a series of 206 rock probings had been made in a part of the site. A bedrock surface contour map was made from the boring and probing data. The subsurface conditions were further investigated, via test borings, specifically for the addition of the Unit 4 Emergency Diesel Generator Building. Refer to Section 2.9.4 for additional information.

(3) Samples of rock core were subjected to laboratory tests to evaluate the physical and chemical properties of the foundation rock.

2.9.2 REGIONAL GEOLOGY

The site lies within the Floridian Plateau, which is the partly submerged southeastern peninsula of the North American continental shelf.

The Plateau, which separates the Atlantic deep from the deep waters of the Gulf of Mexico, has been described as a large horst which may be bounded by high-angle fault scarps at the edge of the shelf. In the vicinity of the site, the edge of the shelf is located some 18 miles offshore to the east. The peninsula is underlain by a thick series of sedimentary rocks, which in the southern part of the state consist essentially of gently dipping or flat-lying limestones and associated formations. Beneath these sedimentary formations are igneous and metamorphic basement rocks which correspond to those which underlie most of the eastern North American continent. The sedimentary rocks overlying the basement complex range from 4,000 ft thick in the northern part of the state to more than 15,000 ft thick in southern Florida. The strata range in age from Paleozoic to Recent. Deep borings indicate that in southern Florida the rock in the uppermost 5,000 ft is predominantly calcareous and ranges in age from late Cretaceous to Pleistocene. Mesozoic limestones, chalk and sandstones are underlain by Paleozoic shales and sandstones and Pre-Cambrian granitic basement.

The region is characterized by very simple geologic structures. The predominant structure affecting the thickness and attitude of the sedimentary formations in southern Florida is the Ocala antic line of Tertiary age. This gentle flexure is some 230 miles long and 70 miles wide. The sedimentary formations comprising the flanks of the anticline dip gently away from its crest, the slope becoming less pronounced with successively younger formations. The most recent Pleistocene formations are nearly horizontal. Pleistocene shorelines have been traced as far north as New Jersey, with elevations essentially the same as those in Florida.

It can, therefore, be concluded that no tilting or structural deformation associated with tectonic activity has occurred during the past one-half million years. The closest geologic structure to the north of the site is a gentle, low syncline near Fort Lauderdale, some 50 miles away. The great thickness of Tertiary carbonates indicates that the region has been slowly subsiding for many millions of years. Faults are not common because the strata are undeformed. No fault or structural deformation is known or suspected in the bedrock in the site area.

2.9.3 LOCAL GEOLOGY

The site lies within the coastal lowlands province on the south Florida shelf. The area is practically flat, with elevations rising from sea level at the site to 10 ft above MSL in the Homestead area 9 miles to the west. The predominant surface feature near the site is the Atlantic Coastal Ridge, which represents an area of bedrock outcrop of the Miami oolite. This Pleistocene formation underlies the site, where it is overlain by organic, mangrove swamp soils which average 4 to 8 ft in thickness. Pockets of silt and clay are encountered locally, separating the organic soils and the limestone bedrock.

Local depressions, some of which attain depths as great as 16 feet, are occasionally encountered in the surface of the limestone bedrock at the site. Such depressions are not sinkholes associated with collapse above an underground solution channel, but rather potholes, which are surficial erosion or solution features. These features probably developed during a former period of lower sea level when the rock surface was sub-

jected to weathering and the effects of fresh water.

The Miami oolite, a deposit of highly permeable limestone, extends to about 20 ft below sea level. The rock contains random zones of harder and softer rock and heterogeneously distributed small voids and solution channels, many of which contain secondary deposits. Recrystallized calcite on the surfaces of many of the voids and solution channels is indicative of secondary deposition. This limestone lies unconformably upon the Ft. Thompson formation, which is a complex sequence of limestones and calcareous sandstones.

The upper 5 to 10 ft of the limestone beneath the Miami oolite contains much coral which may represent the Key Largo formation, a coralline reef rock. This formation is contemporaneous in part with both the Ft. Thompson formation and the Miami oolite.

Prior to deposition of the Miami oolite, the surface of the Ft. Thompson formation was subjected to erosion and weathering. The Miami oolite, therefore, fills in irregular depressions in (lies unconformably upon) the surface of the underlying formation. Much of the Ft. Thompson formation is riddled with small voids and cavities resulting from solution action, and is, therefore, extremely permeable. The results of solution activity evident in both the Miami oolite and Ft. Thompson formations are derived from solution by fresh ground water at a former period of lower sea level.

The Ft. Thompson formation, together with the Miami oolite, comprises the bulk of the Biscayne aquifer, a hydrogeologic unit described in Section 2.10.

At a depth of about 70 ft. below sea level, the Ft. Thompson formation unconformably overlies the Tamiami formation, a predominantly clayey and calcareous marl, locally indurated to limestone. The Tamiami formation also contains beds of silty and shelly sands, and is relatively impermeable. The Tamiami and underlying Hawthorne and Tampa formations, all of which are Miocene in age, comprise a relatively impermeable hydrogeologic unit called the Floridian aquiclude, which is roughly 500 to 700 ft. thick in southern Florida.

Because of their composition, the soils and the rock in the site area have negligible base exchange capacity and, therefore, will not effect any significant ion exchange.

The bedrock beneath the site is competent with respect to foundation conditions and is capable of supporting heavy loads.

The fossil-fueled unit (Unit 1) and now dual-convertible synchronous condenser/generator (Unit 2) were constructed prior to the nuclear units (Units 3 & 4). During construction of Units 1 & 2, the entire fossil-fueled unit site was demucked and backfilled with crushed limerock fill. The Unit 4 EDG Building is located within the Units 1 & 2 excavation. After demucking, this area was backfilled up to Elevation +5.0 feet above the mean level of water (MLW). C28

Units 1 and 2 impose heavy loads on limestone and limestone rock fill identical in overall character to that underlying the two nuclear units. The total design load is applied on the foundations of Units 1 and 2 and observed settlements are well below those incorporated for design.

No subsurface conditions were encountered during construction of the nuclear units that materially differed from those presented in the Preliminary Safety Analyses Report. During construction of Units 3 & 4, the building site area was backfilled to the existing grade at elevation 18.0 feet MLW.

2.9.4 SUBSURFACE INVESTIGATION FOR THE UNIT 4 EDG BUILDING

Foundation engineering investigations were performed to evaluate the subsurface conditions in order to determine the most satisfactory foundation system to support the Unit 4 Emergency Diesel Generator (EDG) Building. The investigations consisted of drilling, sampling, field and laboratory testing and engineering analyses.

The results of field explorations and field and laboratory testing programs which provide the basis for the engineering analyses are presented in Reference 1.

This subsection summarizes the results of the subsurface and foundation investigation (Reference 1) specifically conducted for the construction of the Unit 4 EDG Building. Conclusions drawn from this investigation demonstrate the suitability of the site for the safe support of the Unit 4 EDG Building mat foundation.

2.9.4.1 PROPERTIES OF SUBSURFACE MATERIALS

The Seismic Category I Unit 4 EDG Building is founded on a reinforced concrete mat with bottom at Elevation +10.0 feet MLW and supported on compacted limerock fill extending to limestone bedrock (Miami Oolite).

The subsurface soils at the site consist of a limerock fill, sand and silt fill layer, underlain by limerock.

Description	Elevation, ft MLW
Very dense limerock, sand, and silt fill	+18 to - 5
Limestone, sand and silt fill	- 5 to -10
Fossiliferous limerock (Miami Oolite)	-10 to -35

The geophysical survey indicated the following two basic units for the subsurface conditions:

Description	Elevation, ft MLW
Limerock fill	+18 to -10
Miami Oolite	-10 to -35

Exploration

The foundation soil test boring program was developed by Ebasco Services, Inc. and borings were made by Ardaman & Associates of Miami, Florida. The initial Standard Penetration Testing (SPT) boring program consisted of five borings. The site drilling was performed between December 21 and December 29, 1987. A supplementary soil test program consisting of 5 borings was conducted in April 1988. The purpose of this program was to obtain additional information regarding the density of existing fill, verify that no muck exists at the lower levels of the fill, and evaluate the liquefaction potential of the fill. This program is discussed in Reference 1.

Limerock Fill Material

A grain size distribution of a composite sample of limerock fill material was made. Standard Penetration Test samples were combined to create a composite sample. The limerock fill from the samples were classified as light tan silty sand with gravel mixture, SM designation in accordance with the Unified Soil Classified System, ASTM D-2487, Reference 2.

Rock Cores (Miami Oolite)

Five samples were trimmed from the rock cores for unconfined compressive strength determinations. The specific gravity equaled 2.68 and the carbonate content was 96.6%.

A detailed discussion of the test program and the results for both the limerock fill material and the Miami Oolite are presented in Reference 1. See Subsection 2.9.4.4 for in-situ engineering properties including Poisson's ratio, Young's modulus and shear modulus determined by seismic surveys.

2.9.4.2 GEOPHYSICAL SURVEYS

A geophysical testing program was conducted on January 20, 1988. This program is summarized and the results are presented in Subsection 2.9.4.4. The program consisted of a down-hole survey. Both compression and shear wave velocities of the foundation materials were measured at one boring location. These velocities along with the unit weight values of soil and rock determined from laboratory tests were used to compute Poisson's Ratio, Young's modulus and shear modulus of the in-situ materials.

2.9.4.3 EXCAVATIONS AND BACKFILL

Field, geophysical and laboratory data show that the soil on the site at the locations and the depths explored consist, from the ground surface to a depth ranging from 25 to 27 feet, of tan to light tan limerock fill with sand and silt. Underlying the fill material, fossiliferous limestone (Miami Oolite) was encountered to the termination depth of the test borings.

The Unit 4 EDG Building is founded on a reinforced concrete mat with bottom at Elevation +10.0 feet MLW and is supported by existing crushed compacted limerock fill. The limerock fill material is crushed rock, shot rock, or a combination of the two. The static and dynamic engineering properties of these materials are summarized in Subsections 2.9.4.4 and 2.9.4.7.

2.9.4.4 RESPONSE OF SOIL AND ROCK TO DYNAMIC LOADING

The Seismic Category I Unit 4 EDG Building structure is founded on compacted limerock fill extending to limestone bedrock. The seismic design of the Unit 4 EDG Building structure is discussed in Subsection 5.3.4.

A downhole seismic velocity survey was completed on January 20, 1988 in one boring. This seismic survey was carried out to provide information which could be used to augment data collected during the exploratory boring program and to provide estimates of the in-situ engineering properties of foundation materials.

Two surveys were completed and checked against each other. The first survey began at a depth of 41 feet (EL -24.6 feet MLW) and arrival times for compressional and shear waves were recorded at 2-foot intervals up to a depth of 15 feet. A second survey was carried out at 5-foot intervals from a depth of 40 feet (EL -23.6 feet MLW) up to a depth of 5 feet. The results of both surveys were combined to determine the compressional and shear wave velocities for materials beneath the proposed emergency diesel generator building.

On the basis of compressional and shear wave velocities established from the downhole seismic surveys, values for Poisson's ratio, Young's modulus, and Shear modulus were determined. These values are presented below.

Material	Poisson's Ratio	Young's Modulus	Shear Modulus
Limerock Fill	0.256	18.42×10^6 psf	7.38×10^6 psf
Miami Oolite	0.253	46.65×10^6 psf	18.62×10^6 psf

The density of the limerock fill was taken as 125 pcf on the basis of previous studies conducted at the site by Dames and Moore as stated in their report of February, 1967 (Reference 9). The density of the Miami Oolite was taken as 113 pcf on the basis of laboratory tests of samples obtained from the survey boring. Reference 1 provides details of the geophysical test results.

See Subsection 5.3.4 for discussions concerning soil and structure interaction and the design of manholes and ductbanks.

2.9.4.5 LIQUEFACTION POTENTIAL

Liquefaction analysis is based upon the Standard Penetration Test (SPT) data using conservative, standard procedures. The Safe Shutdown Earthquake (SSE) used in the analysis has a peak ground acceleration of 0.15g (see Subsection 2.11.2). Using these criteria, the calculated factor of safety against liquefaction of the fill material is well within safe limits.

A liquefaction analysis was conducted for the area designated for the location of the Unit 4 EDG Building structure. This analysis was based on SPT blow

count records from the boring logs in accordance with the procedure first outlined by H. B. Seed et al. (1983), and modified by H. B. Seed et al. (1985) (References 3 and 4).

Liquefaction potential was systematically evaluated for all sand layers below the ground water table with measured SPT blow count values. This evaluation was performed for all borings. Details of this analysis are presented in Reference 1.

The calculated factor of safety against liquefaction of the fill material is greater than 1.1 which indicated that no potential for liquefaction exists at the Unit 4 EDG Building location.

2.9.4.6 EARTHQUAKE DESIGN BASIS

The evaluation of the maximum earthquake potential is presented in Section 2.11. Based on this analysis, the design earthquake (Operating Basis Earthquake, OBE), has been conservatively established as 0.05g horizontal ground acceleration. The Unit 4 EDG Building, including the diesel oil storage facility, and manholes and ductbanks have also been designed for a Safe Shutdown Earthquake, SSE, of 0.15g ground acceleration to assure no loss of function of this vital system. The maximum vertical earthquake ground acceleration is taken as two-thirds of the maximum horizontal ground acceleration.

2.9.4.7 STATIC STABILITY

The Unit 4 EDG Building is founded on a reinforced concrete mat with bottom at EL +10.0 feet MLW and supported by existing crushed limerock fill. The maximum static uniform foundation pressure for the foundation mat is 6000 psf. Soil properties used in the foundation evaluations were determined from the field, geographical and laboratory data.

Bearing Capacity

Bearing capacity is based upon proven and conservative methods using Terzaghi's equation. The computed ultimate bearing capacity of the mat is

70 ksf, which provides a factor of safety of 7.0 for the allowable backfill bearing pressure of 10 ksf. Therefore, the computed allowable capacity was found to be well above the applied loads. A detailed discussion of this subject is provided in Reference 1.

Settlement

Settlement determination is based upon direct measurement of soil elastic modulus obtained by geophysical testing (Swiger Method - Reference 5). Research indicates that this method yields the most realistic and comprehensive determination of settlement.

The settlement computed by using the down hole shear wave velocity values at the Unit 4 EDG Building site is the most accurate representation of the predicted settlement value.

The computed average settlement of the Unit 4 EDG Building structure due to static loading is 0.163 inches. The maximum differential settlement across the mat foundation is about 0.13 inches. In view of the rigid nature of the Unit 4 EDG Building foundation concrete mat, this settlement is acceptable. These calculated settlements are within acceptable limits from a safety of operations standpoint. A detailed discussion of this subject is provided in Reference 1.

2.9.4.8 DESIGN CRITERIA

Design of mats on elastic foundations require determination of the modulus of subgrade reaction. Based on the average settlements obtained using the geophysical properties and the "SETTLG" computer program, the modulus was calculated from the following equation:

$$K_b = \frac{P}{\Delta Havg} \qquad \text{(Reference 6)}$$

where;

K_b = Coefficient of subgrade reaction for foundation of width b

P = Contact pressure (stress units)

$\Delta Havg$ = Average computed settlement of the mat

The computed value of modulus of subgrade reaction is 185 pci.

2.9.4.9 TECHNIQUES TO IMPROVE SUBSURFACE CONDITIONS

No improvements of subsurface conditions were required for the Unit 4 EDG Building structure.

2.9.5 REFERENCES

1. Ebasco Services Inc. Report No. FLO 53-20E.5009, "Turkey Point Units 3 and 4 EDG Enhancement Geotechnical Investigations and Foundation Analysis for Diesel Building Addition", Rev. 0, August 1988.

2. ASTM Standard D-2487 (1985), "Unified Soil Classification System".

3. Seed, H.B., Idriss, I.M., and Arango, I. (1983), "Evaluation of Liquefaction Potential Using Field Performance Data", J. Geotech. Engg. Div., ASCE 109(3), 458-482.

4. Seed, H.B., Tokimatsu, K., Harder, L., and Chung, R.M. (1985), "Influence of SPT Procedures in Soil Liquefaction Resistance Evaluations", J. Geotech, Engg. Div., ASCE III (12), 1425-1445.

5. Swiger, W.F. (1974), "Evaluation of Soil Moduli", Analysis and Design in Geotechnical Engineering, ASCE Proceeding Vol. II.

6. Foundations and Earth Structures (1982). Design Manual DM7, NAVFAC, Department of the Navy, Alexandria, Virginia.

2.10 GROUND WATER

The information in sections 2.10.1 through 2.10.3 pertains to studies conducted of the ground water and geological features at Turkey Point Units 3 and 4 at the time of construction. This information is for historical purposes only. C25

2.10.1 INTRODUCTION

A study of the ground water hydrology of the site has been completed. This study included review of geology and ground-water reports, review of water level data and historic ground-water conditions, and discussions with ground-water geologists who have worked in the area. Field studies completed at the site included installation of 5 sets of 3 observation wells, which were cased and cemented at 3 different depths at each location, measurement of water levels and tidal response, a pumping test, and injection of dye to evaluate the depth, direction, and rate of groundwater flow. Laboratory studies included salinity and conductivity measurements.

2.10.2 REGIONAL

A large part of southeastern Florida is underlain by the Biscayne aquifer, which furnishes the majority of agricultural, industrial, and municipal fresh water supplies. The aquifer is a hydrogeologic unit which occurs at or close to the ground surface and extends to a depth of 70 ft at the site. The highly porous and permeable limestone formations comprising this aquifer are described in more detail in Section 2.9. The rock consists essentially of oolitic, crystalline and sandy, fossiliferous limestone and coral deposits with random hard and soft layers. The high permeability derives primarily from the numerous small voids and solution channels which are heterogeneously distributed through the aquifer. Some of the voids and channels in the rock are filled with detritus and secondary deposits.

Shallow water table conditions prevail in the area, and the aquifer is unconfined except for a thin (4 to 6 ft) layer of organic soils in the coastal swamp areas. The Biscayne aquifer is underlain by 500 to 700 ft of less permeable limestone, marl, and sandstone strata which comprise the aquiclude overlying the deeper artesian Floridan aquifer. The artesian head in this deeper aquifer is approximately +20 ft MSL at the site. The deep aquifer is not significant in this study except that the positive artesian pressure prevents downward percolation of shallow ground water from the Biscayne aquifer.

Southeastern Florida is a water conservation area extending south and east from Lake Okeechobee. The conservation area consists of large inland areas divided by dikes constructed for the purpose of storing fresh water which otherwise would be wasted by discharge through numerous drainage canals. The water control project and the high permeability and infiltration characteristics of the Biscayne aquifer, together with the highly interconnected surface and ground water flow system, allow excellent control and almost complete management of the water resources of the area.

Ground water levels and the direction and rate of ground water flow in the Biscayne aquifer are products of the topography, rainfall and recharge, hydraulic gradients, canals and drainage channels, ground water use and the hydrologic properties of the aquifer.

Under normal conditions, the water table is near the ground surface, the hydraulic gradient is extremely flat and the ground water moves very slowly (estimated to be about 2,000 ft per year for a hydraulic gradient of 1 ft per mile) toward Biscayne Bay. The flat gradients and directions of ground water flow are consonant with the topography. Most of the water that recharges the Biscayne aquifer is supplied by local rainfall. The amount of annual rainfall varies within relatively short distances. Of the 60 inches of average annual rainfall in the coastal ridge area of Dade County, it is estimated that about 22 inches is discharged by evapotranspiration and surface run off without reaching the water table, and 38 inches reaches the water table. Of this 38 inches, about 20 inches is discharged as ground water flow, and, 18 inches is discharged by evapotranspiration of ground water and by pumping from wells. The magnitude of ground water fluctuations in Dade County varies from 2 to 8 ft in any one year, depending upon the amount and distribution of rainfall in the area. Because of the thin soil cover and very high permeability of the aquifer, recharge to the shallow ground water table from rainfall is extremely rapid.

During periods of extended drought, when recharge is not sufficient to balance evapotranspiration losses, the ground water table in inland areas may be locally depressed below sea level, resulting in reverse direction of ground water flow. Records for a well located about 4 miles southwest of Florida City show that in 7 years out of the 14 years that were studied, the water level has for short periods approached, and at times gone below, sea level. Such conditions, if maintained, would lead to slow inland migration of safe water. However, although the salt water moves inland at depth in the aquifer under low water table conditions, the rate of advance, owing to the extremely low gradient causing encroachment, is so slow that the total advance of the salt water front during 3 or 4 months of extremely low water table conditions is not likely to exceed several hundred feet.

As the water table rises (a result of recharge from rainfall), the rate of advance is decreased, and if recharge continues, the advance of the salt-water front will be stopped; if high water-table conditions are maintained for several months, the salt-water front may be flushed seaward beyond its original position.

Salt-water intrusion has resulted from tidal and storm wave inundation along the coast, leakage from formerly uncontrolled canals which allowed inland migration of salt water, droughts, density variations between salt and fresh ground water, and withdrawal by pumping. At the present time, in the vicinity of the site, the 1,000 ppm isochlor at the base of the Biscayne aquifer is located approximately 4 to 6 miles from the coast. Salinity is generally less in the higher part of the aquifer, suggesting density stratification.

Water sufficiently fresh for irrigation purposes is available from wells located west and northwest of the site. The nearest of these wells is about 3-1/2 miles from the site. The cities of Homestead, Florida City, and Key West derive their ground-water supplies from well fields in the vicinity of Homestead and Florida City. Potable water for the plant is obtained through a pipeline from Rex Utilities, Inc., a private concern 9-1/2 miles distant, which also serves Leisure City near Homestead. The water is obtained from the Biscayne aquifer.

2.10.3 LOCAL

The site is located in an area of shallow, extremely permeable, limestone bedrock, with a very high water table. Because the natural ground elevations at the site are generally less than 1 ft. above MSL and the normal tide range in Biscayne Bay averages 2 ft., the site is subject to tidal inundation. At the site, the Biscayne aquifer is overlain by a shallow deposit, approximately 5 ft. thick, of organic swamp soils. The base of the aquifer is at a depth of approximately 70 ft. below sea level, where it is underlain by less permeable limestone and sandstone strata.

Because of tidal inundation, the ground water and surface water at and in the vicinity of the site are highly saline. The water table responds very rapidly to rainfall and tidal fluctuations. Observations of water level fluctuations in selected observation holes and hydrologic holes located approximately 1,300 to 2,900 ft. from the shore, show that the water level rises and falls in accordance with tidal variations, but with an approximate 25 percent to 50 percent head loss and a 2 to 3 hour time delay.

Dye studies to evaluate the rate, direction, and depth of ground water flow at the site indicate that the lateral movement of ground water at the site is very slow. No dye appeared in observation wells within 140 ft. of the injection point even 23 days after injection. Observation of suspended matter by means of a downhole TV camera showed no sign of any lateral movement of ground water

2.10.4 Site Conceptual Model

This section summarizes the Site Conceptual Model for ground water flow and tritium migration at the Turkey Point site as presented in Conestoga-Rovers & Associates Report No. 051293-2, dated November 2009.

The Turkey Point site employs the use of fossil, nuclear, a dual-convertible synchronous condenser/generator, and combined cycle units for commercial electric power generation. Unit 1 is a fossil-fuel unit, Unit 2 is a dual-convertible synchronous condenser/generator, while Units 3 and 4 are nuclear reactors. Unit 5 is a combined cycle unit (employing four natural gas turbines and one heat-recovery steam-powered generator). In addition to the nuclear and fossil-fuel units, the site features a 5,900 acre system of closed recirculating cooling canals which four of the five units use for heat rejection (Unit 5 does not use the cooling canals). C28

The site is bounded by a system of artificial intake, discharge, and cooling canals that are hydraulically connected to the surrounding natural water bodies. These canals serve to direct and control the shallow ground water regime in the immediate vicinity of the site. During construction, the native overburden was excavated in order to build the site structures. Some foundations for the site structures extend to a depth of 45 feet below the land surface. Engineering backfill was used around the foundation footprint. The presence of these structures and the backfill serve to locally alter the direction and rate of groundwater flow where they exist. The underlying rock formations in the Biscayne Aquifer are highly permeable and allow for relatively quick ground water flow and diffusion.

Operation of the site cooling water system through the use of the intake and discharge canals significantly influences ground water flow. Ground water generally flows from west to east in response to the hydraulic heads in the intake and discharge canals. The typical difference between the intake and discharge canals is 1 to 3 feet. A portion of the ground water beneath the site discharges to the intake canal, where it is captured and subsequently used as cooling water prior to discharge to the cooling canals.

Shallow and intermediate ground water flow also is affected by surface water tidal fluctuations and subsurface structures that channel or impede ground water flow. Ground water flow direction in the deep wells appears markedly different than the shallow flow, with flow generally in the northerly direction. Ground water flow velocities were calculated to be on the order of several feet per day, primarily due to the high hydraulic conductivities associated with the underlying coral rock. Vertical gradients across the site appear varied geographically. For the monitoring period, the southern portion of the site indicated a positive or upward (deep-to-shallow) potential for ground water flow, while the northern portion of the site indicated a downward gradient potential. The center portion of the site, where the most significant penetration of building structures has occurred, indicated little or no vertical gradient.

Evaluation of daily tidal fluctuations on ground water indicated the greatest influence occurred in those monitoring wells located along the eastern half of the site, near the canals and turning basin. In general, there is a relatively consistent tidal influence of 0.2 to 0.5 feet maximum tidal C25
fluctuation on ground water elevations at the site. Ground water flow directions within the shallow, intermediate, and deep regimes indicated little variability due to tidal influences.

Tritium migrates with ground water flow, and the tritium discharges into the intake canal are captured and used in the cooling water system. After use by the plants, the cooling water is discharged to the discharge canal, and ultimately to the cooling canals. Surface water in the cooling canals is noted as routinely having detectable tritium concentrations. The cooling canals are in direct hydraulic connection to the underlying sediments and coral rock, and a near continuous exchange of surface water in the cooling canals and ground water within the sediments presumably exists. However, the potential for tritium in the ground water at the site due to this exchange is unlikely to present an environmental or health risk either on-site or off-site. Facility personnel are provided a municipal source of drinking water and a surficial aquifer is essentially non-existent. As such, health risks due to human consumption do not appear credible. Restrictions on shoreline access near the plant would also serve to minimize the risks to boaters and recreational fishermen. Therefore, based on the ground water and surface water data provided, none of the potential receptors identified are at a credible risk of exposure to concentrations of tritium.

2.11 SEISMOLOGY

2.11.1 INTRODUCTION

Records of the earthquake history of southeastern United States and Cuba have been used to develop estimates of the maximum expected and maximum hypothetical earthquakes which could affect the site. All recorded earthquakes felt in Florida have been plotted and considered in the analysis.

2.11.2 EARTHQUAKES

Records show that there have been no more than 7 shocks in the past 200 to 250 years with epicenters located in Florida. Two of these had epicentral intensities of no more than VI (Modified Mercali). Neither of these was felt in southern Florida. Five others were exceedingly small and may have been caused by explosions or submarine slides rather than earthquakes. Other shocks have had epicenters in Cuba. The closest to southern Florida was approximately 250 miles to the south at San Cristobal, Cuba. The largest shock nearest the area was the Charleston, South Carolina earthquake in 1886, with an epicentral intensity of X (Modified Mercali).

On the basis of historical or statistical seismic activity, Turkey Point is located in a seismically inactive area, far from any recorded damaging shocks. Even though several of the larger historical earthquakes may have been felt in southern Florida, the amount of ground motion caused by them was not great enough to cause damage to any moderately well built structure. The Uniform Building Code (1964 edition, Volume 1, as approved by the International Conference of Building Officials) designates the area as Zone 0 on the map entitled "Map of the United States Showing Zones of Approximately Equal Seismic Probability."

Limestone bedrock is at or near the ground surface at the site. The site area is far from any folded or deformed sediments, and surface faults are unknown.

Predicated on history, building codes (which do not require consideration of seismic loading), geologic conditions, and earthquake probability, the design earthquake has been conservatively established as 0.05 g horizontal ground acceleration. The nuclear units have also been checked for a 0.15 g ground acceleration to assure no loss of function of the vital systems and structures. Vertical acceleration is taken as 2/3 of the horizontal value and is considered to act concurrently.

2.12 ENVIRONMENTAL MONITORING

2.12.1 GENERAL

The environmental monitoring program is designed to accomplish two objectives.

The first objective was to determine the existing level of background radioactivity resulting from natural occurrence and global fallout in the Turkey Point Plant environs before radioactive materials are delivered to the site. This preoperational phase began approximately one year before nuclear fuel was received at the site and continued until the first nuclear reactor went critical.

The type, frequency, and location of samples included in the preoperational environmental monitoring program were selected on the basis of population density and distribution, agricultural practices, sources of public water and food sources, industrial activities, recreational and fishing activities in the area. In addition, the natural features of the environment including meteorology, topography, geology, hydrology, hydrography, pedology, and natural vegetative cover of the area were also considered. Accessibility within the area and the necessity for protecting the sampling equipment from vandalism limited the choice of available sampling sites.

In the design of the preoperational monitoring program, various factors were studied in the preliminary evaluation of available or possible exposure pathways including: (1) method or mode of radionuclide release, (2) estimated isotopes, (3) activity, (4) chemical and physical form of radionuclides which may be expected from the operation of the facility.

During the preoperational phase, procedures were established, methods and techniques were developed and a continuing review of the program made to verify the suitability and adequacy of the environmental monitoring program. See Figure 2.12-1.

The second objective of the environmental monitoring program is to determine the effect of the operation of the nuclear units on the environment. This operational phase began with initial criticality, startup and subsequent operation of units 3 and 4, and is essentially a continuation of the preoperational program.

Significant quantities of radioactive materials should not be released to the environment during the operation of the nuclear units and the monitoring program is designed to demonstrate this. The sampling and analysis program is described in the Offsite Dose Calculation Manual (ODCM) in accordance with the plant Technical Specifications.

2.12.2 AIR ENVIRONMENT

The air environmental monitoring program was designed to determine existing natural background radioactivity and to detect changes in radiation levels in the air environment which may be attributed to the operation of the nuclear units.

2.12.3 WATER ENVIRONMENT

The water environmental monitoring program was designed to determine existing natural background radioactivity and to detect changes in radiation levels which may be attributed to the operations of the nuclear units.

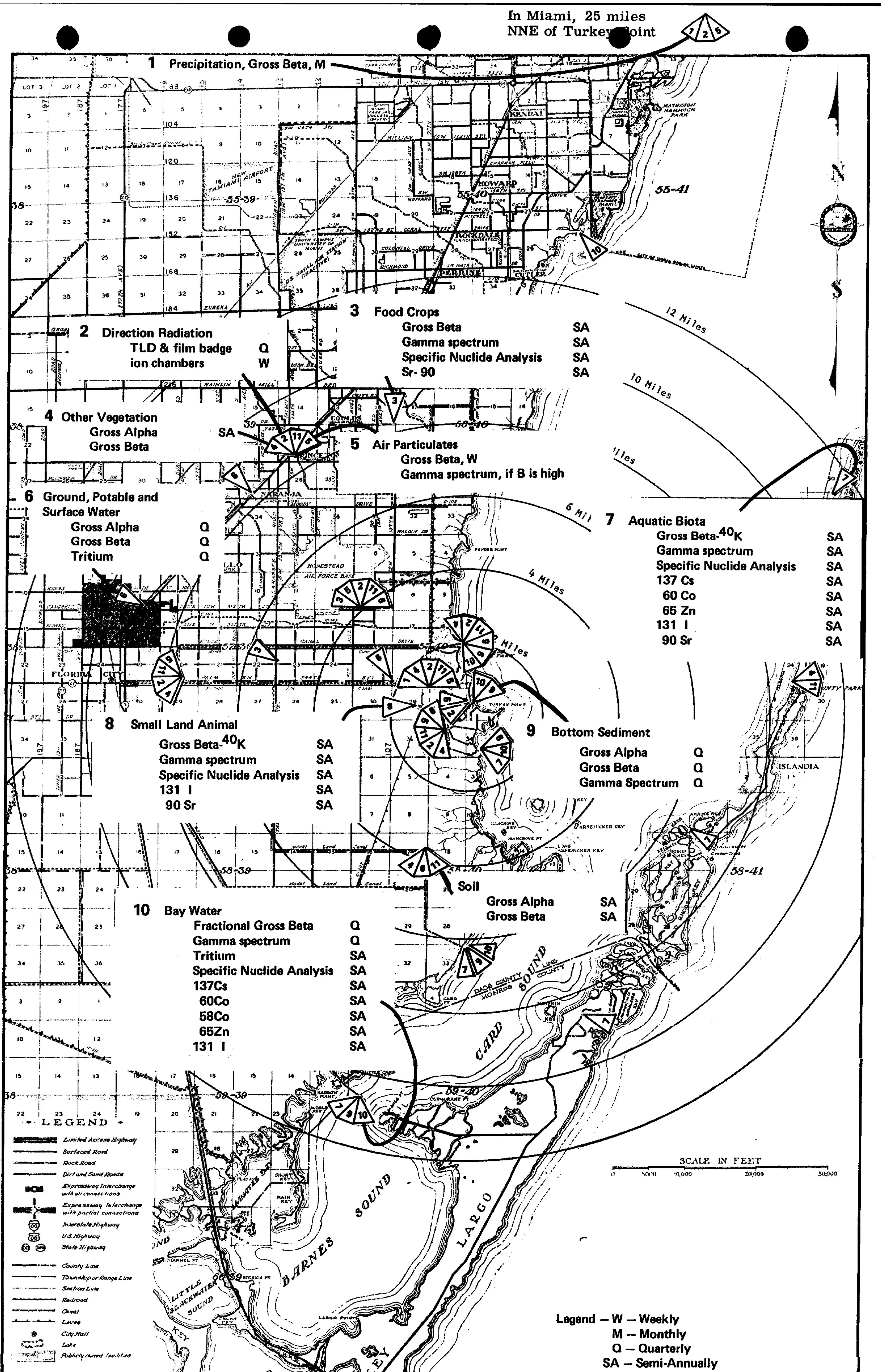
In the preliminary assessment of exposure pathways in the Water Environmental Program, it was apparent that drinking water was not the critical exposure pathway because Biscayne Bay water is essentially sea water. Investigation was directed to other pathways that may be steps in the food chain to man since it is known that certain species of aquatic biota,

inherently or by means of aquatic food sources, may concentrate specific radionuclides several times above the equilibrium concentration of radionuclides in the water environment.

2.12.4 LAND ENVIRONMENT

In the land environmental monitoring program, as in the water monitoring program, the program was designed to determine existing natural background radioactivity and to detect changes in radiation levels in the land environment which may be attributed to the operation of the nuclear units.

In the preliminary assessment of exposure pathways in the land environmental program, milk was not the critical pathway because there are no dairy herds within 25 miles of the facility. Other exposure pathways which may be steps in the food chain to man were investigated, including fruit and vegetable crops which may be grown in the vicinity of the facility. Radionuclides are present in soil as background radioactivity and may be incorporated into plant life.



PREOPERATIONAL RADIOLOGICAL
SURVEILLANCE PROGRAM
FIG. 2.12-1

2.13 EXCLUSION ZONE - LOW POPULATION ZONE

2.13.1 EXCLUSION ZONE

On the basis of meteorological data and analysis of the consequences of a postulated release of fission products originally established in 1968 - 1970 in Section 14.3.5 and Appendix 14F, the exclusion zone is included within the property boundary line. As shown on the property plan, the minimum exclusion distance is 4164 feet to the north property line. The minimum distance to the south property line is 5582 feet. The exclusion radius as identified in Appendix 14F is 4164 feet which is bounded by the exclusion zone. The exclusion zone is identified as the area within the property boundary line. C26

Within the exclusion zone there are:

(1) one fossil fuel electric generating unit, one dual-convertible synchronous condenser/generator unit, and one combined cycle unit. These three units are staffed by approximately 65 FP&L employees. C26

(2) a picnic area used intermittently, that has been used by as many as 1500 persons (during a local organization's picnic).

2.13.2 LOW POPULATION ZONE

The low population area is enclosed by a circle of 5-mile radius. The area includes Homestead Bayfront Park and farmland to the north, a portion of Homestead Air Force Reserve Base to the northwest, the Turkey Point elementary school, farmland to the west and undeveloped swampland to the southwest and south (refer to Figure 2.2-2). There are no permanent residents in the area at the present time (refer to Tables 2.4-1 and 2.4-2). Additionally, population projections through the year 2013, as presented in Tables 2.4-13 through 2.4-16, indicate that this area will remain uninhabited by permanent residents for the remaining plant operating period authorized in the Turkey Point Units 3 and 4 Operating Licenses.

It should be noted that the land within this area is low and is periodically subject to hurricane flooding. Development has traditionally taken place in the more elevated areas to the west.

While it can be said that there is some pressure to develop areas having Biscayne Bay frontage, two factors are present as a deterrent to such development. The western boundary of Biscayne National Monument coincides with the western shore of Biscayne Bay for almost 4 miles south of the plant. There is strong local sentiment against bayshore development which might impair the values of the monument or which would deny the bayfront to general public use. Secondly, land adjoining the bayfront is overlain with a five or six-foot deep layer of organic peat or "muck" as it is known locally. This material is unsuitable for the foundation of structures, consequently the cost of any development is extremely high.

Transient population in the low population zone is principally confined to visitors to the Homestead Bayfront Park. The maximum number of persons expected to visit the Park is 10,000 which would be for the 4th of July. Since the only available estimates are for total daily visitors, the number present in the Park at any one time would be less than this amount. Likewise the figure can be compared to the normal weekend day of 5000 visitors and the normal weekday of 1000 visitors.

Monroe County and Dade County Emergency Response Directors, the State Department of Health, Bureau of Radiation Control, and the State Division of Emergency Management are responsible for determining and implementing protective measures in offsite areas. (Turkey Point Radiological Emergency Plan Section 5.2.1).

The Park is served by two roads, one on each side of North Canal. It is reasonable to assume that cars can be evacuated at the rate of about 1650 cars per hour. Thus 5000 cars could be evacuated over one road in about three hours.

The low population zone is served by several hard surfaced roads. Tallahassee Road and South Allapattah-East Allapattah Road provide access to the area from the north around the west and east sides of the Homestead Air Force Reserve Base respectively. Tallahassee Road also provides access to the south via Card Sound Road and Key Largo. Palm Drive, North Canal Drive and Mowry Drive all provide access to the area from the west. On the basis of the paucity of population, the existence of several hard surfaced roads, and the analysis set forth in Section 14.3.5, it is concluded that the proposed low population zone meets the criteria set forth in 10CFR100.

2.14 SITE and LOCATION RELATED EXTERNAL EVENTS

The Turkey Point site employs the use of fossil, nuclear, and combined cycle units for commercial electric power generation. Units 1 and 2 are fossil-fuel units, while Units 3 and 4 are nuclear reactors. Unit 5 is a combined cycle unit (employing four natural gas turbines and one heat-recovery steam- powered generator). In addition to the nuclear and fossil-fuel units, the site features a 5,900 acre system of closed recirculating cooling canals which four of the five units use for heat rejection (Unit 5 does not use the cooling canals).

2.14.1 NATURAL GAS PIPELINE

The potential hazard impacts of a natural gas line rupture on Units 3 and 4 were not explicitly assessed during the initial licensing of the nuclear units. The potential impacts of the natural gas pipeline, and lower pressure gas lines servicing Units 1 and 2, were subsequently evaluated as an external event to ensure that the consequences of a release of natural gas would not adversely impact Units 3 and 4. The consequence analysis (Reference 1) was performed assuming worst case operating and atmospheric conditions in order to provide a credible upper limit when assessing potential impact areas. The analysis considered the impacts of a torch fire, flash fire (vapor cloud fire) and vapor cloud explosion. The results confirmed that the potential impacts of a natural gas pipeline rupture on Units 3 and 4 are sufficiently low and would not adversely affect the ability of structures, systems, and components to perform their safety related functions.

2.14.2 UNIT 5 AQUEOUS AMMONIA

C28

Unit 5 uses aqueous ammonia in their effluent stream to reduce nitrogen oxide emissions. The aqueous ammonia storage facility contains two identical 40,000-gallon tanks and a surrounding impoundment basin. Each tank can be filled to 85% capacity (34,000 gallons) with aqueous ammonia. The impoundment basin is designed to accommodate the contents of one tank in the event of a postulated tank failure consistent with 40 CFR 68.25 for a worst-case release scenario.

To ensure that the Control Room operators are not impaired by an ammonia storage tank spill, a layer of floating (special surface blanketing) balls has been installed in the impoundment basin below the ammonia storage tanks. These balls will automatically arrange themselves into a close packed formation if a spill occurs and reduce the release of ammonia to the atmosphere. Consequence modeling (Reference 2) demonstrates that the concentration of ammonia in the control room will remain below the Occupational Safety and Health Administration Permissible Exposure Levels (OSHA – PEL) without operator action. These levels are significantly less than the limits to which Turkey Point committed in RG 1.78, Assumptions for Evaluating the Habitability of a Nuclear Power Plant Control Room during a Postulated Chemical Hazardous Chemical Release.

2.14.3 HOMESTEAD AIR FORCE BASE

The Homestead Air Force Base was established in 1955 and was in operation during the initial permitting and licensing of the Turkey Point site. After its destruction by Hurricane Andrew in August 1992, the base was taken off active status with the regular Air Force and rebuilt as an Air Force Reserve facility in 1994. Circa 2000, plans were circulated to convert the reserve base to a commercial airport or a spaceport. The impact of a commercial airport facility or spaceport on Units 3 and 4 was assessed using probabilistic risk assessment methods considering the proposed number of operations, flight paths, and proposed flight mix (i.e., military versus commercial versus general aviation) for single runway operation. Based on projections at the time, a scoping estimate of the aircraft impact frequency (number/year), the conditional core damage probability, the conditional containment failure probability, and the 10 CFR Part 100 exposure exceedance frequency for the critical structures was performed. The risk of exceeding 10 CFR Part 100 exposure guidelines associated with aircraft operations in 1994 (the then current risk of military operations) had been conservatively calculated to be 4.91E-7/year. The expected rate of occurrence of potential exposures in the year 2014 (the projected date of airport operation) in excess of the 10 CFR Part 100 guidelines was conservatively calculated to be 3.63E-7/year, which is less than the significance threshold of 1.0E-6/year specified in Section 2.2.3 of NUREG-0800. (References 3 and 4). C28

REFERENCES

1. Quest Consultants, Inc. Report 7044-CAS01-RevF0, Release and Hazard Calculations for Florida Power and Light's Incoming natural Gas Pipeline, Dated July 12, 2016.

2. EC 242200, PCM-06004 Addition of Unit 5 to the Turkey Point Site.

3. FPL Letter L-99-251 to NRC, Response to Request for Information Regarding the Impact of a Commercial Airport at Homestead Air Force Base Site on Safety at Turkey Point Unit 3 and 4, dated November 17, 1999.

4. NRC Letter to Ms. Barbara Lange, Turkey Point Units 3 and 4 - Homestead Air Force Base Property Disposal, dated July 25, 2000.

APPENDIX 2A

MICROMETEOROLOGICAL ANALYSIS

DELETED IN ITS ENTIRETY C26

APPENDIX 2B

MAXIMUM PROBABLE HURRICANE PARAMETERS

DELETED IN ITS ENTIRETY C26

APPENDIX 2C

OCEANOGRAPHY

FINAL SAFETY ANALYSIS REPORT

FIGURE 2C-1

REFER TO ENGINEERING DRAWING

5610-C-1168, SHEET 1

REV. 16 (10/99)

FLORIDA POWER & LIGHT COMPANY
TURKEY POINT PLANT UNITS 3 & 4

COOLING CANAL SYSTEM LAYOUT

FIGURE 2C-1

APPENDIX 2D

METEOROLOGICAL DATA

DELETED IN ITS ENTIRETY C26

APPENDIX 2E

C26

SHORT - TERM (ACCIDENT) DIFFUSION FOR THE EXCLUSION AREA BOUNDRY AND LOW POPULATION ZONE

Short - Term (Accident) Diffusion for the Exclusion Area Boundary and Low Population Zone

Objective

Conservative values of atmospheric diffusion at the site Exclusion Area Boundary (EAB) and the Low Population Zone (LPZ) were calculated for appropriate time periods using meteorological data collected onsite during the time period 2005 through 2009. The offsite maximum *X/Q* factors for the EAB and LPZ are presented in Table App 2E-2, "Offsite Atmospheric Dispersion Factors (*X/Q*)."

Methodology

For offsite release-receptor combinations, the atmospheric dispersion (*X/Q*) factors are developed using the PAVAN computer code (Reference 2). In accordance with Regulatory Position 4 from Reference 2, the maximum value from all downwind sectors for each time period are compared with the 5% overall site *X/Q* values for those boundaries, and the larger of the values are used in evaluations. Note that the 0-2 hour EAB atmospheric dispersion factor is applied to all time periods in the analyses. C26

All of the releases are considered ground level releases because the highest possible release elevation is 200 feet (from the plant stack). From Section 1.3.2 of Reference 1, a release is only considered a stack release if the release point is at a level higher than two and one-half times the height of adjacent solid structures. For the Turkey Point plant, the elevation of the top of the containment structures is given as 186 ft and 4-3/8 in. The highest possible release point is not 2.5 times higher than the adjacent containment building; therefore, all releases are considered ground level releases. As such, the release height is set equal to 10.0 meters as required by Table 3.1 of Reference 2. The building area used for the building wake term is the same as for some of the ARCON96 onsite *X/Q* cases. The building height entered into PAVAN is the top elevation of the cylindrical portion of the containment building of 170.28 ft less the plant grade elevation of 18 ft.

Meteorological Input Data

Meteorological data over a five-year period (2005 through 2009) is used in the development of the new onsite and offsite *X/Q* factors used in the analysis. The meteorological data is converted from the raw format into the proper formatting required to create the meteorological data files for the ARCON96 (onsite receptors) runs and PAVAN runs (offsite receptors). Five years worth of meteorological data is used which meets the guidance set forth in Section 3.1 of the Regulatory Guide 1.145 (Reference 1). The raw data for 2005 through 2009 was provided in electronic format. The data from these files was manipulated within a spreadsheet for appropriate formatting for use with ARCON96 and PAVAN.

The meteorological data was screened and validated using a number of quantitative and qualitative tests. The METD (Reference 3) suite of programs was one method used to identify anomalous data or data trends. The raw data was also examined graphically and otherwise to identify and flag bad or missing data. These screening activities ensure that the meteorological data used in the atmospheric dispersion factor determination were of high quality. ARCON96 analyzes the meteorological data file used and lists the total number of hours of data processed and the number of hours of missing data in the case output. A meteorological data recovery rate may be determined from this information. For the 2005 to 2009 data base, the meteorological data recovery rate is 98.3%. No regulatory guidance is provided in Reference 1 (PAVAN) or Reference 6 (ARCON96) documentation regarding the valid meteorological data recovery rate required for use in determining onsite *X/Q* values. However, Regulatory Position C.5 of Reg. Guide 1.23 specifies a 90% data recovery threshold for measuring and capturing meteorological data. Clearly, the 98.3% valid meteorological data rate for the cases in this analysis exceeds the 90% data recovery limit set forth by Regulatory Guide 1.23. With a data recovery rate of 98.3% and a total of five years worth of data, the contents of the meteorological data file are representative of the long-term meteorological trends at the Turkey Point site. C26

The raw meteorological data was also processed into annual and cumulative joint frequency distribution format for 2005 through 2009 for the offsite analysis. The joint frequency distribution file requires the annual meteorological data to be sorted into several classifications. This is accomplished by using three classifications that include wind direction, wind speed, and atmospheric stability class. The format for the file conforms to the format provided in Table 1 of Regulatory Guide 1.23 (Reference 3). The data for all years was sorted into wind speed bins using the guidance provided in RIS 2006-04 (Reference 5), which are slightly different than the Regulatory Guide. The total values for each stability class are then arranged so that the rows correspond to the wind speed bins and the columns correspond to the wind directions. The wind directions are then ordered properly so that the first column corresponds to the north (N) wind direction and the last column corresponds to the North-NorthWest (NNW) direction as required by the PAVAN code. The final ordered numbers are used in the input file for PAVAN. C26

Based on calibration issues identified with the past temperature instrument accuracy for measuring vertical temperature difference, an additional set of meteorological data was created with a bias applied to the nominal vertical temperature differences to account for additional temperature instrument inaccuracy. Atmospheric dispersion factors (*X/Q*s) were re-evaluated using the biased vertical temperature difference based stability class binning. For time periods and release-receptor locations where the biased meteorological data yielded atmospheric dispersion factors that were more conservative, these factors were substituted for those based on the nominal vertical temperature differences.

The tower height at which the wind speeds are measured is 11.58 meters above plant grade. There were 83 calm hours in the five year joint frequency data. This low number of calm hours is likely due to the positioning of the Turkey Point plant and its proximity to the Atlantic Ocean.

Calculations/PAVAN Computer Code Input Data

The Table App 2E-1 lists the boundary distance used in each of the 16 downwind directions from the site. These distance and direction combinations were chosen to be conservative, while taking credit for the different distances to the EAB in the various primary directions. Figure 2.2-4 provides the LPZ boundary distance as a 5 mile radius in all directions. Converting the distance to meters yields a value of 8,045 m.

LPZ Distance = 5 miles x (1,609 m / 1 mile) = 8,045 m

All of the releases were considered ground level releases because the highest possible release elevation is from the plant stack at 200 ft. From Section 1.3.2 of Reference 1, a release is only considered a stack release if the release point is at a level higher than two and one-half times the height of adjacent solid structures. For the Turkey Point plant, the elevation of the top of the containment is 186 ft 4-3/8 in. Therefore, the highest possible release point is not 2.5 times higher than the adjacent containment buildings, and thus all releases were considered ground level releases. As such, the release height was set equal to 10.0 meters as required by Table 3.1 of Reference 2. The building area used for the building wake term was 1,254 m^2. This area was calculated to be conservatively small in that the height used in the area calculation was from the highest roof elevation of a nearby building to the elevation of the bottom of the containment dome. C26

The tower height at which the wind speeds were measured is 11.58 m above plant grade. The number of hours of calms from each atmospheric stability class are tabulated from the 2005-2009 joint frequency distribution meteorological data files, and are listed in Table App 2E-1. The relatively low number of calm hours is due to the positioning of the Turkey Point plant and its proximity to the Atlantic Ocean.

The hourly meteorological data files were provided with wind speed units given in miles per hour. For binning into joint frequency data format, the guidance of RIS 2006-04 (Reference 5) made conversion of these mph units to meters per second convenient. Conversion of these Reference 5 bin limits back to mph yielded the non-integer mph binning values which are shown in the Table App 2E-2.

Therefore, given the mph based binning process, the PAVAN input flag was set to convert the input wind speeds to meters per second. The maximum wind speed values are 0.5 (calm), 1.12, 1.68, 2.24, 2.8, 3.36, 4.47, 6.71, 8.95, 11.18, 13.42, 17.9, 22.37, and 58.16 mph. The highest wind speed category is given in References 3 and 5 as "greater than 10 m/sec," however the PAVAN code requires that the maximum speed for each category be input. Therefore, the 58.16 mph (26.0 mps) value was chosen as the upper limit on the fastest wind speed category because the raw meteorological data showed that there were no hours with wind speeds higher than 58.16 mph.

Results C26

PAVAN computer runs for the EAB and LPZ boundary distances were performed using the data discussed previously. Per Section 4 of Reference 1, the maximum *X/Q* for each distance was determined and compared to the 5% overall site value for the boundary under consideration. In addition, the unbiased *X/Q* values were compared to the biased meteorological data based *X/Q* results, and the maximum values were selected on a case by case basis to ensure that a conservative *X/Q* input would be used for dose analysis calculations. The maximum EAB and LPZ *X/Q*s that resulted from this comparison are provided in the Table App 2E-2.

1. USNRC Regulatory Guide 1.145, "Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants," Revision 1, November 1982, (Reissued February 1983 to correct page 1.145-7).

2. NUREG/CR-2858, "PAVAN: An Atmospheric Dispersion Program for Evaluating Design Basis Accidental Releases of Radioactive Materials from Nuclear Power Stations," November 1982.

3. Safety Guide 23/Regulatory Guide 1.23, "Onsite Meteorological Programs," February 17, 1972, and Revision 1 March, 2007. C26

4. RSICC Code Package PSR-197, "METD - Computer Code Systems for Use with Meteorological Data," (including NUREG-0917, "Nuclear Regulatory Commission Staff Computer Programs for Use with Meteorological Data, July 1982)," November 1983, Updated, April 1985.

5. USNRC, Regulatory Issue Summary (RIS) 2006-04, "Experience with Implementation of Alternate Source Terms," March 7, 2006.

6. NUREG/CR-6331, "Atmospheric Relative Concentrations in Building Wakes," Rev. 1, May 1997 with associated Errata July 1997.

Summary of Inputs used in Determination of Offsite X/Q Determination

EAB Distances for PAVAN Runs

EAB Distance Used (ft)	EAB Distance Used (m)	Downwind Directions for which Distance is Used
4,164	1,269	NW, NNW, N, NNE, NE, ENE, E, ESE, SE
6,935	2,113	SW, WSW, W, WNW
5,582	1,701	SSE, S, SSW

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METEOROLOGICAL DATA USED AS INPUT

Number of Hours of Calm (2005-2009) for PAVAN Runs

Atmospheric Stability	Number of Hours of Calm from
A	0
B	0
C	0
D	1
E	12
F	31
G	39

Summary of Inputs used in Determination of Offsite X/Q Determination

Turkey Point Biased JFD Meteorological Data (Lower Sensor, 2005-2009)

Class	mps	mph	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
	0.22	0.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.5	1.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.75	1.68	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0
	1.00	2.24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
	1.25	2.80	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	3
A	1.5	3.36	2	1	1	0	1	2	0	2	4	2	2	1	4	2	4	3
	2.00	4.47	15	7	8	9	5	4	4	23	11	8	8	8	6	9	20	20
	3.00	6.71	31	22	28	13	35	25	20	49	47	10	10	10	14	23	30	49
	4.00	8.95	44	17	63	64	70	88	39	108	79	42	25	9	24	20	28	99
	5.00	11.18	39	19	109	106	159	109	69	129	97	69	39	25	32	9	23	66
	6.00	13.42	32	20	143	179	171	149	109	115	72	89	55	17	19	10	23	61
	8.00	17.90	3	3	13	9	14	10	9	5	6	14	11	0	4	4	3	9
	10.00	22.37	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
	0.22	0.50	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
	0.5	1.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.75	1.68	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0
	1.00	2.24	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0
	1.25	2.80	2	1	0	0	0	1	0	0	0	0	1	0	1	1	0	0
B	1.5	3.36	2	2	1	1	3	0	1	2	0	3	5	0	0	0	1	5
	2.00	4.47	11	4	5	8	6	12	18	15	9	6	2	5	2	6	14	18
	3.00	6.71	17	6	23	25	42	34	34	52	24	15	2	5	6	6	15	14
	4.00	8.95	21	14	43	42	51	79	68	57	39	23	6	6	11	6	12	19
	5.00	11.18	10	11	55	43	74	71	58	47	27	29	14	8	4	2	6	30
	6.00	13.42	10	9	42	83	98	55	44	17	16	21	19	8	2	3	7	27
	8.00	17.90	1	0	5	9	5	1	2	0	0	3	3	3	0	0	1	4
	10.00	22.37	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	0.22	0.50	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	0.5	1.12	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	0.75	1.68	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
	1.00	2.24	0	0	0	0	1	0	0	0	1	0	0	0	0	1	1	0
	1.25	2.80	0	1	1	0	2	1	1	1	0	0	1	0	1	2	1	1
C	1.5	3.36	4	5	3	1	2	6	0	5	1	1	2	0	2	2	4	1
	2.00	4.47	18	7	24	20	14	23	17	27	13	10	4	7	7	13	17	16
	3.00	6.71	30	16	38	44	40	66	46	62	27	16	5	9	8	10	16	12
	4.00	8.95	19	17	66	73	126	118	104	87	47	23	20	10	4	14	5	29
	5.00	11.18	15	13	71	86	97	125	70	35	35	33	26	8	7	3	7	17
	6.00	13.42	13	17	77	120	118	64	55	16	11	39	12	7	3	3	4	27
	8.00	17.90	2	1	4	20	6	8	2	1	1	0	12	1	0	0	1	1
	10.00	22.37	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1

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Summary of Inputs used in Determination of Offsite *X/Q* Determination
Turkey Point Biased JFD Meteorological Data (Lower Sensor, 2005-2009)

Class	mps	mph	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
D	0.22	0.50	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
	0.5	1.12	0	0	1	0	3	0	0	1	0	0	0	0	0	0	0	0
	0.75	1.68	2	2	2	0	0	0	1	1	3	2	2	2	1	5	1	3
	1.00	2.24	8	3	1	2	7	4	5	1	3	5	2	7	3	5	3	7
	1.25	2.80	10	3	5	3	5	6	12	9	5	3	5	2	2	3	9	8
	1.5	3.36	22	12	13	20	32	28	26	25	17	18	13	13	17	19	20	25
	2.00	4.47	86	45	99	176	165	157	150	127	80	71	41	45	56	55	52	73
	3.00	6.71	112	48	143	343	515	466	254	209	136	83	69	43	71	47	44	122
	4.00	8.95	100	64	207	481	712	513	234	166	127	81	75	46	41	32	30	136
	5.00	11.18	69	43	234	454	527	334	187	115	57	61	60	27	24	14	18	100
	6.00	13.42	27	56	316	459	481	201	134	46	43	43	69	25	5	5	8	82
	8.00	17.90	1	19	67	48	63	19	19	1	10	7	13	4	1	0	0	11
	10.00	22.37	0	2	0	3	10	4	7	1	0	8	2	0	0	0	0	0
E	0.22	0.50	0	1	1	0	3	0	1	1	0	0	1	0	4	2	1	1
	0.5	1.12	4	5	4	4	5	7	2	8	4	4	6	6	2	5	7	5
	0.75	1.68	16	10	7	18	8	18	17	12	10	11	14	17	17	14	9	19
	1.00	2.24	15	17	13	36	45	53	29	22	15	19	24	30	22	21	19	23
	1.25	2.80	25	11	9	27	48	59	35	24	19	23	29	29	41	33	28	25
	1.5	3.36	76	32	38	100	211	158	101	65	71	58	63	65	60	69	71	63
	2.00	4.47	212	77	143	528	792	493	348	203	191	125	98	82	153	108	138	232
	3.00	6.71	209	54	150	593	778	490	317	164	136	64	49	55	55	50	77	252
	4.00	8.95	81	56	213	495	643	351	224	116	73	36	29	24	21	19	42	177
	5.00	11.18	29	29	140	261	339	167	119	73	29	14	20	10	5	3	19	71
	6.00	13.42	4	24	126	137	180	97	70	30	14	22	10	4	2	4	9	40
	8.00	17.90	0	8	25	1	16	29	16	8	6	5	1	2	0	0	0	3
	10.00	22.37	0	0	1	3	12	25	20	8	7	0	1	0	0	0	0	0
F	0.22	0.50	1	1	3	1	3	3	2	1	0	0	2	0	3	5	1	3
	0.5	1.12	8	6	4	2	4	3	5	8	5	4	3	7	6	7	8	12
	0.75	1.68	18	10	6	7	16	5	9	14	7	13	10	15	15	10	25	26
	1.00	2.24	26	19	26	11	10	11	15	15	10	15	30	28	25	34	46	47
	1.25	2.80	47	17	15	13	18	23	16	10	12	19	30	17	39	44	46	72
	1.5	3.36	112	27	20	31	50	61	50	41	32	45	56	59	87	79	119	198
	2.00	4.47	214	33	26	50	175	134	102	55	57	64	71	97	89	86	155	281
	3.00	6.71	86	10	12	13	32	20	22	21	22	14	10	17	7	7	48	172
	4.00	8.95	9	1	6	4	18	5	6	3	6	6	6	6	1	0	6	23
	5.00	11.18	1	3	3	1	1	4	7	1	5	1	1	6	0	0	2	7
	6.00	13.42	0	1	2	1	0	1	3	2	1	0	2	0	0	0	0	1
	8.00	17.90	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10.00	22.37	0	0	0	0	0	0	0	1	1	1	1	2	0	0	0	0
G	0.22	0.50	1	0	2	0	1	0	1	0	2	1	0	1	1	4	1	5
	0.5	1.12	4	2	0	0	1	0	0	0	4	2	0	1	8	3	3	4
	0.75	1.68	8	1	1	3	1	3	1	2	1	2	3	5	13	16	7	11
	1.00	2.24	22	10	2	2	5	6	2	3	3	0	10	9	18	24	17	20
	1.25	2.80	19	1	7	1	2	1	0	4	0	3	10	12	30	30	34	28
	1.5	3.36	94	13	4	3	4	4	3	4	11	16	37	37	50	68	97	176
	2.00	4.47	282	14	3	2	4	8	11	5	6	11	35	32	35	60	183	485
	3.00	6.71	56	2	1	1	0	0	2	3	1	2	5	1	0	1	23	69
	4.00	8.95	2	1	2	0	0	2	0	1	0	1	1	0	0	0	0	3
	5.00	11.18	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0
	6.00	13.42	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	8.00	17.90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10.00	22.37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Summary of Inputs used in Determination of Offsite X/Q Determination
Turkey Point Un-Biased JFD Meteorological Data (Lower Sensor, 2005-2009)

Clas	mps	mph	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
A	0.22	0.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.5	1.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.75	1.68	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	1.00	2.24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
	1.25	2.80	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	2
	1.5	3.36	1	1	1	0	1	2	0	1	3	4	2	1	4	2	3	3
	2.00	4.47	13	5	6	7	5	3	4	20	11	8	8	6	5	8	15	21
	3.00	6.71	26	17	18	12	23	19	22	53	41	8	8	11	14	21	27	44
	4.00	8.95	44	14	57	45	51	50	49	104	65	31	24	10	19	19	30	97
	5.00	11.18	44	21	98	86	131	85	76	120	87	64	36	24	28	10	25	72
	6.00	13.42	31	24	143	185	178	160	100	109	72	78	34	9	16	11	22	57
	8.00	17.90	3	2	10	13	18	9	9	5	6	15	14	0	4	4	3	10
	10.00	22.37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B	0.22	0.50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	0.5	1.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.75	1.68	1	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0
	1.00	2.24	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	1.25	2.80	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	1.5	3.36	3	2	2	1	1	0	1	1	1	1	4	0	0	0	3	4
	2.00	4.47	13	8	7	7	9	6	12	15	10	7	3	3	4	8	17	23
	3.00	6.71	22	13	27	9	33	22	44	45	23	19	1	4	8	8	26	17
	4.00	8.95	25	22	69	61	60	89	84	77	55	29	7	8	12	9	6	25
	5.00	11.18	13	15	79	64	83	121	57	62	51	38	10	5	11	4	8	25
	6.00	13.42	12	16	77	103	118	60	69	23	13	38	21	9	4	2	5	31
	8.00	17.90	3	3	5	14	4	2	1	1	0	0	7	3	0	0	1	3
	10.00	22.37	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
C	0.22	0.50	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.5	1.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.75	1.68	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0
	1.00	2.24	0	0	1	0	0	0	0	0	1	0	0	1	0	1	1	0
	1.25	2.80	0	1	2	1	1	2	2	1	0	0	1	0	2	3	0	1
	1.5	3.36	5	4	2	1	4	6	0	5	1	1	2	0	3	4	4	1
	2.00	4.47	22	3	22	24	8	22	25	28	13	10	4	14	9	12	18	13
	3.00	6.71	29	20	49	60	60	84	58	72	38	14	11	11	9	14	10	22
	4.00	8.95	22	25	64	89	156	171	84	84	60	26	26	11	8	10	5	20
	5.00	11.18	12	9	66	107	135	143	77	34	22	31	28	12	5	3	6	16
	6.00	13.42	11	12	58	126	125	75	60	11	17	34	28	14	6	3	6	25
	8.00	17.90	0	0	4	18	8	8	4	0	1	3	9	3	0	0	1	2
	10.00	22.37	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0
D	0.22	0.50	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0
	0.5	1.12	0	0	1	1	3	0	0	1	0	0	0	0	0	0	0	0
	0.75	1.68	2	2	2	0	0	0	2	2	4	2	2	4	1	4	1	3
	1.00	2.24	7	3	1	2	7	4	5	1	3	5	2	6	3	6	4	7
	1.25	2.80	11	4	4	2	6	5	10	8	5	4	6	3	2	3	10	9
	1.5	3.36	21	12	13	21	31	29	26	30	18	17	14	14	17	20	22	26
	2.00	4.47	83	44	106	170	175	171	150	131	78	72	38	43	53	60	52	75
	3.00	6.7	117	49	133	340	516	477	236	204	132	84	69	45	66	43	43	106
	4.00	8.95	98	53	191	465	666	482	225	157	113	84	72	43	42	32	36	140
	5.00	11.18	64	42	241	458	490	256	170	93	58	54	66	28	22	11	17	100
	6.00	13.42	28	52	314	464	467	174	101	42	40	37	71	25	4	4	11	80
	8.00	17.90	1	23	76	39	56	19	22	1	10	8	9	2	1	0	0	5
	10.00	22.37	0	1	0	3	11	11	7	1	0	8	2	0	0	0	0	1

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TABLE App 2E-1

Summary of Inputs used in Determination of Offsite *X/Q* Determination
Turkey Point Un-Biased JFD Meteorological Data (Lower Sensor, 2005-2009)

Class	mps	mph	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
E	0.22	0.50	0	1	1	0	3	0	2	1	0	0	1	0	3	1	1	1
	0.5	1.12	4	8	4	4	5	7	2	8	4	4	6	5	2	5	6	6
	0.75	1.68	1	10	7	19	9	18	16	10	9	12	15	15	16	14	11	18
	1.00	2.24	1	17	14	36	44	51	29	22	15	19	26	33	22	23	18	23
	1.25	2.80	2	13	9	27	48	58	34	25	19	24	28	29	40	33	29	24
	1.5	3.36	8	35	36	98	212	154	104	61	71	63	60	66	58	63	68	67
	2.00	4.47	2	81	137	537	783	486	344	204	191	124	99	80	149	103	132	225
	3.00	6.71	2	47	156	596	775	480	310	160	138	65	46	50	57	50	78	262
	4.00	8.95	7	54	211	495	671	358	228	112	72	36	26	25	20	21	40	179
	5.00	11.18	2	28	125	235	357	201	123	90	26	19	19	11	6	3	17	74
	6.00	13.42	4	22	112	101	160	97	82	39	14	27	10	4	1	5	7	44
	8.00	17.90	0	3	19	3	18	29	12	8	6	3	1	2	0	0	0	8
	10.00	22.37	0	0	1	3	11	18	20	8	7	0	1	0	0	0	0	0
F	0.22	0.50	1	1	3	1	3	2	2	1	0	0	2	0	4	6	1	3
	0.5	1.12	8	3	4	2	3	3	5	8	4	3	3	7	6	7	9	11
	0.75	1.68	1	10	6	6	15	5	8	15	6	12	9	16	16	10	23	26
	1.00	2.24	2	20	26	11	12	14	15	15	12	15	28	23	24	32	44	46
	1.25	2.80	4	15	14	13	18	24	18	11	12	17	33	17	41	44	43	70
	1.5	3.36	1	24	22	33	49	64	47	40	32	41	59	57	84	77	117	195
	2.00	4.47	2	33	27	46	177	136	101	53	58	61	73	97	93	85	156	278
	3.00	6.71	8	10	10	15	35	19	24	23	21	12	10	18	7	7	46	169
	4.00	8.95	1	1	6	4	16	4	5	3	6	5	6	4	1	0	6	21
	5.00	11.18	1	3	3	2	1	4	7	1	6	1	1	4	1	0	2	4
	6.00	13.42	0	1	2	0	0	1	3	2	1	0	3	0	0	0	0	1
	8.00	17.90	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10.00	22.37	0	0	0	0	0	0	0	1	1	1	1	2	0	0	0	0
G	0.22	0.50	1	0	2	0	1	1	0	0	2	1	0	1	1	4	1	5
	0.5	1.12	4	2	0	0	2	0	0	0	5	3	0	2	8	3	3	4
	0.75	1.68	8	1	1	3	1	3	2	2	2	2	3	4	13	17	7	12
	1.00	2.24	2	9	1	2	5	5	2	3	1	0	10	11	19	24	19	21
	1.25	2.80	1	1	8	1	2	2	0	3	0	3	8	11	29	30	35	30
	1.5	3.36	9	14	4	2	5	4	3	6	10	16	37	37	54	73	99	175
	2.00	4.47	2	13	3	2	4	7	14	4	6	13	34	33	35	61	189	490
	3.00	6.71	5	2	2	0	0	0	1	3	0	2	5	1	0	1	23	70
	4.00	8.95	2	1	2	0	0	2	0	1	0	1	1	0	0	0	0	4
	5.00	11.1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	6.00	13.42	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	8.00	17.90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10.00	22.37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Offsite Atmospheric Dispersion *X/Q* Factors for Analysis Events

Time Period	EAB *X/Q* (Sec/m^3)	LPZ *X/Q* (Sec/m^3)
0-2 hours	1.37E-04*	2.73E-05
0-8 hours	7.89E-05	1.23E-05
8-24 hours	6.00E-05	8.24E-06
1-4 days	3.30E-05	3.46E-06
4-30 days	1.40E-05	9.95E-07

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* With the exception of the WGDT Rupture, only the 0.2 hour EAB *X/Q* is used in the event analyses

APPENDIX 2F

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SHORT - TERM (ACCIDENT) DIFFUSION FOR THE CONTROL ROOM & ON SITE LOCATIONS

Short-Term (Accident) Diffusion for Control Room & Onsite Locations Objective

Conservative values of atmospheric diffusion to the Control Room and onsite locations were calculated for appropriate time periods using meteorological data collected onsite during the time period 2005 through 2009. The offsite maximum *X/Q* factors for the list of onsite release-receptor pairs are presented in Table Att 2F-3, "Onsite Atmospheric Dispersion Factors (*X/Q*)."

Methodology

For onsite release-receptor combinations, atmospheric dispersion *X/Q* factors are developed using the ARCON96 computer code (Reference 1). Additionally, guidance contained in NRC Regulatory Guide 1.194 (Reference 3) and Regulatory Issues Summary (RIS) 2006-04 (Reference 5) have been implemented. Reference 5 contains specific guidance on formatting hourly data files, and treatment of missing data fields. Reg. Guide 1.194 contains new guidance that supersedes the Reference 1 recommendations for using certain default parameters as input. Therefore, the following changes from the default values are made:

- For surface roughness length, m, a value of 0.2 is used in lieu of the default value of 0.1, and

- For averaging sector width constant, a value of 4.3 is used in lieu of the default value of 4.0. C26

- A number of various release-receptor combinations are considered for the onsite control room atmospheric dispersion factors. These different cases are considered to determine the limiting release-receptor combination for the events.

A building wake term is only applied to releases directly from the containment surface. The building area used for this wake term is 1,254 m^2. This value is calculated to be conservatively small in that the height used in the area calculation is from the highest roof elevation of a nearby building to the elevation of the bottom of the containment dome. Section 3.3.2.2 of Regulatory Guide 1.194 allows for the use of an effective *X/Q* for dual intake arrangements if the two intakes are not located in the same wind direction. This credit allows for a reduction in the *X/Q*s to the more limiting intake in proportion to the relative flow rate through the intakes. The control room emergency intakes are being relocated into separate wind sectors for all release points and will be balanced to have equal flow rates. Thus, the dual intake dilution credit enables the *X/Q*s to the most limiting emergency intake to be reduced by a factor of two in the event analyses.

Meteorological Input Data

Meteorological data over a five-year period (2005 through 2009) is used in the development of the new onsite and offsite *X/Q* factors used in the analysis. The meteorological data is converted from the raw format into the proper formatting required to create the meteorological data files for the ARCON96 (onsite receptors) runs and PAVAN runs (offsite receptors). Five years worth of meteorological data is used which meets the guidance set forth in Section 3.1 of the Regulatory Guide 1.145 (Reference 1). The raw data for 2005 through 2009 was provided in electronic format. The data from these files was manipulated within a spreadsheet for appropriate formatting for use with ARCON96 and PAVAN.

See Appendix 2E for a discussion about the quality checking and conservative screening of the 2005-2009 meteorological data to ensure that identified issues with calibration of vertical temperature difference instrumentation did not lead to the determination of non- conservative *X/Q* inputs to the dose analysis calculations.

Calculations/ARCON Computer Code Input Data

Figure Fig 2F-1 provides a sketch of the general layout of Turkey Point that has been annotated to highlight the release and receptor point locations described above, among others. All releases are taken as ground releases per guidance provided in Reg. Guide 1.145 (Reference 6). C26

Table Att 2F-1, "Release-Receptor Combination Parameters for Analysis Events," provides information related to the relative elevations of the release-receptor combinations, the straight-line horizontal distance between the release point and the receptor location, and the direction (azimuth) from the receptor location to the release point. Angles are calculated based on trigonometric layout of release and receptor points in relation to the North-South and East-West axes. Plant North is aligned with True North.

Table Att 2F-2, "Onsite Atmospheric Dispersion Factors (*X/Q*) for Analysis Events," provides the Control Room *X/Q* factors for the release-receptor combinations listed above. These factors are not corrected for occupancy. This table summarizes the *X/Q* factors for the control room intakes used in the various accident scenarios for onsite control room dose consequence analyses. Values are presented for the normal intake prior to control room isolation and for the unfavorable emergency intake during control room isolation.

Table Att 2F-3, "Release-Receptor Point Pairs Assumed for Analysis Events," identifies the Release-Receptor pair and associated Control Room *X/Q* factors from Table Att 2F-2 that are used in the event analyses during each of the modes of control room ventilation.

Five years of meteorological data (2005-2009) were used for the ARCON96 computer code runs. The percentage of valid data over this time period was 98.3% which exceeds the minimum value of 90% data recovery specified in Reference 2. C26

Results

ARCON96 computer runs for the various release points and control room intake locations were performed using the data discussed previously. Per Reference 3, the 95th percentile *X/Q* values were determined. In addition, the unbiased *X/Q* values were compared to the biased meteorological data based *X/Q* results, and the maximum values were selected on a case by case basis to ensure that a conservative *X/Q* input would be used for dose analysis calculations. The maximum onsite *X/Q*s that resulted from this comparison are provided in Table Att 2F-3.

References:

1. NUREG/CR-6331 PNL-10521, "[ARCON96] Atmospheric Relative Concentrations in Building Wakes", May 1995, with Errata dated July 1997.

2. Safety Guide 23, "Onside Meteorological Programs", February 17, 1972.

3. USNRC Regulatory Guide 1.194, "Atmospheric Relative Concentrations for Control Room Radiological Habitability Assessments at Nuclear Power Plants", June 2003.

4. RSICC Code Package PSR-197, METD - Computer Code Systems for Use with Meteorological Data," (including NUREG-0917, "Nuclear Regulatory Commission Staff Computer Programs for Use with Meteorological Data, July 1982"), November 1983, Updated, April 1985.

5. USNRC, Regulatory Issue Summary (RIS) 2006-04, Experience with Implementation of Alternate Source Terms, March 7, 2006.

6. USNRC Regulatory Guide 1.145, "Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants", Revision 1, November 1982, (Reissued February 1983 to correct page 1.145-7).

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Release-Receptor Combination Parameters for Analysis Events

Release-Receptor Pair	Release Location	Receptor Location	Release Height (m)	Receptor Height (m)	Distance(m)	Direction (deg)	Building Area (m2)
A	Plant stack	Normal	55.5	4.3	46.3	95	0.01
B	Plant stack	SE emergency	55.5	1.83	100.1	330	0.01
C	Unit 4 RWST	Normal	15.2	4.3	92.9	97	0.01
D	Unit 4 RWST	SE emergency	15.2	1.83	79.3	358	0.01
E	Unit 4 Closest MSSV	Normal	18.6	4.3	17.0	158	0.01
F	Unit 4 Closest MSSV	SE emergency	18.4	1.83	104.8	302	0.01
G	Unit 4 Main Steam Line Closest Point	Normal	11.2	4.3	18.5	157	0.01
H	Unit 4 Main Steam Line Closest Point	SE emergency	11.2	1.83	100	305	0.01
I	Unit 4 Personnel Hatch	Normal	3.3	4.3	23.1	148	1254
J	Unit 4 Emergency Escape Lock	SE	11.1	1.83	75.4	320	1254
K	Unit 4 Spent Fuel Building (NW corner)	Normal	4.3	4.3	57.3	118	0.01
L	Unit 4 Spent Fuel Building (SE corner)	SE emergency	1.83	1.83	57.6	333	0.01
M	Unit 4 SJAE	Normal	7.5	4.3	9.4	331	0.01
N	Unit 4 Westernmost Electrical	Normal	4.3	4.3	22.7	113	1254
O	Auxiliary Building Vent V-10	Normal	4.9	4.3	52.4	86	0.01
P	Unit 3 RWST	NE	15.2	6.1	71.7	186	0.01
Q	Unit 3 Spent Fuel Building (NE corner)	NE	6.1	6.1	47.9	220	0.01
R	Unit 3 Emergency Escape Lock	TSC HVAC Intake	11.1	1.2	115.1	250	1254
S	U3 RWST	TSC HVAC Intake	15.2	1.2	88.0	226	0.01

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Onsite Atmospheric Dispersion (*X/Q*) Factors for Analysis Events

This table summarizes the results for *X/Q* factors for the control room intakes for the various accident scenarios. Values are presented for the normal air intake prior to intake isolation and the least favorable emergency air intake after Control Room isolation. The same atmospheric dispersion factor is applied to both the makeup flow and unfiltered inleakage for each release- receptor pair. These values are not adjusted for Control Room Occupancy Factors. Note that the letters that indicate the release-receptor pairs do not necessarily correspond with the release identification letters on Figure 2F-1.

Release-Receptor Pair	Release Point	Receptor Point	0-2 hour *X/Q*	2-8 hour *X/Q*	8-24 hour *X/Q*	1-4 days *X/Q*	4-30 days *X/Q*
A	Plant stack	Normal intake	1.86E-03				
B(1)	Plant stack	SE emergency intake	7.52E-04	6.22E-04	2.32E-04(5)	1.80E-04	1.34E-04(5)
C	Unit 4 RWST	Normal intake	9.87E-04				
D(1)	Unit 4 RWST	SE emergency intake	1.21E-03(5)	(5)9.53E-04	4.25E-04(5)	2.98E-04	2.31E-04(5)
E	Unit 4 Closest MSSV/ADV(2)	Normal intake	1.37E-02(3)				
F(1)	Unit 4 Closest MSSV/ADV(2)	SE emergency intake	6.94E-04(3)	4.74E-04(5)	1.82E-04	1.43E-04(5)	1.02E-04(5)
G	Unit 4 Main Steam Line Closest Point	Normal intake	1.59E-02				
H(1)	Unit 4 Main Steam Line Closest Point	SE emergency intake	6.82E-04	4.99E-04(5)	1.95E-04	1.51E-04(5)	1.11E-04(5)
I	Unit 4 Personnel Hatch	Normal intake	1.04E-02				
J(1)	Unit 4 Emergency Escape Lock	SE emergency intake	1.10E-03	8.61E-04	3.15E-04(5)	2.59E-04(5)	2.03E-04(5)

Onsite Atmospheric Dispersion (*X/Q*) Factors for Analysis Events

Release-Receptor Pair	Release Point	Receptor Point	0-2 hour *X/Q*	2-8 hour *X/Q*	8-24 hour *X/Q*	1-4 days *X/Q*	4-30 days *X/Q*
K	Unit 4 Spent Fuel Building (NW corner)	Normal intake	2.36E-03				
L(1)	Unit 4 Spent Fuel Building (SE corner)	SE emergency intake	1.97E-03	1.61E-03(5)	6.18E-04(5)	4.90E-04	3.78E-04 (5)
M	Unit 4 SJAE	Normal intake	5.81E-02 (4)				
N	Unit 4 Westernmost Electrical Penetration	Normal intake	1.15E-02				
O	Auxiliary Building Vent V-10	Normal intake	2.84E-03(5)	2.58E-03(5)	1.28E-03(5)	1.19E-03(5)	8.45E-04(5)
P	Unit 3 RWST	NE emergency intake	1.27E-03	8.89E-04(5)	3.82E-04(5)	2.74E-04(5)	2.13E-04(5)
Q	Unit 3 Spent Fuel Building (NE corner)	NE emergency intake	2.43E-03(5)	1.52E-03(5)	6.87E-04	4.84E-04(5)	3.04E-04(5)
R(6)	Unit 3 Emergency Escape Lock	TSC HVAC Intake	4.09E-04	2.41E-04	1.12E-04	7.84E-05	4.46E-05
S(6)	U3 RWST	TSC HVAC Intake	7.86E-04	4.81E-04	2.21E-04	1.59E-04	9.75E-05

Onsite Atmospheric Dispersion (*X/Q*) Factors for Analysis Events

Table Notes:

(1) This receptor location qualifies for the dual intake credit allowed by Section 3.3.2.2 of Reg. Guide 1.194. This credit is not applied to the values shown in this table; however, these values are reduced by a factor of 2 when applied in the event analyses.

(2) The atmospheric dispersion factor corresponding to the limiting MSSV or ADV is used for each time period. No distinction is made between automatic steam relief from the MSSVs and controlled releases from the ADVs for radiological purposes.

(3) This release location meets the requirements for the plume rise credit described in Section 6 of Reg. Guide 1.194. The 0-2 hour values shown in this table are reduced by a factor of 5 when used in the applicable event analyses.

(4) The distance from the Unit 4 SJAE to the normal intake is 9.4 meters as shown in Table Att 2F-1 Section 3.4 of Reg Guide 1.194 that states ARCON96 should not be used to address situations with distances of less than about 10 m. Therefore, the value in this table was derived using a $1/r^2$ relationship referenced to an ARCON96-calculated value at 20 meters. The $1/r^2$ approach was demonstrated to calculate conservative atmospheric dispersion factors with respect to values determined directly from ARCON96 at the same distance. For example, the 10-meter *X/Q* value determined in this manner is 5.68E-02 sec/m^3 compared with the ARCON96 calculated value of 5.02E-02 sec/m^3, a difference of 11.6%. For shorter distances, this approach becomes more conservative. At 9.4 meters, the ARCON96 result is 5.81E-02 sec/m^3, which is 12.1% less than the 6.61E-02 sec/m^3 value used in the analysis. The SJAE vent was rerouted to the plant vent. However, the SGTR dose analysis was not revised and remains bounding for the release assumed to occur at the old SJAE vent locations. C31

(5) The atmospheric dispersion factor calculated using the meteorological data that was adjusted to account for temperature measurement uncertainty as described in Appendix 2E was found to be more limiting for this case and has been applied in the dose calculation.

(6) These atmospheric dispersion factors are applicable to the dose analyses performed for the Technical Support Center (TSC).

Control Room & TSC Release-Receptor Point Pairs Assumed for Analysis Events[1]

Event	Prior to CR Isolation	During CR Recirculation	TSC - All Phases
LOCA:			
Containment Leakage	N	J	R
ECCS Leakage	C	D, P	S
RWST Backleakage	C	B	S
FHA:			
Containment Purge	I	J	Not Modeled
FHB Release	K	L, Q	Not Modeled
MSLB:			
Break Release	G	H	Not Modeled
MSSV/ADV Release	E	F	Not Modeled
SGTR	M, E[2]	F	Not Modeled
Locked Rotor	E	F	Not Modeled
RCCA Ejection:			
Containment Leakage	N	J	Not Modeled
Secondary Side Leakage	E	F	Not Modeled
WGDT Rupture	O	n/a	Not Modeled

(1) Letters correspond to Release-Receptor pairs listed in Table Att 2F-2.

(2) Prior to reactor trip, the release receptor pair is assumed to occur from the SJAE (from the old vent locations prior to reroute to the plant vent) to the normal intake (See Table App 2F-2, Note 4). The release point changes to the MSSV/ADVs immediately after reactor trip, and the receptor point shifts to the southeast emergency intake following control room isolation. C31

Figure 2F-1

Turkey Point Onsite Release - Receptor Location Sketch

Security-Related Information - Withheld Under 10 CFR 2.390

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