FLORIDA POWER & LIGHT COMPANY

ST. LUCIE PLANT UNIT NO. 2

UPDATED

FINAL SAFETY ANALYSIS REPORT

VOLUME 1

FLORIDA POWER & LIGHT COMPANY

ST. LUCIE PLANT UNIT NO.2

UPDATED

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VOLUME 1

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1.0 INTRODUCTION AND GENERAL DESCRIPTION OF PLANT

1.1 INTRODUCTION

This Updated Final Safety Analysis Report (UFSAR) is submitted in accordance with the requirements of 10 CFR 50.71(e). It is based on the original FSAR, including 14 amendments, which was submitted in support of an application by Florida Power & Light Company for a license to operate a nuclear power unit designated as St. Lucie Unit 2. The unit is located on Hutchinson Island in St. Lucie County about halfway between the cities of Fort Pierce and Stuart on the east coast of Florida.

This submittal contains updated information which is accurate for the period up to six months prior to the most recent revision of this document. The updated material is of the same level of detail presented in the original FSAR. It includes changes necessary to reflect information and analysis submitted to the NRC or prepared pursuant to Commission requirements, and it includes changes describing physical modifications to the plant.

Generally, the information provided in the original FSAR where no update is required is retained for historical purposes.

The original Nuclear Steam Supply System (NSSS) is a pressurized water reactor system designed by Combustion Engineering Incorporated. The containment structure is comprised of a steel containment vessel designed by Chicago Bridge & Iron Company, and is surrounded by a reinforced concrete Shield Building designed by Ebasco Services Incorporated.

The initial rating of the NSSS thermal power level was 2570 Mwt (including a 10 Mwt net heat addition from reactor coolant pumps). 2560 Mwt was the projected initial operating power of the core and the power at which the thermal and hydraulic aspects of the core had been analyzed. The corresponding net electrical output for the rated power level was 802 Mwe. Subsequent to the Cycle 2 reload, St. Lucie Unit 2 requested and was granted a stretch power rating of 2700 Mwt. This corresponds to a net electrical output of 830 Mwe. The UFSAR has been modified, where necessary to reflect the revisions brought about by this increased power level. The design thermal power level is 2700 Mwt, the maximum expected output of the Nuclear Steam Supply System. This is the basis for the design of the balance of plant and related facilities, including the major systems and components, the Engineered Safety Features and for site radiological release calculations.

Prior to the Cycle reload, St. Lucie Unit 2 requested an extended power rating of 3020 Mwt, comprised of an approximate 10% Extended Power Uprate (EPU) and a 1.7% Measurement Uncertainty Recapture (MUR). This represents an approximate 11.85% increase from the stretch power rating of 2700 Mwt. The UFSAR has been modified, where necessary, to reflect revisions brought about by this increased power level.

Both original steam generators (OSGs) were removed and replacement steam generators (RSGs) designed and manufactured by AREVA were installed. The effect of the RSG installation on the information provided in the UFSAR is specifically noted in the affected sections.

1.2 GENERAL PLANT DESCRIPTION

1.2.1 PRINCIPAL SITE CHARACTERISTICS

The site for St. Lucie Units 1 and 2 consists of approximately 1,132 acres. The unimproved area of the site is generally flat, covered with water and has a dense vegetation characteristic of Florida coastal mangrove swamps. At the ocean shore the land rises slightly in a dune or ridge to approximately 15 ft, above mean low water.

The island and the adjoining mainland are sparsely populated. The southern most boundary of the nearest population center is the City of Fort Pierce which is 4.1 miles from the site. The City of Fort Pierce has an estimated population of 33,083 people as of a 1978 estimate. The minimum site exclusion radius is 5,100 ft. Site characteristics are given in Chapter 2.

1.2.2 PRINCIPAL DESIGN CRITERIA

Principal structures, system and equipment which may serve either to prevent accidents or to mitigate their consequences are designed and erected in accordance with applicable codes to withstand the most severe earthquakes, flooding conditions, windstorms, temperature and other deleterious natural phenomena which could be reasonably assumed to occur at the site during the lifetime of the plant. Principal structures, systems and equipment are sized for the design power level of the nuclear steam supply system output.

Redundancy is provided in the reactor protective and engineered safety feature systems so that no single failure of any active component of the systems can prevent action necessary to avoid an unsafe condition. The plant is designed to facilitate inspection and testing of systems and components whose reliability are important to plant shutdown and to the protection of the public and plant personnel.

Provisions are made to minimize the probability and effect of fires and explosions, in accordance with 10 CFR 50, Appendix R.

Systems and components which are significant from the standpoint of nuclear safety are designed, fabricated and erected to quality standards commensurate with the safety function to be performed.

Section 3.1 addresses the implementation of the NRC General Design Criteria for Nuclear Power Plants, 10 CFR Part 50, Appendix A. Chapter 17 describes the quality assurance program for the design and operation of St. Lucie Unit 2.

1.2.2.1 Reactor

The reactor is of the pressurized water-type, designed to provide heat to steam generators which, in turn, provide steam to drive a turbine generator. The full power core thermal output is 3020 megawatts.

The reactor core is fueled with UO_2 and UO_2-Gd_2O_3 and/or UO_2 Er_2O_3 pellets enclosed in zircaloy tubes pressurized with helium and fitted with welded end plugs.

The tubes are fabricated into assemblies in which end fittings prevent axial motion and spacer grids prevent lateral motion of the tubes. Beginning with Region N, the fuel incorporates the GUARDIAN^{TM} fuel assembly design to screen and entrap debris. The GUARDIAN^{TM} design employs a redesigned bottom spacer grid that provides positive axial restraint to the rods and added screening features. Region N also includes the addition of "backup arches" adjacent to all cantilevered springs in the interior of the upper H1D-1L spacer grid or top Inconel grid (beginning with Region U). The backup arch limits the possible compression of the grid spring, and thereby better maintains the proper geometry between the grid support features and the fuel rod during fabrication and operation. This same feature was present in peripheral locations in each Zircaloy spacer grid for all previous St. Lucie 2 fuel batches. In these locations, the backup arches protect the grid springs that may be subject to compression during fuel handling, when peripheral fuel rods can be pressed inward as bowed fuel assemblies are slid past one another in the core. In the new upper grid design, the arches will be present at all 440 interior spring locations in the grid. The backup arches will thus limit compression of grid springs in all interior locations during fuel rod loading. The control element assemblies (CEAs) consist of inconel clad boron carbide absorber rods which are guided by zircaloy tubes located within the fuel assembly. The core consists of 217 fuel assemblies.

Minimum departure from nucleate boiling ratio (DNBR) during normal operation and anticipated operational occurrences is not less than 1.28 (cycle 1 was 1.19) using the CE-1 correlation. The maximum center line temperature of the fuel, evaluated at the design overpower condition, is below that value which could lead to fuel rod failure. The melting points of the UO_2 and UO_2-Gd_2O_3 and/or UO_2-Er_2O_3 are not reached during routine operation and anticipated operational occurrences.

The combined response of the fuel temperature coefficient, the moderator temperature coefficient, the moderator void coefficient and the moderator pressure coefficient to an increase in reactor thermal power is a decrease in reactivity. In addition, the reactor power transient remains bounded and damped in response to any expected changes in any operating variable.

Control element assemblies (CEAs) are capable of holding the core sub-critical at hot zero power conditions with margin following a trip even with the most reactive CEA stuck in the fully withdrawn position.

Fuel rod clad is designed to maintain cladding integrity throughout fuel life. Fission gas release within the rods and other factors affecting design life are considered for the maximum expected exposures.

The reactor and control systems are designed so that any xenon transients are adequately damped.

The reactor in conjunction with the Reactor Protective System is designed to accommodate safely and without fuel damage, the anticipated operational occurrences.

The reactor vessel and its closure head are fabricated from manganese molybdenum nickel steel internally clad with austenitic stainless steel. The vessel and its internals are designed so that the integrated neutron flux does not exceed 4.9×10^{19} n/cm^2 (E > 1 Mev) over the 60 year design life of the vessel.

Power excursions which could result from any credible reactivity addition do not cause damage, either by deformation or rupture of the reactor vessel and do not impair operation of the Engineered Safety Features.

The internal structures include the core support barrel, the lower support structure, the core shroud, the hold-down ring and the upper guide structure assembly. The core support barrel is a right circular cylinder supported from a ring flange from a ledge on the reactor vessel. The flange carries the entire weight of the core. The lower support structure transmits the weight of the core to the core support barrel by means of vertical columns and a beam structure. The core shroud surrounds the core and limits the amount of coolant bypass flow. The upper guide structure provides a flow shroud for the CEAs and prevents upward motion of the fuel assemblies during pressure transients. Lateral motion limiters or snubbers are provided at the lower end of the core support barrel assembly. The hold-down ring acts as a shim and is set between the reactor vessel head and the upper guide structure to resist axial upward movement.

Further details concerning the reactor are given in Chapters 3 and 4.

1.2.2.2 Reactor Coolant and Auxiliary Systems

The Reactor Coolant System is arranged as two closed loops connected in parallel to the reactor vessel. Each loop consists of one 42 in. ID outlet (hot) pipe, one steam generator, two 30 in. ID inlet (cold) pipes and two reactor coolant pumps. An electrically heated pressurizer is connected to the hot leg of one of the loops and a safety injection line is connected to each of the four cold legs.

The Reactor Coolant System operates at a nominal pressure of 2235 psig. The reactor coolant enters near the top of the reactor vessel, and flows downward between the reactor vessel shell and the core support barrel into the lower plenum. It then flows upward through the core, leaves the reactor vessel, and flows through the tube side of the two vertical U-tube steam generators where heat is transferred to the secondary system. Reactor coolant pumps return the reactor coolant to the reactor vessel.

The two steam generators are vertical shell and U-tube units. The steam generated in the shell side of the steam generator flows upward through moisture separators and scrubber plate dryers which reduce the moisture content to less than 0.2 percent. All surfaces in contact with the reactor coolant are either stainless steel or NiCrFe alloy in order to minimize corrosion.

The reactor coolant is circulated by four electric motor driven single suction vertical centrifugal pumps. The pump shafts are sealed by mechanical seals. Each pump motor is equipped with an antireverse mechanism to prevent reverse rotation.

Components of the Reactor Coolant System are designed and operated so that no stresses are imposed on the structural materials that result in loss of function. The necessary consideration has been given to the ductile characteristics of the materials at low temperatures.

The Reactor Coolant System is designed and constructed to maintain its integrity throughout the plant life. Appropriate means of test and inspection are provided.

See Chapter 5 for further information.

1.2.2.3 Engineered Safety Features

The plant design incorporates redundant Engineered Safety Features. These systems in conjunction with the containment system, ensure that the offsite radiological consequences following any LOCA up to and including a double ended break of the largest reactor coolant pipe do not exceed the guidelines established for design basis accidents. The systems also ensure that the guidelines of 10 CFR 50 Appendix K, "Acceptance Criteria for Emergency Core Cooling

Systems" are satisfied, based upon analytical methods, assumptions and procedures accepted by the NRC. The Engineered Safety Features include: (a) independent redundant systems (Containment Cooling System and Containment Spray System) to remove heat from and reduce the pressure in the containment vessel in order to maintain containment integrity, (b) a high and low pressure Safety Injection System to limit fuel and cladding damage to an amount which does not interfere with adequate emergency core cooling and to limit metal-water reactions to negligible amounts, (c) a Shield Building Ventilation System and an Iodine Removal System to reduce offsite consequences due to leakage from the containment vessel, (d) a containment isolation system to minimize post-LOCA radiological effects offsite, (e) a hydrogen control system to maintain safe post-LOCA hydrogen concentration within the containment, and (f) a control room habitability system.

The Reactor Building, which is a dual containment design, is comprised of a steel containment vessel surrounded by an annular space and enclosed by a reinforced concrete Shield Building. The containment vessel is a low leakage steel shell which is designed to confine the radioactive material that could be released from a postulated design basis, Loss-of-Coolant Accident, (LOCA). It is a cylindrical vessel with hemispherical dome and ellipsoidal bottom. The Shield Building is a medium leakage concrete structure which surrounds the annulus and steel containment vessel. It protects the containment vessel from external missiles, and provides biological shielding and a means of collecting radioactive fission products that may leak from the containment following a major hypothetical accident (see Subsection 6.2.1 for details).

The containment in conjunction with either of the associated spray and cooling systems is designed to withstand the internal pressure and coincident temperature resulting from the energy release associated with the design basis accident. The containment is equipped with two 100 percent capacity heat removal systems, each comprised of one containment spray loop and two containment cooling units.

The Containment Spray System supplies borated water to cool and reduce pressure in the containment atmosphere. The pumps take suction initially from the refueling water tank. Long term cooling is based on suction from the containment sump through the recirculation lines.

The Containment Cooling System provides containment atmosphere mixing by recirculation. The cooling coils and fans of the Containment Cooling System are sized to provide adequate containment cooling at post-accident conditions of temperature, pressure and humidity (see Subsection 6.2.2 for details).

In the event of a LOCA, the Safety Injection System described in Section 6.3 injects borated water into the Reactor Coolant System. This provides cooling to limit core damage and fission product release, and assures adequate shutdown margin. The injection system also provides continuous long term post-accident cooling of the core by recirculation of borated water from the containment sump through the shutdown heat exchangers and back to the reactor core.

The Shield Building Ventilation System is provided to maintain a negative pressure in the annulus between the steel containment vessel and the concrete Shield Building following a LOCA. Two independent 100 percent capacity systems are provided. This system filters any radioactivity leakage from the containment vessel and therefore reduces the effects on the environment (see Subsection 6.2.3 for details). The SBVS is provided with carbon absorbers for iodine removal in the Shield Building.

The Iodine Removal System is provided to enhance the capture of radio-iodines from the containment atmosphere following a LOCA by adding controlled amounts of hydrazine to the containment spray water. Two independent 100 percent capacity systems are provided (see Subsection 6.5.2 for details).

A containment isolation system consisting of valves and associated actuators and controls is provided for each line penetrating the containment that must be closed to prevent a radioactivity release in the case of a loss-of-coolant accident (see Subsection 6.2.4 for details).

A hydrogen control system is provided which consists of redundant hydrogen recombiners and hydrogen sampling systems. A hydrogen purge system is provided as a non-safety, diverse system in addition to the redundant recombiner system (see Subsection 6.2.5 for details).

The control room habitability system is provided to limit control room doses from airborne activity to within GDC 19 limits (see Section 6.4 for details).

1.2.2.4 Protection, Control, Instrumentation and Electrical Systems

a) Reactor Protective System

The reactor parameters are maintained within the acceptable limits by the inherent characteristics of the reactor, by the Reactor Regulating System, by boron in the moderator and by the operating procedures. In addition in order to preclude unsafe conditions for plant equipment or personnel, the Reactor Protective System initiates reactor trip if a selected parameter reaches its preset limit. Four independent channels normally monitor each of the selected plant parameters. The Reactor Protective System logic initiates protective action whenever the signal of any two of three channels reaches the preset limit. A fourth channel is provided as a spare and allows bypassing of one channel while maintaining a two-out-of-three system. If any two channels receive coincident signals, the power supply to the magnetic jack control element drive mechanisms is interrupted releasing the control elements to drop into the core to shutdown the reactor. Redundancy is provided in the Reactor Protective System to assure that no single failure prevents protective action when it is required. The protective system is completely independent of and separate from the control system (see Section 7.2 for details).

b) Control System

The reactor is controlled by a combination of control element assemblies (CEAs) and dissolved boric acid in the reactor coolant. Boric acid is used for reactivity changes associated with large but gradual changes in water temperature, core xenon, fuel burnup and power levels. Additions of boric acid also provide an increased shutdown margin during the initial loading and subsequent refuelings. The boric acid solution is prepared and stored at a temperature sufficiently high to prevent precipitation. CEA movement provides changes in reactivity for shutdown or power changes. The CEAs are actuated by control drive mechanisms mounted on the reactor vessel head. The control drive mechanisms are designed to permit rapid insertion of the CEAs into the reactor core by gravity. CEA trip motion can be initiated manually or automatically.

The Reactor Regulating System (RRS) was designed to control reactivity to maintain the programmed reactor coolant temperature and power level which includes the capability to load follow. The RRS was designed to match the Nuclear Steam Supply System capability of following a ramp change from 15 percent to 100 percent power at a rate of five percent per minute and at greater rates over smaller load change increments up to a step change of 10 percent.

Using the RRS, control is accomplished by automatic movement of CEAs in response to a change in reactor coolant temperature. A temperature controller is used to compare the existing average reactor coolant temperature with the value corresponding to the power called for by the temperature control program. If the temperature is different, the CEAs are adjusted to bring the two temperatures within the prescribed control band. Regulation of the reactor coolant temperature in accordance with this program maintains the secondary steam pressure within operating limits and matches reactor power to load demand. Note that the RRS was modified such that CEA movement is limited to insertion only (i.e., no automatic withdrawal capability). Also, the automatic CEA insertion is not used to avoid any spurious CEA insertion (administratively disabled).

In addition to the capability to automatically control rod movement via the RRS, the CEAs can be moved through manual operation by the operator. Note that placing the CEA mode selector switch to any manual setting (or OFF), inhibits all automatic signals for CEA control.

The pressure in the Reactor Coolant System is controlled by regulating the temperature of the coolant in the pressurizer, where steam and water are held in thermal equilibrium. Steam is formed by the pressurizer heaters or condensed by the pressurizer spray to reduce variations caused by expansion and contraction of the reactor coolant temperature changes. The pressure and water level control systems are described in Subsection 7.7.1.1.

Overpressure protection of the Reactor Coolant System is provided by power operated relief valves and spring loaded safety valves connected to the pressurizer. The discharge from the pressurizer safety and relief valves is released under water in the pressurizer quench tank, where it is condensed and cooled. In the event the discharged steam exceeds the capacity of the tank, the tank relieves to the containment atmosphere (see Subsections 5.2.2, 5.2.6, and 5.4.13 for details).

A Turbine Control System is provided to regulate steam flow to the turbine as a function of system load. In the event of turbine trip, bypass systems are provided to release steam to the condenser and to the atmosphere. These systems are designed to reduce the sensible heat in the Reactor Coolant System, maintain the steam generator pressure during hot standby, and meet the original design basis of 45 percent steam bypass capability to mitigate challenges to the pressurizer and steam generator safety valves (see Section 7.7).

A Steam Generator Water Level Control System regulates feedwater flow to the steam generator (see Subsection 7.7.1.1). An Auxiliary Feedwater System is provided to ensure flow to the steam generators during plant startup, plant shutdown, and in the event of a plant design basis accident.

c) Instrumentation System

The nuclear instrumentation includes excore and incore neutron flux detectors. Twelve channels of excore instrumentation monitor the neutron flux and provide reactor protection and control signals during start up and power operation. Four of the channels are wide range logarithmic safety channels to measure neutron flux from source range to 200 percent of full power. Another four channels are power range safety channels to measure neutron flux linearly from one percent to 200 percent of full power. The power range safety channels are used by the reactor protection system to determine the neutron flux power and axial offset, and by the high power bypass circuitry for the high rate-of-change of power trip (see Subsection 7.2.1.1). There are two linear power range channels utilized for control purposes and two channels for startup and extended shutdown (see Subsection 7.7.1.1.9).

The original feedwater flow and temperature instrumentation consisting of venturis, differential pressure indications and Resistance Temperature Detectors (RTDs) has been supplemented by the installation of a Cameron/Caldon Leading Edge Flow Meter (LEFM) Checkplus system. This change supports the MUR 1.7% increase in core thermal power. The original feedwater flow and temperature instrumentation was retained and is used for companson monitoring of the LEFM system and as a backup feedwater mass flow measurement when needed (see Subsection 7.7.4).

The incore instrumentation consists of self-powered rhodium neutron detectors and background detectors to provide information on neutron flux distribution.

The process instrumentation monitoring includes those critical channels which are used for protective action. Temperature, pressure, flow and liquid level monitoring is provided, as required, to keep the operating personnel informed of plant conditions and to provide information from which plant processes can be evaluated and/or regulated.

Instrument signals transmitted from the containment are electric. Instrument signal transmission for the remaining plant instruments is either electric or pneumatic (see Chapter 7 for details).

The plant gaseous and liquid effluents are monitored to assure that they are maintained within acceptable radioactivity limits. Activity levels are displayed and off-normal values are annunciated. Area monitoring stations measure radioactivity at selected locations in the plant for personnel protection. A complete description of the radiation instrumentation is contained in Section 11.5 and Subsection 12.3.4.

d) Electrical System

Redundant sources of offsite power are provided by three separate transmission lines.

The unit includes a 1,200 MVA, 0.9 power factor generator delivering power to a 230 kV switchyard through step-up power transformers. Auxiliary power is utilized at 6.74 kV (a 6.9 kV winding is provided for the start up transformers), 4.16 kV, 480V, and 120V ac; 125V dc systems are also provided. For emergency power, Engineered Safety Features control, and essential nuclear instrumentation, all voltages except 6.74 kV are provided.

The auxiliary load is normally supplied from two auxiliary transformers connected to the main generator bus. Start up power is supplied from two start up transformers connected to the 230 kV switchyard. Emergency power for the Engineered Safety Features is supplied by redundant diesel generator sets (see Chapter 8 for details).

1.2.2.5 Power Conversion System

The power conversion system removes heat energy from the reactor coolant in two U-tube steam generators, and converts the steam into electrical energy by means of a turbine-generator. The unusable heat in the steam cycle is transferred to the main condenser for rejection by the Circulating Water System. The resulting condensate is deaerated in the condenser, then heated through feedwater heaters and returned to the steam generators as feedwater.

The turbine generator is a Siemens Energy Inc. unit. It is an 1,800 rpm tandem-compound, four-flow exhaust unit. The feedwater pumps are electric motor driven. Each of two strings of feedwater heaters consists of four low pressure and one high pressure heaters.

The Auxiliary Feedwater System contains two electric motor driven pumps and one pump driven by a noncondensing steam turbine. This system provides a source of water inventory to the steam generators during plant startup and hot standby, and during plant cooldown provides heat removal to bring the Reactor Coolant System to the shutdown cooling system activation window. (See Chapter 10 for details.)

1.2.2.6 Fuel Handling and Storage Systems

The fuel handling systems provide for the safe handling of fuel assemblies and control element assemblies under all foreseeable conditions and for the required assembly, disassembly, and storage of the reactor vessel head and internals. These systems include a refueling machine located inside containment above the refueling cavity, the fuel transfer carriage, the upending machine, the fuel transfer tube, a spent fuel handling machine in the Fuel Handling Building, and various devices used for handling the reactor vessel head and internals (see Subsection 9.1.4 for details). Dry storage of spent fuel is provided as discussed in Section 1.2.2.9.

New fuel is stored dry in vertical racks in the Fuel Handling Building. The rack and fuel assembly spacing precludes criticality (see Subsection 9.1.1 for details).

The spent fuel pool is a reinforced concrete structure, stainless steel lined. Spent fuel assemblies are stored in vertical racks. Spacing between fuel assemblies is such that the effective neutron multiplication factor (k_{eff}) will remain less than 1.0 for non-accident conditions when no credit is taken for the boron in the pool water (see Subsections 9.1.2 and 9.1.3.3.2 for details). As discussed in Subsection 9.1.2.3, partial credit is taken for the negative reactivity of soluble boron in fuel pool water during certain postulated accidents.

Cooling and purification equipment is provided for the fuel pool water. This equipment may also be used for cleanup of refueling water after each fuel change in the reactor (see Subsection 9.1.3 for details).

1.2.2.7 Cooling Water and Other Auxiliary Systems

a) Chemical and Volume Control System

The purity level in the Reactor Coolant System is controlled by continuous purification of a bypass stream of reactor coolant. Water removed from the Reactor Coolant System is cooled in the regenerative heat exchanger. From there, the coolant flows to the letdown heat exchanger and then through a filter and a demineralizer where corrosion and fission products are removed. It is then sprayed into the volume control tank and returned to the regenerative heat exchanger by the charging pumps where it is heated prior to return to the Reactor Coolant System.

The Chemical and Volume Control System automatically adjusts the amount of reactor coolant in order to maintain a constant level in the pressurizer. This compensates for changes in specific volume due to coolant temperature changes and reactor coolant pump shaft controlled seal leakage (see Subsection 9.3.4 for details).

The Chemical and Volume Control System is capable of adding boric acid to the reactor coolant at a rate sufficient to maintain an adequate shutdown margin during Reactor Coolant System cooldown at the maximum design rate following a reactor trip. The system is independent of the CEA system.

b) Shutdown Cooling System

The Shutdown Cooling System is used to reduce the temperature of the reactor coolant at a controlled rate and to maintain the proper reactor coolant temperature during refueling.

The Shutdown Cooling System utilizes the low pressure safety injection pumps to circulate the reactor coolant through two shutdown heat exchangers, returning it to the Reactor Coolant System through the low pressure injection header (see Subsection 5.4.7).

The Component Cooling System serves as a heat sink for the shutdown heat exchangers.

c) Sampling System

Two sampling systems are provided; one for the reactor coolant and its auxiliary systems and one for the turbine steam and feedwater system. These systems are used for determining both chemical and radiochemical conditions of the various process fluids used in the plant (see Subsection 9.3.2).

d) Cooling Water Systems

The turbine generator condenser is cooled by the Circulating Water System which takes suction from and discharges to the Atlantic Ocean.

An Intake Cooling Water System provides seawater from the Circulating Water System intake structure and serves as a heat sink for the component cooling water heat exchangers, the Turbine Closed Cooling System heat exchangers and the blowdown system open cooling water heat exchangers.

The Component Cooling Water System, consisting of three pumps and two heat exchangers, removes heat from the various auxiliary systems. Corrosion inhibited demineralized water is circulated by the system through auxiliary components of the Nuclear Steam Supply System that require cooling water. During reactor shutdown, component cooling water is also circulated through the shutdown heat exchangers. The Component Cooling Water System provides an intermediate barrier between the Reactor Coolant System and the Intake Cooling Water System (see Subsection 9.2.2 for details).

The blowdown system closed cooling water heat exchangers remove heat from the steam generator blowdown. This heat is, in turn, removed by the intake cooling water by the open blowdown cooling water system heat exchangers.

The Turbine Closed Cooling Water System removes heat from the turbine generator oil cooler, hydrogen coolers, feed pump oil coolers, sample coolers, and other components by providing corrosion inhibited demineralized water to those components (see Section 9.2 for details).

e) Plant Ventilation Systems

Separate ventilation systems are provided for the containment vessel, the control room, the Reactor Auxiliary Building, the Fuel Handling Building, Turbine Building, CCW structure, intake structure, and the Diesel Generator Building. Two purge systems are provided for the containment atmosphere (see Section 9.4).

The annular space between the steel containment vessel and the concrete Shield Building is evacuated by the Shield Building Ventilation System utilizing charcoal filters for removal of radioactive iodine. This system is automatically put into operation upon receipt of a containment isolation actuation signal following a LOCA (see Subsection 6.2.3).

f) Plant Fire Protection System

The Fire Protection System, common to St. Lucie Units 1 and 2, supplies water to fire hydrants, deluge systems and hose racks in the various areas of the plant. Additional design features are provided throughout the plant to ensure conformance to 10 CFR 50 Appendix A and Appendix R. (See Subsection 9.5.1 and Appendix 9.5A.)

g) Compressed Air System

The Compressed Air System supplies properly conditioned compressed air required to operate pneumatic instruments and controls, operate containment isolation valves and perform normal plant maintenance. It consists of the Instrument Air System, which supplies the various air operated valves, pneumatic instruments and controls, and the Station Air System which supplies various outlets throughout the plant.

Multiple compressor units and a cross-connection are provided between the Instrument and Station Air Systems. In case of loss of instrument air, all safety related pneumatically operated devices in the plant are designed to fail in a position which would allow safe shutdown. Where safety class valves are required to operate, accumulators are provided (see Subsection 9.3.1).

h) Diesel Generator Fuel Oil Storage and Transfer System

The Diesel Generator Fuel Oil System is provided to transfer diesel fuel oil from the onsite storage tanks to the day tanks which supply the emergency diesel generator sets. Redundant subsystems are provided, capable of supplying sufficient fuel to their respective diesel generator sets, 1.2.2.8 Radioactive Waste Management System

The Waste Management System provides the means for controlled handling, storage and disposal of liquid, gaseous and solid wastes. The principal design criterion is that plant personnel and the general public are protected by ensuring that all normal operating releases of radioactive material are made as low as reasonably achievable in accordance with the provisions of 10 CFR 50, Appendix I.

Reactor coolant from the Chemical and Volume Control System and from the reactor drain tank is processed by the boron management subsystem as described in Section 11.2.2.1.

Miscellaneous liquid wastes from the Reactor Auxiliary Building are collected in the equipment and chemical drain tanks and subsequently processed by the liquid waste subsystem as described in Section 11.2.2.2.

Waste gases are handled by the Gaseous Radwaste Treatment System. In this system, waste gases may be compressed and stored in the gas decay tanks which have a 30 day storage capacity or the gaseous effluent may be directly released to the plant vent if its activity level is sufficiently low. After decay, the gas in the waste gas decay tanks is sampled to ensure radioactivity levels are within acceptable limits, and is then released to the plant vent at a controlled rate.

Spent ion exchange resins and filters can be temporarily stored in high intensity containers (HICs) within the low level waste storage facility and ultimately transported in a shielded container from the plant.

Low activity wastes such as contaminated laundry, rags and paper are compacted and containerized for removal from the plant (see Chapter 11 for details).

1.2.2.9 Independent Spent Fuel Storage Installation (ISFSI)

An Independent Spent Fuel Storage Installation (ISFSI) has been constructed on the St. Lucie site to provide Unit 1 and Unit 2 spent fuel storage capacity through the current end of extended plant lives and to provide the storage required to facilitate decommissioning of the plant. The ISFSI provides the capability to store St. Lucie spent nuclear fuel, high-level radioactive waste, and reactor-related Greater Than Class C (GTCC) waste into dry storage casks.

The ISFSI is licensed under the General License provided to power reactor licensees under 10 CFR 72.210. ISFSI information is provided in References 1, 2, and 3. Therefore, only brief descriptions of the ISFSI are provided herein.

ISFSI soil improvements and construction changes have been evaluated and do not adversely affect safe plant operation. The ISFSI storm water management system limits storm water runoff to pre-construction levels. Other design and environmental effects of the ISFSI have been evaluated to ensure there are no adverse effects on safe plant operation.

1.2.2.10 Low Level Waste Storage Facility (LLWSF)

Due to the uncertainty of availability of offsite disposal options, a Low Level Waste Storage Facility (LLWSF) has been constructed on the site to provide interim low level waste storage capability for both St. Lucie units 1 and 2. Conservatively, both units produce a combined 840 cu. ft. of Class B/C low level radioactive waste (LLW) per year. This amount would fill approximately seven (7) 8-120 High Integrity Containers (HICs) per year. The LLWSF is designed to safely store five (5) years of LLW (36 HICs) within an array of concrete shields inside the precast panel concrete building.

The storage of Low Level Waste is licensed under the General License provided to power reactor licensees under 10 CFR Part 50.

The construction/implementation of the LLWSF including associated soil improvements have been evaluated and do not adversely affect safe plant operation. The existing storm water management system has the capacity to meet Florida Department of Environmental Protection requirements. Other design and environmental effects of the LLWSF have been evaluated to ensure there are no adverse effects on safe plant operation.

1.2.3 MAJOR STRUCTURES AND EQUIPMENT ARRANGEMENT

Refer to the Site Plan, Figure 1.2-1, and the Enlarged Plot Plan, Figure 1.2-2, for the site general layout including the ISFSI site. The plant structures arrangement plans and sections are shown on Figures 1.2-3 through 1.2-22.

The Turbine Building is oriented parallel to State Road A1A and the shoreline of the Atlantic Ocean, with the Reactor Building located on the east, or seaward, side of the Turbine Building. The Reactor Auxiliary Building is located perpendicular to and east of the Turbine Building, oriented in an east-west direction. The Fuel Handling Building is located east of the

Reactor Building and the Reactor Auxiliary Building, oriented in a north-south direction.

The Reactor Containment Building encloses the steel containment structure, which houses the Nuclear Steam Supply System consisting of the reactor, steam generators, reactor coolant pumps, pressurizer, and other reactor auxiliaries. The containment structure is served by a polar bridge crane.

The Reactor Auxiliary Building houses the waste management facilities, Engineered Safety Features, heating and ventilating system components, electrical equipment, laboratories, offices, laundry and control room.

The Fuel Handling Building contains the spent fuel pool and new fuel storage facilities, as well as the cooling equipment for the fuel pool. The fuel is transferred from the Reactor Building to the Fuel Handling Building through the fuel transfer tube.

The Turbine Building houses the turbine generator, condensers, feedwater heaters, condensate and feedwater pumps, turbine auxiliaries and electrical switchgear assemblies and other electrical distribution systems which are non-Class 1E.

1.2.4 SHARED SYSTEMS AND INTERCONNECTIONS BETWEEN UNIT 1 AND UNIT 2

Normal plant shutdown requires the operation of several auxiliary systems, none of which are normally used by both units.

The following is a list of systems interconnected (one complete system on each unit which may, under certain conditions, be used by the other unit) between St. Lucie Units 1 and 2:

a) condensate storage tanks (AFW pump suction inter-tie),
b) diesel generator fuel oil storage and transfer system,
c) station blackout cross-tie,
d) liquid waste management system,
e) instrument air system,
f) station service air system, and
g) startup transformers.

A tie between the two units has been provided from the Unit 2 condensate storage tank to the Unit 1 auxiliary feedwater pump's suction for a backup tornado missile protected water supply. This cross-tie is normally isolated. The valve alignment assures that the minimum quantity of water required for safe shutdown is maintained at all times in both tanks.

The diesel generator fuel oil storage and transfer system has a seismic Category I interconnecting tie line between St. Lucie Units 1 and 2. Seismic Category I locked closed isolation valves assure that the tie line is opened only after administrative approval has been obtained.

In the event of a total loss of AC power, both onsite and offsite, (i.e., station blackout) power can be transferred from the non-blacked out unit's emergency diesel generator set via the station blackout tie to one of the blacked-out unit's redundant Class 1E electrical distribution trains. Plant procedures limit the amount of the power transferred so as not to affect the non-blacked out unit's safe shutdown equipment.

The liquid waste management system is interconnected at two non-seismic, non-safety locations by normally closed valves. One interconnection allows either unit to transfer liquid wastes to the other unit's holdup tanks. The other interconnection allows the transfer of liquid waste from the aerated waste storage tank of one unit to the other.

The instrument air system is interconnected but normally isolated between units via automatically controlled valves. As instrument air pressure is lost in one unit the isolation valves automatically open to allow compressed air be provided by the other unit.

The station service air system is interconnected between units, but is isolated via normally closed valves.

The startup transformers (1A-2A, 1B-2B) are provided with a manual switching arrangement which permits paralleling 4.16kV power to St. Lucie Units 1 and 2 (see Section 8.2.1.5 for additional discussion).

St. Lucie Units 1 and 2 are designed using the "slide along" concept. The following facilities, systems and components are shared (one system which may be used by either or both units) by both nuclear units:

a) ultimate heat sink,

b) steam generator blowdown treatment facility,

c) makeup demineralizer regeneration (water treatment facility),

d) domestic water and fire protection system,

e) switchyard, telemetering and load dispatch equipment,

f) seismic instrumentation,

g) site and offsite environmental monitors,

h) hypochlorite system,

i) turbine oil storage tank,

j) carbon dioxide, nitrogen and hydrogen systems,

k) auxiliary steam supply system,

l) safety assessment system, and

m) condensate polisher filter demineralizer system.

All facilities are constructed so that no failure can in any way preclude safe shutdown of the plant.

An accident or single failure in one unit does not affect safe shutdown of either unit. A failure in any of the share features may result in reduced load operation of either or both units, but the capability for safe shutdown is unaffected by such a failure.

The ISFSI (Section 1.2.2.9) is also shared by both units for dry storage of spent fuel.

The LLWSF (Section 1.2.2.10) is also shared by both units for the interim storage of low level waste prior to shipment off site.

1.2.5 SECURITY PLAN

As discussed in Section 13.7 of the Unit 1 UFSAR, a common site security plan is provided for St. Lucie Units 1 and 2.

1.2.6 EMERGENCY PLAN

As discussed in Section 13.3, a common site emergency plan is provided for St. Lucie Units 1 & 2.

1.2.7 SYMBOLS AND ABBREVIATIONS ON FIGURES

Definitions of symbols and abbreviations used throughout the chapters on fluid and electrical systems are shown in detail on Figures 1.2-23 and 1.2-24. The auxiliary pumps P&I diagram is shown on Figure 1.2-34.

1.2.8 REFERENCES FOR SECTION 1.2

1) Letter from M. Rahimi (NRC) to T. Neider (Transnuclear, Inc.), "Certificate of Compliance No. 1030 for the NUHOMS® HD System " dated January 10, 2007, including Safety Evaluation Report to Transnuclear, Inc. NUHOMS® HD Horizontal Modular Storage System for Irradiated Nuclear Fuel

2) Appendix A to Certificate of Compliance No. 1030: NUHOMS® HD System Generic Technical Specifications

31) Transnuclear NUHOMS® HD Horizontal Modular Storage System for Irradiated Nuclear Fuel Final Safety Analysis Report

Refer to Drawing
2998-G-058

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

SITE PLAN

FIGURE 1.2-1

Refer to Drawing
2998-G-059

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

ENLARGED PLOT PLAN

FIGURE 1.2-2

Refer to Dwg.
2998-G-060

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

GENERAL ARRANGEMENT
TURBINE BUILDING
GROUND FLOOR PLAN
FIGURE 1.2-3

Refer to Drawing
2998-G-061

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

GENERAL ARRANGEMENT
TURBINE BUILDING
FIGURE 1.2-4

Refer to Dwg.
2998-G-062

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

GENERAL ARRANGEMENT
TURBINE BUILDING
OPERATING FLOOR PLAN
FIGURE 1.2-5

Refer to Dwg.
2998-G-063

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

GENERAL ARRANGEMENT
TURBINE BUILDING SECTIONS
SHEET 1
FIGURE 1.2-6

Refer to Dwg.
2998-G-064

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

GENERAL ARRANGEMENT
TURBINE BUILDING SECTIONS
SHEET 2
FIGURE 1.2-7

Refer to Dwg.
2998-G-065

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

GENERAL ARRANGEMENT
REACTOR BLDG FLOOR PLANS
SHEET 1
FIGURE 1.2-8

Refer to Dwg.
2998-G-066

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

GENERAL ARRANGEMENT
REACTOR BLDG FLOOR PLANS
SHEET 2 AND MAIN STEAM TRESTLE
FIGURE 1.2-9

Amendment No. 18 (01/08)

Refer to Dwg.
2998-G-067

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

GENERAL ARRANGEMENT
REACTOR BUILDING SECTIONS
SHEET 1
FIGURE 1.2-10

Refer to Dwg.
2998-G-068

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

GENERAL ARRANGEMENT
REACTOR BUILDING SECTIONS
SHEET 2
FIGURE 1.2-11

Refer to Dwg.
2998-G-069

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

GENERAL ARRANGEMENT
REACTOR AUXILIARY BUILDING PLAN
SHEET 1
FIGURE 1.2-12

Refer to Dwg.
2998-G-070

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

GENERAL ARRANGEMENT
REACTOR AUXILIARY BUILDING PLAN
SHEET 2
FIGURE 1.2-13

Refer to Dwg.
2998-G-071

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

GENERAL ARRANGEMENT
REACTOR AUXILIARY BUILDING PLAN
SHEET 3
FIGURE 1.2-14

Refer to Dwg.
2998-G-072

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

GENERAL ARRANGEMENT
REACTOR AUXILIARY BUILDING

FIGURE 1.2-15

Refer to Dwg.
2998-G-073

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

GENERAL ARRANGEMENT
FUEL HANDLING BUILDING
PLANS
FIGURE 1.2-16

Refer to Dwg.
2998-G-074

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

GENERAL ARRANGEMENT
FUEL HANDLING BUILDING
SECTIONS
FIGURE 1.2-17

Refer to Drawing
2998-G-075

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

GENERAL ARRANGEMENT
REACTOR AUXILIARY

FIGURE 1.2-18

Refer to Dwg.
2998-G-076

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

GENERAL ARRANGEMENT
REACTOR AUXILIARY BUILDING
MISCELLANEOUS PLANS AND SECTIONS
FIGURE 1.2-19

Refer to Dwg.
2998-G-077 SH 1

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

GENERAL ARRANGEMENT
COMPONENT COOLING WATER AREA AND
DIESEL GENERATOR BUILDING
FIGURE 1.2-20

Refer to Drawing
2998-G-077 SH 2

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

GENERAL ARRANGEMENT
COMPONENT COOLING AREA

FIGURE 1.2-21

Refer to Drawing
2998-G-077 SH 3

FLORIDA POWER & LIGHT COMPANY **ST. LUCIE PLANT UNIT 2**
GENERAL ARRANGEMENT INTAKE STRUCTURE **FIGURE 1.2-22**

Refer to Drawing
2998-G-078 SH 100

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

FLOW DIAGRAM SYMBOLS

FIGURE 1.2-23

Refer to Dwg.
2998-B-276, Sheet 00-2

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

CONTROL AND BLOCK
DIAGRAM

FIGURE 1.2-24

Refer to Dwg.
2998-B-270, Sheet 03

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

INSTRUMENT SYMBOLS

FIGURE 1.2-25

Refer to Dwg.
8770-B-270, Sheet 04

FLORIDA POWER & LIGHT COMPANY **ST. LUCIE PLANT UNIT 2**
INSTRUMENT TYPE **FIGURE 1.2-26**

Refer to Dwg.
8770-B-270, Sheet 05

FLORIDA POWER & LIGHT COMPANY **ST. LUCIE PLANT UNIT 2**
LINE SYMBOLS
FIGURE 1.2-27

Refer to Dwg.
8770-B-270, Sheet 06

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

ABBREVIATIONS – SHEET 1

FIGURE 1.2-28

Refer to Dwg.
8770-B-270, Sheet 07

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

ABBREVIATIONS – SHEET 2

FIGURE 1.2-29

Refer to Dwg.
8770-B-270, Sheet 08

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

VALVE SYMBOLS – SHEET 1

FIGURE 1.2-30

Refer to Dwg.
8770-B-270, Sheet 09

FLORIDA POWER & LIGHT COMPANY **ST. LUCIE PLANT UNIT 2**
VALVE SYMBOLS – SHEET 2 **FIGURE 1.2-31**

Refer to Dwg.
8770-B-270, Sheet 10

FLORIDA POWER & LIGHT COMPANY **ST. LUCIE PLANT UNIT 2**
PIPE OR EQUIPMENT ACCESSORY SYMBOLS – SHEET 1
FIGURE 1.2-32

Refer to Dwg.
8770-B-270, Sh. 11

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

PIPING AND INSTRUMENTATION
DIAGRAM SYMBOLS

FIGURE 1.2-33

Refer to Dwg.
2998-G-078 SH 105A, B, C

Amendment No. 11, (5/97)

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

FLOW DIAGRAM
AUXILIARY PUMPS

FIGURE 1.2-34

1.3 COMPARISONS

Comparisons contained herein were valid at the time the operating license for St. Lucie Unit 2 was issued, and are being retained in the Updated FSAR for document completeness and historical record. No present or future update of this section is required.

1.3.1 COMPARISONS WITH SIMILAR FACILITY DESIGNS

Table 1.3-I presents a summary of the characteristics of St. Lucie Unit 2 as originally licensed. The table presents comparative data for San Onofre Units 2 and 3; Arkansas Nuclear One, Unit 2; and St. Lucie Unit 1. Data was extracted from the applicable FSAR.

The San Onofre Units 2 and 3, and Arkansas Nuclear One, Unit 2 designs were selected for comparison because of the basic similarity of the reactor cores. Also they are well advanced in terms of licensing relative to St. Lucie Unit 2. St. Lucie Unit 1 was selected because it is an operating plant which is essentially the same design as St. Lucie Unit 2.

1.3.2 COMPARISON OF FINAL AND PRELIMINARY INFORMATION

1.3.2.1 General

This section contains a discussion of the significant changes that have been made in the St. Lucie Unit 2 design since submittal of the FSAR. Changes considered as significant would include changes in design bases or criteria for seismic Category I structures, and safety related systems or components, plant arrangement, mode of system operation, type of equipment, or gross changes in component or system capacity. In general, such changes further increase the safety margins and operating flexibility of St. Lucie Unit 2.

1.3.2.2 Fuel Load and Operation Dates

Fuel loading was scheduled to commence in October 1982 and 100 percent power operation was expected to be reached in April 1983. The operating license was actually issued in April 1983 and 100 percent power operation was achieved in July 1983.

1.3.2.3 Deletion of Chlorine Accident Detection System

A hypochlorite system has replaced the onsite use of bottled chlorine storage to control biological fouling in the Circulating Water System (refer to Subsection 10.4.5.4). As a result, the chlorine accident detection system is not required and has been eliminated.

1.3.2.4 New and Spent Fuel Storage Racks

The capacities of both the new fuel and spent fuel storage racks have increased as discussed in Subsections 9.1.1 and 9.1.2, respectively.

1.3.2.5 Construction Responsibility

Florida Power & Light Company (FP&L) has assumed responsibility for construction of St. Lucie Unit 2, with Ebasco Services Incorporated providing supervision and craft labor for performance of construction as directed or required by FP&L (refer to Section 1.4).

1.3.2.6 Pipe Rupture Criteria

Rupture restraint locations are selected on a "break anywhere" criteria based on Giambusso criteria which was accepted by the NRC review as delineated in the SER (November 1974). Rupture restraints are not provided where it was shown that the broken pipe does not cause unacceptable damage to essential systems. Rupture restraints are also not provided for system pressures under 275 psig, for slot breaks in lines less than four inches, and for systems only operating during accident and/or testing conditions.

In addition, a moderate energy piping analysis has been performed based on criteria as presented in Section 3.6.

The Shutdown Cooling System, which is used as high energy fluid system for only short operational periods and as moderate energy fluid system for the major operational periods, is classified and analyzed as a moderate energy system.

1.3.2.7 Clarification of Code Commitments

ACI-349 was not utilized as design criteria for St Lucie Unit 2 structures. For a clarification of the extent of use of ASME Code, Section III NF, refer to Subsections 3.8.3.2.1 and 3.9.3.4.

1.3.2.8 Containment Analysis

As discussed in Subsection 6.2.1.1, the computer code utilized to determine the containment pressure/temperature results from a loss-of-coolant-accident (LOCA) or main steam line break (MSLB) was CONTRANS (rather than CONTEMPT). In addition, the main feedwater and back-up isolation valves have changed to a 4.0 second closure time.

A spectrum of small break LOCAs are also analyzed.

1.3.2.9 Iodine Removal System

The iodine removal agent used by the Iodine Removal System has changed from sodium hydroxide to hydrazine (refer to Subsection 6.5.2).

1.3.2.10 Control Room Design and Analysis

The control room can support a 30 day occupancy throughout the duration of the accident without exceeding the guidelines of GDC 19. The control room is automatically isolated at the outset of the accident followed by the manual opening of an outside air intake, with filtration of the air through charcoal and HEPA filters.

The maximum temperature reached in the control room is based on having only one chiller of the Control Room Air Conditioning System available. Refer to Subsection 9.4.1 for further discussion.

1.3.2.11 Atmospheric Dump Valves and Main Feedwater Isolation Valves

In lieu of two 100 percent ac controlled atmospheric dump valves, four 50 percent capacity valves are provided, two on each main steam line, with ac controlled modulation and dc control for open/close operation (refer to Subsection 10.4.9).

The backup feedwater isolation valves have been relocated immediately upstream of the main feedwater isolation valves, in place of the feedwater check valves (refer to Subsection 10.4.7) and are now classified as Quality Group B, seismic Category I.

1.3.2.12 Continuous Containment Purge/Hydrogen Purge System

A Continuous Containment Purge/Hydrogen System has been added, as described in Subsection 9.4.8. As a result, the Airborne Radioactivity Removal System and Containment Instrument Air Compressor inside the containment are no longer required and they have been eliminated.

1.3.2.13 Solid Waste Management System

As stated in Section 11.4, when solidification is performed, in lieu of a permanent system a portable solidification system provided by an outside contractor is utilized to prepare waste material for transportation to an offsite disposal facility.

1.3.2.14 Radiation Protection

The Radiation Monitoring System is a computer based digital system as described in Section 11.5 and Subsection 12.3.4.

In light of the ALARA concern, plant shielding has been improved where practicable, some of which was based on St Lucie Unit 1 experience. Some examples of improved shielding design are the shielding provided for the fuel transfer tube, and shielding for neutron streaming around the reactor vessel (refer to Subsection 12.3.1). Other changes such as a bottom-loaded filter system are provided to reduce doses to operating personnel.

1.3.2.15 Protection Logic

As described in Sections 7.2 and 7.3, the Reactor Protective System and engineered safety features system logic is designed to initiate protective action whenever the signal of any two of three channels reaches the preset limit. A fourth channel is provided as a spare and allows bypassing of one channel while maintaining a two-out-of-three system.

1.3.2.16 Meteorological Data Acquisition

New calculational techniques for updating the site meteorological data are used as detailed in Section 2.3.

1.3.2.17 Fire Hazards Analysis

Design features which conform to 10CFR Appendices A and R are presented in Appendix 9.5A.

1.3.2.18 Auxiliary Feedwater System

The motor-operated valves required for the operation of the turbine-driven auxiliary feedwater pump are dc controlled (refer to Subsection 10.4.9).

1.3.2.19 Chapter 15 Accident Analysis

The chapter is structured around an event type/frequency matrix which categorizes the initiating events by type and expected frequency of occurrence. Only the limiting cases in each group have been quantitatively analyzed.

Incorporated into Chapter 15 is the Reload Safety Evaluation and Chapter 15 appendices. 1

TABLE 1.3-1

PLANT PARAMETER COMPARISON

Item	St. Lucie Unit 2 (Cycle 1)	Reference Section	San Onofre Units 2 and 3	ANO-2	St. Lucie Unit 1 (Cycle 1)
Hydraulic and Thermal Design Parameters					
Rated core heat output, MWt	2,560	4.4	3,390	2,815	2,560
Rated core heat output, Btu/hr	$8,737 \times 10^6$	4.4	$11,570 \times 10^6$	$9,608 \times 10^6$	$8,737 \times 10^6$
Heat generated in fuel, %	97.5	4.4	97.5	97.4	97.5
System pressure, nominal, psia	2,250	4.4	2,250	2,250	2,250
System pressure, minimum steady state, psia	2,200	4.4	2,200	2,200	2,200
Hot channel factors,					
Heat flux, F_q	2.57		2.35	2.35	2.85
DNB ratio at nominal conditions	2.64 (CE-1)	4.4	2.07 (CE-1)	2.26 (W-3)	2.30 (W-3)
Coolant flow					
Minimum allowable reactor flowrate, lb/hr	139.4×10^6	4.4	148×10^6	120.4×10^6	122×10^6
Effective flowrate for heat transfer, lb/hr	134.3×10^6	4.4	142.8×10^6	116.2×10^6	117.5×10^6
Effective flow area for heat transfer, ft^2	54.7	4.4	54.7	44.6	53.5
Average velocity along fuel rods, ft/sec	15.1	4.4	16.3	16.4	13.6
Average mass velocity, lb/hr-ft^2	2.45×10^6	4.4	2.61×10^6	2.60×10^6	2.20×10^6
Coolant temperatures, F					
Nominal inlet	548	4.4	553	553.5	538.9
Design inlet	550	4.4	556	556.5	544
Average rise in vessel	48	4.4	58	58.5	55
Average rise in core	50	4.4	60	60.5	56
Average in core	573	4.4	586	583.75	572
Average in vessel	572	4.4	582	582.75	571.5
Nominal outlet of hot channel	622	4.4	642	652	640

TABLE 1.3-1 (Cont'd)

Item	St. Lucie Unit 2 (Cycle 1)	Reference Section	San Onofre Units 2 and 3	ANO-2	St. Lucie Unit 1 (Cycle 1)
Hydraulic and Thermal Design Parameters (Cont'd)					
Heat transfer at 100% power					
Active heat transfer surface area, ft^2	56,315	4.4	62,000	51,000	48,400
Average heat flux, $Btu/hr\text{-}ft^2$	151,300	4.4	182,400	185,000	176,000
Maximum heat flux, $Btu/hr\text{-}ft^2$	388,800	4.4	428,000	433,800	501,300
Average thermal output, KW/ft (Fuel Rod Only)	4.43	4.4	5.34	5.41	5.94
Maximum thermal output, KW/ft (Fuel Rod Only)	11.4	4.4	12.5	12.7	17
Maximum clad surface temperature at nominal pressure, F	657.0	4.4	657.0	657	657
Fuel center temperature, F maximum at 100% power	2,986	4.4	3,180	3,420	3,890
Core Mechanical Design Parameters					
Fuel assemblies					
Design	CEA	4.2	CEA	CEA	CEA
Rod pitch, in.	0.506	4.2	0.5063	0.5063	0.58
Cross-section dimensions, in.	7.972 x 7.972	4.2	7.972 x 7.972	7.97 x 7.97	7.98 x 7.98
Fuel weight (as UO_2), lb_m	204.4×10^3	4.2	223.9×10^3	183,834	207,200
Total weight, lb_m	282.8×10^3	4.2	314,867	250,208	271,280
Number of grids per assembly	10	4.2	11	12	8
Fuel rods					
Number	49,580	4.2	49,580	40,644	36,896
Outside diameter, in.	0.382	4.2	0.382	0.382	0.44
Diametral gap, in.	0.007	4.2	0.007	0.007	0.0085
Clad thickness, in.	0.025	4.2	0.025	0.025	0.026
Clad material	Zircaloy-4	4.2	Zircaloy-4	Zircaloy	Zircaloy

TABLE 1.3-1 (Cont'd)

Item	St. Lucie Unit 2 (Cycle 1)	Reference Section	San Onofre Units 2 and 3	ANO-2	St.Lucie Unit 1 (Cycle 1)
Core Mechanical Design Parameters (Cont'd)					
Fuel pellets					
Material	UO_2 sintered	4.2	UO_2 sintered	UO_2 sintered	UO_2 sintered
Diameter, in.	0.325	4.2	0.325	0.325	0.3795
Length, in.	0.390	4.2	0.390	0.390	0.650
Control assemblies					
Neutron absorber	(See Table 4.2-1)	4.2	(See Table 4.2-1)	B_4C/Ag-In-Cd	B_4C/SS
Cladding material	Inconel 625	4.2	Inconel 625	NiCrFe alloy	NiCrFe alloy
Clad thickness	0.035	4.2	0.035	0.035	0.040
Number of assembly, full/part-length	83/0	4.2	83/8	73/8	73/8
Number of rods per assembly	4,5/5	4.2	4,5/5	5	5
Nuclear Design Data					
Structural characteristics					
Core diameter, in. (equivalent)	136	4.2	136	123	136
Core height, in. (active fuel)	136.7	4.2	150	150	136.7
H_2O/UO_2 Unit Cell (cold), volume ratio	1.705	4.2	1.705	1.705	1.63
Number of fuel assemblies	217	4.2	217	177	217
UO_2 Rods per assembly, unshimmed/shimmed					
Batch A	236	4.3	236	236	176
Batch B	236/220	4.3	236/220	224	164
Batch C	236/224 or 220	4.3	236/224 or 220	224/234/233	176/164/164
Performance characteristics loading technique	3-batch mixed central zone	4.3	3-batch mixed central zone	3-batch mixed central zone	3-batch mixed central zone
Fuel discharge burnup, MWD/MTU					
Average first cycle	13,187	4.3	12,731	12,500	12,800

TABLE 1.3-1 (Cont'd)

Item	St. Lucie Unit 2 (Cycle 1)	Reference Section	San Onofre Units 2 and 3	ANO-2	St. Lucie Unit 1 (Cycle 1)
Nuclear Design Data (Cont'd)					
Feed enrichment, wt%					
Region 1	1.71	4.3	1.87	1.93	1.93
Region 2	2.28	4.3	2.38	2.27	2.33
Region 3	2.73	4.3	2.88	2.94	2.82
Control characteristics effective multiplication (beginning of life)					
Cold, no power, clean	1.170	4.3	1.170	1.195	1.170
Hot, no power, clean	1.119	4.3	1.125	1.139	1.134
Hot, full power, Xe equilibrium	1.070	4.3	1.067	1.082	1.078
Control Assemblies					
Total rod worth (hot), %	11.16 (EOC)	4.3	11.35	12.3	11.0
Boron concentrations for criticality:					
Zero power no rods inserted, clean, ppm Cold/Hot	901/809	4.3	899/832	1011/1001	945/935
At power with no rods inserted, clean/equilibrium xenon, ppm	715/493	4.3	719/452	881/611	820/590
Kinetic characteristics, range over life					
Moderator temperature coefficient, $\Delta\rho/F$	See Table 4.3-4	4.3	See Table 4.3-4	-0.3×10^{-4} to -2.5×10^{-4}	-0.4×10^{-4} to -2.1×10^{-4}
Moderator pressure Coefficient, $\Delta\rho/psi$	$+0.6 \times 10^{-6}$	4.3	$+0.7 \times 10^{-6}$	$+0.06 \times 10^{-6}$ to $+2.6 \times 10^{-6}$	$+0.49 \times 10^{-6}$ to $+2.55 \times 10^{-6}$
Moderator void coefficient, $\Delta\rho/\%$ Void	-0.22×10^{-3}	4.3	-0.36×10^{-3}	-0.03×10^{-3} to -1.22×10^{-3}	-0.26×10^{-3} to -1.35×10^{-3}
Doppler coefficient, $\Delta\rho/F$	See Figure 4.3-34	4.3	1.18 x 10 to 1.28×10^{-5}	-1.18×10^{-5} to -1.78×10^{-5}	-1.45×10^{-5} to -1.07×10^{-5}

TABLE 1.3-1 (Cont'd)

Item	St. Lucie Unit 2 (Cycle 1)	Reference Section	San Onofre Units 2 and 3	ANO-2	St. Lucie Unit 1 (Cycle 1)
Principal Design Parameters of the Reactor Coolant System					
Operating pressure, psig	2,235	5.1	2,235	2,235	2,235
Operating Reactor inlet temperature, F	550	5.1	553	553.5	539.7
Operating Reactor outlet temperature, F	604	5.1	611.2	612.5	595.7
Number of loops	2	5.1	2	2	2
Design pressure, psig	2,485	5.1	2,485	2,485	2,485
Design Temperature, F	650	5.1	650	650	650
Hydrostatic test pressure (cold), psig	3,110	5.1	3,110	3,110	3,110
Principal Design Parameters of the Reactor Vessel					
Material	See Table 5.2-3	5.2	See Table 5.2-2	SA-533, Grade B, Class I, low alloy steel, internally clad with Type 304 austenitic SS	SA-533, Grade B, Class 1, low alloy steel, internally clad with Type 304 austenitic SS
Design pressure, psig	2,485	5.3	2,485	2,485	2,485
Design temperature, F	650	5.3	650	650	650
Operating pressure, psig	2,235	5.3	2,235	2,235	2,235
Inside diameter of shell, in.	172	5.3	172	157	172
Outside diameter across nozzles, in.	253	5.3	253	238	253
Overall height of vessel and enclosure head, ft-in. to top of CEDM nozzle	41-10-3/8	5.3	43-6-1/2	43-4-1/6	41-11-3/4
Minimum clad thickness, in.	1/8	5.3	1/8	1/8	5/16
Principal Design Parameters of the Steam Generators					
Number of Units	2	5.4	2	2	2

TABLE 1.3-1 (Cont'd)

Item	St. Lucie Unit 2 (Cycle 1)	Reference Section	San Onofre Units 2 and 3	ANO-2	St. Lucie Unit 1 (Cycle 1)
Principal Design Parameters of the Steam Generators (Cont'd)					
Type	Vertical U-tube with integral moisture separator	5.4	Vertical U-tube with integral moisture separator	Vertical U-tube with integral moisture separator	Vertical U-tube with integral moisture separator
Tube material	NiCrFe alloy	5.2	NiCrFe alloy	NiCrFe alloy	NiCrFe alloy
Shell material	SA-533 GR A&B, Class 1 and SA 516, Gr. 70	5.2	SA-533 Gr. B Class 1 and SA-516, Gr.70	SA-533 Gr. B Class 1 and SA-516, Gr. 70	SA-533 Gr. B Class 1 and SA-516, Gr. 70
Tube side design pressure, psig	2,485	5.4	2,485	2,485	2,485
Tube side design temperature, F	650	5.4	650	650	650
Tube side design flow, lb/hr	61×10^6	5.4	74×10^6	60.2×10^6	61×10^6
Shell side design pressure, psia	1,000	5.4	1,100	1,100	1,000
Shell side design temperature, F	550	5.4	560	560	550
Operating pressure, tube side, nominal, psig	2,235	5.4	2,235	2,235	2,235
Operating pressure, shell side, maximum, psig	885		985	985	885
Maximum moisture at outlet at full load, %	0.2	5.4	0.2	0.2	0.2
Hydrostatic test pressure, tube side (cold) psig	3,110		3,110	3,110	3,110
Steam pressure, at full power, psia	815	5.4	900	900	815
Steam temperature, at full power, F	520.3	5.4	532	531.95	520.3
Principal Design Parameters of the Reactor Coolant Pumps					
Number of units	4	5.4	4	4	4
Type	Vertical, single stage centrifugal with bottom suction and horizontal discharge		Vertical, single stage radial flow with bottom suction and horizontal discharge	Vertical, single stage centrifugal with bottom suction and horizontal discharge	Vertical, single stage centrifugal with bottom suction and horizontal discharge
Design pressure, psig	2,485	5.4	2,485	2,485	2,485

TABLE 1.3-1 (Cont'd)

Item	St. Lucie Unit 2 (Cycle 1)	Reference Section	San Onofre Units 2 and 3	ANO-2	St. Lucie Unit 1 (Cycle 1)
Principal Design Parameters of the Reactor Coolant Pumps (Cont'd)					
Design temperature, F	650	5.4	650	650	650
Operating pressure, nominal psig	2,235	5.4	2,235	2,235	2,235
Suction temperature, F	550	5.4	553	553.5	540
Design capacity, gal/min	81,200	5.4	99,000	80,000	80,000
Design head, ft	310	5.4	310	275	250
Hydrostatic test pressure (cold), psig	3,110		3,110	3,110	3,110
Motor type	AC induction, single speed		AC induction, single speed	AC induction, single speed	AC induction, single speed
Motor rating, hp	6,500		9,700	6,500	6,500
Principal Design Parameters of the Reactor Coolant Piping					
Material	See Table 5.2-3		SA-516, Gr 70 with nominal 7/32 SS clad	SA-516, Gr 70 with nominal 3/16 SS clad	SA-516, Gr 70 with nominal 7/32 SS clad
Hot leg ID, in.	42	5.4	42	42	42
Cold leg ID, in.	30	5.4	30	30	30
Between pump and steam generator ID, in.	30	5.4	30	30	30
Engineered Safety Features					
High pressure safety injection pumps	2	6.3	3	3	3
Low pressure safety injection pumps	2	6.3	2	2	2
Safety injection tanks, number	4	6.3	4	4	4
Containment spray pumps	2	6.2	2	2	2
Containment fan coolers units	4	6.2	4	4	4
Air flow capacity, each at emergency conditions, ft^3/min	39,600	6.2	31,000	50,000	55,800

TABLE 1.3-1 (Cont'd)

Item	St. Lucie Unit 2 (Cycle 1)	Reference Section	San Onofre Units 2 and 3	ANO-2	St. Lucie Unit 1 (Cycle 1)
Engineered Safety Features (Cont'd)					
Emergency power Diesel-generator unit	2	8.3	4 (for two units)	2	2
Containment System Parameters					
Type	Steel containment vessel with cylindrical shell, hemispherical dome and ellipsoidal bottom - ASME Code, Section III, Class MC, surrounded by reinforced concrete Shield Building.	3.8.2	Steel-lined prestressed post tensioned concrete cylinder, curve dome roof.	Steel-lined prestressed post tensioned concrete cylinder, curved dome roof.	Steel containment vessel with cylindrical shell, hemispherical dome and ellipsoidal bottom - ASME Code, Section III, Class B, surrounded by reinforced concrete Shield Building.
Inside Diameter, ft.	140	3.8	150	116	140
Height, ft.	232	3.8	172	207	232
Free volume, ft^3	2,500,000	6.2	2,335,000	1,780,000	2,500,000
Reference accident Pressure, psig	44	3.8	60	54	44
Steel Thickness, in.			-	-	-
Vertical Wall	1.92	3.8	Not Applicable	Not Applicable	1.91
Hemispherical Head	0.96		Not Applicable	Not Applicable	0.95
Knuckles	2.125		Not Applicable	Not Applicable	225
Concrete Thickness, ft.					
Vertical Wall	Not Applicable	3.8	4 1/3	3 3/4	Not Applicable
Dome	Not Applicable		3 3/4	3 1/4	Not Applicable
Design Parameters - Shield Building		3.8	Not Applicable	Not Applicable	
Inside Diameter, ft.	148				148
Height, ft. (top of foundation to top of dome)	230.5				230.5
Concrete Thickness, ft.					
Vertical Wall	3				3
Dome	2.5				2.5

TABLE 1.3-1 (Cont'd)

Item	St. Lucie Unit 2 (Cycle 1)	Reference Section	San Onofre Units 2 and 3	ANO-2	St. Lucie Unit 1 (Cycle 1)
Containment Leak Prevention and Mitigation Systems	Leak-tight penetration, Automatic isolation where required.	6.2	Leak-tight penetration, and continuous steel liner. Automatic isolation where required.	Leak-tight penetration, and continuous steel liner. Automatic isolation where required.	Leak-tight penetration, Automatic isolation where required.
Gaseous Effluent Purge	Discharge through vent.	6.2	Discharge through vent.	Discharge through vent.	Discharge through vent.
RADIOACTIVE WASTE MANAGEMENT SYSTEM					
Liquid Waste Processing Systems					
Reactor Coolant Waste Holdup Tank (BMS)		11.2			
Number	4		1/2	4	4
Capacity (Gal.), each	40,000		6,000/25,000	51,270	40,000
Concentrators					
Number	1		1 (For 2 units)	1	1
Capacity (gpm)	20		50	20	2
Gaseous Waste Processing Systems					
Waste Gas Decay Tank		11.3			
Number	3		6 (For 2 units)	3	3
Capacity (ft^3), each	138		500	300	144
Pressure (psig)	190		150	380	190
Hold-up Time (days)	25		30	30	30
ELECTRIC SYSTEMS					
Number of Offsite Circuits	3	8.1	8	3	3
Number of Incoming Lines to Startup Transformers	2	8.2	2	2	2
Number of Startup Transformers	2	8.2	4	1+1(shared)	2
Number of Main Unit Transformers (Three Phase)	2	8.2	1	3 (single phase)	2
Number of 4.16 KV Engineered Safety Features System Buses	3	8.3	3	2	3

TABLE 1.3-1 (Cont'd)

Item	St. Lucie Unit 2 (Cycle 1)	Reference Section	San Onofre Units 2 and 3	ANO-2	St. Lucie Unit 1 (Cycle 1)
ELECTRIC SYSTEMS (Cont'd)					
Number of 480V Engineered Safety Features System Buses	3	8.3	3	2	3
Number of 120V Safety Related Vital Buses	4	8.3	4	4	4
Number of Standby Diesel Generators	2	8.3	2	2	2
Diesel Generator Rating (KW)	3685	8.3	4700	2850	3500
INSTRUMENTATION SYSTEMS*					
Reactor Protective System	7.2	7.2	7.2	7.2	7.2
Reactor and Reactor Coolant System	7.7.1.1 7.6.1	7.7.1.1 7.1.1.2	7.7.1.1 7.7.1.2	7.7.1.1 7.7.1.2	7.7.1.1 7.7.1.2
Steam and Feedwater Control System	7.7.1.1	7.7.1.3	7.7.1.3	7.7.1.3	7.7.1.3
Nuclear Instrumentation	7.2.1.1 7.7.1.1	7.2.1.1	7.2.1.1	7.2.1.1	7.2.1.1
Non-Nuclear Process Instrumentation	7.7.1.1 7.5.1	7.5.1.5	7.5.1.5	7.5.1.5	7.5.1.5
CEA Position Instrumentation	7.7.1.1	7.5.1.3	7.5.1.3	7.5.1.3	7.5.1.3

* This section is not suited for tabular description. SAR section numbers have been included for the location of the detailed description of each system.

1.4 IDENTIFICATION OF AGENTS AND CONTRACTORS

Information contained herein was valid at the time the operating license for St. Lucie Unit 2 was issued, and is being retained in the updated FSAR for document completeness and historical record. No present or future update of this section is required.

The Florida Power & Light Company is the applicant for the operating license for St Lucie Unit 2. Florida Power & Light Company is responsible for the design and engineering review, construction and operation of the plant.

Florida Power & Light Company has engaged Combustion Engineering, Inc. (CE) to design, manufacture and provide the Nuclear Steam Supply System and nuclear fuel for the first core and the first three core reload batches. The Nuclear Steam Supply System includes the Reactor Coolant System, reactor auxiliary system components, nuclear and certain process instrumentation, and the reactor control and protective system. In addition, CE will furnish technical assistance for erection, initial fuel loading, testing and initial startup of the Nuclear Steam Supply System.

Ebasco Services Inc. has been engaged by the Applicant for engineering and procurement services for this project and as such has performed engineering and design work for the balance - of -plant equipment, systems and structures not included under the CE scope of supply. Ebasco has also provided supervision and craft labor for performance of construction as directed or required by Florida Power & Light Company.

These and other engineering firms with approved Quality Assurance Programs may perform backfit, retrofit, maintenance and construction activities during plant operation under the auspices of Florida Power & Light Company.

1.5 REQUIREMENTS FOR FURTHER TECHNICAL INFORMATION

Material contained herein were valid at the time the operating license for St Lucie 2 was issued, and are being retained in the Updated FSAR for document completeness and historical record. No present or future update of this section is required.

This section provides a description of safety related technical information relevant to this application. Combustion Engineering, Inc., (CE), is conducting research and development programs relating to the requirements of this section.

The St Lucie Unit 2 reactor incorporates a 16 x 16 fuel assembly design with five guide tubes. This design provides an increase in conservatism for loss-of-coolant accident (LOCA) considerations with a minimum change from previous CE fuel designs. Previous designs have undergone extensive testing, and operating experience is now being acquired.

The three test programs described in Subsections 1.5.1, 1.5.2, and 1.5.3 are considered necessary to confirm the adequacy of the 16 x 16 fuel assembly design.

References 1 to 6 present descriptions of development programs aimed at verifying the Nuclear Steam Supply System (NSSS) design and the anticipated performance characteristics, and at confirming the design margins. Other programs that apply to this plant are identified in Subsections 1.5.4 through 1.5.8.

1.5.1 FRETTING AND VIBRATIONS TESTS OF FUEL ASSEMBLIES

Extensive autoclave vibration and dynamic flow tests have been performed to characterize fuel rod and spacer grid fretting corrosion in CE fuel assemblies.

Tests have been completed using a full sized 16 x 16 fuel assembly. This assembly is similar to the 16 x 16 five guide tube design used on the St Lucie Unit 2 reactor. This assembly was subjected to flow testing under conditions of temperature, water chemistry, pressure, and flow velocities in excess of normal reactor conditions. Further information is provided in Subsections 4.2.3.1.1, 4.2.3.1.2, and 4.2.4.4.

1.5.2 DEPARTURE FROM NUCLEATE BOILING (DNB) TESTING

Extensive heat transfer testing has been completed with electrically heated rod bundles representative of the CE 16 x 16 and 14 x 14 fuel assemblies. The program for each assembly geometry included tests to determine the effects on DNB of the control element assembly (CEA) guide tube, bundle heated length, and grid spacing, and lateral and axial power distributions. Each test yielded DNB data over a wide range of conditions of interest for pressurized water reactor (PWR) design. Those data were used with the TORC subchannel analysis code to develop and to verify the CE-1 DNB correlation for predicting DNB in fuel assemblies with standard spacer grids. The CE-1 correlation, which is discussed in more detail in Subsection 4.4.4.1, is used in computing margin to DNB for St. Lucie Unit 2.

1.5.3 FUEL ASSEMBLY STRUCTURAL TESTS

The fuel assembly structural testing program was designed to verify the structural adequacy of the fuel assembly design under normal handling, normal operation, seismic excitation, and LOCA loadings. The test program provides the structural characteristics employed in the fuel assembly structural analyses.

A series of tests were conducted on a 14 x 14 fuel assembly to determine the combined axial and lateral load deflection characteristics of the fuel assembly. Axial compression tests and axial drop tests were performed. Measurements were made of axial loads, axial deflections, lateral deflections of all spacer grids, and strains in the guide tubes and fuel rods.

A series of structural tests on the 16 x 16 fuel assembly design was also conducted. The fuel assembly was subjected to both static and dynamic tests so as to determine basic structural characteristics. In addition, several 16 x 16 spacer grids were subjected to impact tests to determine dynamic load deflection characteristics and damage limits. These tests are also discussed in Subsection 4.2.3.1.3.

1.5.4 FUEL ASSEMBLY FLOW MIXING TESTS

The objective of the fuel assembly flow mixing program was to obtain information on the magnitude of coolant mixing in CE fuel assemblies. Several series of tests have been completed, and the data from these tests provide a sound basis for the treatment of coolant mixing in design thermal margin calculations.

The first series of single phase flow mixing tests was run in 1966 with a prototype CE PWR fuel assembly. The average level of coolant mixing was determined using dye injection and sampling equipment.

A second series of single phase mixing tests was conducted in 1968 with a model representing a portion of a 14 x 14 CEA type fuel assembly. Those tests, which also used dye injection and sampling techniques, are described in Reference 1.

More recently, tests were conducted in which coolant temperatures were measured in the subchannels of electrically heated rod bundles representative of the 14 x 14 or 16 x 16 fuel assemblies with standard spacer grids.

As discussed in Subsection 4.4.4.1, those data provide confirmation that the results from the previous dye sampling experiments are applicable for the fuel assembly design used in St Lucie Unit 2.

1.5.5 REACTOR FLOW MODEL TESTING AND EVALUATION

The objective of the reactor flow model test programs is to obtain information on:

a) Flow and pressure distributions in various regions of the reactor

b) Pressure loss coefficients

c) Hydraulic loads on certain vessel internal components

This information is used for establishing or verifying design hydraulic parameters.

Flow model testing, which began in 1966, was designed to obtain those reactor hydraulic design data not amenable to direct calculation. Scale model testing possesses the advantages, relative to actual reactor tests, of:

a) Providing the information early in the design stage

b) Being more suitable for extensive instrumentation

c) Being flexible so that proposed design modifications can be investigated

The reactor flow models used by CE are generally 1/5 true scale models. In the first four CE flow model programs, a closed core design was used. The closed core simulates the reactor fuel assemblies with individual closed wall tubes containing orifices to provide the correct axial hydraulic resistance.

Further discussion of the CE flow model test programs is provided in Subsection 4.4.4.2.1.

1.5.6 FUEL ASSEMBLY FLOW TESTS

The objectives of the fuel assembly flow test program included assessment of the effect of postulated flow maldistributions on thermal behavior and margin.

The program originated in 1967 with fuel assembly flow distribution testing. Both flow visualization and flow pattern measurements were generated on an overscale model of the lower portion of an early CE design fuel assembly.

A second test series was conducted for the CEA type fuel assembly. The second test series was designed to:

a) Determine the effect of flow obstructions on flow distribution within the fuel assembly

b) Determine the magnitude of the effect of the disturbed flow patterns on the thermal margin within a CEA type fuel assembly

The information from these tests, described further in Reference 1, has established the effect of flow obstructions within the fuel assembly. Additional information on the effects of postulated fuel coolant channel flow blockages is presented in Subsection 4.2.3.2.14.

1.5.7 CONTROL ELEMENT DRIVE MECHANISM (CEDM) TESTS

Performance testing of the magnetic jack CEDM is described in Subsections 3.9.4.4 and 4.2.4.4 and in Reference 1. The program has confirmed the operability of the drive assembly in normal and misaligned conditions as well as the load carrying capability and life characteristics.

1.5.8 DNB IMPROVEMENT

The DNB improvement program was initiated by CE in order to obtain empirical information on the departure from nucleate boiling (DNB) phenomenon and on other thermal and hydraulic characteristics of CE fuel assemblies. Testing has been performed with electrically heated rod bundles that correspond dimensionally to fuel rod configurations under in-reactor temperature pressure and flow conditions to obtain data on DNB, pressure drop, and coolant channel exit temperatures. These data were employed to verify that the CE thermal hydraulic design methods conservatively predict DNB.

The DNB improvement program is described in References 1, 2, 3, and 4. It is a continuing program providing improvements in the accuracy of CE thermal and hydraulic computer programs for predicting local coolant conditions and pressure drops and confirming the applicability of currently used DNB correlations to the CE fuel design. Additional information on the program and results applicable to St Lucie Unit 2 are presented in Subsection 4.4.4.1.

SECTION 1.5: REFERENCES

1. "Safety Related Research and Development for Combustion Engineering Pressurized Water Reactors, Program Summaries," CENPD-87 (Proprietary), January 1973, and CENPD-87, Rev 01, (Non-Proprietary), March 1973.

2. "Safety Related Research and Development for Combustion Engineering Pressurized Water Reactors, Program Summaries," CENPD-143 (Proprietary) and CENPD-143, Rev 01 (Non-Proprietary), May 1974.

3. "Safety Related Research and Development for Combustion Engineering Pressurized Water Reactors, 1974 Program Summaries," CENPD-184-P (Proprietary) and CENPD-184 (Non-Proprietary), May 1975.

4. "Safety Related Research and Development for Combustion Engineering Pressurized Water Reactors, 1975 Program Summaries," CENPD-229-P (Proprietary) and CENPD-229 (Non-Proprietary), June 1976.

5. "Safety Related Research and Development for Combustion Engineering Pressurized Water Reactors, 1976 Program Summaries," CENPD-258 (Non-Proprietary), October 1977.

6. "Safety Related Research and Development for Combustion Engineering Pressurized Water Reactors, 1977-1978 Program Summaries," CENPD-262 (Non-Proprietary), December 1978.

1.6 MATERIAL INCORPORATED BY REFERENCE

Topical reports incorporated by reference were valid at the time of application to the NRC, and are being retained in the updated FSAR for document completeness and historical record. No present or future update of this section is required.

The following topical reports are incorporated by reference.

Report Number	Author and Title	Date to NRC	FSAR Section
CENPD-162 (with Suppl. 1)	Combustion Engineering, Inc. "CHF Correlation for C-E Fuel Assemblies with Standard Spacer Grids-Part 1; Uniform Axial Power Distribution"	May 1975 (Approved Version, Sept. 1976)	4.4, 15.0
CENPD-168 Rev. 1	Combustion Engineering, Inc. "Design Basis Pipe Breaks for the Combustion Engineering Two Loop Reactor Coolant System"	Oct. 1976 (Approved Version, Aug. 1977)	3.6
CENPD-178P and 178 Rev. 1	Combustion Engineering, Inc. "Structural Analysis of the 16 x 16 Fuel Assembly for Combined Seismic and Loss-of-Coolant-Accident Loadings"	August 1981	3.9, 4.2
CENPD-115 Suppl. 1	Combustion Engineering, Inc. "Comparison of Calvert Cliffs, Maine Yankee, and Fort Calhoun Design Parameters and Flow-Induced Structural Response"	April 1974	3.9
CENPD-182 Rev. 1	Combustion Engineering, Inc. "Seismic Qualification of C-E Instrumentation and Control Equipment"	June 1977	3.10, 7.2
CENPD-183	Combustion Engineering, Inc. "C-E Methods for Loss of Flow Analysis"	August 1975	15.3
CENPD-187 (with Suppl. 1)	Combustion Engineering, Inc. "Method of Analyzing Creep Collapse of Oval Cladding"	October 1975 and May 1975 (Approved Version, April 1976)	4.2

CENPD-26 (with Suppl. 1 through 3)	Combustion Engineering, Inc. "Description of Combustion Engineering Loss of Coolant Calculational Procedures"	August 1971	3.9

Report Number	Author and Title	Date to NRC	FSAR Section
CENPD-42	Combustion Engineering, Inc. "Dynamic Analysis of Reactor Vessel Internals Under Loss of Coolant Accident Conditions with Application to C-E 800 Mwe Class Reactors"	August 1972	3.9
CENPD-67 Rev. 1, Addenda 1 and 2	Combustion Engineering, Inc. "Iodine Decontamination Factors During PWR Steam Generation and Steam Venting"	September 1973 November 1974, August 1975	10.3
CENPD-98	Combustion Engineering, Inc. "Coast Code Description"	July 1973 (Approved Version, April 1974)	4.4, 15.0
CENPD-107 (with Suppl. 1 through 5)	Combustion Engineering, Inc. "CESEC"	August 1974, September 1974, Septem- 1975, January 1976, June 1976	15.0
CENPD-105	Combustion Engineering, Inc. "Fast Neutron Attenuation by the ANISN-SHADRAC Analytical Method"	Nov. 1973	4.3
CENPD-132 (with Suppl. 1 and 2)	Combustion Engineering, Inc. "Calculative Methods for the C-E Large Break LOCA Evaluation Model"	September 1974, March 1975, August 1975.	6.2, 6.3, 15.6
CENPD-133 (with Suppl. 2)	Combustion Engineering, Inc. "CEFLASH-4A Fortran IV Digital Computer Program for Reactor Blowdown Analysis"	September 1974, March 1975	6.2, 6.3, 15.6
CENPD-134 (with Suppl. 1)	Combustion Engineering, Inc. "COMPERC-II A Program for Emergency Refill-Reflood of the Core"	September 1974, March 1975	6.2, 6.3, 15.6
CENPD-135 (with Suppl. 2, 4 and 5	Combustion Engineering, Inc. "STRIKIN-II A Cylindrical Geometry Fuel Rod Heat Transfer Program"	September 1974, March 1975 September 1976, May 1977	4.2, 6.3, 15.6

Report Number	Author and Title	Date to NRC	FSAR Section
CENPD-136	Combustion Engineering, Inc. "High Temperature Properties of Zircaloy and UO_2 for use in LOCA Evaluation Model"	August 1974	4.2, 6.3, 15.6
CENPD-137 (with Suppl. 1)	Combustion Engineering, Inc. "Calculative Methods for the C-E Small Break LOCA Evaluation Model"	September 1974	6.3, 15.6
CENPD-139 (with Suppl. 1)	Combustion Engineering, Inc. "C-E Fuel Evaluation Model"	September 1974 (Approved Version, April 1975)	4.1, 4.2, 4.3, 4.4, 6.3, 15.6
CENPD-145	Combustion Engineering, Inc. "A Method of Analyzing In-Core Detector Data in Power Reactors"	May 1975, February 1978	4.3
CENPD-148	Combustion Engineering, Inc. "Review of Reactor Shutdown System (PPS Design) for Common Mode Failure Susceptibility"	September 1974	4.6, 7.2
CENPD-153 with Amendments 1 through 3	Combustion Engineering, Inc. "Evluation of Uncertainty in the Nuclear Form Factor Measured by Self Powered Fixed In-Core Detector Systems"	December 1974, August 1977, February 1978, April, 1979	4.3
CENPD-155	Combustion Engineering, Inc. "C-E Procedure for Design, Fabrication, Installation and Inspection of Surveillance Specimen Brackets Attached to Reactor Vessel Beltline Region"	October 1974 (Approved Version, August 1975)	5.3
CENPD-161 with Amendment 1.	Combustion Engineering, Inc. "TORC - A Computer Code for Determining the Thermal Margin of a Reactor Core"	June 1975, May 1976 (Approved Version, September 1978)	4.1, 4.2, 4.3, 4.4, 15.0

Report Number	Author and Title	Date to NRC	FSAR Section
CENPD-190	Combustion Engineering, Inc. "C-E Method for Control Element Assembly Ejection Analysis"	January 1976 (Approved Version, August 1976)	15.4
CENPD-198 and Supplements 1 and 2	Combustion Engineering, Inc. "Zircaloy Growth-In-Reactor Dimensional Changes in Zircaloy-4 Fuel Assemblies"	December 1975 January 1978 November 1978	4.2
CENPD-206	Combustion Engineering, Inc. "Comparison of TORC Code Predictions with Experimental Data"	February 1977	4.4
CENPD-207	Combustion Engineering, Inc. "Critical Heat Flux Correlation for C-E Fuel Assemblies with Standard Spacer Grids, Part 2, Non-Uniform Axial Power Distributions"	July 1976	4.4
CENPD-213 and Suppl. 1	Combustion Engineering, Inc. "Application of FLECHT Reflood Heat Transfer Coeffficients to Combustion Engineering 16 x 16 Fuel Bundles"	February 1976, March 1976	6.3, 15.6
CENPD-225	Combustion Engineering, Inc. "Fuel and Poison Rod Bowing"	October 1976	4,2, 4.4
CENPD-199	Combustion Engineering, Inc. "C-E Setpoint Methodology: Local Power Density and DNB LCSS and LCO Setpoint Methodology for Analog Protective System."	April 1976	4.3
CENPD-188	Combustion Engineering, Inc. "HERMITE, A Multi-Dimensional Space-Time Kinetics Code for PWR Transients"	April 1976 (Approved Version, September 1976)	4.3
CENPD-254	Combustion Engineering, Inc. "Post-LOCA Long Term Cooling Evaluation Model"	August 1977	6.3

Report Number	Author and Title	Date to NRC	FSAR Section
CENPD-252P-A	Combustion Engineering, Inc. "Method for Analysis of Blowdown Forces in a Reactor Vessel"	July 1979	3.9
CVI-TR-7301	CVI Design and Development of High Efficiency Charcoal Adsorbers and its Application in ESF Atmospheric Cleanup Systems	February 1975	6.5.1
AFF-TR-7101	American Air Filter "Design and Testing of Fan Cooler Filter Systems for Nuclear Applications"	November 1972	6.2.2
WCAP-7709-L	Westinghouse "Electric Hydrogen Recombiners for PWR Containments"	April 1972	6.2.5
FPLTQAR 1-76A Revision 0 Revision 1 Revision 2	Florida Power & Light Co. Florida Power & Light Co. "Topical Quality Assurance Report"	January 1976 June 1976 September 1976 January 1977 (Approved by NRC September 1977)	17.2
ETR-1002 P	Ebasco Services, Inc. "Design Considerations for Protection from Effects of Pipe Rupture - Part I - Dynamic Analysis"	November 1975	3.6

1.7 DRAWINGS

Drawings contained herein were valid at the time the operating license for St Lucie 2 was issued, and are being retained in the Updated FSAR for document completeness and historical record. No present or future update of the section is required. Updated drawings are maintained at the St Lucie 2 site.

1.7.1 ELECTRICAL, INSTRUMENTATION, AND CONTROL DRAWINGS

Tables 1.7-1 and 1.7-2 are lists of electrical, instrumentation and control safety-related drawings prepared by the Architect/Engineer and NSSS supplier, respectively. There are no drawings considered proprietary.

1.7.2 PIPING AND INSTRUMENTATION DIAGRAMS

Tables 1.7-3 and 1.7-4 are lists of safety-related piping and instrumentation diagrams prepared by the Architect/Engineer and NSSS supplier, respectively.

TABLE 1.7-1

ARCHITECT/ENGINEER SUPPLIED
ELECTRICAL, INSTRUMENTATION AND CONTROL DRAWINGS
SAFETY RELATED

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B 271		0	3/3/78	E	ELECTRICAL GEN INSTALLATION NOTES
G 272		5	7/23/82	E	MAIN ONE LINE WIRING DIAGRAM
G 274		5	7/23/82	E	AUXILIARY ONE LINE WIRING DIAGRAM
B 325		7	11/14/80	E	BILL OF MATERIALS
B 328				E	CABLE & CONDUIT LIST
G 332		7	10/30/82	E	480V MISC 125V DC & VITAL AC ONE LINE WIRING DIAGRAM
G 332	2	0	10/30/82	E	480V MISC 125V DC & VITAL AC ONE LINE WIRING DIAGRAM SH 2
B 335		2	12/10/80	E	POWER DISTRIBUTION & MOTOR DATA SHEETS
B 337		2	1/4/79	E	ELECTRICAL PENETRATION SCHEDULE
G 340		10	1/8/83	E	TURBINE BUILDING GROUND FLOOR CONDUITS, TRAYS & GRDG SH2
C 348		11	1/8/80	E	MANHOLE & HANDHOLE DETAILS
G 352		4	8/4/82	E	ARRANGEMENT-SWITCHGEAR ROOM REACTOR AUX BLDG
G 354		4	1/18/83	E	CABLE TRAY ARRANGEMENT KEY PLAN
G 355		7	1/11/83	E	TURBINE AREA-UNDERGROUND CONDUIT & GROUNDING SH1
G 356		7	1/11/83	E	TURBINE AREA-UNDERGROUND CONDUIT & GROUNDING SH2
G 358		7	1/11/83	E	TURBINE AREA-UNDERGROUND CONDUIT & GROUNDING SH4

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
G 367		9	3/11/83	E	REACTOR CONTAINMENT BLDG-COND TRAYS & GRDG PLAN-EL 62'-0
G 364		8	4/12/83	E	REACTOR CONTAINMENT BLDG-COND & GRDG-PLAN-BELOW EL 18'-0
G 364	1	6	3/11/83	E	REACTOR CONTAINMENT BLDG CONDUIT LOCATION PLAN
G 365		9	11/22/82	E	REACTOR CONTAINMENT BLDG-COND TRAYS & GRDG PLAN EL-18'-0
G 366		8	11/22/82	E	REACTOR CONTAINMENT BLDG-COND TRAYS & GRDG PLAN EL-45'-0
G 368		8	10/29/82		REACTOR CONTAINMENT BLDG-COND SECTIONS & DETAILS SH-1
G 369	1	6	10/29/82	E	REACTOR CONTAINMENT BLDG-COND SECTIONS & DETAILS SH-2
G 369	2	5	10/6/82	E	REACTOR CONTAINMENT BLDG-COND SECTIONS & DETAILS SH-3
G 369	3	5	10/6/82	E	REACTOR CONTAINMENT BLDG-COND SECTIONS & DETAILS SH-4
G 372	1A	5	3/23/83	E	SUMMARY SHEET CABLE TRAY SUPPORT SH-1A
G 372	1B	1	8/11/78	E	SUMMARY SHEET CABLE TRAY SUPPORT SH-1B
G 372	2	4	11/18/82	E	REACTOR CONT BLDG EL 18.0 CABLE TRAY SUPPORT SH-2
G 372	3	3	8/4/82	E	REACTOR CONT BLDG EL 45.0 CABLE TRAY SUPPORT SH-3
G 372	4	5	8/31/81	E	RCB PEN AREA EL 23-0 CABLE TRAY SUPPORT SH-4
G 372	5	5	3/23/83	E	RCB PEN AREA EL 45-0 CABLE TRAY SUPPORT SH-5

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
G 372	6	6	11/18/82	E	REACTOR AUX BLDG PEN AREA CABLE TRAY SUPPORT SH-6
G 372	7	5	3/23/83	E	REACTOR AUX BLDG EL-05.0 CABLE TRAY SUPPORT SH-7
G 372	8	5	1/21/83	E	REACTOR AUX BLDG EL-05.0 CABLE TRAY SUPPORT SH-8
G 372	9	6	3/23/83	E	REACTOR AUX BLDG EL 19.5 CABLE TRAY SUPPORT SH-9
G 372	10	4	8/31/82	E	REACTOR AUX BLDG EL 19.5 CABLE TRAY SUPPORT SH-10
G 372	11	5	3/23/83	E	REACTOR AUX BLDG EL 43'-0 CABLE TRAY SUPPORT SH-11
G 372	12	4	11/18/82	E	REACTOR AUX BLDG EL 43'-0 CABLE TRAY SUPPORT SH-12
G 372	13	4	1/21/83	E	CABLE VAULT CABLE TRAY SUPPORT SH-13
G 372	14	4	8/31/82	E	REACTOR AUX BLDG EL 74.0 CABLE TRAY SUPPORT SH-14
G 372	15	2	8/31/82	E	CABLE VAULT-CABLE TRAY SUPPORT SH-15
G 372	16	2	8/31/82	E	PENETRATION AREA CABLE TRAY SUPPORT SH-16
G 374	1	6	11/18/82	E	REACTOR AUX BLDG PENETRATION AREA-COND-TRAYS & GRDG SH-1
G 374	3	3	7/28/82	E	REACTOR AUX BLDG PENETRATION AREA-SECTIONS & DETAILS
G 375	1	7	10/29/82	E	REACTOR CONT BLDG PEN AREA-CND., TRAYS & GRDG SH-1
G 375	3	5	1/21/83	E	REACTOR CONT BLDG PEN AREA-SECTIONS & DETAILS

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
G 375	4	3	8/31/82	E	REACTOR CONT BLDG PEN AREA-TRAYS - KEY PLAN
G 377	1	10	3/23/83	E	REACTOR AUXILIARY BUILDING UNDERGROUND COND GRDG SH-1
G 378	2	10	1/18/83	E	REACTOR AUXILIARY BUILDING UNDERGROUND COND & GRDG SH-2
G 380		8	1/18/83	E	OUTLYING AREA CONDUIT GROUNDING & LIGHTING
G 385		8	1/11/83	E	INTAKE STRUCTURE CONDUIT & LIGHTING
G 386		7	1/21/83	E	INTAKE STRUCTURE-LIGHTING SECTION & DETAILS
G 388		8	3/11/83	E	DIESEL GENERATOR BUILDING CONDUIT, GROUNDING & LIGHTING
G 390	1	9	3/23/83	E	REACTOR AUXILIARY BLDG EL-0.5 CONDUIT & TRAYS SH-1
G 391	2	9	1/11/83	E	REACTOR AUXILIARY BLDG EL-0.5 CONDUIT & TRAYS SH-2
G 392	1	5	1/28/83	E	REACTOR AUXILIARY BLDG EL 19'-6 CONDUIT TRAYS & GRDG SH-1
G 393	2	7	1/21/83	E	REACTOR AUXILIARY BLDG EL 19'-6 CONDUIT TRAYS & GRDG SH-2
G 394	1	6	1/15/83	E	REACTOR AUXILIARY BLDG EL 43'-0 & 62'-0 CND TRAYS & GRDG SH-1
G 394	3	6	1/21/83	E	REACTOR AUXILIARY BLDG EL 62'-0 CND & GRDG SH-3
G 395	2	6	1/21/83	E	REACTOR AUXILIARY BLDG EL 43'-0 & 62'-0 CND TRAYS & GRDG SH-2
G 396	1	7	12/15/82	E	REACTOR AUXILIARY BLDG EL 43'-0 SECTIONS & DETAILS SH-1

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
G 396	2	8	1/21/83	E	REACTOR AUXILIARY BLDG EL 43'-0 SECTIONS & DETAILS SH-2
G 396	3	5	11/15/82	E	REACTOR AUXILIARY BLDG SECTIONS & DETAILS SH-3
G 396	4	2	11/15/82	E	REACTOR AUXILIARY BLDG SECTIONS & DETAILS SH-4
G 396	5	2	11/15/82	E	REACTOR AUXILIARY BLDG SECTIONS & DETAILS SH-5
G 396	6	3	3/23/83	E	REACTOR AUXILIARY BLDG SECTIONS & DETAILS SH-6
G 396	7	2	11/15/82	E	REACTOR AUXILIARY BLDG SECTIONS & DETAILS SH-7
G 401	1	6	3/7/83	E	FUEL HANDLING BUILDING CONDUIT TRAYS & GROUNDING SH-1
G 401	2	6	3/7/83	E	FUEL HANDLING BUILDING CONDUIT TRAYS & GROUNDING SH-2
G 402		7	3/7/83	E	FUEL HANDLING BUILDING CONDUIT SECTIONS & DETAILS
B 404		0	5/30/78	E	BOX DETAILS
G 407		7	1/19/83	E	YARD DUCT RUNS & LIGHTING
G 407X		2	7/22/82	E	YARD DUCT RUNS & LIGHTING
G 408	1	6	2/7/83	E	YARD DUCT RUNS & LIGHTING SECTIONS & DETAILS SH-1
G 408 LS	2A	1	1/11/83	E	YARD DUCT RUNS & LIGHTING SECTIONS & DETAILS SH-2A
G 408	2B	3	1/11/83	E	STREAM TRESTLE AREA LTG & DETAILS

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
G 408	1B	2	7/22/82	E	COMPONENT COOLING LIGHTING
G 409		7	3/7/83	E	TRANSFORMER YARD CONDUIT GROUNDING & LIGHTING
G 409	2	4	1/11/83	E	XFRMR YD-PLAN XFRMR FIRE PROT & 5KV & 6.9KV NON-SEG PHASE BUS
G 409X		5	1/11/83	E	TRANSFORMER YARD CONDUIT GROUNDING & LIGHTING
G 409	2	4	1/11/83	E	XFMR YD-PLAN XFMR FIRE PROT & 5KV & 6-9KV NON-SEG PHASE BUS
G 410	1	5	3/7/83	E	CABLE VAULT TRAYS-PLAN & SECTIONS SH-1
G 410	2	4	11/18/82	E	RTG BOARDS-TRAY RISERS-PLAN
G 410	3	4	12/15/82	E	RTE BOARDS-TRAY RISERS-SECT
G 410	6	4	3/23/83	E	CABLE VAULT TRAYS - KEY PLAN
G 410	7	4	3/7/83	E	RAB EL 74.0 CONDUIT TRAYS & GRDG
G 410	8	3	1/18/83	E	RAB EL 62'-0 CONDUIT & GROUNDING
2998-G-386	2	2	11/19/82		INTAKE STRUCTURE LIGHTING SECTION & DETAILS
2998-G-415	1	4	5/6/83		RAB RADIATION MONITORING SYSTEM CONDUIT & EQUIPMENT
2998-G-415	2	4	5/6/83		RAB RADIATION MONITORING SYSTEM CONDUIT & EQUIPMENT
2998-G-415	3	4	5/6/83		RAB RADIATION MONITORING SYSTEM CONDUIT & EQUIPMENT
2998-G-415	4	4	5/6/83		RAB RADIATION MONITORING SYSTEM CONDUIT & EQUIPMENT
2998-G-415	5	4	4/18/83		RCB RADIATION MONITORING SYSTEM CONDUIT & EQUIPMENT
2998-G-415	6	4	4/18/83		RCB RADIATION MONITORING SYSTEM CONDUIT & EQUIPMENT
2998-G-415	7	4	2/22/83		RCB RADIATION MONITORING SYSTEM CONDUIT & EQUIPMENT

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
2998-G-415	8	3	11/19/82		RCB RADIATION MONITORING SYSTEM CONDUIT & EQUIPMENT
2998-G-420	1	2	1/11/83		HEAT TRACE SYSTEM CONDUIT, FLOOR PENETRATION & EQUIPMENT LOCATION
2998-G-420	2	2	1/11/83		HEAT TRACE SYSTEM CONDUIT & TRAY SECTIONS AND DETAILS
2998-G-420	3	2	12/22/82		HEAT TRACE SYSTEM CONDUIT & TRAY
2998-G-420	4	2	12/22/82		HEAT TRACE SYSTEM CONDUIT & TRAY SECTIONS AND DETAILS
2998-G-420	5	2	12/22/82		HEAT TRACE SYSTEM CONDUIT & TRAY
2998-G-420	6	3	12/22/82		HEAT TRACE SYSTEM THERMOCOUPLE & POWER JUNCTION BOXES
2998-G-420	7	3	1/18/83		HEAT TRACE SYSTEM THERMOCOUPLE & POWER JUNCTION BOXES
2998-G-420	8	2	1/18/83		HEAT TRACE SYSTEM THERMOCOUPLE & POWER JUNCTION BOXES
2998-G-420	9	3	1/18/83		HEAT TRACE SYSTEM THERMOCOUPLE & POWER JUNCTION BOXES
2998-G-420	10	3	1/18/83		HEAT TRACE SYSTEM THERMOCOUPLE & POWER JUNCTION BOXES
2998-G-420	11	3	1/18/83		HEAT TRACE SYSTEM THERMOCOUPLE & POWER JUNCTION BOXES
2998-G-420	12	3	5/23/83		HEAT TRACE SYSTEM THERMOCOUPLE & POWER JUNCTION BOXES
2998-G-420	13	3	5/23/83		HEAT TRACE SYSTEM THERMOCOUPLE & POWER JUNCTION BOXES
2998-G-420	14	1	7/29/82		HEAT TRACE SYSTEM THERMOCOUPLE & POWER JUNCTION BOXES
2998-G-420	15	1	7/29/82		HEAT TRACE SYSTEM THERMOCOUPLE & POWER JUNCTION BOXES
2998-G-420	17	0	1/24/83		HEAT TRACE SYSTEM THERMOCOUPLE & POWER JUNCTION BOXES

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
G 224	1	R8	8/24/82	E	TURBINE BUILDING INSTRUMENT ARR SH-1
G 226	1	R7	12/3/82	E	REACTOR BUILDING INSTRUMENT ARR SH-1
G 226	2	R8	3/7/83	E	REACTOR BUILDING INSTRUMENT ARR SH-2
G 226	3	R7	2/1/83	E	REACTOR BUILDING INSTRUMENT ARR SH-3
G 226	4	R7	2/1/83	E	REACTOR BUILDING INSTRUMENT ARR SH-4
G 226	5	R7	2/1/83	E	REACTOR BUILDING INSTRUMENT ARR SH-5
G 226	6	R7	10/24/82	E	REACTOR BUILDING INSTRUMENT ARR SH-6
G 226	7	R6	10/24/82	E	REACTOR BUILDING INSTRUMENT ARR SH-7
G 227	1	R8	3/7/83	E	REACTOR AUXILIARY BUILDING INSTRUMENT ARR SH-1
G 227	2	R8	3/7/83	E	REACTOR AUXILIARY BUILDING INSTRUMENT ARR SH-2
G 227	3	R4	6/21/81	E	REACTOR AUXILIARY BUILDING INSTRUMENT ARR SH-3
G 227	4	R9	12/3/82	E	REACTOR AUXILIARY BUILDING INSTRUMENT ARR SH-4
G 227	5	R6	3/7/83	E	REACTOR AUXILIARY BUILDING INSTRUMENT ARR SH-5
G 227	6	R7	12/3/83	E	REACTOR AUXILIARY BUILDING INSTRUMENT ARR SH-6
G 227	6	R6	1/22/82	E	REACTOR AUXILIARY BUILDING INSTRUMENT ARR SH-7
G 227	8	R6	3/7/83	E	REACTOR AUXILIARY BUILDING INSTRUMENT ARR SH-8

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
G 228	1	R6	3/7/83	E	FUEL HANDLING BUILDING INSTRUMENT ARR
G 229	1	R6	1/13/82	E	MISCELLANEOUS INSTRUMENT ARR
B 231	604 SHTS		VARIOUS	E	INSTRUMENT INSTALLATION DETAILS
G 232	4	R4	3/7/83	E	REACTOR AUX BLDG ANALYZER & SAMPLING LINES ARR
	5	R3	3/7/83	E	REACTOR AUX ALDG ANALYZER & SAMPLING LINES ARR
	7	R3	2/1/83	E	REACTOR BLDG ANALYZER & SAMPLING LINES ARR
	8	R2	10/22/81	E	REACTOR BLDG ANALYZER & SAMPLING LINES ARR
	9	R2	10/22/81	E	REACTOR BLDG ANALYZER & SAMPLING LINES ARR
G 233	1	R3	12/3/82	E	REACTOR AUXILIARY BUILDING LABORATORY GAS SYSTEM LAYOUT
G 278		R1	11/21/79	E	CONTROL & BLOCK DIAGRAM CONTAINMENT SPRAY & RECIRCULATION SYSTEM
B 326				E	SCHEMATIC DIAGRAMS
	103S	R2	5/26/83	E	OIL LIFT PUMPS FOR REACTOR COOLANT PUMP P-2A1 (2B1, 2A2, 2B2-TYP.)
	139S	R2	4/11/83	E	PRESSURIZER LEVEL CH-L-1110
	159	R2	5/23/83	E	VALVES V-2505, V2510, V2511 & V-2524
	163S	R1	5/26/83	E	VALVES FCV-2210X, FCV-2210Y & V-2512
	174S	R3	4/21/83	E	BORIC ACID MAKE-UP PUMP 2A
	175S	R3	5/26/83	E	BORIC ACID MAKE-UP PUMP 2B
	177S	R3	4/11/83	E	CHARGING PUMP 2A

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No	Revision No.	Revision Date	Prepared By	Title
B 326					SCHEMATIC DIAGRAMS (Cont'd)
	178S	R3	5/26/83	E	CHARGING PUMP 2B
	179S	R3	5/26/83	E	CHARGING PUMP 2C
	187S	R2	4/21/83	E	CHARGING PUMPS SEAL LUBRICATION SYSTEM VALVES V-2627, V-2628, V-2629
	201S	R2	4/21/83	E	COMPONENT COOLING WATER PUMP ?A
	203S	R2	5/26/83	E	COMPONENT COOLING WATER SUCTION HDR VALVE MV-14-3 (MV-14-1, 14-2 & 14-4-TYP.)
	205S	R2	4/21/83	E	COMPONENT COOLING WATER PUMP 2B
	209S	R2	4/21/83	E	COMPONENT COOLING WATER PUMP 2C
	237S	R2	4/21/83	E	HP SAFETY INJECTION PUMP 2A
	238S	R2	4/21/83	E	HP SAFETY INJECTION PUMP 2B
	249S	R2	5/23/83	E	SHUTDOWN COOLING ISOLATION VALVE V-3480 (V-3481, V-3651, V-3652-TYP.)
	251S	R2	5/23/83	E	LP SAFETY INJECTION PUMP 2A
	252S	R2	5/23/83	E	LP SAFETY INJECTION PUMP 2B
	257S	R2	5/23/83	E	LP SAFETY INJECTION FLOW CONT VALVES (HCV-3615, 3626, 3637, 3625, 3616, 3617, 3635, 3636, 3637, 3645, 3646, 3647-TYP.)
	269S	R2	5/23/83	E	SAFETY INJECTION TANK 2A1 ISOL VALVE V-3624 (3614, 3634, 3644-TYP.)
	285S	R2	5/26/83	E	CONTAINMENT FAN COOLER 2-HVS-1A (-1B,-1C,-1D-TYP.)
	287S	R2	5/26/83	E	CONTAINMENT SPRAY PUMP 2A

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B 326					SCHEMATIC DIAGRAMS (Cont'd)
	289S	R2	5/26/83	E	CONTAINMENT SPRAY VALVES FCV-07-1A & FCV-07-1B
	290S	R2	5/26/83	E	CONTAINMENT SPRAY PUMP 2B
	297S	R1	5/28/83	E	REFUELING WATER TANK VALVE MV-07-1A (07-1B-TYP.)
	299S	R2	5/26/83	E	REACTOR SUMP VALVE MV-07-2A (07-2B-TYP)
	311S	R2	5/26/83	E	MAIN STEAM ISOLATION BYPASS VALVE MV-08-1A (08-113-TYP)
	312S	R3	5/26/83	E	MAIN STEAM ISOL VALVE HCV-08-1A OPENING, CLOSING & SOL TEST
	315S	R3	5/26/83	E	MAIN STEAM ISOL VALVE HCV-08-1B OPENING, CLOSING & SOL TEST
	411S	R2	5/26/83	E	REACTOR TRIP BKR. TCB-1
	482S	R1	6/24/83	E	REACTOR CONTAINMENT & SHLD BLDG DIFF PRESS
	490S	R2	6/24/83	E	CONTROL ROOM EMERG FILTRATION FAN 2HVE-13A (13B-TYP)
	492S	R2(0)	7/22/83	E	CONTROL ROOM AIR COND UNIT 2-HVA/ACC-3A(-3B,-3C TYP) SH 1
	493S	R2(0)	7/22/83	E	CONTROL ROOM AIR COND UNIT 2-HVA/ACC-3A(-3B,-3C TYP) SH 2
	503S	R2	6/24/83	E	REACTOR AUX BLDG EMERG EXHAUST FAN 2HVE-9A (9B-TYP)
	505S	R2	6/24/83	E	REACTOR AUX BLDG SUPPLY FAN 2HVS-4A (4B-TYP)
	507S	R1	6/24/83	E	CEDM COOLING FAN 2HVE-21A

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B 326					SCHEMATIC DIAGRAMS (Cont')
	508S	R1	6/23/83	E	CEDM COOLING FAN 2HVE-21F
	509S	R2	6/24/83	E	REACTOR CONTAINMENT PURGE EXHAUST FAN 2HVE-8A
	510S	R2	6/24/83	E	REACTOR CONTAINMENT PURGE EXHAUST FAN 2HVE-8B
	511S	R2	6/24/83	E	REACTOR CONTAINMENT PURGE ISOLATION VALVES - SH. 1
	512S	R2	6/24/83	E	REACTOR CONTAINMENT PURGE ISOLATION VALVES - SH. 2
	513S	R2	6/24/83	E	SHIELD BLDG VENT EXHAUST FAN 2HVE-6A
	516S	R2	5/24/83	E	SHIELD BLDG VENT EXHAUST FAN 2HVE-6B
	629S	R2	7/18/83	E	AUX FEEDWATER PUMP 2A
	630S	R2	7/18/83	E	AUX FEEDWATER PUMP 2B
	631S	R2	7/18/83	E	AUX FEEDWATER PUMP 2C TURBINE AND STM VLV MV-08-3
	711	R2(0)	7/22/83	E	EMERG TURBINE TRIP & TURBINE ALARMS
	832S	R2	7/18/83	E	INTAKE COOLING WATER PUMP 2A
	833S	R2	7/18/83	E	INTAKE COOLING WATER PUMP 2B
	834S	R2	7/18/83	E	INTAKE COOLING WATER PUMP 2C
	835S	R2	7/18/83	E	INTAKE COOLING WATER NON-EMERG HDR A ISOL VALVE MV-21-3 (MV-21-2-TYP)
	934S	R2	6/24/83	E	4160V SWGR 2A2 FDR TO BUS 2A3 (2B2 FDR TO BUS 2B3-TYP)

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B 326					SCHEMATIC DIAGRAMS (Cont'd)
	936S	R2	6/24/83	E	4160V SWGR 2A3 INCOMING FEEDER FROM BUS 2A2 (2B3 FDR FROM BUS 2B2-TYP)
	938S	R2	6/24/83	E	4160V SWGR 2A3 FDR TO BUS 2AB (2B3 FDR TO BUS 2AB-TYP)
	940S	R2	6/24/83	E	4160V SWGR 2AB INCOMING FEEDER FROM BUS 2A3 (2AB FDR FROM BUS 2B3-TYP)
	949S	R2	6/24/83	E	4160V SWGR 2A3 LOAD SHEDDING RELAYS
	950S	R2	6/24/83	E	4160V SWGR 2B3 LOAD SHEDDING RELAYS
	951S	R1	6/24/83	E	4160V SWGR 2AB LOAD SHEDDING RELAYS
	953S	R2	6/24/83	E	DIESEL GENERATOR 2A BREAKER
	956S	R2	6/24/83	E	DIESEL GENERATOR 2A LOCKOUT RELAY
	957S	R2	6/24/83	E	DIESEL GENERATOR 2A START CKTS SH 1
	959S	R2	6/24/83	E	DIESEL GENERATOR 2A START SOLENOIDS
	963S	R2	6/24/83	E	DIESEL GENERATOR 2B BREAKER
	966S	R2	6/24/83	E	DIESEL GENERATOR 2B LOCKOUT RELAY
	967S	R2	6/24/83	E	DIESEL GENERATOR 2B START CKTS SH 1
	969S	R2	6/24/83	E	DIESEL GENERATOR 2B START SOLENOIDS
	1000S	R2	6/24/83	E	125V DC BUS TRANSFER CONTROL
	1170S	R2	6/24/83	E	CONTROL ROOM NORTH OUTSIDE AIR INSUL VA FCV-25-M

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B 326					SCHEMATIC DIAGRAMS (Cont'd)
	1176S	R2	6/24/83	E	SHIELD BLDG VENT COOL AIR VA FCV-25-11 (FCV-25-12 TYP)
	1501S	R2(0)	7/22/83	E	SHUTDOWN COOLING ISOL, HEAT EXCH, WARM-UP & CONTROL VALVES (V-3545, 3664, 3665, 3456, 3457, 3517, 3658, 3536, 3539; HCV-3657, 2512, 3306, 3301)
	1601S	R2	6/24/83	E	DIESEL GENERATOR 2A START CKTS SH 2
	1602S	R2	6/24/83	E	DIESEL GENERATOR 2A START CKTS SH 3
	1603S	R2	6/24/83	E	DIESEL GENERATOR 2A START CKTS SH 4
	1604S	R2	6/24/83	E	DIESEL GENERATOR 2A START CKTS SH 5
	1605S	R2	6/24/83	E	DIESEL GENERATOR 2A START CKTS SH 6
	1611S	R2	6/24/83	E	DIESEL GENERATOR 2B START CKTS SH 2
	1612S	R2	6/24/83	E	DIESEL GENERATOR 2B START CKTS SH 3
	1613S	R2	6/24/83	E	DIESEL GENERATOR 2B START CKTS SH 4
	1614S	R2	6/24/83	E	DIESEL GENERATOR 2B START CKTS SH 5
	1615S	R2	6/24/83	E	DIESEL GENERATOR 2B START CKTS SH 6

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
	1	R14	4/1/83		INDEX
	2	R14	4/1/83		INDEX
	3	R13	4/1/83		INDEX
	4	R14	4/1/83		INDEX
	5	R14	4/1/83		INDEX
	6	R14	4/1/83		INDEX
	7	R14	4/1/83		INDEX
	8	R14	4/1/83		INDEX
	8A	R14	4/1/83		INDEX
	8B	R14	4/1/83		INDEX
	8B-1	R4	4/1/83		INDEX
	8B-2	R3	4/1/83		INDEX
B-327					CONTROL WIRING DIAGRAM
					NUCLEAR INSTRUMENTATION
	8DS	R4	9/9/82	E	ANNUNCIATOR REFLASH MODULES SH 1
	8ES	R4	9/9/82	E	ANNUNCIATOR REFLASH MODULES SH 2
	8FS	R3	9/9/82	E	ANNUNCIATOR REFLASH MODULES SH 3
	8HS	R3	9/9/82	E	ANNUNCIATOR REFLASH MODULES SH 5
	8IS	R3	9/9/82	E	ANNUNCIATOR REFLASH MODULES SH 6
	50S	R5	9/9/82	E	NUCLEAR INSTR SYS WIDE RANGE LOG CH-001A, 001B
	51S	R2	9/9/82	E	NUCLEAR INSTR SYS WIDE RANGE LOG CH-001C, 001D
	54S	R4	11/5/82	E	NUCLEAR INSTR. SYS. PWR RANGE SAF CH-003A/004A, 003B/004B, 003C/004C
	55S	R5	10/21/82	E	NUCLEAR INSTR. SYS. PWR RANGE SAF CH-003D/004D
	56S	R2	7/2/82	E	NUCLEAR INSTR. SYS. FLUX INDICATORS
	60S	R4	9/23/82	E	OUT-OF-CORE NEUTRON DETECTORS NO. 1, 2, 5 & 9

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	61S	R4	9/23/82	E	OUT-OF-CORE NEUTRON DETECTORS NO. 4, 6, 10 & 11
	62S	R4	9/23/82	E	OUT-OF-CORE NEUTRON DETECTORS NO. 3 & 7
	63S	R4	9/23/82	E	OUT-OF-CORE NEUTRON DETECTORS NO. 8 & 12
	90S	R9	10/6/82	E	PRESSURIZER LEVEL CHANNEL L-1110 SH. 3
	91S	R11	5/26/83	E	MEASUREMENT CHANNELS P-1105 & P-1106
	101S	R13	10/20/82	E	REACTOR COOLANT PUMP 2A1
	103S	R11	5/26/83	E	OIL LIFT PUMPS FOR REACTOR COOLANT PUMP 2A1
	105S	R12	11/10/82	E	REACTOR COOLANT PUMP 2B1
	107S	R11	1/24/83	E	OIL LIFT PUMPS FOR REACTOR COOLANT PUMP 2B1
	109S	R10	10/20/82	E	REACTOR COOLANT PUMP 2A2
	111S	R11	1/24/83	E	OIL LIFT PUMPS FOR REACTOR COOLANT PUMP 2A2
	113S	R10	10/20/82	E	REACTOR COOLANT PUMP 2B2
	115S	R11	5/26/83	E	OIL LIFT PUMPS FOR REACTOR COOLANT PUMP 2B2
	118S	R6	2/26/82	E	PRESSURIZER RELIEF ISOLATION VALVE V-1477
	120S	R6	2/26/82	E	PRESSURIZER RELIEF ISOLATION VALVE V-1476
	136S	R9	1/8/83	E	REACTOR COOLANT LOOP TEMP CHT-1111Y, T-1111X & T-1115
	137S	R10	1/8/83	E	REACTOR COOLANT LOOP TEMP CHT-1121Y, T-1121X & T-1125

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	139S	R9	1/31/83	E	PRESSURIZER LEVEL CH L-1110 SH 2
	140S	R12	5/26/83	E	MEASUREMENT CHANNELS L-1103, L-1116 & P-1103
	141S	R9	4/14/83	E	REACTOR HEAD SEAL P-1118 & QUENCH TANK P-1116 - PRESS
					CHEMICAL & VOLUME SYSTEM
	146S	R4	12/20/82	E	CHEM & VOL CONTROL SYSTEM-BORIC ACID HEAT TRACE TRANSF 2A
	147S	R4	12/20/82	E	CHEM & VOL CONTROL SYSTEM-BORIC ACID HEAT TRACE TRANSF 2B
	150S	R9	1/8/83	E	MEASUREMENT CHANNELS F-2212, P-2212, P-2215, T-2229 & T-2221
	154S	R6	8/14/82	E	MEASUREMENT CHANNELS T-2225, P-2225, L-2227 & L-2226
	157S	R7	11/17/81	E	LETDOWN STOP VA V-2515 AND LET-DOWN CONTAINMENT ISOL VA V-2516
	159S	R5	8/17/82	E	VALVES V-2505, V-2510, V-2511 & V-2524
	161S	R8	12/11/82	E	VOLUME CONTROL TANK DISCHARGE VALVE V-2501
	163S	R6	8/17/82	E	VALVES FCV-2210X, FCV-2210Y & V-2512
	165S	R9	12/15/82	E	BORIC ACID GRAVITY FEED VALVE V-2508
	166S	R8	9/18/82	E	BORIC ACID GRAVITY FEED VALVE V-2509
	167S	R8	9/17/82	E	MAKE-UP BYPASS TO CHARGING PUMPS VALVE V-2514
	174S	R9	2/28/83	E	BORIC ACID MAKE-UP PUMP 2A
	175S	R9	2/28/83	E	BORIC ACID MAKE-UP PUMP 2B

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	176S	R7	8/26/82	E	CHARGING LINES 2B1 & 2A2 VA'S I-SE-02-01 & I-SE-02-02 & RECIRC DRAIN TK VA V-3661
	177S	R10	12/6/82	E	CHARGING PUMP 2A
	178S	R10	12/6/82	E	CHARGING PUMP 2B
	179S	R10	12/6/82	E	CHARGING PUMP 2C
	180S	R6	9/9/82	E	FUEL POOL PUMP 2A
					FUEL POOL SYSTEM
	181S	R8	4/20/82	E	FUEL POOL PUMP 2B
	182S	R8	2/10/83	E	FUEL POOL PURIFICATION PUMP
					COMPONENT COOLING WATER SYSTEM
	187S	R5	8/25/82	E	CHARGING PUMP SEAL LUBE SYS VALVES V-2627, V-2628 & V-2629
	188S	R4	7/2/82	E	CHEMICAL & VOLUME CONTROL SYSTEM ANN REFLASH CIRCUITS
	189S	R5	1/10/83	E	AUX SPRAY VALVES 1-SE-02-03, 1-SE-02-04
	190S	R6	12/11/82	E	BORON LOAD CONTROL VALVE V-2525
	192S	R9	3/24/83	E	MAKE-UP SYSTEM CH F-2210
	194S	R7	8/4/82	E	LETDOWN CONTROL & CHARGING LINE ISOL VALVES V-2522 & V-2523
	196S	R5	9/29/82	E	CHARGING PUMP 2A BYPASS VALVE V-2555
	197S	R6	9/29/82	E	CHARGING PUMP 2B BYPASS VALVE V-2554
	198S	R6	1/12/83	E	CHARGING PUMP 2C BYPASS VALVE V-2553
	201S	R7	8/25/82	E	COMPONENT COOLING WATER PUMP 2A

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	202S	R7	3/3/82	E	NORMAL SUPPLY HDR & NORMAL RETURN HDR ISOL VALVES
	203S	R6	9/18/82	E	COMPONENT COOLING WATER SUCTION HDR A VALVE MV-14-3
	204S	R7	9/18/82	E	COMPONENT COOLING WATER DISCH HDR A VALVE MV-14-1
	205S	R7	11/10/82	E	COMPONENT COOLING WATER PUMP 2B
	206S	R6	12/6/82	E	CCW FROM RCP'S
	207S	R6	9/18/82	E	COMPONENT COOLING WATER SUCTION HDR B VALVE MV-14-4
	208S	R7	8/27/82	E	COMPONENT COOLING WATER DISCH HDR B VALVE MV-14-2
	209S	R7	8/21/82	E	COMPONENT COOLING WATER PUMP 2C
	211S	R10	2/28/83	E	COMPONENT COOL WTR SHUTDN HT EXCH & SURGE TANK FILL VALVES
	212S	R5	6/3/82	E	CCW TO & FROM REACTOR COOL PUMPS HCV-14-1, 2 & HCV-14-6, 7
	217S	R7	8/21/82	E	COMP. COOL. WTR A FLOW & PRESSURE
	218S	R8	9/9/82	E	COMP. COOL. WTR B FLOW & PRESSURE
	220S	R7	9/18/82	E	COMP. COOL. WTR TO CONT COOL UNIT 2A VALVE MV-14-9
	221S	R5	9/18/82	E	COMP. COOL. WTR FROM CONT. COOL. UNIT 2A VALVE MV-14-10
	222S	R5	9/18/82	E	COMP. COOL. WTR TO CONT. COOL. UNIT 2B VALVE MV-14-11
	223S	R7	9/18/82	E	COMP. COOL. WTR FROM CONT. COOL. UNIT 2B VALVE MV-14-12
	224S	R5	9/18/82	E	COMP. COOL. WTR TO CONT. COOL. UNIT 2C VALVE MV-14-13

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	225S	R5	9/18/82	E	COMP. COOL. WTR FROM CONT. COOL. UNIT 2C VALVE MV-14-14
	226S	R5	9/18/82	E	COMP. COOL. WTR TO COOL UNIT 2D VALVE MV-14-15
	227S	R6	9/27/82	E	COMP. COOL. WTR FROM CONT. COOL. UNIT 2D VALVE MV-14-16
	228S	R6	2/28/83	E	COMP. COOL. HDR B TO FUEL POOL HT EXCH VALVE MV-14-17
	229S	R6	12/11/82	E	COMP. COOL. HDR A TO FUEL POOL HT EXCH VALVE MV-14-18
	230S	R4	9/18/82	E	COMP. COOL. HDR B FROM FUEL POOL HT EXCH VALVE MV-14-19
	231S	R5	2/12/83	E	COMP. COOL. HDR A FROM FUEL POOL HT EXCH VALVE MV-14-20
					SAFETY INJECTION
	233S	R9	9/18/82	E	HP SAFETY INJECTION TO HOT LEG 2A VALVE V-3540
	234S	R8	9/18/82	E	HP SAFETY INJECTION TO HOT LEG 2A VALVE V-3550
	235S	R8	9/18/82	E	HP SAFETY INJECTION TO HOT LEG 2B VALVE V-3523
	236S	R8	9/18/82	E	HP SAFETY INJECTION TO HOT LEG 2B VALVE V-3551
	237S	R5	11/17/81	E	HP SAFETY INJECTION PUMP 2A
	238S	R6	9/3/82	E	HP SAFETY INJECTION PUMP 2B
	239S	R2	10/7/80	E	4160V SWGR 2AB SPARE
	242S	R8	8/17/82	E	SI TANK FILL & DRAIN VALVES I-SE-03-1A, I-SE-03-1B, I-SE-03-1C, I-SE-03-1D
	244S	R9	12/17/82	E	MINIMUM FLOW ISOLATION VALVE V-3659

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	245S	R8	12/17/82	E	MINIMUM FLOW ISOLATION VALVE V-3660
	246S	R7	3/25/83	E	SAFETY INJECTION CHANNEL A - TRIP & BLOCK
	247S	R0	1/29/82	E	SAFETY INJECTION TANK VENT VALVES
	248S	R7	3/25/83	E	SAFETY INJECTION CHANNEL B - TRIP & BLOCK
	249S	R8	1/12/83	E	SHUTDOWN COOLING ISOLATION VALVE V-3480
	250S	R9	1/12/83	E	SHUTDOWN COOLING ISOLATION VALVE V-3481
	251S	R4	6/30/82	E	LP SAFETY INJECTION PUMP 2A
	252S	R4	8/17/82	E	LP SAFETY INJECTION PUMP 2B
	253S	R9	1/12/83	E	SHUTDOWN COOLING ISOLATION VALVE V-3651
	254S	R9	1/12/83	E	SHUTDOWN COOLING ISOLATION VALVE V-3652
	255S	R4	8/17/82	E	ISOL VALVES V-3614, V-3624, V-3634 & V-3644 POSITION INDICATORS
	256S	R3	8/17/82	E	N_2 TO SI TANK VALVES V-3612, V-3622, V-3632 & V-3642
	257S	R9	12/15/82	E	LOW PRESS SAFETY INJECT FLOW CONT VALVE HCV-3615
	258S	R7	9/18/82	E	HIGH PRESS SAFETY INJECT FLOW CONT VALVE HCV-3626
	259S	R8	1/14/83	E	AUX HIGH PRESS FLOW CONT VALVE HCV-3627
	260S	R10	1/14/83	E	LOW PRESS SAFETY INJECT FLOW CONT VALVE HCV-3625

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	261S	R8	1/14/83	E	HIGH PRESS SAFETY INJECT FLOW CONT VALVE HCV-3616
	262S	R7	9/18/82	E	AUX HIGH PRESS FLOW CONT VALVE HCV-3617
	263S	R9	9/18/82	E	LOW PRESS SAFETY INJECT FLOW CONT VALVE HCV-3635
	264S	R7	9/18/82	E	HIGH PRESS SAFETY INJECT FLOW CONT VALVE HCV-3636
	265S	R9	1/14/83	E	AUX HIGH PRESS FLOW CONT VALVE HCV-3637
	266S	R8	9/18/82	E	LOW PRESS SAFETY INJECT FLOW CONT VALVE HCV-3645
	267S	R8	10/14/82	E	HIGH PRESS SAFETY INJECT FLOW CONT VALVE HCV-3646
	268S	R8	10/14/82	E	AUX HIGH PRESS FLOW CONT VALVE HCV-3647
	269S	R6	8/5/82	E	SAFETY INJECT TANK 2A1 ISOL VALVE V-3624
	270S	R6	8/5/82	E	SAFETY INJECT TANK 2A2 ISOL VALVE V-3614
	271S	R6	8/5/82	E	SAFETY INJECT TANK 2B1 ISOL VALVE V-3634
	272S	R7	2/28/83	E	SAFETY INJECT TANK 2B2 ISOL VALVE V-3644
	273S	R10	7/20/82	E	MEASUREMENT CHANNELS F-3305, P-3307, P-3308, P-3309, P-3303X & P-3303Y
	275S	R0	1/29/82	E	SI TANK VENT VALVES V-3736, V-3734, V-3738, V-3740
	277S	R7	10/14/82	E	HPSI PUMP DISCHARGE VALVE V-3654
	279S	R7	10/14/82	E	HPSI PUMP DISCHARGE VALVE V-3656

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	280S	R6	8/4/82	E	SI TANK 2A2 INSTR & CHECK VA LEAKAGE DRAIN TO RWT HCV-3618
	281S	R8	12/15/82	E	SI TANK 2A1 INSTR & CHECK VA LEAKAGE DRAIN TO RWT HCV-3628
	282S	R6	8/4/82	E	SI TANK 2B1 INSTR & CHECK VA LEAKAGE DRAIN TO RWT HCV-3638
	283S	R6	8/4/82	E	SI TANK 2B2 INSTR & CHECK VA LEAKAGE DRAIN TO RWT HCV-3648
	284S	R7	8/24/82	E	HIGH PRESSURE SAFETY INJECTION FLOW & PRESSURE MONITORS
					CONTAINMENT COOLING
	285S	R5	2/18/83	E	CONTAINMENT FAN COOLER 2-HVS-1A
	286S	R5	2/18/83	E	CONTAINMENT FAN COOLER 2-HVS-1B
	287S	R5	6/30/82	E	CONTAINMENT SPRAY PUMP 2A
	288S	R6	5/2/83	E	IODINE REMOVAL SYSTEM INSTRUMENTATION
	289S	R7	8/11/82	E	CONTAINMENT SPRAY VALVES FCV-07-1A & FCV-07-1B
	290S	R5	8/21/82	E	CONTAINMENT SPRAY PUMP 2B
	291S	R5	3/11/83	E	HYDRAZINE SYSTEM PUMP 2A
	292S	R5	3/11/83	E	HYDRAZINE SYSTEM PUMP 2B
	293S	R9	7/30/82	E	CONT PRESS, SPRAY HDR A PRESS & FLOW & REFUEL WTR TANK LEVEL
	294S	R9	7/30/82	E	CONT PRESS, SPRAY HDR B PRESS & FLOW & REFUEL WTR TANK LEVEL
	295S	R7	7/30/82	E	CONT PRESSURE & REFUELING WATER TANK LEVEL - 1

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	296S	R10	4/20/83	E	CONT PRESSURE, TEMP & REFUELING WATER TANK LEVEL
	297S	R8	12/11/82	E	REFUEL WATER TANK VALVE MV-07-1A
	298S	R8	12/11/82	E	REFUEL WATER TANK VALVE MV-07-1B
	299S	R6	12/11/82	E	REACTOR SUMP VALVE MV-07-2A
	300S	R6	12/11/82	E	REACTOR SUMP VALVE MV-07-2B
	302S	R5	12/6/82	E	CONTAINMENT SPRAY & RECIRC ACTUATION CH'S A MAN RESET
	303S	R7	12/6/82	E	CONTAINMENT SPRAY & RECIRC ACTUATION CH'S B MAN RESET
	304S	R6	2/18/83	E	CONTAINMENT FAN COOLER 2-HVS-1C
	305S	R6	2/18/83	E	CONTAINMENT FAN COOLER 2-HVS-1D
	306S	R5	3/24/83	E	IODINE REMOVAL SYSTEM VALVES
	307S	R2	8/26/82	E	MCC 2A9 FDR BKR (2-HVS-1A)
	308S	R2	3/30/82	E	MCC 2A9 FDR BKR (2-HVS-1B)
	309S	R2	6/3/82	E	MCC 2B9 FDR BKR (2-HVS-1C)
	310S	R2	4/16/82	E	MCC 2B9 FDR BKR (2-HVS-1D)
					CONTAINMENT ISOLATION
	311S	R7	12/11/82	E	MAIN STEAM ISOLATION BYPASS VALVE MV-08-1A
	312S	R10	8/20/82	E	MAIN STEAM ISOL VALVE HCV-08-1A OPENING, CLOSING & SOL TEST
	313S	R7	3/25/83	E	MAIN STEAM ISOL VALVE HCV-08-1A STROKE TEST & SOLENOID TEST

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	314S	R7	12/11/82	E	MAIN STEAM ISOLATION BYPASS VALVE MV-08-1B

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
					CONTAINMENT ISOLATION (Cont'd)
	315S	R8	6/3/82	E	MAIN STEAM ISOL VALVE HCV-08-1B OPENING, CLOSING & SOL TEST
	316S	R7	3/25/83	E	MAIN STEAM ISOL VALVE HCV-08-1B STROKE TEST & SOLENOID TEST
	317S	R4	10/21/82	E	INSTRUMENT AIR ISOLATION VALVE HCV-18-1
	319S	R8	5/11/83	E	STEAM GEN BLOWDOWN ISOL VALVES FCV-23, 3, 4, 5 & 6
	320S	R6	1/10/83	E	CONTAINMENT SAMPLE ISOLATION VALVES
	321	R1	3/12/82	E	CONTAINMENT ISOLATION VALVE I-SE-07,-5A, -5C, -5E
	322	R1	3/12/82	E	CONTAINMENT ISOLATION VALVE I-SE-07-5B, -5D, -5F
	323	R1	3/12/82	E	CONTAINMENT PRESSURE CHANNELS P-07-4A1 & P-07-4B1
	324	R1	3/26/82	E	CONTAINMENT WATER LEVEL L-07-13A, -13B, -14A
	330S	R6	12/6/82	E	CONTAINMENT ISOL CH A-MAN RESET & MAIN STM ISOL VA BLOCK A
	331S	R7	12/6/82	E	CONTAINMENT ISOL CH B-MAN RESET & MAIN STM ISOL VA BLOCK B
	333	R3	2/10/82	E	CONT RADIATION MONITORS DETECTOR NO. RD-26-3 & RD-26-4
	334	R3	2/10/82	E	CONT RADIATION MONITORS DETECTOR NO. RD-26-5 & RD-26-6

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
					SPENT FUEL POOL
	335S	R5	11/10/82	E	AREA RADIATION MONITOR DETECTOR NO.-RD-26-7
	336S	R5	11/24/82	E	AREA RADIATION MONITOR DETECTOR NO.-RD-26-8
	337	R2	2/26/82	E	AREA RADIATION MONITOR DETECTOR NO. RD-26-9
	338	R2	2/26/82	E	AREA RADIATION MONITOR DETECTOR NO. RD-26-10
	339	R2	2/26/82	E	AREA RADIATION MONITOR DETECTOR NO. RD-26-11
	340	R2	2/26/82	E	AREA RADIATION MONITOR DETECTOR NO. RD-26-12
					REACTOR PROTECTIVE SYSTEM
	369S	R5	12/6/82	E	STEAM GENERATORS 2A/2B PRESSURE & LEVEL
	370S	R5	7/30/82	E	PRESSURIZER PRESSURE & LEVEL
	371S	R3	4/16/82	E	STEAM GENERATORS 2A & 2B LEVEL
	372S	R6	12/6/82	E	PRESSURIZER PRESSURE P-1102A MEASUREMENT LOOP
	373S	R6	12/6/82	E	PRESSURIZER PRESSURE P-1102B MEASUREMENT LOOP
	374S	R7	12/6/82	E	PRESSURIZER PRESSURE P-1102C MEASUREMENT LOOP
	375S	R6	12/6/82	E	PRESSURIZER PRESSURE P-1102D MEASUREMENT LOOP

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAMS (Cont'd)
	376S	R7	7/30/82	E	STEAM GENERATOR 2A LEVEL
	377S	R7	7/30/82	E	STEAM GENERATOR 2B LEVEL
	378S	R6	7/30/82	E	STEAM GENERATOR 2A PRESSURE
	379S	R7	11/10/82	E	STEAM GENERATOR 2B PRESSURE
	381S	R6	10/21/82	E	REACTOR COOLANT TEMP CH T-1112A, T-1122A
	382S	R6	10/21/82	E	REACTOR COOLANT TEMP CH T-1112B, T-1122B
	383S	R6	10/21/82	E	REACTOR COOLANT TEMP CH T-1112C, T-1122C
	384S	R6	10/21/82	E	REACTOR COOLANT TEMP CH T-1112D, T-1122D
	385S	R7	10/21/82	E	REACTOR COOLANT DELTA FLOW CH P-1101A
	386S	R7	10/21/82	E	REACTOR COOLANT DELTA FLOW CH P-1101B
	387S	R7	10/21/82	E	REACTOR COOLANT DELTA FLOW CH P-1101C
	388S	R7	10/21/82	E	REACTOR COOLANT DELTA FLOW CH P-1101D
	392S	R3	8/7/82	E	RTGB-204 120V AC & 125V DC DISTRIBUTION
	393S	R3	8/31/82	E	RTGB-203 28V DC DISTRIBUTION
	395S	R4	9/9/82	E	RTGB-203 120V AC DISTRIBUTION SH 2
	396S	R6(0)	7/25/83	E	RTGB-203 125V DC DISTRIBUTION
					REACTOR REGULATING SYSTEM
	411S	R7	9/28/82	E	REACTOR TRIP BKP TCR-1

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAMS (Cont'd)
	412S	R6	9/28/82	E	REACTOR TRIP BKR TCB-5
	413S	R7	9/28/82	E	REACTOR TRIP BKR TCB-2
	414S	R6	9/27/82	E	REACTOR TRIP BKR TCB-6
	415S	R8	9/27/82	E	REACTOR TRIP BKR TCB-3
	416S	R6	9/28/82	E	REACTOR TRIP BKR TCB-7
	417S	R7	9/27/82	E	REACTOR TRIP BKR TCB-4
	418S	R6	9/28/82	E	REACTOR TRIP BKR TCB-8
	419S	R8	11/10/82	E	REACTOR TRIP BKR TCB-9
	424S	R6	9/27/82	E	REACTOR TRIP SWGR & CEDMC'S 120V AC & 125V DC DISTR
					AREA & PROCESS RADIATION MONITORING
	332	R2	2/10/82	E	POST-ACCIDENT MONITORS DETECTOR NOS. RD-26-38, RD-26-39
	438S	R2	1/29/82	E	CONTAINMENT SAMPLING VALVES SH 1
	439S	R2	1/29/82	E	CONTAINMENT SAMPLING VALVES SH 2
	440S	R2	1/29/82	E	CONTAINMENT SAMPLING VALVES SH 3
	441S	R2	1/29/82	E	CONTAINMENT SAMPLING VALVES SH 4
	442S	R1	2/10/82	E	PROCESS RADIATION MONITOR
	443S	R6	2/28/83	E	CONTAINMENT HIGH RANGE RAD MONITORS
	444S	R6	4/13/83	E	COMPONENT COOLING WATER RADIATION MONITORING
	445S	R2	11/24/82	E	PLANT VENT STACK & FUEL HANDLING BLDG VENT STACK RAD MONITORING
	446S	R5	2/12/83	E	ECCS EFFLUENT GAS & PLANT VENT GAS WIDE RAD MONITORING

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAMS (Cont'd)
	447S	R0	11/13/81	E	ECCS EFFLUNET GAS (VENT A) WIDE RANGE RAD MONITORS SH 2
	448S	R1	2/10/82	E	ECCS EFFLUENT GAS (VENT B) WIDE RANGE RAD MONITORS SH 1
	449S	R0	11/13/81	E	ECCS EFFLUENT GAS (VENT B) WIDE RANGE RAD MONITORS SH 2
	452S	R1	2/10/82	E	CONTROL ROOM OA1 (NORTH) RADIATION MONITORS
	453S	R1	2/10/82	E	CONTROL ROOM OA1 (SOUTH) RADIATION MONITORS
	455S	R0	12/31/81	E	FUEL POOL RAD MONITORING 2-OUT-OF-3 LOGIC SH 1
	456S	R0	12/31/81	E	FUEL POOL RAD MONITORING 2-OUT-OF-3 LOGIC SH 2
	457S	R4	2/26/82	E	CONTAINMENT RADIATION
	461S	R5	12/6/82	E	STEAM GEN. BLOWDOWN SAMPLE ISOL. VALVES & SNUBBER OIL RESERVOIR LEVEL
					HEATING & VENTILATING
	462S	R1	10/26/78	E	AUX BLDG & ECCS SYSTEM DAMPERS SH 1 OF 6
	463S	R2	9/10/82	E	AUX BLDG & ECCS SYSTEM DAMPERS SH 2 OF 6
	464S	R2	9/10/82	E	AUX BLDG & ECCS SYSTEM DAMPERS SH 3 OF 6
	465S	R7	3/29/83	E	AUX BLDG & ECCS SYSTEM DAMPERS SH 4 OF 6
	466S	R4	3/30/82	E	AUX BLDG & ECCS SYSTEM DAMPERS SH 5 OF 6
	467S	R4	3/30/82	E	AUX BLDG & ECCS SYSTEM DAMPERS SH 6 OF 6
	468S	R7	2/22/83	E	ELEC EQUIPMENT ROOM FANS

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAMS (Cont'd)
	476S	R13	3/1/83	E	ELEC EQUP. RM SUPPLY FAN 2HVS-5A
	477S	R11	2/22/83	E	ELEC EQUIP. RM SUPPLY FAN 2HVS-5B
	478S	R4	3/20/81	E	TEMP RECORDER TR-25-2A MISC T/C'S
	479S	R5	12/15/82	E	TEMP RECORDER TR -25-2B MISC T/C'S
	481S	R4	12/15/82	E	AIRBORNE RADIOACTIVITY & ECCS VENT SYSTEM
	482S	R9	3/11/83	E	REACTOR CONTAINMENT & SHLD BLDG DIFF. PRESS
	483S	R7	8/26/82	E	TEMP RECORDERS TR-25-1A MISC T/C'S
	487S	R6	12/20/82	E	CONTAINMENT TO ANNULUS & ECCS ROOM DIFF PRESS
	490S	R12	4/7/83	E	CONTROL ROOM EMERG. FILTRATION FAB 2HVE-13A
	491S	R12	4/7/83	E	CONTROL ROOM EMERG. FILTRATION FAB 2HVE-13B
	492S	R11	1/24/83	E	CONTROL ROOM AIR COND. UNIT 2-HVA/ACC-3A
	494S	R11	1/24/83	E	CONTROL ROOM AIR COND UNIT 2-HVA/ACC-3B
	496S	R9	1/24/83	E	CONTROL ROOM AIR COND UNIT 2-HVA/ACC-3C
	499S	R4	2/18/83	E	CONTROL ROOM FILTER & FAN INLET DAMPERS
	500S	R8	1/14/83	E	CONTROL ROOM O.A.I. RADIATION DETECTORS
	503S	R7	3/1/83	E	REACTOR AUX BLDG EMER EXH FAN 2HVE-9A

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAMS (Cont'd)
	504S	R7	12/20/82	E	REACTOR AUX BLDG EMERG EXH FAN 2HVE-9B
	505S	R7	12/20/82	E	REACTOR AUX BLDG SUPPLY FAN 2HVS-4A
	506S	R7	12/20/82	E	REACTOR AUX BLDG SUPPLY FAN 2HVS-4B
	507S	R8	11/10/82	E	CEDM COOLING FAN 2HVE-21A
	508S	R9	12/22/82	E	CEDM COOLING FAN 2HVE-21B
	509S	R8	2/10/83	E	REACTOR CONTAINMENT PURGE EXHAUST FAN 2HVE-8A
	510S	R7	2/18/83	E	REACTOR CONTAINMENT PURGE EXHAUST FAN 2HVE-8B
	511S	R7	7/16/82	E	REACTOR CONTAINMENT PURGE ISOLATION VALVES SH 1
	512S	R7	6/17/82	E	REACTOR CONTAINMENT PURGE ISOLATION VALVES SH 2
	513S	R7	11/10/82	E	SHIELD BLDG VENT EXH FAN 2HVE-6A
	516S	R7	11/10/82	E	SHIELD BLDG VENT EXH FA N 2HVE-6B
	517S	R4	9/17/82	E	FUEL POOL DIFF PRESS & HSCP ROOM FANS
	518S	R2	3/20/81	E	DIESEL GEN 2A BLDG FAN 2-RV-5
	519S	R2	3/20/81	E	DIESEL GEN 2B BLDG FAN 2-RV-6
	522S	R6	3/1/83	E	REACTOR CAVITY COOLING SYSTEM 2HVS-2A
	523S	R7	11/10/82	E	REACTOR CAVITY COOLING SYSTEM 2HVS-2B
	524S	R5	3/1/83	E	REACTOR SUPPORT COOLING SYSTEM 2HVE-3A

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIIRING DIAGRAMS (Cont'd)
	525S	R4	5/11/82	E	REACTOR SUPPORT COOLING SYSTEM 2HVE-3B
	529S	R6	1/24/83	E	CONTAINMENT VACUUM RELIEF VALVES FCV-25-7 & FCV-25-8
					WASTE MANAGEMENT & SAMPLING
	532S	R8	4/21/83	E	SAFEGUARDS ROOM "A" SUMP PUMPS
	533S	R9	4/21/83	E	SAFEGUARDS ROOM "B" SUMP PUMPS
	536S	R1	4/28/80	E	DRAIN VALVES TO REACTOR AUXILIARY BUILDING SUMPS - SH 1
	542S	R4	9/7/82	E	REACTOR DRAIN PUMP 2A
	543S	R5	9/10/82	E	REACTOR DRAIN PUMP 2B
	563S	R4	9/7/82	E	RDT VENT STOP & CONT ISOL VALVES V-6300, V-6341, & V-6342
	564S	R6	12/6/82	E	WASTE GAS CONT ISOL & STOP VALVES V-6718, V-6750, & V-6565
	566S	R5	9/7/82	E	N2 HDR CONT ISOL & DISCH STOP VALVES V-6741 & V-6728
	576S	R7	4/1/83	E	REACTOR SUMP ISOL VALVES LCV-07-11A & LCV-07-11B AND REACTOR CAVITY LEAK DETECTORS
	578S	R5	7/20/82	E	PRIMARY COOLANT SAMPLES VALVES V-5200 & V 5203
	579S	R3	4/3/81	E	PRESSURIZER SURGE SAMPLE VALVES V-5201 & V-5204
	580S	R4	8/21/82	E	PRESSURIZER STEAM SAMPLE VALVES V-5202 & V-5205
	586S	R1	4/28/80	E	DRAIN VALVES TO REACTOR TO AUX BLDG SUMPS - SH 2

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAMS (Cont'd)
					COMBUSTIBLE GAS CONTROL
	597S	R4	11/10/82	E	HYDROGEN RECOMBINER 2A
	598S	R3	11/10/82	E	HYDROGEN RECOMBINER 2B
					FEEDWATER
	601S	R4	7/2/82	E	AUX FW HDR'S A&B FLOW & PRESSURE
	602S	R7	2/28/83	E	AUX FW HDR C FLOW & PRESSURE & FWP 2A & 2B FLOW
	603S	R9	6/24/83	E	STM GEN 2A & 2B ATM STM DUMP FWP DISCH HDR PRESS SH 1
	608S	R8(0)	7/25/83	E	AUX FWP 2A DISCHARGE TO ST. GEN 2A MV-09-9
	609S	R9(0)	7/25/83	E	AUX FWP 2B DISCHARGE TO ST. GEN 2B MV-09-10
	610S	R9	12/11/82	E	AUX FWP 2A DISCHARGE TO ST. GEN 2B MV-09-13
	611S	R10	1/14/83	E	AUX FWP 2B DISCHARGE TO ST. GEN 2A MV-09-14
	612S	R8(0)	7/25/83	E	AUX FWP 2C DISCHARGE TO ST. GEN 2A MV-09-11
	613S	R7(0)	7/25/83	E	AUX FWP 2C DISCHARGE TO ST. GEN 2A MV-09-12
	629S	R8	3/1/83	E	AUX FEEDWATER PUMP 2A
	630S	R8	5/26/83	E	AUX FEEDWATER PUMP 2B
	631S	R7	5/26/83	E	AUX FEEDWATER PUMP 2C - TURBINE
	632S	R8	5/26/83	E	AUX FEEDWATER PUMP 2C - STEAM VALVE MV-08-3

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	638S	R6	3/30/82	E	SG 2A/2B TO AFWP 2C WARM-UP VALVES I-SE-08-1,2
	639S	R4	8/24/82	E	RTGB-202 45VDC DISTRIBUTION
	643S	R5	8/5/82	E	RTGB-202 120VAC DISTRIBUTION SH.1
	645S	R5	8/26/82	E	RTGB-205 125VDC&120VAC DISTR.
	646S	R3	8/21/82	E	RTGB-206 125VDC DISTRIBUTION
	647S	R6	9/17/82	E	RTGB-206 120V AC DISTRIBUTION SH.1
	648S	R2	3/6/81	E	RTGB-206 120V AC DISTRIBUTION SH.2
	649S	R4	8/5/82	E	HOT SHUTDOWN CONTROL PANEL 120VAC DISTRIBUTION
	652S	R8	5/26/83	E	SG 2A TO AFWP 2C TURBINE MV-08-13
	653S	R7	1/17/83	E	SG 2B TO AFWP 2C TURBINE MV-08-12
	654S	R6	6/24/83	E	STM GEN 2A&2B ATM STM DUMP FWP DISCH HDR PRESS SH.2
	655S	R4	2/14/83	E	MAIN FEEDWATER ISOLATION VALVE HCV-09-1A
	656S	R4	2/14/83	E	MAIN FEEDWATER ISOLATION VALVE HCV-09-113
	657S	R5	4/1/83	E	RTGB 205, 125VDC&120VAC DISTRIBUTION SH.2
	658S	R3	9/2/82	E	RTGB 205, 120VAC DISTRIBUTION
	664S	R4	8/11/82	E	RTGB 206, 45VDC DISTRIBUTION
	671S	R5	5/11/83	E	MAIN FEEDWATER ISOLATION VALVE HCV-09-2A
	672S	R6	5/11/83	E	MAIN FEEDWATER ISOLATION VALVE HCV-09-2B

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd) MAIN STEAM
	695S	R7	8/15/82	E	AUX FWP 2C & TURB INLET PRESS & STM GEN FLOW PRESSURE
					TURBINE
	709S	R3	1/18/82	E	TURBINE TRIP STEAM GEN. HIGH-HIGH LEVEL
	710S	R11	1/7/83	E	TURBINE AUTO-STOP-TRIP & TURBINE ALARMS
	743S	R8	9/7/82	E	CONDENSATE TRANSFER PUMP
	744S	R7	2/12/83	E	AUXILIARY STEAM
					SJAE STM&FEED PUMP SUCT HDR PRESS COND STM TK & HOTWELL LEVEL
					TURBINE INSTRUMENTATION
	800S	R5	6/1/81	E	RTGB-201, 125VDC&120VAC DISTRIBUTION
					TURBINE COOLING
	831S	R6	9/3/82	E	INTAKE COOL WTR DISCH HDR PRESS PUMP 2A & PUMP 2B
	832S	R7	7/18/83	E	INTAKE COOLING WATER PUMP 2A
	833S	R7	7/18/83	E	INTAKE COOLING WATER PUMP 2B
	834S	R6	7/18/83	E	INTAKE COOLING WATER PUMP 2C
	835S	R5	10/21/82	E	INTAKE COOL WTR NON EMER HDR A ISOL VALVE MV-21-3
	836S	R5	8/19/82	E	INTAKE COOL WTR NON EMER HDR B ISOL VALVE MV-21-2
	839S	R5	4/28/82	E	LUBE WATER SUPPLY STRAINERS

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
					PRIMARY WATER
	849S	R4	12/17/82	E	PRIMARY WATER ISOLATION VALVE HCV-15-1
					STATION AUXILIARY POWER
	924S	R2	1/18/82	E	4160V SWGR 2A3 DIFF. RELAY
	925S	R2	10/6/82	E	4160V SWGR 2B3 DIFF. RELAY
	926S	R3	6/9/81	E	4160V SWGR 2AB DIFF. RELAY
	931S	R4	6/9/81	E	4160V SWGR 2A3 AC-DC DISTR & HEATERS
	932S	R4	6/9/81	E	4160 SWGR 2B3 AC-DC DISTR & HEATERS
	933S	R4	6/9/81	E	4160V SWGR 2AB AC-DC DISTR & HEATERS
	934S	R6	1/26/83	E	4160V SWGR 2A2 FDR TO BUS 2A3
	935S	R6	1/26/83	E	4160V SWGR 2B2 FDR TO BUS 2B3
	936S	R7	3/2/83	E	4160V SWGR 2A3 INCOMING FDR. FROM BUS 2A2
	937S	R6	3/2/83	E	4160V SWGR 2B3 INCOMING FEEDER FROM BUS 2B2
	938S	R4	1/26/83	E	4160V SWGR 2A3 FDR TO BUS 2AB
	939S	R4	1/26/83	E	4160V SWGR 2B3 FDR TO BUS 2AB
	940S	R5	1/26/83	E	4160V SWGR 2AB INCOMING FDR FROM BUS 2A3
	941S	R6	4/13/83	E	4160V SWGR 2AB INCOMING FDR FROM BUS 2B3
	942S	R2	9/7/82	E	4160V SWGR 2AB RELAYING & METERING
	943S	R8	6/24/83	E	PRESS HTR TRANSF 2A3 4160V FDR BKR

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	944S	R8	6/24/83	E	PRESS HTR TRANSF 2B3 4160V
	946S	R5	4/13/83	E	480V STA SERV TRANSF 2A2 4160V FDR BKR
	948S	R4	9/1/82	E	480V STA SERV TRANSF 2B2 4160V FDR BKR
	949S	R8	12/16/82	E	4160V SWGR 2A3 LOAD SHEDDING RELAYS
	950S	R5	12/16/82	E	4160V SWGR 2B3 LOAD SHEDDING RELAYS
	951S	R4	1/11/82	E	4160V SWGR 2AB LOAD SHEDDING RELAYS
					EMERGENCY DIESEL GENERATOR
	953S	R4	12/16/82	E	DIESEL GENERATOR 2A BREAKER
	954S	R7	12/16/82	E	DIESEL GENERATOR 2A RELAYING & METERING
	955S	R6	12/16/82	E	DIESEL GENERATOR 2A INSTR. & DIFF RELAYING
	956S	R5	6/24/83	E	DIESEL GENERATOR 2A LOCKOUT RELAY
	957S	R8	3/2/83	E	DIESEL GENERATOR 2A START CKT'S - SH.1
	958S	R5	3/2/83	E	DIESEL GENERATOR 2A REMOTE CONTROL
	959S	R1	1/28/80	E	DIESEL GENERATOR 2A START SOLENOIDS
	960S	R1	9/7/82	E	DIESEL GENERATOR 2A ANNUNCIATOR SH.1
	961S	R2	12/10/82	E	DIESEL GENERATOR 2A ANNUNCIATOR SH.2
	962S	R2	9/16/81	E	D-G 2A ENG CYL'S TEMP & EXH DIFF TEMP MONITORING

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	963S	R5	12/16/82	E	DIESEL GENERATOR 2B BREAKER
	964S	R8	12/16/82	E	DIESEL GENERATOR 2B RELAYING & METERING
	965S	R6	12/16/82	E	DIESEL GENERATOR 2B INSTR & DIFF RELAYING
	966S	R6	6/24/83	E	DIESEL GENERATOR 2B LOCKOUT RELAYS
	967S	R8	3/2/83	E	DIESEL GENERATOR 2B START CKT'S - SH.1
	968S	R5	3/2/83	E	DIESEL GENERATOR 2B REMOTE CONTROL
	969S	R2	1/8/82	E	DIESEL GENERATOR 2B START SOLENOIDS
	970S	R2	9/7/82	E	DIESEL GENERATOR 2B ANNUNCIA-TORS-SH.1
	971S	R2	12/10/82	E	DIESEL GENERATOR 2B ANNUNCIA-TORS-SH.2
	972S	R3	9/16/81	E	D-G 2B ENG CYL'S TEMP & EXH DIFF TEMP MONITORING
	974S	R2	4/16/82	E	D-G 2A ENG CYC'S TEMP EXH DIFF TEMP MONITORING
					480V AUXILIARY POWER
	977S	R3	9/7/82	E	480V SWGR 2A2 FDR
	978S	R4	8/3/82	E	480V SWGR 2A2 - 2AB TIE
	979S	R3	8/3/82	E	480V SWGR 2AB - 2A2 TIE
	980S	R2	1/24/83	E	480V SWGR 2B2 FDR
	981S	R3	8/3/82	E	480V SWGR 2B2-2AB TIE
	982S	R4	8/3/82	E	480V SWGR 2AB-2B2 TIE
	983S	R2	4/16/82	E	480V SWGR SPARE COMPARTMENTS
	984S	R3	3/30/82	E	480V SWGR 2A2 FDR TO FUEL HANDLING MCC 2A8

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	985S	R3	4/16/82	E	480V SWGR 2B2 FDR TO FUEL HANDLING MCC 2B8
	990S	R12	2/1/83	E	480V SWGR 2A2 MET REL & HTR'S
	991S	R4	8/25/82	E	480V SWGR 2A2 MCC FEEDERS
	992S	R12	2/1/83	E	480V SWGR 2B2 MET REL & HTR'S
	993S	R5	8/25/82	E	480V SWGR 2B2 MCC FEEDERS
	994S	R6	3/11/83	E	480V SWGR 2AV MEG. REL & HTR'S
	995S	R2	2/20/81	E	480V SWGR 2AB FEEDER TO REACTOR AREA MCC 2AB
	996S	R6	3/26/82	E	EMERGENCY DIESEL GEN NO. 2A LOADING LIGHTS
	997S	R8	3/25/83	E	EMERGENCY DIESEL GEN. NO. 2B LOADING LIGHTS
	998S	R6	9/27/82	E	EMERGENCY DIESEL GEN'S NO. 2A & NO. 2B LOADING LIGHTS
					MISCELLANEOUS ELECTRICAL
	999S	R7	1/10/83	E	BATTERY 2C & BATTERY CHARGER 2C
	1000S	R2	10/17/80	E	125 VDC BUS TRANSFER CONTROL
	1001S	R9	4/18/83	E	BATTERY 2A BATTERY CHARGER 2A
	1002S	R8	4/14/83	E	BATTERY 2B BATTERY CHARGER 2B
	1003S	R6	12/20/82	E	BATTERY CHARGER 2AB
	1004S	R4	4/20/83	E	ISOL CAB'S 125V DC POWER SUPPLY
	1005S	R4	9/1/82	E	MOTOR SPACE HEATER FEEDERS
	1006S	R3	3/1/83	E	MOTOR SPACE HEATER FEEDERS
	1007S	R6	4/28/82	E	MISC ANNUNCIATIONS
	1008S	R7	3/11/83	E	VITAL AC BUS POWER SUPPLY (SUPS)

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	1009S	R11	5/26/83	E	INSTRUMENT BUSES & INVERTERS 2MA & 2 MC
	1010S	R11	5/26/83	E	INSTRUMENT BUSES & INVERTERS 2MB & 2MD
	1024S	R1	11/10/82	E	MCC 2A1,2B1,2A3,2B3,2A9,2B9, SP 2HTRS
	1026S	R(0)	7/25/83	E	MCC 2A5,2B5,2AB,2A7,2B7 SP HTRS
	1027S	R2	11/10/82	E	MCC 2A6,2B6,2AB,2B SP HTRS
					EMERGENCY DIESEL GENERATOR
	1117S	R2	10/6/82	E	DIESEL GENERATOR 2A ANN CKT'S - SH 1
	1118S	R3	11/10/82	E	DIESEL GENERATOR 2A ANN CKT'S - SH 2
	1119S	R7	6/24/83	E	DIESEL GENERATOR 2A ANN CKT'S - SH 3
	1120S	R3	8/26/82	E	DIESEL GENERATOR 2A LUBE OIL CIRC. PUMP 2A1
	1121S	R3	8/26/82	E	DIESEL GENERATOR 2A LUBE OIL CIRC. PUMP 2A2
	1126S	R6	4/5/83	E	DIESEL GEN FUEL OIL TRANSFER PUMP 2A
	1127S	R2	1/8/82	E	DIESEL GENERATOR 2B ANN CKT'S SH 1
	1128S	R4	11/10/82	E	DIESEL GENERATOR 2B ANN CKT'S SH 2
	1129S	R6	6/24/83	E	DIESEL GENERATOR 2B ANN CKT'S SH 3
	1130S	R4	8/26/82	E	DIESEL GENERATOR 2B LUBE OIL CIRC. PUMP 2B1
	1131S	R4	8/26/82	E	DIESEL GENERATOR 2B LUBE OIL CIRC. PUMP 2B2

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd) MISCELLANEOUS HVAC
	1136S	R5	4/5/83	E	DIESEL GEN FUEL OIL TRANSFER PUMP 2B
	1137S	R3	4/7/82	E	TEMPERATURE RECORDER TR-25-1B MISC THERMOCOUPLES
	1138S	R5	12/15/82	E	HYDRAMOTOR ACTUATORS FOR FANS 2HVE-9A & 2HVE-9B
	1139S	R3	1/17/83	E	HYDRAMOTOR ACTUATORS FOR FANS 2HVE-13A & 2HVE-13B
	1140S	R4	11/11/82	E	SHIELD BLDG VENT SYS D-23 DAMPER CONTROL
	1141S	R4	11/11/82	E	SHIELD BLDG VENT SYS D-24 DAMPER CONTROL
	1142S	R6	4/21/83	E	PLANT AUXILIARIES CONTROL BOARD, ANNUNCIATOR-LA
	1143S	R6	4/21/83	E	PLANT AUXILIARIES CONTROL BOARD ANNUNCIATOR-LB
	1149S	R4	3/6/82	E	PLANT AUX. CONTROL BOARD ANN. LA, LB INTER. WIRING
	1150S	R7	3/11/83	E	SHIELD BLDG VENT SYSTEM ELECTRIC HEATING COILS 2-HVE-6A1, 6A2
	1152S	R7	3/11/83	E	SHIELD BLDG VENT SYSTEM ELECTRIC HEATING COILS 2-HVE-6B1, 6B2
	1154S	R5	12/11/82	E	FUEL HANDLING BLDG EMERG. VENT VALVE FCV-25-30
	1155S	R4	12/11/82	E	FUEL HANDLING BLDG EMERG. VENT VALVE FCV-25-31
	1156S	R4	12/11/82	E	SHIELD BLDG VENT SYSTEM ISOL VALVE FCV -25-32
	1157S	R4	12/11/82	E	SHIELD BLDG VENT SYSTEM ISOL VALVE FCV-25-33

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	1158S	R6	4/5/80	E	CONT. CONTAIN./H2 PU DISCH. TO SHIELD BLDG. VENT SYS. FCV-25-29
	1159S	R5	10/21/82	E	CONT. CONTAIN./H2 PU DISCH. TO SHIELD BLDG. VENT SYS. FCV-25-34
	1160S	R6	12/17/82	E	CONT. CONTAIN./H2 PURGE ISOL VALVE FCV-25-20
	1161S	R5	12/17/82	E	CONT. CONTAIN./H2 PURGE ISOL. VALVE FCV-25-21
	1162S	R5	12/20/82	E	INTAKE STRUCTURE EXHAUST FAN 2HVE-41A
	1163S	R5	12/20/82	E	INTAKE STRUCTURE EXHAUST FAN 2 HVE-41B
	1164S	R4	7/20/82	E	CONT. CONTAIN./H2 PURGE ISOL. VALVE FCV-25-26
	1165S	R4	12/6/82	E	SHIELD BLDG. HEPA FILTERS & CHARCOAL ADSORBER DIFF PRESS
	1166S	R6	1/25/83	E	CONTROL ROOM DAMPERS D-39 & D-40 & DIFF PRESSURES
	1167S	R3	4/3/81	E	CONTROL ROOM HEPA FILTER DIFF PRESSURES
	1168S	R3	7/1/82	E	FUEL HDLG BLDG HEATING & VENT RM FAN 2HVE-17
	1169S	R9	12/20/82	E	ROOF VENTILATORS 2RV3 & 2RV4
	1170S	R6	10/14/82	E	CONTROL ROOM NORTH OAI ISOL VA FCV-25-14
	1171S	R5	10/14/82	E	CONTROL ROOM SOUTH OAI ISOL VA FCV-25-15
	1172S	R7	10/14/82	E	CONTROL ROOM NORTH OAI ISOL VA FCV-25-16
	1173S	R5	9/27/82	E	CONTROL ROOM SOUTH OAI ISOL VA FCV-25-17

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	1174S	R3	1/29/82	E	TOILET EXH FAN ISOL VA FCV-25-18
	1175S	R4	12/20/82	E	TOILET EXH FAN ISOL VA FCV-25-19
	1176S	R6	9/27/82	E	SHIELD BLDG VENT COOL AIR VALVE FCV-25-11
	1177S	R4	9/27/82	E	SHEILD BLDG VENT COOL AIR VALVE FCV-25-12
	1178S	R6	9/27/82	E	SHIELD BLDG VENT SYSTEM TIE VALVE FCV-25-13
	1182S	R3	4/6/82	E	FUEL HANDLING BLDG DAMPERS RAD SIGNAL A
	1183S	R3	4/6/82	E	FUEL HANDLING BLDG DAMPERS RAD SIGNAL B
	1189S	R1	4/6/82		
	1190S	R2	2/20/81	E	KITCHEN EXHAUST FAN ISOL VALVE FCV-25-24
	1191S	R2	2/20/81	E	KITCHEN EXHAUST FAN ISOL VALVE FCV-25-25
	1192S	RO	1/29/82		
	1196S	R4	2/28/83	E	CONTAINMENT ATMOSPHERE HYDROGEN ANALYZER SH.1
	1197S	R4	7/26/82	E	CONTAINMENT ATMOSPHERE HYDROGEN ANALYZER-2
	1204S	R2	7/26/82	E	CONTAINMENT ATMOSPHERE HYDROGEN ANALYZER-3
	1205S	R4	2/28/83	E	CONTAINMENT ATMOSPHERE HYDROGEN ANALYZER-4
	1217S	R3	7/27/81	E	ANNUNCIATOR REFLASH
	1219S	R4	12/20/82	E	BATTERY ROOM 2A ROOF VENTILA-TOR-2RV-1
	1220S	R4	12/20/82	E	BATTERY ROOM 2B ROOF VENTILA-TOR-2RV-2

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	1238S	R2	3/20/81	E	HVCB-45V DC DISTRIBUTION
	1239S	R3	4/6/82	E	HVCB-125V DC & 120V AC DISTRIBUTION SH 1
	1240S	R3	10/7/80	E	HVCB-120V AC DISTRIBUTION SH 2
	1253S	R3	9/2/82	E	MOTOR OPER VALVE SPACE HEATERS FEEDERS
	1254S	R3	10/6/82	E	MOTOR OPER VALVE SPACE HEATERS FEEDERS
	1255S	R6	7/26/82	E	MOTOR OPER VALVE SPACE HEATERS FEEDERS
	1256S	R4	7/26/82	E	MOTOR OPER VALVE SPACE HEATERS FEEDERS
	1257S	R4	7/26/82	E	MOTOR OPER VALVE SPACE HEATERS FEEDERS
	1260S	R3	12/1/81	E	MOTOR OPER VALVE SPACE HEATERS FEEDERS
	1276S	R1	3/28/80	E	480V SWGR SPACE COMPARTMENT
	1278S	R2 (0)	7/26/83	E	480V SWGR 2A2, 2B2 INTER-CONNECTIONS BETWEEN CUBICLES
	1279S	R4	8/25/81	E	480V SWGR 2AB INTERCONNEC-TIONS BETWEEN WIRING BOXES
					SAFETY INJECTION & SHUTDOWN COOLING
	1501S	R10	11/11/82	E	SHUTDOWN COOLING ISOL. VALVE V-3545
	1502S	R7	1/12/83	E	SHUTDOWN COOLING ISOL. VALVE V-3664
	1503S	R7	9/27/82	E	SHUTDOWN COOLING ISOL. VALVE V-3665
	1504S	R6	9/27/82	E	SHUTDOWN CLG FROM.HEAT EXCH 2A VALVE V-3456

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	1505S	R7	2/14/83	E	SHUTDOWN CLG FROM HEAT EXCH. - 2B VALVE V-3457
	1506S	R4	9/27/82	E	SHUTDOWN CLG HEAT EXCH. - 2A INLET VALVE V-3517
	1507S	R4	9/27/82	E	SHUTDOWN CLG HEAT EXCH.- 2B INLET VALVE V-3658
	1508S	R2	8/05/82	E	RECORDER DISTRIBUTION MODULE INTERCONNECTION SH 1
	1510S	R6	9/29/82	E	SHUTDN. CLG.LINE 2A WARM-UP VALVE V-3536
	1511S	R9	9/29/82	E	SHUTDN. CLG. LINE 2B WARM-UP VALVE V-3539
	1512S	R7	7/18/83	E	HP INJECTION TO HOT LOOP 2A FLOW & PRESS MONITORS
	1513S	R5	8/05/82	E	HP INJECTION TO HOT LOOP 2B FLOW & PRESS MONITORS
	1514S	R6	9/29/82	E	SHUTDN. COOLING CONTROL VALVE 2A HCV-3657
	1515S	R7	9/29/82	E	SHUTDN. COOLING CONTROL VALVE 2B HCV-3512
	1516S	R8(0)	7/26/82	E	SHUTDOWN COOLING & BYPASS VALVE FCV-3306
	1517S	R8(0)	7/26/82	E	SHUTDOWN COOLING & BYPASS VALVE FCV-3301
	1518S	R4	4/13/83	E	RECORDER DISTRIBUTION MODULE INTERCONNECTION-SH 2
	1519S	R7	8/21/82	E	HOT LEG HPSI LINE CHECK VLV LEAK'G DRAIN VA'S V-3571, V-3572, I-SE-03-2A, I-SE-03-2B
	1520S	R6	7/18/83	E	MINIMUM FLOW ISOLATION VALVES V-3495 & V-3496

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	1525S	R3	1/13/82	E	MEASUREMENT CHANNELS T-3351 X/Y, 3352 X/Y, 3303 W/X/Y/Z
	1526S	R6	3/10/82	E	MEASUREMENT CHANNELS P3301, P3302, P-3304, P-3307
	1527S	R4	10/14/82	E	SI TANKS 2A1, 2A2, 2B1, 2B2 SAMPLE VA'S I-SE-05-1A, 1B, 1C & 1D
	1528S	R11	1/13/83	E	SI TANKS SAMPLE FCV-03-1E MEASUREMENT CH'S F-3301, F-3306
	1529S	R2	2/26/82	E	CONTAINMENT SPRAY ISOLATION VALVE MV-07-161
	1530S	R2	2/26/82	E	CONTAINMENT SPRAY ISOLATION VALVE MV-07-164
	1531S	R2	2/26/82	E	LPSI PUMP 2A SUCTION VALVE V-3432
	1532S	R2	2/26/82	E	LPSI PUMP 2B SUCTION VALVE V-3444
					ANNUNCIATORS
	1551S	R5	10/14/82	E	ISOL CAB/ALC-1 INTERCONN DIAGRAM RTGB-201 ANN B SH 1
	1552S	R6	8/27/82	E	ISOL CAB/ALC-1 INTERCONN DISGRAM RTGB-201 ANN B SH 2
	1553S	R6	11/5/82	E	ISOL CAB/ALC-1 INTERCONN DIAGRAM RTGB-201 ANN A SH 1
	1554S	R6	11/5/82	E	ISOL CAB/ALC-1,2 INTERCONN DIAGRAM RTGB-201, 204 ANN A SH 2, L
	1555S	R6	11/5/82	E	ISOL CAB/ALC-2 INTERCONN DIAGRAM RTGB-202 ANN G
	1556S	R6(0)	7/26/82	E	ISOL CAB/ALC-2 INTERCONN DIAGRAM RTGB-202 ANN E

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	1557S	R5	9/10/82	E	ISOL CAB/ALC-3 INTERCONN DIAGRAM RTGB-205 ANN M
	1558S	R7	9/2/82	E	ISOL CAB/ALC-3 INTERCONN DIAGRAM RTGB-205 ANN N
	1559S	R7	5/23/83	E	ISOL CAB/ALC-3 INTERCONN DIAGRAM RTGB-206 ANN S SH 1
	1560S	R4	6/9/81	E	ISOL CAB/ALC-3 INTERCONN DIAGRAM RTGB-206 ANN S SH2
	1561S	R5	6/9/81	E	ISOL CAB/ALC-2,3 INTERCONN DIAGRAM RTGB-205, 206, ANN B, SH 3
	1563S	R3	3/6/81	E	ISOL CAB/ALC-3 INTERCONN DIAGRAM RTGB-206 ANN R SH 2
	1564S	R4	10/21/82	E	ISOL CAB/ALC-3 INTERCONN DIAGRAM RTGB-206 ANN R SH 3
	1565S	R5	10/14/82	E	ISOL CAB/ALC-3 INTERCONN DIAGRAM RTGB-206 ANN Q SH 1
	1566S	R4	8/5/82	E	ISOL CAB/ALC-3 INTERCONN DIAGRAM RTGB-206 ANN Q SH 2
	1567S	R6	2/23/83	E	ISOL CAB/ALC-2,3 INTERCONN DIAGRAM RTGB-204, 206, ANN K, Q, SH 3
	1568S	R7	12/15/82	E	ISOL CAB/ALC-3 INTERCONN DIAGRAM RTGB-206 ANN P SH 1
	1569S	R4	10/11/82	E	ISOL CAB/ALC-3 INTERCONN DIAGRAM RTGB-206 ANN P SH 2
	1570S	R4	9/9/82	E	ISOL CAB/ALC-3 INTERCONN DIAGRAM RTGB-206 ANN P SH 3
	1571S	R5	3/6/81	E	ISOL CAB/ALC-1 INTERCONN DIAGRAM HVCB ANN "T"
	1572S	R4	3/6/81	E	ISOL CAB/ALC-1 INTERCONN DIAGRAM HVCB ANN "U"

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	1573S	R6	12/20/82	E	ISOL CAB/ALC-1 INTERCONN DIAGRAM HVCB ANN "V" SH 1
	1574S	R5	1/24/83	E	ISOL CAB/ALC-1 INTERCONN DIAGRAM HVCB ANN "V" SH 2
	1575S	R4	3/6/81	E	ISOL CAB/ALC-1 INTERCONN DIAGRAM HVCB ANN "W"
	1576S	R7	2/22/83	E	ISOL CAB/ALC-1 INTERCONN DIAGRAM HVCB ANN "X"
	1577S	R5	8/30/82	E	ISOL CAB/SEQ-OF EVENTS CAB INTERCONN DIAGRAM SH 1
	1578S	R4	6/14/82	E	ISOL CAB/SEQ OF EVENTS CAB INTERCONN DIAGRAM SH 2
	1580S	R1	7/16/82	E	ESC/ISOL CAB/ALC-3 INTER-WIRING
	1583S	R5	4/6/82	E	BYPASS INDICATION SYSTEM A SH.2
	1584S	R5	4/6/82	E	BYPASS INDICATION SYSTEM A SH.3
	1587S	R4	5/22/81	E	BYPASS INDICATION SYSTEM B SH.2
	1588S	R4	4/6/82	E	BYPASS INDICATION SYSTEM B SH.3
					EMERGENCY DIESEL GENERATORS
	1601S	R6	6/24/83	E	DIESEL GEN. 2A START CKT'S SH. 2
	1602S	R5	6/24/83	E	DIESEL GEN. 2A START CKT'S SH. 3
	1603S	R1	1/28/80	E	DIESEL GEN. 2A START CKT'S SH. 4
	1604S	R2	10/11/82	E	DIESEL GEN. 2A START CKT'S SH. 5

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	1605S	R2	9/17/82	E	DIESEL GEN. 2A START CRT'S SH. 6
	1606S	R5	10/21/82	E	DIESEL GEN 2A GROUNDING & METERING
	1607S	R4	1/11/82	E	DIESEL GEN 2A IMMERSION HEATERS
	1608S	R6	3/11/83	E	DIESEL GEN 2A VOLTAGE
	1609S	RO	7/31/81	E	REGULATOR
	1611S	R6	6/24/83	E	DIESEL GEN. 2B START CSTS SH. 2
	1612S	R5	6/24/83	E	DIESEL GEN. 2B START CKTS SH. 3
	1613S	R1	1/28/80	E	DIESEL GEN 2B START CKTS SH. 4
	1614S	R2	1/13/82	E	DIESEL GEN 2B START CKTS SH. 5
	1615S	R3	9/17/82	E	DIESEL GEN 2B START CKTS SH. 6
	1616S	R6	10/21/82	E	DIESEL GEN 2B GROUNDING & METERING
	1617S	R4	1/13/82	E	DIESEL GEN 2B IMMERSION HEATERS
	1618S	R7	3/11/83	E	DIESEL GEN 2B VOLTAGE
	1619S	RO	7/31/81	E	REGULATOR
	1621S	R3	1/17/83	E	ATMOS STM DUMP ISOL VA MV-08-15
	1622S	R4	1/17/83	E	ATMOS STM DUMP ISOL VA MV-08-14

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	1623S	R3	1/17/83	E	ATMOS STM DUMP ISOL VA MV-08-17
	1624S	R3	1/17/83	E	ATMOS STM DUMP ISOL VA MV-08-18
	1625S	R3	1/10/83	E	STM GEN 2A ATMOS STM DUMP VA MV-08-19A
	1626S	R3	1/10/83	E	STM GEN 2A ATMOS STM DUMP VA MV-08-18A
	1627S	R4	1/10/83	E	STM GEN 2A ATMOS STM DUMP VA MV-08-19B
	1628S	R3	1/10/83	E	STM GEN 2A ATMOS STM DUMP VA MV-08-18B
	1629	R2	1/10/83	E	RELIEF VALVE V-1474
	1630	R2	1/10/83	E	RELIEF VALVE V-1475
	1631	R5	7/18/83	E	AFWP-2A DISCH TO SG-2A I-SE-09-2
	1632	R6	7/18/83	E	AFWP-2B DISCH TO SG-2B I-SE-09-3
	1633	R6	7/18/83	E	AFWP-2C DISCH TO SG-2A I-SE-09-4
	1634	R5	7/18/83	E	AUX FW PUMP 2C DISCH TO STEAM GEN 2B I-SE-09-5
	1635	R4	2/12/83	E	FEEDWATER, HEADER PRESS 9B-9C-9D-10A-10B-10C-10D
	1636	R3	12/20/82	E	STEAM GEN 2A & 2B LEVEL/ PRESSURE
	1637	R2	7/18/83	E	REMOTE MANUAL INITIATE AFAS-1, AFAS-2
	1638	R3	2/18/83	E	AFAS ANNUNCIATORS SH 1
	1639	R3	7/18/83	E	AFAS ANNUNCIATORS SH 2

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	1641S	R4	11/21/83	E	RADIATION MONITORING 120V AC DISTRIBUTION
	1642	R5	1/10/83	E	120V AC DISTRIBUTION SH 3
	1643	R9	3/11/83	E	120V AC DISTRIBUTION SH 4
	1648	R1	2/26/82	E	LOOP NO. 2 SH 1
	1649	R1	2/26/82	E	LOOP NO. 2 SH 2
	1650	R1	1/29/82	E	LOOP NO. 2 SH 3
	1653	R2	11/24/82	E	LOOP NO. 3 SH 1
	1654	R2	11/15/83	E	LOOP NO. 3 SH 2
	1655	R2	7/18/83	E	LOOP NO. 3 SH 3
	1656	R2	11/24/82	E	LOOP NO. 3 SH 4
	1657	R2	11/24/82	E	LOOP NO. 3 SH 5
	1658	R1	2/26/82	E	LOOP NO. 4 SH 1
	1659	R1	2/26/82	E	LOOP NO. 4 SH 2
	1668	R2	3/25/83	E	RAD MONITORING LOOP 3 SH 6
	1691S	R3	2/14/83	E	REACTOR COOLANT VENT SYSTEM-1
	1692	R5	12/14/82	E	REACTOR COOLANT VENT SYSTEM-2
	1694	R2	12/14/82	E	PLANT AUX CONTROL BOARD-2 120V AC & 125V DC DISTRIBUTION
	1695	R1	3/12/82	E	PLANT AUX CONTROL BOARD 45V DC DISTRIBUTION
	1701S	R3	2/1/83	E	480V SWGR 2A-5 MOT REL & HTRS
	1702S	R1	8/14/82	E	480V SWGR 2A-5 FEEDER
	1703S	R1	3/26/82	E	REACTOR AREA MCC-2A6

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	1711	R4	2/1/83	E	480V SWGR 2B5 METERING RELAYS & HEATERS
	1712	R2	8/15/82	E	480V SWGR 2B5 FDR
	1713	R1	4/8/82	E	480V SWGR 2B5 FEEDWATER TO RE-ACTOR AREA MCC-2B6
	1751	R4	8/17/83	E	QSPDS INTERCONNECTION
	1755	R3	1/24/83	E	REACTOR COOLANT TEMP. SAS-QSPDS INPUTS SH 1
	1756	R4	3/11/83	E	REACTOR COOLANT TEMP. SAS-QSPDS INPUTS SH 2
	1757	R1	8/13/82	E	PRESSURIZED PRESSURE ICC-INPUTS
	1810	R2	8/17/83	E	PRESSURIZER PRESSURE ICC-INPUTS
	1829	R4	5/12/83	E	PASS VALVES SH 4
	1831	R3	4/12/83	E	PSB-1 UNDERVOLTAGE PROTECTION 4160V BUS 2A3
	1833	R3	4/12/83	E	PSB-1 UNDERVOLTAGE PROTECTION 480V BUS 2A2/2A5
	1834	R3	4/12/83	E	PSB-1 UNDERVOLTAGE PROTECTION 480V BUS 2B2/2B5
	1836	R3	4/11/83	E	PSB-1 UNDERVOLTAGE PROTECTION BUS 2A3/2A2/2A5 RELAY
	1837	R3	4/11/83	E	PSB-1 UNDERVOLTAGE PROTECTION BUS 2B3/2B2/2B3 RELAY
	1851	R2	11/30/82	E	INCORE MONITOR DETECTORS L18, L20, R16, R18
	1852	R2	11/30/82	E	INCORE MONITOR DETECTORS C18, E13, E16, E18
	1853	R2	11/30/82	E	INCORE MONITOR DETECTORS C6, C13, E2, G4

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	1854	R2	11/30/82	E	INCORE MONITOR DETECTORS G6, L4, L6, R2
	1855	R2	11/30/82	E	INCORE MONITOR DETECTORS R9, R15, T4, T6
	1856	R2	11/30/82	E	INCORE MONITOR DETECTORS T9, W4, W9, W13
	1857	R2	11/30/82	E	INCORE MONITOR DETECTORS R20, T20, Y8, Y14
	1858	R2	11/30/82	E	INCORE MONITOR DETECTORS A8, C4, E4, G2
	1859	R2	11/30/82	E	INCORE MONITOR DETECTORS A14, C9, E6, E9
	1860	R2	11/30/82	E	INCORE MONITOR DETECTORS C16, E20, G9, G13
	1861	R2	11/30/82	E	INCORE MONITOR DETECTORS G16, G18, L13, L16
	1862	R2	11/30/82	E	INCORE MONITOR DETECTORS G20, T18, W16, W18
	1863	R2	11/30/82	E	INCORE MONITOR DETECTORS L9, T13, T16, W6
	1864	R2	11/30/82	E	INCORE MONITOR DETECTORS L2, R4, R6, T2
	1865	R3	3/11/83	E	HEATER JUNCTION THERMOCOUPLES 1A, 2A, 3A, 4A
	1866	R3	3/11/83	E	HEATER JUNCTION THERMOCOUPLES 5A, 6A, 7A, 8A
	1867	R3	3/11/83	E	HEATER JUNCTION THERMOCOUPLES 1B, 2B, 3B, 4B
	1868	R3	3/11/83	E	HEATER JUNCTION THERMOCOUPLES 5B, 6B, 7B, 8B

TABLE 1.7-1 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-327					CONTROL WIRING DIAGRAM (Cont'd)
	-1692S	R5	2/14/83	E	REACTOR COOLANT VENT SYSTEM-2
G-878		R7	5/19/83	E	HVAC - CONTROL DIAGRAMS SH. 1
G-879	2	R7	5/19/83	E	HVAC - CONTROL DIAGRAMS SH. 2
G-879	3	R9	5/19/83	E	HVAC - CONTROL DIAGRAMS SH. 3

TABLE 1.7-2

NSSS SUPPLIED ELECTRICAL, INSTRUMENTATION AND CONTROL DRAWINGS
SAFETY RELATED

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
B-13172-412-330	1-9	R2	7/26/77	CE	ELEMENTARY W/D REAC TRIP CKT BKR
E-13172-413-130		R2	7/20/77	CE	REACTOR TRIP SWITCHGEAR ARRANGEMENT
E-13172-411-022		R3	10/28/82	CE	NUCLEAR INSTRUMENTATION AND RPS CABINET ASSY
E-13172411012	1	R6	10/27/82	CE	RPS TERMINAL BLOCK WIRING DIAGRAM
E-13172411012	2	R6	10/28/82	CE	RPS TERMINAL BLOCK WIRING DIAGRAM SH. 2
E-13172411012	3	R6	10/28/82	CE	RPS TERMINAL BLOCK WIRING DIAGRAM SH. 3
E-13172411012	4	R6	10/28/82	CE	RPS TERMINAL BLOCK WIRING DIAGRAM SH. 4
805B1		R0	8/18/75	CE	RTSG HEATER ELEMENTARY
805B13		R2	12/3/75	CE	GE AK-2-25 CIRCUIT BREAKER ELEMENTARY & CONN DIAG
805B12		R1	3/24/76	CE	RTSG DC ELEMENTARY TCB-9
8055-B10		R2	3/24/76	CE	RTSG DC ELEMENTARY TCB-7
805B11		R2	3/24/76	CE	RTSG DC ELEMENTARY TCB-8
805B8		R2	3/24/76	CE	RTSG DC ELEMENTARY TCB-5
805B9		R2	3/24/76	CE	RTSG DC ELEMENTARY TCB-6
805B6		R2	3/24/76	CE	RTSG DC ELEMENTARY TCB-3
805B7		R2	3/24/76	CE	RTSG DC ELEMENTARY TCB-4
805B5		R2	3/24/76	CE	RTSG DC ELEMENTARY TCB-2
805B4		R2	3/24/76	CE	RTSG DC ELEMENTARY TCB-1
805B3		R0	8/19/75	CE	RTSG CURRENT MONITOR ELEMENTARY

TABLE 1.7-2 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
805B2		R1	9/26/75	CE	RTSG CURRENT MONITOR ELEMENTARY
805E6		R1	3/24/76	CE	RTSG WIRING DIAGRAM SECTION 04
805E7		R1	3/24/76	CE	RTSG WIRING DIAGRAM SECTION 05
805E5		R1	3/24/76	CE	RTSG WIRING DIAGRAM SECTION 03
805E4		R1	3/24/76	CE	RTSG WIRING DIAGRAM SECTION 02
805E3		R1	3/23/76	CE	RTSG WIRING DIAGRAM SECTION 01
805E2		R1	10/1/75	CE	RTSG ARRANGEMENT & DETAILS
805E1		R1	10/1/75	CE	RTSG ARRANGEMENT & DETAILS
E-13172-411-071		R3	7/26/82	CE	CORE PROTECT CALCULATOR NO.1 SCHEMATIC
E-13172-411-072	1	R3	1/28/83	CE	CORE PROTECT CALCULATOR NO. 2 SCHEMATIC
E-13172-411-086	1	R2	1/28/83	CE	RPS ISOLATION LOGIC & WIRING DIAGRAM
E-13172-411-013	4	R2	7/28/82	CE	RPS SCHEMATIC SH4 of 4
E-13172-411-018		R2	7/28/82	CE	TRIP INHIBIT MODULE WIRING DIAGRAM
E-13172-411-400		R1	3/14/79	CE	RPS CALIB.& INDIC. PNL. SCHEMATIC
E-13172-411-040		R3	1/28/83	CE	REACTOR TRIP BYPASS SCHE-MATIC
E-13172-411-325		R1	3/14/79	CE	RPS MISC. SCHEMATICS
E-13172-411-013	1	R2	7/28/82	CE	RPS MISC. SCHEMATICS SH1 OF 4

TABLE 1.7-2 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
E-13172-411-013	3	R2	7/28/82	CE	RPS MISC. SCHEMATICS SH3 OF 4
E-13172-411-013	2	R2	7/28/82	CE	RPS MISC. SCHEMATICS SH2 OF 4
E-13172-411-401		R1	3/14/79	CE	RPS CALIB & IND. PNL ASSEMBLY
E-13172-411-011		R2	7/28/82	CE	RPS BIN ASSEMBLIES WIRING DIAG.
E-13172-411-324		R1	3/14/79	CE	AUX. LOGIC WIRING DIAGRAM
E-13172-411-072	2	R2	1/28/83	CE	CORE PROT. CALC NO.2 SCHEMATIC-SH2 OF 2
E-13172-411-024		R2	10/28/82	CE	RPS BIN ASSEMBLY
E-13172-411-015		R0	12/23/77	CE	TRAC 1 WIRING & ASSEMBLY DIAGRAM
E-13172-411-029		R2	1/28/83	CE	TRIP TEST CABLE PNL ASSEMB.
D-13172-411-366		R2	3/14/79	CE	TRIP UNIT BIN ASSEMB. PERSPECT.
E-13172-411-085		R2	1/28/82	CE	POWER RATIO SIGNAL CALC. SCHEM.
E-13172-411-310		R2	3/14/79	CE	AUX. LOGIC SCHEMATIC
E-13172-411-025		R2	10/28/82	CE	TRIP INHIBIT MODULE ASSY
E-13172-411-034	1	R3	1/28/83	CE	RPS TRIP STATUS PNL. SCHEM & W/D
E-13172-411-302		R4	7/28/82	CE	TRIP UNIT INTERCONN. MODULE W/D
E-13172-411-021		R2	7/28/82	CE	NUC. INST. RPS CAB. ASSY. FRNT PNL LAYOUT
E-13172-411-039		R2	1/28/83	CE	SCHEM. INPUT SIG. CONN. TO TRIP UNITS
E-13172-411-350		R1	3/14/79	CE	AUX. LOGIC ASSEMBLY

TABLE 1.7-2 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
E-13172-411-003		R2	7/28/82	CE	RPS FUNCTIONAL DIAGRAM
E-13172-411-033		R2	1/28/83	CE	RPS TRIP STATUS PNL. ASSY
E-13172-411-043		R1	12/23/77	CE	LOW FLOW PROT. SYS. FUNCT. DIAG.
E-13172-411-376		R2	3/14/79	CE	TRIP UNIT INTERCONN. MODULE ASSY
D-13172-411-091		R1	3/14/79	CE	BISTABLE TRIP UNIT MODULE ASSEMBLY
D-13172-411-035		R2	1/28/83	CE	RPS/NI INTERFACE
D-13172-411-092		R1	3/14/79	CE	AUXILIARY TRIP UNIT MODULE ASSEMBLY
E-13172-411-034	2	R2	1/28/83	CE	RPS TRIP STATUS PANEL SCHEM & WIRING DIAGRAM
E-13172-411-086	2	R2	1/28/83	CE	RPS ISOLATION LOGIC & WIRING DIAGRAM AW 20
D-13172-413-412		R5	11/29/82	CE	STEAM GENERATOR-B PROTECTIVE CHANNEL BLOCK DIAGRAM
D-13172-413-411		R4	1/29/82	CE	STEAM GENERATOR-A PROTECTIVE CHANNEL BLOCK DIAGRAM
D-13172-416-214		R5	3/18/83	CE	INTERC/D CHGNG PMP DISCH HDR PRES CHAN P2212
D-13172-416-121	3	R5	5/02/83	CE	INTERCONN DIAG PRESS LEVEL CHANNEL L-1110 SH3
D-13172-416-121	2	R7	5/02/83	CE	INTERCONN DIAG PRESS LEVEL CHANNEL L-1110 SH2
D-13172-416-121	1	R6	4/06/83	CE	INTERCONN DIAG PRESS LEVEL CHANNEL L-1110 SH1
D-13172-416-112		R4	3/18/83	CE	INTERC/D-PRESSURIZER PRESSURE CHANNEL P1102
D-13172-416-131		R5	4/06/83	CE	I/D-REAC COOL DELTA PRES FLOW CHANS P1101A-D

TABLE 1.7-2 (Cont'd)

Drawing No.	Sheet No	Revision No.	Revision Date	Prepared By	Title
D-13172-416-217		R2	11/21/80	CE	I/D-CHARGING PUMP SUCT PRESS CHANNEL P-2224
D-13172-416-311	1	R2	4/06/83	CE	ID-HPSI.LPSI HEADER PRESS CHANNELS P-3308,9
D-13172-416-311	2	R3	4/06/83	CE	ID-HPSI.LPSI HDR PRESS CHANNELS P3304-7
D-13172-416-103	1	R3	6/25/82	CE	ID-RCS LOOP TEMP CHANNELS T1111 & 1121 SH1OF2
D-13172-416-103	2	R4	4/06/83	CE	ID-RCS LOOP TEMP CHANNELS T1115 & 1125 SH2OF2
D-13172-416-104		R3	4/06/83	CE	INTERCONN DIAG-RCS LOOP TEMP CHS T1112&1122
D-13172-416-113	1	R5	4/06/83	CE	ID-PRESSURIZER PRESS LO RNGE CH P1103,5 SH1/2 877
D-13172-416-113	2	R5	4/06/83	CE	ID-PRESSURIZER PRESS LO RNGE CH P1103,5 SH2/2
D-13172-416-115		R1	2/26/80	CE	INTERCONN DIAG-RCP SEAL PRESS CHANNELS
D-13172-416-132		R1	2/26/80	CE	ID-RCP CONT BLEEDOFF FLO CHS F1150,60,70,80
D-13172-416-401		R4	4/06/83	CE	ID-STEAM GENERATOR STEAM PRESS CHANNEL P8013
D-13172-416-402		R4	4/06/83	CE	INTERCONN DIAG-STEAM GENERATOR LEVEL CH L9013 877
D-13172-416-651		R3	11/24/81	CE	I/D WMS MISC LOCAL & REMOTE ALARMS 8770-1938
D-13172-416-470	1	R3	1/29/82	CE	I/D-CONT BRD MTD NUCLEAR INST SH1 OF 4
D-13172-416-470	4	R2	7/12/81	CE	I/D CONT BRD MTD NUCLEAR INST SH 4 OF 4
D-13172-416-331		R2	4/06/83	CE	ID HI & LO PRES SI FLOW CHANNELS F3311,F3312

TABLE 1.7-2 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
D-13172-416-470	2	R4	9/27/82	CE	ID CONTR BOARD MNTD NUC INSTR SH2 8770-1511-13
D-13172-416-470	3	R2	1/19/81	CE	INTERCONN DIAG CONTROL BOARD MNTD INSTR SH 3
D-13172-416-105		R4	10/12/82	CE	INTERCONN DIAG RCS TEMP CHANNEL T-1102
D-13172-416-222		R2	7/10/81	CE	ID-BA TANKS 2A & 2B LEVEL CHS L-2206,7,8,9

TABLE 1.7-3

ARCHITECT/ENGINEER SUPPLIED
FLOW DIAGRAMS, PIPING AND INSTRUMENTATION DIAGRAMS
SAFETY RELATED

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
G 079	1	R11	6/15/83	E	FLOW DIAG - MAIN, EXTRACTION AUXILIARY STEAM & AIR EVACUATION SYSTEMS
G 079	2	R10	4/12/83	E	FLOW DIAG - MAIN, EXTRACTION AUXILIARY STEAM & AIR EVACUATION SYSTEMS
G 080	1	R9	6/15/83	E	FLOW DIAG - FDWTR & CONDENSATE SYSTEMS
G 080	2	R9	6/15/83	E	FLOW DIAG - FDWTR & CONDENSATE SYSTEMS
G 081	1	R9	4/12/83	E	FLOW DIAG - HEATER DRAIN & VENT SYSTEMS
G 081	2	R9	4/12/83	E	FLOW DIAG - HEATER DRAIN & VENT SYSTEMS
G 082		R11	6/15/83	E	FLOW DIAG - CRLG & INTAKE COOLING WATER SYSTEMS
G 083		R11	12/27/82	E	FLOW DIAG - COMPONENT COOLANT SYSTEM
G 084		R11	6/15/83	E	FLOW DIAG - FIREWATER DOMESTIC AND MAKEUP SYSTEMS
G 085	1	R11	6/15/83	E	FLOW DIAG - SERVICE AND INSTRUMENT AIR SYSTEMS
G 085	2	R10	6/15/83	E	FLOW DIAGRAM - INSTRUMENT INSTRUMENT AIR SYSTEM
G 086		R11	6/15/83	E	FLOW DIAG - MISCELLANEOUS SYSTEMS SH-1
G 087		R11	6/15/83	E	FLOW DIAG - MISCELLANEOUS SYSTEMS SH-2
G 088		R11	6/15/83	E	FLOW DIAG - CONTAINMENT SPRAY & REFUELING WATER SYSTEMS

TABLE 1.7-3 (Cont'd)

Drawing No.	Sheet No.	Revision No.	Revision Date	Prepared By	Title
G 089		R9	10/4/82	E	FLOW DIAG - TURBINE COOLING WATER SYSTEM
G 090		R7	10/11/82	E	REACTOR COOLANT - PRESSURE BOUNDARY DIAGRAM
G 091		R9	6/15/83	E	FLOW DIAG MISC SYSTEMS
G 092		R7	6/15/83	E	FLOW DIAG MISC SAMPLING SYSTEMS
G 862		R6	11/19/82	E	HVAC - AIR FLOW DIAGRAM
G 863		R5	5/19/83	E	HVAC - REFRIGERANT PIPING

TABLE 1.7-4

NSSS SUPPLIED FLOW DIAGRAMS, PIPING AND INSTRUMENTATION DIAGRAMS
SAFETY RELATED

Drawing No.	Revision No.	Revision Date	Prepared By	Title
E-13172-310-100	13	7/1/82	CE	PIPING & INSTRUMENTATION DIAGRAM SYMBOLS
E-13172-310-110	17	5/17/83	CE	REACTOR COOLANT SYSTEM P&I DIAGRAM
E-13172-310-111	17	7/7/83	CE	REACTOR COOLANT PUMP P&I DIAGRAM
E-13172-310-120	17	3/16/83	CE	CHEMICAL & VOLUME CONTROL SYSTEM P&I DIAG
E-13172-310-121	18	5/17/83	CE	CHEMICAL & VOLUME CONTROL SYSTEM P&I DIAG
E-13172-310-130	19	5/17/83	CE	SAFETY INJECTION SYS P&I DIAGRAM
E-13172-310-131	17	5/17/83	CE	SAFETY INJECTION SYS P&I DIAGRAM
E-13172-310-140	19	7/7/83	CE	FUEL POOL SYS P&I DIAGRAM
E-13172-310-150	18	7/7/83	CE	SAMPLING SYSTEM P&I DIAGRAM
E-13172-310-160	19	5/17/83	CE	WASTE MANAGEMENT SYS P&I DIAGRAM
E-13172-310-161	19	7/7/83	CE	WASTE MANAGEMENT SYS P&I DIAGRAM
E-13172-310-162	19	7/7/83	CE	WASTE MANAGEMENT SYS P&I DIAGRAM
E-13172-310-163	20	7/7/83	CE	WASTE MANAGEMENT SYS P&I DIAGRAM (SHEET 4)
E-13172-310-164	16	5/17/83	CE	WASTE MANAGEMENT SYS P&I DIAGRAM
E-13172-310-105	17	7/7/83	CE	AUXILIARY PUMPS P&I DIAGRAM
E-13172-310-165	13	3/18/83	CE	BORIC ACID CONCENTRATOR 2A P&ID

TABLE 1.7-4 (Cont'd)

Drawing No.	Revision No.	Revision Date	Prepared By	Title
E-13172-310-166	13	3/16/83	CE	BORIC ACID CONCENTRATOR 2B P&ID
E-13172-310-167	13	3/16/83	CE	RADIOACTIVE WASTE CON-CENTRATOR P&ID
E-13172-310-168	11	11/22/82	CE	WASTE MANAGEMENT SYS P&I DIAGRAM
E-13172-310-109	13	7/7/83	CE	REACTOR COOLANT SYS P&I DIAGRAM
E-13172-310-122	13	7/7/83	CE	CHEMICAL & VOLUME CONTROL SYS P&I DIAGRAM
E-13172-310-107	06	3/16/83	CE	REACTOR COOLANT SYSTEM P&I DIAGRAM
E-13172-310-108	04	5/17/83	CE	REACTOR COOLANT SYSTEM P&I DIAGRAM
E-13172-310-153	09	7/7/83	CE	SAMPLING SYSTEM P&I DIAGRAM
E-13172-310-132	07	5/17/83	CE	SAFETY INJECTION SYSTEM P&I DIAGRAM
E-13172-310-152	08	7/7/83	CE	SAMPLING SYSTEM P&I DIAGRAM
E-13172-310-169	08	5/18/83	CE	WASTE MANAGEMENT SYSTEM P&I DIAGRAM
E-13172-310-171	04	9/23/82	CE	WASTE MANAGEMENT SYSTEM P&I DIAGRAM
E-13172-310-101	03	9/23/82	CE	STEAM GENERATOR SUPPORT SNUBBER PIPING SYSTEM VALVE IDENTIFICATION
E-13172-310-145	03	11/23/82	CE	REFUELING EQUIPMENT VALVE IDENTIFICATION
E-13172-310-115	06	7/7/83	CE	R.C. PUMP SEAL INJECTION ADDITION P & I DIAGRAM

1.8 NRC REGULATORY GUIDES

Information contained herein were valid at the time the Construction Permit for St. Lucie 2 was issued, and are being retained in the Updated FSAR for document completeness and historical record. No present or future update of this section is required.

Subject to the implementation dates therein, Regulatory Guides issued on or before May 2, 1977 (Construction Permit date for St. Lucie Unit 2) are considered to contain the recommendations that are applicable to the design of this plant. Table 1.8-1 is a listing of all such Regulatory Guides, with corresponding dates and revision numbers. Cross-references are provided in Table 1.8-1 for those regulatory guide subjects discussed in particular subsections.

In specific instances, later revisions to Regulatory Guides listed in Table 1.8-1 are addressed where following such guidance is deemed proper.

Other NRC staff requirements are discussed in Section 1.9.

TABLE 1.8-1

APPLICABLE NRC REGULATORY GUIDES

Number	Title	Date	Revision	Discussion in Subsection(s)	Remarks
1.1	Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal System Pumps	11/70	0	6.2.2.3.1 6.3.4.1.1	
1.2	Thermal Shock to Reactor Pressure Vessels	11/70	0	5.3.1	
1.3	Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Boiling Water Reactors.	6/74	2	Not Applicable	
1.4	Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Pressurized Water Reactors	6/74	2	2.3.4	
1.5	Assumptions Used for Evaluating the Potential Radiological Consequences of a Steam Line Break Accident for Boiling Water Reactors	3/71	0	Not Applicable	
1.6	Independence Between Redundant Standby (Onsite) Power Sources and Between Their Distribution Systems	3/71	0	8.3.1.2	
1.7	Control of Combustible Gas Concentrations in Containment Following a Loss of Coolant Accident	11/78	2	6.2.5.3.2	
1.8	Personnel Selection and Training	5/77	1-R	12.5.1/12.5.3 13.1.3, 17.2	
1.9	Selection of Diesel Generator Set Capacity for Standby Power Supplies	3/71	0	8.3.1.2	
1.10	Mechanical (Cadweld) Splices in Reinforcing Bars of Category I Concrete Structures	1/73	1	3.8.3.2	
1.11	Instrument Lines Penetrating Primary Reactor Containment	3/71	0	7.1.2.2 6.2.4	
1.12	Instrumentation for Earthquakes	4/74	1	3.7.4	
1.13	Spent Fuel Storage Facility Design Basis	12/75	1	9.1.1.3/9.1.2.3 9.1.3.3	
1.14	Reactor Coolant Pump Flywheel Integrity	10/71	0	5.4.1.1	Regulatory Position C.4.6 of Revision 1 (8/75) is applicable to in-service inspections conducted on all plants after January 1, 1976.
1.15	Testing of Reinforcing Bars for Category I Concrete Structures	12/72	1	3.8.3.2/3.8.3.6	

TABLE 1.8-1 (Cont'd)

Number	Title	Date	Revision	Discussion in Subsection(s)	Remarks
1.16	Reporting of Operating Information-Appendix A Technical Specifications	8/75	4	12.5.3	
1.17	Protection of Nuclear Plants Against Industrial Sabotage	6/73	1	13.6	A proprietary St Lucie Plant Security Plan is submitted under separate cover.
1.18	Structural Acceptance Test for Concrete Primary Reactor Containments	12/72	1	Not Applicable	
1.19	Nondestructive Examination of Primary Containment Liner Welds	8/72	1	Not Applicable	
1.20	Comprehensive Vibration Assessment Program for Reactor Internals During Preoperational and Initial Startup Testing	5/76	2	3.9.2.4	
1.21	Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Release of Radioactivity in Liquid and Gaseous Effluents from Light Water-Cooled Nuclear Power Plants	6/74	1	11.5.1.2 12.3.4	
1.22	Periodic Testing of Protection System Actuation Functions	2/72	0	7.2.1.1.9/7.5.2.9 7.3.1.1.1/7.6.2 7.4.2.2	
1.23	Onsite Meteorological Programs	2/72	0	2.3.3	
1.24	Assumptions Used for Evaluating the Potential Radiological Consequences of a Pressurized Water Reactor Gas Storage Tank Failure	3/72	0	15.7.1	
1.25	Assumptions Used for Evaluating the Potential Radiological Consequences of a Fuel Handling Accident in the Fuel Handling and Storage Facility for Boiling and Pressurized Water Reactors	3/72	0	15.7.3	
1.26	Quality Group Classifications and Standards for Water-Steam- and Radio-Waste-Containing Components of Nuclear Power Plants	2/76	3	3.2.2	
1.27	Ultimate Heat Sink for Nuclear Power Plants	1/76	2	9.2.5	
1.28	Quality Assurance Program Requirements (Design and Construction)	6/72	0	Not Applicable	This regulatory guide is applicable during the design and construction phases of nuclear power plants and as such is discussed in PSARs, not FSARs.

TABLE 1.8-1 (Cont'd)

Number	Title	Date	Revision	Discussion in Subsection(s)	Remarks
1.29	Seismic Design Classification	9/78	3	3.2.1	
1.30	Quality Assurance Requirements for the Installation, Inspection, and Testing of Instrumentation and Electric Equipment	-	-	17.2	The revision and date of this document endorsed for St. Lucie Unit 2 is governed by the latest revision of the FP&L Topical Quality Assurance Report as referenced in Section 17.2 of the FSAR.
1.31	Control of Ferrite Content in Stainless Steel Weld Metal	5/77	2 & 3	5.2.3.4.2 6.1.1.1 10.3.6.2	Subsections 6.1.1.1 and 10.3.6.2 address Revision 1 (6/73) of this regulatory guide also.
1.32	Criteria for Safety-Related Electric Power Systems for Nuclear Power Plants	8/72	0	8.3.1.2	
1.33	Quality Assurance Program Requirements (Operations)	-	-	13.5.1, 17.2	The revision and date of this document endorsed for St. Lucie Unit 2 is governed by the latest revision of the FP&L Topical Quality Assurance Report as referenced in Section 17.2 of the FSAR.
1.34	Control of Electroslag Weld Properties	12/72	0	5.2.3.3.2 5.2.3.4	
1.35	Inservice Inspection of Ungrouted Tendons in Prestressed Concrete Containment Structures	1/76	2	Not Applicable	
1.36	Nonmetallic Thermal Insulation for Austenitic Stainless Steel	2/73	0	5.2.3.2 6.1.1.1	
1.37	Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants	-	-	6.1.1.1, 17.2	The revision and date of this document endorsed for St. Lucie Unit 2 is governed by the latest revision of the FP&L Topical Quality Assurance Report as referenced in Section 17.2 of the FSAR.
1.38	Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Water-Cooled Nuclear Power Plants	-	-	17.2	The revision and date of this document endorsed for St. Lucie Unit 2 is governed by the latest revision of the FP&L Topical Quality Assurance Report as referenced in Section 17.2 of the FSAR.
1.39	Housekeeping Requirements for Water-Cooled Nuclear Power Plants	-	-	17.2	The revision and date of this document endorsed for St. Lucie Unit 2 is governed by the latest revision of the FP&L Topical Quality Assurance Report as referenced in Section 17.2 of the FSAR.

TABLE 1.8-1 (Cont'd)

Number	Title	Date	Revision	Discussion in Subsection(s)	Remarks
1.40	Qualification Tests of Continuous-Duty Motors Installed Inside the Containment of Water-Cooled Nuclear Power Plants	3/73	0	3.11	
1.41	Preoperational Testing of Redundant Onsite Electric Power Systems to Verify Proper Load Group Assignments	3/73	0	8.3.1.2	
1.42	Withdrawn 3/76				
1.43	Control Stainless Steel Weld Cladding of Low-Alloy Steel Components	5/73	0	5.2.3.3.2	
1.44	Control of the Use of Sensitized Stainless Steel	5/73	0	5.2.3.4.1 6.1.1.1 10.3.6.2	
1.45	Reactor Coolant Pressure Boundary Leakage Detection Systems	5/73	0	5.2.5	
1.46	Protection Against Pipe Whip Inside Containment	5/73	0	3.6.1.1/3.6.2.3.2 3.6.2.1.1	
1.47	Bypassed and Inoperable Status Indication for Nuclear Power Plant Safety Systems	5/73	0	7.5.2.7	
1.48	Design Limits and Loading Combinations for Seismic Category I Fluid System Components	5/73	0	3.9.1.4 3.9.3.1.1	
1.49	Power Levels of Nuclear Power Plants	12/73	1	6.2, 15.0	The guidance provided in this regulatory guide is utilized in accident analyses performed.
1.50	Control of Preheat Temperature for Welding of Low-Alloy Steel	5/73	0	5.2.3.3.2 10.3.6.2	
1.51	Withdrawn	7/75			
1.52	Design, Testing, and Maintenance Criteria for Post-accident Engineered-Safety-Feature Atmosphere Cleanup System Air Filtration and Absorption Units of Light-Water-Cooled Nuclear Power Plants	3/78	2	6.5.1	
1.53	Application of the Single-Failure Criterion to Nuclear Power Plant Protection Systems	6/73	0	7.1.2.2 7.2.1.2	
1.54	Quality Assurance Requirements for Protective Coatings Applied to Water-Cooled Nuclear Power Plants	6/73	0	6.1.2	

TABLE 1.8-1 (Cont'd)

Number	Title	Date	Revision	Discussion in Subsection(s)	Remarks
1.55	Concrete Placement in Category I Structures	6/73	0	3.8.3.2/3.8.3.6	
1.56	Maintenance of Water Purity in Boiling Water Reactors	6/73	0	Not Applicable	
1.57	Design Limits and Loading Combinations for Metal Primary Reactor Containment System Components	6/73	0	3.8.2.3	
1.58	Qualification of Nuclear Power Plant Inspection,	-	-	13.1, 17.2	The revision and date of this document endorsed for St. Lucie Unit 2 is governed by the latest revision of the FP&L Topical Quality Assurance Report as referenced in Section 17.2 of the FSAR.
1.59	Design Basis Flood for Nuclear Power Plants	4/76	1	2.4.2.2/2.4.3 3.4.1	
1.60	Design Response Spectra for Seismic Design of Nuclear Power Plants	12/73	1	3.7.1.1	
1.61	Damping Values for Seismic Design of Nuclear Power Plants	10/73	0	3.7.1.3	
1.62	Manual Initiation of Protective Actions	10/73	0	7.1.2.2, 8.3.1.2	
1.63	Electric Penetration Assemblies in Containment Structures for Light-Water-Cooled Nuclear Power Plants	10/73	0	8.3.1.2	
1.64	Quality Assurance Requirements for the Design of Nuclear Power Plants	-	-	17.2	The revision and date of this document endorsed for St. Lucie Unit 2 is governed by the latest revision of the FP&L Topical Quality Assurance Report as referenced in Section 17.2 of the FSAR.
1.65	Materials and Inspection for Reactor Vessel Closure Studs	10/73	0	5.3.1.7	
1.66	Withdrawn 10/77				
1.67	Installation of Overpressure Protective Devices	10/73	0	3.9.3.3	
1.68	Initial Test Programs for Water-Cooled Nuclear Power Plants	1/77	1		Section 14.0 addressed Revision 0.
1.68.1	Preoperational and Initial Startup Testing of Feed-water and Condensate Systems for Boiling Water Reactor Power Plants	1/77	1	Not Applicable	

TABLE 1.8-1 (Cont'd)

Number	Title	Date	Revision	Discussion in Subsection(s)	Remarks
1.68.2	Initial Startup Test Program to Demonstrate Remote Shutdown Capability for Water-Cooled Nuclear Power Plants	7/78	1		Initially discussed in Section 14.0
1.69	Concrete Radiation Shields for Nuclear Power Plants	12/73	0	12.3.2.4	
1.70	Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants-LWR Edition	9/75	2		Revision 3 (11/78) of this regulatory guide was used insofar as to the extent practicable in developing the St Lucie Unit 2 Final Safety Analysis Report.
1.71	Welder Qualification for Areas of Limited Accessibility	12/73	0	5.2.3.3.2 10.3.6.2	
1.72	Spray Pond Piping Made From Fiberglass-Reinforced Thermosetting Resin	12/73	0	Not Applicable	
1.73	Qualification Tests of Electric Valve Operators Installed Inside the Containment of Nuclear Power Plants	1/74	0	3.11	
1.74	Quality Assurance Terms and Definitions	-	-	17.2	The revision and date of this document endorsed for St. Lucie Unit 2 is governed by the latest revision of the FP&L Topical Quality Assurance Report as referenced in Section 17.2 of the FSAR.
1.75	Physical Independence of Electric Systems	1/75	1	7.1.2.2 8.3.1.2	
1.76	Design Basis Tornado for Nuclear Power Plants	4/74	0		The Design Basis Tornado for St Lucie Unit 2 is discussed in Subsection 3.3.2.
1.77	Assumptions Used for Evaluating a Control Rod Ejection Accident for Pressurized Water Reactors	5/74	0	15.4.3	
1.78	Assumptions for Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release	6/74	0	2.2.3.3	
1.79	Preoperational Testing of Emergency Core Cooling Systems for Pressurized Water Reactors	9/75	1	6.3.4.1.1	
1.80	Preoperational Testing of Instrument Air Systems	6/74	0	14.2	
1.81	Shared Emergency and Shutdown Electric Systems for Multi-Unit Nuclear Power Plants	1/75	1	8.3.1.2	St Lucie Units 1 and 2 have separate and independent onsite emergency and shutdown electric systems.
1.82	Sumps for Emergency Core Cooling and Containment Spray Systems	6/74	0	6.2.2.2.3	

TABLE 1.8-1 (Cont'd)

Number	Title	Date	Revision	Discussion in Subsection(s)	Remarks
1.83	Inservice Inspection of Pressurized Water Reactor Steam Generator Tubes	7/75	1	5.4.2.2	
1.84	Design and Fabrication Code Case Acceptability - ASME Section III Division 1	3/77	9	3.9.3.1.1	
1.85	Materials Code Case Acceptability - ASME Section III Division 1	3/77	9	-	Materials acceptability is discussed in various subsections of the FSAR which deal with this topic for various structures, systems, and components.
1.86	Termination of Operating Licenses for Nuclear Reactors	6/74	0	Not Applicable	The regulatory guide is applicable when a licensee decides to terminate the nuclear reactor operating license.
1.87	Guidance for Construction of Class 1 Components in Elevated-Temperature Reactors (Supplement to ASME Section III Code Classes 1592, 1593, 1594, 1595, and 1596)	6/74	0	Not Applicable	
1.88	Collection, Storage, and Maintenance of Nuclear Power Plant Quality Assurance Records	-	-	17.2	The revision and date of this document endorsed for St. Lucie Unit 2 is governed by the latest revision of the FP&L Topical Quality Assurance Report as referenced in Section 17.2 of the FSAR.
1.89	Qualification of Class IE Equipment for Nuclear Power Plants	11/74	0	8.3.1.2 3.11	
1.90	In-service Inspection of Prestressed Concrete Containment Structures With Grouted Tendons	11/74	0	Not Applicable	
1.92	Combining Modal Responses and Spatial Components in Seismic Response Analysis	12/74	0	3.7.2.6/3.7.2.7 3.7.3.6/3.7.3.7	
1.93	Availability of Electric Power Sources	12/74	0	8.3.1.2	The applicable recommendations of Regulatory Guide 1.93 are also a part of the Technical Specifications.
1.94	Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete, Structural Steel, Soils and Foundations During the Construction Phase of Nuclear Power Plants	4/76	1	Not Applicable	The revision and date of this document endorsed for St. Lucie Unit 2 is governed by the latest revision of the FP&L Topical Quality Assurance Report as referenced in Section 17.2 of the FSAR.
1.95	Protection of Nuclear Power Plant Control Room Operators Against an Accidental Chlorine Release	2/75	0	2.2.3.3	
1.96	Design of Main Steam Isolation Valve Leakage Control Systems for Boiling Water Reactor Nuclear Power Plants	6/76	1	Not Applicable	

TABLE 1.8-1 (Cont'd)

Number	Title	Date	Revision	Discussion in Subsection(s)	Remarks
1.98	Assumptions Used for Evaluating the Potential Radiological Consequences of a Radioactive Offgas System Failure in a Boiling Water Reactor	3/76	0	Not Applicable	
1.99	Effects of Residual Elements on Predicted Radiation Damage to Reactor Vessel Materials	7/75	0	5.3.1.6.7	
1.101	Emergency Planning for Nuclear Power Plants	3/77	1	13.3	A St. Lucie Plant Emergency Plan is submitted under separate cover.
1.102	Flood Protection for Nuclear Power Plants	9/76	1	3.4.1	
1.104	Withdrawn	8/79			
1.107	Qualifications for Cement Grouting for Prestressing Tendons in Containment Structures	2/77	1	Not Applicable	
1.108	Periodic Testing of Diesel Generator Units used as Onsite Electric Power Systems at Nuclear Power Plants	8/77	1	8.3.1.2	This regulatory guide was issued after the CP issuance date of May 2, 1977 on St. Lucie Unit 2.
1.109	Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I	3/76	0	11.2.3/11.3.3	
1.111	Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors	3/76	0	2.3.5 11.2.3/11.3.3	
1.112	Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Light-Water-Cooled Power Reactors	5/77	O-R	11.2.3/11.3.3	
1.113	Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I	4/77	1	11.2.3	
1.114	Guidance on Being Operator at the Controls of a Nuclear Power Plant	11/76	1		Operator training is discussed in Chapter 13.
1.116	Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems	-	-	17.2	The revision and date of this document endorsed for St Lucie Unit 2 is governed by the latest revision of the FP&L Topical Quality Assurance Report as referenced in Section 17.2 of the FSAR.
1.119	Withdrawn 6/77				

TABLE 1.8-1 (Cont'd)

Number	Title	Date	Revision	Discussion in Subsection(s)	Remarks
1.121	Bases for Plugging Degraded PWR Steam Generator Tubes	8/76	0		Steam generator tube corrosion allowance is addressed in Subsection 5.4.4.2.
1.123	Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants	-	-	17.2	The revision and date of this document endorsed for St. Lucie Unit 2 is governed by the latest revision of the FP&L Topical Quality Assurance Report as referenced in Section 17.2 of the FSAR.
1.126	An Acceptable Model and Related Statistical Methods for the Analysis of Fuel Densification	3/77	0		The subject of fuel density is discussed in Subsection 4.2.1.2.4.3.
1.127	Inspection of Water-Control Structures Associated with Nuclear Power Plants	4/77	0	Not Applicable	There are no water-control structures specifically built for use in conjunction with this plant and whose failure could have radiological consequences adversely affecting the public health and safety.
1.129	Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Nuclear Power Plants	4/77	0		The implementation section for this regulatory guide states that this regulatory guide is used in the evaluation of CP applicants docketed after December 1,1977.
1.144	Auditing of Quality Assurance Programs for Nuclear Power Plants	-	-	17.2	The revision and date of this document endorsed for St. Lucie Unit 2 is governed by the latest revision of the FP&L Topical Quality Assurance Report as referenced in Section 17.2 of the FSAR.
1.146	Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plants	-	-	17.2	The revision and date of this document endorsed for St. Lucie Unit 2 is governed by the latest revision of the FP&L Topical Quality Assurance Report as referenced in Section 17.2 of the FSAR.
1.183	Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors	7/00	0		Provides guidance on the performance of AST dose analyses for design basis accidents.

1.9 OTHER CONCERNS AND COMMITMENTS

1.9.1 TMI ACTION PLAN

Appendix 1.9A depicts those TMI Action Plan[1] requirements as described in NUREG-0737[2] for St. Lucie Unit 2. UFSAR Subsections discussing TMI "Lessons Learned" are delineated in Appendix 1.9A.

1.9.2 UNDERGROUND CABLE REVIEW

Kerite insulated power and control cables have been reviewed and approved by the NRC for underground wet/dry environmental qualification.[3]

1.9.3 REPLACEMENT STEAM GENERATORS

As a result of tube degradation, Florida Power & Light Company replaced the original steam generators (OSGs) with two replacement steam generators (RSGs) manufactured by AREVA. Specific UFSAR text pertinent to the installation and operation of the RSGs was updated as necessary.

SECTION 1.9: REFERENCES

1. NUREG - 0660, May 1980 "NRC Action Plan Developed as a Result of the TMI-2 Accident."

2. NUREG - 0737, Letter dated October 31, 1980, D G Eisenhut (NRC) to all Licensees of Operating Plants and Applicants for Operating Licenses and Holders of Construction Permits, Subject "Post-TMI Requirements."

3. Letter dated January 31, 1978, K Kniel (NRC) to R E Uhrig (FP&L), "Use of Kerite Insulated Cable."

APPENDIX 1.9A

1.9A TMI RELATED REQUIREMENTS

The following item numbers correspond to those listed in NUREG-0737 "Clarification of TMI Action Plan Requirements" (October, 1980)[1] . NRC staff documented reviews and approval of these TMI related requirements are given by references to the Safety Evaluation Report[2] and its supplements.[3-6]

I.A.1.1 SHIFT TECHNICAL ADVISOR

Florida Power & Light Co (FP&L) programs in response to this requirement have been developed for St. Lucie Unit 1 (Docket No. 50-335) and are also applicable to St. Lucie Unit 2.

I.A.1.2 SHIFT SUPERVISOR ADMINISTRATIVE DUTIES

FP&L programs in response to this requirement have been developed for St. Lucie Unit 1 (Docket No. 50-335) and are also applicable to St. Lucie Unit 2.

I.A.1.3 SHIFT MANNING

Procedures reflecting the requirements of NUREG-0737 and Generic Letter 82-16 in limiting overtime, hours of work and minimum shift complement have been generated for St. Lucie Unit 1 and also apply to St. Lucie Unit 2.

I.A.2.1 IMMEDIATE UPGRADING OF OPERATOR AND SENIOR OPERATOR TRAINING AND QUALIFICATIONS

Unit Staff qualifications are delineated in the plant Technical Specifications Section 6.3.

I.A.2.3 ADMINISTRATION OF TRAINING PROGRAMS

Training is covered by Section 6.4 of the plant Technical Specifications.

I.A.3.1 REVISE SCOPE AND CRITERIA FOR LICENSING EXAM

FP&L initial and requalification training program revisions to address the increased scope of the license exams have been developed for St. Lucie 1 (Docket No. 50-335) and are also applicable to St. Lucie Unit 2.

I.B.1.2 EVALUATION OF ORGANIZATION AND MANAGEMENT

The FP&L organization is provided in the FPL Quality Assurance Topical Report discussed in Section 17.2. The principal function of the Independent Safety Engineering Group as indicated by NUREG-0737 is assessment of operating experience. This function is the responsibility of the Engineering Manager and the Performance Improvement Manager.

I.C.1 SHORT TERM ACCIDENT ANALYSIS AND PROCEDURE REVISION

The Combustion Engineering (CE) Owners' Group revised analysis and guidelines contained in CEN-152[7] were reviewed. Meetings were held with representatives of the CE Owners' Group in Bethesda, Maryland, on June 23, 24, and 29, 1982 to discuss NRC's preliminary comments on the analysis and guidelines. At a follow-up meeting in Bethesda on August 20, 1982, a revised CEN-152 was submitted which addressed a majority of the NRC staff concerns discussed at the June meetings. This revised document is now under review. Until the revised analysis and guidelines are approved, CEN-117 and CEN-128 are being used as interim technical bases for the St. Lucie Plant Unit No. 2 emergency operating procedures.

Based on their review of selected emergency operating procedures and their observation of these procedures being exercised on a simulator and in a control room walk-through, as described in Item I.C.8, NRC has concluded that the interim guidelines have been adequately incorporated into the procedures. Further revision to the procedures is expected to be necessary when the revised analysis and guidelines are approved. This satisfies the requirements of Item I.C.1, as per SER Supplement 4.[5]

I.C.2 SHIFT RELIEF AND TURNOVER PROCEDURES

The FP&L program in response to this requirement has been developed for St. Lucie 1 (Docket No. 50-335) and also is applicable to St. Lucie Unit 2.

I.C.3 SHIFT SUPERVISOR RESPONSIBILITIES

The FP&L program in response to this requirement has been developed for St. Lucie 1 (Docket No. 50-335) and also is applicable to St. Lucie Unit 2.

I.C.4 CONTROL ROOM ACCESS

The FP&L program in response to this requirement has been developed for St. Lucie 1 (Docket No. 50-335) and also is applicable to St. Lucie Unit 2. Access limitations are also addressed in the site Security Plan.

I.C.5 PROCEDURES FOR FEEDBACK OF OPERATING EXPERIENCE TO PLANT STAFF

Procedures have been generated to reflect the requirements of NUREG-0737. Administrative controls are addressed in the FPL Quality Assurance Topical Report discussed in Section 17.2.

I.C.6 VERIFY CORRECT PERFORMANCE OF OPERATING ACTIVITIES

Performance and procedures currently in effect at St. Lucie Unit 1 reflect the requirements of NUREG-0737. This requirement is also met at St. Lucie Unit 2. Reviews and audits are covered in the FPL Quality Assurance Topical Report discussed in Section 17.2.

I.C.7 NSSS VENDOR REVIEW OF PROCEDURES

The NRC reviewed selected emergency operating procedures as described in SER Supplement 2 and concluded that the NSSS vendor's comments have been acceptably incorporated into the selected emergency operating procedures.

I.C.8 PILOT MONITORING OF SELECTED EMERGENCY PROCEDURES FOR NTOL APPLICANTS

Any deficiencies identified by an NRC audit were corrected.

I.C.9 LONG TERM PROGRAM PLAN FOR UPGRADING PROCEDURES

Generic Letter 82-33[8] requests that each licensee and applicant develop and submit to the NRC by April 15, 1983 its own plant-specific schedule for completion of the upgrading and implementation of Emergency Operating Procedures (EOPs). FP&L has upgraded and implemented the EOPs.

I.D.1 CONTROL ROOM DESIGN

Generic Letter 82-33 requests that each licensee and applicant develop and submit to the NRC by April 15, 1983 its own plant-specific schedule for submittal of the Control Room Design Review Program Plan and of the Summary Report. FPL has submitted the Summary Report of the Detailed Control Room Design Review (DCRDR), dated October 1983. The history and methodology of the DCRDR is presented in UFSAR Section 7.7.3.

I.D.2 PLANT SAFETY PARAMETER DISPLAY SYSTEM

The Safety Assessment System (SAS)/Emergency Response Data Acquisition And Display System (ERDADS) (refer to Appendix 7.5A) provides the Safety Parameter Display System (SPDS) and all other data required in the control room. The ERDADS system also provides data to Technical Support Center (TSC), Emergency Offsite Facility (EOF) and the Nuclear Data Link (NDL) through the PI server.

Generic Letter 82-33 requests that each licensee and applicant develop and submit to the NRC by April 15, 1983 its own plant-specific schedule for completion of the SPDS and submittal of the SAR and SPDS Implementation Plan. By letter L-83-238 dated April 15, 1983, FP&L indicated the following:

a) The SPDS is operable and the operators were trained by the end of the first refueling outage.

b) The SAR and SPDS Implementation Plan have been submitted.[15]

I.G.1 TRAINING DURING LOW - POWER TESTING

This training is in accordance with Robert L. Tedesco, Assistant Director for Licensing to Dr. Robert E. Uhrig letter dated June 12, 1981. (Subject, TMI-2 Action Plan Item I.G.1). Since testing was accomplished at a comparable prototype plant, SONGS-2, only the training required by this letter need be accomplished.

This page has been

intentionally deleted.

II.B.1 REACTOR COOLANT SYSTEM VENTS

A description of the Reactor Coolant System Vents is provided in Subsection 9.3.7.

II.B.2 PLANT SHIELDING

A design review was conducted to evaluate the radiological environment of the plant following an accident in which significant core damage has occurred. The evaluation provides for access to vital areas and equipment needed for post-accident operations. A detailed description and results of this design review is provided in Appendix 12.3A.

For environmental qualification of safety-related equipment for post-accident conditions refer to Section 3.11.

II.B.3 POST-ACCIDENT SAMPLING

A description of the Post-Accident Sampling System is provided in Subsection 9.3.6.

II.B.4 TRAINING FOR MITIGATING CORE DAMAGE

Training criteria are discussed in Section 6.4 of the plant Technical Specifications.

II.D.1 RELIEF AND SAFETY VALVE TEST REQUIREMENTS

The design and testing of these valves are summarized in Table 5.4-9 and Subsection 5.4.13.

FP&L's letter of March 22, 1983 from Mr. R Uhrig, FP&L to Mr. D Eisenhut, NRC, references two Combustion Engineering Topical Reports [9, 10] as documentation as to how the EPRI/NSAC test results are applicable to the St. Lucie 2 relief and safety valves.

The staff finds that the general approach in the reports of using the EPRI test results to demonstrate plant specific operability of the relief and safety valves is acceptable (see SER Supplement 3).

NUREG-0737 required utilities to evaluate the functional performance capabilities of PWR safety, PORV, and block valves and to verify the piping systems for normal, transient, and accident conditions. Reference 18 documents the NRC review and acceptance of performance capabilities of pressurizer safety valves, PORVs, and block valves. Qualification of the plant specific piping systems by performing the appropriate analyses is still under evaluation.

II.D.3 RELIEF AND SAFETY VALVE POSITION INDICATION

Acoustic flow monitors are used for the indication of pressurizer safety relief and power operated relief valve position. Design information is presented in Subsection 7.6.3.10.

II.E.1.1 AUXILIARY FEEDWATER SYSTEM RELIABILITY EVALUATION

a) A standard deterministic type of safety review has been performed using as principal guidance the acceptance criteria specified in Standard Review Plan 10.4.9 "Auxiliary Feedwater System" (R1) and Branch Technical Position ASB 10-1, "Design Guidelines for Auxiliary Feedwater System Pump Drive and Power Supply Diversity for PWR Plants" (R0). The results of this review are provided in Appendix 10.4.9A.

b) The guidelines of Enclosure 2 of NRC letter to pending OL applicants dated March 10, 1980[11] has been addressed to describe the design basis accident and transients and the corresponding acceptance criteria for Auxiliary Feedwater System in Appendix 10.4.9A.

c) Event tree and fault tree logic techniques have been conducted as part of a reliability analysis to determine dominant failure modes and assess Auxiliary Feedwater System reliability levels. The results of this reliability evaluation are provided in Appendix 10.4.9B.

II.E.1.2 AUXILIARY FEEDWATER INITIATION AND INDICATION

Safety Grade Auxiliary Feedwater Flow indication and automatic initiation is implemented for St. Lucie Unit 2 and is described in Subsections 10.4.9, 7.3.1.1.8, and 7.5.

II.E.3.1 EMERGENCY POWER SUPPLY FOR PRESSURIZER HEATERS

St. Lucie Unit 2 employs a Combustion Engineering (CE) pressurized water nuclear steam supply system. An analysis performed by CE for St. Lucie Unit 2 has determined that 150 kilowatts of pressurizer heater capacity is needed to maintain hot standby conditions when offsite power is lost. CE recommends this minimum pressurizer heater capacity be available within two hours following loss of offsite power.

The St. Lucie Unit 2 design provides two heater banks each rated 200 kilowatts which are connected to separate 400-volt emergency power trains. The emergency power trains are energized from separate and independent diesel generators upon loss of offsite power. Each of the two heater banks has access to only one Class 1E diesel generator and their controls are likewise supplied from separate safety-grade power supplies. The pressurizer heaters are automatically shed from the Class 1E power system upon the occurrence of a Safety Injection Actuation Signal (SIAS). Procedures for manually loading the pressurizer heaters onto the emergency power sources following an SIAS are available to the operator, and identify under what conditions selected loads can be shed from the emergency bus to prevent overloading of the diesel generators when the pressurizer heaters are connected. The connection of the pressurizer heater elements and controls to the Class 1E buses is through safety-grade circuit breakers.

Based on NRC review, the staff concludes that the power supplies for pressurizer heaters are capable of being powered from both offsite and onsite emergency power systems. This is consistent with the staff positions and clarifications and is acceptable, as per the Safety Evaluation Report.

II.E.4.1 DEDICATED HYDROGEN PENETRATIONS

As discussed in Subsection 6.2.5, redundant internal hydrogen recombiners are provided. Therefore, this requirement is not applicable to St. Lucie Unit 2.

II.E.4.2 CONTAINMENT ISOLATION DEPENDABILITY

The following items address corresponding NRC positions contained in NUREG-0737:

a) As discussed in Subsection 7.3.1.1 the containment isolation actuation signal (CIAS) is initiated upon high containment pressure, high containment radiation or on SIAS actuation. Therefore, the CIAS complies with the recommendation in Standard Review Plan 6.2.4 "Containment Isolation System" (R1) with respect to diversity in the parameters sensed for initiation of containment isolation.

b) Using the definition in Appendix A to the Branch Technical Position APCSB 3-1 (11/24/75) (attached to Standard Review Plan 3.6.1), essential system and components are defined as those systems and components required to shutdown the reactor and mitigate the consequences of an accident. Table 6.2-52 identifies the essential penetrations as ESF penetrations. As indicated in Subsection 6.2.4, containment penetrations associated with nonessential systems are either administratively locked closed or automatically isolated upon a CIAS. Penetrations for systems like post-accident monitoring instrumentation and RCS sampling however are provided with manual override of the CIAS to enable the operator to open the containment isolation valves and activate the systems as necessary.

c) The St. Lucie Unit 2 containment isolation system complies with General Design Criteria (GDC) 55, 56, and 57. A CIAS is used to isolate nonessential systems. GDC 57 permits the use of one containment isolation valve located outside containment which is capable of automatic or remote manual operation and does not require closure on a CIAS. The penetrations that fall into this category are main steam and feedwater which are automatically isolated upon receipt of a MSIS. However, with the diversity of high containment pressure or low steam generator pressure, an MSIS is generated and isolates the main steam isolation valves and Main Feedwater isolation valves. The component cooling water lines to and from the reactor coolant pump fall under the requirements of GDC 56. An SIAS isolates these penetrations and is initiated by diverse parameters: low pressurizer pressure or high containment pressure.

d) The present design of control systems for automatic containment isolation valves is such that resetting the isolation signal does not result in the automatic reopening of containment isolation valves. Certain valves (e.g., post-accident sampling, instrument air) which are required to open during an accident are provided with the capability of manually overriding the automatic isolation signal. Reopening of these containment isolation valves requires deliberate operator action, and is accomplished only on a valve-by-valve basis. The containment isolation design does not utilize "ganged" control switches for containment isolation valves.

e) A review of the operating history of containment pressure for St. Lucie Unit 1 was performed. (St. Lucie Units 1 & 2 have similar containment volumes and thermal power ratings). Pressure increases of up to two psi can be expected to occur from time to time during plant operation. The instrument loop error, including setpoint variances, effects of line voltage fluctuations, temperature effects and instrument drift is incorporated in the plant Technical Specification setpoint values.

f) The containment purge valves comply with the operability criteria provided in Branch Technical Position CSB 6-4 (R1) and are maintained and surveyed pursuant to the plant Technical Specifications.

The 48 inch purge valves are verified to be closed at least every 31 days.

g) The continuous containment purge valves close on a CIAS which, as stated in Item 1, is initiated upon a high radiation or high pressure inside containment.

II.F.1 ADDITIONAL ACCIDENT MONITORING INSTRUMENTATION

Generic Letter No. 82-33 requests that each licensee and applicant develop and submit to the NRC by April 15, 1983 its own plant specific schedule for submittal of the Regulatory Guide (RG) 1.97 Evaluation Report describing how RG 1.97 has been met.

FP&L submitted this material in Letter L-83-573.

II.F.2 INSTRUMENTS FOR CORE COOLING

Description of Instruments for Core Cooling is provided in Subsections 3.9.5.1.5 and 7.5.4.

II.G.1 EMERGENCY POWER FOR PRESSURIZER EQUIPMENT

The description of the operation of the PORV and PORV block valves is found in Subsection 5.2.6.

The PORVs are powered from safety-related 125V dc buses 2A and 2B and are available continuously. The PORV block valves are powered from safety-related 480V ac motor control centers which are powered through the onsite distribution system. Upon loss of offsite power, the diesel generator is started and powers the onsite system (refer to Section 8.3). Therefore, the PORV block valves receive reliable power in the event they are required to operate during a loss of offsite power. The design is acceptable to NRC as per the SER.

II.K.1 IE BULLETINS ON MEASURES TO MITIGATE SMALL-BREAK LOCAS AND LOSS OF FEEDWATER ACCIDENTS

As per the requirements of NUREG-0737, only two concerns under this item are applicable to St. Lucie Unit 2. These concerns are addressed below.

II.K.1.5 REVIEW ESF VALVES

All safety-related valve positions, positioning requirements, and positive controls were reviewed, and documented in Table 1.9A-1, to assure that valves remain positioned (open or closed) in a manner to ensure the proper operation of engineered safety features.

The provision of complete display of instrumentation is an integral part of the design of systems required for safe shutdown and accident mitigation. A major component of the display information provided in the control room is position indication for valves and HVAC dampers. Table 1.9A-1 lists all active valves and dampers that may be required to operate to achieve safe shutdown or mitigate the consequences of an accident. For most valves and dampers position indicating lights are provided on control panels in the control room. For all other valves and dampers whose failure might have adverse consequences, sufficient information is available for position determination in the control room (refer to Table 1.9A-1).

The related procedures for maintenance, testing, plant and system startup and supervisory periodic surveillance require that these valves are returned to their correct positions following necessary manipulation and are maintained in their proper position during all operational modes. These procedures have been developed in response to this NUREG-0737 requirement for St. Lucie Unit 1 (Docket No. 50-335) and also are applicable to St. Lucie Unit 2.

II.K.1.10 OPERABILITY STATUS

FP&L programs in response to this requirement have been developed for St. Lucie Unit 1 (Docket No. 50-335) and also are applicable to St. Lucie Unit 2. As indicated in NUREG-0660 (not clarified by NUREG-0737) for units applying for operating licenses, this item is addressed in Items I.D.2 and I.C.6 above.

II.K.2.13 THERMAL MECHANICAL REPORT-EFFECT OF HIGH PRESSURE

FP&L is participating in CE Owners Group generic efforts to evaluate the effect of high pressure safety injection on reactor vessel integrity in response to Item II.K.2.13 of NUREG-0737 (see Subsection 5.3.3.8). FP&L concurs with the CE Owners Group evaluation as reported in CEN 189 and CEN 189 Appendix F, December 1981. Staff review of this item is covered in their Unresolved Safety Issues program, issue A-49, "Pressurized Thermal Shock." See SER Supplement 2.

II.K.2.17 POTENTIAL FOR VOIDING IN THE REACTOR COOLANT SYSTEM DURING TRANSIENTS

II.K.2.17.1 DESCRIPTION

In the event a void formation is identified in the Reactor Coolant System the operators are trained to implement a procedure to mitigate voiding. The NSSS vendor has completed an extensive analysis of voiding in the Reactor Coolant System. The results show that rapid refill and drain of the reactor vessel head does not cause stress levels in excess of those occurring during a normal cooldown at 100°F/hour. The results of this analysis for St. Lucie Unit 1, which is applicable to St. Lucie Unit 2, are provided in Appendix 5.2C.

Reactor Coolant System Cooldown rate is addressed in Amendment 4, Subsection 5.4.7.5. FP&L is also participating in the CE Owners Group effort to address item II.K.2.17; FP&L concurs with the evaluation as reported in CEN-199[12].

II.K.2.19 <u>SEQUENTIAL AUXILIARY FEEDWATER FLOW ANALYSIS</u>

As indicated by the NRC (letter from R A Clark, Chief Operating Reactor Branch 3, Division of Licensing to R E Uhrig, Vice President, Florida Power & Light Co., dated July 2, 1981), this item is not applicable to CE supplied steam generators which utilize inverted U tubes.

II.K 3.1 INSTALLATION AND TESTING OF AUTOMATIC PORV ISOLATION SYSTEM

II.K.3.2 REPORT ON OVERALL SAFETY EFFECT OF PORV ISOLATION SYSTEM

FP&L has participated in CE Owners Group activities conducted since the Three Mile Island accident to address various aspects of PORV design and operation. These activities have included review of operating experience with PORVs on CE reactors, development of input to the EPRI program for testing these valves, review of requirements for emergency power to the PORVs and the associated block valves, development of a recommendation for PORV position indication, review and updating of emergency procedure guidelines to assure PORV operation is adequately addressed, and development of associated operator training materials. The requirements of Action Plan Item II.K.3.2 have also been addressed as a CE Owners Group activity in CEN-145[13].

It has been concluded based on the CE Owners Group activities that the addition of an automatic PORV isolation system on St. Lucie Unit 2 to further decrease the probability of a small-break loss-of-coolant accident caused by a stuck-open PORV is not necessary. This conclusion is based on the following considerations. First, the design of the PORV actuation logic is such that the valves are only actuated coincident with the high pressurizer pressure trip of the reactor. The PORV cases are not used prior to the Reactor Protection System actuation in an attempt to avoid the reactor trip. Thus, challenges to the PORVs are reduced because the margin between the normal operating pressure and the high pressure reactor trip is maximized. The success of this design approach is evident based on the operating experience compiled to date which has only 19 challenges to the PORVs in 29 reactor-years of operation on CE plants (data from a recent survey of the CE Owners Group). It should be noted that 11 of these 19 challenges were caused by a turbine runback feature which has been removed. The PORVs successfully reclosed in each case where they were challenged.

The second consideration for not needing an automatic PORV isolation system is that various actions have been taken which significantly improve the reliability of the PORVs and associated block valves. The elimination of the turbine runback feature mentioned previously, and the provision of a direct reliable means for indicating PORV position to the operator reduce the recurrence frequency of a small break LOCA due to PORV failure by an estimated factor of 15. Improved operator training programs, improved emergency procedures, and the provision of emergency power to the PORVs and block valves reduce the small break LOCA recurrence frequency further although the exact magnitude has not been quantified.

The final consideration for not needing an automatic PORV isolation system is that the recurrence frequency of a small break LOCA due to PORV failure has been substantially reduced by the actions mentioned previously to an estimated value which falls well within the uncertainty band of the recurrence frequencies for a LOCA due to a small pipe rupture estimated in WASH-1400.

Thus, the recurrence frequency is now at an acceptably low value. The incorporation of an automatic PORV isolation system would further increase PORV system reliability. However, this action is not considered to be necessary since the recurrence frequency of PORV system failures without this feature is small.

II.K.3.3 REPORTING SAFETY VALVE AND PORV FAILURE AND CHALLENGES

FP&L assures that any failure of a PORV or safety valve to close is reported to the NRC promptly. All challenges to the PORVs or safety valves are documented in a Special Report.

II.K.3.5 AUTOMATIC TRIP OF REACTOR COOLANT PUMPS DURING A LOCA

FP&L is a member of the CE Owners Group. The CE Owners Group has selected an operational strategy which will close out TMI Action Plan Item II.K.3.5, "Automatic Trip of Reactor Coolant Pumps." Following a current review of several possible strategies, the strategy chosen is to trip two pumps initially followed by the trip of the remaining two pumps at the same time a LOCA has been diagnosed. The "trip two, leave two" strategy has been discussed in the past as a preferred approach. Based on the currently available information, it remains the preference of CE, the CE Owners Group, and FP&L. A program is being developed whose goal will be to provide information which both meets the NRC guidelines stated in the reference letter and provides the operational requirements for participating utilities to use in developing emergency operating procedures and conducting training. The expectation is that the selected operational strategy for the RCPs will make use of manual operator actions. The operational strategy currently in use on St. Lucie Unit No. 2 is to trip all RCPs during the initial phase of a depressurization transient followed by pump restart when it is confirmed that the event is not a LOCA. This strategy will remain in effect until replaced by the new approach which will be implemented with supported by appropriate documentation and operator training.

The NRC, in Reference 17, has concluded that the CE Owner's Group methodology significantly improves reactor safety. The adoption and implementation of this methodology resolves TMI Action Plan Item II.K.3.5 satisfactorily.

II.K.3.17 REPORT ON OUTAGES OF EMERGENCY CORE-COOLING SYSTEMS LICENSEE REPORT AND PROPOSED TECHNICAL SPECIFICATION CHANGES

Reports on ECCS outages will follow the guidelines of 10 CFR 50.73 for the development and content of License Event Reports which will document any significant problems with the ECCS equipment. Other ECCS equipment failures are reported via the Institute of Nuclear Power Operations (INPO) Equipment Performance and Information Exchange System (EPIX), formally known as Nuclear Plant Reliability Data System (NPRDS). These two methods provide an on-line reporting system which satisfies the requirements of NUREG-0737, Item II.K.3.17.

These methods were accepted by the NRC in Reference 16.

II.K.3.25 EFFECT OF LOSS OF AC POWER ON PUMP SEALS

FP&L has conducted a test of RCP seals under simulated loss of ac power conditions of full temperature and pressure. After approximately 50 hours at coolant conditions of 550°F and 2250 psig, the RCP seal cartridge still performed satisfactorily with the pump idle. Some seal damage was observed during the post-test inspection; however, the maximum seal leakage during the test was only 16 gph (Reference: FP&L letter L-81-107, March 10, 1981).

PCM 98021 replaced the RCP SU mechanical seals with N-9000 seals. An aged N-9000 seal has been rigorously tested by Flowserve (OEM) in a test fixture to simulate the conditions imposed by a station blackout for an eight (8) hour period. During this test downward shaft movements and pressure changes were imposed.

II.K.3.30 REVISED SMALL BREAK LOCA METHODS TO SHOW COMPLIANCE WITH 10 CFR PART 50, APPENDIX K

NRC Generic Letter 83-10b[14] documents NRC evaluation of the analyses of LOFT Test L3-6 performed by the CE Owners Group and concludes that the evaluations acceptably predict the test results, and finds the currently approved CE evaluation model for small LOCAs in continued conformance with 10 CFR 50 Appendix K for the case of limited RCP operation after reactor trip, and for the range of licensed CE reactor designs.

II.K.3.31 PLANT SPECIFIC CALCULATIONS TO SHOW COMPLIANCE WITH 10 CFR PART 50.46

See Item II.K.3.30 of NUREG-0737.

III.A.1.1 UPGRADE EMERGENCY PREPAREDNESS

The St. Lucie Plant Emergency Plan discussed in Section 13.3 incorporates the requirements of this task.

III A.1.2 UPGRADE EMERGENCY SUPPORT FACILITIES

FP&L programs in response to this requirement have been or are being developed for St. Lucie Unit 1 (Docket No. 50-335) and also are applicable to St. Lucie Unit 2.

Generic Letter No. 82-33 requests that each licensee and applicant develop and submit to the NRC by April 15, 1983 its own plant-specific schedule for completion of the Emergency Response Facilities (ERFs). By letter L-83-238 dated April 15, 1983, FP&L indicated the ERFs schedule is as follows:

a) Technical Support Center (TSC)

The TSC is operational.

b) Operational Support Center (OSC)

The OSC is operational.

c) Emergency Operation Facility (EOF)

The EOF is operational.

III.D.1.1 <u>INTEGRITY OF SYSTEMS OUTSIDE CONTAINMENT LIKELY TO CONTAIN RADIOACTIVE MATERIAL</u>

In the unlikely event of an accident, the Containment Isolation Actuation Signal (CIAS) isolates all non-essential systems, thereby eliminating all large radioactive leakage paths from containment. The only means of leakage into the Reactor Auxiliary Building is through ESF system components (i.e., pump seals, valve leakage, etc.) and post-accident monitoring sample lines. Liquid leakages collected in the ECCS room sumps are normally routed to the equipment drain tank in the Waste Management System (WMS). The normal operational mode of the ECCS room sump pumps has not been modified. On high sump water level, the pumps discharge to the equipment drain tank. To prevent radioactive contaminants from entering the WMS, the ESF Leakage Collection and Return System (see Subsection 9.3.5) provides operators with a method to direct ESF leakage to the containment. This system eliminates highly radioactive liquid from entering normally "Low activity" waste hold-up tanks. Likewise, all sources of high activity sample gas (e.g., hydrogen sampling) are re-routed to the containment, thus eliminating contamination of the Waste Gas System. The above described design precludes the use of Liquid and Gaseous Waste Management Systems during an unlikely event of an accident.

The following systems contain high activity fluid during a postulated accident:

a) Shutdown Cooling System

b) High Pressure Safety Injection (Recirculation Phase)

c) Containment Spray (Recirculation Phase)

d) Sampling System.

Periodic integrated leak testing, at intervals not to exceed each refueling cycle, is established for these systems. A program is established to evaluate results and initiate leakage reduction measures as appropriate.

III.D.3.3 IN-PLANT RADIATION MONITORING

FP&L programs in response to this requirement have been developed for St. Lucie Unit 1 (Docket No. 50-335) and are applicable to St. Lucie Unit 2. The Health Physics procedures address detailed radioiodine assessment. These are generally described in Subsection 12.5.3. Training is an integral part of the non-licensed training program is covered in the plant Technical Specifications.

III.D.3.4 CONTROL ROOM HABITABILITY

Potential hazards in the vicinity of the site have been identified and evaluated to confirm that operators in the control room are adequately protected (refer to Section 2.2). In addition, radioactive releases have been analyzed for their effects on control room operators (refer to Section 6.4). Liquid source terms from within the Reactor Auxiliary Building, although not factored into the dose rate to the operators presented in Section 6.4, would have insignificant impact in terms of doses because the control room itself is located on top of the Reactor Auxiliary Building and is well separated from liquid source terms.

REFERENCES: APPENDIX 1.9A

1. U.S. Nuclear Regulatory Commission, "Clarification of TMI Action Plan Requirements," USNRC Report NUREG-0737, October, 1980.

2. NUREG-0843, Safety Evaluation Report related to the operation of St. Lucie Plant, Unit No. 2, Docket No. 50-389; October 1981.

3. NUREG-0843, Supplement No. 1; December 1981.

4. NUREG-0843, Supplement No. 2; September 1982.

5. NUREG-0843, Supplement No. 3; April 1983.

6. NUREG-0843, Supplement No. 4; June 1983.

7. CEN-152, "Combustion Engineering Emergency Procedure Guidelines," dated November 22, 1982.

8. NRC Generic Letter 82-33, Supplement 1 to NUREG-0737 - Requirements for Emergency Response Capability, dated December 17, 1982.

9. CEN-227, "Summary Report on the Operability of Pressurizer Safety Valves in CE Designed Plants," December 1982.

10. CEN-213, "Summary Report on the Operability of Powered Operated Relief Valves," July 1982.

11. Letter from D. F. Ross Jr., NRC to All Pending Operating License Applicants of Nuclear Steam Supply Systems Designed by Westinghouse and Combustion Engineering, Subject: Actions Required from Operating License Applicants of Nuclear Steam Supply Systems Designed by Westinghouse and Combustion Engineering Resulting from the NRC Bulletins and Orders Task Force Review Regarding the Three Mile Island Unit 2 Accident, dated March 10, 1980.

12. CEN-199, "Effects of Vessel Head Voiding During Transients and Accidents in CE-NSSS's," March 1982.

13. CEN-145, "PORV Failure Reduction Methods-Final Report," December 1980.

14. NRC Generic Letter No. 83-10b, Resolution of TMI Action Items II.K.3.5, "Automatic Trip of Reactor Coolant Pumps," dated February 8, 1983.

15. FPL Letter L-84-49 dated March 1, 1984 from Mr. J. W. Williams, Jr. to Mr. D.G. Eisenhut, "SPDS Implementation Plan and Parameter Selection Report."

16. Letter, from E. G. Tourigny (NRC) to W. F. Conway (FPL), "Emergency Core Cooling Systems (ECCS) Outages, 5-Year Report - St Lucie Plant Unit No. 2," dated May 11, 1988.

17. Letter, from J. A. Norris/G.E. Edison (NRC) to W.F. Conway (FPL), "Closing of Multiplant Action G-01-Reactor Coolant Pump Trip (NUREG-0737 Item II.K.3.5)," dated March 15, 1989

18 Letter, from J. A. Norris (NRC) to C.O. Woody (FPL), "NUREG-0737 Item II.D.1 Performance Testing of Relief and Safety Valves," dated May 11,1989.

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TABLE 1.9A-1

SAFETY RELATED VALVE POSITION AND POSITION INDICATION

SYSTEM	VALVE	FUNCTION	TYPE	OPERATOR	ACTUATION SIGNAL	NORMAL VALVE POSITION	ACCIDENT VALVE[a] POSITION	FAILURE MODE	METHOD OF[b] POSITION INDICATION
Reactor Coolant	V1474	LTOP	Ang. Glb.	Sol.	---	Closed	Closed	Closed	1
	V1475	LTOP	Ang. Glb.	Sol.	---	Closed	Closed	Closed	1
	V1476	LTOP Isol.	Gate	Motor	---	Open	Closed	As Is	1
	V1477	LTOP Isol.	Gate	Motor	---	Open	Closed	As Is	1
	V1460	RV Head Vent	Glb.	Solenoid	---	Closed	Closed	Closed	1
	V1461	RV Head Vent	Glb.	Solenoid	---	Closed	Closed	Closed	1
	V1462	RV Head Vent	Glb.	Solenoid	---	Closed	Closed	Closed	1
	V1463	RV Head Vent	Glb.	Solenoid	---	Closed	Closed	Closed	1
	V1464	RV Head Vent	Glb.	Solenoid	---	Closed	Closed	Closed	1
	V1465	RV Head Vent	Glb.	Solenoid	---	Closed	Closed	Closed	1
	V1466	RV Head Vent	Glb.	Solenoid	---	Closed	Closed	Closed	1
Chemical and Volume Control	V2522	Cont. Isol.	Glb.	Pneu.	CIAS	Open	Closed	Closed	1
	V2508	BAMT. Isol.	Gate	Motor	SIAS	Closed	Open	As Is	1
	V2509	BAMT. Isol.	Gate	Motor	SIAS	Closed	Open	As Is	1
	V2514	BAMP. Disch.	Gate	Motor	SIAS	Closed	Open	As Is	1
	V2525	PMW Supply	Gate	Motor	SIAS	Closed	Closed	As Is	1
	V2504	RWT Supply	Gate	Motor	---	Closed	Open	As Is	1
	V2515	Cont. Isol.	Glb.	Pneu.	SIAS	Open	Closed	Closed	1
	V2516	Cont. Isol.	Glb.	Pneu.	SIAS/CIAS	Open	Closed	Closed	1
	SE-02-3	Aux. Spray	Glb.	Sol.	---	Locked Closed	Open	Closed	1
	SE-02-4	Aux. spray	Glb.	Sol.	---	Locked Closed	Open	Closed	1
	SE-02-1	Charging	Glb.	Sol.	---	Open	Open	Open	1
	SE-02-2	Charging	Glb.	Sol.	---	Open	Open	Open	1
	V2553	Charg. Bypass	Glb.	Motor	---	Open[c]	Closed	As Is	2
	V2554	Charg. Bypass	Glb.	Motor	---	Open[c]	Closed	As Is	2
	V2555	Charg. Bypass	Glb.	Motor	---	Open[c]	Closed	As Is	2
	V2523	Charg. Isol.	Glb.	Pneu.	---	Locked Open	Open	Open	1
	FCV-2210Y	BAMT Supply	Glb.	Pneu.	SIAS	Closed	Closed	Closed	1
	V2524	Cont.Isol.	Glb.	Pneu.	CIAS	Open	Closed	Closed	1
	V2505	Cont.Isol.	Glb.	Pneu.	CIAS	Open	Closed	Closed	1
	V2501	VCT Isol.	Gate	Motor	SIAS	Open	Closed	As Is	1
	V2650	BAMT Recirc	Glb.	Pneu.	SIAS	Open	Closed	Closed	1
	V2651	BAMT Recirc	Glb.	Pneu.	SIAS	Open	Closed	Closed	1
Safety Injection	FCV-3301	SDC	BFY	Motor	---	Locked Open	Open	As Is	1
	FCV-3306	SDC	BFY	Motor	---	Locked Open	Open	As Is	1
	HCV-3512	SDC	BFY	Motor	---	Locked Closed	Open	As Is	1
	HCV-3657	SDC	BFY	Motor	---	Locked Closed	Open	As Is	1
	V3456	SDC Isol.	Gate	Motor	---	Locked Closed	Open	As Is	1
	V3457	SDC Isol.	Gate	Motor	---	Locked Closed	Open	As Is	1
	V3517	SDC Isol.	Gate	Motor	---	Locked Closed	Open	As Is	1
	V3658	SDC Isol.	Gate	Motor	---	Locked Closed	Open	As Is	1
	V3540	Hot Leg Inj.	Glb.	Motor	---	Locked Closed	Open	As Is	1
	V3550	Hot Leg Inj.	Glb.	Motor	---	Locked Closed	Open	As Is	1

TABLE 1.9A -1(Cont'd)

SYSTEM	VALVE	FUNCTION	TYPE	OPERATOR	ACTUATION SIGNAL	NORMAL VALVE POSITION	ACCIDENT VALVE[a] POSITION	FAILURE MODE	METHOD OF[b] POSITION INDICATION
Safety Injection(Cont'd)	V3523	Hot Leg Inj.	Glb.	Motor	---	Locked Closed	Open	As Is	1
	V3551	Hot Leg Inj.	Glb.	Motor	---	Locked Closed	Open	As Is	1
	V3656	HPSI Isol.	Gate	Motor	---	Locked Open	Open	As Is	1
	V3654	HPSI Isol.	Gate	Motor	---	Locked Open	Open	As Is	1
	SE-03-2A	Cont. Isol.	Glb.	Sol.	SIAS/CIAS	Closed	Closed	Closed	1
	SE-03-2B	Cont. Isol.	Glb.	Sol.	SIAS/CIAS	Closed	Closed	Closed	1
	V3659	Recirc.	Gate	Motor	RAS	Locked Open	Closed	As Is	1
	V3660	Recirc.	Gate	Motor	RAS	Locked Open	Closed	As Is	1
	V3495	Recirc.	Glb.	Sol.	RAS	Locked Open	Closed	Closed	1
	V3611	SIT Drain	Glb.	Pneu.	SIAS	Closed	Closed	Closed	1
	V3621	SIT Drain	Glb.	Pneu.	SIAS	Closed	Closed	Closed	1
	V3631	SIT Drain	Glb.	Pneu.	SIAS	Closed	Closed	Closed	1
	V3641	SIT Drain	Glb.	Pneu.	SIAS	Closed	Closed	Closed	1
	V3496	Recirc.	Glb.	Sol.	RAS	Locked Open	Closed	Closed	1
	HCV-3615	Inj.	Glb.	Motor	SIAS	Closed	Open	As Is	1
	HCV-3625	Inj.	Glb.	Motor	SIAS	Closed	Open	As Is	1
	HCV-3635	Inj.	Glb.	Motor	SIAS	Closed	Open	As Is	1
	HCV-3645	Inj.	Glb.	Motor	SIAS	Closed	Open	As Is	1
	HCV-3616	Inj.	Glb.	Motor	SIAS	Closed	Open	As Is	1
	HCV-3626	Inj.	Glb.	Motor	SIAS	Closed	Open	As Is	1
	HCV-3636	Inj.	Glb.	Motor	SIAS	Closed	Open	As Is	1
	HCV-3646	Inj.	Glb.	Motor	SIAS	Closed	Open	As Is	1
	HCV-3617	Inj.	Glb.	Motor	SIAS	Closed	Open	As Is	1
	HCV-3627	Inj.	Glb.	Motor	SIAS	Closed	Open	As Is	1
	HCV-3637	Inj.	Glb.	Motor	SIAS	Closed	Open	As Is	1
	HCV-3647	Inj.	Glb.	Motor	SIAS	Closed	Open	As Is	1
	V3480	SDC Isol.	Gate	Motor	---	Locked Closed	Open	As Is	1
	V3481	SDC Isol.	Gate	Motor	---	Locked Closed	Open	As Is	1
	V3651	SDC Isol.	Gate	Motor	---	Locked Closed	Open	As Is	1
	V3652	SDC Isol.	Gate	Motor	---	Locked Closed	Open	As Is	1
	V3545	SDC X-Tie	Gate	Motor	---	Locked Open	Open	As Is	1,8
	V3664	SDC Isol.	Gate	Motor	---	Locked Closed	Open	As Is	1
	V3665	SDC Isol.	Gate	Motor	---	Locked Closed	Open	As Is	1
	V3536	SDC Warmup	Glb.	Motor	---	Locked Closed	Open	As Is	1
	V3539	SDC Warmup	Glb.	Motor	---	Locked Closed	Open	As Is	1
	V3614	SIT Isol.	Gate	Motor	SIAS	Locked Open	Open	As Is	1,8
	V3624	SIT Isol.	Gate	Motor	SIAS	Locked Open	Open	As Is	1,8
	V3634	SIT Isol.	Gate	Motor	SIAS	Locked Open	Open	As Is	1,8
	V3644	SIT Isol.	Gate	Motor	SIAS	Locked Open	Open	As Is	1,8
	SE-03-1A	SIT Drain	Glb.	Sol.	SIAS	Closed	Closed	Closed	1
	SE-03-1B	SIT Drain	Glb.	Sol.	SIAS	Closed	Closed	Closed	1
	SE-03-1C	SIT Drain	Glb.	Sol.	SIAS	Closed	Closed	Closed	1
	SE-03-1D	SIT Drain	Glb.	Sol.	SIAS	Closed	Closed	Closed	1
	HCV-3618	CV Leakage	Glb.	Pneu.	SIAS	Closed	Closed	Closed	1
	HCV-3628	CV Leakage	Glb.	Pneu.	SIAS	Closed	Closed	Closed	1

TABLE 1.9A -1(Cont'd)

SYSTEM	VALVE	FUNCTION	TYPE	OPERATOR	ACTUATION SIGNAL	NORMAL VALVE POSITION	ACCIDENT VALVE[a] POSITION	FAILURE MODE	METHOD OF[b] POSITION INDICATION
Safety Injection(Cont'd)	HCV-3638	CV Leakage	Glb.	Pneu.	SIAS	Closed	Closed	Closed	1
	HCV-3648	CV Leakage	Glb.	Pneu.	SIAS	Closed	Closed	Closed	1
	V3571	Inj. Relief	Glb.	Pneu.	SIAS	Closed	Closed	Closed	1
	V3572	Inj. Relief	Glb.	Pneu.	SIAS	Closed	Closed	Closed	1
	V3444	RWT Isol	Gate	Motor	---	Locked Open	Closed	As Is	1
	V3432	RWT Isol	Gate	Motor	---	Locked Open	Closed	As Is	1
Sampling	SE-05-1A	Cont. Isol.	Glb.	Sol.	CIAS	Closed	Closed	Closed	1
	SE-05-1B	Cont. Isol.	Glb.	Sol.	CIAS	Closed	Closed	Closed	1
	SE-05-1C	Cont. Isol.	Glb.	Sol.	CIAS	Closed	Closed	Closed	1
	SE-05-1D	Cont. Isol.	Glb.	Sol.	CIAS	Closed	Closed	Closed	1
	SE-05-1E	Cont. Isol.	Glb.	Sol.	CIAS	Closed	Closed	Closed	1
	V5200	Cont. Isol.	Glb.	Sol.	CIAS	Closed	Closed	Closed	1
	V5201	Cont. Isol.	Glb.	Sol.	CIAS	Closed	Closed	Closed	1
	V5202	Cont. Isol.	Glb.	Sol.	CIAS	Closed	Closed	Closed	1
	V5203	Cont. Isol.	Glb.	Pneu.	CIAS	Closed	Closed	Closed	1
	V5204	Cont. Isol.	Glb.	Pneu.	CIAS	Closed	Closed	Closed	1
	V5205	Cont. Isol.	Glb.	Pneu.	CIAS	Closed	Closed	Closed	1
SIT Vent Valves	V3733	SIT Vent to Atm.	Glb.	Sol.	---	Closed	Closed	Closed	1
	V3734	SIT Vent to Atm.	Glb.	Sol	---	Closed	Closed	Closed	1
	V3735	SIT Vent to Atm.	Glb.	Sol.	---	Closed	Closed	Closed	1
	V3736	SIT Vent to Atm.	Glb.	Sol.	---	Closed	Closed	Closed	1
	V3737	SIT Vent to Atm.	Glb.	Sol.	---	Closed	Closed	Closed	1
	V3738	SIT Vent to Atm.	Glb.	Sol.	---	Closed	Closed	Closed	1
	V3739	SIT Vent to Atm.	Glb.	Sol.	---	Closed	Closed	Closed	1
	V3740	SIT Vent to Atm.	Glb.	Sol.	---	Closed	Closed	Closed	1
Waste Management	V6341	Cont. Isol.	Diaph.	Pneu.	CIAS	Open	Closed	Closed	1
	V6342	Cont. Isol.	Diaph.	Pneu.	CIAS	Open	Closed	Closed	1
	V6718	Cont. Isol.	Diaph.	Pneu.	CIAS	Open	Closed	Closed	1
	V6750	Cont. Isol.	Diaph.	Pneu.	CIAS	Open	Closed	Closed	1
	V6741	Cont. Isol.	Glb.	Pneu.	CIAS	Open	Closed	Closed	1
Main Steam	HCV-08-1A	Cont. Isol	Glb.	Pneu.	MSIS	Open	Closed	As Is	1
	HCV-08-1B	Cont. Isol	Glb.	Pneu.	MSIS	Open	Closed	As Is	1
	MV-08-1A	Warmup	Glb.	Motor	MSIS	Closed	Closed	As Is	1
	MV-08-1B	Warmup	Glb.	Motor	MSIS	Closed	Closed	As Is	1
	MV-08-18A	ADV	Glb.	Motor	---	Closed	Open	As Is	1
	MV-08-18B	ADV	Glb.	Motor	---	Closed	Open	As Is	1
	MV-08-19A	ADV	Glb.	Motor	---	Closed	Open	As Is	1
	MV-08-19B	ADV	Glb.	Motor	---	Closed	Open	As Is	1
	MV-08-12	Aux. Stm	Gate	Motor	AFAS	Closed	Open	As Is	1
	MV-08-13	Aux. Stm	Gate	Motor	AFAS	Closed	Open	As Is	1

TABLE 1.9A - 1(Cont'd)

SYSTEM	VALVE	FUNCTION	TYPE	OPERATOR	ACTUATION SIGNAL	NORMAL VALVE POSITION	ACCIDENT VALVE[a] POSITION	FAILURE MODE	METHOD OF[b] POSITION INDICATION
Main Steam (Cont'd)	MV-08-3	Aux.Stm	Glb.	Motor	---	Locked Open	Open	As Is	1
	MV-08-14	ADV Isol.	Gate	Motor	---	Open	Open	As Is	1
	MV-08-15	ADV Isol.	Gate	Motor	---	Open	Open	As Is	1
	MV-08-16	ADV Isol	Gate	Motor	---	Open	Open	As Is	1
	MV-08-17	ADV Isol.	Gate	Motor	---	Open	Open	As Is	1
Main Feed Water	HCV-09-1A	Cont. Isol.	Gate	Hyd.	MSIS/AFAS	Open	Closed*	As Is	1
	HCV-09-1B	Cont. Isol.	Gate	Hyd.	MSIS/AFAS	Open	Closed*	As Is	1
	HCV-09-2A	Cont. Isol.	Gate	Hyd.	MSIS/AFAS	Open	Closed*	As Is	1
	HCV-09-2B	Cont. Isol.	Gate	Hyd.	MSIS/AFAS	Open	Closed*	As Is	1
	MV-09-9	Aux. Feed	Glb.	Motor	AFAS	Closed	Open/Closed	As Is	1
	MV-09-10	Aux. Feed	Glb.	Motor	AFAS	Closed	Open/Closed	As Is	1
	MV-09-11	Aux. Feed	Glb.	Motor	AFAS	Closed	Open/Closed	As Is	1
	MV-09-12	Aux. Feed	Glb.	Motor	AFAS	Closed	Open/Closed	As Is	1
	MV-09-13	Aux. Feed	Gate	Motor	---	Closed	Open	As Is	1
	MV-09-14	Aux. Feed	Gate	Motor	---	Closed	Open	As Is	1
	SE-09-2	Aux. Feed Isol.	Glb.	Sol.	AFAS	Closed	Open/Closed	Closed	1
	SE-09-3	Aux. Feed Isol.	Glb.	Sol.	AFAS	Closed	Open/Closed	Closed	1
	SE-09-4	Aux. Feed Isol.	Glb.	Sol.	AFAS	Closed	Open/Closed	Closed	1
	SE-09-5	Aux. Feed Isol.	Glb.	Sol.	AFAS	Closed	Open/Closed	Closed	1
Intake Cooling Water	MV-21-2	Sys. Isol.	BFY	Motor	SIAS	Open	Closed	As Is	1
	MV-21-3	Sys. Isol.	BFY	Motor	SIAS	Open	Closed	As Is	1
Component Cooling Water	HCV-14-8A	Sys. Isol.	BFY	Pneu.	SIAS	Open	Closed	Closed	1
	HCV-14-8B	Sys. Isol.	BFY	Pneu.	SIAS	Open	Closed	Closed	1
	MV-14-17	FP. Isol.	BFY	Motor	SIAS	Open	Closed	As Is	1
	MV-14-18	FP. Isol.	BFY	Motor	SIAS	Closed	Closed	As Is	1
	MV-14-19	FP. Isol.	BFY	Motor	---	Open	Closed	As Is	1
	MV-14-20	FP. Isol.	BFY	Motor	---	Closed	Closed	As Is	1
	MV-14-9	Fan Isol.	BFY	Motor	---	Open	Open	As Is	1
	MV-14-10	Fan Isol.	BFY	Motor	---	Open	Open	As Is	1
	MV-14-11	Fan Isol.	BFY	Motor	---	Open	Open	As Is	1
	MV-14-12	Fan Isol.	BFY	Motor	---	Open	Open	As Is	1
	MV-14-13	Fan Isol.	BFY	Motor	---	Open	Open	As Is	1
	MV-14-14	Fan Isol.	BFY	Motor	---	Open	Open	As Is	1
	MV-14-15	Fan Isol.	BFY	Motor	---	Open	Open	As Is	1
	MV-14-16	Fan Isol.	BFY	Motor	---	Open	Open	As Is	1

*The AFAS maybe overridden and the valve re-opened by the control room operator only during 2-EOP-06, Total Loss of Feedwater.

TABLE 1.9A - 1 (Cont'd)

SYSTEM	VALVE	FUNCTION	TYPE	OPERATOR	ACTUATION SIGNAL	NORMAL VALVE POSITION	ACCIDENT VALVE[a] POSITION	FAILURE MODE	METHOD OF[b] POSITION INDICATION
Component Cooling Water (Cont'd)	HCV-14-1	RCP Isol.	BFY	Pneu.	SIAS	Open	Closed	Closed	1
	HCV-14-2	RCP Isol.	BFY	Pneu.	SIAS	Open	Closed	Closed	1
	HCV-14-6	RCP Isol.	BFY	Pneu.	SIAS	Open	Closed	Closed	1
	HCV-14-7	RCP Isol.	BFY	Pneu.	SIAS	Open	Closed	Closed	1
	HCV-14-9	Sys. Isol.	BFY	Pneu.	SIAS	Open	Closed	Closed	1
	HCV-14-10	Sys. Isol.	BFY	Pneu.	SIAS	Open	Closed	Closed	1
	HCV-14-3A	SDC HX	BFY	Pneu.	SIAS	Closed	Open	Open	1
	HCV-14-3B	SDC HX	BFY	Pneu.	SIAS	Closed	Open	Open	1
	MV-14-1	CCW Pump Isol.	BFY	Motor	---	Open (1)	Open (1)	As Is	1
	MV-14-2	CCW Pump Isol.	BFY	Motor	---	Closed (2)	Closed (2)	As Is	1
	MV-14-3	CCW Pump Isol.	BFY	Motor	---	Open (1)	Open (1)	As Is	1
	MV-14-4	CCW Pump Isol.	BFY	Motor	---	Closed (2)	Closed (2)	As Is	1
Primary Water	HCV-15-1	Cont. Isol.	Glb.	Pneu.	CIAS	Closed	Closed	Closed	1
Instr. Air	HCV-18-1	Cont. Isol.	Glb.	Pneu.	CIAS	Open	Closed	Closed	1
Station Air	HCV-18-2	Cont. Isol.	Glb.	Pneu.	CIAS	Closed	Closed	Closed	1
Steam Generator Blowdown	FCV-23-3	Cont. Isol.	Gate	Pneu.	CIAS	Open	Closed	Closed	1
	FCV-23-5	Cont. Isol.	Gate	Pneu.	CIAS	Open	Closed	Closed	1
	FCV-23-7	Cont. Isol.	Glb.	Pneu.	CIAS	Open	Closed	Closed	1
	FCV-23-9	Cont. Isol.	Glb.	Pneu.	CIAS	Open	Closed	Closed	1
Diesel Oil	SE-59-1A1	Oil Supply	Glb.	Sol.	---	Closed	Open	Closed	3
	SE-59-1A2	Oil Supply	Glb.	Sol.	---	Closed	Open	Closed	3
	SE-59-1B1	Oil Supply	Glb.	Sol.	---	Closed	Open	Closed	3
	SE-59-1B2	Oil Supply	Glb.	Sol.	---	Closed	Open	Closed	3
HVAC	FCV-25-1	Cont. Isol.	BFY	Pneu.	CIAS	Closed	Closed	Closed	1
	FCV-25-2	Cont. Isol.	BFY	Pneu.	CIAS	Closed	Closed	Closed	1
	FCV-25-3	Cont. Isol.	BFY	Pneu.	CIAS	Closed	Closed	Closed	1
	FCV-25-4	Cont. Isol.	BFY	Pneu.	CIAS	Closed	Closed	Closed	1
	FCV-25-5	Cont. Isol.	BFY	Pneu.	CIAS	Closed	Closed	Closed	1
	FCV-25-6	Cont. Isol.	BFY	Pneu.	CIAS	Closed	Closed	Closed	1
	FCV-25-20	Cont. Isol.	BFY	Pneu.	CIAS	Open	Closed	Closed	1
	FCV-25-21	Cont. Isol.	BFY	Pneu.	CIAS	Open	Closed	Closed	1
	FCV-25-26	Cont. Isol.	BFY	Pneu.	CIAS	Open	Closed	Closed	1
	FCV-25-36	Cont. Isol.	BFY	Pneu.	CIAS	Open	Closed	Closed	1
	FCV-25-7	Vac. Relief	BFY	Pneu.	Cont. Press	Closed	Open	Closed	1
	FCV-25-8	Vac. Relief	BFY	Pneu.	Cont. Press	Closed	Open	Closed	1
	FCV-25-29	SBVS Isol.	BFY	Motor	---	Locked Closed	Closed	As Is	1
	FCV-25-30	Cont. Isol.	BFY	Motor	CIAS	Open	Closed	As Is	1
	FCV-25-31	Cont. Isol.	BFY	Motor	CIAS	Open	Closed	As Is	1
	FCV-25-32	Cont. Isol.	BFY	Motor	CIAS	Closed	Open	As Is	1
	FCV-25-33	Cont. Isol.	BFY	Motor	CIAS	Closed	Open	As Is	1
	FCV-25-34	SBVS Isol.	BFY	Motor	---	Locked Closed	Closed	As Is	1

TABLE 1.9A - 1(Cont'd)

SYSTEM	VALVE	FUNCTION	TYPE	OPERATOR	ACTUATION SIGNAL	NORMAL VALVE POSITION	ACCIDENT VALVE[a] POSITION	FAILURE MODE	METHOD OF[b] POSITION INDICATION
HVAC (Cont'd)	FCV-25-14	CRECS Isol.	BFY	Motor	CIAS	Open	Closed	As Is	1
	FCV-25-15	CRECS Isol.	BFY	Motor	CIAS	Open	Closed	As Is	1
	FCV-25-16	CRECS Isol.	BFY	Motor	CIAS	Open	Closed	As Is	1
	FCV-25-17	CRECS Isol.	BFY	Motor	CIAS	Open	Closed	As Is	1
	FCV-25-18	CRECS Isol.	BFY	Motor	CIAS	Open	Closed	As Is	1
	FCV-25-19	CRECS Isol.	BFY	Motor	CIAS	Open	Closed	As Is	1
	FCV-25-24	CRECS Isol.	BFY	Motor	CIAS	Open	Closed	As Is	1
	FCV-25-25	CRECS Isol.	BFY	Motor	CIAS	Open	Closed	As Is	1
	FCV-25-11	SBVS Isol.	BFY	Motor	Diff. Pres.	Closed	Open	As Is	1
	FCV-25-12	SBVS Isol.	BFY	Motor	Diff. Pres.	Closed	Open	As Is	1
Containment Spray	MV-07-1A	RWT Isol.	BFY	Motor	RAS	Open	Closed	As Is	1
	MV-07-1B	RWT Isol.	BFY	Motor	RAS	Open	Closed	As Is	1
	MV-07-2A	Sump Isol.	BFY	Motor	RAS	Closed	Open	As Is	1
	MV-07-2B	Sump Isol.	BFY	Motor	RAS	Closed	Open	As Is	1
	FCV-07-1A	Cont. Isol.	BFY	Pneu.	CSAS	Closed	Open	Open	1
	FCV-07-1B	Cont. Isol.	BFY	Pneu.	CSAS	Closed	Open	Open	1
	LCV-07-11A	Cont. Isol.	Glb.	Pneu.	CIAS/SIAS	Closed	Closed	Closed	1
	LCV-07-11B	Cont. Isol.	Glb.	Pneu.	CIAS/SIAS	Closed	Closed	Closed	1
	SE-07-3A	IRS Isol.	Glb.	Sol.	CSAS	Closed	Open	Open	1
	SE-07-3B	IRS Isol.	Glb.	Sol.	CSAS	Closed	Open	Open	1
	MV-07-3	Cont. Spray Isol.	Gate	Motor	---	Open	Open	As Is	1
	MV-07-4	Cont. Spray Isol.	Gate	Motor	---	Open	Open	As Is	1
	SE-07-5A thru 5D	Cont. Pressure	Globe	Sol.	---	Open	Open	Open	1
	SE-07-5E, 5F	Cont. Pressure	Globe	Sol.	---	Open	Open	Closed	1
Containment Air Monitoring	FCV-26-1	Cont. Isol.	Glb.	Pneu.	CIAS	Open	Closed	Closed	1
	FCV-26-2	Cont. Isol.	Glb.	Pneu.	CIAS	Open	Closed	Closed	1
	FCV-26-3	Cont. Isol.	Glb.	Pneu.	CIAS	Open	Closed	Closed	1
	FCV-26-4	Cont. Isol.	Glb.	Pneu.	CIAS	Open	Closed	Closed	1
	FCV-26-5	Cont. Isol.	Glb.	Pneu.	CIAS	Open	Closed	Closed	1
	FCV-26-6	Cont. Isol.	Glb.	Pneu.	CIAS	Open	Closed	Closed	1
Hydrogen Sampling	FSE-27-8	Cont. Isol.	Glb.	Sol.	---	Closed	Open	Closed	1
	FSE-27-9	Cont. Isol.	Glb.	Sol.	---	Closed	Open	Closed	1
	FSE-27-10	Cont. Isol.	Glb.	Sol.	---	Closed	Open	Closed	1
	FSE-27-11	Cont. Isol.	Glb.	Sol.	---	Closed	Open	Closed	1
	FSE-27-12	Cont. Isol.	Glb.	Sol.	---	Closed	Open	Closed	1
	FSE-27-13	Cont. Isol.	Glb.	Sol.	---	Closed	Open	Closed	1
	FSE-27-14	Cont. Isol.	Glb.	Sol.	---	Closed	Open	Closed	1
	FSE-27-15	Cont. Isol.	Glb.	Sol.	---	Closed	Open	Closed	1
	FSE-27-16	Cont. Isol.	Glb.	Sol.	---	Closed	Open	Closed	1
	FSE-27-17	Cont. Isol.	Glb.	Sol.	---	Closed	Open	Closed	1
	FSE-27-18	Cont. Isol.	Glb.	Sol.	---	Closed	Open	Closed	1

TABLE 1.9A - 1(Cont'd)

SYSTEM	VALVE	FUNCTION	TYPE	OPERATOR	ACTUATION SIGNAL	NORMAL VALVE POSITION	ACCIDENT VALVE[a] POSITION	FAILURE MODE	METHOD OF[b] POSITION INDICATION
HVAC	D-17A	Cont. Room	N/A	Motor	CIAS [d]	Closed	Open	Open	1
	D-17B	Cont. Room	N/A	Motor	CIAS [d]	Closed	Open	Open	1
	D-18	Cont. Room	N/A	Motor	CIAS [d]	Closed	Open	Open	1
	D-19	Cont. Room	N/A	Motor	CIAS [d]	Closed	Open	Open	
	D-29	FHB Isol.	N/A	Motor	High Rad	Open	Closed	Closed	1
	D-30	FHB Isol.	N/A	Motor	High Rad	Open	Closed	Closed	1
	D-31	FHB Isol.	N/A	Motor	High Rad	Open	Closed	Closed	1
	D-32	FHB Isol.	N/A	Motor	High Rad	Open	Closed	Closed	1
	D-33	FHB Isol.	N/A	Motor	High Rad	Open	Closed	Closed	1
	D-34	FHB Isol.	N/A	Motor	High Rad	Open	Closed	Closed	1
	D-35	FHB Isol.	N/A	Motor	High Rad	Open	Closed	Closed	1
	D-36	FHB Isol.	N/A	Motor	High Rad	Open	Closed	Closed	1
	D-23	SBVS Cont.	N/A	Motor	Diff. Pres.	Open	Open	Open	4
	D-24	SBVS Cont.	N/A	Motor	Diff. Pres.	Open	Open	Open	4
HVAC	D-1	RAB Isol.	N/A	Motor	SIAS	Open	Open	Open	5
	D-2	RAB Isol.	N/A	Motor	SIAS	Open	Open	Open	5
	D-3	RAB Isol.	N/A	Motor	SIAS	Open	Open	Open	5
	D-4	RAB Isol.	N/A	Motor	SIAS	Open	Open	Open	5
	D-9A	RAB Isol.	N/A	Motor	SIAS	Open	Closed	Closed	1
	D-9B	RAB Isol.	N/A	Motor	SIAS	Open	Closed	Closed	1
	D-12A	RAB Isol.	N/A	Motor	SIAS	Open	Closed	Closed	1
	D-12B	RAB Isol.	N/A	Motor	SIAS	Open	Closed	Closed	1
	D-7A	RAB Isol.	N/A	Motor	SIAS	Open	Closed	Closed	6
	D-7B	RAB Isol.	N/A	Motor	SIAS	Open	Closed	Closed	6
	D-8A	RAB Isol.	N/A	Motor	SIAS	Open	Closed	Closed	6
	D-8B	RAB Isol.	N/A	Motor	SIAS	Open	Closed	Closed	6
	D-5A	RAB Isol.	N/A	Motor	SIAS	Open	Closed	Closed	1
	D-5B	RAB Isol.	N/A	Motor	SIAS	Open	Closed	Closed	1
	D-6A	RAB Isol.	N/A	Motor	SIAS	Open	Closed	Closed	1
	D-6B	RAB Isol.	N/A	Motor	SIAS	Open	Closed	Closed	1
	D-13	RAB Isol.	N/A	Motor	SIAS [d]	Open	Open	Open	1
	D-14	RAB Isol.	N/A	Motor	SIAS [d]	Open	Open	Open	1
	D-15	RAB Isol.	N/A	Motor	SIAS [d]	Open	Open	Open	1
	D-16	RAB Isol.	N/A	Motor	SIAS [d]	Open	Open	Open	1
	L-7A	RAB Isol.	N/A	Motor	SIAS [d]	Open	Open	Open	7
	L-7B	RAB Isol.	N/A	Motor	SIAS [d]	Open	Open	Open	7

TABLE 1.9A-1 (Cont'd)

Notes:

a) <u>Accident Valve Position</u>

The designation "open" or "closed" indicates the position as a result of an ESFAS signal or a position that may be manually selected as part of a post accident procedure.

1) These valves will be closed if the "C" CCW pump is supplying the "B" CCW header.
2) These valves will be open if the "C" CCW pump is supplying the "B" CCW header.

b) <u>Method of Position Indication in the Control Room</u>

1) Position Indicating Lights.
2) Failure of valve to close would result in low flow indication by flow transmitter FIA-2212.
3) Failure of valve to open would result in a low-low alarm for Diesel Generators Day tank.
4) Failure of damper to open would result in low flow indication by flow transmitter FIS-25-20A1 or 20B1 for D23 and D24 respectively.
5) Failure of damper to open would result in high differential pressure indication by pressure transmitter PDIS-25-16A or 16B.
6) Each damper is backed up by redundant counterpart. Failure of one damper to close would result in no adverse consequence.
7) Failure of damper to open would result in low flow indication by flow transmitter FIS-25-21A1 or 21B1 for 2L-7A and 7B respectively.
8) Analog Position indicator; Indicator power separate from control power.

c) Valve position is dependent on charging pump running status. See section 9.3.4.2.2g for details.

d) Damper is actuated to its accident position by the start signal of its associated fan.

e) Normal Valve Position

1) These valves will be closed if the "C" CCW pump is supplying the "B" CCW header.
2) These valves will be open if the "C" CCW pump is supplying the "B" CCW header.

APPENDIX 1.9B HAS BEEN DELETED IN ITS ENTIRETY. THIS INFORMATION IS INCLUDED IN SUBSECTIONS 3.9.5 AND 7.5.3. 14

APPENDIX 1.9B

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APPENDIX 1.9B

1.0 INTRODUCTION

1.1 PURPOSE

This document provides the FP&L partial response to the requirements of Section II.F.2 of NUREG-0737[1] regarding the documentation of the FP&L St. Lucie 2 instrumentation for detection of Inadequate Core Cooling (ICC). 5

1.2 SCOPE

This report identifies the instrument sensor package selected by FP&L to detect ICC in St. Lucie 2 and describes the status of design and development activities being conducted by FP&L, to implement the instrumentation to be used to detect ICC. 10

1.3 BACKGROUND

CE Owners Group efforts on the evaluation of Inadequate Core Cooling have been ongoing since early 1979. Results of initial studies by the CE Owners Group are documented in reports CEN-117[2] and CEN-125[3]. These results are being considered in the preparation of the emergency operating instructions which FP&L will transmit to the NRC. All studies have been based on the requirements to indicate the approach to, the existence of, and the recovery from ICC.

The CE Owners Group (with FP&L participation) has performed an evaluation of response characteristics of potential Inadequate Core Cooling (ICC) detection instrumentation. This study is, in part, an amplification of the work reported in CEN-117 in that it provided detailed analyses of the existing instruments, as well as investigating the performance characteristics of selected new instruments. Specifically, the instruments whose response characteristics have been evaluated are the subcooled margin monitor, the heated junction thermocouple reactor vessel level monitor, core exit thermocouples, in-core thermocouples, self powered neutron detectors, hot leg resistance temperature detectors and ex-core neutron detectors. A summary of the details of this effort is contained in Appendix A. 5

Based on the results of the above instrument evaluation study, FP&L has selected an Inadequate Core Cooling Instrumentation (ICCI) package for use in St. Lucie 2, consisting of:

a) hot and cold leg Resistance Temperature Detectors (RTDs)
b) pressurizer pressure sensors
c) Core Exit Thermocouples (CETs)
d) Reactor Vessel Level Monitoring System (RVLMS) probes employing the Heated Junction Thermocouple (HJTC) concept

FP&L is in the process of evaluating appropriate transmission, processing and display hardware for use with the above ICC sensor package. This hardware will satisfy the licensing requirements of Section II.F.2 of NUREG-0737.

2.0 BASES FOR ICC INSTRUMENT SELECTION

The ICC instrumentation sensor package selected by FP&L is designed to:

a) provide the operator with an advanced warning of the approach to ICC
b) cover the full range of ICC from normal operation to complete core uncovery.

The ICC detection system that employs the FP&L sensor package and displays the sensor output enables the reactor operator to monitor system conditions associated with the approach to and the recovery from ICC. 5

2.1 DESCRIPTION OF ICC PROGRESSION

The instrument sensor package for ICC detection provides the reactor operator a continuous indication of the progression leading to and away from ICC. To ensure the selected instrument package provides such coverage, a methodical presentation of the conditions leading to and away from ICC is developed. In this development, the progression towards and away from ICC is divided into conditions based on physical processes occurring within the reactor vessel. 10 Six distinct ICC conditions are identified. These are characterized as follows:

Conditions Associated with the Approach to ICC

Condition 1a	Loss of fluid subcooling prior to the first occurrence of saturation conditions in the coolant.
Condition 2a	Falling coolant inventory within the upper plenum, from the top of the vessel to the top of the active fuel.
Condition 3a	Increasing core exit temperature produced by uncovery of the core resulting from the drop in the level of the mixture of vapor bubbles and liquid from the top of the active fuel to the minimum level during the event. 5

Conditions Associated with Recovery from ICC

Condition 3b	Decreasing core exit steam temperature resulting from the rising of the level to the top of the active fuel.
Condition 2b	Vessel fill by the increase in inventory above the fuel.
Condition 1b	Establishment of saturation conditions followed by an increase in fluid subcooling.

These conditions encompass all possible coolant situations associated with any ICC event progression. The conditions denoted with an "a" refer to fluid situations that occur during the approach to ICC. Conditions denoted by a "b" refer to fluid situations which occur during the recovery from ICC. Thus, "a" conditions differ from "b" conditions in the trending (directional behavior) of the associated parameters.

In order to provide indicators during the entire progression of an event, an ICC instrument system consists of instruments which provide at least one appropriate indicator for each of the physical conditions described above.

Applying this description of the "approach to", and "recovery from" ICC to ICC instrument selection:

a) provides assurance that the selected ICC system detects the entire progression.

b) demonstrates the extent of instrument diversity or redundancy which is possible with the available instruments.

Furthermore, by defining the ICC progression on a physical basis the general labels of "approach to", and "recovery from" ICC can now be associated with specific physically measurable processes. (See Sections 2.2, 2.3, and 2.4 of this appendix.)

The instrument package selected by FP&L to monitor the ICC event progression consists of (1) saturation margin monitors (SMM), (2) reactor vessel level monitors employing the HJTC design concept and (3) core exit thermocouples. The SMMs can indicate the initial occurrence of saturation (Condition 1a) and the achievement of a subcooled condition following core recovery (Condition 1b). The reactor vessel level monitors provide information to the operator on the decreasing liquid inventory in the reactor pressure vessel (RPV) regions above the fuel alignment plate (FAP), as well as the increasing RPV liquid inventory above the FAP following core recovery (Conditions 2a and 2b). The core exit thermocouples (CETs) monitor the increasing steam temperatures associated with ICC and the decreasing steam temperatures associated with recovery from ICC (Conditions 3a and 3b). 5

2.2 ADVANCED WARNING OF THE APPROACH TO ICC

The FP&L ICC instrumentation provides the operator with an advanced warning of the approach to ICC by providing indications of:

a) the loss of subcooling and occurrence of saturation (Condition 1a) with the SMM.

b) the loss of inventory in the RPV (Condition 2a) with the RVLMS.

c) the increasing core coolant exit temperature (Condition 3a) with CETs.

It should be noted that the RVLMS measures inventory (collapsed liquid level) rather than two-phase level. This measurement provides the operator with an advanced indication of the coolant level should conditions arise to cause the two-phase froth to collapse via system overpressurization, or the loss of operating reactor coolant pumps.

2.3 APPLICATION OF FP&L ICC DETECTION SYSTEM

Following an event leading to ICC the FP&L ICC detection system will provide information to the reactor operator so that he may:

a) verify that the core cooling safety function is being met,

b) establish the potential for fission product release.

Accomplishment of the core cooling safety function is verified via ICCI by observing (1) an increasing inventory level above the fuel alignment plate, (2) an increasing subcooling in the RPV and RCS piping or (3) a decreasing core exit steam superheat. The operator is informed about the progression of an event by both static and trend displays. The trending of ICC information enables the operator to quickly assess the success of automatically or manually performed mitigating actions. A chart indicating the ICCI trending during the various ICC progression conditions associated with the approach to and recovery from ICC is presented in Table 1.9B-1.

2.4 INSTRUMENT RANGE 5

FP&L uses saturation temperature and water inventory as indicators for the approach to and recovery from ICC when there is water inventory above the fuel alignment plate. These measurements characterize conditions 1a, 1b, 2a, and 2b of the ICC progression.

When the two-phase level is below the fuel alignment plate, the measurement of core exit fluid temperature represents a direct indication of the approach to, and recovery from ICC (Conditions 3a and 3b). Therefore, the FP&L ICC sensor package is sufficient to provide information to the reactor operator on the entire progression of an event with the potential of resulting in ICC.

3.0 INADEQUATE CORE COOLING INSTRUMENTATION DESIGN DESCRIPTION 5

This section describes the FP&L St. Lucie 2 Inadequate Core Cooling Instrument sensor package. The ICC instrumentation consists of four sensor types. The sensors include: 1) pressure transmitter on the pressurizer, 2) Resistance Temperature Detectors (RTD) in the hot and cold legs, 3) pairs of heated and unheated junction thermocouples (HJTC) arranged in an axial string in the upper plenum, and 4) Core Exit Thermocouples (CET). Except for the HJTC, these sensors already exist in all CE designed reactors. 13

The signals from the ICC sensors are processed to yield five variables. The ICC variables include 1) temperature margin to saturation from pressurizer pressure and temperature of RTD, 2) temperature margin to saturation from pressurizer pressure and temperature of unheated thermocouples in the HJTC, 3) collapsed coolant level above the core, detected by the HJTC, 4) temperature margin to saturation from CET and pressurizer pressure, and 5) core exit steam temperature from the CET.

The reactor vessel liquid inventory above the core and the fluid conditions at various locations in the primary system will be measured by:

- Saturation Margin Monitors 5

- Reactor Vessel Level Monitors

- Core Exit Thermocouples 10

These instruments collectively conform to the design requirements presented in Section 2.0 and functional requirements of Section 4.0 of this appendix. 5

The St. Lucie 2 ICC instrumentation package will provide the operator with indications of the approach to, existence of and recovery from ICC.

A functional diagram of the ICC instrumentation package is presented on Figure 1.9B-1.

The hot and cold leg temperatures (resistance analogs sensed in the control room) are sensed via conventional cabling from the primary (RCS) piping to the control room, where a resistance bridge measures the resistance of the RTD and 13 converts it to a 4 to 20 ma DC analog signal (current) which becomes an input to the Subcooled Margin Monitor (SMM). The pressurizer pressure transmitter provides a 4 to 20 ma DC analog signal from inside the containment to the control room via conventional cable. In the control room this signal is routed to the EFAS, RPS, and SMM. These pressure and temperature signals are now existing instrument measurement channels of which there are 4 each.

The HJTC and CET's are Chromel/Alumel thermocouples which provide a DC milivolt signal via Mineral Insulated (MI) cable from the reactor vessel to the containment penetration. Outside of the containment these signals are transmitted via conventional cables to the control room where they are processed for the SMM. (Fig. 1.9B-9) The signals from the various sensors are processed and then displayed (see table) on both QSPDS channels SA & SB. The QSPDS consists of microcomputers and plasma display units that are class IE.

Summary of Processing Requirements

Table 1.9B-6 lists the ICC variables. For each variable, the table summarizes 13 the thermal hydraulic requirements for display, trending and alarm.

3.1 SENSOR DESIGN 5

3.1.1 SATURATION MARGIN MONITORING

Saturation Margin Monitoring (SMM) provides information to the reactor operator on (1) the approach to and existence of saturation and (2) existence of core uncovery.

The SMM includes inputs from RCS cold and hot leg temperatures measured by RTDs, the temperature of the maximum of the top three Unheated Junction 10 Thermocouples (UHJTC), maximum core exit temperature, and pressurizer pressure sensors. The UHJTC input comes from the output of the HJTCS processing units. In summary, the sensor inputs are as follows:

Input	Range	
Pressurizer Pressure	0-3000 psia	
Cold Leg Temperature	50-750F	
Hot Leg Temperature	50-750F	12
Maximum UHJTC Temperature of top three sensors (from HJTC processing)	200-2300F	10
Maximum CET Temperature	200-2300F	

3.1.2 HEATED JUNCTION THERMOCOUPLE (HJTC) SYSTEM

The HJTC System measures reactor coolant liquid inventory above the fuel alignment plate with discrete HJTC sensors located at different levels within a separator tube ranging from the top of the fuel alignment plate to the reactor vessel head. The basic principle of system operation is the detection of a temperature difference between adjacent heated and unheated thermocouples.

As pictured in Figure 1.9B-2, the HJTC sensor consists of a Chromel-Alumel thermocouple near a heater (or heated junction) and another Chromel-Alumel 5 thermocouple positioned away from the heater (or unheated junction). In a fluid with relatively good heat transfer properties, the temperature difference between the adjacent thermocouples is small. In a fluid with relatively poor heat transfer properties, the temperature difference between the thermocouples is large.

The HJTC System is composed of two channels of HJTC instruments. Each HJTC instrument is manufactured into a probe assembly. The probe assembly includes eight HJTC sensors, a seal plug, and electrical connectors (Figure 1.9B-3).

The eight HJTC sensors are electrically independent. Details of the axial placements of the 16 HJTC sensors have not been finalized.

Two design features ensure proper operation under all thermal-hydraulic conditions. First, each HJTC is shielded to avoid overcooling due to direct water contact during two phase fluid conditions. The HJTC with the splash shield is referred to as the HJTC sensor (see Figure 1.9B-2). Second, a string of HJTC sensors is enclosed in a tube that separates the liquid and gas phases that surround it.

The separator tube (see Figure 1.9B-4) creates a collapsed liquid level that the HJTC sensors measure. This collapsed liquid level is directly related to the average liquid fraction of the fluid in the reactor head volume above the fuel alignment plate. This mode of direct in-vessel sensing reduces spurious effects due to pressure, fluid properties, and non-homogenousness of the fluid
medium. The string of HJTC sensors and the separator tube is referred to as 5
the probe assembly.

The probe assembly is housed in a stainless steel structure that protects it from flow loads. Figure 1.9B-5 shows the two radial locations of the HJTC probe assemblies. Installation arrangements are being developed for St. Lucie 2 and will be provided in a future amendment.

3.1.3 CORE EXIT THERMOCOUPLE (CET) SYSTEM

The core exit thermocouples provide a measure of core heatup via measurement of core exit steam temperature.

The design of the St. Lucie 2 In-core Instrumentation (ICI) system includes a Type K (Chromel-Alumel) thermocouple within each of the 56 ICI detector assemblies.

The junction of each thermocouple is located 18" above the top of the active fuel inside a structure which supports and shields the ICI detector assembly string from flow forces in the outlet plenum region. These Core Exit Thermocouples (CETs) monitor the temperature of the reactor coolant as it exits the fuel assemblies. The representative core exit temperature will be calculated as follows during normal RCS conditions (saturation margin alarm not active), non-valid core exit thermocouples (CETs) will be detected with out-of-scale checks, tolerance checks, and statistical analysis. The
representative core exit temperature will be selected from the upper end of 13
the temperature distribution of the remaining valid CETs. While a saturation margin alarm is active, indicating abnormal RCS conditions, the same method will be used to select the representative core exit temperature from among the valid CETs determined during prior normal operation. The out-of-scale failure checks are still performed. Figure 1.9B-6 depicts a typical ICI detector assembly, showing the CET. The core locations of the ICI detector assemblies are shown in Figure 1.9B-7.
5

Appendix D describes the present design of the CET system which will be used for the first cycle of St. Lucie Unit 2.

The CETs have a usable temperature range from 200F up to 2300F[4].

3.2 DESCRIPTION OF ICCI PROCESSING

The following sections provide a description of the processing control and display functions associated with each of the ICC detection instruments in the Safety Assessment System (SAS, primary displays) and the Qualified Safety Parameter Display System (QSPDS, backup displays). The sensor inputs for the major ICC parameters; saturation margin, reactor vessel inventory/temperature above the core, and core exit temperature are processed in the two-channel QSPDS and transmitted to the SAS for primary display and trending.

3.2.1 SATURATION MARGIN

The QSPDS processing equipment will perform the following saturation margin monitoring functions:

a) Calculate the saturation margin.

The saturation temperature is calculated from the minimum pressure 10
input. The temperature subcooled or superheat margin is the difference between saturation temperature and the sensor temperature input. Three temperatures subcooled or superheat margin presentations will be available. These are as follows:

1) RCS saturation margin - the temperature saturation margin based on the difference between the saturation temperature and the maximum temperature from the RTDs in the hot and cold legs.

2) Upper head saturation margin - temperature saturation margin based on the difference between the saturation temperature and the UHJTC temperature (based on the maximum of the top three UHJTC).

3) CET saturation margin - temperature saturation margin based on the difference between the saturation temperature and the maximum core exit temperature calculated from the CETs Subsection 2.2.3).

b) Process sensor outputs for determination of temperature saturation margin.

c) Provide an alarm output for an annunciator when temperature saturation margin reaches a preselected setpoint (expected to be within 0F to 50F
subcooled) for RCS or upper head saturation margin. 13

3.2.2 HEATED JUNCTION THERMOCOUPLE SYSTEM

The QSPDS processing equipment performs the following functions for the HJTCS:

a) Determine collapsed liquid level above core. 10

The heated and unheated thermocouples in the HJTCS are connected in such a way that absolute and differential temperature signals are available. This is shown on Figure 1.9B-8. When liquid water surrounds the thermocouples, their temperature and voltage outputs are small. The voltage $V_{(A-C)}$ is, therefore, small. In the absence of liquid, the thermocouple temperatures and output voltages become large, causing $V_{(A-C)}$ to rise. When V of the individual HJTC rises above a predetermined setpoint, liquid inventory does not exist at this HJTC position.

b) Determine the maximum upper plenum/head fluid temperature from the top three unheated thermocouples for use as an output to the SMM calculation. (The temperature processing range is from 200F to 2300F).

c) Process input signals to display collapsed liquid level and unheated junction thermocouple temperatures.

d) Provide an alarm output when any of the HJTCS detects the absence of liquid level. 10

e) Provide control of heater power for proper HJTC output signal level. Figure 1.9B-9 shows the design for one of the two channels which includes the heater controller power supplies.

3.2.3 CORE EXIT THERMOCOUPLE SYSTEM

The QSPDS performs the following CET processing functions:

a) Process core exit thermocouple inputs for display.

b) Calculate a maximum core exit temperature.

c) Provide an alarm output when temperature reaches a preselected value.

d) Process CETs for display of CET temperature and superheat.

These functions are intended to meet the design requirements of NUREG-0737, II.F.2 Attachment 1.

3.3 SYSTEM DISPLAY

The ICC detection instrumentation displays in both the SAS (primary displays) and the QSPDS (backup displays have an ICC summary page as part of the core heat removal control critical function supported by more detailed display pages for each of the ICC variable categories.

The summary page will include:

a) RCS/Upper Head saturation margin - the maximum of the RCS and Upper Head saturation margin.

b) Reactor vessel level above the core.

c) Maximum core exit temperature.

d) Core exit saturation margin.

Since the SAS has more display capabilities than the QSPDS (such as color graphics, trending, and a larger format), additional information may be added and with a better presentation than is available with the QSPDS. These variables are incorporated in other SAS system displays. 10

Since the SAS receives both QSPDS channels of ICC input, the SAS displays both channels of ICC information. The QSPDS displays only one channel of ICC information for each video display unit.

Although all inputs are accessible for trending and historical recall, the SAS has a dedicated ICC trend page for RCS/upper head saturation margin, reactor vessel level, and representative core exit temperature and core exit saturation margin. These are also available as analog outputs from the QSPDS cabinet.

Each QSPDS safety-grade backup display also has available the most reliable basic information for each of the ICC instruments. These displays are human engineered to give the operator clear unambiguous indications. The backup displays are designed:

a) To give instrument indications in the remote chance that the primary display becomes inoperable.

b) To provide confirmatory indications to the primary display.

c) To aid in surveillance tests and diagnostics.

The following sections describe displays as presently conceived for each of the ICC instrument systems. Both primary and backup displays are intended to be designed consistent with the criteria in II.F.2 Attachment 1 and Appendix B.

3.3.1 SATURATION MARGIN DISPLAY

The following information is presented on the SAS and QSPDS displays:

a) Temperature and pressure saturation margins for RCS, Upper Head, Core Exit Temperature.

b) Temperatures and pressure inputs.

3.3.2 HEATED JUNCTION THERMOCOUPLE SYSTEM DISPLAY

The following information is displayed on the SAS and QSPDS displays:

a) Liquid inventory level above the fuel alignment plate derived from the eight discrete HJTC positions.

b) 8 discrete HJTC positions indicating liquid inventory above the fuel alignment plate.

c) Inputs from the HJTCS: 10

- a. Unheated junction temperature at the 8 positions.
- b. Heated junction temperature at the 8 positions.
- c. Differential junction temperature at the 8 positions.

3.3.3 CORE EXIT THERMOCOUPLE DISPLAY

The following information is displayed on the SAS display:

a) A spatially oriented core map indicating the temperature at each of the CET's.

b) A selective reading of CET temperatures.

c) The maximum core exit temperature.

The following information is displayed on the QSPDS display:

a) Maximum core exit temperature.

b) A selective reading of the CET temperatures (two highest temperatures in each quadrant)

c) A listing of all core exit temperatures.

4.0 INSTRUMENT FUNCTIONAL DESCRIPTION

In the following sections a functional description of the instruments of the ICC Detection System is given and the function of the instruments is related to the ICC conditions which are described in Section 2.1 of this appendix.

4.1 SUBCOOLING AND SATURATION

The parameters measured to detect subcooling and saturation are the RCS and UHJTC coolant temperature and the pressurizer pressure. Temperature is measured in the hot legs and the vessel upper head region. 5

4.1.1 INSTRUMENT RANGE AND RESPONSE TIME

In order to include all initial conditions and ICC event types, the instruments to detect initial saturation should encompass the range from the shutdown cooling entry conditions, which are the lowest temperature conditions for which the reactor primary system provides the heat removal safety function, up to the saturation conditions at the pressurizer safety valve pressure rating, which are the highest temperature conditions which can occur while the core is covered with coolant.

The instrument response time should be fast enough so as not to limit or delay the reactor operator from taking appropriate actions.

Generic analyses done to date show that existing or planned instruments have adequate range and response.

The information which is derived from the reactor vessel temperature and pressure measurements is the amount of subcooling during the initial approach to saturation conditions and the occurrence of saturation (Condition 1a) and, the reestablishment of subcooled conditions (Condition 1b).

4.2 COOLANT INVENTORY MEASUREMENT IN REACTOR VESSEL

The Reactor Coolant System is at subcooled or saturation conditions until
sufficient coolant is lost to lower the two-phase level to the top of the 11
active core. A Heated Junction Thermocouple System provides a direct measurement during this period. The parameter which is measured is the collapsed liquid level above the fuel alignment plate. The collapsed level represents the amount of liquid mass which is in the reactor vessel above the core. Measurement of the collapsed water level was selected in preference to measuring two-phase level, because it is a direct indication of the water
inventory while the two-phase level is determined by water inventory and void 5
fraction.

The collapsed level is obtained over the same temperature and pressure range as the saturation measurements, thereby encompassing all operating and accident conditions where it must function. Also, it is intended to monitor Condition 2b (following core recovery). Therefore, it must survive the high steam temperature which may occur during the preceeding core uncovery interval.

4.2.1 RANGE AND RESPONSE TIME

The level range extends from the top of the vessel down to the top of the fuel alignment plate. The response time is short enough to track the level during small break LOCA events. The resolution is sufficient to show the initial level drop, the key locations near the hot leg elevation and the lowest levels just above the alignment plate. This provides the operator with adequate indication to track the progression of Conditions 2a and 2b and to detect the consequences of his mitigating actions or the functionability of automatic equipment.

4.3 CORE EXIT STEAM TEMPERATURE

The overall intent of ICC detection is the detection of the potential for fission product release from the reactor fuel. The parameter which is related to the potential for fission product release is the fluid temperature at the core exit, rather than the uncovery of the core by coolant. After the core 5
becomes uncovered, the fluid leaving the core is superheated steam and the trending of the superheat provides the operator with an indication of whether he is approaching or receding from an ICC condition. Unlike the measure of coolant inventory, the CET provides a direct indication of the ICC direction and severity.

The amount of superheat of the steam leaving the core will be measured by the core exit thermocouples. The time behavior of the superheat temperature is similar to the time behavior of the cladding temperature.

The core exit steam temperature is measured with the thermocouples included in the In-Core Instrument (ICI) string. They are located inside the ICI support tube, at an elevation a few inches above the fuel alignment plate. Generic calculations of a similar installation for representative uncovery events show that the thermocouples respond sufficiently fast to the increasing steam temperature. Plant specific calculations on the St. Lucie 2 configuration will be made to verify this response.

4.3.1 RANGE AND RESPONSE TIME

The required temperature range of the thermocouples extends from 200F, the lowest saturation temperature at which uncovery may occur, up to 1200F which gives a significant measure of superheat. The approximate upper service temperature limit of the thermocouples is 1800F. Therefore, the desired range 10
can be met with the present thermocouple capabilities. Thermocouples are 5
expected to function with reduced accuracy at even higher temperatures, so the range for processing the thermocouple output could extend to about 2300F (see 10
Section 6.3 of this appendix).

It is not necessary that the core exit steam temperature be measured accurately. It is only necessary to the reactor operator that his indicator of steam temperature provide an analogous trending (with a small time delay) of the fuel temperature behavior. Therefore, through the steam temperature 5
trending the operator can monitor the consequences of his remedial actions. This information is of primary interest to the operator during core uncovery (Conditions 3a and 3b).

5.0 SYSTEM QUALIFICATION

The qualification program for St. Lucie-2 ICC instrumentation will be based on the following three categories of ICC instruments:

a) Sensor instrumentation within the pressure vessel.

b) Instrumentation components and systems which extend from the primary 10
pressure boundary up to and including the primary display (SAS) isolator and including the backup displays (QSPDS).

c) Instrumentation systems which comprise the primary display equipment.

The in-vessel sensors represent the best equipment available consistent with
qualification and schedular requirements (as per NUREG-0737, Appendix B). 5
Design of the equipment will be consistent with current industry practices in
this area. Specifically, instrumentation will be designed such that they meet
appropriate stress criteria when subjected to normal and design basis accident
loadings. Seismic qualification to safe shutdown conditions will verify
function after being subjected to the seismic loadings.

The out-of-vessel instrumentation system, up to and including the primary
display isolator, and the backup displays will be environmentally qualified in
accordance with IEEE-323-1974, as interpreted by CENPD-255 (Rev. 01). 10
Plant-specific containment temperature and pressure design profiles will be
used where appropriate in these tests. This equipment will also be 5
seismically qualified according to IEEE-STD-344-1975. CENPD-182, "Seismic 10
Qualification of CE Instrumentation Equipment, Combustion Engineering, Inc."
(May 1977) describes the methods used to meet the criteria of this document.

5
FP&L is evaluating what is required to augment the out-of-vessel Class IE
instrumentation equipment qualification program to NUREG-0588. Consistent
with Appendix B of NUREG-0737, the out-of-vessel equipment under procurement
is the best available equipment. See Section 3.11 for further information on 10
equipment qualifications.

6.0 SYSTEM VERIFICATION TESTING

This section describes tests and operational experience with ICC instruments.

6.1 RTD AND PRESSURIZER PRESSURE SENSORS

The hot and cold leg RTD temperature sensors and the pressurizer pressure sensors are standard NSSS instruments which have well known responses. No special verification tests have been performed nor are planned for the future. These sensors along with UHJTC inputs provide basic reliable temperature and pressure inputs which are considered adequate for use in the SMM and other additional display functions.

6.2 HJTC SYSTEM SENSORS AND PROCESSING

The HJTC System is a new system developed to indicate liquid inventory above the core. Since it is a new system, extensive testing has been performed and further tests are planned to assure that the HJTC System will operate to unambiguously indicate liquid inventory above the core.

The testing is divided into three phases:

Phase 1 - Proof of Principle Testing
Phase 2 - Design Development Testing 5
Phase 3 - Prototype Testing

The first phase consisted of a series of five tests, which have been completed. The testing demonstrated the capability of the HJTC instrument design to measure liquid level in simulated reactor vessel thermal-hydraulic conditions (including accident conditions).

Proof of Principle Testing

Test 1 Autoclave test to show HJTC (thermocouples only) response to water or steam.

In April 1980, a conceptual test was performed with two thermocouples in one sheath with one thermocouple as a heater and the other thermocouple as the inventory sensor. This configuration was placed in an autoclave (pressure vessel with the capabilities to adjust temperature and pressure). The thermocouples were exposed to water and then steam environments. The results demonstrated a significant output difference between steam and water conditions for a given heater power level.

Test 2 Two-phase flow test to show bare HJTC sensitivity to voids.

In June 1980, a HJTC (of the present differential thermocouple design) was placed into the Advanced Instrumentation for Reflood Studies (AIRS) test facility, a low pressure two-phase flow test facility at Oak Ridge National Laboratory (ORNL). The HJTC was exposed to void fractions at various heater power levels. The results demonstrated that the bare HJTC output was virtually the same in two-phase liquid as in subcooled liquid. The HJTC did generate a significant output in 100 percent quality steam.

Test 3 Atmospheric air-water test to show the effect of a splash shield.

A splash shield was designed to increase the sensitivity to voids. The splash shield prevents direct contact with the liquid in the two-phase fluid. The HJTC output changed at intermediate void fraction two-phase fluid. The results demonstrated that the HJTC sensor (heated junction thermocouple with the splash shield) sensed intermediate void fraction fluid conditions.

Test 4 High pressure boil-off test to show HJTC sensor response to reactor thermal-hydraulic conditions.

In September 1980, a CE HJTC sensor (HJTC with splash shield) was installed and tested at the ORNL Thermal-Hydraulics Test Facility (THTF). The HJTC sensor was subjected to various two-phase fluid conditions at reactor temperatures and pressures. The results verified that the HJTC sensor is a device that can sense liquid inventory under normal and accident reactor vessel high pressure and temperature two-phase conditions.

Test 5 Atmospheric air-water test to show the effect of a separator tube.

A separator tube was added to the HJTC design to form a collapsed liquid level
so that the HJTC sensor directly measures liquid inventory under all simulated
two-phase conditions. In October 1980, atmospheric air-water tests were
performed with HJTC sensor and the separator tube. The results demonstrated
that the separator tube did form a collapsed liquid level and the HJTC output 5
did accurately indicate liquid inventory. This test verified that the HJTC
instrument, which includes the HJTC, the splash shield, and the separator
tube, is a viable measuring device for liquid inventory.

Design Development Testing

The Phase 2 test program consisted of high pressure and temperature tests of the probe assembly under steady state and transient conditions. These tests, performed during May 1981 at CE, provided design verification information for the HJTC instrument under conditions expected to occur in the reactor.

Test Series 1 Single Phase Tests

The HJTC response was measured as the water level was changed by filling or draining the test vessel at different rates. Information on HJTC temperature response at various pressures and sensor heater powers was obtained.

Test Series 2 Two-Phase Tests

Steam was injected at the bottom of the test vessel to produce a two-phase mixture. The HJTC response was measured as the water level was varied by filling or draining. The results were similar to the single phase tests, indicating that the HJTC can measure the collapsed water level in a two-phase environment under conditions similar to those encountered during a small break LOCA.

Test Series 3 Depressurization Transient Tests

The HJTC response during a depressurization transient was determined by 5
allowing the test vessel to blowdown from high pressure. Results of these
tests are still being reviewed, additional information on this test series
will be provided via separate correspondence. 10

Prototype Testing 5

The Phase 3 test program will consist of high temperature and pressure testing
of the manufactured prototype system HJTC probe assembly and processing
electronics. Verification of the HJTC system prototype will be the goal of
this test program. The results of the Phase 3 test program will be submitted 10
to the NRC under separate correspondence.

6.3 CORE EXIT THERMOCOUPLES

Testing at ORNL was performed to evaluate the response of CETs under simulated
accident conditions[4]. This test in addition showed that the instruments 5
remained functional up to 2300F. This test along with previous reactor
operating experience are considered sufficient to verify the response of CETs.

7.0 OPERATING INSTRUCTIONS

The CE Owners Group is defining a program for development of further emergency procedure guidelines and operator training materials associated with the ICC Detection System described in Section 3 of this appendix. This program is expected to provide these guidelines and training materials during the fourth quarter of 1981. These guidelines and training materials will be based on modifications to existing ICC guidelines. 5

The existing guidelines for reactor operators to use to detect ICC and take corrective action have been developed by the CE Owners Group and submitted to NRC for review[5]. These guidelines have been used to review and revise the plant emergency procedures for St. Lucie Unit 2. In addition, the CE Owners Group has developed reactor operator training materials concerning ICC.

8.0 COMPARISON OF DOCUMENTATION REQUIREMENTS OF POSITION II.F.2, ATTACHMENT 1 AND APPENDIX B WITH STATUS REPORT

Tables 1.9B-2 through 1.9B-4 provide a point by point comparison of the documentation required by NUREG-0737, Item II.F.2, the requirements of Attachment 1 of Item II.F.2, and the Criteria of Appendix B of NUREG-0737 with the inadequate core cooling detection instrumentation to be installed in St. Lucie Unit 2. 5

9.0 SCHEDULE FOR ICC INSTRUMENTATION INSTALLATION 5

Florida Power and Light is actively pursuing, procuring and expediting equipment necessary to implement requirements for TMI item II.F.2, "Instrumentation for Inadequate Core Cooling". However, this commitment is 10 predicated upon manufacturers and vendors meeting their scheduled delivery promises (See Table 1.9B-5). When firm schedules are developed FP&L will inform NRC of the most probable implementation date.

10.0 OPERATION WITH INTERIM ICC INSTRUMENTATION

Procedures and training for identification of an approach to ICC on St. Lucie
2 have been developed using existing instrumentation. These procedures are 5
currently undergoing NSSS vendor review and will be reviewed by the NRC PIRB
prior to startup of St. Lucie Unit 2.

With final ICC instrumentation installation scheduled for first refueling, the
plant will be operated during the first cycle using existing instrumentation.
This includes two of three instrumentation systems planned for the final ICC
system. Those two systems are: 10

- Subcooled Margin Monitor (SMM)
- Core Exit Temperature (CETs)

The HJTCS will be absent from the interim system. This instrumentation will 5
be integrated with:

- Emergency Operating Instructions
- Operator Training for ICC Recognition and Mitigation

Emergency Operating Instructions (EOI)

To be submitted in a separate correspondence prior to fuel load. 10

Training

FP&L will complete operator training (including simulator training) prior to
fuel load on use of the existing control room instrumentation related to ICC 5
as utilized in the approved EOIs.

Based on the existing instrumentation, training and procedures for ICC
recognition, FP&L is confident that St. Lucie 2 can be safety operated prior
to implementation of the final ICC instrumentation. (see Section 9.0 for 10
schedule).

11.0 REFERENCES

1. NUREG-0737, "Clarification of TMI Action Plan Requirements," U.S. Nuclear Regulatory Commission, November, 1980.

2. CEN-117, "Inadequate Core Cooling - A Response to NRC IE Bulletin 79-06C, Item 5 for Combustion Engineering Nuclear Steam Supply Systems," Combustion Engineering, October, 1979.

3. CEN-125, "Input for Response to NRC Lessons Learned Requirements for Combustion Engineering Nuclear Steam Supply Systems," Combustion Engineering, December, 1979. 5

4. Anderson, R.L., Banda, L.A., Cain, D.G., "Incore Thermocouple Performance Under Simulated Accident Conditions," IEEE Nuclear Science Symposium, Vol. 28, No. 1, page 773, Figure 81.

5. Letter CE Owners Group to NRC, "CE Generic Emergency Procedure Guidelines," December 10, 1980.

TABLE 1.9B-1

ICC STATUS AS AVAILABLE TO THE OPERATOR FROM ICC INSTRUMENTATION TRENDING

I. APPROACHING AN ICC CONDITION

CONDITION	SUBCOOLING MEASURED BY SMM	WATER INVENTORY MEASURED BY HJTC PROBE	COOLANT SUPERHEAT MEASURED BY CET
1a	DECREASING	CONSTANT	CONSTANT
2a	CONSTANT	DECREASING	CONSTANT
3a	CONSTANT	CONSTANT	INCREASING

II. RECEDING FROM AN ICC CONDITION

CONDITION	SUBCOOLING MEASURED BY SMM	WATER INVENTORY MEASURED BY HJTC PROBE	COOLANT SUPERHEAT MEASURED BY CET
3b	CONSTANT	CONSTANT	DECREASING
2b	CONSTANT	INCREASING	CONSTANT
1b	INCREASING	CONSTANT	CONSTANT

5

TABLE 1.9B-2

EVALUATION OF ICC DETECTION INSTRUMENTATION TO DOCUMENTATION REQUIREMENTS OF NUREG 0737 ITEM II.F.2

ITEM	RESPONSE
1.a.	Description of the ICC Detection Instrumentation is provided in Section 3.0. The instrumentation to be added includes the QSPDS, the Probe Assemblies, and Improved ICI Detector Assemblies (including CETs).
1.b.	The instrumentation described in Section 3.0 will be the ICC detection instrumentation design for St. Lucie Unit 2.
1.c.	The Planned modifications to the existing Unit 2 instrumentation will be made prior to fuel load. Modifications include replacing the SMM with the QSPDS, design, procurement and installation of the HJTCS probe assemblies, and improved ICI Detector Assemblies (which necessitate installation of improved ICI Nozzle Flanges). The final ICC Detection Instrumentation will be as described in Section 3.0.
2.	The design analysis and evaluation of the ICC Detection Instrumentation is discussed in Sections 2.0 and 4.0 and Appendix A. Testing is discussed in Section 6.0. 10
3.	The HJTCS has one remaining test phase. The Phase 3 test program will consist of high temperature and pressure testing of a manufactured production prototype system HJTCS probe assembly and processing electronics. The Phase 3 test program will be executed at the CE test facility used for the Phase 2 test and is expected to be completed by the first quarter of 1982. Results will be reported to the NRC by separate correspondence. No special verification or experimental tests are planned for the hot leg and cold leg RTD sensors, the pressurizer pressure sensors, or the Type K (chromel-alumel) core exit thermocouples since they are standard high quality nuclear instruments with well known responses. For qualification testing, all out-of-vessel sensors and equipment, including the QSPDS up to the including the isolation to the SAS, will be environmentally qualified to IEEE Std. 323-1974 as interpreted by CENPD-255 Rev. 01, "Qualification of CE Instruments" and seismically qualified to IEEE Std. 344-1975, as interpreted by CENPD-182, "Seismic Qualification of CE Instrumentation Equiment". (See Sections 3.10 and 3.11 for further information)

TABLE 1.9B-2 (Cont'd)

ITEM — RESPONSE

4. This table evaluates the ICC Detection Instrumentation's conformance to the NUREG-0737, Item II.F.2 documentation requirements. Table 1.9B-3 evaluated conformance to Attachment 1 of Item II.F.2. Table 1.9B-4 evaluates conformance to Appendix B of NUREG-0737.

5. The ICC detection instrumentation processing and display consists of computer systems; the 2 redundant-channel, safety-grade microcomputer based QSPDS and the SAS. The ICC inputs are acquired and processed by the safety grade QSPDS and isolated and transmitted to the primary display in the SAS. The QSPDS also has the seismically qualified backup displays for the ICC detection instruments. The software functions for processing are listed in Section 3.2, the functions for display are listed in Section 3.3.

The software for the QSPDS is being designed consistent with the
recommendations of the draft standard, IEEE Std. P742/ANS 10
4.3.2, "Criteria for the Application of Programmable Digital Computer Systems in the Safety Systems of Nuclear Power Generating Stations". This design procedure verifies and validates that the QSPDS software is properly implemented and integrated with the system hardware to meet the system's functional requirements. This procedure is quality assured by CE. Since CE has designed the only licensed safety grade digital computer system in the nuclear industry, CE has the facilities and experience to design reliable computer systems.

The QSPDS hardware is designed as a redundant safety-grade computer system which is designed to the unavailability goal of 0.01 with the appropriate spare parts and maintenance support.

6. Section 9.0 discusses the schedule for installation and implementation of the complete ICC Detection Instrumentation.

7. Guidelines for use of the ICC detection Instrumentation are discussed in Section 7.0.

8. Section 7.0 discusses the emergency procedures to be implemented upon incorporation of the complete ICC Detection System.

9. The following describes additional submittals that will be provided to support the acceptability of the final ICC Detection Instrumentation.

   1) Environmental and Seismic Qualification of the instrumentation equipment. (See Sections 3.10 and 3.11 for further information)

   2) Modifications to emergency procedures (prior to fuel load)

   3) Changes to Technical Specifications (prior to fuel load)

TABLE 1.9B-3

EVALUATION OF ICC DETECTION INSTRUMENTATION TO ATTACHMENT 1 OF II.F.2 5

ITEM	RESPONSE
1.	St. Lucie 2 has 56 core exit thermocouples (CETs) distributed uniformly over the top of the core, Subsection 3.1.3 has a description of the CET sensors, Figure 1.9B-7 depicts the locations of the CETs.
2.	The SAS meets the primary display requirements for CET temperatures.
2.a.	A spatial CET temperature map is available on demand.
2.b	A selective representative CET temperature will be displayed continuously on demand. Although not finalized, this temperature will be either the maximum CET temperature or the average of the five highest CET temperatures. 10
2.c.	The SAS provides direct readout of CET temperature with a dedicated display page. The line printer provides the hardcopy capability for recording CET temperatures.
2.d.	The SAS has an extensive trend and historical data storage and retrieval system. The historical data storage and retrieval system function allows all ICC inputs to be recorded, stored, and recalled by the operator. The operator (and other user stations) can graphically trend any CET value on the display screen. A dedicated ICC trend page which includes the representative CET temperature and representative CET saturation margin will be accessible to the users.
2.e.	The SAS has alarm capabilities and visually displayed value alarms on the system level pages.
2.f.	The SAS is an extensively human-factor designed display system which allows quick access to requested displays.
3.	ICC instrumentation (QSPDS) design incorporates a minimum of one backup display with the capability of selective reading of a minimum of 16 operable thermocouples, four from each quadrant. All CET temperatures can be displayed within six minutes.

TABLE 1.9B-3 (Cont'd)

ITEM	RESPONSE
4.	The types and locations of displays and alarms are determined for the primary display (SAS) by performing a human-factors analysis. The QSPDS also incorporates human factors engineering. The use of these display systems will be addressed in operating procedures, emergency procedures, and operator training. 10
5.	The ICC instrumentation was evaluated for conformance to Appendix B of NUREG-0737 (see Table 1.9B-4).
6.	The QSPDS channels are Class IE, electrically independent, energized from independent station Class IE power sources and physically separated in accordance with Regulatory Guide 1.75 "Physical Independence of Electric Systems" January 1975 (R1) up to and including the isolation devices.
7.	ICC instrumentation shall be environmentally qualified pursuant to CE owners group qualification program. The isolation devices in the QSPDS are accessible for maintenance following an accident. 5
8.	Primary and backup display channels are designed to provide the highest availability possible. The QSPDS is designed to provide 99 percent availability. The availability of the QSPDS will be addressed in the Technical Specifications.
9.	The quality assurance provision of Appendix B, Item 5, will be applied to the ICC detection instruments as described in the Appendix B evaluation in Table 1.9B-4.

TABLE 1.9B-4

EVALUATION OF ICC DETECTION INSTRUMENTATION
TO APPENDIX B OF NUREG-073

ITEM	RESPONSE
1.	The ICC detection instrumentation is environmentally and seismically qualified as specified in Section 5.0. The isolation devices in the QSPDS are accessible for maintenance following an accident.
2.	The ICC detection instrumentation through the QSPDS 1E isolators meet the single failure requirements specified in Appendix B of NUREG 0737.
3.	The ICC detection instrumentation through the QSPDS 1E isolators are powered from the Class 1E power sources for channels A and B. 5
4.	The ICC detection instrumentation through the QSPDS 1E isolators are designed to operate during normal as well as emergency conditions. The availability will be addressed in the technical specification.
5.	Recommendations of the following Regulatory Guides were considered in the design of ICC instrumentation:

1.28 "Quality Assurance Program Requirements (Design & Construction)"

1.30 "Quality Assurance Reuirements for the Installation Inspection and Testing of Instrumentation and Electric Equipment".

1.38 "Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage and Handling of Items for Water-Cooled Nuclear Power Plants".

1.58 "Qualification of Nuclear Power Plant Inspection, Examination, and Testing Personnel".

1.64 "Qualifty Assurance Requirements for the Design of Nuclear Power Plants".

1.74 "Quality Assurance Terms and Definitions".

1.88 "Collection, Storage, and Maintenance of Nuclear Power Plant Quality Assurance Records".

1.123 "Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants".

TABLE 1.9B-4 (Cont'd)

ITEM	RESPONSE	
5.	1.144 "Auditing of Quality Assurance Programs for Nuclear Power Plants".	5
6.	The ICC detection instrumentation outputs are continuously available on the QSPDS displays through manual callup of displays. Additionally, one channel of analog trend recording will continuously indicate the ICC summary variables.	
7.	The ICC instrumentation is designed to provide readout display and trending information to the operator through the SAS and analog trend recording of the ICC summary variables. (See Section 3.3).	10
8.	The inadequate core cooling instrumentation is specifically and singularly identified so that the operator can easily discern their use during an accident condition.	
9.	Transmission of signals from instruments of associated sensors between redundant 1E channels or between 1E and non-1E instrument channels are isolated with isolation devices qualified to the provisions of Appendix B.	5
10.	The QSPDS consists of two redundant channels to avoid interruptions of display due to a single failure. If in the remote chance that one complete QSPDS channel fails, the operator has: 1) Additional channels of ICC sensor inputs for cold leg temperature, hot leg temperature, and pressurizer pressure on the control board separate from the QSPDS. 2) The HJTCS and CET have multiple sensors in each channel for the operator to correlate and check inputs. 3) The HJTCS sensor output may be tested by the operator reading the temperature of the unheated thermocouple and comparing to other temperature indications. 4) Other variables are available to the operator on the Main Control Board for verifying the ICC parameter.	10 5
11.	Servicing, testing and calibrating programs shall be consistent with operating technical specifications.	
12.	The ICC instrumentation, including the QSPDS, are not intended to be removed or bypassed during operation. Administrative control will be necessary to remove power from a channel.	10

TABLE 1.9B-4 (Cont'd)

ITEM	RESPONSE	
13.	The system design is such as to facilitate administrative control of access to all setpoints adjustments, calibration adjustments and test points.	5
14.	The QSPDS is designed to minimize anomalous indications to the operator (see Section 3.3).	10
15.	Instrumentation is designed to facilitate replacement of components or modules. The instrumentation design is such that malfunctioning components can be identified easily.	5
16.	The design incorporates this requirement to the extent practical.	
17.	The design incorporates this requirement to the extent practical.	
18.	The system is designed to be capable of periodic testing of instrument channels.	

TABLE 1.9B-5

I.C.C. DELIVERY SCHEDULE
AS OF NOVEMBER 1981

ITEM	In Order - Started	Delivery Date	
1. Fixed core exit thermocouple (CET)	8-81	9-82	
2. H.J.T.C. (Heated junction thermocouple)	1-81 (prototype completed)	9-82	
3. M.I. Cable	9-81	6-82	10
4. Modification to ICI nozzle and head H.J.T.C. shroud	6-81 (started)	12-81 (Completed)	
5. Q.S.P.D.S. calculator - displays	7-81	9-82	
6. Process instrumentation Q.S.P.D.S. (subcooling margin monitor)	12-81	7-82	

TABLE 1.9B-6

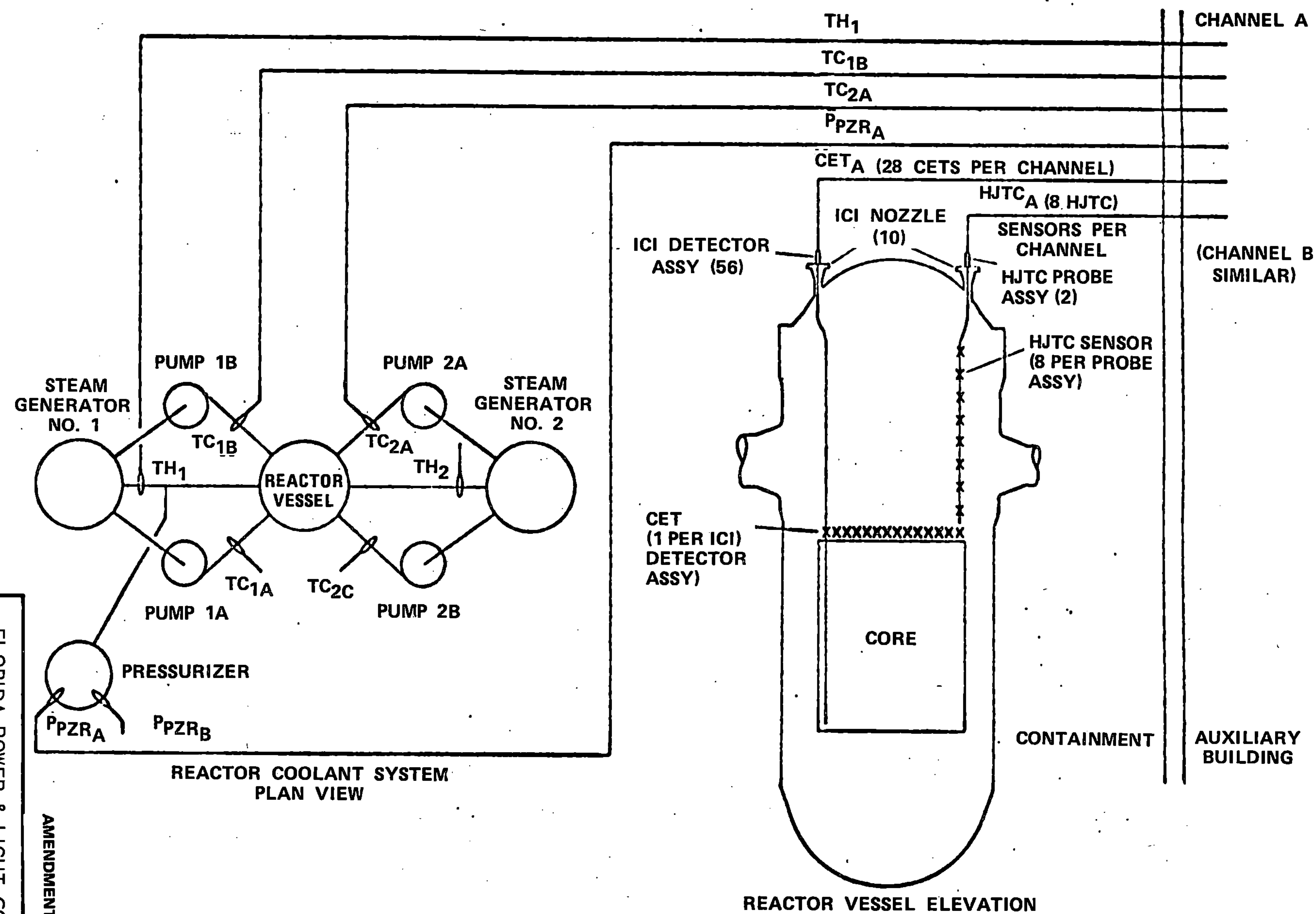
SUMMARY OF PROCESSING REQUIREMENTS

ICC Variable	Operator Access To Individual Sensor Input	Continuous Trended Display	Audible Alarm
Saturation Margin From RTDs	X	X(1)	X(1)
Saturation Margin From HJTC	X		
Saturation Margin From CETs	X	X	X(2)
Collapsed Level From HJTC	X	X	X(3)
Temperature From CETs	X	X	X(2)

13

(1) Highest temperature used for trend of Saturation Margin and for alarm on approach to saturation.
(2) Alarm only earlier of CET superheat or maximum CET temperature and only after prior saturation alarm (1).
(3) Alarm on first level indication.

13



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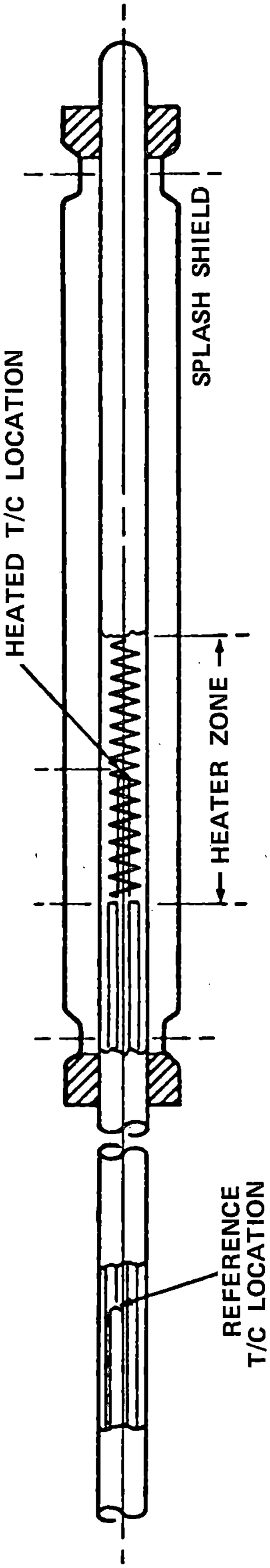
FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

ICC DETECTION INSTRUMENTATION
FIGURE 1.9B-1



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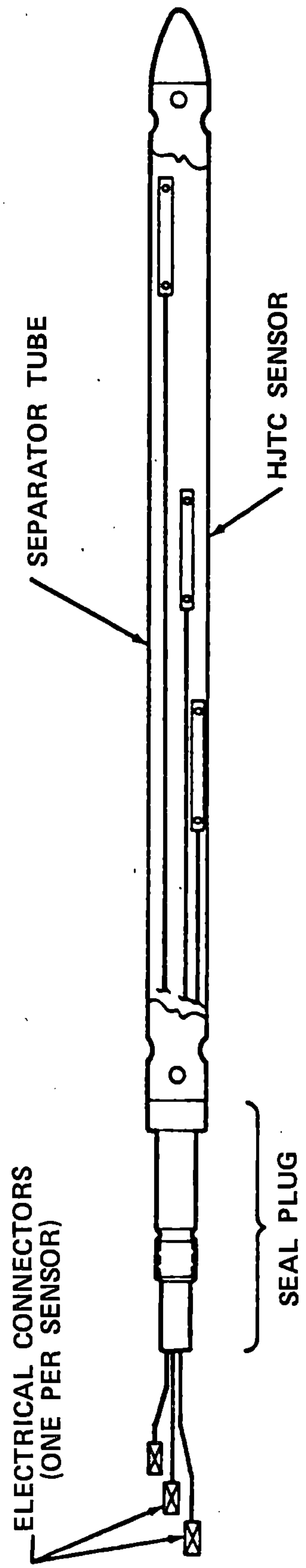
ST. LUCIE PLANT UNIT 2

HJTC SENSOR – HJTC/SPLASH SHIELD

FIGURE 1.9B-2



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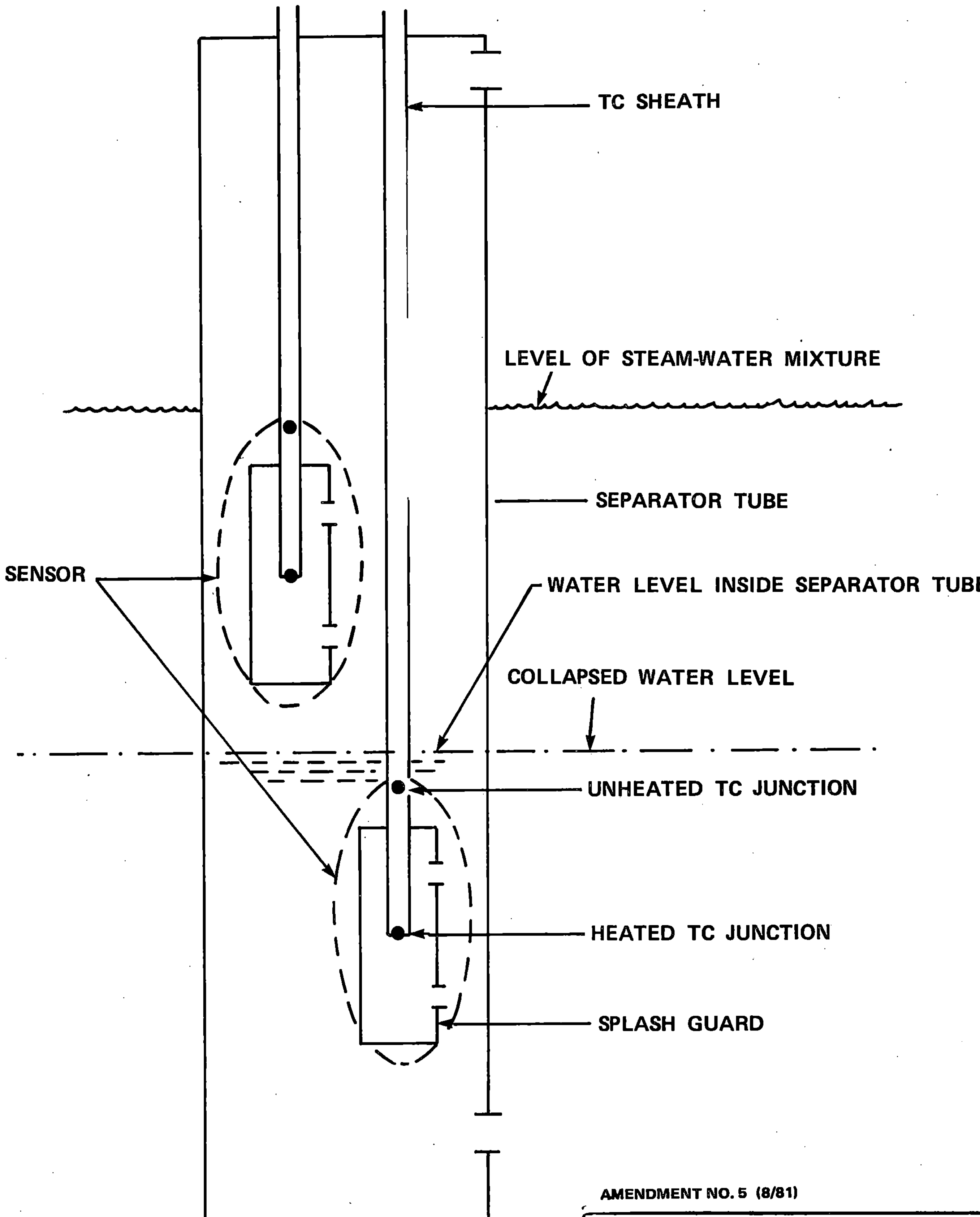
HEATED JUNCTION
THERMOCOUPLE PROBE
ASSEMBLY

FIGURE 1.9B-3



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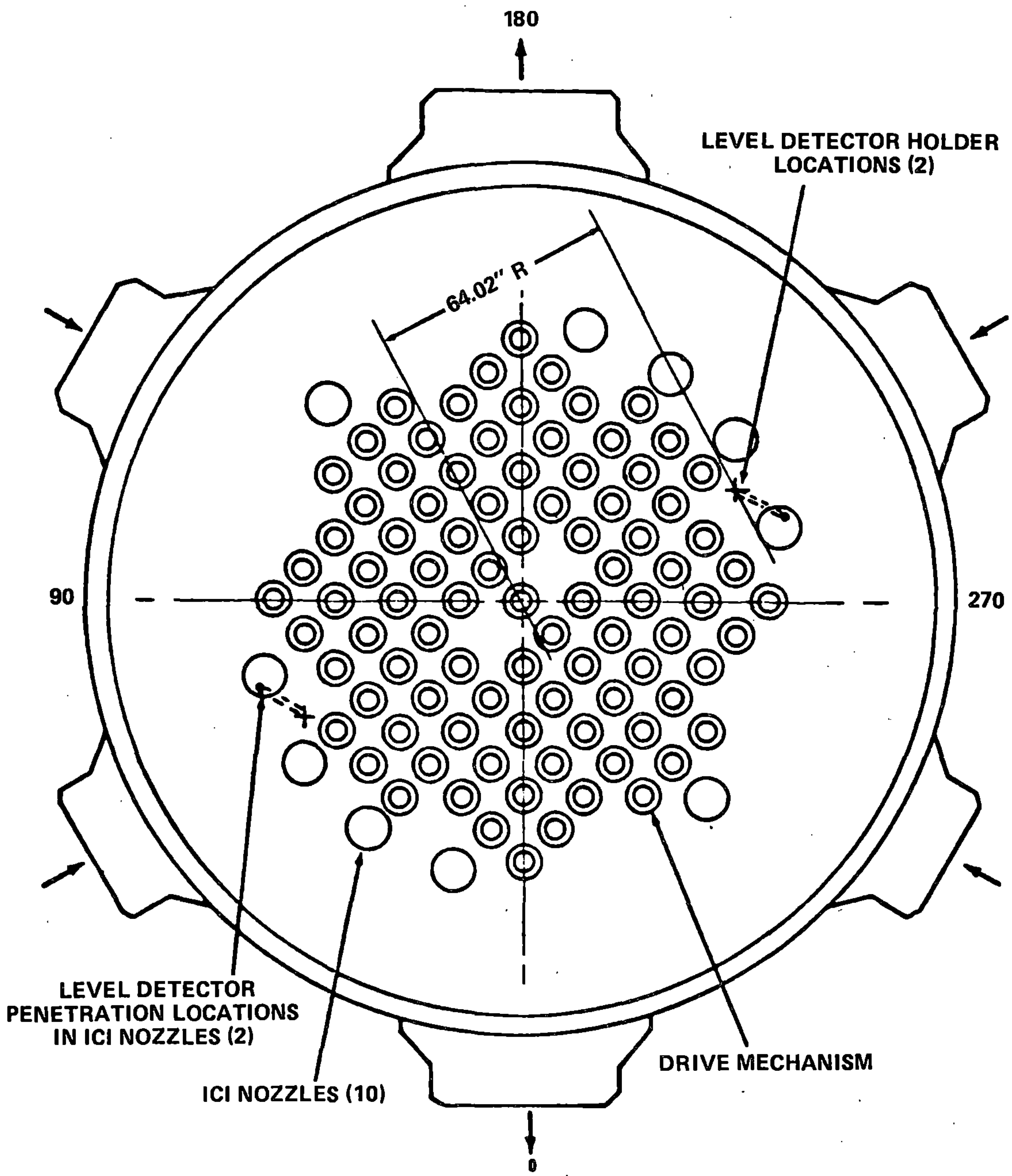
HJTC SENSOR
AND SEPARATOR TUBE
FIGURE 1.9B-4



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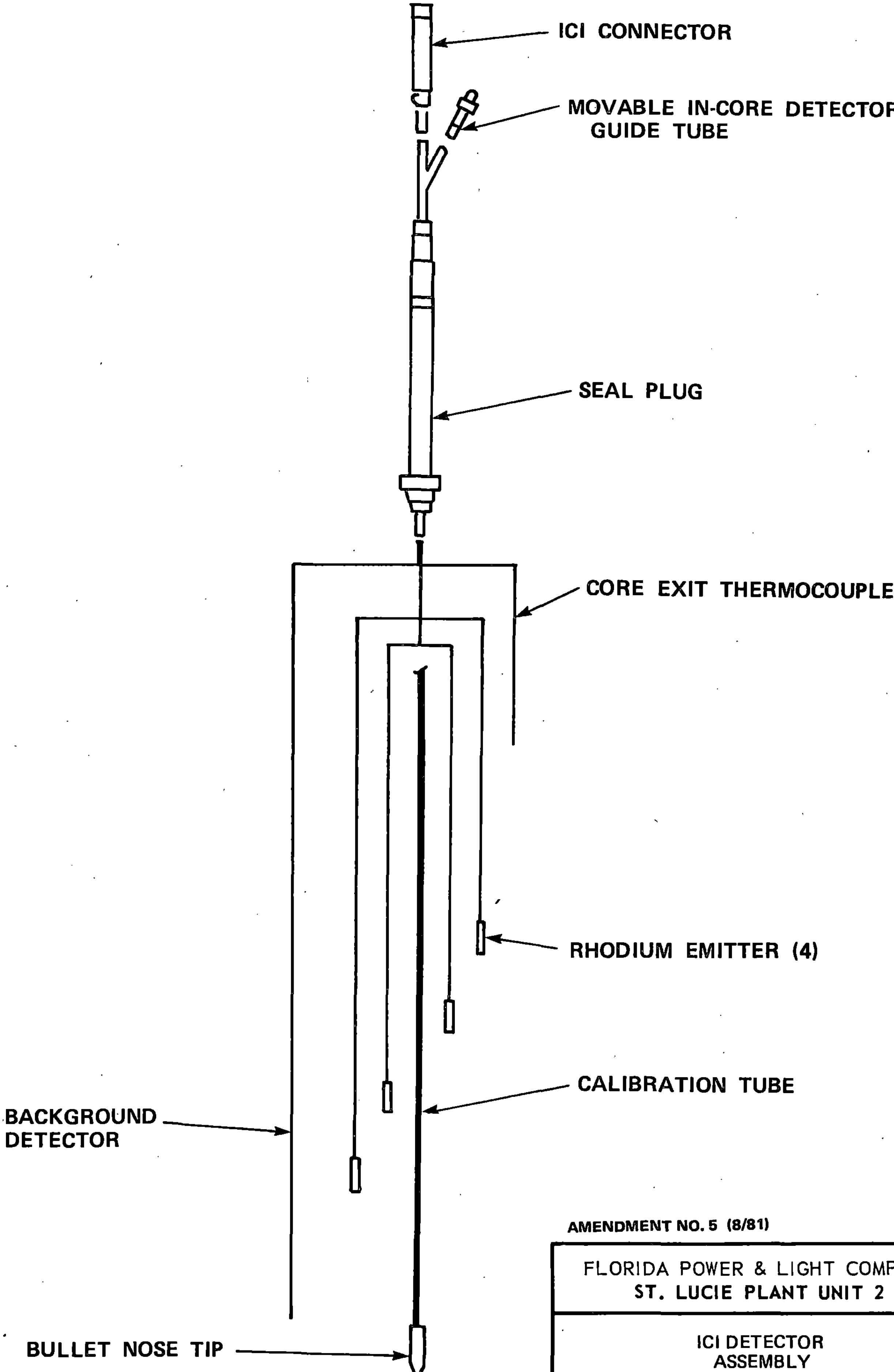
HJTC PROBE ASSEMBLY LOCATIONS

FIGURE 1.9B-5



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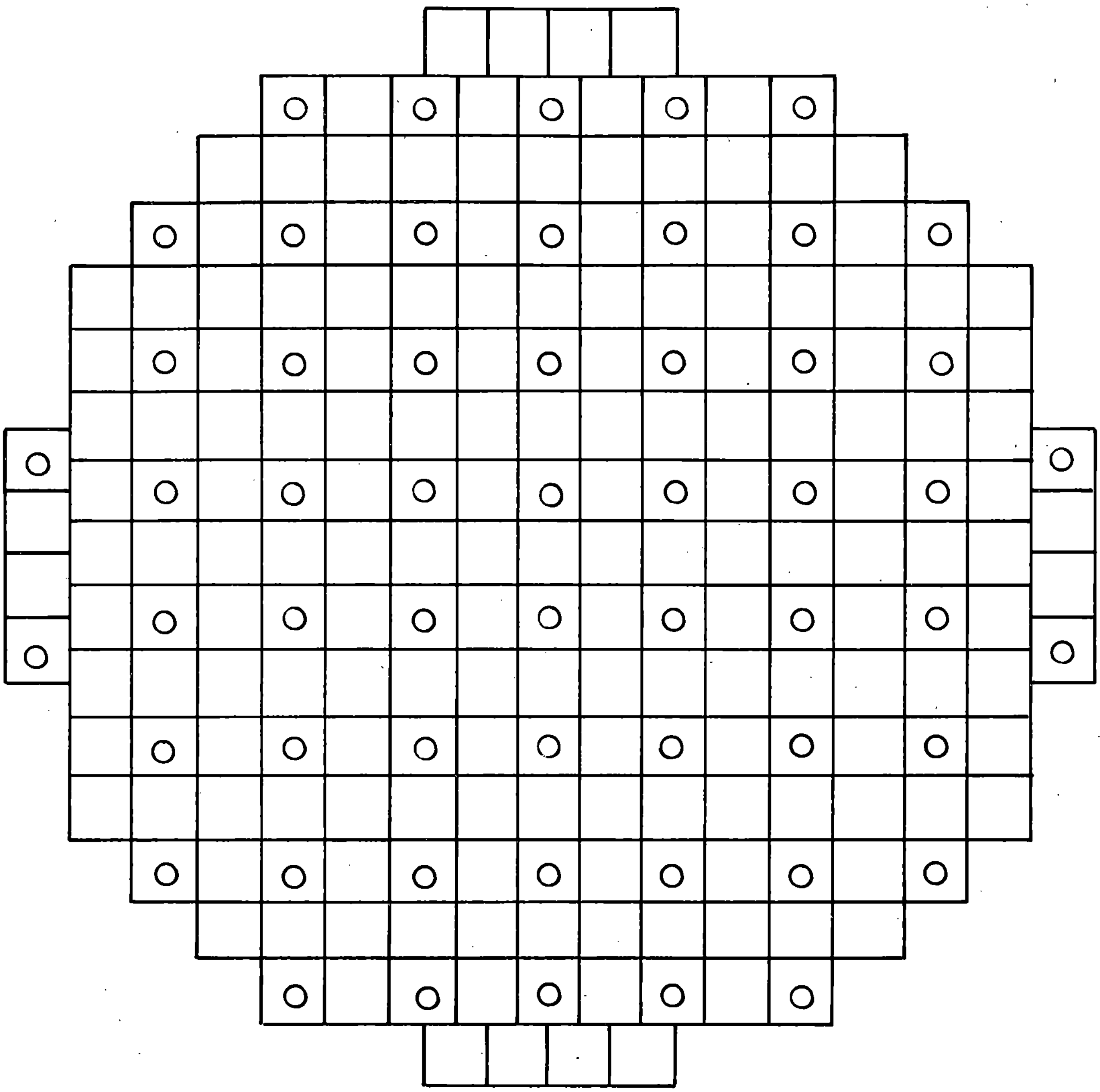
ST. LUCIE PLANT UNIT 2

ICI DETECTOR ASSEMBLY

FIGURE 1.9B-6



LEGEND

 ICI DETECTOR ASSEMBLY/CORE EXIT THERMOCOUPLE LOCATION

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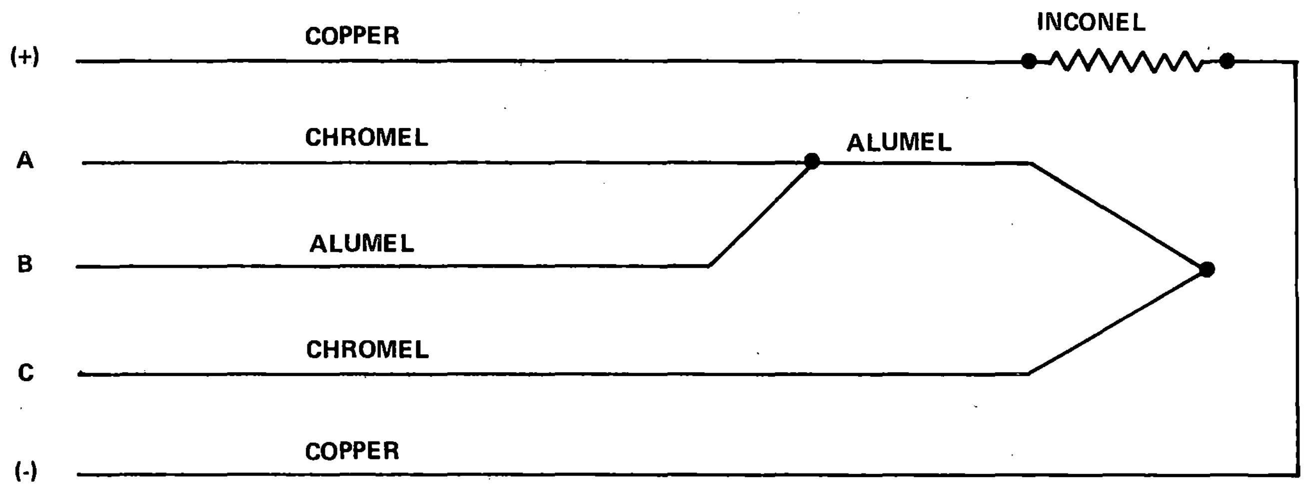
ST. LUCIE PLANT UNIT 2

ICI DETECTOR ASSEMBLIES/CORE EXIT THERMOCOUPLES CORE LOCATIONS

FIGURE 1.9B-7



V (A-B) = ACTUAL TEMPERATURE, UNHEATED JUNCTION
V (C-B) = ACTUAL TEMPERATURE, HEATED JUNCTION
V (A-C) = DIFFERENTIAL TEMPERATURE

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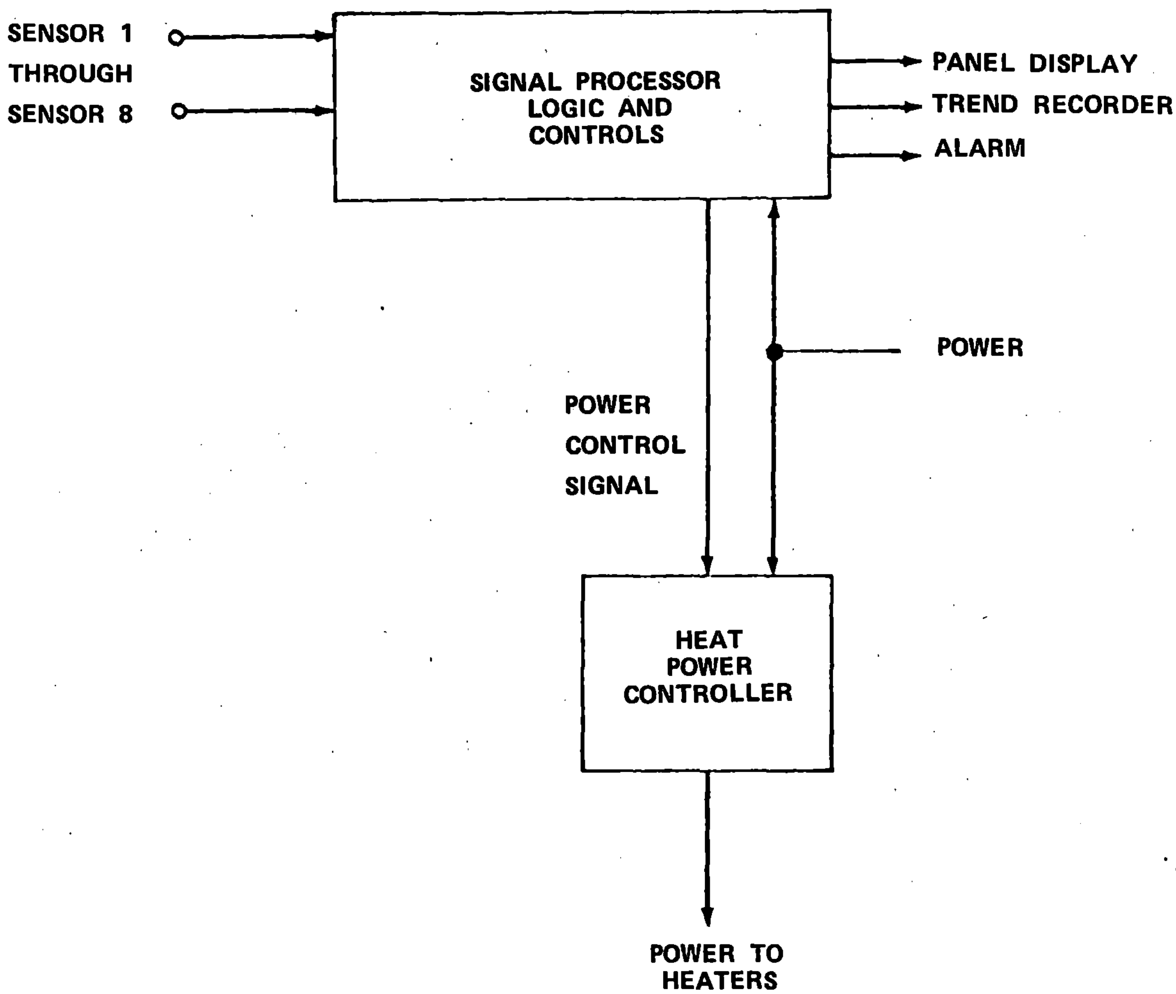
FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

ELECTRICAL DIAGRAM OF HJTC
FIGURE 1.9B-8



AMENDMENT NO. 5 (8/81)

FLORIDA POWER & LIGHT COMPANY ST. LUCIE PLANT UNIT 2
HJTC SYSTEM PROCESSING CONFIGURATION (ONE CHANNEL SHOWN) FIGURE 1.9B-9

APPENDIX B.A 10

EVALUATION OF INSTRUMENTATION FOR DETECTION 5
OF CORE COOLING 12

APPENDIX B.A 10

Evaluation of Instrumentation for Detection of Inadequate Core Cooling

The CE Owners Group has conducted an evaluation of instrumentation for the potential application ot the detection of Inadequate Core Cooling. The 5 performance characteristics of selected instruments were compared for representative transients resulting in various degrees of reactor coolant system voiding. The respective instruments then were evaluated based on their developmental and post-accident qualification status, response characteristics, and signal clarity.

A.1 DESCRIPTION OF ICC EVENT PROGRESSION

The state of progression of an event resulting in ICC can be divided based on physical processes occurring within the RPV, into the following six conditions:

Conditions Associated with the Approach to ICC

Condition 1a Loss of fluid subcooling prior to the first occurrence of saturation conditions in the coolant.

Condition 2a Falling coolant inventory within the upper plenum, from the top of the vessel to the top of the active fuel.

Condition 3a Increasing core exit temperature produced by uncovery of the core resulting from the drop in level of the mixture of vapor bubbles and liquid from the top of the active fuel to the minimum level during the event.

Conditions Associated with Recovery from ICC

Condition 3b Decreasing core exit steam temperature resulting from the rising of the level to the top of the active fuel.

Condition 2b Vessel fill by the increase in inventory above the fuel.

Condition 1b Establishment of saturation conditions followed by an increase in fluid subcooling.

The instrument system used for the detection of ICC should provide the reactor operator with the current status of selected key parameters and the trending of prior status of selected key parameters as the event progresses through each of the above conditions.

A.2 SUMMARY OF SENSOR EVALUATION

The instruments evaluated in this effort were the subcooled margin monitor (SMM), resistance temperature detectors (RTDs), reactor vessel level monitor employing the heated junction thermocouples (HJTC), core exit thermocouples (CETs), self-powered neutron detectors (SPNDs), ex-core detectors and in-core thermocouples. The instruments are listed in Table 1.9B.A-1, where their capabilities are summarized. Significant conclusions about each instrument are given below.

A.2.1 SUBCOOLED MARGIN MONITOR

The Subcooled Margin Monitor (SMM), using input from existing Resistance Temperature Detectors (RTD) in the hot and cold legs and from the pressurizer pressure sensors, will detect the initial occurrence of saturation during LOCA events and during loss of heat sink events.

The usefulness of the SMM may be significantly increased by also feeding into it the signals from the fluid temperature measurements from the HJTCS and by modifying the SMM to calculate and display degrees of superheat in addition to degrees subcooling. The signals from the HJTCS temperature measurements provide information about possible local differences in temperature between the reactor vessel upper head/upper plenum (location of the HJTCS) and the hot or cold legs (location of the RTDs). 5

With these modifications, the SMM can be used not only for detection of the approach to ICC, namely Condition 1a (loss of subcooling), but also for Conditions 3a and 3b (core uncovery) and Condition 1b (core recovery). Even with the modifications, the SMM will not be capable of indicating the existence of Conditions 2a and 2b when the coolant is at saturation conditions and the level is between the top of the vessel and the top of the core.

A.2.2 RESISTANCE TEMPERATURE DETECTORS (RTD)

The RTD are adequate for sensing the initial occurrence of saturation. The hot leg[1] RTD range is sufficient to sense saturation for events initiated at power. The cold leg RTD, which have a wider range, are sufficient to sense saturation for events initiated from zero power or shutdown conditions.

The RTD range is not adequate for ICC indications during core uncovery. For depressurization LOCA events, the core may uncover at low pressure, when the saturation temperature is below the lower limit of the hot leg RTD. Initial superheat of the steam will therefore not be detected by the hot leg RTD. As the uncovery proceeds, the superheated steam temperature may quickly exceed the upper limit of the RTD range.

---

(1) In most CE PWRs a dual range RTC system is employed. Typically, narrow band RTDs are located in the hot legs and wide range RTDs are found in the cold leg. St. Lucie Unit 2 employs wide range RTDs in both hot and cold legs.

A.2.3 HEATED JUNCTION THERMOCOUPLE SYSTEM (HJTCS)

The HJTC probe is designed to create and measure a collapsed liquid level in a localized plenum region. The height of the collapsed liquid level within the probe is sensed using pairs of heated junction thermocouples. This mode of sensing reduces spurious effects due to pressure, fluid properties, and non-homogeneousness of the fluid medium.

The signal which is produced by the HJTC prove is a small electrical current similar in magnitude to, or greater than, the current produced by typical temperature sensing devices presently used in the Reactor Coolant System. This signal may be transmitted from within the reactor vessel to outside of the containment building with no intermediate electronics. 5 Furthermore, the signal is not subject to external disturbances, such as containment environment as would be present with a hydraulic signal transmission system.

The HJTC can provide significant information to the operator for two conditions associated with an ICC event - Condition 2a, the approach to uncovery and Condition 2b, the refill. For a large small break event, the two-phase level drops to the top of the core within 5 to 15 minutes of the break initiation. In this event, the HJTC would show the rapidly decreasing coolant inventory and would quantify for the operator the status of the degrading situation which is otherwise evident to him from numerous existing instruments. For smaller breaks, the progression of the event is slower, and the HJTC can provide significant information on the effectiveness of his mitigating actions. It is probably for such long term conditions, prior to core uncovery, that the HJTC would have its greatest usefulness.

Following recovery of the core, the operator could use the HJTC to verify that the core is again covered and therefore is being adequately cooled. Through monitoring the HJTC level the operator has better indication of the correctness and effectiveness of his actions in maintaining the coolant inventory.

A.2.4 CORE EXIT THERMOCOUPLES (CETs)

The core exit thermocouples will show the approach to and existence of ICC after core uncovery for the events analyzed. The core exit thermocouples respond to the coolant temperature at the core exit and indicate superheat after the core is no longer completely covered by coolant. The trend of the change in superheat corresponds to the trend of the change in cladding temperature.

Existing thermocouples in CE reactors have been qualified to industry standard accuracy for operation to 750F. However, thermocouples of this design (i.e., stainless steel sheathed, alumina insulated, Type K, Chromel-Alumel) are suitable for nuclear service to 1650F. Tests have been run on such thermocouples to simulate severe accidents (See Reference 4 of text). Results from these tests demonstrated the shunting error caused by the increase in electrical conductance of the alumina at high temperature is shown to be negligible up to 1650F and is acceptably small to 1800F. It is concluded that the thermocouples in operating CE designed reactors could satisfy the minimum NRC requirement for 1650F and are adequate to 1800F.

A.2.5 SELF-POWERED NEUTRON DETECTORS (SPND)

The SPND yield a signal caused by high temperature as the two-phase level 5
falls below the elevation of the SPND. However, testing is required to identify the phenomena responsible for the anomalous behavior of the SPND at TMI-2. At the present, their use is limited to low temperature events (less than 1000F clad temperature) or to only the initial uncovery portion of an event.

A.2.6 EX-CORE NEUTRON DETECTORS

Existing source range neutron detectors are sensitive enough to respond to the formation of coolant voids within the vessel during the events analyzed. However, the signal magnitude is ambiguous because of the effects of varying boron concentation and deuterium concentration in the reactor coolant.

A stack of ex-core detectors gives less ambiguous information on voids and level in the vessel. The relative shape of the axial distribution of signals from a stack of five detectors shows promise as an ICC Indicator, but additional development is needed.

A.2.7 IN-CORE THERMOCOUPLES

Although the loss of other instrumentation such as the SPND's would have to be considered, in general, it appears feasible that in-core thermocouples may be added to or substituted for some SPND in the in-core instrument string. In-core thermocouples sense the surrounding environment via radiation, as well as, steam convection. The information provided to the operator by in-core thermocouples is qualitatively the same as that provided by CETs.

TABLE 1.9B.A-1

INSTRUMENTS INCLUDED IN EVALUATIONS
FOR ICC INSTRUMENTATION SYSTEM

Instruments	Development Status	Post-Accident Qualification Status	Indication Provided By Instrument	Clarity Of Signal	Conditions Monitored
Subcooled Margin Monitor	Exists	Qualified	Degree Of Subcooling In RCS	Good	1a, 1b
Reactor Vessel Level Monitor	Under Develop.	Will Be Qualified	1) Liquid Inventory In Upper Head	Good	2a, 2b
			2) Liquid Inventory In Upper Plenum	Good	
			3) Axial Temperature Distribution In Head And Plenum	Good	
Core Exit Thermocouples	Exist	Can Be Done	1) Fluid Temperature At Core Exit	Good	3a, 3b
In-Core Thermocouples	Concept Stage	Can Be Done	1) Metal Temperature Inside Guide Tube When RCP Off	Good	3a, 3b
Self Powered Neutron Detectors	Exist	Can Be Done	Indirect Measure Of Mixture Level (Low Pressure Uncovery)	Poor	3a, 3b
Hot Leg RTD (5 Each)	Exist	Qualified	Fluid Temperature In Hot Leg	Good	1a, 1b, 3a, 3b
Ex-Core Neutron Detector (ONL, Source Range)	Exist	Can Be Done	Indirect Measure Of Gross Voiding	Fair	3a, 3b
			Indirect Indication Of Mixture Level In Core, RCP Off	Fair	
Ex-Core Neutron Detector (Stack Of 5, Source Range)	Concept	Can Be Done	Same As One Ex-Core Detector, Bore Axial Resolution	Fair	3a, 3b

APPENDIX B.B 10

SATURATION MARGIN MONITOR 5

10

APPENDIX B.B

SATURATION MARGIN MONITOR

The design of the St. Lucie Unit 2 Saturation Margin Monitor (SMM) is described in Section 3.1.1 of Appendix 1.9B. 5 This device will provide on-line control room indication of reactor coolant saturation conditions to the operator. The St. Lucie 2 SMM is designed to accept input from selected RTDs and the Unheated Junction thermocouple with the maximum temperature indication.

During the first cycle of St. Lucie Unit 2 operation the HJTC level probe will not be installed. Therefore, the SMM will receive its input from the RTDs alone. See Section 3.0 of Appendix 1.9B for more information.

10

APPENDIX B.C

HEATED JUNCTION THERMOCOUPLE SYSTEM 5

APPENDIX B.C 10

Heated Junction Thermocouple System

C.1 SYSTEM DESCRIPTION

The Heated Junction Thermocouple System (HJTC) that is planned to be installed in St. Lucie Unit 2 consists of two separate channels of instrumentation which meet the design requirements for a post-accident monitoring system. The sensors are internal to the reactor vessel. Details of the associated transmission, control and display hardware are currently being finalized and will be presented in a separate correspondence.

C.2 TECHNICAL DESCRIPTION OF THE REACTOR VESSEL INTERNALS CHANGE 5

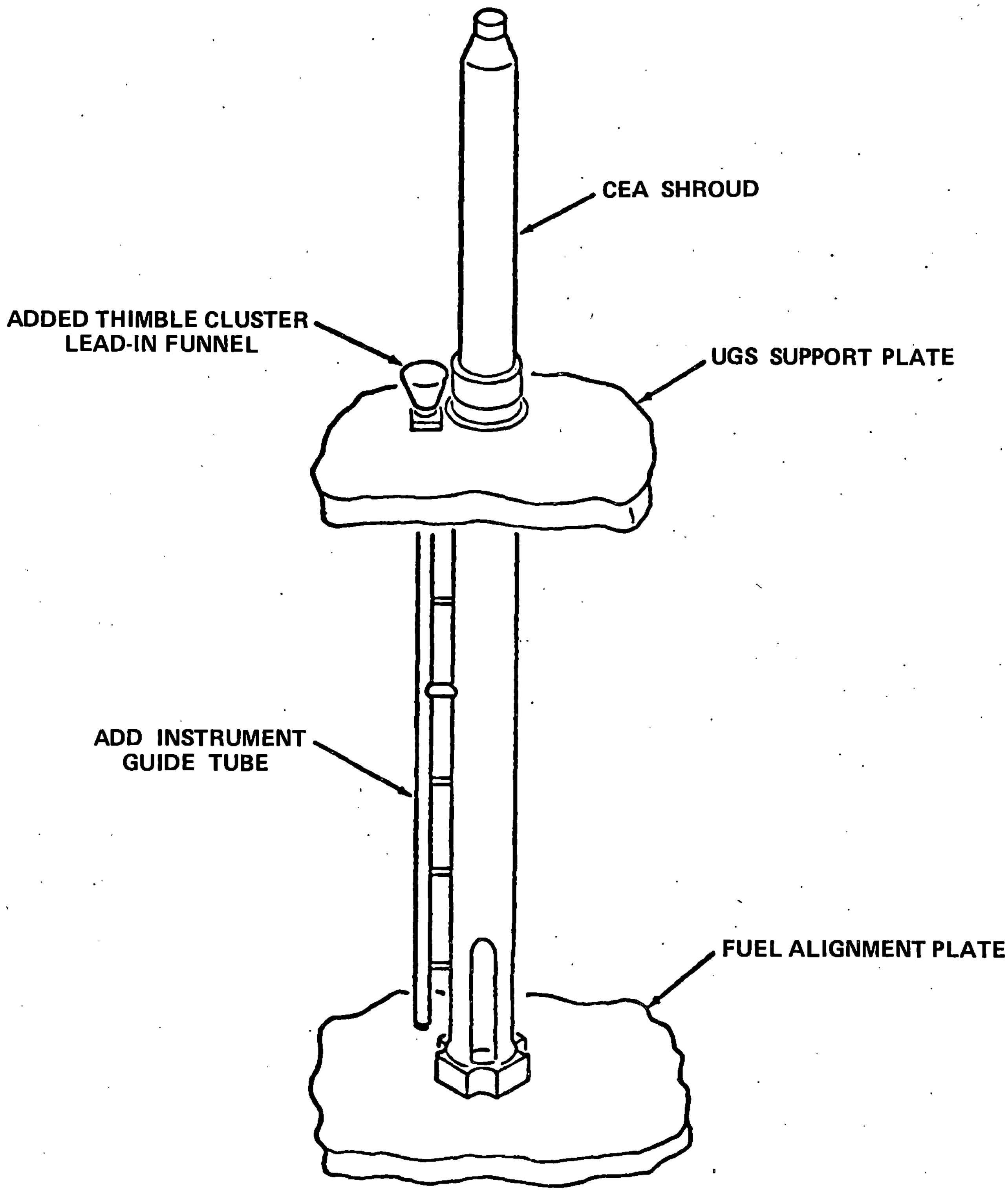
The changes concern hardware modifications internal to the reactor vessel which will serve as a holder and guide path for level detector assemblies. The design of the holders will facilitate future use of the level detectors.

Basically, three major components are affected by the modification. These include the upper guide structure assembly, the instrument support plate assembly, and the in-core instrumentation nozzle. The upper guide structure changes include two instrument guide tubes, support brackets and lead-in funnels as shown on Figure 1.9B.C-1. The instrument support plate is being modified to provide a pathway for the HJTC probe assemblies as shown on Figure 1.9B.C-2. An additional penetration is being added in each of two ICI nozzle flanges.

When the above changes are complete, St. Lucie Unit 2 will have provisions for two HJTC probe assemblies located as shown in Figure 1.9B-5.

C.3 IMPLEMENTATION SCHEDULE

The future HJTC probe assembly to be installed in the holders is shown on Figure 1.9B.C-3 and described in Section 3.1.2 of Appendix 1.9B. The HJTC probe/holder locations are depicted in Figure 1.9B-5. An implementation schedule for this effort will be provided in a future amendment.



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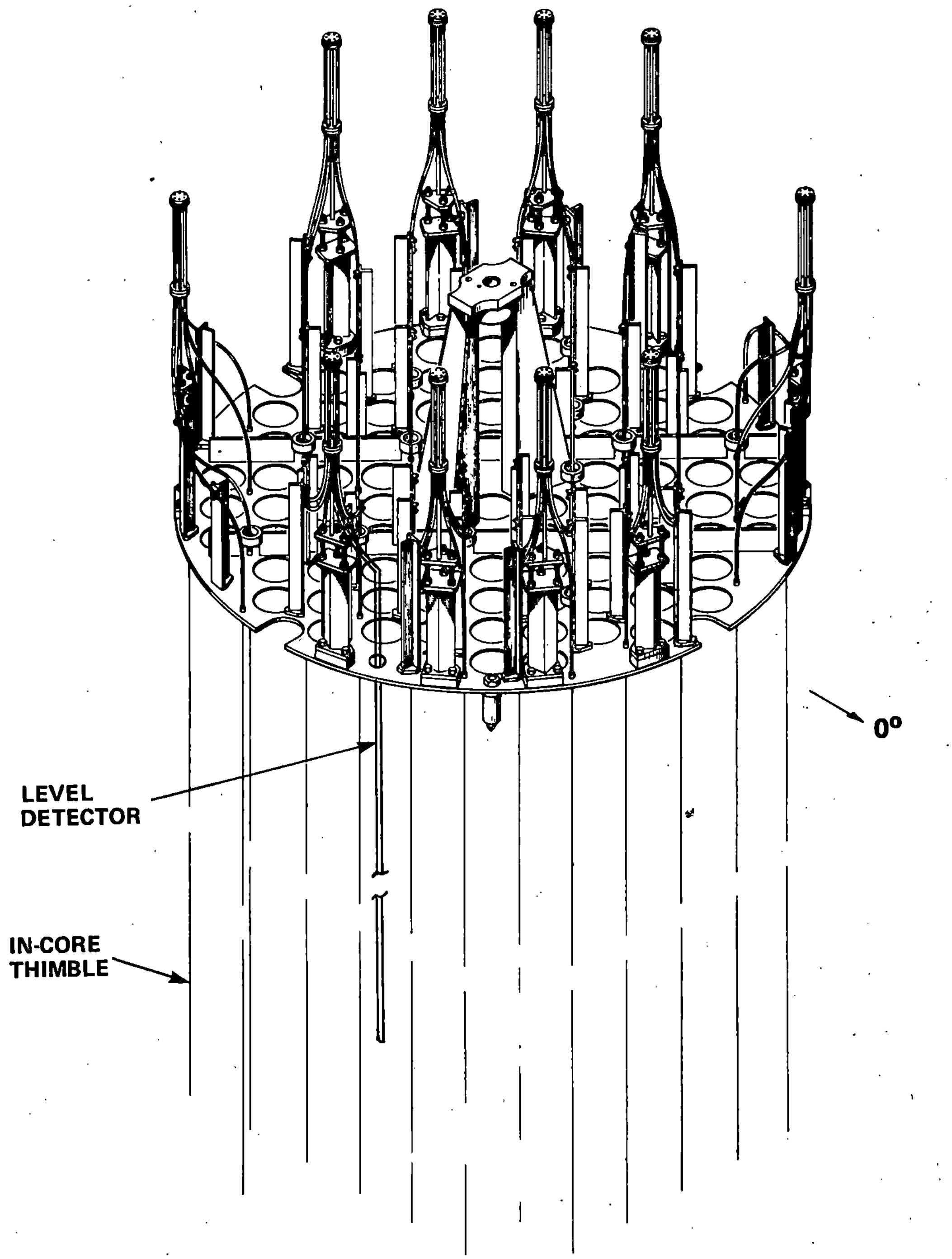
FLORIDA POWER & LIGHT COMPANY **ST. LUCIE PLANT UNIT 2**
REACTOR VESSEL LEVEL MONITORING SYSTEM INSTRUMENT GUIDE TUBE **FIGURE 1.9B.C-1**



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FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

INSTRUMENT SUPPORT PLATE
FIGURE 1.9B.C-2

10

APPENDIX B.D

CORE EXIT THERMOCOUPLE SYSTEM 5

APPENDIX B.D 10

Core Exit Thermocouple System

The basic design of the St. Lucie Unit 2 Core Exit Thermocouples (CET) is
described in Section 3.1.3 of the accompanying report. The CETs are included 5
in the 56 In-Core Instrument (ICI) Detector Assemblies as shown on Figure
1.9B-6; the locations of which are shown on Figure 1.9B-7.

A description of the CET processing and display to be used during the first cycle of operation of Unit 2 is presented in Section 3.0 of Appendix 1.9B.

APPENDIX B.E 10

Responses to NRC Questions on Inadequate Core Cooling Instrumentation

APPENDIX B.E

Response to NRC Questions on Inadequate Core Cooling Instrumentation

(1-13) Responses to questions (1-13) were responded to on a generic basis by the CE Owners Group. These responses were provided in CEN-181-P, "Generic Responses to NRC Questions on the CE Inadequate Core Cooling Instrumentation", which was transmitted in a letter from K P Baskin (Chairman CE Owners Group 1 to D.M. Crutchfield dated September 15, 1981. That letter also transmitted CEN-185, "Documentation of Inadequate Core Cooling Instrumentation for Combustion Engineering Nuclear Steam Supply Systems", which is applicable to the St. Lucie-2 ICC instrumentation. 10

Question 14: Describe how the processor tests operate to determine that the sensor outputs are within range. How are the ranges selected?

Response: Analog signals are converted to digital form through a 12 bit resolution A/D converter. The input electrical ranges are preprogrammed to 0-10V, 1-5V, 4-20 ma, 10-50 ma, and a range suitable for Type K thermocouples.

Functionally, the analog signals are first converted into volts, then scaled to engineering units. The input variable is then compared to upper and lower out of range values to detect out of range inputs. If the variable is out of range, the display will clearly identify the variable as out of range. The out of range variables will be eliminated from algorithms.

Question 15: Describe the display measurement units.

Response: The primary ICC display will be in the Safety Assessment System. However, the QSPDS display will present the measured variables in engineering units. The engineering units will be in units most directly describing the process. For the ICC detection variables, the following units will be used:

FUNCTION		UNITS
1. Saturation/Subcooled Margin	-	°F or PSL (subcooled or superheat)
Inputs	-	°F or PSIA
2. Reactor Vessel Level Above the Core	-	% height above the core and discrete level displays
Inputs	-	°F

FUNCTION		UNITS
3. Core Exit Thermocouple Temperature	-	°F

Question 16: Describe which parameter or parameters would need to be calculated from the sensor inputs. The description of the QSPDS implies that such a calculation might or might not be required. When would it be required? When would it not be required?

Response: The following ICC detection parameters or variables require calculation from sensor inputs:

1. Saturation or subcooled margin - The maximum of the temperature inputs and the minimum of the pressure inputs 10
are compared to the saturation temperature or pressure to determine the temperature and pressure margin to saturation. Superheat will be calculated up to the difference between the range of the inputs and the saturation temperature.

2. Reactor vessel level above the core - The HJTC sensor differential temperature and the unheated temperature are compared to setpoints to determine if a liquid covered or uncovered condition exists at each sensor location. The corresponding level output is directly related to the number of sensors that detect liquid or an uncovered state.

3. Maximum core exit thermocouple temperature.

Question 17: Specifically, describe the automatic on-line surveillance tests.

Response: The following on-line surveillance tests are performed in the QSPDS:

1. The temperature inside the QSPDS cabinet with a cooling system alarm on high temperature.

2. Power failure to the processor with alarm on failure.

3. Bad sensors and broken communication links with indication on the display.

4. CPU memory check and data communication checks with alarm and indication on the plasma display and digital panel meter on the cabinet. (These checks are performed periodically.)

5. Analog input offset voltage with compensation performed automatically.

6. Inputs out of range with alarm (see Question 14).

7. Low HJTCS differential temperature with alarm.

Question 18: Describe the manual on-line diagnostic capability and procedures.

Response: The automatic on-line surveillance tests replace the need for a manual initiated on-line or off-line diagnostic test to be performed by the computer. A page displaying the status of the automatic surveillance tests will be provided to aid operator diagnostics.

Additionally, the following manual test capabilities are included in the design: 10

1. Calibration of the A/D boards (with automatic offset voltage compensation).

2. Reset of the system.

Question 19: Discuss the predetermined setpoint for the heated junction thermocouple signals and how it will be selected.

Response: A setpoint on each of two inputs determines the presence or absence of liquid at each HJTC sensor location:

1. Differential temperature between the unheated and heated HJTC junctions, and

2. Unheated HJTC junction temperature.

When either of these two input temperatures exceeds the setpoint for the respective input temperature, the logic indicates that the liquid level has dropped to a level lower than the sensor location. The setpoint values are predetermined and are installed as part of the level logic software. The differential temperature setpoint is calculated (based on tests) to be low enough to obtain a good response time but high enough to assure liquid is not present. The unheated junction temperature setpoint is calculated to assure that liquid is not present at the sensor position.

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2.0 SITE CHARACTERISTICS

2.1 GEOGRAPHY AND DEMOGRAPHY

2.1.1 SITE LOCATION AND DESCRIPTION

2.1.1.1 Specification of Location

Florida Power & Light Company's (FPL) St. Lucie site is located on Hutchinson Island, St. Lucie County, Florida. The coordinates for St. Lucie Unit 1 are latitude 27° 20' 58" north and longitude 80° 14' 48" west. Approximately 300 feet to the south of St. Lucie Unit 1 is FPL's St. Lucie Unit 2. St. Lucie Unit 2 is located at latitude 27° 20' 55" north and longitude 80° 14' 47" west. The Universal Transverse Mercator (UTM) coordinates for the midpoint (FPL's nos.) are 3025173 meters north and 574326 meters east.

The eastern boundary of the site is the Atlantic Ocean and the western boundary is the Indian River, a tidal lagoon. Other prominent natural features within 50 miles of the site include Lake Okeechobee, 30 miles to the west-southwest of the site and a portion of the Everglades approximately 24 miles to the south of the site. Figure 2.1-1 shows the site in relation to the region within 50 miles. Figure 2.1-11 also shows the site with the 50-mile grid positioned over county boundaries. Figure 2.1-2 shows the area within 5 miles of the site.

Prominent cities within 10 miles of the site include Fort Pierce, approximately seven miles to the northwest of the site on the mainland; Port St. Lucie, 4.5 miles to the west-southwest; and Stuart, eight miles to the south.

Transportation corridors within five miles of the site include U.S. Highway 1 (US 1); State Roads (SR) A1A, 712, and 707: the Florida East Coast Railroad; the Atlantic Ocean and the Intracoastal Waterway which is located in the Indian River. SR A1A, the major north-south route on Hutchinson Island, traverses FPL's property to the east of St. Lucie Units 1 and 2. Figure 2.1-2 shows the location and Subsection 2.2.2 further describes these transportation corridors.

2.1.1.2 Site Area Map

A map of FPL's St. Lucie site is shown on Figure 2.1-3. This map includes plant property lines, the site perimeter, principal plant structures, and boundary lines of the exclusion area and low population zone. FPL owns approximately 1,132 acres of land on Hutchinson Island. The site is generally flat, and has dense vegetation characteristic of Florida coastal mangrove swamps. At the ocean shore, the land rises slightly to a dune or ridge approximately 19 feet above mean sea level. The area pre-empted by the plant is about 300 acres, or approximately 27 percent of the total land owned by FPL. There are no industrial, commercial, institutional, or residential structures within the plant area.

The exclusion area and low population zones are shown on Figures 2.1-2 and 2.1-3. The radius of the exclusion area is 0.97 miles from the center of the St. Lucie Plant. The low population zone includes that area within one mile of the center of the St. Lucie Plant. The land within this area is owned by FPL. State Road (SR) A1A traverses FPL property in a north-south direction, approximately 1,000 feet east of the St. Lucie Plant. There are no residents within the LPZ. However, the Walton Rocks public beach access lies within the LPZ. Recreational facilities for limited use by FPL employees and their families are also located within the LPZ.

2.1.1.3 Boundaries for Establishing Effluent Release Limits

The minimum boundary distance for establishing gaseous effluent release limits is that noted on Figure 2.1-4 directly north of the St. Lucie Plant. Also indicated on Figure 2.1-4 are other boundary line distances from plant liquid and gaseous release points. The restricted area as defined in 10 CFR 20 includes the fenced-in area shown in Figure 1.2-2.

2.1.2 EXCLUSION AREA AUTHORITY AND CONTROL

2.1.2.1 Authority

As indicated and authorized within the Appendices to the St. Lucie Plant Radiological Emergency Plan, FPL controls the use of all land and water areas inside the site boundary (property) lines.

2.1.2.2 Control of Activities Unrelated to Plant Operation

All activities conducted within the plant (restricted) areas during plant operation are related to the facility operation. The plant area is the fenced-off area surrounding St. Lucie Units 1 and 2. As indicated in and authorized by the St. Lucie Plant Radiological Emergency Plan and the State of Florida Radiological Emergency Management Plan for Nuclear Power Plants, formal arrangements are made to control the traffic and activities of the public on SR A1A which traverses FPL's property east of the plant area, and on the State and Federal waters and beach adjacent to the FPL property, if necessary, in the event of an emergency to assure the radiological health and safety of the public. Specific details are enumerated in the St. Lucie Plant Radiological Emergency Plan (see Section 13.3).

St. Lucie County has constructed a wastewater treatment facility on Hutchinson Island, approximately 2 miles south of St. Lucie Units 1 and 2. Reclaimed water from this facility will be used for irrigation of properties on Hutchinson Island. During periods of high flow and/or rainy weather, excess reclaimed water will be discharged through an outfall to the St. Lucie Plant discharge canal. In their Letter of Agreement with FPL (Reference 219), St. Lucie County committed not to discharge into the discharge canal any raw sewage or sewage which does not meet the effluent discharge criteria established in the FDEP permit for the wastewater treatment facility. The increased flow in the discharge canal from the excess reclaimed water outfall is insignificant compared to the circulating water flow in the canal from St. Lucie Units 1 and 2.

2.1.2.3 Arrangements for Traffic Control

Formal arrangements are made for traffic control in the event of an emergency as described in the St. Lucie Plant Radiological Emergency Plan and in the State of Florida Radiological Emergency Management Plan for Nuclear Power Plants.

2.1.2.4 Abandonment or Relocation of Roads

There were no public roads subject to abandonment or relocation as a result of construction of the St. Lucie Plant.

2.1.3 POPULATION DISTRIBUTION

In accordance with Section 2.1.3.9, a population estimate update was submitted to the NRC in 2003 as part of an emergency planning study. Excerpts from that report are provided as UFSAR Appendix 2.1A. As a result of this update, the information in Sections 2.1.3.1 through 2.1.3.8 has been superceded by Appendix 2.1A and these sections have been deleted.

A population estimate update was also submitted to NRC in March 2013 (Reference 220). In addition, FPL contracted KLD Engineering, P.C., to estimate annual population changes between decennial censuses for St. Lucie Nuclear Power Plant. This update analysis was provided in September 2013 via Reference 221. Population update estimates for the 10 and 50 mile distances from St. Lucie are provided in Appendices 2.1A and 2.1B.

2.1.3.9 Periodic Update of Population Data

FPL will periodically obtain and submit to the NRC the actual and projected population around the St. Lucie site in order to determine what additional measures, if any, should be undertaken to assure the public health and safety.

Commencing in April, 1993 and at least every 5 years thereafter, FPL will prepare and submit to the NRC an estimate of the actual population within 10 miles of the plant, including the distribution by distance and direction, and listing permanent residents, seasonal residents and transients. The basis for the population estimates will also be provided. In addition, commencing in April, 1993 and at least every 10 years thereafter, FPL will prepare and submit to the NRC an estimate of the actual population within 50 miles of the plant. Seasonal residents and transients within 10 miles will also be listed. Per the above commitment, Appendix 2.1A provides the latest update of the estimate of the population within 50 miles of the plant. Appendix 2.1B provides an estimate of the actual population within 10 miles of the plant.

Based on the revised population data, FPL will determine what changes, if any, should be incorporated into the Emergency Plan to reflect the most recent population data. It is understood that NRC staff will, upon consideration of the population data, plant design features and operational characteristics of the St. Lucie Plant in relation to other nuclear power plants, make a determination of what additional measures, if any, are deemed necessary to assure the public health and safety.

2.1.4 FUTURE LAND USE ON THE APPLICANT'S PROPERTY

Current recreational use of land within the LPZ has been described previously. There are no other proposed land uses within the applicant's property boundaries other than the structure and facilities related to the operation of St. Lucie Units 1 and 2, and the associated Independent Spent Fuel Storage Installation.

Direction	H. Units	H. Units/Sq. Mile
WSW 5-6	2,028	1,036
WSW 6-7	2,951	1,167
WSW 7-8	2,380	815
WSW 8-9	816	247
WSW 9-10	762	206
W 2-3	41	NA
W 3-4	483	361
W 4-5	399	234
W 5-6	466	222
W 6-7	419	167
W 7-8	461	159
W 8-9	25	8

There is limited development in the SW sector until segment 3-4 where Savanna Club, an adult manufactured community, is located. In general, development in this sector is concentrated around major roadways. Specifically, US 1 and Walton Road in segment 4-5; US 1, Lyngate Drive, and Midport Road in segment 5-6; Midport Road, Port St. Lucie Boulevard, and north of the North Fork of the St. Lucie River in segment 6-7; Whitmore Drive and Port St. Lucie Boulevard north of the North Fork of the St. Lucie River, and east of Westmoreland Boulevard in the southern portion of segment 7-8; Port St. Lucie Boulevard, the Florida Turnpike, and the development of Vikings Lookout in segment 8-9; and Port St. Lucie Boulevard, the Florida Turnpike, Savage Boulevard, Tulip Boulevard, and Darwin Boulevard in segment 9-10. The number of housing units and their density (per square mile of land with water subtracted) peak in segment 6-7 at 2,023 units and 814 units per square mile of land.

Sector WSW contains parts of Spanish Lakes MHP and St. Lucie Gardens in segment 3-4, and quickly reaches a maximum density of 1,337 units per square mile of land in the next 1-mile segment with the inclusion of more of Spanish Lakes MHP and St. Lucie Gardens. Hidden River Estates, River Park, and River Park Unit 2 comprise segment 5-6. There is widespread residential concentration around Floresta Drive and Prima Vista Boulevard in segment 6-7 where the sector high of 2,951 housing units are situated. Prima Vista Boulevard and Whitmore Drive are the hubs of development in segment 7-8. The last two segments contain parts of St. Lucie West. Most of the development in segment 8-9 is east of the Florida Turnpike and south of Juliet Avenue. Approximately equal development exists in the last segment, primarily south of Juliet Avenue.

Development in sector W is not noteworthy until segment 3-4 where both the number of housing units and their density abruptly reach maxima for the sector within 10 miles of the plant. These are 483 units and 361 units per square mile, respectively. Together with segment 4-5, These segments make up the heart of the White City area and include parts of Indian River Estates, Lexington Square, River's Edge, and The Woodlands. Segment 5-6 includes part of Driftwood Manor in the north and Rivers Edge in the south. Continuing to the next segment (6-7), some of Lucy Acres in the north and extensive development west of St. James Drive as well as north and south of Bayshore Boulevard make the main contributions, yet a decreasing trend in units and densities continues throughout this and the remainder of the sector. The residential pattern established in the previous segment prevails in segment 7-8 predominantly east of the Florida Turnpike. Development drops off precipitously in the remainder of the radius of interest, with much of it located within the loop of the Torino Parkway.

Direction	H. Units	H. Units/Sq. Mile
WNW 2-3	22	NA
WNW 3-4	480	445
WNW 4-5	1,172	689
WNW 5-6	1,119	526
WNW 6-7	506	201
WNW 7-8	304	105
WNW 8-9	321	98

Direction	H. Units	H. Units/Sq. Mile
WNW 9-10	238	65
NW 3-4	11	NA
NW 4-5	239	NA
NW 5-6	728	660
NW 6-7	1,753	912
NW 7-8	2,984	1,151
NW 8-9	4,749	1,444
NW 9-10	4,626	1,254
NNW 6-7	896	823
NNW 7-8	570	NA
NNW 8-9	1,637	NA
NNW 9-10	380	301

In the WNW sector, significant development is encountered in the 3-4 segment where portions of Indian River Estates in White City are located. Gator Trace and St. James Park, both of Ft. Pierce, join Indian River Estates to comprise the residential tracts of segment 4-5. This is the most densely developed segment of the sector containing 689 housing units per square mile and 1,172 total units. More of St. James Park along with parts of Driftwood Manor and Timber Ridge Estates make up segment 5-6. Midway Road and Oleander Boulevard provide development loci. Segment 6-7 includes pieces of Canoe Creek, River Hammock, and Lucy Acres with development focused on Sunrise Boulevard. Sweetwater and Raintree Forest are the main communities in segment 7-8. In addition, there is some development around Midway Road. About the same level of development continues into segment 8-9 with Lost Tree Estates, River Oaks Estates, Thousand Pines Estates, and more all around Edwards Road. The last mile increment of the 10-mile radius is less developed, but features Westglen and Briargate.

The NW sector contains almost all of incorporated Ft. Pierce. As before, segment 4-5 includes part of St. James Park. Development in segment 5-6 is primarily east of US 1. Most of the development in segment 6-7 is in Oleander Gardens west of US 1. In segment 7-8, development is predominantly north of Edwards Road. It is extensive west of US 1 to Oleander Boulevard (SR 605), and continues west of SR 605 to Sunrise Boulevard and beyond except for the area occupied by the Lawnwood Recreation Complex. The next segment, 8-9, exhibits the peaks of 4,749 housing units and 1,444 units per square mile for this sector. This is due to concentrated development in Ft. Pierce around Okeechobee Road (SR 70); the east-west thoroughfares of Orange Avenue, Delaware Avenue, and Virginia Avenue; and 25th Street (SR 615) running north-south. Tucker Terrace and Lawnwood are the largest communities. The final segment decreases in housing unit density with the majority of units built along Orange Avenue and 25th Street.

The final sector under consideration is NNW. This sector encompasses the majority of Hutchinson Island north of the plant. Segment 6-7 has development east of A1A on the island including Surfside Harbor. Development in segment 7-8 stretches across the island from Jennings Cove on the lagoon side to Surfside and Tropical Beach on the Atlantic side. Segment 8-9 contains the maximum of 1,637 housing units which can be ascribed to Thumb Point, Bayshore Estates, and Causeway Mobile Home Park on the island with little development on the small section of mainland in the segment. All of the South Bridge is within the segment. Most of the North Bridge is in segment 9-10. Residential development lies on the southern tip of the north island between Coral Cove and Ft. Pierce Inlet Recreation Area. There is little development on the mainland inclusion.

2.1.3.1.2 Population by Annular Sectors

The most heavily populated annular sectors are those which cover the towns and developments mentioned above. The most heavily populated sector in the 10-mile radius is annular sector NW 5-10 with a total of 35,265 residents, which includes mich of the City of Fort Pierce, with a 1990 population of 36,830 residents.[187]

2.1.3.1.3 Population by Annuli

The annulus between five and ten miles of the St. Lucie Plant is more densely populated than the area within five miles. A total of 116,230 live between 5 and 10 miles of the plant (circa 1990). Inside five miles, there are about 16,728 residents.

Within two miles of the St. Lucie Plant, there is an estimated total of 154 residents. The entire area within one mile of the plant is owned by FPL and is included in the exclusion area and low population zone. Much of the area in the one- to two-mile annulus is water.

2.1.3.1.4 Population by Sectors

The most populous sector within 10 miles of the St. Lucie Plant is the NW sector which, because of the large concentration of resident population in the city of Fort Pierce, contains 35,636 persons (circa 1990). The second most heavily populated sector is WSW, which has 23,778 persons and includes part of Port St. Lucie. The adjacent sector, SW, is the third highest with 21,019 residents in 1990.

2.1.3.1.5 Projected Population

The population within 10 miles of the St. Lucie Plant is expected to increase by about 19% over the 5-year period between 1990 and 1995. The 1995 resident population is projected to be 157,625. **Figures 2.1-8** through **2.1-9** and **Tables 2.1-7** through **2.1-8** show the distribution of the 1995 population in rose and tabular form, respectively. The continued development of Port St. Lucie and Hutchinson Island are expected to be the largest contributors to this growth.. The most significant population increase in Port St. Lucie will be attributed to St. Lucie West, a 4,600-acre tract of land to be developed by the T.J. White Corporation. St. Lucie West is situated in sectors WSW and W. Most of its area is between 5 and 10 miles of the plant, with some of it extending beyond the 10-mile radius. The St. Lucie West planned development also includes a spring training sports complex for the Mets, new college campuses for Indian River Community College and Barry University, public schools, an industrial park, office park, and a regional mall.

Development along unincorporated Hutchinson Island north of the plant has been slow and is projected to remain this way in the near future. However, this trend will probably change as the southern part of the island becomes more and more congested.

County planning officials have indicated that congestion of the bridges from the mainland to Hutchinson Island could restrict development.[84,85] A bridge has been proposed which would cross the Indian River at SR 712 and link US 1, the Florida Turnpike, and Interstate 95 to Hutchinson Island.[84] An additional river crossing would induce development on the island. However, it is uncertain when or where another river crossing will be constructed, because the waters of the Indian River in this area are part of an aquatic preserve.[84]

2.1.3.2 <u>Population Between 10 and 50 Miles</u>

Table 2.1-4, Table 2.1-6 and **Figure 2.1-7** show the distribution of the estimated 1990 population between 10 and 50 miles of the St. Lucie Plant. The estimated 1990 population is 659,411 persons (see Subsection 2.1.3.7) and represents 83.2 percent of the total population within 50 miles of the plant. This population is confined to sectors SSE through NNW since sectors N through SE, beyond the 10 mile radius, include only the Atlantic Ocean. The major concentration of population occurs in annular sector SSE 40-50 , which includes portions of the city of West Palm Beach, Palm Springs, Haverhill, Greenacres City, Royal Palm Beach, and Wellington. West Palm Beach is the northern limit of the Florida Gold Coast development extending north from Miami through Dade and Broward Counties into Palm Beach County. The 151,310 residents in annular sector S 40-50 live on approximately 174.5 square miles of land (there are only 2.1 square miles of water in this sector-segment). Annular sectors SSE 40-50 and SSE 30-40 have the second and third highest populations , respectively, and reflect that Palm Beach County is more highly developed than any other part of the region. Of the total 863,518 residents of Palm Beach County in 1990, about 44 percent lived within 50 miles of the St. Lucie Plant.

2.1.3.2.1 Cities and Towns Within 50 Miles

Table 2.1-28 lists towns, cities, and communities within 50 miles of St. Lucie Plant with a 1990 population of more than 5,000, persons. There are twelve towns with a population of more than 10,000, the largest of which is West Palm Beach, with a 1990 population of 67,643. The second largest is the city of Port St. Lucie, with 55,866 persons in 1990; the third largest is Fort Pierce with 36,830 persons; and the fourth largest is Riviera Beach in Palm Beach County, with 27,639 persons. Of the twelve largest towns, seven are in Palm Beach County. In addition to West Palm Beach and Riviera Beach, the seven include North Palm Beach (11,343 persons), Jupiter (24,986 persons), Greenacres City (18,683 persons), Royal Palm Beach (14,589) and Palm Beach Gardens (22,965 persons). Stuart, the largest city in Martin County, has a 1990 population of 11,936.

Of the four towns with populations between 5,000 and 10,000, all are within Palm Beach County. These include the towns of Palm Beach, with 9,814 persons; Lake Park, with 9,763 persons; and Palm Springs, with 9,763 persons. Pahokee, with a 1990 population of 6,822, is also in Palm Beach County, but is located in the northwestern quarter of the county, on the shore of Lake Okeechobee.

2.1.3.2.2 Population by Annular Sectors

The most heavily populated annular sectors between 10 and 50 miles from the St. Lucie Plant are those which encompass the cities and towns with the greatest populations as discussed in Subsection 2.1.3.2.1. The most populous annular sector, S 40-50, includes Greenacres City (18,683 persons in 1990), Haverhill (1,058 persons in 1990), Palm Springs (9,763 persons in 1990), and Royal Palm Beach (14,589 persons in 1990).

The second most populous annular sector is SSE 40-50, which includes portions of Palm Beach (9,814 persons in 1990), Riviera Beach (27,639), West Palm Beach (67,643); as well as Cloud Lake (121), Glen Ridge (207), Lake Clarke Shores (3,364), and Mangonia Park (1,453).

The third most populous annular sector between 10 and 50 miles of the St. Lucie Plant lies north of West Palm Beach on the Atlantic Coast (SSE 30-40). Although its land area is only 49.33 square miles of the 137.31 total square miles allotted to the sector-segment, i.e. 35.9 percent, it includes Lake Park (6,704 persons in 1990), North Palm Beach (11,343), Juno Beach (2,121), as well as portions of Riviera Beach (27,639), Palm Beach Gardens (22,965), Palm Beach Shores (1,040), and the town of Jupiter (24,986). When the preceding three annular sectors are combined, they comprise 52.2 percent of the total population between 10 and 50 miles of the St. Lucie Plant.

2.1.3.2.3 Population by Annuli

Populations of annuli between 10 and 50 miles of the St. Lucie Plant range in number of residents from the largest, with a total of 301,169 persons (the 40-50 mile annulus), to the smallest, with 98,855 persons (the 20-30 mile annulus). The annulus between 30 and 40 miles has the second largest population of 140,567, while the annulus between 10 and 20 miles contains 118,820 persons.

The 40-50 mile annulus has not only the largest population and the greatest overall area (approximately 1,588 square miles of total area, excluding the seven sectors over the Atlantic Ocean; or 1,091 square miles of land area), but also the highest population density in the region. The population density of the 40-50 mile annulus is 620 persons per square mile of land (an average of the densities of the nine sector-segments). Eighty-eight percent of the population is located on 22 percent of the total annulus area, in sectors SSE and S, which include West Palm Beach and environs.

2.1.3.2.4 Population by Sectors

The most populous sectors between 10 and 50 miles of the St. Lucie Plant are those which cover the West Palm Beach area and the Atlantic Coast. Sectors SSE and S have estimated 1990 populations of 244,979 and 208,367, respectively; and densities ranging from 792 to 3,188 persons per square mile of land, and from 61 to 867 persons per square mile of land, respectively. Sector NNW has a population of 109,718, and densities from 238 to 869 persons per square mile of land; sector NW, the next one inland, has a total population of 29,507 and a density range of 1.2 to 311 persons per square mile of land. The five remaining sectors have densities which range from 1.3 to 623 persons per square mile of land.

The sparseness of population in the five interior sectors can be attributed to extensive acreage covered by wetlands and surface water (Lake Okeechobee), inaccessibility to population centers, and the extent of range and cropland.

2.1.3.2.5 Projected Population

Figure 2.1-10 shows the projected residential population between 10 and 50 miles of the St. Lucie Plant for 1995. **Tables 2.1-7** and **2.1-9** also show this information in tabular form. Analogous tables to the year 2030 are designated as shown in the following matrix.

Description	2000	2010	2020	2030
Resident Population by sector-segment: 0-50 Miles	**2.1-10**	**2.1-13**	**2.1-16**	**2.1-19**
Resident Population by sector-segment: Sums to 50 Miles	**2.1-12**	**2.1-15**	**2.1-18**	**2.1-21**

The population estimates and projections are current as of 1992. Total population between 10 and 50 miles is expected to grow by 92 percent between 1990 and 2030, or from 659,411 to 1,266,338. The average annual growth rate for this area would be 2.3 percent for the 40 year period. This rate of growth can be compared to the rate for the State of Florida, which is expected to be 1.41 percent per year from 1990 to 2020.[186] Florida is presently one of the most rapidly growing states in the United States. Between 1980 and 1990, the state grew by 32.7 percent, a net addition of over three million people. Nearly eighty-seven percent of this growth was attributed to net migration.[187]

2.1.3.2.6 Areas of Development

The principal area of development between 10 and 50 miles of St. Lucie Plant occurs in Palm Beach County in the sectors including and adjacent to the Atlantic Coast. Major development activity outside of Palm Beach is concentrated in what can be called the "Atlantic Corridor", the five to ten mile area between the Atlantic Ocean and either Interstate 95 or the Florida Turnpike in Martin, St. Lucie, Indian River, and southern Brevard Counties.

Land to the west of this region is mostly used for pasture, agricultural production (citrus, sugar cane, and truck farming), or remains undeveloped. Access is limited and population is sparse. In a few widely scattered sites, tracts of land have been platted and sold as home sites or proposed for such development. No significant development of any of these projects which lie west of the Atlantic Corridor has yet taken place.

Development is focused in the Atlantic Corridor for the following reasons:

a) proximity to existing population centers and services;

b) access to the Atlantic Ocean and Indian River, and the amenities they provide: scenic beauty, sports and recreation, tourist and industry potential;

c) presence of soils suitable for development of the coastal ridge;

d) zoning and planning policies developed by county and regional agencies which permit development in these areas; and

e) availability of land suitable for development.

Only three significant clusters of development occur outside the Atlantic Corridor between 10 and 50 miles of St. Lucie Plant. Two are on or near the shores of Lake Okeechobee (which covers 400 square miles in sectors SW and WSW between 30 and 50 miles of the plant). On the southeastern shore of the lake in Palm Beach County, the community of Pahokee serves the agricultural community of the western section as well as the sport fishing community using the lake. A few miles north of the lake in Okeechobee County, a regional center has developed at Okeechobee City. The third location where significant development is occurring is Indiantown, in south central Martin County, at the intersection of the St. Lucie Canal and the Seaboard Coast Rail Line.

The following is a summary of development trends by county within 50 miles of St. Lucie Plant:

a) <u>Palm Beach County</u> (See **Figure 2.1-12**)

The principal area of growth within 50 miles of St. Lucie Plant is in the northeastern quadrant of Palm Beach County, which lies south of the plant, at a distance of more than 27 miles. About 40 percent of Palm Beach County falls within 50 miles of St. Lucie Plant; the total population of this area is expected to increase from 376,578 in 1990 to 733,136 in 2030. This increase represents a growth of 94.7 percent over the entire period, or 2.37 percent averaged annually. The corridor in Palm Beach County between the Atlantic Ocean and the Florida Turnpike is intensively developed with contiguous towns and cities such as Palm Beach, West Palm Beach, Riviera Beach, and Lake Park. Residential development activity is expected to continue in this area because of strong growth to date and its reputation as a desirable place to live. Many developments include self-contained recreation amenities. The Professional Golfer's Association (PGA) is headquartered in Palm Beach County.

Another area of growth exists in the northwestern quadrant of Palm Beach County where Pahokee is located on the shore of Lake Okeechobee. Pahokee is the 15^{th} largest city within 50 miles of St. Lucie Plant (see **Table 2.1-28**). It has an estimated population for 1990 of 6,822.

b) <u>Martin County</u> (See **Figure 2.1-13**)

Nearly all (approximately 84 percent) of Martin County's 1990 population is located between 10 and 50 miles of the plant. The remaining residents are within 10 miles of St. Lucie Plant.

The 1990 total of 84,560 persons between 10 and 50 miles for this county is expected to grow by 19.7 percent to 101,218 by the year 2030. This represents an average annual growth rate of 2.99 percent. the city of Stuart is the major population center for the county; in 1990, its population of 11,936 represented 11.8 percent of the total county population of 100,900. Population is expected to grow in and around the city of Stuart and on the barrier beaches in the Atlantic Corridor in Martin County.[87] Multi-family home construction decreased dramatically between 1988 and 1989, when housing permits dropped by about a third. The decline has continued through the first half of 1992. Single family housing permits plummeted by nearly forty percent across the Treasure Coast the from 1989 to 1990. Martin County has seen a slight increase in these permits in the first half of 1992 compared to 1991.[183]

Indiantown is an incorporated area located approximately 26 miles southwest (immediately east of the dividing line between SSW and SW) of St. Lucie Plant at the intersection of SR 710 and SR 76. No population number has been published for Indiantown based on the 1990 census.

The western part of Martin County is largely range and cropland, with few permanent residents outside of Indiantown.

c) <u>St. Lucie County</u> (See **Figure 2.1-14**)

St. Lucie County extends from the plant site west to the 30-mile radius. Of the county's total estimated population of 150,171 in 1990, approximately 22.3 percent, or 33,553 persons, are estimated to reside outside of the 10-mile radius. The number of people outside the 10-mile radius is expected to grow by 134.2 percent (or 3.35 percent average annual rate) to a population of 78,576 in 2030. The primary reason for this growth is the city of Port St. Lucie.

St. Lucie County's major population centers are the city of Fort Pierce, with a 1990 population of 36,830, and Port St. Lucie with a 1990 population of 55,866. While the county as a whole grew 72.3 percent between 1980 and 1990, the city of Fort Pierce grew 9.0 percent.[187] Most of Fort Pierce's growth occurred in the portion of the city on Hutchinson Island. Inland, relatively little population growth is taking place in Fort Pierce, As Fort Pierce is built up, development is expected to occur within the Atlantic Corridor, outside the city limits. Growth in Port St. Lucie has occurred at a much faster pace than Fort Pierce. In 1980, Port St. Lucie's population was only 14,690. Since 1980, Port St. Lucie's population has increased by 280.3 percent.

Immediately to the west of the Atlantic Coastal Ridge is a freshwater marsh system known as the Savannas. Once found along the entire length of the Indian River Lagoon, this vanishing natural feature has been depleted by mans development. Through the continued effort of the State of Florida's Conservation and Recreational Land (CARL) acquisition program, privately held properties within this area are being acquired for perpetual public preservation.[195] In addition to its inland estuary and isolated wetland network, St. Lucie County has 18 miles of Atlantic Ocean shoreline, much of which is currently undeveloped. Approximately 4.5 miles of this unincorporated oceanfront are under public ownership. FPL owns another 2 miles of oceanfront, and maintains the property in its natural state in conjunction with operation of the plant and limits public use. The balance of the oceanfront properties is held in private ownership and is available for development activities, which have historically been residential in nature. About 40 percent of that property has already been developed.

The major use of land within the unincorporated areas of the county is agriculture. Well over 60 percent of the county is presently used for the production of citrus, cash crops, or ranching activities. The western portion of St. Lucie County is especially dominated by pasture and croplands. However, this situation should change dramatically by 2030, as the city of Port St. Lucie expands to the southwest. The locus of population in St. Lucie County will shift to this area. The largest urban use of land within the unincorporated area of the county is for detached, single family residential housing units. Multi-family and mobile home development activities account for a little less than a third as much acreage as the single family units. As was observed in Martin County, multi-family home construction decreased from 1988 to 1989, but even more drastically at a reduction of about two-thirds. The decline has continued into 1992. The Treasure Coast trend of dropping single family housing permits is evident in St. Lucie County, with permits leveling off over 1991 through 1992.[183]

d) Indian River County (See **Figure 2.1-15**)

Essentially all of Indian River County falls within the 10- to 50-mile radius. The county population of 90,208 in 1990 is expected to grow to 173,184 by 2030. This overall growth of 92 percent represents an annual average growth of 2.3 percent. The principal community in the Atlantic Corridor is the county seat, Vero Beach, with a 1990 population of 17,350 persons (19.2 percent of the total county population). Other cities and towns include Sebastian, 10,205 persons in 1990; and Indian River Shores, 2,278 persons in 1990. Only one settlement, the town of Fellsmere, with a 1990 population of 2,179, is located outside the Atlantic Corridor. Aside from the community at Fellsmere (NW 30-40), the area west of Interstate 95 is for the most part protected wetlands which are part of the St. Johns River Flood Control District.

e) Brevard County (See **Figure 2.1-16**)

The portion of Brevard County which lies within the 50-mile radius of St. Lucie Plant is included in sector-segments NNW 30-40, NNW 40-50, and NW 40-50. From the 1980 decennial census to 1990, Brevard tied with Okeechobee County for sixth place in percent growth (46.2 %) of the nine counties involved in the 50-mile radius.[187] Only the inland counties of Highlands and Glades experienced slower growth, thus Brevard had the slowest growth rate of the coastal counties. Major development in Brevard County over 1980 to 1990 has taken place at Cape Canaveral, Malabar, Palm Shores, Palm Bay, and West Melbourne. It is expected that the main growth will continue in the southern portion of the county as vacant coastal areas become more attractive.

In southern Brevard County, development has occurred along the Indian River and Atlantic Coast, Small communities include Barefoot Bay, Micco, Grant, Valkaria, Melbourne Shores, and Floridana Beach. The only incorporated town entirely within the 50-mile radius of St. Lucie Plant is Malabar, which in 1990 had a population of 1,977. The town of Palm Bay lies to the north of Malabar, just outside the 50-mile radius, on the Indian River. However, part of Palm Bay's incorporated area falls within the 50-mile radius in NNW 40-50 and NW 40-50. The development of Palm Bay is proceeding at a rapid pace. The city grew from 18,560 persons in 1980 to 62,632 in 1990, an increase of 237.5 percent. In southern Brevard, as in Indian River County, development will be confined to the eastern coastal area because of restrictions imposed in the western region by the St. Johns River Flood Control District.

f) Okeechobee County (See **Figure 2.1-17**)

Most of Okeechobee County's 1990 population of 29,627 persons resides within the 10- to 50-mile area. By the year 2030, this number is expected to increase by 96.5 percent to 58,219. Okeechobee's population is concentrated in and around the county seat of Okeechobee City. The county seat is at the convergence of US 98 and US 441 and SR 70, SR 78, and SR 710, less than five miles north of Lake Okeechobee. This accessibility is expected to ensure it's continued growth as a regional center, The city's 1990 population of 4,943 represents about 16.7 percent of the county total. The unincorporated population of 24,684 persons accounts for the other 83.3 percent of the county's total population. Along with Okeechobee City, the nearby community of Cypress Quarters is split between sector-segments WSW 30-40 and W 30-40. In addition, WSW 30-40 contains Taylor Creek. W 30-40 encompasses Basswood Estates, Whispering Pines, and Country Hill Estates.

g) Glades, Osceola, and Highlands Counties (See **Figures 2.1-18, 19, and 20**)

Three counties on the periphery of the 50-mile study area contribute less than half of a percent of the 1990 population between 10 and 50 miles of St. Lucie Plant. In Glades County, in sector-segment WSW 40-50 , on the northwest shore of Lake Okeechobee, a community known as Buckhead Ridge has developed. The only other settlement of greater size in Glades County is the county seat of Moore Haven, which had a 1990 population of 1,432, an increase of 14.6 percent from 1980.[187] The unincorporated portion of Glades County accounted for 6,159 persons in 1990, representing an increase of 29.9 percent over 1980.

Osceola County is partially included in the 50-mile radius in sectors NW and WNW. The only significant settlement is Yeehaw Junction, found in sector-segment WNW 40-50.

Like Osceola, Highlands County has a small fraction of its land area within the 50-mile radius, In this area, a small settlement has developed on SR 70.[101] Highlands County's predominant growth is expected to continue outside of the 50-mile radius in the vicinity of Sebring, Avon Park and Lake Placid, in the central part of the county.[102,103,104] All three interior counties reflect the lower rates of development taking place in Florida's central regions, which are not adjacent to the Atlantic or Gulf coasts.

2.1.3.2.7 Projected Growth Rates Between 10 and 50 Miles

The total population between 10 and 50 miles is expected to grow by 92 percent from an estimated 659,411 persons in 1990 to 1,266,338 in 2030. Regarding the six main counties involved in the 50-mile radius, the following projections are expected:

County	1990 Pop.	2030 Pop.	Total Change	Percent Increase
Brevard	398,978	779,646	380,668	95.4
Indian River	90,208	173,184	82,976	92.0
Martin	100,900	221,676	120,776	119.7

County	1990 Pop.	2030 Pop.	Total Change	Percent Increase
Okeechobee	29,627	58,219	28,592	96.5
Palm Beach	863,518	1,750,700	887,182	102.7
St. Lucie	150,171	351,678	201,507	134.2

Sector-segments likely to have the highest rates of growth are those that include attractive areas near population centers that have reached, or are approaching saturation. The listing above indicates a growth hierarchy for the top three counties of St. Lucie > Martin > Palm Beach. An analysis of 1990 resident populations per square mile of land area available shows that sector-segment SSE 40-50 has the highest density of 3,188 persons per square mile (See **Table 2.1-32**). This area is entirely within Palm Beach County and includes the city of West Palm Beach. Expansion is likely directly north into SSE 30-40; also dense, but to a lesser degree at 1,594 persons per square mile. Growth could also continue to the west in S 40-50 where the current density is 867 persons per square mile. The aforementioned sector-segments of likely expansion are also entirely within Palm Beach County. In contrast, a relatively low rate of growth is expected for annular sector SSE 40-50 because of its high density. Low growth rates can also be expected for sector-segments of low density surrounded by others of low density (less than 500 persons per square mile). Such sector-segments include SW 20-30, WSW 20-30, W 20-30, WNW 20-30, W 30-40, and WNW 30-40.

2.1.3.3 Transient Population

The total peak 1992 transient population within 10 miles of the St. Lucie Plant is estimated at about 46,711. This total includes an estimate of the number of seasonal visitors and daily transients. This is represented in **Figure 2.1-21** for seasonal visitors and daily transients, as well as **Table 2.1-84** for the combination of the two. The corresponding 1995 projections are attached as **Figure 2.1-22**, and **Table 2.1-85**.

As in much of Florida, this region experiences significant fluctuations in population as thousands come to the area for the winter season (generally from Christmas/New Year's to Easter) or for a summer or winter vacation. Many attractions and events are held throughout the year which draw thousands of people. Although few in number, major industries and colleges draw many workers and students every day.

The population from each of these transient population sources has been estimated and projected for the required years through 2030. Estimates and projections for these three components are presented in **Tables 2.1-85** through **2.1-89**, and discussed in the subsections which follow. Transient population resulting from transportation by road, rail, waterway, and by air is estimated by calculating the average daily passengers at locations where vehicles or passenger counts are made. The transient population estimates and projections for the 10-mile EPZ are current as of December of 1992.

2.1.3.3.1 Tourists and Seasonal Visitors

The St. Lucie area experiences a significant influx of transient visitors during the winter months, from about December to April. This seasonal population includes persons with residence in another state who come to the area for several months out of the year. Because their stay can be a lengthy one, planning officials have found it difficult to distinguish between permanent and seasonal residents.[6,9,190] Seasonal residents may also claim permanent residence to avoid state income taxes. Other seasonal visitors include persons who come into the area for a short vacation, staying in seasonal housing units, overnight tourist accommodations, recreational camping areas or with friends and relatives. One of the more important cities in the plume pathway evacuation zone is Port St. Lucie. In 1990, the city had less than 450 hotel/motel units, no recreational vehicle parks, and no migrant labor camps.[218] The 1980 Census indicated that Port St. Lucie's housing stock had a permanent occupancy rate of

81.7%. This occupancy rate reflects a moderate to high degree of transient residents. Since 1980, the city has experienced a visible increase in younger families with children and in year-round residents. It is estimated that the occupancy rate has increased to approximately 85% to 86% during the 1980's and can be expected to remain at that rate. The City also estimates that approximately 95% to 96% of its housing units are occupied during the peak season. Therefore, seasonal population projections for Port St. Lucie are based upon an increase of approximately 10% above permanent residents. This anticipates that the majority of the seasonal influx is due to out-of-state residents moving to existing housing units within the city.[218] Sector SSE, with an estimated 13,918 visitors in 1992 (see **Table 2.1-84**), accommodates the largest number of overnight visitors due to the large number of recreational vehicle lots and condominium units on Hutchinson Island. Of the total, 9,586 persons visit sector-segment SSE 5-10. In segment 4-5 of the same sector, 4,013 persons are expected to visit on a peak day. This figure is greater than six of the nine 5-10 mile segments, and eight of the twelve sectors for the entire ten miles. The 4-5 mile annulus is the most populous by far for one mile increments to five miles with a peak daily total of 6,338 persons.

2.1.3.3.2 Recreational Attractions and Events

There are a number of attractions which draw thousands of visitors to the area throughout the year. These include public parks, beaches, and special events such as festivals which take place throughout the year. Several public access points along Hutchinson Island's coastline exist for persons attending the beach.[12, 183] The public access points within 10 miles have been listed in **Table 2.1-75** along with an estimate of the number of persons using these access points during a fair weather day.

Attractions include the Fort Pierce Inlet State Park and Savanna State Preserve. The Fort Pierce Inlet State Park is located on the southern tip of Hutchinson Island's north island. When filled to capacity, up to 1,400 people may be enjoying the park on a warm day.[195] The Savannas State Preserve is located on the mainland along the western shore of the Indian River. The Savannas represent the last freshwater lagoon system existing in the state. There is a county park located off Midway Road which offers recreational facilities for visitors.[28] 1992 population estimates for these recreational areas are also listed in **Table 2.1-75**.

The population associated with major special events which take place throughout the year is listed in **Table 2.1-73**. In Fort Pierce, the Cattlemen's Day Parade is estimated to draw up to 15,000 people in February.[162, 185] The parade is followed by a barbecue held at the Fort Pierce Shrine Club. In Port St. Lucie, the Great American Raft Race is held every year in September at the Northport Marina. An estimated 4,000 people attend this event.[163] There are several other events which take place within 10 miles of the plant and attract a large number of visitors, as shown in **Table 2.1-73**.

With respect to the area beyond 10 miles, in February and March, an estimate of about 9,500 persons per day attend the week-long St. Lucie County Fair,[117] which is held at the County Fairgrounds in Fort Pierce, located approximately 12 miles from the St. Lucie Plant. The attendance is projected to rise to about 11,400 persons per day in 1995. The Martin County Fair,[118] held at the fairgrounds in Stuart, had a peak daily attendance of approximately 10,000 and is expected to reach about 11,800 persons in 1995. Other attractions and events include the football games at Vero Beach High School (where 6,000 fans pack the Citrus Bowl) and at the Martin County High School, exhibition games by the Los Angeles Dodgers at Dodgertown Sports Complex in Vero Beach, and attendance at the Jai-Alai games in Fort Pierce. Between 30 and 50 miles from the St. Lucie Plant, there are several attractions and events held annually. The highest daily attendance at any event (in fact, for the entire 50-mile radius) takes place at the South Florida Fair, at the Palm Beach County Fairgrounds, In 1990, the estimated peak daily attendance was 138,568 persons (see **Table 2.1-74**). Other events, such as fireworks, football games, and festivals, may draw from 1,000 to 10,000 persons on a single day.[114, 185] Special events which take place between 10 and 50 miles of the plant are also listed in **Table 2.1-74**. The attendance numbers are current as of 1992.

2.1.3.3.3 Population at Major Industrial Facilities

The following is an employment summary for the nine counties of interest. Figures are for 1991 as derived from 1992 publications.[203, 209]

County	Labor Force	Employment	Unemployment	Un. Rate
Brevard	199,930	185,701	14,229	7.1
Glades	3,009	2,756	253	8.4
Highlands	27,114	24,841	2,273	8.4
Indian River	40,535	36,082	4,453	11.0
Martin	42,770	38,576	4,194	9.8
Okeechobee	12,243	10,980	1,263	10.3
Osceola	53,835	50,204	3,631	6.7
Palm Beach	432,404	396,025	36,379	8.4
St. Lucie	65,078	56,112	8,966	13.8

Note that St. Lucie County has the highest unemployment rate of all of the counties in the 50-mile radius. The unemployment rate has steadily risen from 8.8 percent in 1988 to the present 13.8 percent in St. Lucie County. Martin County has suffered the same trend with an increase from 5.6 percent in 1988 to 9.8 percent in 1991. St. Lucie County's major private sector employers (1991 data) are HCA Lawnwood Regional Medical Center (1,146), Florida Power & Light (905), Winn-Dixie (755), Publix (641), HCA Medical Center of St. Lucie (475), Southern Bell (429), Club Med/Village Hotel - Sandpiper (425), Harbor Federal (309), Flowers Bakery (275), and Becker/Indian River Foods (210).[201] St. Lucie County last updated its employment figures by TAZ in 1988. These figures were used to approximate the employment in industrial, commercial, and service sectors within 10 miles of the plant. The total employment for 1988 is estimated to have been 26,735. The projected employment for 1995 within 10 miles of the plant is 32,082. See **Table 2.1-77** for a detailed breakdown by TAZ. The major employers in Martin County (1991) are Martin Memorial Hospital (1,700), Grumman Aerospace (1,036), Armellini Express Lines (300), Indian River Plantation (350), First National Bank (350), Stuart News (275), TCT Turbo Combustor Technology (258), Florida Power & Light (240), Ebasco (240), and Dickerson, Inc. (200).[202]

Most of the major industries surrounding the St. Lucie Plant involve citrus growing, packing and processing, construction or marine equipment. Facilities with at least 50 employees were included in this population segment. Many of the areas's largest industries depend on growth, such as construction and real estate. Other large employers, e.g. schools, governments, utilities, and retail stores, depend indirectly on growth. The steadiest local producer is agriculture, which employs more than 10,000 Treasure Coast workers. Freezes in the early and late 1980's forced many citrus growers south into St. Lucie County. **Table 2.1-76** lists the employment facilities identified. Flowers Baking Company and Tropicana Products are two of the largest employers identified within 10 miles , with a total of 400 (a significant increase from 1991) and 300 employees, respectively. FPL itself cut about 60 employees in St. Lucie County, including the nuclear plant, but sees no more cutbacks in the near future.

Grumman Aircraft Systems, currently (1992) employs about 1,000 workers at its Stuart plant near the Martin County Airport after defense cutbacks took their toll.[119, 183] Grumman is located in sector SW, between 10 and 20 miles of the St. Lucie Plant. As of 1992, Grumman's employment is leveling out.

2.1.3.3.4 Special Populations

Special populations which consist of subsets of the resident population include public school, private school, and college students; hospital and hospice patients; and inmates at correctional facilities. Most, but not all, of these special population members will be counted in the resident population, however their locations during school hours, inpatient duration, and incarceration sentences will be different.

a) Local Public and Private Schools

Public and private schools in the nine counties of interest are given by number and enrollment based on the 1990-1991 school year as follows:

County	Public (No.)	No. Students	Private (No.)	No. Students
Brevard	75	56,639	34	6,132
Glades	4	902	0	0
Highlands	15	9,248	8	579
Indian River	20	11,838	7	1,370
Martin	26	11,808	10	2,012
Okeechobee	11	5,963	0	45*
Osceola	21	19,570	5	586
Palm Beach	139	105,712	72	19,348
St. Lucie	28	22,224	10	2,033

* Note that there are students listed, but no formal school.

School enrollment for St. Lucie County was assigned to sector-segments in radii of 0-5, 5-10, and 10-20 miles from the St. Lucie Plant. These data are presented in **Table 2.1-78**, and were extracted from 1988 TAZ attributes. Sector-segment NW 5-10 contains 14,150 students, which is the most populous. The only students within 5 miles of the plant are in SSW 0-5 with a total of 500. There are no schools within 10 miles of the plant in the NNW sector. Other sector-segments that are known to have schools showed no students according to 1988 TAZ data: these are SW 0-5, W 5-10, WNW 0-5, and WNW 5-10. A list of public and private schools in St. Lucie and Martin Counties by sector-segment is attached as **Table 2.1-79**. St. Lucie County's school system presently (Fall - 1992) has about 23,500 students; an increase of about 1,000 over the previous year. Four new schools opened in the county in 1992 to accommodate the growing student population. For example, Forest Grove Middle School in Fort Pierce opened in August, 1992 to about 1,200 students. Martin County has about half as many students with almost 12,000 tallied in 1992. This county opened Hidden Oaks Middle School in Palm City, and is implementing plans to build a new elementary school in Jensen Beach, where growth has been the greatest. One of the newest private schools is Martin County Montessori School in Stuart.

b) Colleges

Many, mainly small, colleges dot six of the nine counties of interest. While most of the colleges are beyond the 50-mile radius, they draw residents during operating hours. A listing of colleges compiled in April of 1990 is summarized below.

County	City	College	Enrollment
Brevard	Cocoa	Brevard Community C.	12,375
	Melbourne	Florida Institute of Technology	6,254
		Phillips Junior C.	239
Highlands	Avon Park	South Florida C. C.	1,308
Martin	Hobe Sound	Hobe Sound Bible C.	202

County	City	College	Enrollment
Osceola	Kissimmee	Florida Bible C.	139
		Florida Christian C., Inc.	123
		Southeastern Academy	203
Palm Beach	Boca Raton	College of Boca Raton	1,137
		Florida Atlantic University	11,325
	West Palm B.	New England Institute of Tech.	580
		Palm Beach Atlantic C.	1,139
	Lake Worth	Palm Beach C. C.	13,121
	Boynton B.	St. Vincent DePaul Regional Seminary	99
St. Lucie	Ft. Pierce	Indian River C. C.	9,483*

* There are now campuses for IRCC and Barry University in St. Lucie West.

Indian River Community College is currently based in Fort Pierce, with branch campuses in Stuart, Vero Beach, St. Lucie West, and Okeechobee. The college has an attendance of 48,000 persons per year. Barry University, formerly a women's college based in Miami Shores, opened a branch campus in St. Lucie West in January of 1992. Their first official year started in October, 1992.

c) Hospitals and Corrections Facilities

Local health service centers include Lakewood Park Medical Center, Fort Pierce Community Health Center, Lawnwood Regional Medical Center, Harbour Shores Hospital, HCA Medical Center of Port St. Lucie, Savannas Hospital, Martin Memorial MediCenter of Port St. Lucie, Emergi-Center of Jensen Beach, Martin Memorial Medical Center, Coastal Surgical Care, Martin Memorial MediCenter of Palm City, Martin Memorial Hospital South, Martin Memorial MediCenter of Hobe Sound, Martin Memorial MediCenter of Indiantown, and SandyPines. Martin County has two main hospitals with the opening of Martin Memorial Hospital South on Salerno Road west of US 1 in September, 1992. This 100 bed facility is a satellite of the 236 bed Martin Memorial Medical Center in Stuart. HCA Medical Center of Port St. Lucie expanded with a 28 bed obstetrics unit in January, 1992. All of the counties combined have a total of 8 hospices with only 48 beds.

The following is an estimation of the number of inmates and patients residing in federal and state-operated institutions and considered nonresidents of the local area as of April 1, 1990.

County	City	Inmates/Patients
Brevard	Titusville	42
	Unincorporated	1,074
Highlands	Unincorporated	115
Indian River	Unincorporated	257
Martin	Stuart	24
	Unincorporated	1,342
Okeechobee	Unincorporated	164
Osceola	Unincorporated	53
Palm Beach	Boca Raton	8
	Lantana	293

County	City	Inmates/Patients
	West Palm Beach	125
	Unincorporated	1,248
St. Lucie	Unincorporated	102

2.1.3.3.5 Transportation Sources of Transient Population

The transient population resulting from the four basic modes of transportation is estimated by calculating the average daily number of passengers at locations on roads, waterways, rails, and airports where vehicles, vessels or passengers are counted. Since there is no way to know which or how many annular sectors people have traveled through and to avoid counting people as both residents and passengers, transient population resulting from transportation has not been incorporated into the transient population totals by annular sector (see subsection 2.1.3.3.1). Estimates and projections of passengers for 1990 through 2030 are presented in **Tables 2.1-80** through **2.1-83**.

2.1.3.3.5.1 Highway Traffic

Within 10 miles of the St. Lucie Plant, highways and roads are a major source of transient population. SR A1A, SR 707, and US 1 are major north-south arterials. SR A1A passes within approximately 1,000 feet of St. Lucie Plant on Hutchinson Island. SR 707 along the mainland coast is less than two miles from St. Lucie Plant at its nearest point. US 1 is not only a major arterial north and south, but also a focus of commercial activity in St. Lucie County. At its closest point, US 1 is approximately 4.8 miles from St. Lucie Plant.

At or near the 10-mile radius, four major river crossings concentrate traffic over the St. Lucie and Indian Rivers (see **Figure 2.1-14**). These include the South Bridge, Jensen Beach Bridge, and Stuart Causeway from the mainland to Hutchinson Island and the Roosevelt Bridge on US 1 in Stuart. In February and March, traffic congestion in the Fort Pierce area and at the access points to Hutchinson Island is a severe problem; in fact, it is considered a limit to growth.[85] Recommendations for an additional bridge crossing the Indian River have been made for the northern end of Hutchinson Island, within Fort Pierce City limits or in adjacent areas.[85] As of December, 1992 this has not proceeded beyond preliminary investigation.

Traffic from the larger region comes within 10 miles of St. Lucie Plant on Florida's Turnpike, Route 91. At its closest point, the Florida Turnpike is approximately 7.5 miles from St. Lucie Plant. Traffic counts made in 1990 resulted in peak season ADTs in each direction of 16,999 vehicles on the turnpike north of Okeechobee Boulevard, 17,683 vehicles south of Okeechobee Boulevard, and 21,168 vehicles per day south of Port St. Lucie Boulevard.[196] The number of passengers for 1992 through 2030 has been estimated and projected from these ADTs and is attached as **Table 2.1-82**.

Peak season ADTs for Interstate 95 (I-95), and projected numbers of passengers are also given in **Table 2.1-82**. ADTs for 1990 were 29,443 vehicles per direction per day on I-95 north of Orange Avenue, 28,867 north of Okeechobee Road, 37,579 north of Midway Road, 34,994 north of St. Lucie West Boulevard, 26,851 north of Gatlin Boulevard, and 36,163 south of Gatlin Boulevard. Since the last revision of this document, I-95 has been completed in St. Lucie, Martin, and Palm Beach Counties and now spans the length of the state from the Georgia state line to South Miami.

Average daily traffic counts and passenger projections through 2030 are tabulated for 156 road segments in Martin County, and 216 road segments in St. Lucie County. These data are attached as **Tables 2.1-83** and **2.1-82**, respectively.

Projected passenger populations can change as construction efforts allow increased capacities on congested roadways. Ongoing and anticipated projects for 1992 and 1993 are discussed below for St. Lucie and Martin Counties.

St. Lucie County

Projects include:

a) widening the Prima Vista Boulevard bridge over the North Fork of the St. Lucie River,

b) widening Port St. Lucie Boulevard to six lanes west of the turnpike to Savage Boulevard,

c) widening Port St. Lucie Boulevard to four lanes between Savage and Darwin Boulevards,

d) improvements to Midport Road between US 1 and Port St. Lucie Boulevard, and

e) engineering design work on South 25th Street between Port St. Lucie and Fort Pierce, Midway Road between US 1 and South 25th Street, Jenkins Road and Lennard Road.

Prima Vista Boulevard in Port St. Lucie was widened to five lanes in 1992. The work scheduled for the bridge will widen the last two-lane gap in the road which is one of Port St. Lucie's two major east-west routes. Another east-west route, the proposed Palmer Expressway through northern Port St. Lucie between US 1 and I-95, has been cancelled by the state Department of Transportation.[183]

Martin County

Projects include:

a) widening County Road A1A to five lanes from Jefferson Avenue to Indian Street,

b) paving Cove Road from State Road 76 to US 1 to improve travel between western Martin County and the Port Salerno area,

c) building Willoughby Boulevard from Monterey Road to Indian Street with developers of Willoughby Golf Club concurrently building the section from Indian Street to Salerno Road,

d) improvements to the US 1 - Jensen Beach Boulevard intersection near the Treasure Coast Square Mall, and

e) improvements to the intersection of Sewall's Point Road and East Ocean Boulevard.

The widening of County Road A1A from Indian Street to Monterey Road has been delayed by lack of money; but the intersection of County Road A1A, Monterey Road, and Palm Beach Road could be improved in 1993-1994.

State planners are studying another plan to improve travel between the east and west coasts by creating a four-lane, high-speed highway along State Roads 710 and 70. State Road 710 links West Palm Beach, Indiantown, and Okeechobee. State Road 70, which links Fort Pierce and the Bradenton-Sarasota area, meets State Road 710 near Okeechobee.[183]

2.1.3.3.5.2 Waterways Population

The population associated with vessels navigating along the intracoastal waterway or rivers in the area, was estimated based on information obtained from the State Department of Transportation (DOT).[71] The State DOT provided information on the number of bridge openings and number of vessels passing under the five bridges within the 10-mile area. The number of yearly vessels was divided by 365 days to obtain a daily average. This number was then multiplied by 4 passengers per vessel to obtain the total population associated with waterways travel. **Table 2.1-80** lists the estimated number of passengers associated with vessels counted along the Indian and St. Lucie Rivers for 1988 and projected for 1995 through 2030.

The Florida peninsula is transversed from Fort Myers to Stuart by the Okeechobee Waterway, a cross-land lock system providing access from the Gulf of Mexico to the Atlantic Ocean and Intracoastal Waterway. From September 1986 to September 1987, 9,639 vessels used the Waterway.[71] The Waterway runs from Fort Myers Harbor to Lake Okeechobee. At Port Mayaca in Martin County, the Waterway enters the St. Lucie Canal. Heading north and east through Indiantown, the Canal connects with the South Fork of the St. Lucie River in Stuart. This eastern terminus of the Waterway lies within the 10-mile radius in sectors S and SSE. In 1987, the average daily number of passengers on ships going through the locks was estimated to be 106 persons.

The following is a list of the number of registered pleasure and commercial boats in the counties of interest for 1989-1990.[203, 206]

County	No. Pleasure Boats	No. Commercial Boats
Brevard	25,153	1,346
Glades	822	127
Highlands	7,352	120
Indian River	7,616	411
Martin	11,426	467
Okeechobee	4,231	253
Osceola	5,297	319
Palm Beach	30,878	743
St. Lucie	8,534	393

2.1.3.3.5.3 Rail Passengers

Within 10 miles of St. Lucie Plant, the Florida East Coast Rail Line passes at a distance of two miles from the Plant. It carries no passengers.[129] To the southwest, Amtrak trains on the Seaboard Coast Line carried a total of 135,336 passengers between October 1, 1976 to September 30, 1977. At its closest point, the Seaboard Coast Line is approximately 26 miles from the St. Lucie Plant. Peak daily capacity, which means all seats available on all six trains on the line, was 2,474 in August, 1978.[129] A cutback in the number of passenger trains has reduced passenger totals after 1978.[130] As indicated in **Table 2.1-81**, the Seaboard Coast Line, which passes through the 30-, 40- and 50-mile annuli, had an estimated daily average of 292 passengers in 1990 between Sebring, Florida and West Palm Beach. Modest increases are expected through 2030.

2.1.3.3.5.4 Airport Passengers

Although no airports exist within the 10-mile radius, both St. Lucie and Martin Counties have airports located between the 10- and 20-mile radii. The St. Lucie County Airport is located north of the City of Fort Pierce in sector NW. St. Lucie is a landing rights airport with complete US Customs facilities. Total air traffic operations (arrival or departure) in 1989-1990 were 195,621, with 59,893 itinerant and 135,728 local. None were conducted by a scheduled air carrier. Of the itinerant flights, 2,094 were classified as air taxi, i.e. performing at least five round trips per week between two or more points and publishing flight schedules or transporting mail.

The Stuart/Martin County Airport is located south of Stuart in annular sector S 10-20. Its use is limited primarily to test flights for Grumman Aerospace.

Between 20 and 30 miles of St. Lucie Plant, in Indian River County, the Vero Beach Municipal Airport had 251,739 operations for the 1989-1990 fiscal year. Of that total, 161,234 were itinerant, with 29 via air carrier, 3,364 by air taxi, and the balance due to general aviation and 133 military flights. Local operations consisted of 90,505 flights, of which 19 were military and the remainder attributed to general aviation.[203, 207]

The West Palm Beach International Airport is located in sector SSE, inside the 50-mile radius (see **Figure 2.1-12**). In 1989-1990, a total of 2,403,585 arriving and departing passengers used the airport. The average daily number of passengers is estimated to be 6,585. Passengers are accompanied on the average by two persons each prior to departure and upon arrival. Estimates and projections of average daily passengers are included in **Table 2.1-81**. Operations totalled 238,873. Only 21,147 of these were local. Air carrier traffic accounted for 63,026 of the 217,726 itinerant operations, air taxi service contributed 34,206, military flights totalled 1,727, and the other 118,767 were from general aviation.

2.1.3.4 Low Population Zone

The Low Population Zone (LPZ) has been defined as the area within one mile of the St. Lucie Nuclear Power Plant. The land within this area is owned by Florida Power & Light Company. Route A1A runs in a north-south direction through the LPZ along Hutchinson Island.

There are no residents within the LPZ. However, the Walton Rocks public beach access lies within the LPZ, and includes a parking area with an approximate 100-car capacity. Based on an average of 4 persons per vehicle, about 400 persons may be present at the beach opposite the plant. Recreational facilities for limited use by FPL employees and their families are located within the LPZ.

2.1.3.5 Population Center

The nearest population center to the plant, as defined by 10CFR100, is the city of Port St. Lucie. Overall, the city is a pre-platted, single family residential community. There is very limited existing opportunity for medium to large scale multi-family, commercial, or industrial development within the city limits. Port St. Lucie has a 1990 population of 55,866. The city's political boundary closest to the plant is about 2.7 miles. This area, located south-southwest of the plant is sparsely populated. More densely developed areas of the city are approximately four miles from the plant to the southwest and south-southwest. The city of Port St. Lucie covers a large portion of the 10-mile area. Its boundaries range in distance from 2.7 miles to about 13 miles from the plant and cover most of the south to west-northwest sectors between 5 and 10 miles. The sectors with the highest population include the SSW, SW, and WSW sectors.

Although the city of Fort Pierce has a much lower population than Port St. Lucie, at 36,830, this city is more densely populated. The majority of the population in Fort Pierce is located in sector NW 5-10 miles. Future growth for the city will depend on the redevelopment and conversion of lower use areas to higher intensity uses or through the annexation of additional property into the city. Development to the west has typically been residential with the exception of an emerging commercial area around the intersection of Virginia Avenue and Okeechobee Road.[195]

The major population center within the 50-mile radius is the City of West Palm Beach with a 1990 population of 67,643 persons. Other population centers with populations greater than 5,000 persons within the 50-mile radius are found in **Table 2.1-28**.

2.1.3.6 Population Density

The cumulative population density within 10 miles of the St. Lucie Plant is presented in **Tables 2.1-31** through **2.1-36**. Sector NW has the highest cumulative population density with 1,827 persons per square mile of total area, or 2,657 persons per square mile of land area alone. Most of the city of Fort Pierce is within this sector. The population densities presented in **Tables 2.1-34** and **2.1-35** show that in 1990, three sectors exceed 500 persons per square mile of total area, and five exceed 500 when only land area is considered within the 10-mile radius. These higher densities are associated with the SSE, S, SW, WSW, and NW sectors.

The SSE sector is the only one with a cumulative density greater than 500 (with 1,650) when taken to the full 50 miles and only land area is considered. This sector has only 11 persons per square mile greater than 500 when water area is added to yield the density per total area.

Cumulative populations, densities by land area, densities by total area, comparisons to 500, and comparisons to 1,000 are attached as **Tables 2.1-31** through **2.1-72**. In 2030, it is expected that only two of the ten 0-10 mile sector-segments will have densities of less than 500 persons per square mile of total area, and only the SE sector will remain as such when only land area is considered. Six of those ten sector-segments will have greater than 1,000 persons per square mile of total area; but when expanded to the full 50 miles, all will fall below 1,000.

2.1.3.7 <u>Methodologies for Estimating and Projecting Resident Population</u>

It is our thinking that the output data should reflect the most accurate methodologies available, and should be presented in the most professional manner possible. The traditional method can be summarized as follows:

a) transfer census tract and block group boundaries by hand from library maps to USGS quadrangle maps,

b) check county highway maps for more recent revisions,

c) overlay sector-segment lines and arcs by hand,

d) assign percentages of block groups to sector-segments by using ratios of domiciles counted in the block groups,

e) multiply fractions by populations for the block groups making up a sector-segment and sum in a spreadsheet,

f) use State FSCPE member data to construct growth curves for counties,

g) apply growth factors to sector-segments to predict future distributions,

h) plot current and predicted distributions on a radial graph.

For the 1990 census, the Census Bureau developed a computer file format known as Topologically Integrated Geographic Encoding and Referencing (TIGER). The TIGER/Line file contains vertices (lines and points) that define items such as roads, voting districts, census regions, and their names and address ranges. The average file size for a state is 500 megabytes (7.5 Mb per county). Public Law 94-171 mandated that the results of the 1990 census be available. Of the many electronic formats available, the most prevalent is on a CD-ROM (a Compact Disk as a Read Only Memory). All the statistical data associated with the census is available (some census information is due in 1993). Population in Census Blocks are detailed with respect to total number, sex, race, age groups, and household types, occupancy, value, own/rent, etc. These data may be integrated into any pre-defined political units or user defined areas. In 1980, census data were available only on magnetic tape and were much more difficult to address. The computer hardware and software necessary to take advantage of these databases are only now becoming available. TIGER/LINE files must be translated to regions to match the PL 94-171 database. The translated boundary files are then imported into the mapping software. The PL 94-171 data are then matched to the regions (census blocks) as map attributes.

Census blocks are defined by physical boundaries; either man-made (such as streets, roads, fence lines, power lines, etc.) or natural (rivers, lakes, oceans, mountains, etc). **Figure 2.1-23** demonstrates the complexity and detail of census blocks within 10 miles of the St. Lucie Plant. The computing system has been designed to handle this level of detail. Investigators can provide a much more accurate estimate of present and future population distributions than was possible during the last revision of this document. The mapping software has an imbedded dBASE III+ format and will calculate populations for any polygon we draw by automatically assigning fractions (called "area weighting") of census blocks to sector-segments. Also, the additional mapping capabilities produce a better quality output. There are extensive numbers of Census Feature Class Codes (CFCC) that can be "switched" on or off for display or use once the TIGER file is loaded into a computer. For example, there are almost sixty choices of road features ranging from interstate through state, county and neighborhood, to alleys. Even jeep trails passable only by 4WD vehicles are noted. There are twenty rail features that can be selected. Power transmission lines and pipelines are coded. The "landmark" feature lists some fifty items that can be called from the file: military installations, hospitals, educational institutions, transportation terminals, industrial parks, parks and forests (as limited by the USGS 1:100,000 maps). There are some physical features available: mountain peaks, streams, lakes, bays, oceans, glaciers, etc.

2.1.3.7.1 1990 Census Results and Future Projections by County

The only "true" population counts are available in decennial census years, e.g. 1970, 1980, 1990, etc. Of course, the most recent was the 1990 census which serves as the base for present and future projections until the year 2000 census is taken and published. Population projection methodologies at the county level have been developed by various State agencies. In 1967, the Federal-State Cooperative Program for Local Population Estimates (FSCPE) was formed. Through member participation, the Bureau of the Census has an opportunity to evaluate the level of accuracy of the population estimates produced between censuses and to review the adequacy of specific procedures used to prepare the estimates.

It is our conclusion that FSCPE participants use those methods that have statistically proved to generate the most accurate projections for their respective States. In that regard, the underlying assumptions and methodology for standard, reliable techniques are not questioned. The Bureau of Economic and Business Research located on the campus of the University of Florida is the foremost FSCPE participant agency in this state, and is the source of the predictive growth rates used in this document.

The most important and complex component of population change for States, counties, and small geographical areas is internal migration. With fertility and mortality rates in the U.S. becoming stable at historically low levels, internal migration has assumed critical importance in determining the growth or decline of counties and States [180]. Trends in internal migration differ throughout the U.S. There is also an interdependency at the State level, i.e. since net internal migration is zero by definition at the national level, an increase in net internal migration in one State has to be offset by decreases elsewhere. Internal migration is sensitive to changes in economic conditions, therefore both rapid and sizeable changes in internal migration can be expected. This is why local bureaus that monitor economic conditions are valuable to our purpose.

Population size is also a major determinant of accuracy levels. Upon comparison of projections with decennial counts in both 1970 and 1980, smaller counties (less than 5,000 population) experienced larger errors (7 percent) while larger counties (greater than 100,000 population) had errors of about half that amount [176]. Clearly, a sparsely populated county such as Glades County, Florida is at risk for larger error. However, the average error for a ten-year projection is still not excessive. Since the counties surrounding Glades are more populous (Highlands and Okeechobee), the inclusion of their more accurately projected blocks in shared sector-segments will dilute the Glades error contribution. In addition, even Glades County contains numerous census blocks; an asset that enables us to confidently place the "true" 1990 figures in the correct sector-segments. The importance of this is explained in the succeeding paragraph.

The starting point for each projection will be 1990 population enumerated by the U.S. Bureau of the Census (these numbers have not been adjusted for possible undercount or overcount). Consequently, this is also the starting point for our sector-segment projections. The more finely divided a county's population (i.e., a large number of blocks), the less likely it will be to fractionate a large populace. In a number of counties special adjustments must be made to the population before applying the techniques described above. This is done to account for special populations such as university students, military personnel and prison inmates. Adjustments are made for counties in which these special populations account for a large proportion of total population or where the special populations have moved counter to trends for the rest of the population. The investigators have drawn upon local FSCPE member agencies with an intimate knowledge of these factors and the methods best-suited to dealing with them. The application of the predictive equations generated by these agencies is revealed in the next section.

2.1 3.7.2 1990 and Projected Future Populations by Sector-Segment

A sector-segment grid is constructed originating at the latitude-longitude coordinates of the site of interest with sixteen sectors centered on the compass points and radii of 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 20, 30, 40, and 50 miles.

Population projections for sector-segments are estimated by applying common growth rates (predictive equations) to all census blocks within a particular county; then the software assigns weighted fractions of projected block populations to construct sector-segment totals. Projections are tabulated at user-defined intervals. The reliability of FSCPE member's projections coupled with the computerized sector-segment assignment system result in the most accurate delineations of projected population distributions available.

2.1.3.8 Methodology: Transient Population

2.1.3.8.1 Methodology for Estimating Peak Daily and Seasonal 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.

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,[22,23,24, 194] Chamber of Commerce publications,[28,30,31,32] county planning documents,[195, 204] personal communication,[184] and field surveys. Although St. Lucie County is not presently considered to be a primary tourist destination, indications are that the profile of the seasonal visitor to this community is changing rapidly, partially as a result of the introduction of the New York Mets major league baseball training complex, as well as the expanded tourist use of the area's aquatic resources.[195]

Local planning officials have found it difficult to accurately estimate the number of seasonal residents in the area, since many of them are residents for several months at a time.[4,9, 190] For purposes of estimating this population segment, a portion of all multi-family housing units was designated as seasonal, since this type of residential facility is most commonly associated with seasonal use. Interviews with management personnel of many of these developments indicated that they were unsure as to how many units were used only seasonally. Responses ranged from units being used essentially by all permanent residents, even on Hutchinson Island, to about 25% being used year-round.

Based on the various responses received, it was assumed that on Hutchinson Island about one-third of the multi-family developments were used strictly seasonally. Since the island, being on the ocean, probably accommodates the highest number of seasonal residents, the percentage of seasonal residences that was used on the island was not considered to be appropriate for estimating seasonal residents on the mainland. Seasonal visitors to Fort Pierce are concentrated along the northern tip of South Hutchinson Island. Since the mainland portion of Fort Pierce is not expected to attract a significant number of seasonal visitors, only 5% of the units were estimated to be used seasonally. Other mainland areas south of Fort Pierce probably attract more seasonal visitors than fort Pierce itself, but still not as much as Hutchinson Island. Seasonal residents along this area of the mainland may be more concentrated along other inland water bodies, such as the St. Lucie and Indian Rivers. As a comparison between the number of visitors attracted to Hutchinson Island and those attracted to Fort Pierce's mainland, it was assumed that 20% of multi-family units in this area are used seasonally. The location and number of multi-family units were determined based on field surveys and Traffic Analysis Zone (TAZ) data. An occupancy factor of 2.0 persons per unit was used to estimate the seasonal resident population.

In order to estimate the number of seasonal visitors staying with friends and relatives, information on tourism in Florida was obtained.[40, 188] These data showed what percentage of visitors stay in the various types of overnight accommodations which are available. By comparing the percentage of visitors which stay with friends or relatives to the estimated number of seasonal visitors which use other types of accommodations, the total number of visitors staying with friends was estimated. This figure was compared to the 1990 resident population to calculate a ratio between the two. The resulting ratio of was applied to the resident population to disaggregate this seasonal category to each annular sector within the 10-mile area.

Data used in the analysis are summarized below.

County	Tot. licensed lodgings 1 (units)	Apt. bldgs (units)	Rooming houses (units)	Rental condos (units)	Trans. bldgs (units)	Occup. rate (%)
Brevard	28,513	17,433	167	1,348	1,262	72
Glades	271	0	14	30	9	73
Highlands	2,926	1,207	52	32	659	73
Indian River	3,223	1,293	18	396	116	53
Martin	2,798	1,158	38	30	362	53
Okeechobee	397	74	0	0	60	73
Osceola	30,441	6,651	107	2,064	1,519	84
Palm Beach	58,466	39,440	1,580	578	1,331	72
St. Lucie	4,813	1,272	249	909	289	73

Transient Population at Recreational Attractions and Events

The population associated with recreational areas and events are listed in **Tables 2.1-73** through **2.1-75**. In order to estimate the peak number of daily beach-goers within 10 miles, the parking capacity counted at each location was multiplied by 4 persons per vehicle, Persons at the beach who do not arrive by automobile are assumed to be staying within walking distance of the beach and are therefore, accounted for as permanent or seasonal residents. The population attending major events in the 10-mile area was not added to the transient population distribution. Since all of these events take place at different times of the year, it would not be appropriate to simply include the population associated with each event, as this would result in a misleadingly high population total. For this reason, the populations associated with special events have not been included in the transient population rose.

Attractions and events occurring within 50 miles of the St. Lucie plant as of 1990, along with estimated and projected attendance, are shown in **Tables 2.1-73** and **2.1-74**. Attendance at events has been projected at the average annual rate of growth of the area. If a facility had a maximum attendance which could not be exceeded, this was left constant.

Transient Population at Major Employment Facilities

The largest employers in the 10-mile area have been listed in **Table 2.1-76**, along with the number of employees at these facilities,[15,16,19, 208,209] 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.

Major industrial employers between 10 and 50 miles of the St. Lucie Plant attract large numbers of people from a very great area on a regular basis. Any employer with more than 500 persons on a shift in 1990-1991 has been included in the totals for the annular sector in which it was located. Since expansion and contraction are impossible to predict, the number of employees has been held constant throughout the projection period.

Transient Population at Major Colleges

The number of students attending colleges within 10 miles of the plant was obtained from published data. Since students attending the IRCC Fort Pierce campus may travel some distance, it was assumed that, as with employees, of the students attending college in the area, 50 percent of them live beyond the 10-mile area. Therefore, those students contribute to the total transient population estimate. Projections from 1995 to 2030 for all campuses were based on county incremental growth rates.

2.1.3.8.2 Methodology for Estimating Transient Population from Transportation

Transient population generated by transportation is comprised of four basic modes: highways, railroads, waterways, and airports. Because transportation is not limited to individual annular sectors, it is described separately from totals for transient population. In addition, traffic volume numbers are given by average daily total number of passengers for highway, rail, waterway, and air traffic.

Highway Traffic

Between 0 and 10 miles of St. Lucie Plant, travelers on major roads were estimated from the average daily traffic count (ADT)[126, 189, 196] from 1990 at the sampling stations closest to the 10-mile radius (preferably at or just inside the 10-mile line). Major roads include interstate highways and state roads. Where ADT counts separated traffic by direction of flow, travel into the 10-mile radius has been used. Where the directions were combined, the ADT count was divided in half, on the assumption that traffic is evenly distributed in both directions. Numbers of vehicles were increased annually by incremental county growth rates to the 1992 estimate and then multiplied by 2.5 for interstate and turnpike,[125] and by 1.5 for state roads, to achieve the number of passengers on the roads.

Between 10 and 30 miles of the St. Lucie Plant, highway passengers have been estimated for the two major interstates, I-95 and the Florida Turnpike. The number of persons coming within 30 miles of the St. Lucie Plant is derived from average daily counts done by the State of Florida Department of Transportation. Numbers of vehicles traveling in the direction toward the plant are multiplied by 2.5 passengers per vehicle to generate passenger estimates.

Projections are calculated by using the expected rate of growth for the entire resident population for the 50-mile radius to 2030. Since it is possible that the vehicles counted at one station are counted at another, there has been no attempt to total passengers, or to assign persons in transit to an annular sector.

Waterway Traffic

Estimates of transient population were derived from the number of vessels and drawbridge openings counted in 1987 on the Indian River and the St. Lucie River.[71] The annual number of vessels recorded by bridge tenders was divided by 365 to reach a daily average. The number of vessels was then multiplied by four passengers per vessel to arrive at an average daily number of passengers for each bridge. These estimates do not include passengers on small craft which can pass beneath the drawbridges.

On the St. Lucie Canal,[71] transient population has been derived from the lock master's records of annual total number of vessels. The annual total number has been divided by 365 days in the year, and multiplied by four persons per vessel to reach an average daily number of passengers. On the St. Lucie Canal, all vessels are counted as they pass through the locks.

Rail Passengers

Only one rail line within 50 miles of St. Lucie Plant has passenger service.[129] The average daily passenger count in 1978 was derived by dividing the total passengers for the year by 365 days. Passenger totals were divided in half for 1980 because of anticipated reductions in Amtrak service to Florida.[130] Passenger totals are projected at two percent per year from 1980 to 1983; and at the annual average growth rate of 2.09 percent per year from 1983 to 2030.

St. Lucie County continues to work with the Florida High Speed Rail Commission in the development of a High Speed Rail Corridor between Orlando and Miami, scheduled to commence operation by 1995. The county is encouraging the commission to authorize the construction of a station facility in St. Lucie County by 2005.

Airplane Passengers

Airports with scheduled passenger service in 1992 were considered sources of transient population within 50 miles of the St. Lucie

Plant. Only the West Palm Beach International Airport[134] met this criterion (see Subsection 2.1.3.3.5.4). Estimates for 1995, 2000, 2010, 2020, and 2030 are based on passenger counts made in 1990. Projections to 2030 are based on the incremental annual growth rates for Palm Beach County. Total passengers per year have been divided by 365 to reach the daily average number of passengers.

2.1.3.9 Periodic Update of Population Data

FPL will periodically obtain and submit to the NRC the actual and projected population around the St. Lucie site in order to determine what additional measures, if any, should be undertaken to assure the public health and safety.

Commencing in April, 1993 and at least every 5 years thereafter, FPL will prepare and submit to the NRC an estimate of the actual population within 10 miles of the plant, including the distribution by distance and direction, and listing permanent residents, seasonal residents and transients. The basis for the population estimates will also be provided. In addition, commencing in April, 1993 and at least every 10 years thereafter, FPL will prepare and submit to the NRC an estimate of the actual population within 50 miles of the plant. Seasonal residents and transients within 10 miles will also be listed. Along with the decennial census, the revised population projections for 10-year intervals out to projected end-of-plant life will also be provided. Per the above commitment, Appendix 2.1A provides the 1998 update of the estimate of the population within 10 miles of the plant.

Based on the revised population data, FPL will determine what changes, if any, should be incorporated into the Emergency Plan to reflect the most recent population data. It is understood that NRC staff will, upon consideration of the population data, plant design features and operational characteristics of the St. Lucie Plant in relation to other nuclear power plants, make a determination of what additional measures, if any, are deemed necessary to assure the public health and safety.

2.1.4 FUTURE LAND USE ON THE APPLICANT'S PROPERTY

Current recreational use of land within the LPZ has been described previously. There are no other proposed land uses within the applicant's property boundaries other than the structure and facilities related to the constructions and operation of St. Lucie Units 1 and 2.

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Table 2.1-1

1990 LAND AREA BY SECTOR-SEGMENT (SQUARE MILES)														
	DISTANCE (MILES)													
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-20	20-30	30-40	40-50
N	0.1671	0.1502	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NNE	0.0989	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NE	0.0591	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ENE	0.0505	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E	0.0613	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ESE	0.1119	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SE	0.1595	0.1780	0.8221	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SSE	0.0662	0.1568	0.1464	0.4364	0.6380	0.3532	0.7154	0.2487	0.6024	0.5796	22.1922	40.6434	49.3267	35.7643
S	0.0677	0.0000	0.0000	0.2280	0.7814	1.5199	2.2728	2.9132	3.3445	0.8749	56.2117	95.3550	136.6874	174.5066
SSW	0.0765	0.0000	0.3727	1.1593	1.7918	2.1932	2.5814	2.9539	1.4860	3.0128	58.7254	96.2624	137.2366	176.2544
SW	0.0828	0.0306	0.7565	1.3729	1.7256	2.1061	2.4854	2.8346	3.0853	3.6878	59.1860	97.3741	53.6184	14.1461
WSW	0.0854	0.1031	0.0021	1.3308	1.7394	1.9570	2.5277	2.9193	3.3083	3.6976	58.2220	98.3221	53.6431	89.5997
W	0.0570	0.0176	0.7145	1.3378	1.7039	2.0994	2.5105	2.8955	3.2845	3.6690	57.9083	98.8879	136.3795	171.2929
WNW	0.1038	0.0000	0.3180	1.0797	1.7019	2.1282	2.5135	2.8991	3.2680	3.6601	57.6011	99.0072	136.3155	174.0430
NW	0.1793	0.1032	0.0000	0.0930	0.4420	1.1037	1.9223	2.5915	3.2879	3.6878	57.8596	98.0783	133.4359	168.9862
NNW	0.1629	0.4773	0.3380	0.2524	0.5795	0.4672	1.0893	0.5539	0.9205	1.2632	28.9331	63.7829	71.9004	86.7609
Average by Annulus	0.0994	0.0761	0.2169	0.4556	0.6940	0.8705	1.1636	1.3006	1.4117	1.5083	28.5525	49.2321	56.7840	68.2096

Table 2.1-2

1990 WATER AREA BY SECTOR-SEGMENT (SQUARE MILES)														
	DISTANCE (MILES)													
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-20	20-30	30-40	40-50
N	0.0314	0.4455	0.9923	1.3902	1.7870	2.1838	2.5814	2.9773	3.3758	3.7725	59.6169	96.8724	137.2692	176.5751
NNE	0.0990	0.5946	0.9902	1.3864	1.7833	2.1794	2.5750	2.9721	3.3675	3.7643	59.4205	96.6881	137.0090	176.2730
NE	0.1377	0.5907	0.9850	1.3793	1.7730	2.1668	2.5619	2.9547	3.3505	3.7435	59.1062	97.4714	137.1803	176.4414
ENE	0.1440	0.5846	0.9746	1.3653	1.7553	2.1459	2.5358	2.9252	3.3152	3.7072	58.5159	98.4932	137.3231	176.5937
E	0.1323	0.5809	0.9760	1.3535	1.7413	2.1278	2.5154	2.9006	3.2902	3.6762	58.0590	99.1376	137.3535	176.6273
ESE	0.0836	0.5873	0.9788	1.3714	1.7621	2.1552	2.5449	2.9380	3.3298	3.7212	58.7656	100.4100	139.0724	178.8311
SE	0.0325	0.3982	0.1520	1.3450	1.7291	2.1132	2.4977	2.8804	3.2667	3.6510	57.6596	97.0599	135.2638	173.9017
SSE	0.1310	0.4360	0.8406	0.9455	1.1388	1.8194	1.8527	2.7132	2.7548	3.1728	37.0666	56.9338	87.9795	140.7195
S	0.1320	0.5987	0.9979	1.1689	1.0150	0.6759	0.3226	0.0796	0.0479	2.9172	3.6827	1.6264	0.7526	2.1134
SSW	0.1226	0.5979	0.6248	0.2380	0.0041	0.0024	0.0129	0.0393	1.9071	0.7799	1.1790	0.7488	0.2380	0.4287
SW	0.1150	0.5620	0.2308	0.0102	0.0526	0.0678	0.0831	0.1284	0.2743	0.0660	0.0580	0.1991	83.7034	162.4003
WSW	0.1090	0.4808	0.9585	0.0319	0.0131	0.1856	0.0038	0.0009	0.0033	0.0039	0.1923	0.0770	83.5302	86.8186
W	0.1363	0.5622	0.2516	0.0141	0.0347	0.0269	0.0016	0.0024	0.0020	0.0027	0.0806	0.2038	0.8758	5.2432
WNW	0.0894	0.5802	0.6490	0.2738	0.0391	0.0002	0.0005	0.0024	0.0192	0.0154	0.4334	0.0897	0.9675	2.4687
NW	0.0154	0.4816	0.9750	1.2723	1.3128	1.0417	0.6126	0.3325	0.0274	0.0171	0.6695	0.4002	3.7989	7.4196
NNW	0.0339	0.1136	0.6465	1.1263	1.1942	1.7000	1.4718	2.4005	2.4292	2.4817	30.2148	33.7289	65.2973	89.6457
Average by Annulus	0.0966	0.5122	0.7640	0.9170	1.0710	1.2870	1.3859	1.6405	1.9226	2.2183	30.2950	48.7588	80.4759	108.2813

Table 2.1-3

1990 TOTAL AREA BY SECTOR-SEGMENT (SQUARE MILES)														
	DISTANCE (MILES)													
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-20	20-30	30-40	40-50
N	0.1985	0.5957	0.9925	1.3902	1.7870	2.1838	2.5814	2.9773	3.3758	3.7725	59.6169	96.8724	137.2692	176.5751
NNE	0.1979	0.5946	0.9902	1.3864	1.7833	2.1794	2.5750	2.9721	3.3675	3.7643	59.4205	96.6881	137.0090	176.2730
NE	0.1968	0.5907	0.9850	1.3793	1.7730	2.1668	2.5619	2.9547	3.3505	3.7435	59.1062	97.4714	137.1803	176.4414
ENE	0.1945	0.5846	0.9746	1.3653	1.7553	2.1459	2.5358	2.9252	3.3152	3.7072	58.5159	98.4932	137.3231	176.5937
E	0.1936	0.5809	0.9760	1.3535	1.7413	2.1278	2.5154	2.9006	3.2902	3.6762	58.0590	99.1376	137.3535	176.6273
ESE	0.1955	0.5873	0.9788	1.3714	1.7621	2.1552	2.5449	2.9380	3.3298	3.7212	58.7656	100.4100	139.0724	178.8311
SE	0.1920	0.5762	0.9741	1.3450	1.7291	2.1132	2.4977	2.8804	3.2667	3.6510	57.6596	97.0599	135.2638	173.9017
SSE	0.1972	0.5928	0.9870	1.3819	1.7768	2.1726	2.5681	2.9619	3.3572	3.7524	59.2588	97.5772	137.3062	176.4838
S	0.1997	0.5987	0.9979	1.3969	1.7964	2.1958	2.5954	2.9928	3.3924	3.7921	59.8944	96.9814	137.4400	176.6200
SSW	0.1991	0.5979	0.9975	1.3973	1.7959	2.1956	2.5943	2.9932	3.3931	3.7927	59.9044	97.0112	137.4746	176.6831
SW	0.1978	0.5926	0.9873	1.3831	1.7782	2.1739	2.5685	2.9630	3.3596	3.7538	59.2440	97.5732	137.3218	176.5464
WSW	0.1944	0.5839	0.9606	1.3627	1.7525	2.1426	2.5315	2.9202	3.3116	3.7015	58.4143	98.3991	137.1733	176.4183
W	0.1933	0.5798	0.9661	1.3519	1.7386	2.1263	2.5121	2.8979	3.2865	3.6717	57.9889	99.0917	137.2553	176.5361
WNW	0.1932	0.5802	0.9670	1.3535	1.7410	2.1284	2.5140	2.9015	3.2872	3.6755	58.0345	99.0969	137.2830	176.5117
NW	0.1947	0.5848	0.9750	1.3653	1.7548	2.1454	2.5349	2.9240	3.3153	3.7049	58.5291	98.4785	137.2348	176.4058
NNW	0.1968	0.5909	0.9845	1.3787	1.7737	2.1672	2.5611	2.9544	3.3497	3.7449	59.1479	97.5118	137.1977	176.4066
Average by Annulus	0.1959	0.5882	0.9809	1.3727	1.7649	2.1575	2.5495	2.9411	3.3343	3.7266	58.8475	97.9909	137.2599	176.4909
Standard Deviation	0.0023	0.0070	0.0112	0.0165	0.0211	0.0257	0.0306	0.0353	0.0397	0.0444	0.7049	1.0614	0.7047	0.9072

Table 2.1-4

1990 RESIDENT POPULATIONS BY SECTOR-SEGMENT														
	DISTANCE (MILES)													
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-20	20-30	30-40	40-50
N	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	118	0	0	0	0	0	0	0	0	0	0	0	0
SSE	0	0	0	197	976	2,288	516	421	769	443	20,115	32,205	78,634	114,025
S	0	0	0	196	443	936	1,531	3,931	6,874	1,855	38,024	5,778	13,255	151,310
SSW	0	0	38	710	2,100	2,662	2,223	1,790	1,525	695	7,361	5,241	178	1,398
SW	0	10	124	339	1,998	3,154	5,104	4,554	2,402	3,334	4,434	1,141	246	8,810
WSW	0	20	134	245	2,808	3,966	6,819	6,054	1,796	1,936	3,012	740	15,196	1,824
W	0	6	90	1,292	756	1,247	1,120	1,161	37	5	698	381	10,176	2,478
WNW	0	0	45	1,218	2,490	2,310	1,378	801	819	612	2,078	143	811	494
NW	0	0	0	23	348	1,055	3,560	6,528	10,920	13,202	17,967	8,450	2,882	208
NNW	0	0	0	0	0	0	624	724	1,988	565	25,131	44,776	19,189	20,622
Total by Annulus	0	154	431	4,220	11,919	17,618	22,875	25,964	27,130	22,647	118,820	98,855	140,567	301,169

Table 2.1-5

1990 RESIDENT POPULATIONS BY SECTOR-SEGMENT WITHIN 10 MILES OF THE ST. LUCIE PLANT							
	DISTANCE (MILES)						
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-10	0-10
N	0	0	0	0	0	0	0
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	118	0	0	0	0	118
SSE	0	0	0	197	976	4,437	5,610
S	0	0	0	196	443	15,127	15,766
SSW	0	0	38	710	2,100	8,895	11,743
SW	0	10	124	339	1,998	18,548	21,019
WSW	0	20	134	245	2,808	20,571	23,778
W	0	6	90	1,292	756	3,570	5,714
WNW	0	0	45	1,218	2,490	5,920	9,673
NW	0	0	0	23	348	35,265	35,636
NNW	0	0	0	0	0	3,901	3,901
Total by Annulus	0	154	431	4,220	11,919	116,234	132,958

Table 2.1-6

1990 RESIDENT POPULATIONS BY SECTOR-SEGMENT WITHIN 50 MILES OF THE ST. LUCIE PLANT							
	DISTANCE (MILES)						
DIRECTION	0-10	10-20	20-30	30-40	40-50	10-50	0-50
N	0	0	0	0	0	0	0
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	118	0	0	0	0	0	118
SSE	5,610	20,115	32,205	78,634	114,025	244,979	250,589
S	15,766	38,024	5,778	13,255	151,310	208,367	224,133
SSW	11,743	7,361	5,241	178	1,398	14,178	25,921
SW	21,019	4,434	1,141	246	8,810	14,631	35,650
WSW	23,778	3,012	740	15,196	1,824	20,772	44,550
W	5,714	698	381	10,176	2,478	13,733	19,447
WNW	9,673	2,078	143	811	494	3,526	13,199
NW	35,636	17,967	8,450	2,882	208	29,507	65,143
NNW	3,901	25,131	44,776	19,189	20,622	109,718	113,619
Total by Annulus	132,958	118,820	98,855	140,567	301,169	659,411	792,369

Table 2.1-7

1995 ESTIMATED RESIDENT POPULATIONS BY SECTOR-SEGMENT														
	DISTANCE (MILES)													
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-20	20-30	30-40	40-50
N	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	140	0	0	0	0	0	0	0	0	0	0	0	0
SSE	0	0	0	236	1,170	2,744	594	460	842	484	21,984	36,607	90,860	131,751
S	0	0	0	235	531	1,110	1,672	4,299	7,515	2,029	41,569	6,662	15,316	174,831
SSW	0	0	46	851	2,519	3,191	2,652	2,126	1,718	819	8,093	5,730	206	1,615
SW	0	12	149	406	2,398	3,783	6,126	5,469	2,882	4,001	5,181	1,246	275	10,180
WSW	0	24	161	294	3,369	4,756	8,185	7,266	2,151	2,320	3,592	836	17,430	2,019
W	0	7	108	1,550	906	1,497	1,341	1,395	44	6	838	440	11,668	2,834
WNW	0	0	54	1,461	2,988	2,772	1,652	959	985	735	2,494	170	926	592
NW	0	0	0	28	418	1,266	4,270	7,834	13,099	15,840	21,523	9,813	3,343	240
NNW	0	0	0	0	0	0	749	868	2,382	676	29,503	52,009	22,209	23,608
Total by Annulus	0	183	518	5,061	14,299	21,119	27,241	30,676	31,618	26,910	134,777	113,513	162,233	347,670

Table 2.1-8

1995 ESTIMATED RESIDENT POPULATIONS BY SECTOR-SEGMENT WITHIN 10 MILES OF THE ST. LUCIE PLANT							
	DISTANCE (MILES)						
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-10	0-10
N	0	0	0	0	0	0	0
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	140	0	0	0	0	140
SSE	0	0	0	236	1,170	5,124	6,530
S	0	0	0	235	531	16,625	17,391
SSW	0	0	46	851	2,519	10,506	13,922
SW	0	12	149	406	2,398	22,261	25,226
WSW	0	24	161	294	3,369	24,678	28,526
W	0	7	108	1,550	906	4,283	6,854
WNW	0	0	54	1,461	2,988	7,103	11,606
NW	0	0	0	28	418	42,309	42,755
NNW	0	0	0	0	0	4,675	4,675
Total by Annulus	0	183	518	5,061	14,299	137,564	157,625

Table 2.1-9

1995 ESTIMATED RESIDENT POPULATIONS BY SECTOR-SEGMENT WITHIN 5O MILES OF THE ST. LUCIE PLANT							
	DISTANCE (MILES)						
DIRECTION	0-10	10-20	20-30	30-40	40-50	10-50	0-50
N	0	0	0	0	0	0	0
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	140	0	0	0	0	0	140
SSE	6,530	21,984	36,607	90,860	131,751	281,202	287,732
S	17,391	41,569	6,662	15,316	174,831	238,378	255,769
SSW	13,922	8,093	5,730	206	1,615	15,644	29,566
SW	25,226	5,181	1,246	275	10,180	16,882	42,108
WSW	28,526	3,592	836	17,430	2,019	23,877	52,403
W	6,854	838	440	11,668	2,834	15,780	22,634
WNW	11,606	2,494	170	926	592	4,182	15,788
NW	42,755	21,523	9,813	3,343	240	34,919	77,674
NNW	4,675	29,503	52,009	22,209	23,608	127,329	132,004
Total by Annulus	157,625	134,777	113,513	162,233	347,670	758,193	915,818

Table 2.1-10

2000 ESTIMATED RESIDENT POPULATIONS BY SECTOR-SEGMENT														
	DISTANCE (MILES)													
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-20	20-30	30-40	40-50
N	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	161	0	0	0	0	0	0	0	0	0	0	0	0
SSE	0	0	0	271	1,339	3,140	664	494	902	519	23,589	40,389	101,360	147,012
S	0	0	0	270	608	1,261	1,795	4,610	8,062	2,176	44,576	7,424	17,086	195,053
SSW	0	0	52	975	2,880	3,654	3,019	2,414	1,884	927	8,714	6,147	230	1,801
SW	0	14	170	465	2,742	4,329	7,007	6,248	3,297	4,576	5,833	1,337	304	11,365
WSW	0	27	184	337	3,854	5,442	9,354	8,307	2,467	2,655	4,095	918	19,333	2,185
W	0	8	124	1,772	1,038	1,711	1,540	1,593	51	7	956	491	12,955	3,154
WNW	0	0	62	1,671	3,413	3,171	1,890	1,096	1,123	840	2,850	194	1,033	678
NW	0	0	0	32	479	1,449	4,888	8,958	14,983	18,111	24,595	11,004	3,755	267
NNW	0	0	0	0	0	0	856	994	2,730	775	33,293	58,298	24,918	26,214
Total by Annulus	0	210	592	5,793	16,353	24,157	31,013	34,714	35,499	30,586	148,501	126,202	180,974	387,729

Table 2.1-11

2000 ESTIMATED RESIDENT POPULATIONS BY SECTOR-SEGMENT WITHIN 10 MILES OF THE ST. LUCIE PLANT							
	DISTANCE (MILES)						
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-10	0-10
N	0	0	0	0	0	0	0
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	161	0	0	0	0	161
SSE	0	0	0	271	1,339	5,719	7,329
S	0	0	0	270	608	17,904	18,782
SSW	0	0	52	975	2,880	11,898	15,805
SW	0	14	170	465	2,742	25,457	28,848
WSW	0	27	184	337	3,854	28,225	32,627
W	0	8	124	1,772	1,038	4,902	7,844
WNW	0	0	62	1,671	3,413	8,120	13,266
NW	0	0	0	32	479	48,389	48,900
NNW	0	0	0	0	0	5,355	5,355
Total by Annulus	0	210	592	5,793	16,353	155,969	178,917

Table 2.1-12

2000 ESTIMATED RESIDENT POPULATIONS BY SECTOR-SEGMENT WITHIN 5O MILES OF THE ST. LUCIE PLANT							
	DISTANCE (MILES)						
	0-10	10-20	20-30	30-40	40-50	10-50	0-50
DIRECTION							
N	0	0	0	0	0	0	0
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	161	0	0	0	0	0	161
SSE	7,329	23,589	40,389	101,360	147,012	312,350	319,679
S	18,782	44,576	7,424	17,086	195,053	264,139	282,921
SSW	15,805	8,714	6,147	230	1,801	16,892	32,697
SW	28,848	5,833	1,337	304	11,365	18,839	47,687
WSW	32,627	4,095	918	19,333	2,185	26,531	59,158
W	7,844	956	491	12,955	3,154	17,556	25,400
WNW	13,266	2,850	194	1,033	678	4,755	18,021
NW	48,900	24,595	11,004	3,755	267	39,621	88,521
NNW	5,355	33,293	58,298	24,918	26,214	142,723	148,078
Total by Annulus	178,917	148,501	126,202	180,974	387,729	843,406	1,022,323

Table 2.1-13

2010 ESTIMATED RESIDENT POPULATIONS BY SECTOR-SEGMENT														
	DISTANCE (MILES)													
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-20	20-30	30-40	40-50
N	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	198	0	0	0	0	0	0	0	0	0	0	0	0
SSE	0	0	0	334	1,655	3,880	790	554	1,014	585	26,487	47,395	120,962	175,386
S	0	0	0	333	751	1,543	2,016	5,178	9,051	2,444	50,084	8,842	20,387	232,741
SSW	0	0	65	1,205	3,563	4,513	3,716	2,958	2,189	1,129	9,863	6,904	274	2,153
SW	0	17	210	576	3,389	5,348	8,652	7,718	4,073	5,653	7,040	1,501	356	13,552
WSW	0	34	227	416	4,759	6,727	11,562	10,269	3,044	3,282	5,039	1,072	22,888	2,490
W	0	10	153	2,192	1,282	2,115	1,899	1,969	63	8	1,187	584	15,341	3,739
WNW	0	0	76	2,064	4,226	3,919	2,335	1,358	1,389	1,037	3,524	240	1,224	840
NW	0	0	0	40	591	1,790	6,038	11,070	18,517	22,394	30,344	13,194	4,489	320
NNW	0	0	0	0	0	0	1,058	1,230	3,372	959	40,346	69,906	29,801	31,073
Total by Annulus	0	259	731	7,160	20,216	29,835	38,066	42,304	42,712	37,491	173,914	149,638	215,722	462,294

Table 2.1-14

2010 ESTIMATED RESIDENT POPULATIONS BY SECTOR-SEGMENT WITHIN 10 MILES OF THE ST. LUCIE PLANT							
	DISTANCE (MILES)						
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-10	0-10
N	0	0	0	0	0	0	0
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	198	0	0	0	0	198
SSE	0	0	0	334	1,655	6,823	8,812
S	0	0	0	333	751	20,232	21,316
SSW	0	0	65	1,205	3,563	14,505	19,338
SW	0	17	210	576	3,389	31,444	35,636
WSW	0	34	227	416	4,759	34,884	40,320
W	0	10	153	2,192	1,282	6,054	9,691
WNW	0	0	76	2,064	4,226	10,038	16,404
NW	0	0	0	40	591	59,809	60,440
NNW	0	0	0	0	0	6,619	6,619
Total by Annulus	0	259	731	7,160	20,216	190,408	218,774

Table 2.1-15

2010 ESTIMATED RESIDENT POPULATIONS BY SECTOR-SEGMENT WITHIN 50 MILES OF THE ST. LUCIE PLANT							
	DISTANCE (MILES)						
DIRECTION	0-10	10-20	20-30	30-40	40-50	10-50	0-50
N	0	0	0	0	0	0	0
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	198	0	0	0	0	0	198
SSE	8,812	26,487	47,395	120,962	175,386	370,230	379,042
S	21,316	50,084	8,842	20,387	232,741	312,054	333,370
SSW	19,338	9,863	6,904	274	2,153	19,194	38,532
SW	35,636	7,040	1,501	356	13,552	22,449	58,085
WSW	40,320	5,039	1,072	22,888	2,490	31,489	71,809
W	9,691	1,187	584	15,341	3,739	20,851	30,542
WNW	16,404	3,524	240	1,224	840	5,828	22,232
NW	60,440	30,344	13,194	4,489	320	48,347	108,787
NNW	6,619	40,346	69,906	29,801	31,073	171,126	177,745
Total by Annulus	218,774	173,914	149,638	215,722	462,294	1,001,568	1,220,342

Table 2.1-16

2020 ESTIMATED RESIDENT POPULATIONS BY SECTOR-SEGMENT														
	DISTANCE (MILES)													
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-20	20-30	30-40	40-50
N	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	234	0	0	0	0	0	0	0	0	0	0	0	0
SSE	0	0	0	393	1,945	4,561	907	610	1,115	643	29,154	53,812	138,873	201,361
S	0	0	0	392	882	1,800	2,218	5,697	9,963	2,691	55,082	10,142	23,413	267,226
SSW	0	0	76	1,416	4,190	5,313	4,360	3,460	2,473	1,314	10,898	7,594	315	2,471
SW	0	20	247	676	3,985	6,294	10,196	9,099	4,798	6,652	8,162	1,652	397	15,561
WSW	0	40	267	489	5,601	7,918	13,621	12,098	3,588	3,865	5,910	1,208	26,094	2,766
W	0	12	180	2,579	1,508	2,489	2,238	2,320	74	10	1,393	673	17,466	4,254
WNW	0	0	90	2,430	4,974	4,606	2,746	1,599	1,634	1,221	4,144	280	1,394	986
NW	0	0	0	46	694	2,104	7,099	13,035	21,792	26,342	35,719	15,212	5,188	366
NNW	0	0	0	0	0	0	1,243	1,447	3,967	1,129	46,842	80,593	34,298	35,339
Total by Annulus	0	306	860	8,421	23,779	35,085	44,628	49,365	49,404	43,867	197,304	171,166	247,438	530,330

Table 2.1-17

2020 ESTIMATED RESIDENT POPULATIONS BY SECTOR-SEGMENT WITHIN 10 MILES OF THE ST. LUCIE PLANT							
	DISTANCE (MILES)						
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-10	0-10
N	0	0	0	0	0	0	0
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	234	0	0	0	0	234
SSE	0	0	0	393	1,945	7,836	10,174
S	0	0	0	392	882	22,369	23,643
SSW	0	0	76	1,416	4,190	16,920	22,602
SW	0	20	247	676	3,985	37,039	41,967
WSW	0	40	267	489	5,601	41,090	47,487
W	0	12	180	2,579	1,508	7,131	11,410
WNW	0	0	90	2,430	4,974	11,806	19,300
NW	0	0	0	46	694	70,372	71,112
NNW	0	0	0	0	0	7,786	7,786
Total by Annulus	0	306	860	8,421	23,779	222,349	255,715

Table 2.1-18

2020 ESTIMATED RESIDENT POPULATIONS BY SECTOR-SEGMENT WITHIN 5O MILES OF THE ST. LUCIE PLANT							
	DISTANCE (MILES)						
DIRECTION	0-10	10-20	20-30	30-40	40-50	10-50	0-50
N	0	0	0	0	0	0	0
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	234	0	0	0	0	0	234
SSE	10,174	29,154	53,812	138,873	201,361	423,200	433,374
S	23,643	55,082	10,142	23,413	267,226	355,863	379,506
SSW	22,602	10,898	7,594	315	2,471	21,278	43,880
SW	41,967	8,162	1,652	397	15,561	25,772	67,739
WSW	47,487	5,910	1,208	26,094	2,766	35,978	83,465
W	11,410	1,393	673	17,466	4,254	23,786	35,196
WNW	19,300	4,144	280	1,394	986	6,804	26,104
NW	71,112	35,719	15,212	5,188	366	56,485	127,597
NNW	7,786	46,842	80,593	34,298	35,339	197,072	204,858
Total by Annulus	255,715	197,304	171,166	247,438	530,330	1,146,238	1,401,953

Table 2.1-19

2030 ESTIMATED RESIDENT POPULATIONS BY SECTOR-SEGMENT														
	DISTANCE (MILES)													
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-20	20-30	30-40	40-50
N	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	263	0	0	0	0	0	0	0	0	0	0	0	0
SSE	0	0	0	443	2,187	5,127	1,002	653	1,192	686	31,184	59,049	153,818	223,080
S	0	0	0	439	992	2,015	2,373	6,094	10,658	2,874	58,972	11,222	25,943	295,987
SSW	0	0	86	1,592	4,704	5,962	4,881	3,870	2,695	1,467	11,710	8,131	348	2,738
SW	0	22	278	760	4,476	7,066	11,431	10,206	5,378	7,466	9,066	1,770	437	17,235
WSW	0	45	300	550	6,291	8,883	15,280	13,560	4,024	4,331	6,621	1,322	28,840	2,988
W	0	13	202	2,896	1,693	2,794	2,508	2,602	83	11	1,565	744	19,311	4,701
WNW	0	0	101	2,729	5,580	5,175	3,088	1,793	1,836	1,371	4,655	314	1,539	1,109
NW	0	0	0	52	781	2,366	7,978	14,622	24,457	29,574	40,055	16,897	5,765	404
NNW	0	0	0	0	0	0	1,397	1,622	4,453	1,266	52,228	89,524	38,065	39,001
Total by Annulus	0	343	967	9,461	26,704	39,388	49,938	55,022	54,776	49,046	216,056	188,973	274,066	587,243

Table 2.1-20

2030 ESTIMATED RESIDENT POPULATIONS BY SECTOR-SEGMENT WITHIN 10 MILES OF THE ST. LUCIE PLANT							
	DISTANCE (MILES)						
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-10	0-10
N	0	0	0	0	0	0	0
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	263	0	0	0	0	263
SSE	0	0	0	443	2,187	8,660	11,290
S	0	0	0	439	992	24,014	25,445
SSW	0	0	86	1,592	4,704	18,875	25,257
SW	0	22	278	760	4,476	41,547	47,083
WSW	0	45	300	550	6,291	46,078	53,264
W	0	13	202	2,896	1,693	7,998	12,802
WNW	0	0	101	2,729	5,580	13,263	21,673
NW	0	0	0	52	781	78,997	79,830
NNW	0	0	0	0	0	8,738	8,738
Total by Annulus	0	343	967	9,461	26,704	248,170	285,645

Table 2.1-21

2030 ESTIMATED RESIDENT POPULATIONS BY SECTOR-SEGMENT WITHIN 50 MILES OF THE ST. LUCIE PLANT							
	DISTANCE (MILES)						
DIRECTION	0-10	10-20	20-30	30-40	40-50	10-50	0-50
N	0	0	0	0	0	0	0
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	263	0	0	0	0	0	263
SSE	11,290	31,184	59,049	153,818	223,080	467,131	478,421
S	25,445	58,972	11,222	25,943	295,987	392,124	417,569
SSW	25,257	11,710	8,131	348	2,738	22,927	48,184
SW	47,083	9,066	1,770	437	17,235	28,508	75,591
WSW	53,264	6,621	1,322	28,840	2,988	39,771	93,035
W	12,802	1,565	744	19,311	4,701	26,321	39,123
WNW	21,673	4,655	314	1,539	1,109	7,617	29,290
NW	79,830	40,055	16,897	5,765	404	63,121	142,951
NNW	8,738	52,228	89,524	38,065	39,001	218,818	227,556
Total by Annulus	285,645	216,056	188,973	274,066	587,243	1,266,338	1,551,983

Table 2.1-22

1990 HOUSING UNITS BY SECTOR-SEGMENT														
	DISTANCE (MILES)													
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-20	20-30	30-40	40-50
N	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	225	0	0	0	0	0	0	0	0	0	0	0	0
SSE	0	0	0	486	1,418	3,145	711	434	631	390	12,172	16,019	43,841	59,132
S	0	0	0	93	241	446	860	2,273	3,873	994	20,304	1,927	6,789	73,716
SSW	0	0	20	292	922	1,295	1,023	1,040	828	495	3,438	1,845	75	497
SW	0	2	73	239	1,257	1,532	2,023	1,987	959	1,341	1,303	377	133	3,135
WSW	0	7	87	176	2,326	2,028	2,951	2,380	816	762	1,041	269	7,785	1,351
W	0	1	41	483	399	466	419	461	25	2	329	134	3,724	1,242
WNW	0	0	22	480	1,172	1,119	506	304	321	238	709	50	334	245
NW	0	0	0	11	239	728	1,753	2,984	4,749	4,626	6,806	5,219	1,079	141
NNW	0	0	0	0	0	0	896	570	1,637	380	14,941	23,501	9,925	10,262
Average by Annulus	0	15	15	141	498	672	696	777	865	577	3,815	3,084	4,605	9,358

Table 2.1-23

1990 HOUSING UNIT DENSITY BY SECTOR-SEGMENT (PER SQUARE MILE OF LAND)														
	DISTANCE (MILES)													
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-20	20-30	30-40	40-50
N	0.00	****	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NNE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ESE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SE	0.00	****	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SSE	0.00	****	****	****	****	****	****	****	****	****	548.48	394.14	888.79	1,653.38
S	0.00	0.00	0.00	****	****	293.44	378.39	780.24	1,158.02	****	361.21	20.21	49.67	422.43
SSW	0.00	0.00	****	251.88	514.57	590.46	396.30	352.08	557.20	164.30	58.54	19.17	0.55	2.82
SW	0.00	****	****	174.08	728.44	727.41	813.95	700.98	310.83	363.63	22.02	3.87	2.48	221.62
WSW	0.00	****	****	132.25	1,337.24	1,036.28	1,167.46	815.26	246.65	206.08	17.88	2.74	145.13	15.08
W	0.00	****	****	361.04	234.17	221.97	166.90	159.21	7.61	0.55	5.68	1.36	27.31	7.25
WNW	0.00	0.00	****	444.57	688.64	525.80	201.31	104.86	98.23	65.03	12.31	0.51	2.45	1.41
NW	0.00	****	0.00	****	****	659.60	911.93	1,151.46	1,444.39	1,254.41	117.63	53.21	8.09	0.83
NNW	0.00	****	****	****	****	****	822.55	****	****	300.82	516.40	368.45	138.04	118.28
Average by Annulus	0.00	0.00	0.00	272.76	700.61	579.28	607.35	580.58	546.13	336.40	184.46	95.96	140.28	271.45

**** Land area of less than 1 square mile would yield inflated densities.

Table 2.1-24

1990 HOUSING UNIT DENSITY BY SECTOR-SEGMENT (PER SQUARE MILE OF TOTAL AREA)														
	DISTANCE (MILES)													
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-20	20-30	30-40	40-50
N	0.00	****	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NNE	0.00	****	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NE	0.00	****	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENE	0.00	****	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E	0.00	****	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ESE	0.00	****	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SE	0.00	****	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SSE	0.00	****	****	351.69	798.06	1,447.57	276.86	146.53	187.95	103.93	205.40	164.17	319.29	335.06
S	0.00	****	****	66.58	134.16	203.12	331.36	759.49	1,141.67	262.12	339.00	19.87	49.40	417.37
SSW	0.00	****	****	208.97	513.39	589.82	394.33	347.45	244.02	130.51	57.39	19.02	0.55	2.81
SW	0.00	****	****	172.80	706.89	704.72	787.62	670.60	285.45	357.24	21.99	3.86	0.97	17.76
WSW	0.00	****	****	129.16	1,327.25	946.51	1,165.71	815.01	246.41	205.86	17.82	2.73	56.75	7.66
W	0.00	****	****	357.27	229.49	219.16	166.79	159.08	7.61	0.54	5.67	1.35	27.13	7.04
WNW	0.00	****	****	354.64	673.18	525.75	201.27	104.77	97.65	64.75	12.22	0.50	2.43	1.39
NW	0.00	****	****	8.06	136.20	339.33	691.55	1,020.52	1,432.45	1,248.62	116.28	53.00	7.86	0.80
NNW	0.00	****	****	0.00	0.00	0.00	349.85	192.93	488.70	101.47	252.60	241.01	72.34	58.17
Average by Annulus	0.00	****	****	103.07	282.41	311.00	272.83	263.52	258.24	154.69	64.27	31.59	33.55	53.00

**** Total area of less than 1 square mile would yield inflated densities.

Table 2.1-25

1990 RESIDENT POPULATIONS BY SECTOR-SEGMENT (PER SQUARE MILE OF LAND)														
	DISTANCE (MILES)													
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-20	20-30	30-40	40-50
N	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NNE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ESE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SE	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SSE	0.00	0.00	0.00	****	****	****	****	****	****	****	906.40	792.38	1,594.15	3,188.24
S	0.00	0.00	0.00	****	****	615.83	673.62	1,349.38	2,055.31	****	676.44	60.59	96.97	867.07
SSW	0.00	0.00	****	612.44	1,172.01	1,213.75	861.16	605.98	1,026.24	230.68	125.35	54.44	1.30	7.93
SW	0.00	****	****	246.92	1,157.86	1,497.55	2,053.59	1,606.58	778.53	904.06	74.92	11.72	4.59	622.79
WSW	0.00	****	****	184.10	1,614.35	2,026.57	2,697.71	2,073.78	542.88	523.58	51.73	7.53	283.28	20.36
W	0.00	****	****	965.76	443.69	593.98	446.13	400.97	11.27	1.36	12.05	3.85	74.62	14.47
WNW	0.00	0.00	****	1,128.09	1,463.07	1,085.42	548.24	276.29	250.61	167.21	36.08	1.44	5.95	2.84
NW	0.00	0.00	0.00	****	****	955.88	1,851.95	2,519.00	3,321.27	3,579.91	310.53	86.16	21.60	1.23
NNW	0.00	0.00	0.00	0.00	0.00	0.00	572.84	****	****	447.28	868.59	702.01	266.88	237.69
Average by Annulus	0.00	0.00	0.00	627.46	1,170.19	1,141.28	1,213.16	1,261.71	1,140.87	836.30	382.76	215.02	293.67	620.33

**** Land areas of less than 1 square mile would yield inflated densities.

Table 2.1-26

1990 RESIDENT POPULATIONS BY SECTOR-SEGMENT
(PER SQUARE MILE OF TOTAL AREA)

DIRECTION	DISTANCE (MILES) 0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-20	20-30	30-40	40-50
N	0.00	****	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NNE	0.00	****	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NE	0.00	****	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENE	0.00	****	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E	0.00	****	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ESE	0.00	****	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SE	0.00	****	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SSE	0.00	****	****	142.56	549.30	1,053.12	200.93	142.14	229.06	118.06	339.44	330.05	572.69	646.09
S	0.00	****	****	140.31	246.60	426.27	589.89	1,313.49	2,026.29	489.17	634.85	59.58	96.44	856.70
SSW	0.00	****	****	508.12	1,169.33	1,212.42	856.88	598.02	449.44	183.25	122.88	54.02	1.29	7.91
SW	0.00	****	****	245.10	1,123.61	1,450.85	1,987.15	1,536.96	714.97	888.17	74.84	11.69	1.79	49.90
WSW	0.00	****	****	179.79	1,602.28	1,851.02	2,693.66	2,073.15	542.34	523.03	51.56	7.52	110.78	10.34
W	0.00	****	****	955.69	434.83	586.46	445.84	400.63	11.26	1.36	12.04	3.84	74.14	14.04
WNW	0.00	****	****	899.89	1,430.21	1,085.32	548.13	276.06	249.15	166.51	35.81	1.44	5.91	2.80
NW	0.00	****	****	16.85	198.31	491.75	1,404.39	2,232.56	3,293.82	3,563.39	306.98	85.81	21.00	1.18
NNW	0.00	****	****	0.00	0.00	0.00	243.65	245.06	593.49	150.87	424.88	459.19	139.86	116.90
Average by Annulus	0.00	****	****	193.02	422.16	509.83	560.66	551.13	506.86	380.24	125.21	63.32	63.99	106.62

**** Total areas of less than 1 square mile would yield inflated densities.

Table 2.1-27

1990 RESIDENT POPULATIONS BY SECTOR-SEGMENT PERSONS PER HOUSING UNIT														
	DISTANCE (MILES)													
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-20	20-30	30-40	40-50
N														
NNE														
NE														
ENE														
E														
ESE														
SE		0.52												
SSE				0.41	0.69	0.73	0.73	0.97	1.22	1.14	1.65	2.01	1.79	1.93
S				2.11	1.84	2.10	1.78	1.73	1.77	1.87	1.87	3.00	1.95	2.05
SSW			1.90	2.43	2.28	2.06	2.17	1.72	1.84	1.40	2.14	2.84	2.37	2.81
SW		5.00	1.70	1.42	1.59	2.06	2.52	2.29	2.50	2.49	3.40	3.03	1.85	2.81
WSW		2.86	1.54	1.39	1.21	1.96	2.31	2.54	2.20	2.54	2.89	2.75	1.95	1.35
W		6.00	2.20	2.67	1.89	2.68	2.67	2.52	1.48	2.50	2.12	2.84	2.73	2.00
WNW			2.05	2.54	2.12	2.06	2.72	2.63	2.55	2.57	2.93	2.86	2.43	2.02
NW				2.09	1.46	1.45	2.03	2.19	2.30	2.85	2.64	1.62	2.67	1.48
NNW							0.70	1.27	1.21	1.49	1.68	1.91	1.93	2.01
Average by Annulus		3.60	1.88	1.88	1.63	1.89	1.96	1.99	1.90	2.09	2.37	2.54	2.19	2.05

Table 2.1-28

Communities of over 10,000 Persons				
City or Town	County	1970 Population	1980 Population	1990 Population
West Palm Beach	Palm Beach	57,375	63,305	67,643
Port St. Lucie	St. Lucie	330	14,690	55,866
Fort Pierce	St. Lucie	29,721	33,802	36,830
Riviera Beach	Palm Beach	21,401	26,489	27,639
Jupiter	Palm Beach	3,316	9,868	24,986
Palm Beach Gardens	Palm Beach	6,102	14,407	22,965
Greenacres City	Palm Beach	1,731	8,780	18,683
Vero Beach	Indian River	11,908	16,176	17,350
Royal Palm Beach	Palm Beach		3,423	14,589
Stuart	Martin	9,086	9,467	11,936
North Palm Beach	Palm Beach	9,035	11,344	11,343
Sebastian	Indian River		2,831	10,205
Communities of between 5,000 and 10,000 Persons				
City or Town	County	1970 Population	1980 Population	1990 Population
Palm Beach	Palm Beach	9,086	9,729	9,814
Palm Springs	Palm Beach	4,340	8,166	9,763
Pahokee	Palm Beach	5,663	6,346	6,822
Lake Park	Palm Beach	6,993	6,909	6,704

Note: The information in this table is based upon "Florida Population: Census Summary 1990" April 1991. Bureau of Economic and Business Research, University of Florida.

Table 2.1-29

1990 LAND AREA BY SECTOR-SEGMENT (CUMULATIVE SQUARE MILES)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N	0.1671	0.3173	0.3175	0.3175	0.3175	0.3175	0.3175	0.3175	0.3175	0.3175	0.3175	0.3175	0.3175	0.3175
NNE	0.0989	0.0989	0.0989	0.0989	0.0989	0.0989	0.0989	0.0989	0.0989	0.0989	0.0989	0.0989	0.0989	0.0989
NE	0.0591	0.0591	0.0591	0.0591	0.0591	0.0591	0.0591	0.0591	0.0591	0.0591	0.0591	0.0591	0.0591	0.0591
ENE	0.0505	0.0505	0.0505	0.0505	0.0505	0.0505	0.0505	0.0505	0.0505	0.0505	0.0505	0.0505	0.0505	0.0505
E	0.0613	0.0613	0.0613	0.0613	0.0613	0.0613	0.0613	0.0613	0.0613	0.0613	0.0613	0.0613	0.0613	0.0613
ESE	0.1119	0.1119	0.1119	0.1119	0.1119	0.1119	0.1119	0.1119	0.1119	0.1119	0.1119	0.1119	0.1119	0.1119
SE	0.1595	0.3375	1.1596	1.1596	1.1596	1.1596	1.1596	1.1596	1.1596	1.1596	1.1596	1.1596	1.1596	1.1596
SSE	0.0662	0.2230	0.3694	0.8058	1.4438	1.7970	2.5124	2.7611	3.3635	3.9431	26.1353	66.7787	116.1054	151.8697
S	0.0677	0.0677	0.0677	0.2957	1.0771	2.5970	4.8698	7.7830	11.1275	12.0024	68.2141	163.5691	300.2565	474.7631
SSW	0.0765	0.0765	0.4492	1.6085	3.4003	5.5935	8.1749	11.1288	12.6148	15.6276	74.3530	170.6154	307.8520	484.1064
SW	0.0828	0.1134	0.8699	2.2428	3.9684	6.0745	8.5599	11.3945	14.4798	18.1676	77.3536	174.7277	228.3461	242.4922
WSW	0.0854	0.1885	0.1906	1.5214	3.2608	5.2178	7.7455	10.6648	13.9731	17.6707	75.8927	174.2148	227.8579	317.4576
W	0.0570	0.0746	0.7891	2.1269	3.8308	5.9302	8.4407	11.3362	14.6207	18.2897	76.1980	175.0859	311.4654	482.7583
WNW	0.1038	0.1038	0.4218	1.5015	3.2034	5.3316	7.8451	10.7442	14.0122	17.6723	75.2734	174.2806	310.5961	484.6391
NW	0.1793	0.2825	0.2825	0.3755	0.8175	1.9212	3.8435	6.4350	9.7229	13.4107	71.2703	169.3486	302.7845	471.7707
NNW	0.1629	0.6402	0.9782	1.2306	1.8101	2.2773	3.3666	3.9205	4.8410	6.1042	35.0373	98.8202	170.7206	257.4815
Average by Annulus	0.0994	0.1754	0.3923	0.8480	1.5419	2.4124	3.5761	4.8767	6.2884	7.7967	36.3492	85.5812	142.3652	210.5748

Table 2.1-30

1990 TOTAL AREA BY SECTOR-SEGMENT (CUMULATIVE SQUARE MILES)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N	0.1985	0.7942	1.7867	3.1769	4.9639	7.1477	9.7291	12.7064	16.0822	19.8547	79.4716	176.3440	313.6132	490.1883
NNE	0.1979	0.7925	1.7827	3.1691	4.9524	7.1318	9.7068	12.6789	16.0464	19.8107	79.2312	175.9193	312.9283	489.2013
NE	0.1968	0.7875	1.7725	3.1518	4.9248	7.0916	9.6535	12.6082	15.9587	19.7022	78.8084	176.2798	313.4601	489.9015
ENE	0.1945	0.7791	1.7537	3.1190	4.8743	7.0202	9.5560	12.4812	15.7964	19.5036	78.0195	176.5127	313.8358	490.4295
E	0.1936	0.7745	1.7505	3.1040	4.8453	6.9731	9.4885	12.3891	15.6793	19.3555	77.4145	176.5521	313.9056	490.5329
ESE	0.1955	0.7828	1.7616	3.1330	4.8951	7.0503	9.5952	12.5332	15.8630	19.5842	78.3498	178.7598	317.8322	496.6633
SE	0.1920	0.7682	1.7423	3.0873	4.8164	6.9296	9.4273	12.3077	15.5744	19.2254	76.8850	173.9449	309.2087	483.1104
SSE	0.1972	0.7900	1.7770	3.1589	4.9357	7.1083	9.6764	12.6383	15.9955	19.7479	79.0067	176.5839	313.8901	490.3739
S	0.1997	0.7984	1.7963	3.1932	4.9896	7.1854	9.7808	12.7736	16.1660	19.9581	79.8525	176.8339	314.2739	490.8939
SSW	0.1991	0.7970	1.7945	3.1918	4.9877	7.1833	9.7776	12.7708	16.1639	19.9566	79.8610	176.8722	314.3468	491.0299
SW	0.1978	0.7904	1.7777	3.1608	4.9390	7.1129	9.6814	12.6444	16.0040	19.7578	79.0018	176.5750	313.8968	490.4432
WSW	0.1944	0.7783	1.7389	3.1016	4.8541	6.9967	9.5282	12.4484	15.7600	19.4615	77.8758	176.2749	313.4482	489.8665
W	0.1933	0.7731	1.7392	3.0911	4.8297	6.9560	9.4681	12.3660	15.6525	19.3242	77.3131	176.4048	313.6601	490.1962
WNW	0.1932	0.7734	1.7404	3.0939	4.8349	6.9633	9.4773	12.3788	15.6660	19.3415	77.3760	176.4729	313.7559	490.2676
NW	0.1947	0.7795	1.7545	3.1198	4.8746	7.0200	9.5549	12.4789	15.7942	19.4991	78.0282	176.5067	313.7415	490.1473
NNW	0.1968	0.7877	1.7722	3.1509	4.9246	7.0918	9.6529	12.6073	15.9570	19.7019	78.8498	176.3616	313.5593	489.9659
Average by Annulus	0.1959	0.7842	1.7650	3.1377	4.9026	7.0601	9.6096	12.5507	15.8850	19.6116	78.4591	176.4499	313.7098	490.2007

Table 2.1-31

1990 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	118	118	118	118	118	118	118	118	118	118	118	118	118
SSE	0	0	0	197	1,173	3,461	3,977	4,398	5,167	5,610	25,725	57,930	136,564	250,589
S	0	0	0	196	639	1,575	3,106	7,037	13,911	15,766	53,790	59,568	72,823	224,133
SSW	0	0	38	748	2,848	5,510	7,733	9,523	11,048	11,743	19,104	24,345	24,523	25,921
SW	0	10	134	473	2,471	5,625	10,729	15,283	17,685	21,019	25,453	26,594	26,840	35,650
WSW	0	20	154	399	3,207	7,173	13,992	20,046	21,842	23,778	26,790	27,530	42,726	44,550
W	0	6	96	1,388	2,144	3,391	4,511	5,672	5,709	5,714	6,412	6,793	16,969	19,447
WNW	0	0	45	1,263	3,753	6,063	7,441	8,242	9,061	9,673	11,751	11,894	12,705	13,199
NW	0	0	0	23	371	1,426	4,986	11,514	22,434	35,636	53,603	62,053	64,935	65,143
NNW	0	0	0	0	0	0	624	1,348	3,336	3,901	29,032	73,808	92,997	113,619
Total by Annulus	0	154	585	4,805	16,724	34,342	57,217	83,181	110,311	132,958	251,778	350,633	491,200	792,369

Table 2.1-32

1990 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF LAND)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N														
NNE														
NE														
ENE														
E														
ESE														
SE		****	101.76	101.76	101.76	101.76	101.76	101.76	101.76	101.76	101.76	101.76	101.76	101.76
SSE				****	812.44	1,925.99	1,582.95	1,592.84	1,536.20	1,422.74	984.30	867.49	1,176.21	1,650.03
S				****	593.26	606.47	637.81	904.15	1,250.15	1,313.57	788.55	364.18	242.54	472.09
SSW			****	465.03	837.57	985.07	945.94	855.71	875.80	751.43	256.94	142.69	79.66	53.54
SW		****	****	210.90	622.67	926.00	1,253.40	1,341.26	1,221.36	1,156.95	329.05	152.20	117.54	147.02
WSW		****	****	262.26	983.50	1,374.72	1,806.47	1,879.64	1,563.15	1,345.62	353.00	158.02	187.51	140.33
W		****	****	652.59	559.67	571.82	534.43	500.34	390.47	312.42	84.15	38.80	54.48	40.28
WNW			****	841.16	1,171.57	1,137.18	948.49	767.11	646.65	547.35	156.11	68.25	40.91	27.23
NW				****	****	742.24	1,297.26	1,789.28	2,307.34	2,657.28	752.11	366.42	214.46	138.08
NNW							185.35	343.83	689.11	639.07	828.60	746.89	544.73	441.27
Average by Annulus		****	101.76	422.28	710.31	930.14	929.39	1,007.59	1,058.20	1,024.82	463.46	300.67	275.98	321.16

**** Cumulative area of less than 1 square mile.

Table 2.1-33

1990 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF TOTAL AREA)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NNE	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NE	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENE	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ESE	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SE	0.00	****	67.73	38.22	24.50	17.03	12.52	9.59	7.58	6.14	1.53	0.68	0.38	0.24
SSE	0.00	****	0.00	62.36	237.66	486.90	411.00	347.99	323.03	284.08	325.61	328.06	435.07	511.02
S	0.00	****	0.00	61.38	128.07	219.19	317.56	550.90	860.51	789.95	673.62	336.86	231.72	456.58
SSW	0.00	****	21.18	234.35	571.00	767.06	790.89	745.69	683.50	588.43	239.22	137.64	78.01	52.79
SW	0.00	****	75.38	149.65	500.30	790.82	1,108.21	1,208.68	1,105.04	1,063.83	322.18	150.61	85.51	72.69
WSW	0.00	****	88.56	128.64	660.68	1,025.20	1,468.48	1,610.33	1,385.91	1,221.80	344.01	156.18	136.31	90.94
W	0.00	****	55.20	449.03	443.92	487.49	476.44	458.68	364.73	295.69	82.94	38.51	54.10	39.67
WNW	0.00	****	25.86	408.22	776.23	870.71	785.14	665.82	578.39	500.12	151.87	67.40	40.49	26.92
NW	0.00	****	0.00	7.37	76.11	203.13	521.83	922.68	1,420.39	1,827.57	686.97	351.56	206.97	132.90
NNW	0.00	****	0.00	0.00	0.00	0.00	64.64	106.92	209.06	198.00	368.19	418.50	296.59	231.89
Average by Annulus	0.00	****	20.87	96.20	213.65	304.22	372.29	414.20	433.63	423.48	199.76	124.12	97.82	100.98

**** Cumulative area of less than 1 square mile.

Table 2.1-34

1990 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF LAND COMPARED TO 500)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N														
NNE														
NE														
ENE														
E														
ESE														
SE		****	(398.24)	(398.24)	(398.24)	(398.24)	(398.24)	(398.24)	(398.24)	(398.24)	(398.24)	(398.24)	(398.24)	(398.24)
SSE				****	312.44	1,425.99	1,082.95	1,092.84	1,036.20	922.74	484.30	367.49	676.21	1,150.03
S				****	93.26	106.47	137.81	404.15	750.15	813.57	288.55	(135.82)	(257.46)	(27.91)
SSW			****	(34.97)	337.57	485.07	445.94	355.71	375.80	251.43	(243.06)	(357.31)	(420.34)	(446.46)
SW		****	****	(289.10)	122.67	426.00	753.40	841.26	721.36	656.95	(170.95)	(347.80)	(382.46)	(352.98)
WSW		****	****	(237.74)	483.50	874.72	1,306.47	1,379.64	1,063.15	845.62	(147.00)	(341.98)	(312.49)	(359.67)
W		****	****	152.59	59.67	71.82	34.43	0.34	(109.53)	(187.58)	(415.85)	(461.20)	(445.52)	(459.72)
WNW			****	341.16	671.57	637.18	448.49	267.11	146.65	47.35	(343.89)	(431.75)	(459.09)	(472.77)
NW				****	****	242.24	797.26	1,289.28	1,807.34	2,157.28	252.11	(133.58)	(285.54)	(361.92)
NNW							(314.65)	(156.17)	189.11	139.07	328.60	246.89	44.73	(58.73)
Average by Annulus		****	(398.24)	(77.72)	210.31	430.14	429.39	507.59	558.20	524.82	(36.54)	(199.33)	(224.02)	(178.84)

Note: Values in parentheses are negative. **** Cumulative area of less than 1 square mile.

Table 2.1-35

1990 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF TOTAL AREA COMPARED TO 500)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
NNE	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
NE	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
ENE	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
E	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
ESE	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
SE	(500.00)	****	(432.27)	(461.78)	(475.50)	(482.97)	(487.48)	(490.41)	(492.42)	(493.86)	(498.47)	(499.32)	(499.62)	(499.76)
SSE	(500.00)	****	(500.00)	(437.64)	(262.34)	(13.10)	(89.00)	(152.01)	(176.97)	(215.92)	(174.39)	(171.94)	(64.93)	11.02
S	(500.00)	****	(500.00)	(438.62)	(371.93)	(280.81)	(182.44)	50.90	360.51	289.95	173.62	(163.14)	(268.28)	(43.42)
SSW	(500.00)	****	(478.82)	(265.65)	71.00	267.06	290.89	245.69	183.50	88.43	(260.78)	(362.36)	(421.99)	(447.21)
SW	(500.00)	****	(424.62)	(350.35)	0.30	290.82	608.21	708.68	605.04	563.83	(177.82)	(349.39)	(414.49)	(427.31)
WSW	(500.00)	****	(411.44)	(371.36)	160.68	525.20	968.48	1,110.33	885.91	721.80	(155.99)	(343.82)	(363.69)	(409.06)
W	(500.00)	****	(444.80)	(50.97)	(56.08)	(12.51)	(23.56)	(41.32)	(135.27)	(204.31)	(417.06)	(461.49)	(445.90)	(460.33)
WNW	(500.00)	****	(474.14)	(91.78)	276.23	370.71	285.14	165.82	78.39	0.12	(348.13)	(432.60)	(459.51)	(473.08)
NW	(500.00)	****	(500.00)	(492.63)	(423.89)	(296.87)	21.83	422.68	920.39	1,327.57	186.97	(148.44)	(293.03)	(367.10)
NNW	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(435.36)	(393.08)	(290.94)	(302.00)	(131.81)	(81.50)	(203.41)	(268.11)
Average by Annulus	(500.00)	****	(479.13)	(403.80)	(286.35)	(195.78)	(127.71)	(85.80)	(66.37)	(76.52)	(300.24)	(375.88)	(402.18)	(399.02)

Note: Values in parentheses are negative. **** Cumulative area of less than 1 square mile.

Table 2.1-36

1990 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF LAND COMPARED TO 1000)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N														
NNE														
NE														
ENE														
E														
ESE														
SE		****	(898.24)	(898.24)	(898.24)	(898.24)	(898.24)	(898.24)	(898.24)	(898.24)	(898.24)	(898.24)	(898.24)	(898.24)
SSE				****	(187.56)	925.99	582.95	592.84	536.20	422.74	(15.70)	(132.51)	176.21	650.03
S				****	(406.74)	(393.53)	(362.19)	(95.85)	250.15	313.57	(211.45)	(635.82)	(757.46)	(527.91)
SSW			****	(534.97)	(162.43)	(14.93)	(54.06)	(144.29)	(124.20)	(248.57)	(743.06)	(857.31)	(920.34)	(946.46)
SW		****	****	(789.10)	(377.33)	(74.00)	253.40	341.26	221.36	156.95	(670.95)	(847.80)	(882.46)	(852.98)
WSW		****	****	(737.74)	(16.50)	374.72	806.47	879.64	563.15	345.62	(647.00)	(841.98)	(812.49)	(859.67)
W		****	****	(347.41)	(440.33)	(428.18)	(465.57)	(499.66)	(609.53)	(687.58)	(915.85)	(961.20)	(945.52)	(959.72)
WNW			****	(158.84)	171.57	137.18	(51.51)	(232.89)	(353.35)	(452.65)	(843.89)	(931.75)	(959.09)	(972.77)
NW				****	****	(257.76)	297.26	789.28	1,307.34	1,657.28	(247.89)	(633.58)	(785.54)	(861.92)
NNW							(814.65)	(656.17)	(310.89)	(360.93)	(171.40)	(253.11)	(455.27)	(558.73)
Average by Annulus		****	(898.24)	(577.72)	(289.69)	(69.86)	(70.61)	7.59	58.20	24.82	(536.54)	(699.33)	(724.02)	(678.84)

Note: Values in parentheses are negative. **** Cumulative area of less than 1 square mile.

Table 2.1-37

1990 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF TOTAL AREA COMPARED TO 1000)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
NNE	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
NE	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
ENE	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
E	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
ESE	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
SE	(1,000.00)	****	(932.27)	(961.78)	(975.50)	(982.97)	(987.48)	(990.41)	(992.42)	(993.86)	(998.47)	(999.32)	(999.62)	(999.76)
SSE	(1,000.00)	****	(1,000.00)	(937.64)	(762.34)	(513.10)	(589.00)	(652.01)	(676.97)	(715.92)	(674.39)	(671.94)	(564.93)	(488.98)
S	(1,000.00)	****	(1,000.00)	(938.62)	(871.93)	(780.81)	(682.44)	(449.10)	(139.49)	(210.05)	(326.38)	(663.14)	(768.28)	(543.42)
SSW	(1,000.00)	****	(978.82)	(765.65)	(429.00)	(232.94)	(209.11)	(254.31)	(316.50)	(411.57)	(760.78)	(862.36)	(921.99)	(947.21)
SW	(1,000.00)	****	(924.62)	(850.35)	(499.70)	(209.18)	108.21	208.68	105.04	63.83	(677.82)	(849.39)	(914.49)	(927.31)
WSW	(1,000.00)	****	(911.44)	(871.36)	(339.32)	25.20	468.48	610.33	385.91	221.80	(655.99)	(843.82)	(863.69)	(909.06)
W	(1,000.00)	****	(944.80)	(550.97)	(556.08)	(512.51)	(523.56)	(541.32)	(635.27)	(704.31)	(917.06)	(961.49)	(945.90)	(960.33)
WNW	(1,000.00)	****	(974.14)	(591.78)	(223.77)	(129.29)	(214.86)	(334.18)	(421.61)	(499.88)	(848.13)	(932.60)	(959.51)	(973.08)
NW	(1,000.00)	****	(1,000.00)	(992.63)	(923.89)	(796.87)	(478.17)	(77.32)	420.39	827.57	(313.03)	(648.44)	(793.03)	(867.10)
NNW	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(935.36)	(893.08)	(790.94)	(802.00)	(631.81)	(581.50)	(703.41)	(768.11)
Average by Annulus	(1,000.00)	****	(979.13)	(903.80)	(786.35)	(695.78)	(627.71)	(585.80)	(566.37)	(576.52)	(800.24)	(875.88)	(902.18)	(899.02)

Note: Values in parentheses are negative. **** Cumulative area of less than 1 square mile.

Table 2.1-38

1995 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	140	140	140	140	140	140	140	140	140	140	140	140	140
SSE	0	0	0	236	1,406	4,150	4,744	5,204	6,046	6,530	28,514	65,121	155,981	287,732
S	0	0	0	235	766	1,876	3,548	7,847	15,362	17,391	58,960	65,622	80,938	255,769
SSW	0	0	46	897	3,416	6,607	9,259	11,385	13,103	13,922	22,015	27,745	27,951	29,566
SW	0	12	161	567	2,965	6,748	12,874	18,343	21,225	25,226	30,407	31,653	31,928	42,108
WSW	0	24	185	479	3,848	8,604	16,789	24,055	26,206	28,526	32,118	32,954	50,384	52,403
W	0	7	115	1,665	2,571	4,068	5,409	6,804	6,848	6,854	7,692	8,132	19,800	22,634
WNW	0	0	54	1,515	4,503	7,275	8,927	9,886	10,871	11,606	14,100	14,270	15,196	15,788
NW	0	0	0	28	446	1,712	5,982	13,816	26,915	42,755	64,278	74,091	77,434	77,674
NNW	0	0	0	0	0	0	749	1,617	3,999	4,675	34,178	86,187	108,396	132,004
Total by Annulus	0	183	701	5,762	20,061	41,180	68,421	99,097	130,715	157,625	292,402	405,915	568,148	915,818

Table 2.1-39

1995 RESIDENT POPULATIONS BY SECTOR-SEGMENT
CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF LAND)

DIRECTION	DISTANCE (MILES) 0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N														
NNE														
NE														
ENE														
E														
ESE														
SE		****	414.81	120.73	120.73	120.73	120.73	120.73	120.73	120.73	120.73	120.73	120.73	120.73
SSE				****	1,744.85	2,874.36	2,639.96	2,071.33	2,189.71	1,941.43	7,231.37	2,491.69	2,335.79	2,478.20
S				****	2,590.46	1,741.71	1,366.19	1,611.36	1,973.79	1,562.88	4,912.35	962.00	494.82	851.84
SSW			****	1,996.88	2,123.72	1,943.06	1,655.31	1,392.68	1,177.40	1,103.62	1,408.73	373.15	163.82	96.04
SW		****	****	651.80	1,322.01	1,700.43	2,119.35	2,142.90	1,862.74	1,742.15	1,673.69	409.20	182.73	184.40
WSW		****	****	2,513.12	2,529.25	2,638.62	3,217.64	3,105.67	2,457.24	2,041.49	1,817.59	434.22	289.21	229.98
W		****	****	2,110.00	1,208.80	1,061.92	912.11	806.09	604.08	468.79	420.56	106.72	113.09	72.67
WNW			****	3,591.75	2,999.00	2,271.02	1,674.36	1,260.15	1,011.80	828.28	797.86	189.58	87.19	50.83
NW				****	****	2,094.19	3,113.68	3,594.64	4,182.60	4,397.35	4,793.04	1,039.58	457.25	256.53
NNW							328.90	480.31	1,020.02	965.71	5,599.10	2,459.86	1,096.90	773.22
Average by Annulus		****	414.81	1,830.71	1,829.85	1,827.34	1,714.82	1,658.59	1,660.01	1,517.24	2,877.50	858.67	534.15	511.44

**** Cumulative area of less than 1 square mile.

Table 2.1-40

1995 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF TOTAL AREA)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NNE	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NE	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENE	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ESE	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SE	0.00	****	80.35	45.35	29.07	20.20	14.85	11.37	8.99	7.28	1.82	0.80	0.45	0.29
SSE	0.00	****	0.00	74.71	284.86	583.82	490.26	411.76	377.98	330.67	360.91	368.78	496.93	586.76
S	0.00	****	0.00	73.59	153.52	261.08	362.75	614.31	950.27	871.38	738.36	371.09	257.54	521.03
SSW	0.00	****	25.63	281.03	684.88	919.77	946.96	891.49	810.63	697.61	275.67	156.86	88.92	60.21
SW	0.00	****	90.57	179.38	600.32	948.70	1,329.77	1,450.68	1,326.23	1,276.76	384.89	179.26	101.71	85.86
WSW	0.00	****	106.39	154.44	792.73	1,229.72	1,762.03	1,932.38	1,662.82	1,465.77	412.43	186.95	160.74	106.97
W	0.00	****	66.12	538.64	532.33	584.82	571.29	550.22	437.50	354.68	99.49	46.10	63.13	46.17
WNW	0.00	****	31.03	489.67	931.35	1,044.76	941.93	798.62	693.92	600.06	182.23	80.86	48.43	32.20
NW	0.00	****	0.00	8.97	91.49	243.87	626.07	1,107.15	1,704.11	2,192.67	823.78	419.76	246.81	158.47
NNW	0.00	****	0.00	0.00	0.00	0.00	77.59	128.26	250.61	237.29	433.46	488.69	345.70	269.41
Average by Annulus	0.00	****	25.01	115.36	256.29	364.80	445.22	493.52	513.94	502.14	232.06	143.70	113.15	116.71

**** Cumulative area of less than 1 square mile.

Table 2.1-41

1995 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF LAND COMPARED TO 500)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N														
NNE														
NE														
ENE														
E														
ESE														
SE		****	(85.19)	(379.27)	(379.27)	(379.27)	(379.27)	(379.27)	(379.27)	(379.27)	(379.27)	(379.27)	(379.27)	(379.27)
SSE				****	1,244.85	2,374.36	2,139.96	1,571.33	1,689.71	1,441.43	6,731.37	1,991.69	1,835.79	1,978.20
S				****	2,090.46	1,241.71	866.19	1,111.36	1,473.79	1,062.88	4,412.35	462.00	(5.18)	351.84
SSW			****	1,496.88	1,623.72	1,443.06	1,155.31	892.68	677.40	603.62	908.73	(126.85)	(336.18)	(403.96)
SW		****	****	151.80	822.01	1,200.43	1,619.35	1,642.90	1,362.74	1,242.15	1,173.69	(90.80)	(317.27)	(315.60)
WSW		****	****	2,013.12	2,029.25	2,138.62	2,717.64	2,605.67	1,957.24	1,541.49	1,317.59	(65.78)	(210.79)	(270.02)
W		****	****	1,610.00	708.80	561.92	412.11	306.09	104.08	(31.21)	(79.44)	(393.28)	(386.91)	(427.33)
WNW			****	3,091.75	2,499.00	1,771.02	1,174.36	760.15	511.80	328.28	297.86	(310.42)	(412.81)	(449.17)
NW				****	****	1,594.19	2,613.68	3,094.64	3,682.60	3,897.35	4,293.04	539.58	(42.75)	(243.47)
NNW							(171.10)	(19.69)	520.02	465.71	5,099.10	1,959.86	596.90	273.22
Average by Annulus		****	(85.19)	1,330.71	1,329.85	1,327.34	1,214.82	1,158.59	1,160.01	1,017.24	2,377.50	358.67	34.15	11.44

Note: Values in parentheses are negative. **** Cumulative area of less than 1 square mile.

Table 2.1-42

1995 RESIDENT POPULATIONS BY SECTOR-SEGMENT
CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF TOTAL AREA COMPARED TO 500)

	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
NNE	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
NE	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
ENE	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
E	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
ESE	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
SE	(500.00)	****	(419.65)	(454.65)	(470.93)	(479.80)	(485.15)	(488.63)	(491.01)	(492.72)	(498.18)	(499.20)	(499.55)	(499.71)
SSE	(500.00)	****	(500.00)	(425.29)	(215.14)	83.82	(9.74)	(88.24)	(122.02)	(169.33)	(139.09)	(131.22)	(3.07)	86.76
S	(500.00)	****	(500.00)	(426.41)	(346.48)	(238.92)	(137.25)	114.31	450.27	371.38	238.36	(128.91)	(242.46)	21.03
SSW	(500.00)	****	(474.37)	(218.97)	184.88	419.77	446.96	391.49	310.63	197.61	(224.33)	(343.14)	(411.08)	(439.79)
SW	(500.00)	****	(409.43)	(320.62)	100.32	448.70	829.77	950.68	826.23	776.76	(115.11)	(320.74)	(398.29)	(414.14)
WSW	(500.00)	****	(393.61)	(345.56)	292.73	729.72	1,262.03	1,432.38	1,162.82	965.77	(87.57)	(313.05)	(339.26)	(393.03)
W	(500.00)	****	(433.88)	38.64	32.33	84.82	71.29	50.22	(62.50)	(145.32)	(400.51)	(453.90)	(436.87)	(453.83)
WNW	(500.00)	****	(468.97)	(10.33)	431.35	544.76	441.93	298.62	193.92	100.06	(317.77)	(419.14)	(451.57)	(467.80)
NW	(500.00)	****	(500.00)	(491.03)	(408.51)	(256.13)	126.07	607.15	1,204.11	1,692.67	323.78	(80.24)	(253.19)	(341.53)
NNW	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(422.41)	(371.74)	(249.39)	(262.71)	(66.54)	(11.31)	(154.30)	(230.59)
Average by Annulus	(500.00)	****	(474.99)	(384.64)	(243.71)	(135.20)	(54.78)	(6.48)	13.94	2.14	(267.94)	(356.30)	(386.85)	(383.29)

Note: Values in parentheses are negative. **** Cumulative area of less than 1 square mile.

Table 2.1-43

1995 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF LAND COMPARED TO 1000)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N														
NNE														
NE														
ENE														
E														
ESE														
SE		****	(585.19)	(879.27)	(879.27)	(879.27)	(879.27)	(879.27)	(879.27)	(879.27)	(879.27)	(879.27)	(879.27)	(879.27)
SSE				****	744.85	1,874.36	1,639.96	1,071.33	1,189.71	941.43	6,231.37	1,491.69	1,335.79	1,478.20
S				****	1,590.46	741.71	366.19	611.36	973.79	562.88	3,912.35	(38.00)	(505.18)	(148.16)
SSW			****	996.88	1,123.72	943.06	655.31	392.68	177.40	103.62	408.73	(626.85)	(836.18)	(903.96)
SW		****	****	(348.20)	322.01	700.43	1,119.35	1,142.90	862.74	742.15	673.69	(590.80)	(817.27)	(815.60)
WSW		****	****	1,513.12	1,529.25	1,638.62	2,217.64	2,105.67	1,457.24	1,041.49	817.59	(565.78)	(710.79)	(770.02)
W		****	****	1,110.00	208.80	61.92	(87.89)	(193.91)	(395.92)	(531.21)	(579.44)	(893.28)	(886.91)	(927.33)
WNW			****	2,591.75	1,999.00	1,271.02	674.36	260.15	11.80	(171.72)	(202.14)	(810.42)	(912.81)	(949.17)
NW				****	****	1,094.19	2,113.68	2,594.64	3,182.60	3,397.35	3,793.04	39.58	(542.75)	(743.47)
NNW							(671.10)	(519.69)	20.02	(34.29)	4,599.10	1,459.86	96.90	(226.78)
Average by Annulus		****	(585.19)	830.71	829.85	827.34	714.82	658.59	660.01	517.24	1,877.50	(141.33)	(465.85)	(488.56)

Note: Values in parentheses are negative. **** Cumulative area of less than 1 square mile.

Table 2.1-44

1995 RESIDENT POPULATIONS BY SECTOR-SEGMENT
CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF TOTAL AREA COMPARED TO 1000)

	DISTANCE (MILES)													
	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
DIRECTION														
N	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
NNE	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
NE	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
ENE	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
E	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
ESE	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
SE	(1,000.00)	****	(919.65)	(954.65)	(970.93)	(979.80)	(985.15)	(988.63)	(991.01)	(992.72)	(998.18)	(999.20)	(999.55)	(999.71)
SSE	(1,000.00)	****	(1,000.00)	(925.29)	(715.14)	(416.18)	(509.74)	(588.24)	(622.02)	(669.33)	(639.09)	(631.22)	(503.07)	(413.24)
S	(1,000.00)	****	(1,000.00)	(926.41)	(846.48)	(738.92)	(637.25)	(385.69)	(49.73)	(128.62)	(261.64)	(628.91)	(742.46)	(478.97)
SSW	(1,000.00)	****	(974.37)	(718.97)	(315.12)	(80.23)	(53.04)	(108.51)	(189.37)	(302.39)	(724.33)	(843.14)	(911.08)	(939.79)
SW	(1,000.00)	****	(909.43)	(820.62)	(399.68)	(51.30)	329.77	450.68	326.23	276.76	(615.11)	(820.74)	(898.29)	(914.14)
WSW	(1,000.00)	****	(893.61)	(845.56)	(207.27)	229.72	762.03	932.38	662.82	465.77	(587.57)	(813.05)	(839.26)	(893.03)
W	(1,000.00)	****	(933.88)	(461.36)	(467.67)	(415.18)	(428.71)	(449.78)	(562.50)	(645.32)	(900.51)	(953.90)	(936.87)	(953.83)
WNW	(1,000.00)	****	(968.97)	(510.33)	(68.65)	44.76	(58.07)	(201.38)	(306.08)	(399.94)	(817.77)	(919.14)	(951.57)	(967.80)
NW	(1,000.00)	****	(1,000.00)	(991.03)	(908.51)	(756.13)	(373.93)	107.15	704.11	1,192.67	(176.22)	(580.24)	(753.19)	(841.53)
NNW	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(922.41)	(871.74)	(749.39)	(762.71)	(566.54)	(511.31)	(654.30)	(730.59)
Average by Annulus	(1,000.00)	****	(974.99)	(884.64)	(743.71)	(635.20)	(554.78)	(506.48)	(486.06)	(497.86)	(767.94)	(856.30)	(886.85)	(883.29)

Note: Values in parentheses are negative. **** Cumulative area of less than 1 square mile.

Table 2.1-45

2000 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	161	161	161	161	161	161	161	161	161	161	161	161	161
SSE	0	0	0	271	1,610	4,750	5,414	5,908	6,810	7,329	30,918	71,307	172,667	319,679
S	0	0	0	270	878	2,139	3,934	8,544	16,606	18,782	63,358	70,782	87,868	282,921
SSW	0	0	52	1,027	3,907	7,561	10,580	12,994	14,878	15,805	24,519	30,666	30,896	32,697
SW	0	14	184	649	3,391	7,720	14,727	20,975	24,272	28,848	34,681	36,018	36,322	47,687
WSW	0	27	211	548	4,402	9,844	19,198	27,505	29,972	32,627	36,722	37,640	56,973	59,158
W	0	8	132	1,904	2,942	4,653	6,193	7,786	7,837	7,844	8,800	9,291	22,246	25,400
WNW	0	0	62	1,733	5,146	8,317	10,207	11,303	12,426	13,266	16,116	16,310	17,343	18,021
NW	0	0	0	32	511	1,960	6,848	15,806	30,789	48,900	73,495	84,499	88,254	88,521
NNW	0	0	0	0	0	0	856	1,850	4,580	5,355	38,648	96,946	121,864	148,078
Total by Annulus	0	210	802	6,595	22,948	47,105	78,118	112,832	148,331	178,917	327,418	453,620	634,594	1,022,323

Table 2.1-46

2000 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF LAND)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N														
NNE														
NE														
ENE														
E														
ESE														
SE		****	138.84	138.84	138.84	138.84	138.84	138.84	138.84	138.84	138.84	138.84	138.84	138.84
SSE				****	1,115.11	2,643.29	2,154.91	2,139.73	2,024.68	1,858.69	1,183.00	1,067.81	1,487.16	2,104.96
S				****	815.15	823.64	807.84	1,097.78	1,492.34	1,564.85	928.81	432.73	292.64	595.92
SSW			****	638.48	1,149.02	1,351.75	1,294.21	1,167.60	1,179.41	1,011.35	329.76	179.74	100.36	67.54
SW		****	****	289.37	854.50	1,270.89	1,720.46	1,840.80	1,676.27	1,587.88	448.34	206.14	159.07	196.65
WSW		****	****	360.19	1,349.98	1,886.62	2,478.60	2,579.05	2,144.98	1,846.39	483.87	216.06	250.04	186.35
W		****	****	895.20	767.99	784.63	733.71	686.83	536.02	428.88	115.49	53.07	71.42	52.61
WNW			****	1,154.18	1,606.42	1,559.94	1,301.07	1,052.01	886.80	750.67	214.10	93.58	55.84	37.18
NW				****	****	1,020.20	1,781.71	2,456.25	3,166.65	3,646.34	1,031.21	498.96	291.47	187.64
NNW							254.26	471.88	946.09	877.26	1,103.05	981.03	713.82	575.10
Average by Annulus		****	138.84	579.38	974.63	1,275.53	1,266.56	1,363.08	1,419.21	1,371.12	597.65	386.80	356.07	414.28

**** Cumulative area of less than 1 square mile.

Table 2.1-47

2000 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF TOTAL AREA)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NNE	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NE	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENE	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ESE	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SE	0.00	****	92.41	52.15	33.43	23.23	17.08	13.08	10.34	8.37	2.09	0.93	0.52	0.33
SSE	0.00	****	0.00	85.79	326.19	668.23	559.51	467.47	425.74	371.13	391.33	403.81	550.09	651.91
S	0.00	****	0.00	84.55	175.97	297.69	402.22	668.88	1,027.22	941.07	793.44	400.27	279.59	576.34
SSW	0.00	****	28.98	321.76	783.33	1,052.58	1,082.07	1,017.48	920.45	791.97	307.02	173.38	98.29	66.59
SW	0.00	****	103.50	205.33	686.58	1,085.35	1,521.16	1,658.84	1,516.62	1,460.08	438.99	203.98	115.71	97.23
WSW	0.00	****	121.34	176.68	906.86	1,406.95	2,014.86	2,209.52	1,901.78	1,676.49	471.55	213.53	181.76	120.76
W	0.00	****	75.90	615.96	609.15	668.92	654.09	629.63	500.69	405.92	113.82	52.67	70.92	51.82
WNW	0.00	****	35.62	560.13	1,064.34	1,194.40	1,076.99	913.09	793.18	685.88	208.28	92.42	55.28	36.76
NW	0.00	****	0.00	10.26	104.83	279.20	716.70	1,266.62	1,949.39	2,507.81	941.90	478.73	281.30	180.60
NNW	0.00	****	0.00	0.00	0.00	0.00	88.68	146.74	287.02	271.80	490.15	549.70	388.65	302.22
Average by Annulus	0.00	****	28.61	132.04	293.17	417.29	508.33	561.96	583.28	570.03	259.91	160.59	126.38	130.29

**** Cumulative area of less than 1 square mile.

Table 2.1-48

2000 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF LAND COMPARED TO 500)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N														
NNE														
NE														
ENE														
E														
ESE														
SE		****	(361.16)	(361.16)	(361.16)	(361.16)	(361.16)	(361.16)	(361.16)	(361.16)	(361.16)	(361.16)	(361.16)	(361.16)
SSE				****	615.11	2,143.29	1,654.91	1,639.73	1,524.68	1,358.69	683.00	567.81	987.16	1,604.96
S				****	315.15	323.64	307.84	597.78	992.34	1,064.85	428.81	(67.27)	(207.36)	95.92
SSW			****	138.48	649.02	851.75	794.21	667.60	679.41	511.35	(170.24)	(320.26)	(399.64)	(432.46)
SW		****	****	(210.63)	354.50	770.89	1,220.46	1,340.80	1,176.27	1,087.88	(51.66)	(293.86)	(340.93)	(303.35)
WSW		****	****	(139.81)	849.98	1,386.62	1,978.60	2,079.05	1,644.98	1,346.39	(16.13)	(283.94)	(249.96)	(313.65)
W		****	****	395.20	267.99	284.63	233.71	186.83	36.02	(71.12)	(384.51)	(446.93)	(428.58)	(447.39)
WNW			****	654.18	1,106.42	1,059.94	801.07	552.01	386.80	250.67	(285.90)	(406.42)	(444.16)	(462.82)
NW				****	****	520.20	1,281.71	1,956.25	2,666.65	3,146.34	531.21	(1.04)	(208.53)	(312.36)
NNW							(245.74)	(28.12)	446.09	377.26	603.05	481.03	213.82	75.10
Average by Annulus		****	(361.16)	79.38	474.63	775.53	766.56	863.08	919.21	871.12	97.65	(113.20)	(143.93)	(85.72)

Note: Values in parentheses are negative. **** Cumulative area of less than 1 square mile.

Table 2.1-49

2000 RESIDENT POPULATIONS BY SECTOR-SEGMENT
CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF TOTAL AREA COMPARED TO 500)

DIRECTION	DISTANCE (MILES) 0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
NNE	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
NE	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
ENE	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
E	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
ESE	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
SE	(500.00)	****	(407.59)	(447.85)	(466.57)	(476.77)	(482.92)	(486.92)	(489.66)	(491.63)	(497.91)	(499.07)	(499.48)	(499.67)
SSE	(500.00)	****	(500.00)	(414.21)	(173.81)	168.23	59.51	(32.53)	(74.26)	(128.87)	(108.67)	(96.19)	50.09	151.91
S	(500.00)	****	(500.00)	(415.45)	(324.03)	(202.31)	(97.78)	168.88	527.22	441.07	293.44	(99.73)	(220.41)	76.34
SSW	(500.00)	****	(471.02)	(178.24)	283.33	552.58	582.07	517.48	420.45	291.97	(192.98)	(326.62)	(401.71)	(433.41)
SW	(500.00)	****	(396.50)	(294.67)	186.58	585.35	1,021.16	1,158.84	1,016.62	960.08	(61.01)	(296.02)	(384.29)	(402.77)
WSW	(500.00)	****	(378.66)	(323.32)	406.86	906.95	1,514.86	1,709.52	1,401.78	1,176.49	(28.45)	(286.47)	(318.24)	(379.24)
W	(500.00)	****	(424.10)	115.96	109.15	168.92	154.09	129.63	0.69	(94.08)	(386.18)	(447.33)	(429.08)	(448.18)
WNW	(500.00)	****	(464.38)	60.13	564.34	694.40	576.99	413.09	293.18	185.88	(291.72)	(407.58)	(444.72)	(463.24)
NW	(500.00)	****	(500.00)	(489.74)	(395.17)	(220.80)	216.70	766.62	1,449.39	2,007.81	441.90	(21.27)	(218.70)	(319.40)
NNW	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(411.32)	(353.26)	(212.98)	(228.20)	(9.85)	49.70	(111.35)	(197.78)
Average by Annulus	(500.00)	****	(471.39)	(367.96)	(206.83)	(82.71)	8.33	61.96	83.28	70.03	(240.09)	(339.41)	(373.62)	(369.71)

Note: Values in parentheses are negative. **** Cumulative area of less than 1 square mile.

Table 2.1-50

2000 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF LAND COMPARED TO 1000)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N														
NNE														
NE														
ENE														
E														
ESE														
SE		****	(861.16)	(861.16)	(861.16)	(861.16)	(861.16)	(861.16)	(861.16)	(861.16)	(861.16)	(861.16)	(861.16)	(861.16)
SSE				****	115.11	1,643.29	1,154.91	1,139.73	1,024.68	858.69	183.00	67.81	487.16	1,104.96
S				****	(184.85)	(176.36)	(192.16)	97.78	492.34	564.85	(71.19)	(567.27)	(707.36)	(404.08)
SSW			****	(361.52)	149.02	351.75	294.21	167.60	179.41	11.35	(670.24)	(820.26)	(899.64)	(932.46)
SW		****	****	(710.63)	(145.50)	270.89	720.46	840.80	676.27	587.88	(551.66)	(793.86)	(840.93)	(803.35)
WSW		****	****	(639.81)	349.98	886.62	1,478.60	1,579.05	1,144.98	846.39	(516.13)	(783.94)	(749.96)	(813.65)
W		****	****	(104.80)	(232.01)	(215.37)	(266.29)	(313.17)	(463.98)	(571.12)	(884.51)	(946.93)	(928.58)	(947.39)
WNW			****	154.18	606.42	559.94	301.07	52.01	(113.20)	(249.33)	(785.90)	(906.42)	(944.16)	(962.82)
NW				****	****	20.20	781.71	1,456.25	2,166.65	2,646.34	31.21	(501.04)	(708.53)	(812.36)
NNW							(745.74)	(528.12)	(53.91)	(122.74)	103.05	(18.97)	(286.18)	(424.90)
Average by Annulus		****	(861.16)	(420.62)	(25.37)	275.53	266.56	363.08	419.21	371.12	(402.35)	(613.20)	(643.93)	(585.72)

Note: Values in parentheses are negative. **** Cumulative area of less than 1 square mile.

Table 2.1-51

2000 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF TOTAL AREA COMPARED TO 1000)														
	DISTANCE (MILES)													
	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
DIRECTION														
N	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
NNE	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
NE	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
ENE	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
E	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
ESE	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
SE	(1,000.00)	****	(907.59)	(947.85)	(966.57)	(976.77)	(982.92)	(986.92)	(989.66)	(991.63)	(997.91)	(999.07)	(999.48)	(999.67)
SSE	(1,000.00)	****	(1,000.00)	(914.21)	(673.81)	(331.77)	(440.49)	(532.53)	(574.26)	(628.87)	(608.67)	(596.19)	(449.91)	(348.09)
S	(1,000.00)	****	(1,000.00)	(915.45)	(824.03)	(702.31)	(597.78)	(331.12)	27.22	(58.93)	(206.56)	(599.73)	(720.41)	(423.66)
SSW	(1,000.00)	****	(971.02)	(678.24)	(216.67)	52.58	82.07	17.48	(79.55)	(208.03)	(692.98)	(826.62)	(901.71)	(933.41)
SW	(1,000.00)	****	(896.50)	(794.67)	(313.42)	85.35	521.16	658.84	516.62	460.08	(561.01)	(796.02)	(884.29)	(902.77)
WSW	(1,000.00)	****	(878.66)	(823.32)	(93.14)	406.95	1,014.86	1,209.52	901.78	676.49	(528.45)	(786.47)	(818.24)	(879.24)
W	(1,000.00)	****	(924.10)	(384.04)	(390.85)	(331.08)	(345.91)	(370.37)	(499.31)	(594.08)	(886.18)	(947.33)	(929.08)	(948.18)
WNW	(1,000.00)	****	(964.38)	(439.87)	64.34	194.40	76.99	(86.91)	(206.82)	(314.12)	(791.72)	(907.58)	(944.72)	(963.24)
NW	(1,000.00)	****	(1,000.00)	(989.74)	(895.17)	(720.80)	(283.30)	266.62	949.39	1,507.81	(58.10)	(521.27)	(718.70)	(819.40)
NNW	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(911.32)	(853.26)	(712.98)	(728.20)	(509.85)	(450.30)	(611.35)	(697.78)
Average by Annulus	(1,000.00)	****	(971.39)	(867.96)	(706.83)	(582.71)	(491.67)	(438.04)	(416.72)	(429.97)	(740.09)	(839.41)	(873.62)	(869.71)

Note: Values in parentheses are negative. **** Cumulative area of less than 1 square mile.

Table 2.1-52

2010 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DISTANCE (MILES)														
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	198	198	198	198	198	198	198	198	198	198	198	198	198
SSE	0	0	0	334	1,989	5,869	6,659	7,213	8,227	8,812	35,299	82,694	203,656	379,042
S	0	0	0	333	1,084	2,627	4,643	9,821	18,872	21,316	71,400	80,242	100,629	333,370
SSW	0	0	65	1,270	4,833	9,346	13,062	16,020	18,209	19,338	29,201	36,105	36,379	38,532
SW	0	17	227	803	4,192	9,540	18,192	25,910	29,983	35,636	42,676	44,177	44,533	58,085
WSW	0	34	261	677	5,436	12,163	23,725	33,994	37,038	40,320	45,359	46,431	69,319	71,809
W	0	10	163	2,355	3,637	5,752	7,651	9,620	9,683	9,691	10,878	11,462	26,803	30,542
WNW	0	0	76	2,140	6,366	10,285	12,620	13,978	15,367	16,404	19,928	20,168	21,392	22,232
NW	0	0	0	40	631	2,421	8,459	19,529	38,046	60,440	90,784	103,978	108,467	108,787
NNW	0	0	0	0	0	0	1,058	2,288	5,660	6,619	46,965	116,871	146,672	177,745
Total by Annulus	0	259	990	8,150	28,366	58,201	96,267	138,571	181,283	218,774	392,688	542,326	758,048	1,220,342

Table 2.1-53

2010 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF LAND)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N														
NNE														
NE														
ENE														
E														
ESE														
SE		****	170.75	170.75	170.75	170.75	170.75	170.75	170.75	170.75	170.75	170.75	170.75	170.75
SSE				****	1,377.61	3,266.00	2,650.45	2,612.36	2,445.96	2,234.79	1,350.63	1,238.33	1,754.06	2,495.84
S				****	1,006.41	1,011.55	953.43	1,261.85	1,695.98	1,775.98	1,046.70	490.57	335.14	702.18
SSW			****	789.56	1,421.35	1,670.87	1,597.82	1,439.51	1,443.46	1,237.43	392.73	211.62	118.17	79.59
SW		****	****	358.03	1,056.35	1,570.50	2,125.26	2,273.90	2,070.68	1,961.51	551.70	252.83	195.02	239.53
WSW		****	****	444.98	1,667.08	2,331.06	3,063.07	3,187.50	2,650.66	2,281.74	597.67	266.52	304.22	226.20
W		****	****	1,107.25	949.41	969.95	906.44	848.61	662.28	529.86	142.76	65.47	86.05	63.27
WNW			****	1,425.24	1,987.26	1,929.06	1,608.65	1,300.98	1,096.69	928.23	264.74	115.72	68.87	45.87
NW				****	****	1,260.15	2,200.86	3,034.81	3,913.03	4,506.85	1,273.80	613.99	358.23	230.59
NNW							314.26	583.60	1,169.18	1,084.34	1,340.43	1,182.66	859.13	690.32
Average by Annulus		****	170.75	715.97	1,204.53	1,575.54	1,559.10	1,671.39	1,731.87	1,671.15	713.19	460.84	424.97	494.41

**** Cumulative area of less than 1 square mile.

Table 2.1-54

2010 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF TOTAL AREA)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NNE	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NE	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENE	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ESE	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SE	0.00	****	113.64	64.13	41.11	28.57	21.00	16.09	12.71	10.30	2.58	1.14	0.64	0.41
SSE	0.00	****	0.00	105.73	402.98	825.65	688.17	570.73	514.33	446.22	446.78	468.30	648.81	772.97
S	0.00	****	0.00	104.28	217.25	365.60	474.71	768.85	1,167.39	1,068.04	894.15	453.77	320.20	679.11
SSW	0.00	****	36.22	397.89	968.98	1,301.07	1,335.91	1,254.42	1,126.52	969.00	365.65	204.13	115.73	78.47
SW	0.00	****	127.69	254.05	848.75	1,341.23	1,879.07	2,049.13	1,873.47	1,803.64	540.19	250.19	141.87	118.43
WSW	0.00	****	150.09	218.27	1,119.88	1,738.39	2,489.98	2,730.79	2,350.13	2,071.78	582.45	263.40	221.15	146.59
W	0.00	****	93.72	761.86	753.05	826.91	808.08	777.94	618.62	501.50	140.70	64.98	85.45	62.31
WNW	0.00	****	43.67	691.68	1,316.68	1,477.03	1,331.60	1,129.19	980.91	848.12	257.55	114.28	68.18	45.35
NW	0.00	****	0.00	12.82	129.45	344.87	885.30	1,564.96	2,408.86	3,099.63	1,163.48	589.09	345.72	221.95
NNW	0.00	****	0.00	0.00	0.00	0.00	109.60	181.48	354.70	335.96	595.63	662.68	467.76	362.77
Average by Annulus	0.00	****	35.32	163.17	362.38	515.58	626.46	690.22	712.98	697.14	311.82	192.00	150.97	155.52

**** Cumulative area of less than 1 square mile.

Table 2.1-55

2010 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF LAND COMPARED TO 500)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N														
NNE														
NE														
ENE														
E														
ESE														
SE		****	(329.25)	(329.25)	(329.25)	(329.25)	(329.25)	(329.25)	(329.25)	(329.25)	(329.25)	(329.25)	(329.25)	(329.25)
SSE				****	877.61	2,766.00	2,150.45	2,112.36	1,945.96	1,734.79	850.63	738.33	1,254.06	1,995.84
S				****	506.41	511.55	453.43	761.85	1,195.98	1,275.98	546.70	(9.43)	(164.86)	202.18
SSW			****	289.56	921.35	1,170.87	1,097.82	939.51	943.46	737.43	(107.27)	(288.38)	(381.83)	(420.41)
SW		****	****	(141.97)	556.35	1,070.50	1,625.26	1,773.90	1,570.68	1,461.51	51.70	(247.17)	(304.98)	(260.47)
WSW		****	****	(55.02)	1,167.08	1,831.06	2,563.07	2,687.50	2,150.66	1,781.74	97.67	(233.48)	(195.78)	(273:80)
W		****	****	607.25	449.41	469.95	406.44	348.61	162.28	29.86	(357.24)	(434.53)	(413.95)	(436.73)
WNW			****	925.24	1,487.26	1,429.06	1,108.65	800.98	596.69	428.23	(235.26)	(384.28)	(431.13)	(454.13)
NW				****	****	760.15	1,700.86	2,534.81	3,413.03	4,006.85	773.80	113.99	(141.77)	(269.41)
NNW							(185.74)	83.60	669.18	584.34	840.43	682.66	359.13	190.32
Average by Annulus		****	(329.25)	215.97	704.53	1,075.54	1,059.10	1,171.39	1,231.87	1,171.15	213.19	(39.16)	(75.03)	(5.59)

Note: Values in parentheses are negative. **** Cumulative area of less than 1 square mile.

Table 2.1-56

2010 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF TOTAL AREA COMPARED TO 500)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
NNE	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
NE	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
ENE	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
E	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
ESE	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
SE	(500.00)	****	(386.36)	(435.87)	(458.89)	(471.43)	(479.00)	(483.91)	(487.29)	(489.70)	(497.42)	(498.86)	(499.36)	(499.59)
SSE	(500.00)	****	(500.00)	(394.27)	(97.02)	325.65	188.17	70.73	14.33	(53.78)	(53.22)	(31.70)	148.81	272.97
S	(500.00)	****	(500.00)	(395.72)	(282.75)	(134.40)	(25.29)	268.85	667.39	568.04	394.15	(46.23)	(179.80)	179.11
SSW	(500.00)	****	(463.78)	(102.11)	468.98	801.07	835.91	754.42	626.52	469.00	(134.35)	(295.87)	(384.27)	(421.53)
SW	(500.00)	****	(372.31)	(245.95)	348.75	841.23	1,379.07	1,549.13	1,373.47	1,303.64	40.19	(249.81)	(358.13)	(381.57)
WSW	(500.00)	****	(349.91)	(281.73)	619.88	1,238.39	1,989.98	2,230.79	1,850.13	1,571.78	82.45	(236.60)	(278.85)	(353.41)
W	(500.00)	****	(406.28)	261.86	253.05	326.91	308.08	277.94	118.62	1.50	(359.30)	(435.02)	(414.55)	(437.69)
WNW	(500.00)	****	(456.33)	191.68	816.68	977.03	831.60	629.19	480.91	348.12	(242.45)	(385.72)	(431.82)	(454.65)
NW	(500.00)	****	(500.00)	(487.18)	(370.55)	(155.13)	385.30	1,064.96	1,908.86	2,599.63	663.48	89.09	(154.28)	(278.05)
NNW	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(390.40)	(318.52)	(145.30)	(164.04)	95.63	162.68	(32.24)	(137.23)
Average by Annulus	(500.00)	****	(464.68)	(336.83)	(137.62)	15.58	126.46	190.22	212.98	197.14	(188.18)	(308.00)	(349.03)	(344.48)

Note: Values in parentheses are negative. **** Cumulative area of less than 1 square mile.

Table 2.1-57

2010 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF LAND COMPARED TO 1000)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N														
NNE														
NE														
ENE														
E														
ESE														
SE		****	(829.25)	(829.25)	(829.25)	(829.25)	(829.25)	(829.25)	(829.25)	(829.25)	(829.25)	(829.25)	(829.25)	(829.25)
SSE				****	377.61	2,266.00	1,650.45	1,612.36	1,445.96	1,234.79	350.63	238.33	754.06	1,495.84
S				****	6.41	11.55	(46.57)	261.85	695.98	775.98	46.70	(509.43)	(664.86)	(297.82)
SSW			****	(210.44)	421.35	670.87	597.82	439.51	443.46	237.43	(607.27)	(788.38)	(881.83)	(920.41)
SW		****	****	(641.97)	56.35	570.50	1,125.26	1,273.90	1,070.68	961.51	(448.30)	(747.17)	(804.98)	(760.47)
WSW		****	****	(555.02)	667.08	1,331.06	2,063.07	2,187.50	1,650.66	1,281.74	(402.33)	(733.48)	(695.78)	(773.80)
W		****	****	107.25	(50.59)	(30.05)	(93.56)	(151.39)	(337.72)	(470.14)	(857.24)	(934.53)	(913.95)	(936.73)
WNW			****	425.24	987.26	929.06	608.65	300.98	96.69	(71.77)	(735.26)	(884.28)	(931.13)	(954.13)
NW				****	****	260.15	1,200.86	2,034.81	2,913.03	3,506.85	273.80	(386.01)	(641.77)	(769.41)
NNW							(685.74)	(416.40)	169.18	84.34	340.43	182.66	(140.87)	(309.68)
Average by Annulus		****	(829.25)	(284.03)	204.53	575.54	559.10	671.39	731.87	671.15	(286.81)	(539.16)	(575.03)	(505.59)

Note: Values in parentheses are negative. **** Cumulative area of less than 1 square mile.

Table 2.1-58

2010 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF TOTAL AREA COMPARED TO 1000)														
	DISTANCE (MILES)													
	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
DIRECTION														
N	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
NNE	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
NE	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
ENE	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
E	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
ESE	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
SE	(1,000.00)	****	(886.36)	(935.87)	(958.89)	(971.43)	(979.00)	(983.91)	(987.29)	(989.70)	(997.42)	(998.86)	(999.36)	(999.59)
SSE	(1,000.00)	****	(1,000.00)	(894.27)	(597.02)	(174.35)	(311.83)	(429.27)	(485.67)	(553.78)	(553.22)	(531.70)	(351.19)	(227.03)
S	(1,000.00)	****	(1,000.00)	(895.72)	(782.75)	(634.40)	(525.29)	(231.15)	167.39	68.04	(105.85)	(546.23)	(679.80)	(320.89)
SSW	(1,000.00)	****	(963.78)	(602.11)	(31.02)	301.07	335.91	254.42	126.52	(31.00)	(634.35)	(795.87)	(884.27)	(921.53)
SW	(1,000.00)	****	(872.31)	(745.95)	(151.25)	341.23	879.07	1,049.13	873.47	803.64	(459.81)	(749.81)	(858.13)	(881.57)
WSW	(1,000.00)	****	(849.91)	(781.73)	119.88	738.39	1,489.98	1,730.79	1,350.13	1,071.78	(417.55)	(736.60)	(778.85)	(853.41)
W	(1,000.00)	****	(906.28)	(238.14)	(246.95)	(173.09)	(191.92)	(222.06)	(381.38)	(498.50)	(859.30)	(935.02)	(914.55)	(937.69)
WNW	(1,000.00)	****	(956.33)	(308.32)	316.68	477.03	331.60	129.19	(19.09)	(151.88)	(742.45)	(885.72)	(931.82)	(954.65)
NW	(1,000.00)	****	(1,000.00)	(987.18)	(870.55)	(655.13)	(114.70)	564.96	1,408.86	2,099.63	163.48	(410.91)	(654.28)	(778.05)
NNW	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(890.40)	(818.52)	(645.30)	(664.04)	(404.37)	(337.32)	(532.24)	(637.23)
Average by Annulus	(1,000.00)	****	(964.68)	(836.83)	(637.62)	(484.42)	(373.54)	(309.78)	(287.02)	(302.86)	(688.18)	(808.00)	(849.03)	(844.48)

Note: Values in parentheses are negative. **** Cumulative area of less than 1 square mile.

Table 2.1-59

2020 RESIDENT POPULATIONS BY SECTOR-SEGMENT
CUMULATIVE

DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
	DISTANCE (MILES)													
N	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	234	234	234	234	234	234	234	234	234	234	234	234	234
SSE	0	0	0	393	2,338	6,899	7,806	8,416	9,531	10,174	39,328	93,140	232,013	433,374
S	0	0	0	392	1,274	3,074	5,292	10,989	20,952	23,643	78,725	88,867	112,280	379,506
SSW	0	0	76	1,492	5,682	10,995	15,355	18,815	21,288	22,602	33,500	41,094	41,409	43,880
SW	0	20	267	943	4,928	11,222	21,418	30,517	35,315	41,967	50,129	51,781	52,178	67,739
WSW	0	40	307	796	6,397	14,315	27,936	40,034	43,622	47,487	53,397	54,605	80,699	83,465
W	0	12	192	2,771	4,279	6,768	9,006	11,326	11,400	11,410	12,803	13,476	30,942	35,196
WNW	0	0	90	2,520	7,494	12,100	14,846	16,445	18,079	19,300	23,444	23,724	25,118	26,104
NW	0	0	0	46	740	2,844	9,943	22,978	44,770	71,112	106,831	122,043	127,231	127,597
NNW	0	0	0	0	0	0	1,243	2,690	6,657	7,786	54,628	135,221	169,519	204,858
Total by Annulus	0	306	1,166	9,587	33,366	68,451	113,079	162,444	211,848	255,715	453,019	624,185	871,623	1,401,953

Table 2.1-60

2020 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF LAND)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N														
NNE														
NE														
ENE														
E														
ESE														
SE		****	201.79	201.79	201.79	201.79	201.79	201.79	201.79	201.79	201.79	201.79	201.79	201.79
SSE				****	1,619.34	3,839.18	3,106.99	3,048.06	2,833.66	2,580.20	1,504.78	1,394.76	1,998.30	2,853.59
S				****	1,182.81	1,183.67	1,086.70	1,411.92	1,882.90	1,969.86	1,154.09	543.30	373.95	799.36
SSW			****	927.57	1,671.03	1,965.67	1,878.31	1,690.66	1,687.54	1,446.29	450.55	240.86	134.51	90.64
SW		****	****	420.46	1,241.81	1,847.39	2,502.13	2,678.22	2,438.91	2,309.99	648.05	296.35	228.50	279.35
WSW		****	****	523.20	1,961.79	2,743.49	3,606.74	3,753.84	3,121.86	2,687.33	703.59	313.43	354.16	262.92
W		****	****	1,302.84	1,117.00	1,141.28	1,066.97	999.10	779.72	623.85	168.02	76.97	99.34	72.91
WNW			****	1,678.32	2,339.39	2,269.49	1,892.39	1,530.59	1,290.23	1,092.10	311.45	136.13	80.87	53.86
NW				****	****	1,480.32	2,586.97	3,570.78	4,604.59	5,302.63	1,498.96	720.66	420.20	270.46
NNW							369.22	686.14	1,375.13	1,275.52	1,559.14	1,368.35	992.96	795.62
Average by Annulus		****	201.79	842.36	1,416.87	1,852.48	1,829.82	1,957.11	2,021.63	1,948.96	820.04	529.26	488.46	568.05

**** Cumulative area of less than 1 square mile.

Table 2.1-61

2020 RESIDENT POPULATIONS BY SECTOR-SEGMENT
CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF TOTAL AREA)

DIRECTION	DISTANCE (MILES) 0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NNE	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NE	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENE	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ESE	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SE	0.00	****	134.31	75.79	48.58	33.77	24.82	19.01	15.02	12.17	3.04	1.35	0.76	0.48
SSE	0.00	****	0.00	124.41	473.69	970.56	806.70	665.91	595.86	515.19	497.78	527.45	739.15	883.76
S	0.00	****	0.00	122.76	255.33	427.81	541.06	860.29	1,296.05	1,184.63	985.88	502.55	357.27	773.09
SSW	0.00	****	42.35	467.45	1,139.20	1,530.63	1,570.43	1,473.28	1,317.01	1,132.56	419.48	232.34	131.73	89.36
SW	0.00	****	150.19	298.34	997.77	1,577.70	2,212.28	2,413.48	2,206.64	2,124.07	634.53	293.25	166.23	138.12
WSW	0.00	****	176.55	256.64	1,317.86	2,045.96	2,931.93	3,216.00	2,767.89	2,440.05	685.67	309.77	257.46	170.38
W	0.00	****	110.40	896.44	885.98	972.97	951.19	915.90	728.32	590.45	165.60	76.39	98.65	71.80
WNW	0.00	****	51.71	814.51	1,549.98	1,737.68	1,566.48	1,328.48	1,154.03	997.85	302.99	134.43	80.06	53.24
NW	0.00	****	0.00	14.74	151.81	405.13	1,040.62	1,841.35	2,834.58	3,646.94	1,369.13	691.44	405.53	260.32
NNW	0.00	****	0.00	0.00	0.00	0.00	128.77	213.37	417.18	395.19	692.81	766.73	540.63	418.11
Average by Annulus	0.00	****	41.59	191.94	426.26	606.39	735.89	809.19	833.29	814.94	359.81	220.98	173.59	178.67

**** Cumulative area of less than 1 square mile.

Table 2.1-62

2020 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF LAND COMPARED TO 500)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N														
NNE														
NE														
ENE														
E														
ESE														
SE		****	(298.21)	(298.21)	(298.21)	(298.21)	(298.21)	(298.21)	(298.21)	(298.21)	(298.21)	(298.21)	(298.21)	(298.21)
SSE				****	1,119.34	3,339.18	2,606.99	2,548.06	2,333.66	2,080.20	1,004.78	894.76	1,498.30	2,353.59
S				****	682.81	683.67	586.70	911.92	1,382.90	1,469.86	654.09	43.30	(126.05)	299.36
SSW			****	427.57	1,171.03	1,465.67	1,378.31	1,190.66	1,187.54	946.29	(49.45)	(259.14)	(365.49)	(409.36)
SW		****	****	(79.54)	741.81	1,347.39	2,002.13	2,178.22	1,938.91	1,809.99	148.05	(203.65)	(271.50)	(220.65)
WSW		****	****	23.20	1,461.79	2,243.49	3,106.74	3,253.84	2,621.86	2,187.33	203.59	(186.57)	(145.84)	(237.08)
W		****	****	802.84	617.00	641.28	566.97	499.10	279.72	123.85	(331.98)	(423.03)	(400.66)	(427.09)
WNW			****	1,178.32	1,839.39	1,769.49	1,392.39	1,030.59	790.23	592.10	(188.55)	(363.87)	(419.13)	(446.14)
NW				****	****	980.32	2,086.97	3,070.78	4,104.59	4,802.63	998.96	220.66	(79.80)	(229.54)
NNW							(130.78)	186.14	875.13	775.52	1,059.14	868.35	492.96	295.62
Average by Annulus		****	(298.21)	342.36	916.87	1,352.48	1,329.82	1,457.11	1,521.63	1,448.96	320.04	29.26	(11.54)	68.05

Note: Values in parentheses are negative. **** Cumulative area of less than 1 square mile.

Table 2.1-63

2020 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF TOTAL AREA COMPARED TO 500)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
NNE	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
NE	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
ENE	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
E	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
ESE	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
SE	(500.00)	****	(365.69)	(424.21)	(451.42)	(466.23)	(475.18)	(480.99)	(484.98)	(487.83)	(496.96)	(498.65)	(499.24)	(499.52)
SSE	(500.00)	****	(500.00)	(375.59)	(26.31)	470.56	306.70	165.91	95.86	15.19	(2.22)	27.45	239.15	383.76
S	(500.00)	****	(500.00)	(377.24)	(244.67)	(72.19)	41.06	360.29	796.05	684.63	485.88	2.55	(142.73)	273.09
SSW	(500.00)	****	(457.65)	(32.55)	639.20	1,030.63	1,070.43	973.28	817.01	632.56	(80.52)	(267.66)	(368.27)	(410.64)
SW	(500.00)	****	(349.81)	(201.66)	497.77	1,077.70	1,712.28	1,913.48	1,706.64	1,624.07	134.53	(206.75)	(333.77)	(361.88)
WSW	(500.00)	****	(323.45)	(243.36)	817.86	1,545.96	2,431.93	2,716.00	2,267.89	1,940.05	185.67	(190.23)	(242.54)	(329.62)
W	(500.00)	****	(389.60)	396.44	385.98	472.97	451.19	415.90	228.32	90.45	(334.40)	(423.61)	(401.35)	(428.20)
WNW	(500.00)	****	(448.29)	314.51	1,049.98	1,237.68	1,066.48	828.48	654.03	497.85	(197.01)	(365.57)	(419.94)	(446.76)
NW	(500.00)	****	(500.00)	(485.26)	(348.19)	(94.87)	540.62	1,341.35	2,334.58	3,146.94	869.13	191.44	(94.47)	(239.68)
NNW	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(371.23)	(286.63)	(82.82)	(104.81)	192.81	266.73	40.63	(81.89)
Average by Annulus	(500.00)	****	(458.41)	(308.06)	(73.74)	106.39	235.89	309.19	333.29	314.94	(140.19)	(279.02)	(326.41)	(321.33)

Note: Values in parentheses are negative. **** Cumulative area of less than 1 square mile.

Table 2.1-64

2020 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF LAND COMPARED TO 1000)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N														
NNE														
NE														
ENE														
E														
ESE														
SE		****	(798.21)	(798.21)	(798.21)	(798.21)	(798.21)	(798.21)	(798.21)	(798.21)	(798.21)	(798.21)	(798.21)	(798.21)
SSE				****	619.34	2,839.18	2,106.99	2,048.06	1,833.66	1,580.20	504.78	394.76	998.30	1,853.59
S				****	182.81	183.67	86.70	411.92	882.90	969.86	154.09	(456.70)	(626.05)	(200.64)
SSW			****	(72.43)	671.03	965.67	878.31	690.66	687.54	446.29	(549.45)	(759.14)	(865.49)	(909.36)
SW		****	****	(579.54)	241.81	847.39	1,502.13	1,678.22	1,438.91	1,309.99	(351.95)	(703.65)	(771.50)	(720.65)
WSW		****	****	(476.80)	961.79	1,743.49	2,606.74	2,753.84	2,121.86	1,687.33	(296.41)	(686.57)	(645.84)	(737.08)
W		****	****	302.84	117.00	141.28	66.97	(0.90)	(220.28)	(376.15)	(831.98)	(923.03)	(900.66)	(927.09)
WNW			****	678.32	1,339.39	1,269.49	892.39	530.59	290.23	92.10	(688.55)	(863.87)	(919.13)	(946.14)
NW				****	****	480.32	1,586.97	2,570.78	3,604.59	4,302.63	498.96	(279.34)	(579.80)	(729.54)
NNW							(630.78)	(313.86)	375.13	275.52	559.14	368.35	(7.04)	(204.38)
Average by Annulus		****	(798.21)	(157.64)	416.87	852.48	829.82	957.11	1,021.63	948.96	(179.96)	(470.74)	(511.54)	(431.95)

Note: Values in parentheses are negative. **** Cumulative area of less than 1 square mile.

Table 2.1-65

2020 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF TOTAL AREA COMPARED TO 1000)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
NNE	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
NE	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
ENE	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
E	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
ESE	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
SE	(1,000.00)	****	(865.69)	(924.21)	(951.42)	(966.23)	(975.18)	(980.99)	(984.98)	(987.83)	(996.96)	(998.65)	(999.24)	(999.52)
SSE	(1,000.00)	****	(1,000.00)	(875.59)	(526.31)	(29.44)	(193.30)	(334.09)	(404.14)	(484.81)	(502.22)	(472.55)	(260.85)	(116.24)
S	(1,000.00)	****	(1,000.00)	(877.24)	(744.67)	(572.19)	(458.94)	(139.71)	296.05	184.63	(14.12)	(497.45)	(642.73)	(226.91)
SSW	(1,000.00)	****	(957.65)	(532.55)	139.20	530.63	570.43	473.28	317.01	132.56	(580.52)	(767.66)	(868.27)	(910.64)
SW	(1,000.00)	****	(849.81)	(701.66)	(2.23)	577.70	1,212.28	1,413.48	1,206.64	1,124.07	(365.47)	(706.75)	(833.77)	(861.88)
WSW	(1,000.00)	****	(823.45)	(743.36)	317.86	1,045.96	1,931.93	2,216.00	1,767.89	1,440.05	(314.33)	(690.23)	(742.54)	(829.62)
W	(1,000.00)	****	(889.60)	(103.56)	(114.02)	(27.03)	(48.81)	(84.10)	(271.68)	(409.55)	(834.40)	(923.61)	(901.35)	(928.20)
WNW	(1,000.00)	****	(948.29)	(185.49)	549.98	737.68	566.48	328.48	154.03	(2.15)	(697.01)	(865.57)	(919.94)	(946.76)
NW	(1,000.00)	****	(1,000.00)	(985.26)	(848.19)	(594.87)	40.62	841.35	1,834.58	2,646.94	369.13	(308.56)	(594.47)	(739.68)
NNW	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(871.23)	(786.63)	(582.82)	(604.81)	(307.19)	(233.27)	(459.37)	(581.89)
Average by Annulus	(1,000.00)	****	(958.41)	(808.06)	(573.74)	(393.61)	(264.11)	(190.81)	(166.71)	(185.06)	(640.19)	(779.02)	(826.41)	(821.33)

Note: Values in parentheses are negative. **** Cumulative area of less than 1 square mile.

Table 2.1-66

2030 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DISTANCE (MILES)														
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SE	0	263	263	263	263	263	263	263	263	263	263	263	263	263
SSE	0	0	0	443	2,630	7,757	8,759	9,412	10,604	11,290	42,474	101,523	255,341	478,421
S	0	0	0	439	1,431	3,446	5,819	11,913	22,571	25,445	84,417	95,639	121,582	417,569
SSW	0	0	86	1,678	6,382	12,344	17,225	21,095	23,790	25,257	36,967	45,098	45,446	48,184
SW	0	22	300	1,060	5,536	12,602	24,033	34,239	39,617	47,083	56,149	57,919	58,356	75,591
WSW	0	45	345	895	7,186	16,069	31,349	44,909	48,933	53,264	59,885	61,207	90,047	93,035
W	0	13	215	3,111	4,804	7,598	10,106	12,708	12,791	12,802	14,367	15,111	34,422	39,123
WNW	0	0	101	2,830	8,410	13,585	16,673	18,466	20,302	21,673	26,328	26,642	28,181	29,290
NW	0	0	0	52	833	3,199	11,177	25,799	50,256	79,830	119,885	136,782	142,547	142,951
NNW	0	0	0	0	0	0	1,397	3,019	7,472	8,738	60,966	150,490	188,555	227,556
Total by Annulus	0	343	1,310	10,771	37,475	76,863	126,801	181,823	236,599	285,645	501,701	690,674	964,740	1,551,983

Table 2.1-67

2030 RESIDENT POPULATIONS BY SECTOR-SEGMENT
CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF LAND)

DIRECTION	DISTANCE (MILES) 0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N														
NNE														
NE														
ENE														
E														
ESE														
SE		****	226.80	226.80	226.80	226.80	226.80	226.80	226.80	226.80	226.80	226.80	226.80	226.80
SSE				****	1,821.58	4,316.64	3,486.31	3,408.79	3,152.67	2,863.23	1,625.16	1,520.29	2,199.22	3,150.21
S				****	1,328.57	1,326.92	1,194.92	1,530.64	2,028.40	2,119.99	1,237.53	584.70	404.93	879.53
SSW			****	1,043.21	1,876.89	2,206.85	2,107.06	1,895.53	1,885.88	1,616.18	497.18	264.33	147.62	99.53
SW		****	****	472.62	1,395.02	2,074.57	2,807.63	3,004.87	2,736.02	2,591.59	725.87	331.48	255.56	311.73
WSW		****	****	588.27	2,203.75	3,079.65	4,047.38	4,210.96	3,501.94	3,014.26	789.07	351.33	395.19	293.06
W		****	****	1,462.69	1,254.05	1,281.24	1,197.29	1,121.01	874.86	699.96	188.55	86.31	110.52	81.04
WNW			****	1,884.78	2,625.34	2,548.02	2,125.28	1,718.69	1,448.88	1,226.38	349.76	152.87	90.73	60.44
NW				****	****	1,665.11	2,908.03	4,009.17	5,168.83	5,952.71	1,682.12	807.69	470.79	303.01
NNW							414.96	770.05	1,543.48	1,431.47	1,740.03	1,522.87	1,104.47	883.78
Average by Annulus		****	226.80	946.40	1,591.50	2,080.64	2,051.56	2,189.65	2,256.78	2,174.26	906.21	584.87	540.58	628.91

**** Cumulative area of less than 1 square mile.

Table 2.1-68

2030 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF TOTAL AREA)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NNE	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NE	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ENE	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ESE	0.00	****	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SE	0.00	****	150.95	85.19	54.61	37.95	27.90	21.37	16.89	13.68	3.42	1.51	0.85	0.54
SSE	0.00	****	0.00	140.24	532.85	1,091.26	905.19	744.72	662.94	571.71	537.60	574.93	813.47	975.62
S	0.00	****	0.00	137.48	286.80	479.58	594.94	932.63	1,396.20	1,274.92	1,057.16	540.84	386.87	850.63
SSW	0.00	****	47.92	525.72	1,279.55	1,718.43	1,761.68	1,651.82	1,471.80	1,265.60	462.89	254.98	144.57	98.13
SW	0.00	****	168.76	335.36	1,120.87	1,771.71	2,482.39	2,707.84	2,475.44	2,383.01	710.73	328.01	185.91	154.13
WSW	0.00	****	198.40	288.56	1,480.40	2,296.65	3,290.13	3,607.61	3,104.89	2,736.89	768.98	347.22	287.28	189.92
W	0.00	****	123.62	1,006.44	994.68	1,092.29	1,067.37	1,027.66	817.19	662.49	185.83	85.66	109.74	79.81
WNW	0.00	****	58.03	914.70	1,739.44	1,950.94	1,759.26	1,491.74	1,295.93	1,120.54	340.26	150.97	89.82	59.74
NW	0.00	****	0.00	16.67	170.89	455.70	1,169.77	2,067.41	3,181.93	4,094.04	1,536.43	774.94	454.35	291.65
NNW	0.00	****	0.00	0.00	0.00	0.00	144.72	239.46	468.26	443.51	773.19	853.30	601.34	464.43
Average by Annulus	0.00	****	46.73	215.65	478.75	680.91	825.21	905.77	930.72	910.40	398.53	244.52	192.14	197.79

**** Cumulative area of less than 1 square mile.

Table 2.1-69

2030 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF LAND COMPARED TO 500)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N														
NNE														
NE														
ENE														
E														
ESE														
SE		****	(273.20)	(273.20)	(273.20)	(273.20)	(273.20)	(273.20)	(273.20)	(273.20)	(273.20)	(273.20)	(273.20)	(273.20)
SSE				****	1,321.58	3,816.64	2,986.31	2,908.79	2,652.67	2,363.23	1,125.16	1,020.29	1,699.22	2,650.21
S				****	828.57	826.92	694.92	1,030.64	1,528.40	1,619.99	737.53	84.70	(95.07)	379.53
SSW			****	543.21	1,376.89	1,706.85	1,607.06	1,395.53	1,385.88	1,116.18	(2.82)	(235.67)	(352.38)	(400.47)
SW		****	****	(27.38)	895.02	1,574.57	2,307.63	2,504.87	2,236.02	2,091.59	225.87	(168.52)	(244.44)	(188.27)
WSW		****	****	88.27	1,703.75	2,579.65	3,547.38	3,710.96	3,001.94	2,514.26	289.07	(148.67)	(104.81)	(206.94)
W		****	****	962.69	754.05	781.24	697.29	621.01	374.86	199.96	(311.45)	(413.69)	(389.48)	(418.96)
WNW			****	1,384.78	2,125.34	2,048.02	1,625.28	1,218.69	948.88	726.38	(150.24)	(347.13)	(409.27)	(439.56)
NW				****	****	1,165.11	2,408.03	3,509.17	4,668.83	5,452.71	1,182.12	307.69	(29.21)	(196.99)
NNW							(85.04)	270.05	1,043.48	931.47	1,240.03	1,022.87	604.47	383.78
Average by Annulus		****	(273.20)	446.40	1,091.50	1,580.64	1,551.56	1,689.65	1,756.78	1,674.26	406.21	84.87	40.58	128.91

Note: Values in parentheses are negative. **** Cumulative area of less than 1 square mile.

Table 2.1-70

2030 RESIDENT POPULATIONS BY SECTOR-SEGMENT
CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF TOTAL AREA COMPARED TO 500)

	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
NNE	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
NE	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
ENE	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
E	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
ESE	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)	(500.00)
SE	(500.00)	****	(349.05)	(414.81)	(445.39)	(462.05)	(472.10)	(478.63)	(483.11)	(486.32)	(496.58)	(498.49)	(499.15)	(499.46)
SSE	(500.00)	****	(500.00)	(359.76)	32.85	591.26	405.19	244.72	162.94	71.71	37.60	74.93	313.47	475.62
S	(500.00)	****	(500.00)	(362.52)	(213.20)	(20.42)	94.94	432.63	896.20	774.92	557.16	40.84	(113.13)	350.63
SSW	(500.00)	****	(452.08)	25.72	779.55	1,218.43	1,261.68	1,151.82	971.80	765.60	(37.11)	(245.02)	(355.43)	(401.87)
SW	(500.00)	****	(331.24)	(164.64)	620.87	1,271.71	1,982.39	2,207.84	1,975.44	1,883.01	210.73	(171.99)	(314.09)	(345.87)
WSW	(500.00)	****	(301.60)	(211.44)	980.40	1,796.65	2,790.13	3,107.61	2,604.89	2,236.89	268.98	(152.78)	(212.72)	(310.08)
W	(500.00)	****	(376.38)	506.44	494.68	592.29	567.37	527.66	317.19	162.49	(314.17)	(414.34)	(390.26)	(420.19)
WNW	(500.00)	****	(441.97)	414.70	1,239.44	1,450.94	1,259.26	991.74	795.93	620.54	(159.74)	(349.03)	(410.18)	(440.26)
NW	(500.00)	****	(500.00)	(483.33)	(329.11)	(44.30)	669.77	1,567.41	2,681.93	3,594.04	1,036.43	274.94	(45.65)	(208.35)
NNW	(500.00)	****	(500.00)	(500.00)	(500.00)	(500.00)	(355.28)	(260.54)	(31.74)	(56.49)	273.19	353.30	101.34	(35.57)
Average by Annulus	(500.00)	****	(453.27)	(284.35)	(21.25)	180.91	325.21	405.77	430.72	410.40	(101.47)	(255.48)	(307.86)	(302.21)

Note: Values in parentheses are negative. **** Cumulative area of less than 1 square mile.

Table 2.1-71

2030 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF LAND COMPARED TO 1000)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N														
NNE														
NE														
ENE														
E														
ESE														
SE		****	(773.20)	(773.20)	(773.20)	(773.20)	(773.20)	(773.20)	(773.20)	(773.20)	(773.20)	(773.20)	(773.20)	(773.20)
SSE				****	821.58	3,316.64	2,486.31	2,408.79	2,152.67	1,863.23	625.16	520.29	1,199.22	2,150.21
S				****	328.57	326.92	194.92	530.64	1,028.40	1,119.99	237.53	(415.30)	(595.07)	(120.47)
SSW			****	43.21	876.89	1,206.85	1,107.06	895.53	885.88	616.18	(502.82)	(735.67)	(852.38)	(900.47)
SW		****	****	(527.38)	395.02	1,074.57	1,807.63	2,004.87	1,736.02	1,591.59	(274.13)	(668.52)	(744.44)	(688.27)
WSW		****	****	(411.73)	1,203.75	2,079.65	3,047.38	3,210.96	2,501.94	2,014.26	(210.93)	(648.67)	(604.81)	(706.94)
W		****	****	462.69	254.05	281.24	197.29	121.01	(125.14)	(300.04)	(811.45)	(913.69)	(889.48)	(918.96)
WNW			****	884.78	1,625.34	1,548.02	1,125.28	718.69	448.88	226.38	(650.24)	(847.13)	(909.27)	(939.56)
NW				****	****	665.11	1,908.03	3,009.17	4,168.83	4,952.71	682.12	(192.31)	(529.21)	(696.99)
NNW							(585.04)	(229.95)	543.48	431.47	740.03	522.87	104.47	(116.22)
Average by Annulus		****	(773.20)	(53.60)	591.50	1,080.64	1,051.56	1,189.65	1,256.78	1,174.26	(93.79)	(415.13)	(459.42)	(371.09)

Note: Values in parentheses are negative. **** Cumulative area of less than 1 square mile.

Table 2.1-72

2030 RESIDENT POPULATIONS BY SECTOR-SEGMENT CUMULATIVE DENSITY (PERSONS PER SQUARE MILE OF TOTAL AREA COMPARED TO 1000)														
	DISTANCE (MILES)													
DIRECTION	0-1	0-2	0-3	0-4	0-5	0-6	0-7	0-8	0-9	0-10	0-20	0-30	0-40	0-50
N	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
NNE	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
NE	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
ENE	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
E	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
ESE	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)
SE	(1,000.00)	****	(849.05)	(914.81)	(945.39)	(962.05)	(972.10)	(978.63)	(983.11)	(986.32)	(996.58)	(998.49)	(999.15)	(999.46)
SSE	(1,000.00)	****	(1,000.00)	(859.76)	(467.15)	91.26	(94.81)	(255.28)	(337.06)	(428.29)	(462.40)	(425.07)	(186.53)	(24.38)
S	(1,000.00)	****	(1,000.00)	(862.52)	(713.20)	(520.42)	(405.06)	(67.37)	396.20	274.92	57.16	(459.16)	(613.13)	(149.37)
SSW	(1,000.00)	****	(952.08)	(474.28)	279.55	718.43	761.68	651.82	471.80	265.60	(537.11)	(745.02)	(855.43)	(901.87)
SW	(1,000.00)	****	(831.24)	(664.64)	120.87	771.71	1,482.39	1,707.84	1,475.44	1,383.01	(289.27)	(671.99)	(814.09)	(845.87)
WSW	(1,000.00)	****	(801.60)	(711.44)	480.40	1,296.65	2,290.13	2,607.61	2,104.89	1,736.89	(231.02)	(652.78)	(712.72)	(810.08)
W	(1,000.00)	****	(876.38)	6.44	(5.32)	92.29	67.37	27.66	(182.81)	(337.51)	(814.17)	(914.34)	(890.26)	(920.19)
WNW	(1,000.00)	****	(941.97)	(85.30)	739.44	950.94	759.26	491.74	295.93	120.54	(659.74)	(849.03)	(910.18)	(940.26)
NW	(1,000.00)	****	(1,000.00)	(983.33)	(829.11)	(544.30)	169.77	1,067.41	2,181.93	3,094.04	536.43	(225.06)	(545.65)	(708.35)
NNW	(1,000.00)	****	(1,000.00)	(1,000.00)	(1,000.00)	(1,000.00)	(855.28)	(760.54)	(531.74)	(556.49)	(226.81)	(146.70)	(398.66)	(535.57)
Average by Annulus	(1,000.00)	****	(953.27)	(784.35)	(521.25)	(319.09)	(174.79)	(94.23)	(69.28)	(89.60)	(601.47)	(755.48)	(807.86)	(802.21)

Note: Values in parentheses are negative. **** Cumulative area of less than 1 square mile.

Table 2.1-73

TRANSIENT POPULATION: ATTENDANCE AT ATTRACTIONS AND EVENTS
1988 - 2030

Attractions and Events Within 10 Miles

Special Event	Location	Sector	Time	Est. Total Attend.	Avg. 1988 Daily Attend.	Proj. 1995 D. Attend.	Proj. 2000 D. Attend.	Proj. 2010 D. Attend.	Proj. 2020 D. Attend.	Proj. 2030 D. Attend.	Source*
FT. PIERCE:											
"On the Green" Arts and Crafts Show	IRCC	NW 5-10	January	10,000	5,000	5,500	6,270	7,750	9,106	10,699	1,8,9,10,11,12
Cattlemen's Day Parade & Shrine Club BBQ	Shrine Club	NW 5-10	February	15,000	15,000	16,500	18,810	23,249	27,318	32,098	1,8,9,10,11,12
Greek Festival	Greek Orthodox Church	NW 5-10	February	10,000	3,400	3,667	4,180	5,166	6,071	7,133	1,8,9,10,11,12
Pilot Club Home Show	Civic Center	NW 5-10	January	15,000	5,000	5,500	6,270	7,750	9,106	10,699	2,8,11,12
Seafood Festival	Ft. Pierce	NW 5-10	November	8,000	4,000	4,400	5,016	6,200	7,285	8,560	2,11,12
PORT ST. LUCIE											
Great American Raft Race	Northport Marina	WSW 5-10	September	4,000	4,000	4,800	5,472	6,763	7,947	9,338	2,11,12,13
Sailfish Regatta	St. Lucie River	SSW 5-10	May	10,000	5,000	6,000	6,840	8,454	9,934	11,672	7,11,12
Jaycees Bed Race	Village Green Shop. Ctr.	SW 4-5	August	3,000	3,000	3,600	4,104	5,073	5,960	7,003	2,11,12
Mets Sports Complex	St. Lucie West	W 5-10	Spring	5,600	5,600	7,300	7,300	7,300	7,300	7,300	3,11,12,13
JENSEN BEACH:											
Festival of the Arts	Causeway	SSE 5-10	March	10,000	5,000	6,000	6,780	8,272	9,595	11,130	1,11,12
Operation Turtle Watch	Jensen Beach	SSE 5-10	June/July	2,500	50	60	68	83	96	111	4,11,12,13
Leif Erikson Day	Causeway	SSE 5-10	October	2,000	2,000	2,400	2,712	3,309	3,838	4,452	5,8,11,12
Sertoma Boat Races	Causeway	SSE 5-10	May	15,000	7,500	9,000	10,170	12,407	14,393	16,695	2,8,11,12
Jensen Beach Fireworks	Causeway	SSE 5-10	July	2,000	2,000	2,400	2,712	3,309	3,838	4,452	6,8,11,12

* SOURCES

1. Florida Media Guide, January-June 1988: Fl. Dept. of Commerce, Div. of Tourism
2. Discover the Treasure Coast - The Palm Beach Post, 9/6/87.
3. St. Lucie West, News Tribune, St. Lucie on the Move '87, 10/25/87.
4. 1988 Jensen Beach Business Guide, Centennial Edition; Jensen Beach, Treasure Coast Chamber of Commerce.
5. Member, Sons of Norway Gulfstream Lodge #514, 2/88.
6. Information, "The Mirror", 2/88.
7. Director, Stuart/Martin Co. Chamber of Commerce, Stuart, FL, Letter dated 11/17/78.
8. Discover the Treasure Coast - The Palm Beach Post, 10/11/92.
9. Personal Communication, Gayla Barwick, Tourism/Convention Director, St. Lucie Co. Tourist Development Council, Div. of Leisure Services, 12/92.
10. Personal Communication, Donald McLam, Recreation Superintendent, St. Lucie Co., Div. of Leisure Services, 12/92.
11. "Projections of Florida population by county: 1990 - 2020", Vol. 24, No. 2, Bull. No. 96, Bureau of Economic and Business Research, College of Business Administration, Univ. of Florida, 7/91.
12. "Florida Population: Census Summary 1990", Bureau of Economic and Business Research, College of Business Administration, Univ. of Florida, 4/91.
13. "Atlas of Florida", Institute of Science and Public Affairs, Florida State University, 12/92.

Table 2.1-74

TRANSIENT POPULATION: ATTENDANCE AT ATTRACTIONS AND EVENTS
1990 - 2030

Attractions and Events Between 10 and 50 Miles of the St. Lucie Plant

Special Event	Location	Sector-Seg.	Time	Est. Avg. 1990 Daily Attend.	Proj. 1995 D. Attend.	Proj. 2000 D. Attend.	Proj. 2010 D. Attend.	Proj. 2020 D. Attend.	Proj. 2030 D. Attend.	Source*
P.G.A. Complex	Palm Beach Gardens	SSE 30-40	Year-Round	50,000/event	50,000/e.	50,000/e.	50,000/e.	50,000/e.	50,000/e.	12
West Palm Beach Auditorium	West Palm Beach	SSE 40-50	Year-Round	6,000	6,000	6,000	6,000	6,000	6,000	17
West Palm Beach Jai Alai	Mangonia Park, P. B. Co.	SSE 40-50	Sept.-Jan.	9,000	9,000	9,000	9,000	9,000	9,000	18
West Palm Beach Municipal Stadium	West Palm Beach	SSE 40-50	Year-Round	7,000	7,000	7,000	7,000	7,000	7,000	
Palm Beach Speedway	Palm Beach Fairgrounds	SSE 40-50	Year-Round	8,000	8,000	8,000	8,000	8,000	8,000	15
Martin County Fair	Fairgrounds in Stuart	S 10-20	March	9,998	11,801	13,335	16,269	18,872	21,891	3,9,20,22,23
Martin Co. High Football Stadium	Stuart	S 10-20	Fall	4,500	4,500	4,500	4,500	4,500	4,500	4,22,23
Horse Complex	Palm Beach Fairgrounds	S 40-50	Year-Round	3,150	3640	4,061	4,844	5,563	6,386	8
Lion Country Safari	Route 441 in Palm B. Co.	S 40-50	Year-Round	Confidential						10
Palm Beach Auto Auction	Palm Beach Fairgrounds	S 40-50	Year-Round	1,575	1,821	2,032	2,424	2,783	3,195	14,22,23
Palm Beach Kennel Club	West Palm Beach	S 40-50	Jan.-May	9,134	10,558	11,783	14,057	16,138	18,526	16,22,23
Pahokee Fireworks	Hoover Dike in Pahokee	SW 40-50	July 4th	3,000	3,000	3,000	3,000	3,000	3,000	13
Labor Day Rodeo and Bluegrass Convention	Okeechobee City	WSW 30-40	September	12,283	14,096	15,630	18,449	21,102	24,136	9,22,23
South Florida Fair	Palm Beach Fairgrounds	WSW 30-40	Jan.-Feb.	138,568	160,185	178,767	213,269	244,832	281,068	17,22,23
Speckled Perch Festival	Okeechobee City	WSW 30-40	March	6,141	7,050	7,826	9,234	10,568	12,081	9,19,22,23
Jai Alai of Ft. Pierce	Ft. Pierce	WNW 10-20	Jan. - June	3,661	4,000	4,000	4,000	4,000	4,000	2,22,23
St. Lucie County Fair	Fairgrounds in Ft. Pierce	NW 20-30	Feb./March	9,497	11,397	13,042	16,117	18,940	22,254	5,19,20,21,22,23
Vero Beach Sr. High Football Stadium	Vero Beach	NW 20-30	Fall	6,000	6,000	6,000	6,000	6,000	6,000	6,19
Fish Fry, Volunteer Fire Dept.	Grant, Brevard Co.	NW 40-50	February	22,989	26,338	29,196	34,526	39,406	44,923	7,22,23
Dodgertown Sports Complex	Vero Beach	NNW 20-30	March	8,318	9,664	10,000	10,000	10,000	10,000	1,22,23
Offshore Sport Fishing Tournament	Sebastian Inlet / Atl. O.	NNW 30-40	May-June	766	878	974	1,150	1,310	1,494	11,22,23

* SOURCES

1. Office of Eastern Division Manager, Los Angeles Dodgers Baseball Team, Dodgertown Sport and Conference Center, Vero Beach, Florida, Letter dated 11/17/78.
2. Associate Chief of Security, Jai Alai of Ft. Pierce, Ft. Pierce, FL, Letter dated 11/17/78.
3. Fair Secretary, Sandy Shoes Festival (1979), Ft. Pierce, FL, Letter dated 11/20/78.
4. Athletic Director, Martin County High School, Stuart, FL, Letter dated 11/28/78.
5. Fair Secretary, St. Lucie County Fair, Ft. Pierce, FL, Letter dated 11/20/78.
6. Finance Officer, Indian River County Schools, Vero Beach, FL, Letter dated 11/27/78.
7. Chairman, Fish Fry in Grant, Melbourne, FL, Personal Communication, 12/14/78.
8. Horse Complex, Palm Beach County Fairgrounds, West Palm Beach, FL, Personal Communication, 11/21/78.
9. Okeechobee Chamber of Commerce, Okeechobee, FL, Letter dated 11/17/78.
10. Office of Public Relations, Lion Country Safari, Royal Palm Beach, FL, Letter dated 11/20/78.
11. Chairman, Offshore Sport Fishing Tournament, Sebastian, FL, Letter dated 12/13/78.
12. Project Manager, PGA Complex, Florida Realty Building Company, West Palm Beach, FL, Letter dated 12/11/78.
13. Office Manager, Pahokee Chamber of Commerce, Pahokee, FL, Letter dated 11/20/78.
14. Palm Beach Auto Auction, Palm Beach County Fairgrounds, West Palm Beach, FL, Personal Communication, 12/11/78.
15. South Florida Fair, Palm Beach County Fairgrounds, West Palm Beach, FL, Personal Communications, 11/21/78 and 11/27/78.
16. Palm Beach Kennel Club - Greyhound Racing, West Palm Beach, FL, Letter dated 11/22/78.
17. West Palm Beach Auditorium, West Palm Beach, FL, Letter dated 11/22/78.
18. Office of Public Relations, West Palm Beach Jai Alai, West Palm Beach, FL, Letter dated 11/21/78.
19. Discover the Treasure Coast - The Palm Beach Post, 10/11/92.
20. Personal Communication, Gayla Barwick, Tourism/Convention Director, St. Lucie Co. Tourist Development Council, Div. of Leisure Services, 12/92.
21. Personal Communication, Donald McLam, Recreation Superintendent, St. Lucie Co., Div. of Leisure Services, 12/92.
22. "Projections of Florida population by county: 1990 - 2020", Vol. 24, No. 2, Bull. No. 96, Bureau of Economic and Business Research, College of Business Administration, UF, 7/91.
23. "Florida Population: Census Summary 1990", Bureau of Economic and Business Research, College of Business Administration, Univ. of Florida, 4/91.
24. "Atlas of Florida", Institute of Science and Public Affairs, Florida State University, 12/92.

Table 2.1-75

VISITORS TO RECREATIONAL FACILITIES WITHIN 10 MILES OF THE ST. LUCIE PLANT				
Name	Sector	Estimated Parking Capacity	Note (1, 2)	Peak 1992 Population (3)
Fort Pierce Inlet State Park	NNW 5-10	350	1	1400
South Jetty Park	NNW 5-10	35	2	140
Porpoise Beach	NNW 5-10	10	2	40
South Beach Boardwalk	NNW 5-10	94	1	376
Gulfstream Beach	NNW 5-10	10	2	40
Surfside Park	NNW 5-10	100	2	400
Frederick Douglas Mem. Park	NNW 5-10	50	1	200
Middle Cove Beach	NNW 3-4	16	1	64
Blind Creek Beach	N 1-2	16	1	64
Walton Rocks Beach	ESE 0-1	150	1	600
Hermans Bay Beach	SE 1-2	16	1	64
Normandy Beach	SE 1-2	14	1	56
Waveland Beach	SSE 5-10	70	1	280
Jensen Beach	SSE 5-10	140	2	560
Bob Graham Beach	SSE 5-10	20	2	80
Alex's Beach	SSE 5-10	20	2	80
Tiger Shores	SSE 5-10	25	2	100
Savannas State Preserve	NW 3-5 WNW 3-4	64	1	256

1. Based on data contained in "The Comprehensive Plan for St. Lucie County, Florida. 1990.
2. Based on a field survey performed at the respective beach access.
3. Based on an occupancy of 4 persons per vehicle or campsite.

Table 2.1-76

MAJOR EMPLOYMENT FACILITIES ST. LUCIE AND MARTIN COUNTIES	
NAME	NUMBER EMPLOYEES
FT. PIERCE:	
Colonial Engineering, Inc.	100
Estech General Chemical Corp.	50
Flowers Baking Co. of Ft. Pierce, Inc.	400
Ft. Pierce/Port St. Lucie Tribune	150
GEM Electric of Florida, Inc.	50
Indian River Foods, Inc.	200
Jack Frost Laboratories	50
Pulsair, Inc.	60
S-2 Yachts	60
Stamm Equipment, Johnny	50
Tarmac Concrete Co., Inc.	50
Treasure Coast Truss Co., Inc.	55
Tropicana Products, Inc.	300
World of Plastics, Inc.	86
PORT ST. LUCIE:	
Superior Dental & Surgical Mfg. Co., Inc.	65
STUART:	
D R B Industries, Inc.	144
Grumman Aircraft Systems	1000
S. P. S. Distributors	150
Southeastern Printing Co., Inc.	143
The Stuart News	250
Turbo Combustor Technology, Inc.	375

SOURCE: Florida Manufacturers Register - 1991.

Table 2.1-77

ESTIMATED 1988 EMPLOYMENT WITHIN 10 MILES OF THE ST. LUCIE PLANT							
		EMPLOYMENT			ADJUSTED EMPLOYMENT		
TAZ	% INCLUDED	INDUSTRIAL	COMMERCIAL	SERVICE	INDUSTRIAL	COMMERCIAL	SERVICE
1	0.7	5	2	2	3.5	1.4	1.4
2	1	0	3	33	0	3	33
3	1	3	100	459	3	100	459
7	1	2	73	62	2	73	62
8	1	26	60	88	26	60	88
9	1	25	120	255	25	120	255
10	1	41	22	50	41	22	50
11	1	29	80	751	29	80	751
12	1	15	33	333	15	33	333
13	1	27	55	573	27	55	573
14	1	70	46	2802	70	46	2802
15	1	34	121	427	34	121	427
16	1	0	8	14	0	8	14
17	1	27	940	252	27	940	252
18	1	38	609	212	38	609	212
19	1	57	25	79	57	25	79
20	1	60	6	27	60	6	27
21	1	88	15	639	88	15	639
22	0.6	28	775	74	16.8	465	44.4
23	0.05	443	162	92	22.15	8.1	4.6
25	1	31	97	16	31	97	16
26	1	483	467	473	483	467	473
27	0.3	361	105	109	108.3	31.5	32.7
28	0.1	18	11	25	1.8	1.1	2.5
29	1	81	317	525	81	317	525
30	1	20	198	443	20	198	443
31	0.3	13	83	54	3.9	24.9	16.2
56	0.05	57	69	18	2.85	3.45	0.9
57	0.1	503	71	18	50.3	7.1	1.8
58	1	0	13	7	0	13	7
59	0.75	0	114	68	0	85.5	51

Table 2.1-77
Continued

ESTIMATED 1988 EMPLOYMENT
WITHIN 10 MILES OF THE ST. LUCIE PLANT

		EMPLOYMENT			ADJUSTED EMPLOYMENT		
TAZ	% INCLUDED	INDUSTRIAL	COMMERCIAL	SERVICE	INDUSTRIAL	COMMERCIAL	SERVICE
60	0.05	44	3	10	2.2	0.15	0.5
61	0.95	55	0	0	52.25	0	0
62	1	49	0	0	49	0	0
63	1	176	62	5	176	62	5
64	1	69	40	14	69	40	14
65	1	143	0	97	143	0	97
66	1	719	193	159	719	193	159
67	1	405	625	413	405	625	413
68	1	111	630	210	111	630	210
69	1	0	0	0	0	0	0
70	1	0	0	0	0	0	0
71	1	26	0	0	26	0	0
72	1	0	0	0	0	0	0
73	1	145	88	24	145	88	24
74	1	27	288	41	27	288	41
75	1	62	2	9	62	2	9
76	1	10	17	0	10	17	0
77	0.95	0	0	0	0	0	0
78	0.75	0	0	0	0	0	0
82	0.9	0	0	31	0	0	27.9
83	1	16	2	7	16	2	7
84	1	0	6	0	0	6	0
85	1	119	99	265	119	99	265
86	1	98	365	137	98	365	137
87	1	5	5	31	5	5	31
88	1	0	3	153	0	3	153
89	1	7	240	529	7	240	529
90	1	2	0	17	2	0	17
91	1	27	0	82	27	0	82
92	1	89	17	21	89	17	21
93	1	50	9	21	50	9	21

Amendment No. 8, (9/93)

Table 2.1-77
Continued

ESTIMATED 1988 EMPLOYMENT
WITHIN 10 MILES OF THE ST. LUCIE PLANT

TAZ	% INCLUDED	EMPLOYMENT INDUSTRIAL	EMPLOYMENT COMMERCIAL	EMPLOYMENT SERVICE	ADJUSTED EMPLOYMENT INDUSTRIAL	ADJUSTED EMPLOYMENT COMMERCIAL	ADJUSTED EMPLOYMENT SERVICE
94	0.75	9	49	0	6.75	36.75	0
98	0.4	70	20	44	28	8	17.6
99	1	242	66	296	242	66	296
100	1	11	11	25	11	11	25
101	1	12	0	0	12	0	0
102	1	0	8	34	0	8	34
103	1	194	283	151	194	283	151
104	1	0	0	0	0	0	0
105	1	14	42	73	14	42	73
106	1	0	0	66	0	0	66
107	1	5	4	0	5	4	0
108	1	9	0	180	9	0	180
109	1	46	322	780	46	322	780
110	1	95	638	243	95	638	243
111	1	122	61	589	122	61	589
112	0.75	44	18	263	33	13.5	197.25
113	0.4	31	0	12	12.4	0	4.8
116	0.3	17	0	20	5.1	0	6
119	1	0	52	124	0	52	124
121	1	31	80	15	31	80	15
TOTAL		5991	9148	14171	4642.3	8352.45	13740.55
SUM				29310			26735.3

1995 Projected employment following growth trend (BEBR):	35172	32082.36

Table 2.1-78

ST. LUCIE COUNTY SCHOOL ENROLLMENT YEAR: 1988				
SECTOR	0-5 MILES	5-10	10-20	GRAND TOTAL
SSW	500	3000	0	
SW	0	500	500	
WSW	0	1900	0	
W	0	0	0	
WNW	0	0	500	
NW	0	14150	3500	
NNW	0	0	1000	
TOTAL	500	19550	5500	25550

NOTE: These data were derived from the most recent update of the St. Lucie County corresponding data by TAZ.

Table 2.1-79

PUBLIC AND PRIVATE SCHOOLS WITHIN THE 30-MILE RADIUS OF THE ST. LUCIE PLANT ST. LUCIE AND MARTIN COUNTIES ONLY					
SECTOR	COUNTY	ANNULUS (MILES)	NAME	PHONE NO.	COMMENTS
S	ST. LUCIE	0-5	NONE		
	MARTIN	5-10	Environmental Studies Center	334-1262	
			Jensen Beach Elem.	334-1660	
		10-20	Alternative Education Center		
			J. D. Parker Elem.	288-2090	
			St. Joseph Elem. (Catholic)	287-6975	
			St. Michael's	283-1222	
			Stuart Middle	287-4111	
			Martin County High	287-0710	
			Palm City Elem.	288-3030	
			Challenger Exceptional Student Ed. Center	283-9919	
			Pinewood Elem.	287-0002	
			Port Salerno Elem.	288-2590	
			Crystal Lake Elem.	288-0900	New
			Hidden Oaks Middle	220-0034	New
			Martin County District Office	287-6400	
			IRCC's Chastain Center	283-6550	
			South Fork High	546-5847	
			Community Christian	288-7227	
			First Baptist Christian	287-5161	
			Redeemer Lutheran	286-0932	
			Martin County Montessori	221-9490	
			Spectrum Jr./Sr. High	220-3831	
SSW	ST. LUCIE	0-5	Calvary Academy Christian	335-8875	
			Village Green Elem.	340-4740	
		5-10	Mariposa Elem.	337-5900	
			Morningside Elem.	340-4733	
			Southport Middle	337-5900	
			Morningside Academy	335-5166	
	MARTIN	10-20	Murray Middle		

Table 2.1-79
Continued

PUBLIC AND PRIVATE SCHOOLS WITHIN THE 30-MILE RADIUS OF THE ST. LUCIE PLANT
ST. LUCIE AND MARTIN COUNTIES ONLY

SECTOR	COUNTY	ANNULUS (MILES)	NAME	PHONE NO.	COMMENTS
SSW	MARTIN	20-30	Hobe Sound Bible College	546-5534	
			Hobe Sound Elem.	546-4511	
			Indiantown Middle	597-2146	Indiantown
			Warfield Elem.	597-2551	Indiantown
			Hope Rural	597-2203	
SW	ST. LUCIE	0-5	Port St. Lucie High	340-4777	
		5-10	Floresta Elem.	340-4755	
			Windmill Point Elem.	340-4747	
WSW	ST. LUCIE	0-5	NONE		
		5-10	Northport Middle	340-4700	
			Port St. Lucie Elem.	340-4766	
			Port St. Lucie Baptist Child Development Center	879-0109	
			Bayshore Elem.	340-4720	
			Manatee Elem.	340-4745	
W	ST. LUCIE	0-5	NONE		
		5-10	Parkway Elem.	340-4800	
			Barry Univ.	468-6294	Treasure Coast Campus - St. Lucie West
			Indian River Community College	879-4199	St. Lucie West Campus
			Faith Baptist	461-3607	
WNW	ST. LUCIE	0-5	Lord's Heritage Christian		
		5-10	Sun Grove Montessori	464-5436	
			White City Elem.	468-5840	
			Detention Center		
			Forest Grove Middle	468-5885	
			J.E. Sampson Memorial Seventh Day Adventist	465-8386	
			Indian River Academy		Next to I-95
NW	ST. LUCIE	0-5	NONE		
		5-10	Ft. Pierce Central High	464-5888	
			St. Lucie Elem.	468-5800	
			Dale Cassens	468-5190	

Table 2.1-79
Continued

PUBLIC AND PRIVATE SCHOOLS WITHIN THE 30-MILE RADIUS OF THE ST. LUCIE PLANT ST. LUCIE AND MARTIN COUNTIES ONLY					
SECTOR	COUNTY	ANNULUS (MILES)	NAME	PHONE NO.	COMMENTS
NW	ST. LUCIE	5-10	Dan McCarty Middle	468-5700	
			Lawnwood Elem.	468-5740	
			Indian River Community College	930-4722	Main Campus
			Fairlawn Elem.	468-5345	
			Parochial		
			Ft. Pierce Elem.	468-5300	
			St. Andrews Episcopal	461-7689	
			Stallard Academy	461-9188	
			Palm Vista Christian	464-1591	
			St. Anastasia Elem. (Catholic)	461-2232	
			John Carroll High (Catholic)	464-5200	
			St. Lucie Co. School District Administrative Office	468-5000	
			Chester A. Moore Elem.	468-5315	
			Lincoln Park Academy	468-5474	
			Means Court Elem.		
			Garden City Elem.	468-5277	
			Frances K. Sweet Elem.	468-5330	
			Bible Baptist	461-6630	
		10-20	Ft. Pierce Westwood High	468-5400	
			Anglewood Center	468-5215	
			Woodlands Academy	468-5272	
			Westwood High		
			Lakewood Park Elem.	468-5830	
NNW	ST. LUCIE	0-5	NONE		
		5-10	NONE		
		10-20	St. Lucie Primary		

Table 2.1-80

WATERWAYS POPULATION WITHIN 10 MILES OF THE ST. LUCIE PLANT							
		Estimated Number of Passengers					
BRIDGE	LOCATION	1988	1995	2000	2010	2020	2030
Stuart Causeway	Intracoastal Waterway / Indian River at Sewall's Point	84	101	114	139	161	187
Jensen Beach Causeway	Intracoastal Waterway / Indian River at Jensen Beach	72	86	98	119	138	160
Roosevelt Bridge	St. Lucie River at Stuart	136	163	184	225	261	303
St. Lucie Bridge	St. Lucie River at Sewall's Point	92	110	125	152	177	205
North Bridge	Intracoastal Waterway / Indian River at Ft. Pierce	100	121	138	170	200	235
St. Lucie Canal	Stuart	106	127	144	175	203	236

SOURCE: Bridge Engineer, Florida Dept. of Transportation; Projections using BEBR trends.

Table 2.1-81

TRANSIENT POPULATION: AVERAGE DAILY PASSENGERS BY RAIL AND AIR WITHIN 50 MILES OF THE ST. LUCIE PLANT 1990 - 2030								
MODE	COUNTY	LOCATION	1990	1995	2000	2010	2020	2030
RAIL: Amtrak - Seaboard Coast Line		Sebring - West Palm Beach	292	338	377	450	517	593
AIR: West Palm Beach International Airport	Palm Beach	West Palm Beach	6,585	7,612	8,495	10,135	11,635	13,357

SOURCES:
1. Rail: See main text.
2. Air: Florida Statistical Abstract - 1991. Total passengers for 1990 divided by 365 for 1990 and projected to 2030 using BEBR trends.

Table 2.1-82

ST. LUCIE COUNTY ROADWAY INFORMATION										
ROADWAY NAME	COUNT STATION OR LOCATION	LANES (NO.)	PEAK SEASON ADT 1990	NO. PASSENGERS EACH DIRECTION						
				1992	1995	2000	2010	2020	2030
A1A	Indian River Co. Line	2	3,702	6,217	6,660	7,592	9,384	11,026	12,956
A1A	N of Pepper Park	2	4,093	6,874	7,363	8,394	10,375	12,191	14,324
A1A	N of Holiday Inn	2	5,524	9,277	9,937	11,329	14,002	16,453	19,332
A1A	E of North Bridge	2	10,292	17,284	18,515	21,107	26,088	30,653	36,018
A1A	E of South Bridge	2	17,509	29,405	31,498	35,908	44,382	52,148	61,274
A1A	Ft. Pierce City Limit	2	3,059	5,137	5,503	6,273	7,754	9,111	10,705
A1A	S of Power Plant	2	4,337	7,284	7,802	8,894	10,993	12,917	15,178
A1A	Martin Co. Line	2	15,953	26,791	28,699	32,716	40,438	47,514	55,829
Airoso Blvd.	N of Prima Vista Blvd.	2	6,294	10,570	11,323	12,908	15,954	18,746	22,026
Airoso Blvd.	S of Prima Vista Blvd.	2 - Div.	9,510	15,971	17,108	19,503	24,106	28,324	33,281
Airoso Blvd.	N of W. Virginia Dr.	2	9,668	16,236	17,392	19,827	24,506	28,795	33,834
Airoso Blvd.	N of Port St. Lucie Blvd.	2	9,000	15,115	16,191	18,457	22,813	26,805	31,496
Airport Entrance	N of St. Lucie Blvd.	2	398	668	716	816	1,009	1,185	1,393
Angle Rd.	E of Kings Hwy.	2	4,233	7,109	7,615	8,681	10,730	12,607	14,814
Angle Rd.	NW of Orange Ave.	2	9,980	16,760	17,954	20,467	25,297	29,724	34,926
Ave. "A"	E of N. US-1	2	4,435	7,448	7,978	9,095	11,242	13,209	15,521
Ave. "A"	W of N. US-1	2	5,258	8,830	9,459	10,783	13,328	15,660	18,401
Bayshore Blvd.	N of Prima Vista Blvd.	2	5,011	8,415	9,015	10,277	12,702	14,925	17,536
Bayshore Blvd.	S of Prima Vista Blvd.	2	8,255	13,863	14,850	16,929	20,925	24,587	28,889
Bell Ave.	E of Sunrise Blvd.	2	4,592	7,712	8,261	9,417	11,640	13,677	16,070
Bell Ave.	W of Sunrise Blvd.	2	4,784	8,034	8,606	9,811	12,126	14,249	16,742
Citrus Ave.	E of S. US-1	2	11,567	19,426	20,808	23,722	29,320	34,451	40,480
Citrus Ave.	W of S. US-1	2 o/w	3,513	5,900	6,320	7,204	8,905	10,463	12,294
Delaware Ave.	W of US-1	3 o/w	4,899	8,227	8,813	10,047	12,418	14,591	17,145
Delaware Ave.	W of 6th St.	4	6,805	11,428	12,242	13,956	17,249	20,268	23,815
Delaware Ave.	W of S. 7th St.	4	10,970	18,423	19,734	22,497	27,807	32,673	38,391
Delaware Ave.	E of 13th St.	4	11,562	19,417	20,799	23,711	29,307	34,436	40,462
Delaware Ave.	W of 13th St.	4	12,600	21,160	22,667	25,840	31,938	37,528	44,095
Delaware Ave.	W of Okeechobee Rd.	4	4,052	6,805	7,289	8,310	10,271	12,068	14,180
Delaware Ave.	W of 25th St.	4	6,981	11,724	12,558	14,317	17,695	20,792	24,431
Edwards Rd.	W of US-1	2	8,850	14,863	15,921	18,150	22,433	26,359	30,971
Edwards Rd.	E of Oleander Ave.	2	9,556	16,048	17,191	19,597	24,222	28,461	33,442
Edwards Rd.	W of Oleander Ave.	2	12,357	20,752	22,230	25,342	31,322	36,804	43,245
Edwards Rd.	W of Sunrise Ave.	2	12,039	20,218	21,658	24,690	30,516	35,857	42,132

Table 2.1-82
Continued

ST. LUCIE COUNTY ROADWAY INFORMATION										
ROADWAY NAME	COUNT STATION OR LOCATION	LANES (NO.)	PEAK SEASON ADT 1990	NO. PASSENGERS EACH DIRECTION						
				1992	1995	2000	2010	2020	2030
Edwards Rd.	W of 25th St.	2	10,656	17,896	19,170	21,853	27,011	31,738	37,292
Edwards Rd.	E of McNeil Rd.	2	6,695	11,244	12,044	13,730	16,970	19,940	23,430
Emerson Rd.	Indian River Co. Line	2	5,054	8,488	9,092	10,365	12,811	15,053	17,687
Floresta Dr.	S of Prima Vista Blvd.	2	11,895	19,976	21,399	24,394	30,151	35,428	41,628
Floresta Dr.	N of W. Virginia Dr.	2	13,400	22,504	24,106	27,481	33,966	39,910	46,895
Floresta Dr.	N of Port St. Lucie Blvd.	2	13,791	23,161	24,809	28,283	34,957	41,075	48,263
Floresta Dr.	S of Port St. Lucie Blvd.	2	3,793	6,370	6,823	7,779	9,614	11,297	13,274
Gatlin Blvd.	E of I-95	2	9,167	15,395	16,491	18,800	23,236	27,303	32,081
Georgia Ave.	E of US-1	2	3,477	5,839	6,255	7,131	8,813	10,356	12,168
Georgia Ave.	E of Okeechobee Rd.	2	6,414	10,772	11,538	13,154	16,258	19,103	22,446
Gilson Rd.	Martin Co. Line	2	2,994	5,028	5,386	6,140	7,589	8,917	10,478
Glades Cut-Off Rd.	N of Midway Rd.	2	5,890	9,892	10,596	12,079	14,930	17,543	20,613
Glades Cut-Off Rd.	S of Midway Rd.	2	2,738	4,598	4,926	5,615	6,940	8,155	9,582
Hartman Rd.	N of Okeechobee Rd.	2	5,315	8,926	9,561	10,900	13,472	15,830	18,600
Indian River Dr.	S of A1A/South Bridge	2	7,554	12,686	13,589	15,492	19,148	22,499	26,436
Indian River Dr.	N of Orange Ave.	2	3,495	5,870	6,287	7,168	8,859	10,409	12,231
Indian River Dr.	N of Citrus Ave.	2	4,605	7,734	8,284	9,444	11,673	13,715	16,116
Indian River Dr.	S of Citrus Ave.	2	3,972	6,671	7,145	8,146	10,068	11,830	13,900
Indian River Dr.	N of Savannah Rd.	2	3,654	6,137	6,573	7,494	9,262	10,883	12,788
Indian River Dr.	N of Rio Vista Dr.	2	3,724	6,254	6,699	7,637	9,440	11,091	13,033
Indian River Dr.	S of Midway Rd.	2	2,912	4,890	5,239	5,972	7,381	8,673	10,191
Indian River Dr.	N of Walton Rd.	2	3,396	5,703	6,109	6,965	8,608	10,115	11,885
Indian River Dr.	S of Walton Rd.	2	8,191	13,756	14,735	16,798	20,762	24,396	28,665
Indian River Dr.	Martin Co. Line	2	6,882	11,558	12,380	14,114	17,444	20,497	24,084
Indrio Rd.	E of I-95	2	5,671	9,524	10,202	11,630	14,375	16,890	19,846
Indrio Rd.	W of Kings Hwy.	2	9,238	15,514	16,619	18,945	23,416	27,514	32,329
Indrio Rd.	E of Kings Hwy.	2	6,635	11,143	11,936	13,607	16,818	19,762	23,220
Indrio Rd.	W of N. US-1	2	5,905	9,917	10,623	12,110	14,968	17,587	20,665
Jenkins Rd.	S of Orange Ave.	2	3,032	5,092	5,454	6,218	7,685	9,030	10,611
Jenkins Rd.	N of Okeechobee Rd.	2	4,571	7,677	8,223	9,374	11,587	13,614	15,997
Juanita Ave.	W of US-1	2	3,333	5,597	5,996	6,835	8,448	9,927	11,664
Juanita Ave.	W of 25th St.	2	8,085	13,578	14,545	16,581	20,494	24,080	28,294
Keen Rd.	S of St. Lucie Blvd.	2	1,304	2,190	2,346	2,674	3,305	3,884	4,563
Keen Rd.	N of Angle Rd.	2	1,079	1,812	1,941	2,213	2,735	3,214	3,776

Table 2.1-82
Continued

ST. LUCIE COUNTY ROADWAY INFORMATION									
ROADWAY NAME	COUNT STATION OR LOCATION	LANES (NO.)	PEAK SEASON ADT 1990	NO. PASSENGERS EACH DIRECTION					
				1992	1995	2000	2010	2020	2030
Kings Hwy.	SW of N. US-1	2	10,060	16,895	18,097	20,631	25,500	29,963	35,206
Kings Hwy.	S of Indrio Rd.	2	14,030	23,562	25,239	28,773	35,563	41,787	49,099
Kings Hwy.	N of Orange Ave.	2	11,558	19,411	20,792	23,703	29,297	34,424	40,448
Kings Hwy.	S of Orange Ave.	2	7,946	13,345	14,294	16,296	20,141	23,666	27,808
Lennard Rd.	S of Walton Rd.	2	4,224	7,094	7,599	8,663	10,707	12,581	14,782
Lennard Rd.	N of Mariposa Ave.	2	8,971	15,066	16,138	18,398	22,740	26,719	31,395
Lyngate Dr.	E of Midport Rd.	2	5,952	9,996	10,707	12,206	15,087	17,727	20,830
Midport Rd.	W of S. US-1	2 - Div.	10,502	17,637	18,893	21,538	26,620	31,279	36,753
Midport Rd.	N of Port St. Lucie Blvd.	2 - Div.	16,251	27,292	29,235	33,328	41,193	48,402	56,872
Morningside Blvd.	N of Port St. Lucie Blvd.	2	3,116	5,233	5,606	6,390	7,898	9,281	10,905
Morningside Blvd.	S of Port St. Lucie Blvd.	2	3,327	5,587	5,985	6,823	8,433	9,909	11,643
Midway Rd.	E of Weatherbee Rd.	2	3,995	6,709	7,187	8,193	10,126	11,899	13,981
Midway Rd.	W of Weatherbee Rd.	2	4,054	6,808	7,293	8,314	10,276	12,074	14,187
Midway Rd.	E of S. US-1	2	8,773	14,733	15,782	17,992	22,238	26,129	30,702
Midway Rd.	W of S. US-1	2	13,567	22,784	24,406	27,823	34,390	40,408	47,479
Midway Rd.	W of Oleander Ave.	2	14,557	24,447	26,187	29,854	36,899	43,356	50,944
Midway Rd.	E of S. 25th St.	2	15,422	25,900	27,743	31,627	39,092	45,933	53,971
Midway Rd.	W of S. 25th St.	2	10,684	17,943	19,220	21,911	27,082	31,821	37,390
Midway Rd.	W of Selvitz Rd.	2	8,608	14,456	15,485	17,653	21,819	25,638	30,125
Midway Rd.	E of Glades Cut-off Rd.	2	9,941	16,695	17,883	20,387	25,198	29,608	34,790
Midway Rd.	E of I-95	2	8,210	13,788	14,769	16,837	20,811	24,453	28,732
Okeechobee Rd.	SW of Delaware Ave.	4	11,661	19,583	20,978	23,914	29,558	34,731	40,809
Okeechobee Rd.	E of S. 25th St.	4	16,818	28,244	30,255	34,490	42,630	50,090	58,856
Okeechobee Rd.	W of S. 25th St.	4	18,452	30,988	33,194	37,841	46,772	54,957	64,575
Okeechobee Rd.	W of S. 33rd St.	4	16,044	26,944	28,862	32,903	40,668	47,785	56,148
Okeechobee Rd.	E of Hartman Rd.	4	15,189	25,508	27,324	31,150	38,501	45,239	53,155
Okeechobee Rd.	E of McNeil Rd.	4	20,774	34,888	37,371	42,603	52,658	61,873	72,701
Okeechobee Rd.	E of I-95	4	23,834	40,027	42,876	48,879	60,414	70,987	83,409
Okeechobee Rd.	W of I-95	4	30,729	51,606	55,280	63,019	77,892	91,523	107,539
Okeechobee Rd.	W of Turnpike	2	5,195	8,724	9,346	10,654	13,168	15,473	18,180
Okeechobee Rd.	W of Header Canal Rd.	2	3,649	6,128	6,564	7,483	9,249	10,868	12,770
Old Dixie Hwy.	E of N. US-1	2	7,165	12,033	12,889	14,694	18,162	21,340	25,075
Old Dixie Hwy.	S. of Taylor Creek	2	5,286	8,877	9,509	10,841	13,399	15,744	18,499
Old Dixie Hwy.	N of North A1A	2	2,707	4,546	4,870	5,552	6,862	8,062	9,473

T[illegible] 2.1-82
Continued

ST. LUCIE COUNTY ROADWAY INFORMATION									
ROADWAY NAME	COUNT STATION OR LOCATION	LANES (NO.)	PEAK SEASON ADT 1990	NO. PASSENGERS EACH DIRECTION					
				1992	1995	2000	2010	2020	2030
Old Dixie Hwy.	St. Lucie/Indian River Co. Line	2	1,391	2,336	2,502	2,853	3,526	4,143	4,868
Oleander Ave.	S of Sunrise Blvd.	2	5,522	9,274	9,934	11,325	13,997	16,447	19,325
Oleander Ave.	N of Virginia Ave.	2	6,847	11,499	12,317	14,042	17,356	20,393	23,962
Oleander Ave.	S of Virginia Ave.	2	10,056	16,888	18,090	20,623	25,490	29,951	35,192
Oleander Ave.	N of Edwards Rd.	2	14,164	23,787	25,480	29,048	35,903	42,186	49,568
Oleander Ave.	S of Edwards Rd.	2	14,115	23,705	25,392	28,947	35,779	42,040	49,397
Oleander Ave.	N of Midway Rd.	2	6,370	10,698	11,459	13,064	16,147	18,972	22,292
Oleander Ave.	S of Midway Rd.	2	5,613	9,426	10,098	11,511	14,228	16,718	19,643
Orange Ave.	E of Header Canal Rd.	2	5,286	8,877	9,509	10,841	13,399	15,744	18,499
Orange Ave.	W of Kings Hwy.	2	9,306	15,628	16,741	19,085	23,589	27,717	32,567
Orange Ave.	W of I-95	2	15,058	25,288	27,089	30,881	38,169	44,848	52,697
Orange Ave.	E of I-95	2	12,962	21,768	23,318	26,583	32,856	38,606	45,362
Orange Ave.	E of Jenkins Rd.	2	12,446	20,902	22,390	25,524	31,548	37,069	43,556
Orange Ave.	W of Angle Rd.	2	11,677	19,610	21,006	23,947	29,599	34,779	40,865
Orange Ave.	E of Angle Rd.	5	16,430	27,593	29,557	33,695	41,647	48,935	57,498
Orange Ave.	E of 25th St.	5	16,171	27,158	29,091	33,164	40,990	48,163	56,592
Orange Ave.	W of 7th St.	4	10,195	17,121	18,340	20,908	25,842	30,365	35,678
Orange Ave.	W of US-1	2 o/w	8,402	14,110	15,115	17,231	21,297	25,024	29,404
Orange Ave.	E of US-1	4	7,261	12,194	13,062	14,891	18,405	21,626	25,411
Port St. Lucie Blvd.	W of S. US-1	5	25,593	42,981	46,041	52,486	64,873	76,226	89,565
Port St. Lucie Blvd.	W of Morningside Blvd.	5	19,747	33,163	35,524	40,497	50,055	58,814	69,107
Port St. Lucie Blvd.	W of Midport Rd.	2	31,763	53,343	57,140	65,140	80,513	94,602	111,158
Port St. Lucie Blvd.	W of Floresta Dr.	2	24,465	41,087	44,011	50,173	62,014	72,866	85,618
Port St. Lucie Blvd.	E of FL Turnpike	2	19,290	32,396	34,702	39,560	48,896	57,453	67,507
Port St. Lucie Blvd.	W of FL Turnpike	2	24,397	40,972	43,889	50,033	61,841	72,664	85,380
Prima Vista Blvd.	W of S. US-1	2	21,744	36,517	39,116	44,593	55,117	64,762	76,095
Prima Vista Blvd.	W of Rio Mar Dr.	2	25,082	42,123	45,121	51,438	63,578	74,704	87,777
Prima Vista Blvd.	W of Floresta Dr.	2	14,065	23,621	25,302	28,845	35,652	41,891	49,222
Prima Vista Blvd.	W of Airoso Dr.	2	13,154	22,091	23,663	26,976	33,343	39,178	46,034
Prima Vista Blvd.	E of Bayshore Blvd.	2	5,129	8,614	9,227	10,519	13,001	15,276	17,949
Range Line Rd.	N of Martin Co. Line	2	1,644	2,761	2,957	3,372	4,167	4,896	5,753
Rio Mar Dr.	N of Prima Vista Blvd.	2	10,086	16,938	18,144	20,684	25,566	30,040	35,297
Savage Blvd.	W of Port St. Lucie Blvd.	2	8,908	14,960	16,025	18,269	22,580	26,531	31,174
Savannah Rd.	W of Indian River Dr.	2	1,445	2,427	2,599	2,963	3,663	4,304	5,057

Table [illegible]-82
Continued

ST. LUCIE COUNTY ROADWAY INFORMATION									
ROADWAY NAME	COUNT STATION OR LOCATION	LANES (NO.)	PEAK SEASON ADT 1990	NO. PASSENGERS EACH DIRECTION					
				1992	1995	2000	2010	2020	2030
Seaway Dr.	N of Binney Dr.	2	4,691	7,878	8,439	9,620	11,891	13,972	16,417
Seaway Dr.	S of Binney Dr.	2	9,176	15,410	16,507	18,818	23,259	27,330	32,112
Seaway Dr.	Causeway	2	12,953	21,753	23,302	26,564	32,833	38,579	45,330
Seaway Dr.	Bridge	4		0	0	0	0	0	0
Selvitz Rd.	S of Edwards Rd.	2	6,946	11,665	12,496	14,245	17,607	20,688	24,308
Selvitz Rd.	N of Midway Rd.	2	2,681	4,502	4,823	5,498	6,796	7,985	9,382
St. James Dr.	N of Airoso Blvd.	2	8,636	14,503	15,536	17,711	21,890	25,721	30,223
St. Lucie Blvd.	E of Kings Hwy.	2	4,495	7,549	8,086	9,218	11,394	13,388	15,731
St. Lucie Blvd.	W of Keen Rd.	2	4,934	8,286	8,876	10,119	12,507	14,695	17,267
St. Lucie Blvd.	E of Keen Rd.	2	5,182	8,703	9,322	10,627	13,135	15,434	18,135
St. Lucie Blvd.	W of N. 25th St.	2	11,624	19,521	20,911	23,839	29,464	34,621	40,679
St. Lucie Blvd.	W of N. US-1	2	8,363	14,045	15,045	17,151	21,198	24,908	29,267
St. Lucie West Blvd.	E of I-95	4 - Div.	6,472	10,869	11,643	13,273	16,405	19,276	22,649
Sunrise Blvd.	SW of S. US-1	4 - Div.	4,586	7,702	8,250	9,405	11,625	13,659	16,049
Sunrise Blvd.	N of Virginia Ave.	2	5,146	8,642	9,257	10,553	13,044	15,327	18,009
Sunrise Blvd.	S of Virginia Ave.	2	7,356	12,354	13,233	15,086	18,646	21,909	25,743
Sunrise Blvd.	S of Edwards Rd.	2	5,182	8,703	9,322	10,627	13,135	15,434	18,135
Sunrise Blvd.	N of Bell Ave.	2	4,792	8,048	8,621	9,827	12,147	14,272	16,770
Sunrise Blvd.	S of Bell Ave.	2	3,861	6,484	6,946	7,918	9,787	11,500	13,512
Sunrise Blvd.	N of Midway Rd.	2	2,884	4,843	5,188	5,915	7,310	8,590	10,093
Sunset Blvd.	S of Midway Rd.	2	3,656	6,140	6,577	7,498	9,267	10,889	12,795
Tiffany Dr.	E of S. US-1	2	13,236	22,229	23,811	27,144	33,551	39,422	46,321
Virginia Ave.	W of S. US-1	2	23,177	38,923	41,694	47,531	58,749	69,030	81,110
Virginia Ave.	E of Sunrise Blvd.	2	23,745	39,877	42,716	48,696	60,189	70,722	83,098
Virginia Ave.	E of S. 25th St.	2	19,731	33,136	35,495	40,464	50,014	58,766	69,051
Virginia Ave.	W of S. 25th St.	2	15,276	25,655	27,481	31,328	38,721	45,498	53,460
Virginia Ave.	E of S. 35th St.	2	17,431	29,274	31,357	35,748	44,184	51,916	61,001
Virginia Ave.	E of Okeechobee Rd.	2	14,082	23,649	25,333	28,879	35,695	41,942	49,281
Walton Rd.	E of S. US-1	2	12,756	21,422	22,947	26,160	32,334	37,992	44,641
Weatherbee Rd.	W of Midway Rd.	2	2,312	3,883	4,159	4,741	5,860	6,886	8,091
Westmoreland Blvd.	S of Port St. Lucie Blvd.	2 - Div.	10,179	17,095	18,312	20,875	25,802	30,317	35,622
Westmoreland Blvd.	N of Martin Co. Line	2	8,227	13,816	14,800	16,872	20,854	24,503	28,791
5th St.	N of Delaware Ave.	2	2,369	3,978	4,262	4,858	6,005	7,056	8,291
7th St.	N of Delaware Ave.	4	9,858	16,556	17,734	20,217	24,988	29,361	34,499

Table 2.1-82
Continued

ST. LUCIE COUNTY ROADWAY INFORMATION									
ROADWAY NAME	COUNT STATION OR LOCATION	LANES (NO.)	PEAK SEASON ADT 1990	NO. PASSENGERS EACH DIRECTION					
				1992	1995	2000	2010	2020	2030
13th St.	N of Virginia Ave.	2	8,804	14,785	15,838	18,055	22,316	26,222	30,810
13th St.	S of Delaware Ave.	2	6,505	10,924	11,702	13,340	16,489	19,374	22,765
13th St.	N of Delaware Ave.	2	6,110	10,261	10,992	12,530	15,488	18,198	21,383
17th St.	N of Delaware Ave.	2	6,980	11,722	12,557	14,315	17,693	20,789	24,427
17th St.	N of Okeechobee Rd.	2	10,580	17,768	19,033	21,697	26,818	31,511	37,026
North 25th St.	S of St. Lucie Blvd.	2	6777	11,381	12,191	13,898	17,178	20,184	23,717
North 25th St.	S of Belcher Canal	2	15623	26,237	28,105	32,040	39,601	46,531	54,674
North 25th St.	N of Orange Ave.	5	15455	25,955	27,803	31,695	39,175	46,031	54,086
South 25th St.	S of Orange Ave.	5	18219	30,597	32,775	37,364	46,181	54,263	63,759
South 25th St.	S of Delaware Ave.	5	24333	40,865	43,774	49,902	61,679	72,473	85,156
South 25th St.	N of Okeechobee Rd.	5	24436	41,038	43,959	50,113	61,940	72,780	85,516
South 25th St.	S of Okeechobee Rd.	5	24226	40,685	43,581	49,683	61,408	72,154	84,781
South 25th St.	N of Virginia Ave.	5	20006	33,598	35,990	41,028	50,711	59,585	70,013
South 25th St.	S of Virginia Ave.	2	16626	27,922	29,909	34,097	42,143	49,519	58,184
South 25th St.	N of Edwards Rd.	2	18210	30,582	32,759	37,345	46,159	54,236	63,728
South 25th St.	N of Midway Rd.	2	10771	18,089	19,376	22,089	27,302	32,080	37,694
South 25th St.	S of Midway Rd.	2	10413	17,488	18,732	21,355	26,395	31,014	36,441
North US-1	St. Lucie/Indian River Co. Line	4 - Div.	21532	36,161	38,735	44,158	54,579	64,131	75,353
North US-1	S. of Indrio Rd.	4 - Div.	19000	31,909	34,180	38,965	48,161	56,589	66,492
North US-1	S. of St. Lucie Blvd.	4 - Div.	20683	34,735	37,208	42,417	52,427	61,602	72,382
North US-1	S of Taylor Creek Bridge	5	25420	42,690	45,729	52,131	64,434	75,710	88,960
North US-1	S of South A1A	5	31313	52,587	56,331	64,217	79,372	93,262	109,583
North US-1	S of Ave. "A"	5	29923	50,253	53,830	61,366	75,849	89,122	104,718
South US-1	S of Orange Ave.	5	30291	50,871	54,492	62,121	76,781	90,218	106,006
South US-1	S of Citrus Ave.	5	32526	54,624	58,513	66,704	82,447	96,875	113,828
South US-1	S of Delaware Ave.	5	37721	63,349	67,858	77,358	95,615	112,348	132,008
South US-1	S of Sunrise Blvd.	5	28546	47,940	51,353	58,542	72,358	85,021	99,900
South US-1	N of Virginia Ave.	5	27472	46,136	49,421	56,340	69,636	81,822	96,141
South US-1	S of Virginia Ave.	5	45350	76,161	81,582	93,004	114,953	135,070	158,707
South US-1	S of Edwards Rd.	5	29580	49,677	53,213	60,663	74,979	88,101	103,518
South US-1	N of Midway Rd.	5	32785	55,059	58,979	67,236	83,103	97,646	114,734
South US-1	S of Midway Rd.	5	29974	50,338	53,922	61,471	75,978	89,274	104,897
South US-1	S of Easy St.	5	35033	58,834	63,023	71,846	88,801	104,342	122,601
South US-1	S of Prima Vista Blvd.	4 - Div.	48204	80,954	86,717	98,857	122,187	143,570	168,695

Table 2.1-82
Continued

ST. LUCIE COUNTY ROADWAY INFORMATION									
ROADWAY NAME	COUNT STATION OR LOCATION	LANES (NO.)	PEAK SEASON ADT 1990	NO. PASSENGERS EACH DIRECTION					
				1992	1995	2000	2010	2020	2030
South US-1	N of Walton Rd.	4 - Div.	46194	77,578	83,101	94,735	117,092	137,583	161,660
South US-1	N of Port St. Lucie Blvd.	4 - Div.	31410	52,750	56,505	64,416	79,618	93,551	109,922
South US-1	S of Port St. Lucie Blvd.	6 - Div.	49445	83,038	88,949	101,402	125,333	147,266	173,038
I-95	N of Orange Ave.	4 - E.	29443	82,411	88,277	100,636	124,386	146,154	171,731
I-95	N of Okeechobee Rd.	4 - E.	28867	80,799	86,550	98,668	121,953	143,295	168,371
I-95	N of Midway Rd.	6 - E.	37579	105,184	112,671	128,445	158,758	186,541	219,186
I-95	N of St. Lucie West Blvd.	6 - E.	34994	97,948	104,921	119,610	147,838	173,709	204,108
I-95	N of Gatlin Blvd.	6 - E.	26851	75,156	80,506	91,777	113,436	133,288	156,613
I-95	S of Gatlin Blvd.	6 - E.	36163	101,220	108,426	123,605	152,776	179,512	210,927
FL. Turnpike	N of Okeechobee Blvd.	4 - E.	16999	47,580	50,967	58,103	71,815	84,383	99,149
FL. Turnpike	S of Okeechobee Blvd.	4 - E.	17683	49,495	53,018	60,441	74,705	87,778	103,139
FL. Turnpike	S of Port St. Lucie Blvd.	4 - E.	21168	59,249	63,467	72,352	89,427	105,077	123,466

Amendment No. 8, (9/93)

MARTIN COUNTY ROADWAY INFORMATION										
ROADWAY NAME	COUNT STATION OR LOCATION	LANES (NO.)	LENGTH (MILES)	CURRENT AADT	NO. PASSENGERS EACH DIRECTION					
					1992	1995	2000	2010	2020	2030
Mlk. Dr.	Farm Rd. to SR 710	2	0.70	1,872	2,808	3,111	3,516	4,289	4,975	5,772
Baker Rd.	US 1 to Savanna	2	0.77	2,564	3,846	4,261	4,815	5,875	6,815	7,905
Britt Rd.	SR 5 to Pine Lake Dr.	2	0.50	3,377	5,066	5,613	6,342	7,737	8,975	10,412
Commerce	Monroe St. to Salerno Rd.	2	0.80	4,577	6,866	7,607	8,596	10,487	12,165	14,111
Commerce	Indian St. to Monroe St.	2	1.20	4,577	6,866	7,607	8,596	10,487	12,165	14,111
Country Club	Little Club Way to Isla.	2	0.70	2,533	3,800	4,210	4,757	5,804	6,732	7,809
County Line	SR 5 to Little Club Way	2	2.80	3,580	5,370	5,950	6,723	8,203	9,515	11,037
Cove Rd.	SR 76 to SR 5	2	3.20	1,287	1,931	2,139	2,417	2,949	3,421	3,968
Cove Rd.	SR 5 to CR A1A	2	1.10	7,627	11,441	12,676	14,324	17,475	20,271	23,515
Cove Rd.	CR A1A to End	2	1.50	4,603	6,905	7,650	8,645	10,547	12,234	14,191
Crossrip St.	Gomez Ave. to CR A1A	2	0.20	3,448	5,172	5,731	6,476	7,900	9,164	10,630
CR 609	SR 710 to CR 714	2	9.00	2,095	3,143	3,482	3,935	4,800	5,568	6,459
CR 609	CR 714 to St. L. Co.	2	2.50	1,925	2,888	3,199	3,615	4,411	5,116	5,935
CR 707	SR 732 to NCL	2	1.00	6,050	9,075	10,055	11,362	13,862	16,080	18,653
CR707A	US-1 to G. River Pkwy.	4 - Div.	1.10	15,847	23,771	26,338	29,762	36,309	42,119	48,858
CR707A	G. River to Savanna	2	0.90	13,990	20,985	23,251	26,274	32,054	37,183	43,132
CR707A	Savanna to Skyline	2	0.30	13,990	20,985	23,251	26,274	32,054	37,183	43,132
CR707A	Skyline to Palmetto	2	0.10	14,480	21,720	24,066	27,194	33,177	38,485	44,643
CR707A	Palmetto to I.R. Dr.	4- Und.	0.10	14,480	21,720	24,066	27,194	33,177	38,485	44,643
CR 708	SR 76 to CR 711	2	2.20	1,668	2,502	2,772	3,133	3,822	4,433	5,143
CR 708	CR 711 to TPK	2	1.60	1,848	2,772	3,071	3,471	4,234	4,912	5,698
CR 708	TPK to Powerline	2	4.00	4,369	6,554	7,261	8,205	10,010	11,612	13,470
CR 708	Powerline to US-1	2	2.00	8,432	12,648	14,014	15,836	19,320	22,411	25,997
CR 708	US-1 to CR A1A	2	0.30	8,432	12,648	14,014	15,836	19,320	22,411	25,997
CR 708	CR A1A to Gomez	2	0.10	8,432	12,648	14,014	15,836	19,320	22,411	25,997
CR 708	Gomez to Beach	2	0.60	4,919	7,379	8,175	9,238	11,271	13,074	15,166
CR 711	P. B. Co. Line to CR 708	2	7.00	2,394	3,591	3,979	4,496	5,485	6,363	7,381
CR 711	CR 708 to MCHS	2	1.20	3,505	5,258	5,825	6,583	8,031	9,316	10,806
CR 711	MCHS to SR 76	2	1.80	4,950	7,425	8,227	9,296	11,342	13,156	15,261
CR 711	SR 76 to St. Lucie Falls	2	0.30	4,050	6,075	6,731	7,606	9,279	10,764	12,486
CR 711	St. Lucie Falls to Citr.	2	1.70	4,050	6,075	6,731	7,606	9,279	10,764	12,486
CR 713	SR 714 to CR 714	2	0.70	9,922	14,883	16,490	18,634	22,734	26,371	30,590
CR 713	CR 714 to I-95	2	2.60	5,000	7,500	8,310	9,390	11,456	13,289	15,415
CR 714	SR 710 to Fox Brown	2	7.00	808	1,212	1,343	1,517	1,851	2,148	2,491

e 2.1-83
Continued

MARTIN COUNTY ROADWAY INFORMATION										
ROADWAY NAME	COUNT STATION OR LOCATION	LANES (NO.)	LENGTH (MILES)	CURRENT AADT	NO. PASSENGERS EACH DIRECTION					
					1992	1995	2000	2010	2020	2030
CR 714	Fox Brown to CR 609	2	5.00	808	1,212	1,343	1,517	1,851	2,148	2,491
CR 714	CR 609 to I-95	2	5.20	1,966	2,949	3,267	3,692	4,505	5,225	6,061
CR 714	Turnpike to High Meadow	2	0.10	12,500	18,750	20,775	23,476	28,640	33,223	38,539
CR 714	High Meadows to Berry	2	0.50	5,800	8,700	9,640	10,893	13,289	15,415	17,882
CR 714	Berry to Danforth	2	0.30	5,800	8,700	9,640	10,893	13,289	15,415	17,882
CR 714	Danforth to Mapp Rd.	2	0.50	5,800	8,700	9,640	10,893	13,289	15,415	17,882
CR 723	SR 707 to 24th	2	0.80	13,219	19,829	21,970	24,826	30,288	35,134	40,755
CR 723	24th to J.B. Blvd.	2	1.20	13,219	19,829	21,970	24,826	30,288	35,134	40,755
CR 726	North of SR 710	2	5.40	1,925	2,888	3,199	3,615	4,411	5,116	5,935
CR 726	S of 76A	2	5.40	1,850	2,775	3,075	3,474	4,239	4,917	5,704
CR 76A	CR 711 to SR 714	2	5.00	3,275	4,913	5,443	6,151	7,504	8,704	10,097
CR A1A	SR 5 to CR 708	2	1.10	2,384	3,576	3,962	4,477	5,462	6,336	7,350
CR A1A	CR 708 to Osprey St.	2	3.40	2,271	3,407	3,774	4,265	5,203	6,036	7,002
CR A1A	Osprey St. to Heritage	2	1.00	3,810	5,715	6,332	7,155	8,730	10,126	11,747
CR A1A	Heritage to Cove Rd.	2	1.90	5,326	7,989	8,852	10,003	12,203	14,156	16,421
CR A1A	Cove Rd. to Salerno	2	0.20	8,611	12,917	14,311	16,172	19,730	22,887	26,548
CR A1A	Salerno to St. Lucie	2	0.20	13,349	20,024	22,186	25,070	30,586	35,479	41,156
CR A1A	St. Lucie to Jefferson	2	0.80	15,705	23,558	26,102	29,495	35,984	41,741	48,420
CR A1A	Jefferson to Indian	2	0.80	15,705	23,558	26,102	29,495	35,984	41,741	48,420
CR A1A	Indian to Airport	2	0.80	12,707	19,061	21,119	23,865	29,115	33,773	39,177
CR A1A	Airport to Monterey	2	0.50	12,707	19,061	21,119	23,865	29,115	33,773	39,177
CR A1A	Monterey to Colorado	2	1.50	5,459	8,189	9,073	10,252	12,508	14,509	16,831
Farm Rd.	SR 710 to 170th Dr.	2	1.40	3,000	4,500	4,986	5,634	6,874	7,973	9,249
Fork Rd.	Pine Lake Dr. to SR 5	2	0.60	2,490	3,735	4,138	4,676	5,705	6,618	7,677
Fox Brown Rd.	CR 714 to SR 710	2	7.90	500	750	831	939	1,146	1,329	1,542
Gomez Ave.	Crossrip St. to CR 708	2	2.50	7,500	11,250	12,465	14,085	17,184	19,934	23,123
Gomez Ave.	Osprey St. to Crossrip St.	2	0.50	7,500	11,250	12,465	14,085	17,184	19,934	23,123
High Meadow	SR 714 to Murphy Rd.	2	1.00	7,053	10,580	11,722	13,246	16,160	18,746	21,745
Horseshoe P.	CR A1A to End (Inc Anch.)	2	1.70	4,775	7,163	7,936	8,968	10,941	12,691	14,722
Indian River	Palmer to SR 707	2	1.95	6,648	9,972	11,049	12,485	15,232	17,669	20,496
Island Way	Country Club Way to JU	2	0.70	1,118	1,677	1,858	2,100	2,562	2,971	3,447
Indian St.	SR 76 to Willoughby Blvd.	2	0.40	15,220	22,830	25,296	28,584	34,873	40,452	46,925
Indian St.	Willoughby to US-1	2	0.90	15,220	22,830	25,296	28,584	34,873	40,452	46,925
Indian St.	US-1 to Commerce	4 - Div.	0.20	16,378	24,567	27,220	30,759	37,526	43,530	50,495

Table 2.1-83
Continued

MARTIN COUNTY ROADWAY INFORMATION										
ROADWAY NAME	COUNT STATION OR LOCATION	LANES (NO.)	LENGTH (MILES)	CURRENT AADT	NO. PASSENGERS EACH DIRECTION					
					1992	1995	2000	2010	2020	2030
Indian St.	Commerce to CR A1A	4 - Div.	0.10	16,378	24,567	27,220	30,759	37,526	43,530	50,495
Indian St.	CR A1A to St. Lucie Blvd.	2	0.80	8,737	13,106	14,521	16,409	20,019	23,221	26,937
Jack James	SR 76 to End	2	1.00	250	375	416	470	573	664	771
Jefferson St.	CR A1A to St. Lucie Blvd.	2	1.10	1,522	2,283	2,530	2,858	3,487	4,045	4,692
Little Club Way	County Line Rd. to Country Club	2	0.60	2,203	3,305	3,661	4,137	5,048	5,855	6,792
Locks Rd.	SR 76 to End	2		3,041	4,562	5,054	5,711	6,968	8,082	9,376
MacArthur Blvd.	CR A1A to Sailfish Pt.	2	2.30	4,935	7,403	8,202	9,268	11,307	13,116	15,215
Mapp Rd.	CR 714 to S. End	2	2.50	525	788	873	986	1,203	1,395	1,619
Mapp Rd.	CR 714 to SR 714	2	0.60		0	0	0	0	0	0
Mapp Rd.	SR 714 to Matheson Ave.	2	1.20	3,341	5,012	5,553	6,275	7,655	8,880	10,301
Mapp Rd.	Matheson Ave. to N. End	2	1.50	4,286	6,429	7,123	8,049	9,820	11,391	13,214
Matheson Ave.	SR 714 to Mapp Rd.	2	0.50	3,623	5,435	6,021	6,804	8,301	9,629	11,170
Monroe St.	SR 5 to Commerce St.	2	0.40	5,271	7,907	8,760	9,899	12,077	14,009	16,251
Monterey Rd.	SR 76 to Willoughby	4 - Div.	1.00	19,620	29,430	32,608	36,848	44,954	52,147	60,490
Monterey Rd.	Willoughby to Monterey	4 - Div.	1.00	19,620	29,430	32,608	36,848	44,954	52,147	60,490
Monterey Rd.	Monterey Ext. to US-1	4 - Div.	0.20	14,468	21,702	24,046	27,172	33,150	38,453	44,606
Monterey Rd.	US-1 to CR A1A	4 - Div.	1.00	16,205	24,308	26,933	30,434	37,129	43,070	49,961
Monterey Rd.	CR A1A to Palm Beach Rd.	4 - Div.		17,400	26,100	28,919	32,678	39,867	46,246	53,646
Monterey Rd.	Palm Beach Rd. to SR A1A	2	1.20	11,379	17,069	18,912	21,370	26,072	30,243	35,082
Murphy Rd.	Mapp Rd. to High Meadows	2	1.00	3,082	4,623	5,122	5,788	7,062	8,191	9,502
Murphy Rd.	High Meadows to NCL	2	1.20	6,409	9,614	10,652	12,036	14,685	17,034	19,759
Osprey St.	SR 5 to SR A1A	2	0.60	2,925	4,388	4,861	5,493	6,702	7,774	9,018
Osprey St.	SR A1A to Gomez Ave.	2	0.20	1,204	1,806	2,001	2,261	2,759	3,200	3,712
Palm Beach Rd.	Monterey Rd. to SR A1A	2		9,302	13,953	15,460	17,470	21,313	24,723	28,679
Palm City Rd.	SR 714 to US-1	2	0.60	7,368	11,052	12,246	13,838	16,882	19,583	22,716
Pine Lake Dr.	Britt Rd. to Fork Rd.	2	1.30	1,144	1,716	1,901	2,149	2,621	3,041	3,527
Rivershore St.	SR 5 to Spruce Ridge	2		1,500	2,250	2,493	2,817	3,437	3,987	4,625
Salerno Rd.	SR 76 to Willoughby	2	1.40	11,912	17,868	19,798	22,371	27,293	31,660	36,726
Salerno Rd.	Willoughby to US-1	2	1.00	13,240	19,860	22,005	24,866	30,336	35,190	40,820
Salerno Rd.	US-1 to Commerce	2	0.60	13,384	20,076	22,244	25,136	30,666	35,572	41,264
Salerno Rd.	Commerce to CR A1A	2	0.10	13,384	20,076	22,244	25,136	30,666	35,572	41,264
Saint Lucie	CR A1A to Indian St.	2	3.00	1,410	2,115	2,343	2,648	3,231	3,748	4,347
Seabranch B.	SR 5 to Preserve Trace	4 - Div.	0.50	8,600	12,900	14,293	16,151	19,705	22,857	26,515
Sewalls Pt.	SR A1A to Palmer St.	2	2.20	8,600	12,900	14,293	16,151	19,705	22,857	26,515

Amendment No. 8, (9/93)

MARTIN COUNTY ROADWAY INFORMATION

ROADWAY NAME	COUNT STATION OR LOCATION	LANES (NO.)	LENGTH (MILES)	CURRENT AADT	NO. PASSENGERS EACH DIRECTION					
					1992	1995	2000	2010	2020	2030
Spruce Ridge	Rivershore St. to Pine	2		669	1,004	1,112	1,256	1,533	1,778	2,063
SR 5	Palm Beach Co. to CR A1A	4 - Div.	5.80	18,075	27,113	30,041	33,946	41,414	48,040	55,727
SR 5	CR A1A North to CR 708	4 - Div.	1.40	24,399	36,599	40,551	45,823	55,904	64,848	75,224
SR 5	CR 708 North to Osprey	4 - Div.	3.20	23,424	35,136	38,931	43,992	53,670	62,257	72,218
SR 5	Osprey St. North to Cove Rd.	4 - Div.	3.00	27,176	40,764	45,167	51,038	62,267	72,229	83,786
SR 5	Cove Rd. N to Salerno Rd.	4 - Div.	0.60	29,050	43,575	48,281	54,558	66,560	77,210	89,564
SR 5	Salerno Rd. N to Monroe	4 - Div.	1.10	28,010	42,015	46,553	52,604	64,177	74,446	86,357
SR 5	Monroe N to Indian	4 - Div.	1.20	32,231	48,347	53,568	60,532	73,849	85,665	99,371
SR 5	Indian St. to Monterey	4 - Div.	1.00	41,318	61,977	68,671	77,598	94,669	109,816	127,387
SR 5	Monterey Rd. to SR 5-A	4 - Div.	1.00	33,640	50,460	55,910	63,178	77,077	89,409	103,715
SR 5	SR 5-A North to SR 76	6 - Div.	0.80	38,018	57,027	63,186	71,400	87,108	101,045	117,213
SR 5	SR 76 North to Bridge	6 - Div.	1.20	49,784	74,676	82,741	93,497	114,067	132,317	153,488
SR 5	Roosevelt Bridge	4 - Div.	1.20	49,784	74,676	82,741	93,497	114,067	132,317	153,488
SR 5	Bridge to SR 707	4 - Div.	0.50	49,784	74,676	82,741	93,497	114,067	132,317	153,488
SR 5	SR 707 to Baker	6 - Div.	0.60	43,002	64,503	71,469	80,760	98,528	114,292	132,579
SR 5	Baker Rd. to Britt Rd.	6 - Div.	1.00	46,527	69,791	77,328	87,380	106,604	123,661	143,447
SR 5	Britt Rd. to J.B. Blvd.	6 - Div.	0.60	50,540	75,810	83,997	94,917	115,799	134,327	155,819
SR 5	J.B. Blvd. to Westmoreland	6 - Div.	0.90	45,320	67,980	75,322	85,114	103,839	120,453	139,725
SR 5	Westmoreland to Co. Line	6 - Div.	1.00	45,863	68,795	76,224	86,133	105,083	121,896	141,399
SR 15	SR 76 to SCL	2	1.80	2,971	4,457	4,938	5,580	6,807	7,896	9,160
SR 15	SR 76 to NCL	2	10.00	1,563	2,345	2,598	2,935	3,581	4,154	4,819
SR 76	SR 15 to SR 710	2	10.20	1,452	2,178	2,413	2,727	3,327	3,859	4,477
SR 76	SR 710 to CR 708	2	9.00	2,775	4,163	4,612	5,212	6,358	7,375	8,556
SR 76	CR 708 to CR 711	2	2.40	2,406	3,609	3,999	4,519	5,513	6,395	7,418
SR 76	CR 76A to I-95	2	1.60	9,650	14,475	16,038	18,123	22,110	25,648	29,752
SR 76	I-95 to Cove Rd.	2	0.50	20,358	30,537	33,835	38,234	46,645	54,108	62,765
SR 76	Cove Rd. to Salerno Rd.	2	0.50	20,892	31,338	34,723	39,236	47,868	55,527	64,412
SR 76	Salerno Rd. to Indian St.	2	2.30	18,840	28,260	31,312	35,383	43,167	50,074	58,085
SR 76	Indian St. to Monterey	6 - Div.	1.20	23,100	34,650	38,392	43,383	52,927	61,396	71,219
SR 76	Monterey Rd. to US-1	6 - Div.	1.00	25,287	37,931	42,027	47,491	57,938	67,209	77,962
SR 76	US-1 to CR A1A	6 - Div.	0.40	19,490	29,235	32,392	36,603	44,656	51,801	60,089
SR 707	SR 5 to SR 723	2	1.00	15,919	23,879	26,457	29,897	36,474	42,310	49,080
SR 707	SR 723 to Palmer	2	1.00	7,305	10,958	12,141	13,719	16,737	19,415	22,522
SR 707	Palmer to CR 707A	2	1.00	7,500	11,250	12,465	14,085	17,184	19,934	23,123

MARTIN COUNTY ROADWAY INFORMATION										
ROADWAY NAME	COUNT STATION OR LOCATION	LANES (NO.)	LENGTH (MILES)	CURRENT AADT	NO. PASSENGERS EACH DIRECTION					
					1992	1995	2000	2010	2020	2030
SR 707	CR 707A to SR 732	2	1.00	13,320	19,980	22,138	25,016	30,519	35,402	41,067
SR 710	SR 76 to SCL	2	5.20	6,413	9,620	10,658	12,044	14,694	17,045	19,772
SR 710	SR 76 to CR 726	2	0.50	8,775	13,163	14,584	16,480	20,106	23,322	27,054
SR 710	CR 726 to CR 609	2	1.50	8,775	13,163	14,584	16,480	20,106	23,322	27,054
SR 710	CR 609 to Fox Brown	2	2.40	8,449	12,674	14,042	15,868	19,359	22,456	26,049
SR 710	Fox Brown to NCL	2	11.00	5,187	7,781	8,621	9,741	11,885	13,786	15,992
SR 714	I-95 to CR 76A	2	4.00	6,708	10,062	11,149	12,598	15,370	17,829	20,681
SR 714	CR 76A to Turnpike	2	0.80	6,708	10,062	11,149	12,598	15,370	17,829	20,681
SR 714	Turnpike to High Meadows	4 - Div.	0.60	16,533	24,800	27,478	31,050	37,881	43,942	50,973
SR 714	High Meadows to Matheson	4 - Div.	1.60	16,309	24,464	27,106	30,629	37,368	43,347	50,282
SR 714	Matheson to Mapp Rd.	4 - Div.	8.00	20,198	30,297	33,569	37,933	46,278	53,683	62,272
SR 714	Mapp Rd. to SR 76	4 - Div.	1.20	33,271	49,907	55,296	62,485	76,232	88,429	102,577
SR 732	Jensen Beach Causeway	2	1.90	12,855	19,283	21,365	24,142	29,454	34,166	39,633
SR A1A	Flagler E to Palm Beach	2	1.00	17,461	26,192	29,020	32,793	40,007	46,408	53,834
SR A1A	Palm Beach Rd. to Monterey	4 - Div.	0.80	18,453	27,680	30,669	34,656	42,280	49,045	56,892
SR A1A	Monterey Rd. to St. Lucie	4 - Div.	0.70	19,016	28,524	31,605	35,713	43,570	50,541	58,628
SR A1A	St. Lucie to Sewalls Pt.	2	0.90	21,646	32,469	35,976	40,652	49,596	57,531	66,736
SR A1A	Sewalls Pt. to MacArthur	2	1.50	12,383	18,575	20,581	23,256	28,372	32,912	38,178
SR A1A	MacArthur Blvd. to SR 732	2	3.90	9,612	14,418	15,975	18,052	22,023	25,547	29,635
SR A1A	SR 732 to Co. Line	2	0.50	15,443	23,165	25,666	29,003	35,384	41,045	47,612

Table 2.1-84

1992 PEAK DAILY TOURISTS AND SEASONAL VISITORS WITHIN 10 MILES OF THE ST. LUCIE PLANT							
	DISTANCE (MILES)						
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-10	0-10
N	0	138	0	0	0	0	138
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	600	0	0	0	0	0	600
SE	0	521	0	0	0	0	521
SSE	0	0	0	319	4,013	9,586	13,918
S	0	0	0	16	139	3,312	3,467
SSW	0	0	4	379	359	3,585	4,328
SW	0	1	1	50	868	2,729	3,648
WSW	0	3	3	9	223	1,560	1,799
W	0	2	2	197	232	1,863	2,296
WNW	0	0	5	206	368	1,448	2,026
NW	0	0	0	84	135	8,075	8,294
NNW	0	0	0	64	0	5,613	5,677
Total by Annulus	600	664	14	1,324	6,338	37,771	46,711

Table 2.1-85

1995 PEAK DAILY TOURISTS AND SEASONAL VISITORS WITHIN 10 MILES OF THE ST. LUCIE PLANT							
	DISTANCE (MILES)						
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-10	0-10
N	0	144	0	0	0	0	144
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	628	0	0	0	0	0	628
SE	0	618	0	0	0	0	618
SSE	0	0	0	382	4,811	10,795	15,988
S	0	0	0	19	166	3,682	3,868
SSW	0	0	5	455	431	4,219	5,109
SW	0	1	1	60	1,042	3,275	4,378
WSW	0	4	4	11	268	1,871	2,157
W	0	2	2	236	278	2,232	2,750
WNW	0	0	6	247	442	1,737	2,432
NW	0	0	0	102	162	9,688	9,952
NNW	0	0	0	64	0	6,504	6,568
Total by Annulus	628	769	17	1,576	7,600	44,003	54,593

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Table 2.1-86

2000 PEAK DAILY TOURISTS AND SEASONAL VISITORS WITHIN 10 MILES OF THE ST. LUCIE PLANT							
	DISTANCE (MILES)						
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-10	0-10
N	0	150	0	0	0	0	150
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	654	0	0	0	0	0	654
SE	0	711	0	0	0	0	711
SSE	0	0	0	439	5,506	11,843	17,787
S	0	0	0	22	191	3,999	4,212
SSW	0	0	5	521	492	4,767	5,786
SW	0	1	1	68	1,191	3,746	5,007
WSW	0	5	4	12	306	2,141	2,468
W	0	2	2	270	319	2,570	3,164
WNW	0	0	6	283	505	1,985	2,779
NW	0	0	0	117	186	11,083	11,385
NNW	0	0	0	64	0	7,285	7,349
Total by Annulus	654	869	19	1,796	8,696	49,420	61,453

Table 2.1-87

2010	PEAK DAILY TOURISTS AND SEASONAL VISITORS WITHIN 10 MILES OF THE ST. LUCIE PLANT						
	DISTANCE (MILES)						
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-10	0-10
N	0	162	0	0	0	0	162
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	703	0	0	0	0	0	703
SE	0	874	0	0	0	0	874
SSE	0	0	0	541	6,805	13,769	21,115
S	0	0	0	28	235	4,581	4,844
SSW	0	0	7	644	609	5,793	7,053
SW	0	1	1	85	1,472	4,627	6,186
WSW	0	6	5	15	378	2,645	3,050
W	0	3	3	334	394	3,127	3,860
WNW	0	0	8	349	625	2,454	3,436
NW	0	0	0	146	229	13,695	14,071
NNW	0	0	0	64	0	8,743	8,807
Total by Annulus	703	1,045	24	2,205	10,748	59,435	74,159

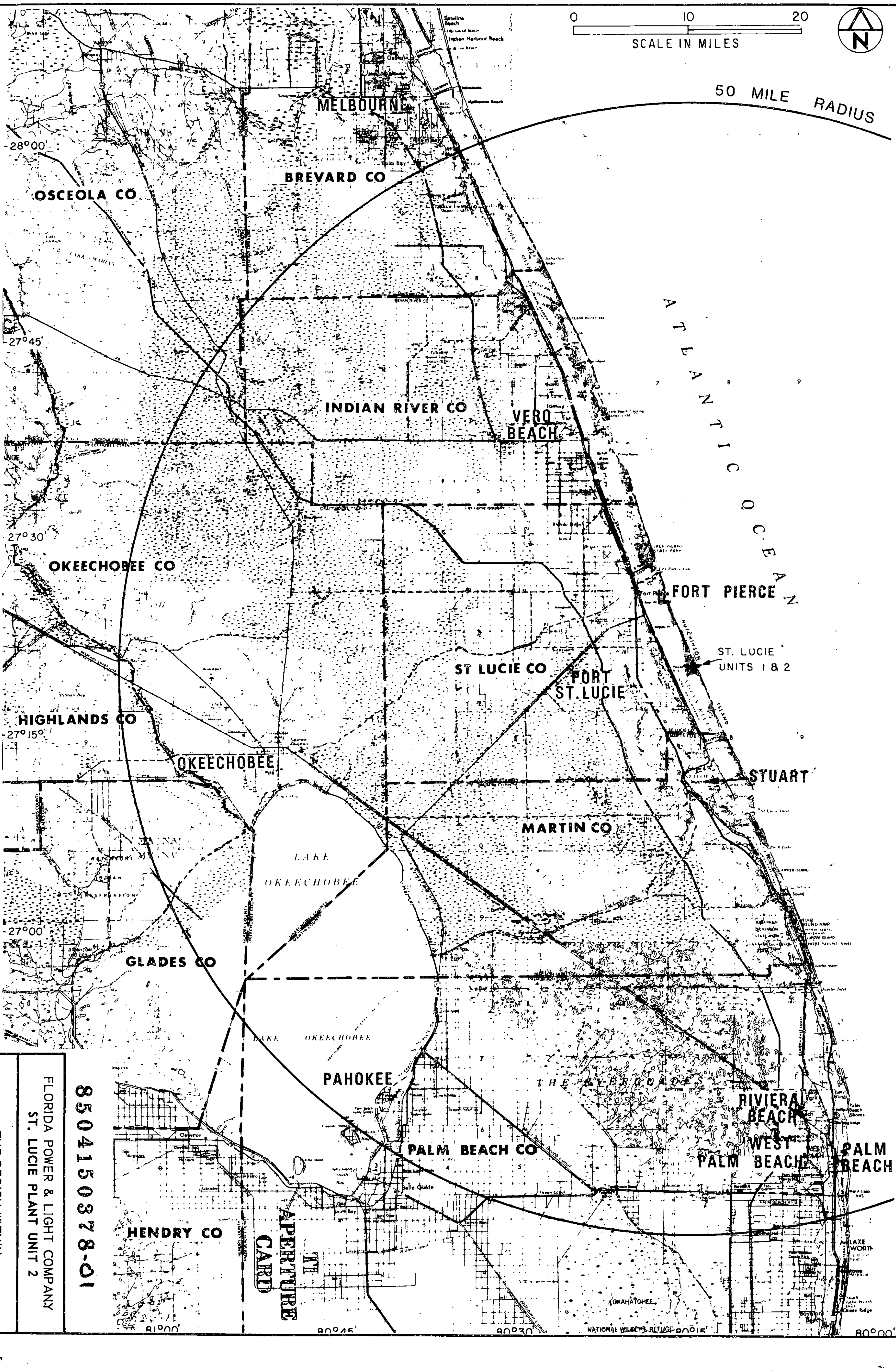
Table 2.1-88

2020 PEAK DAILY TOURISTS AND SEASONAL VISITORS WITHIN 10 MILES OF THE ST. LUCIE PLANT							
	DISTANCE (MILES)						
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-10	0-10
N	0	172	0	0	0	0	172
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	749	0	0	0	0	0	749
SE	0	1,033	0	0	0	0	1,033
SSE	0	0	0	636	7,998	15,532	24,166
S	0	0	0	32	276	5,114	5,423
SSW	0	0	8	757	716	6,742	8,223
SW	0	1	1	99	1,731	5,450	7,282
WSW	0	7	6	18	445	3,116	3,592
W	0	3	3	393	463	3,724	4,586
WNW	0	0	9	411	735	2,887	4,043
NW	0	0	0	168	269	16,111	16,548
NNW	0	0	0	64	0	10,086	10,150
Total by Annulus	749	1,216	28	2,578	12,635	68,762	85,968

Table 2.1-89

2030	PEAK DAILY TOURISTS AND SEASONAL VISITORS WITHIN 10 MILES OF THE ST. LUCIE PLANT						
	DISTANCE (MILES)						
DIRECTION	0-1	1-2	2-3	3-4	4-5	5-10	0-10
N	0	180	0	0	0	0	180
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	782	0	0	0	0	0	782
SE	0	1,161	0	0	0	0	1,161
SSE	0	0	0	717	8,993	16,933	26,643
S	0	0	0	36	311	5,533	5,880
SSW	0	0	9	851	804	7,511	9,175
SW	0	1	2	112	1,945	6,113	8,172
WSW	0	8	7	20	500	3,494	4,028
W	0	3	4	441	520	4,161	5,129
WNW	0	0	10	462	825	3,243	4,540
NW	0	0	0	190	303	18,093	18,585
NNW	0	0	0	64	0	11,181	11,245
Total by Annulus	782	1,353	31	2,892	14,201	76,261	95,520

Also Available On
Aperture Card

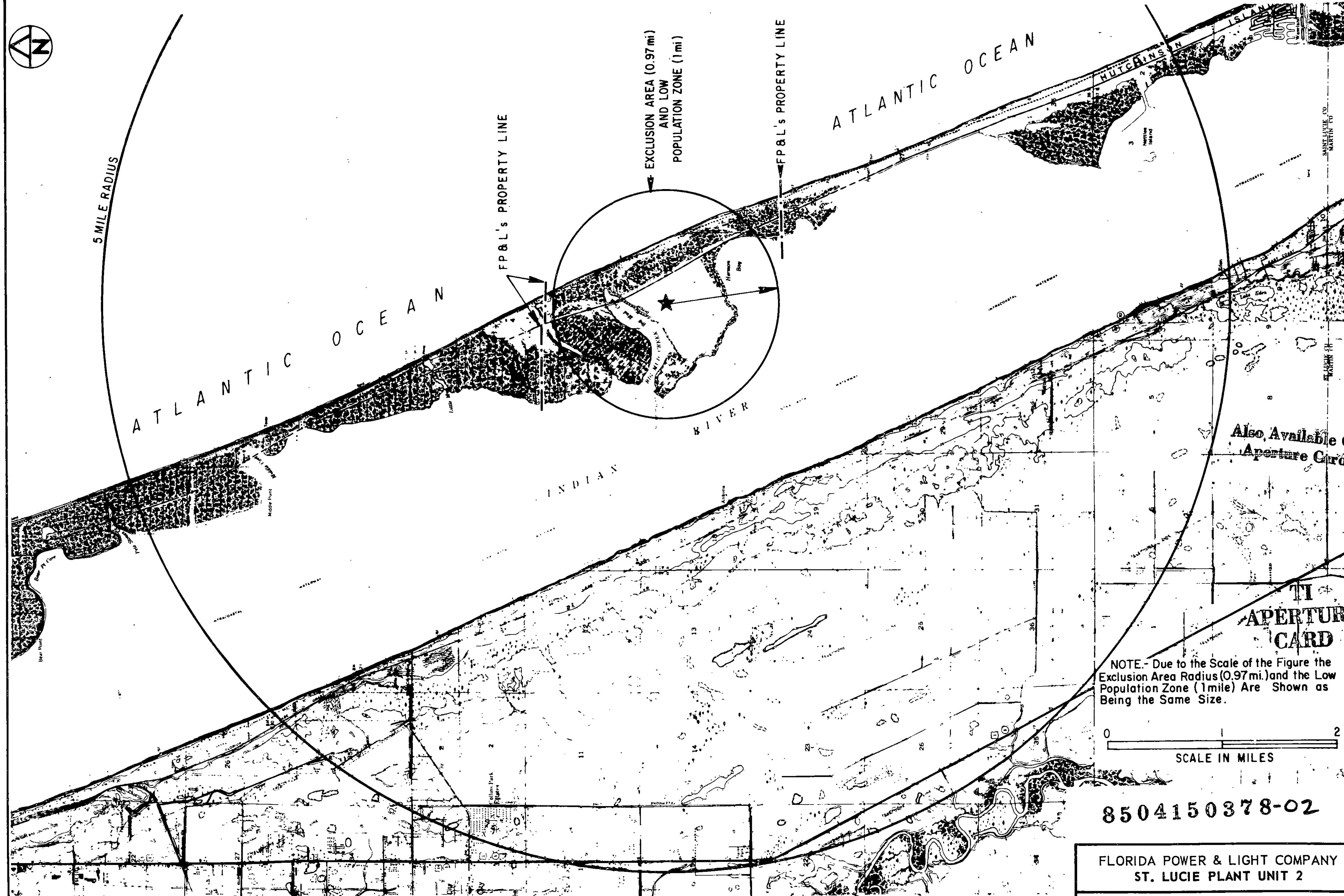


8504150378-01

APERTURE CARD

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

THE REGION WITHIN
50 MILES OF ST LUCIE UNIT 2
FIGURE 2.1-1



NOTE.- Due to the Scale of the Figure the Exclusion Area Radius (0.97 mi.) and the Low Population Zone (1 mile) Are Shown as Being the Same Size.

Also Available On Aperture Card

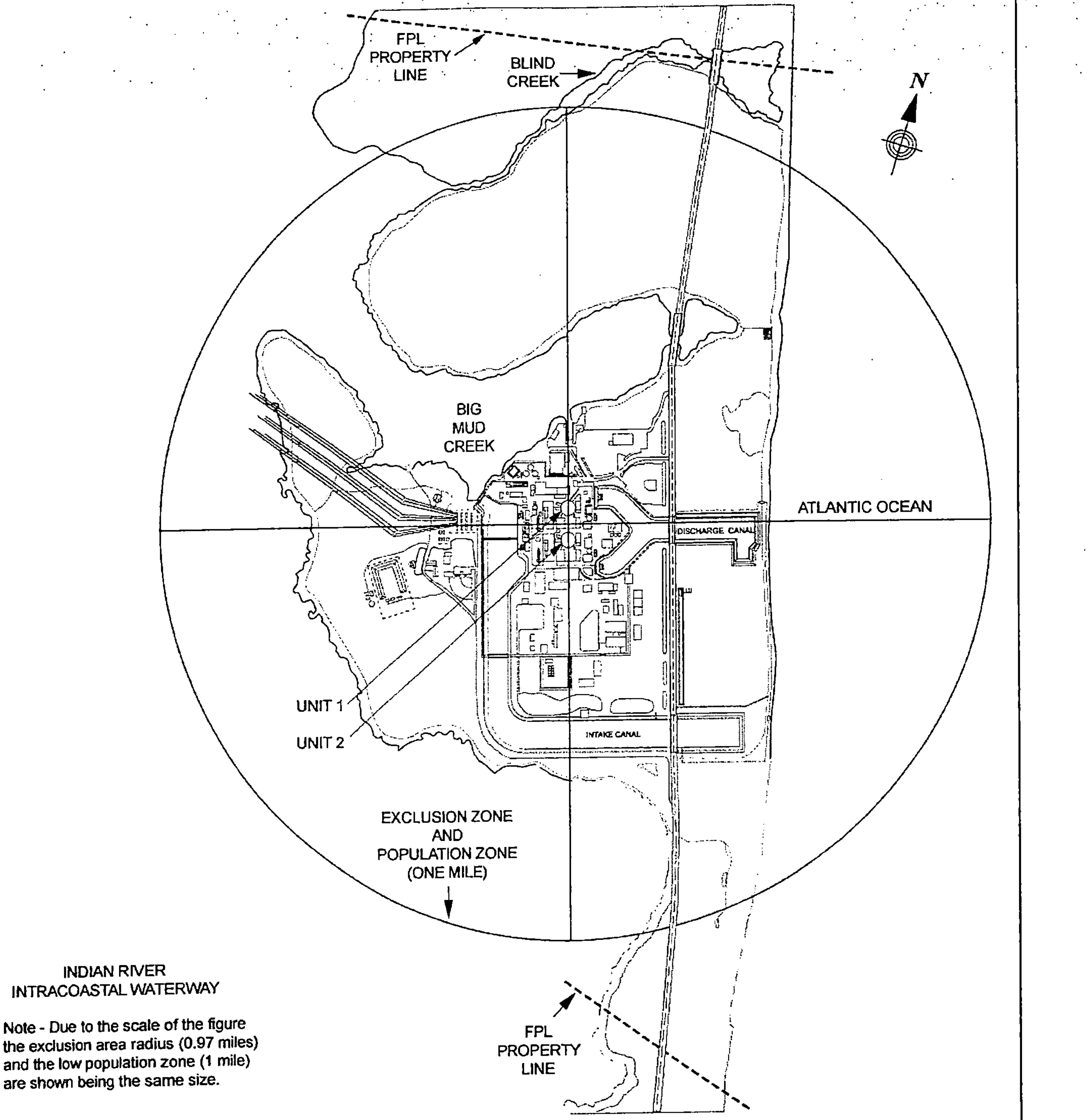
TI APERTURE CARD

8504150378-02

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

THE AREA WITHIN 5 MILES OF ST LUCIE UNIT 2

FIGURE 2.1-2

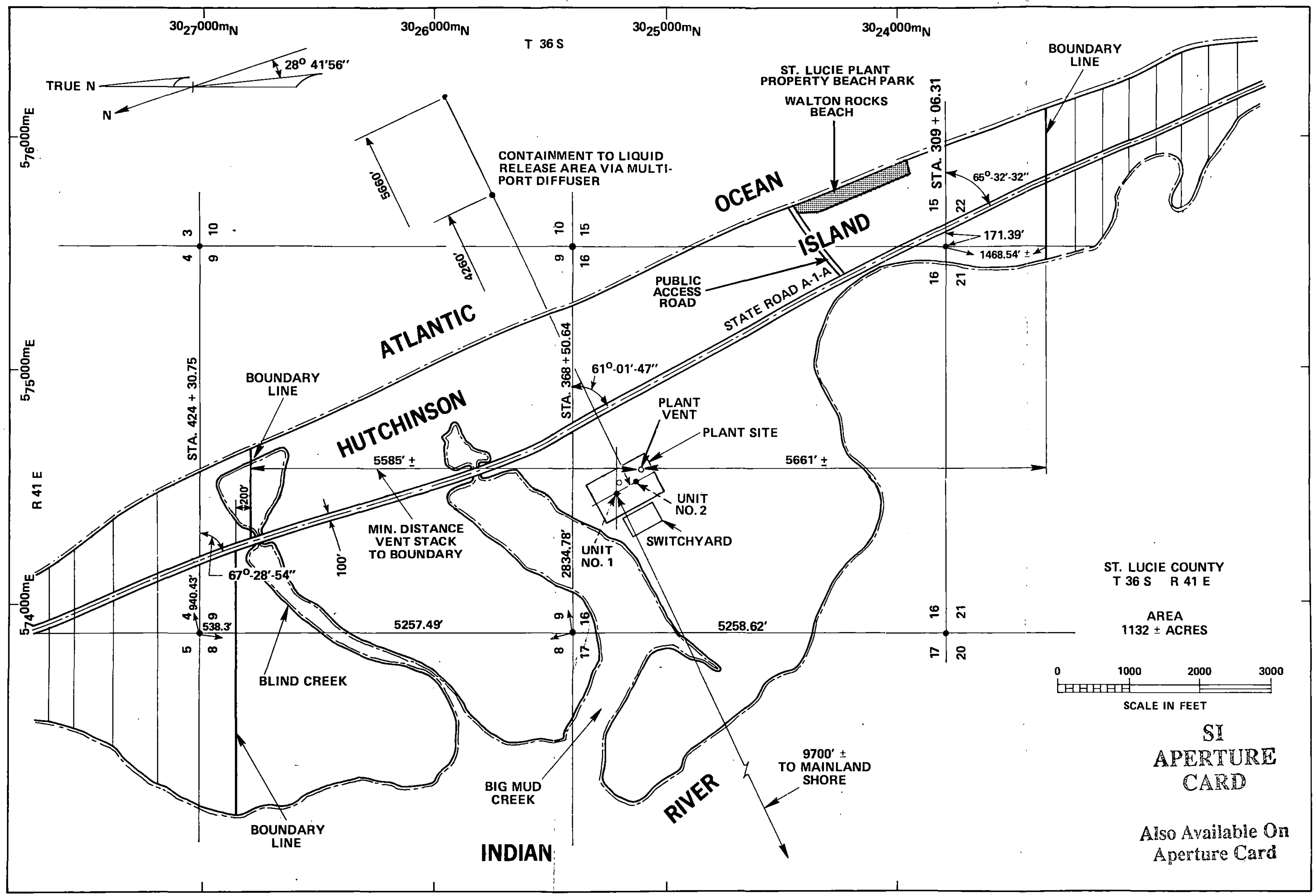


Note - Due to the scale of the figure the exclusion area radius (0.97 miles) and the low population zone (1 mile) are shown being the same size.

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

SITE AREA MAP

FIGURE 2.1-3



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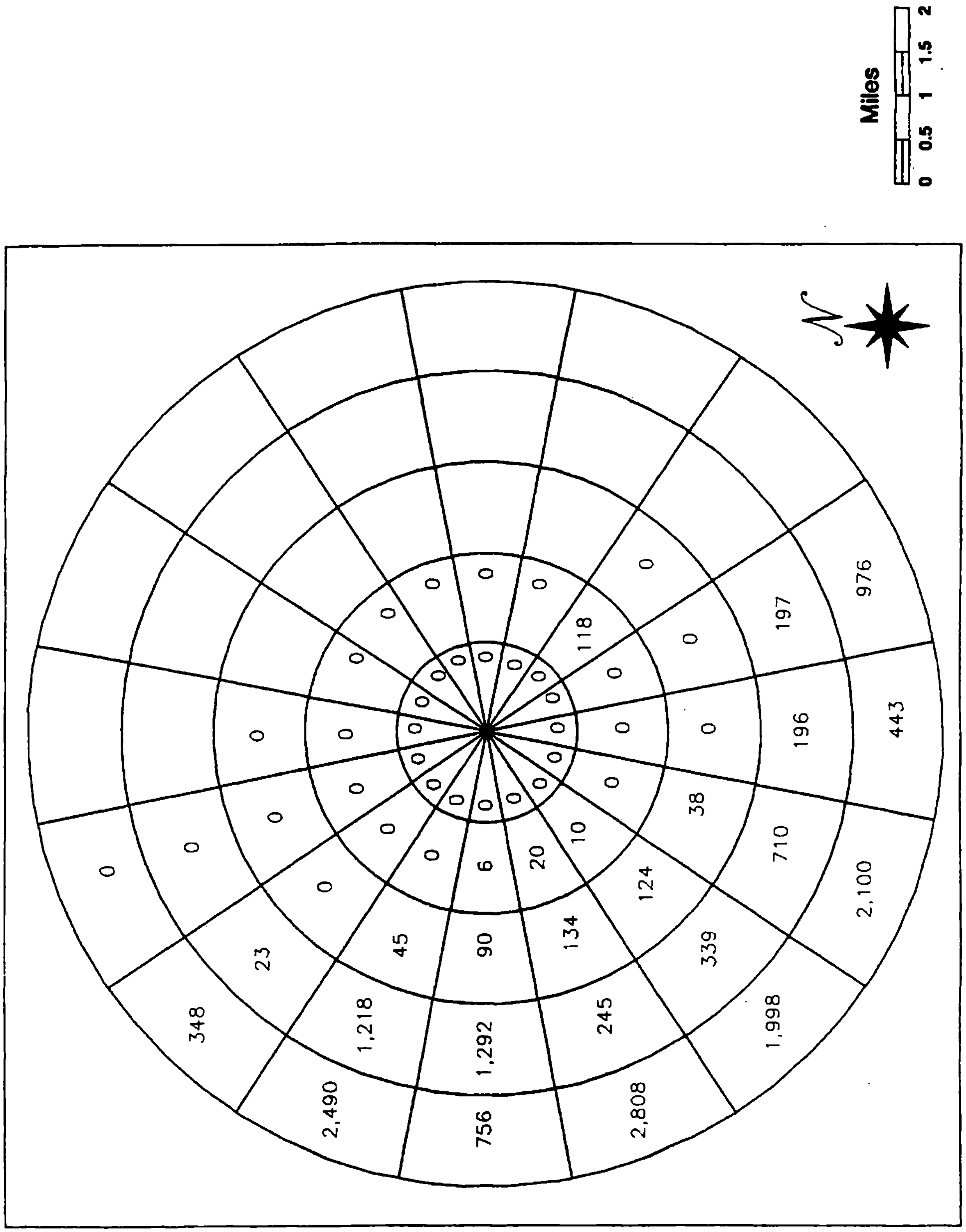
AMENDMENT NO. 5 (4/90)

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

PROPERTY PLAN

FIGURE 2.1-4

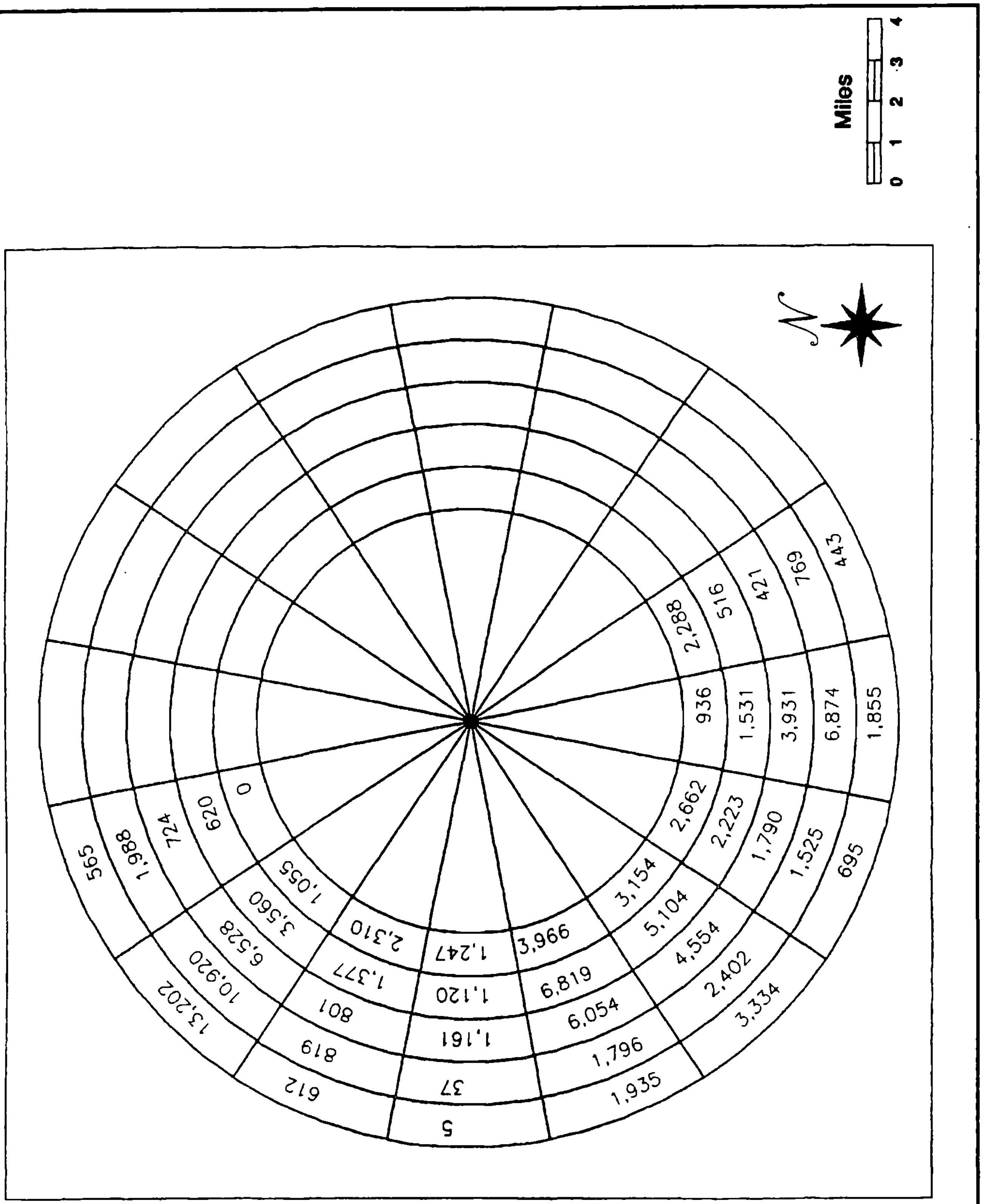


AMENDMENT NO. 8 (9/93)

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT - UNIT 2

1990 RESIDENT POPULATION
WITHIN 0-5 MILES
SHEET 1

FIGURE 2.1-5

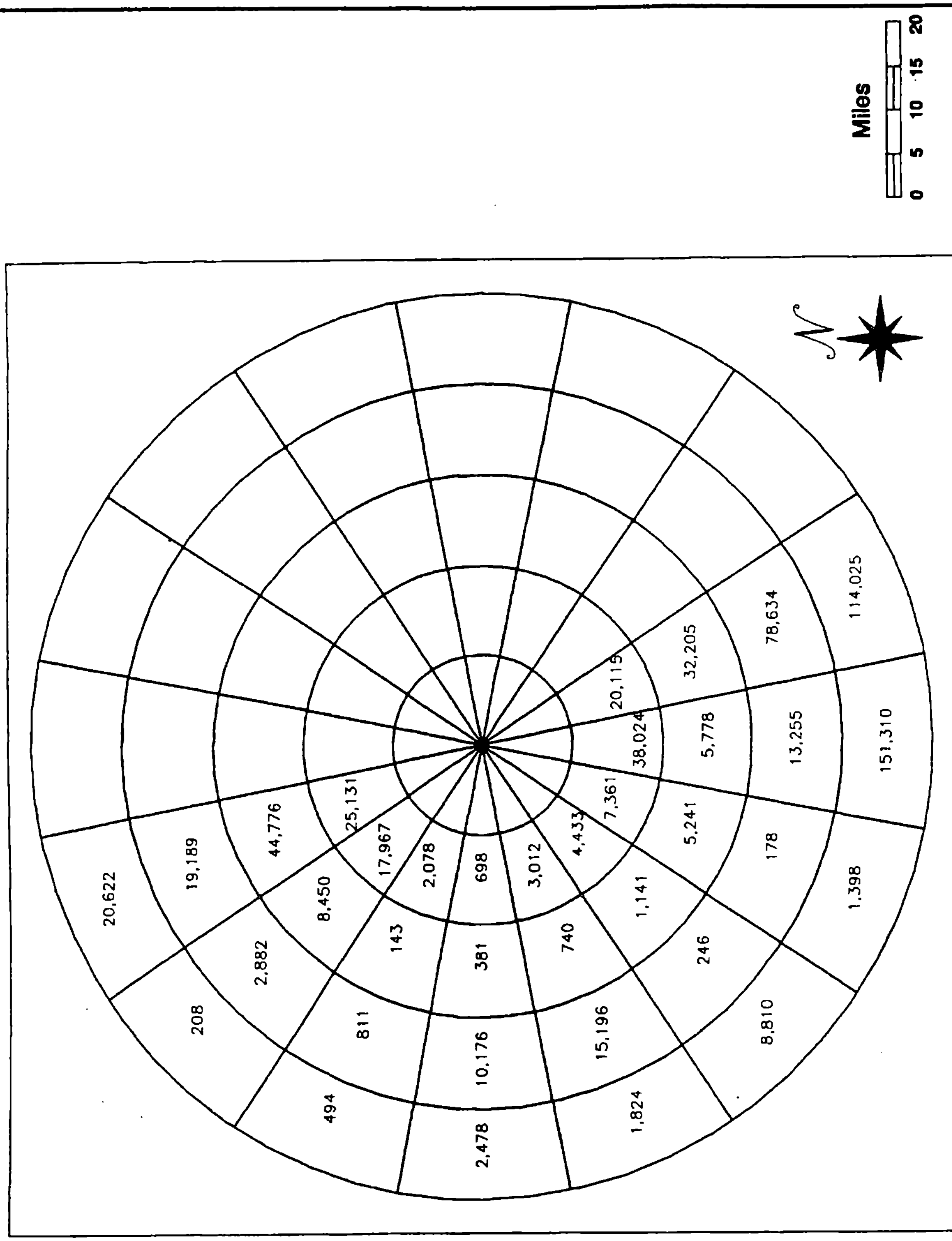


AMENDMENT NO. 8 (9/93)

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT – UNIT 2

1990 RESIDENT POPULATION
WITHIN 5–10 MILES
SHEET 2

FIGURE 2.1–6

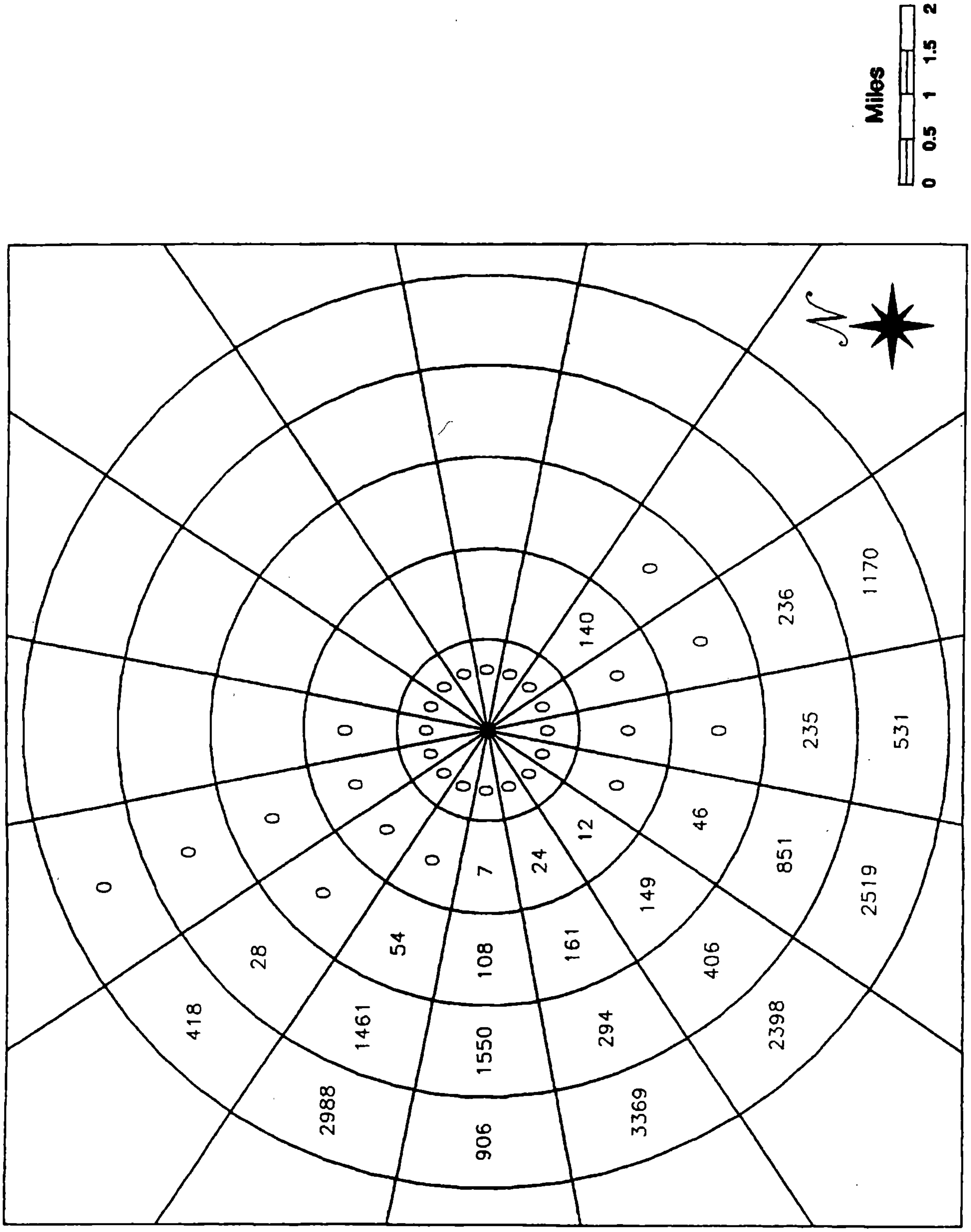


AMENDMENT NO. 8 (9/93)

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT - UNIT 2

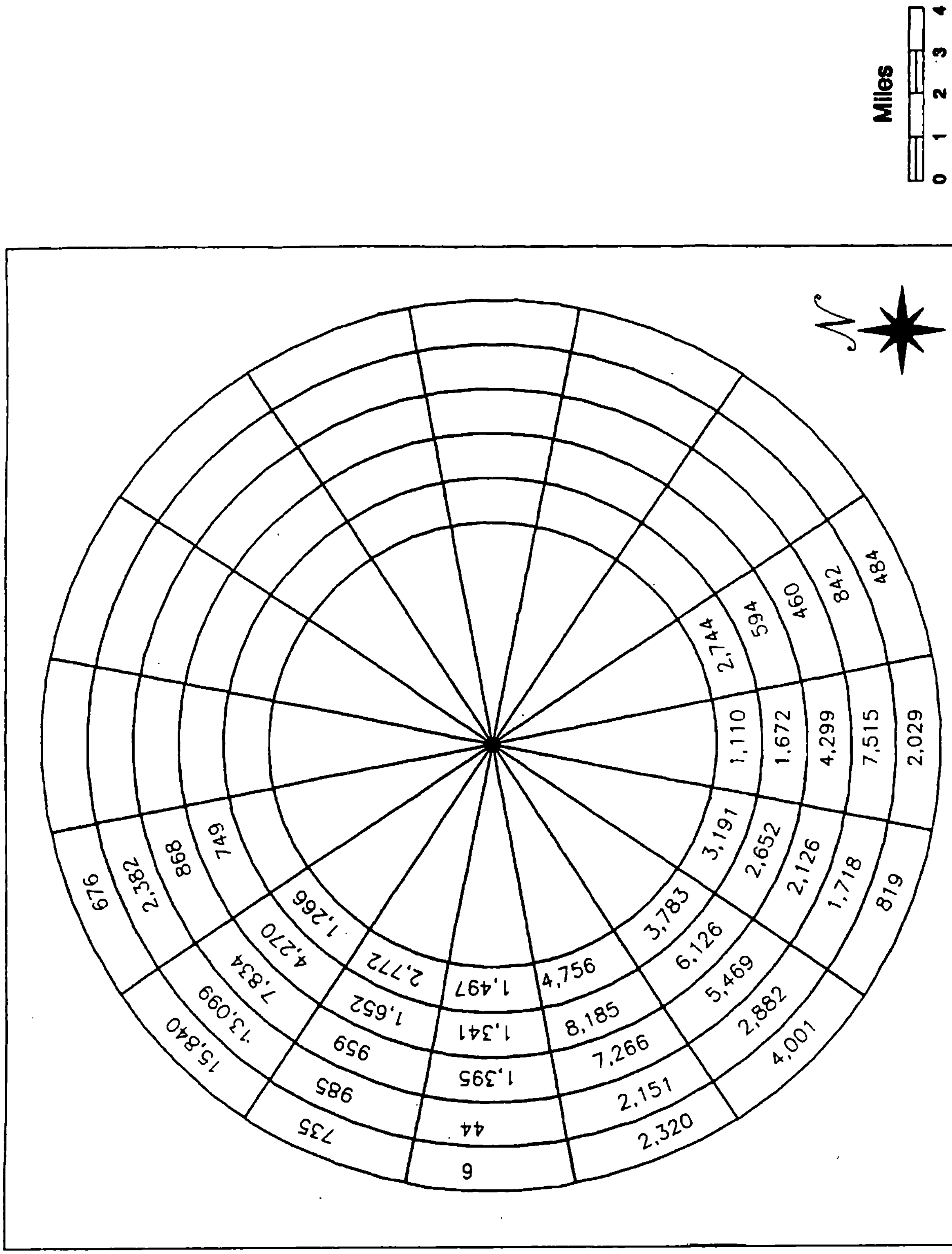
1990 RESIDENT POPULATION
WITHIN 10-50 MILES
SHEET 3

FIGURE 2.1-7



AMENDMENT NO. 8 (9/93)

FLORIDA POWER & LIGHT COMPANY ST. LUCIE PLANT – UNIT 2
ESTIMATED 1995 RESIDENT POPULATION WITHIN 0–5 MILES SHEET 4 FIGURE 2.1–8

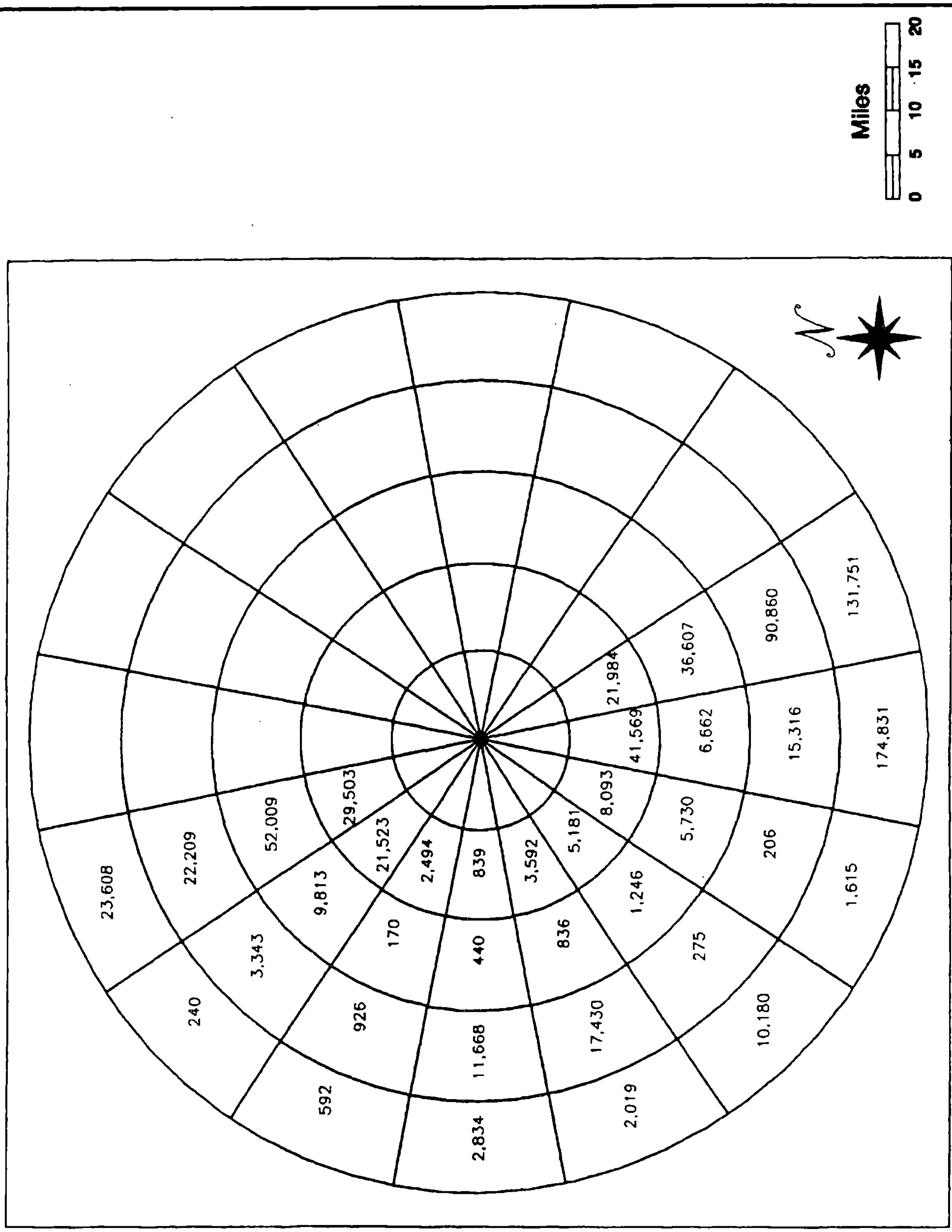


AMENDMENT NO. 8 (9/93)

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT - UNIT 2

ESTIMATED 1995 RESIDENT POPULATION
WITHIN 5-10 MILES
SHEET 5

FIGURE 2.1-9

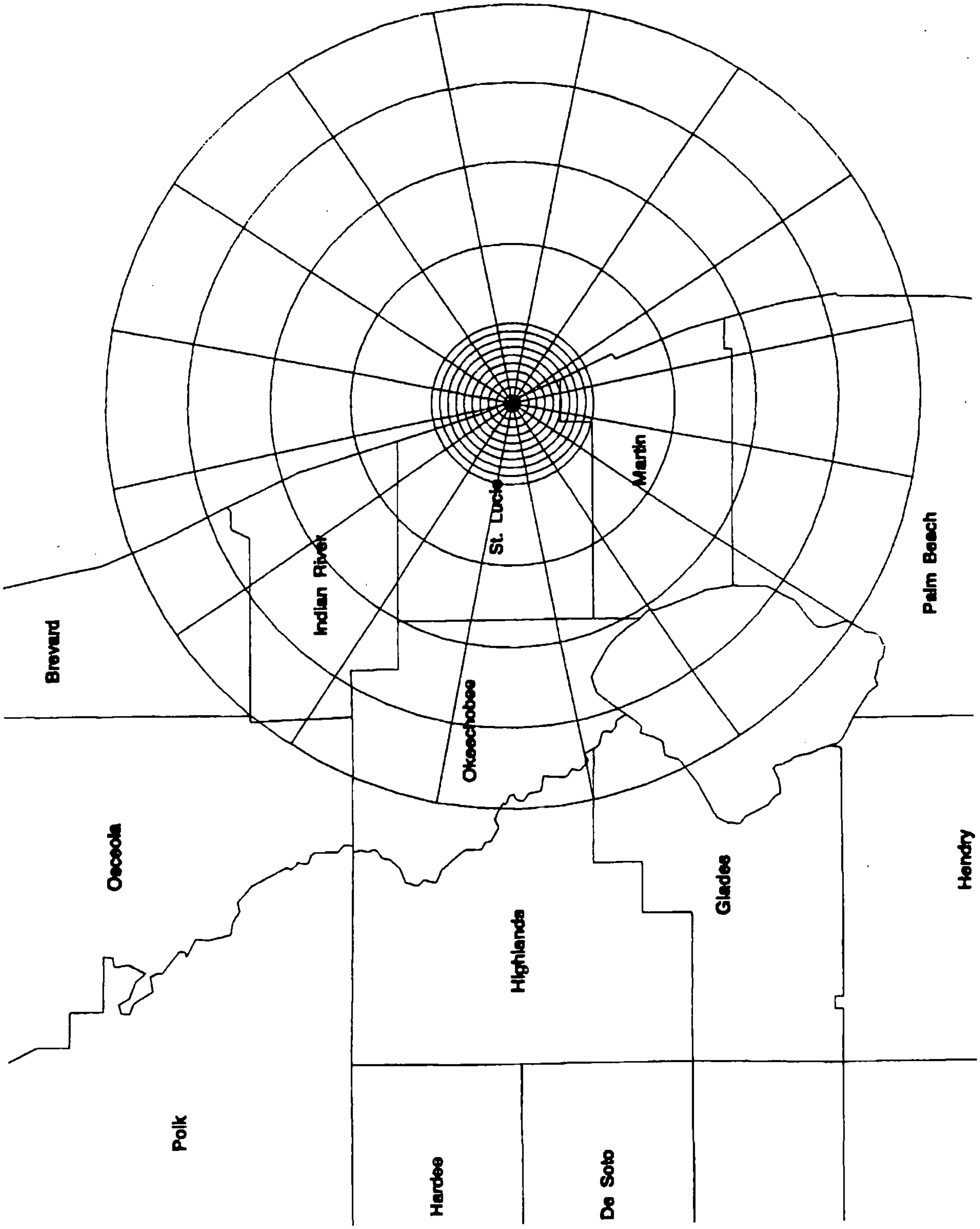


AMENDMENT NO. 8 (9/93)

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT – UNIT 2

ESTIMATED 1995 RESIDENT POPULATION
WITHIN 10–50 MILES
SHEET 6

FIGURE 2.1–10

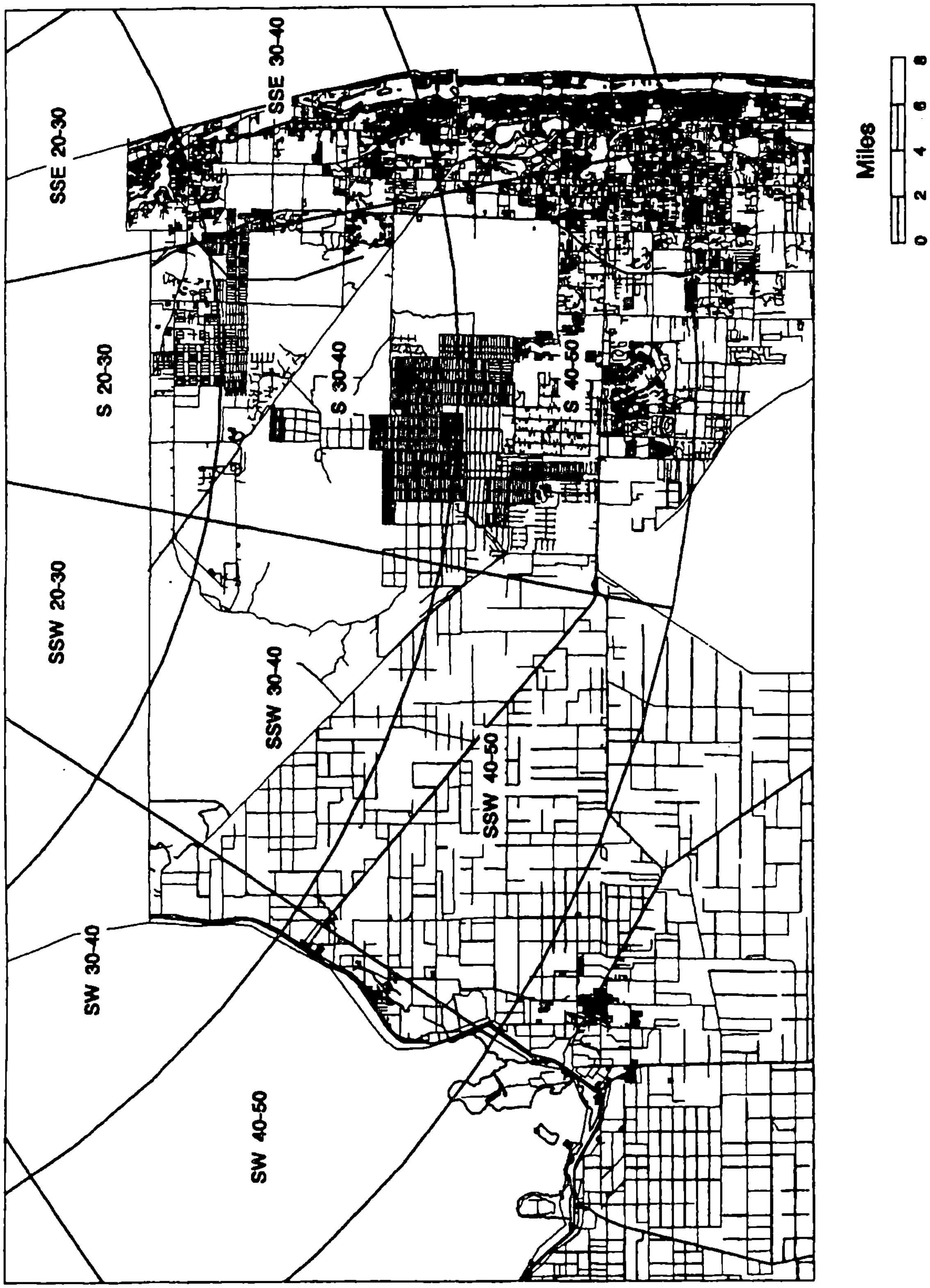


AMENDMENT NO. 8 (9/93)

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT - UNIT 2

COUNTIES WITHIN
50 MILE RADIUS
SHEET 7

FIGURE 2.1-11

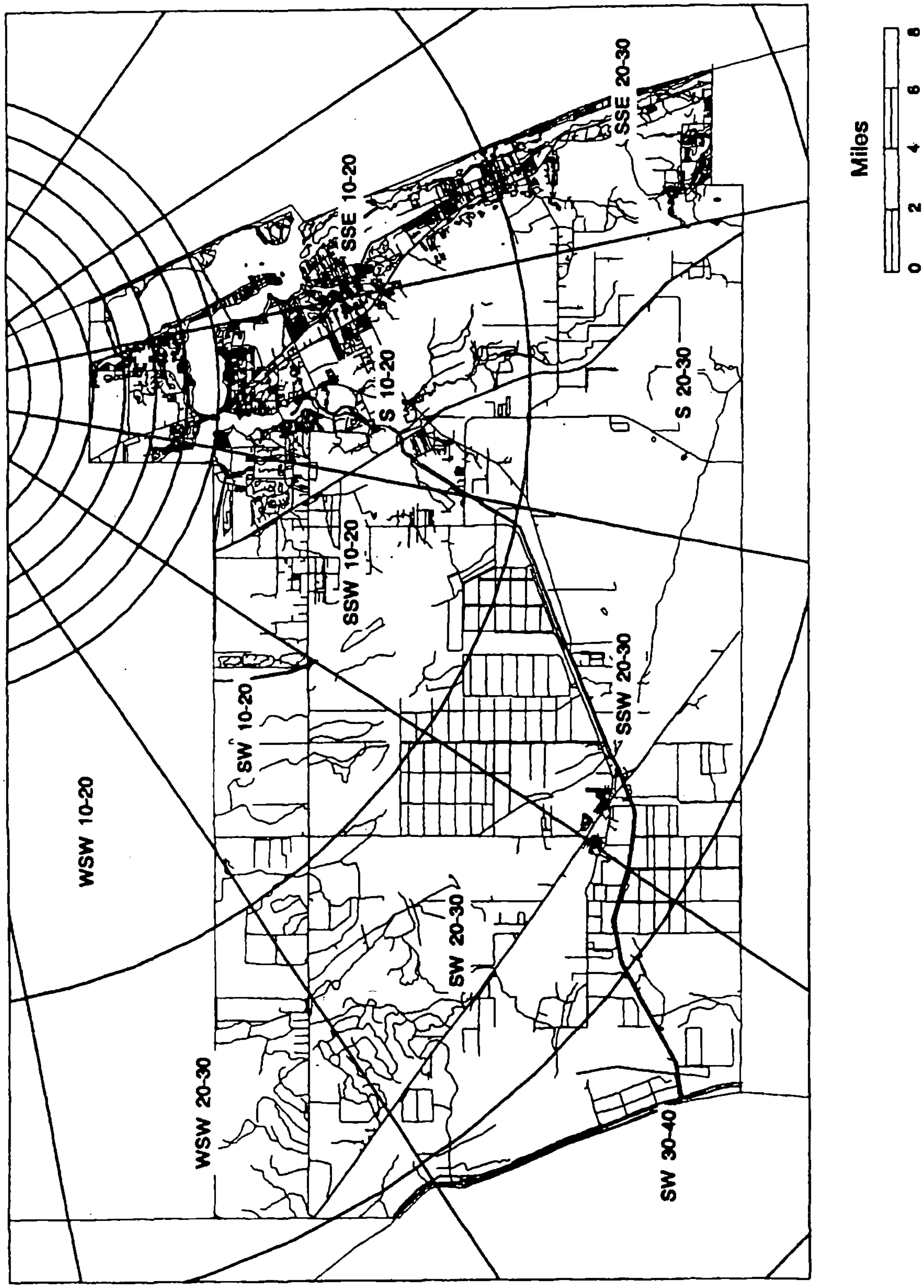


AMENDMENT NO. 8 (9/93)

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT – UNIT 2

PALM BEACH COUNTY
WITH SECTOR SEGMENTS
SHEET 8

FIGURE 2.1–12

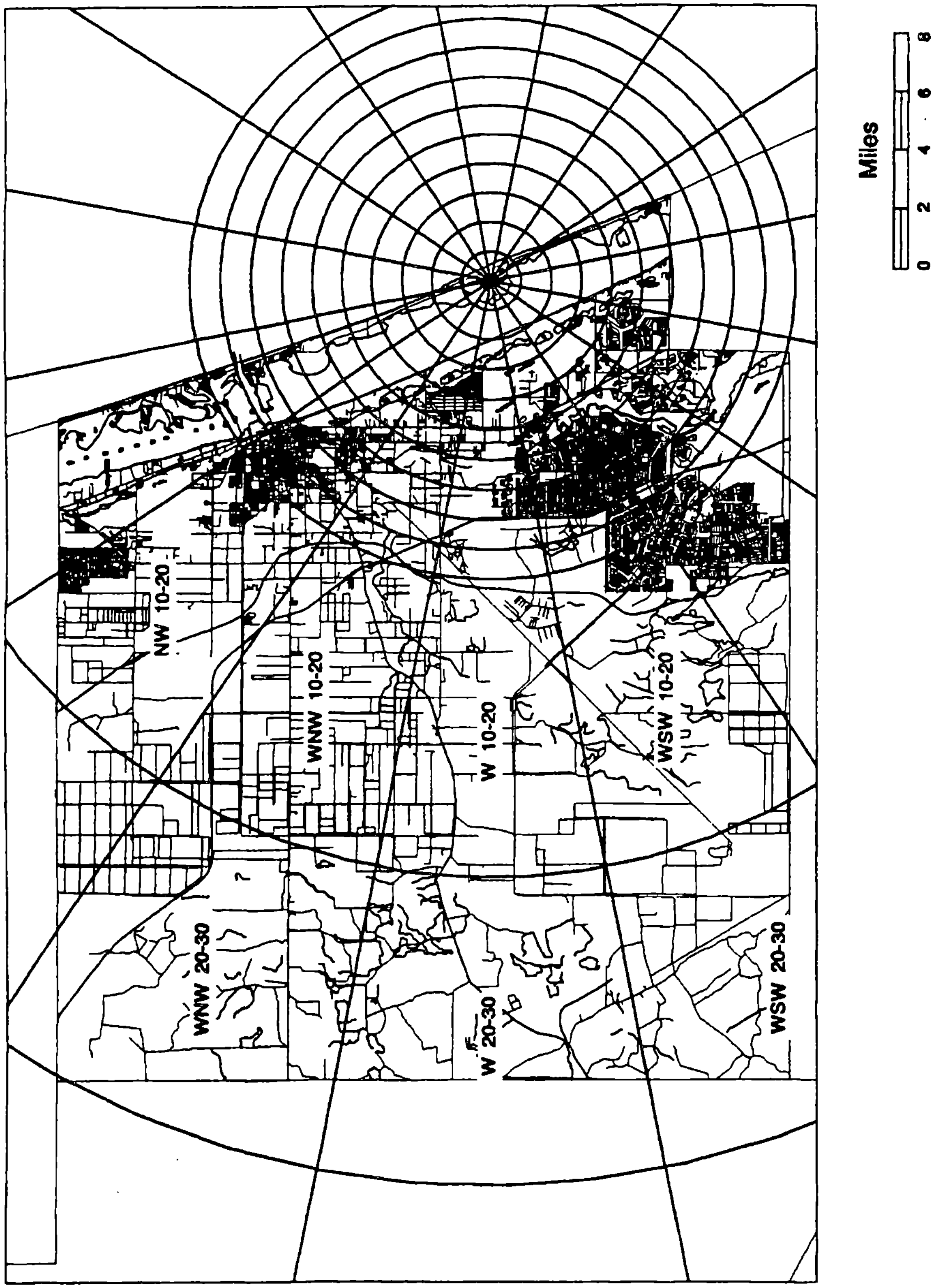


AMENDMENT NO. 8 (9/93)

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT – UNIT 2

MARTIN COUNTY
WITH SECTOR SEGMENTS
SHEET 9

FIGURE 2.1–13

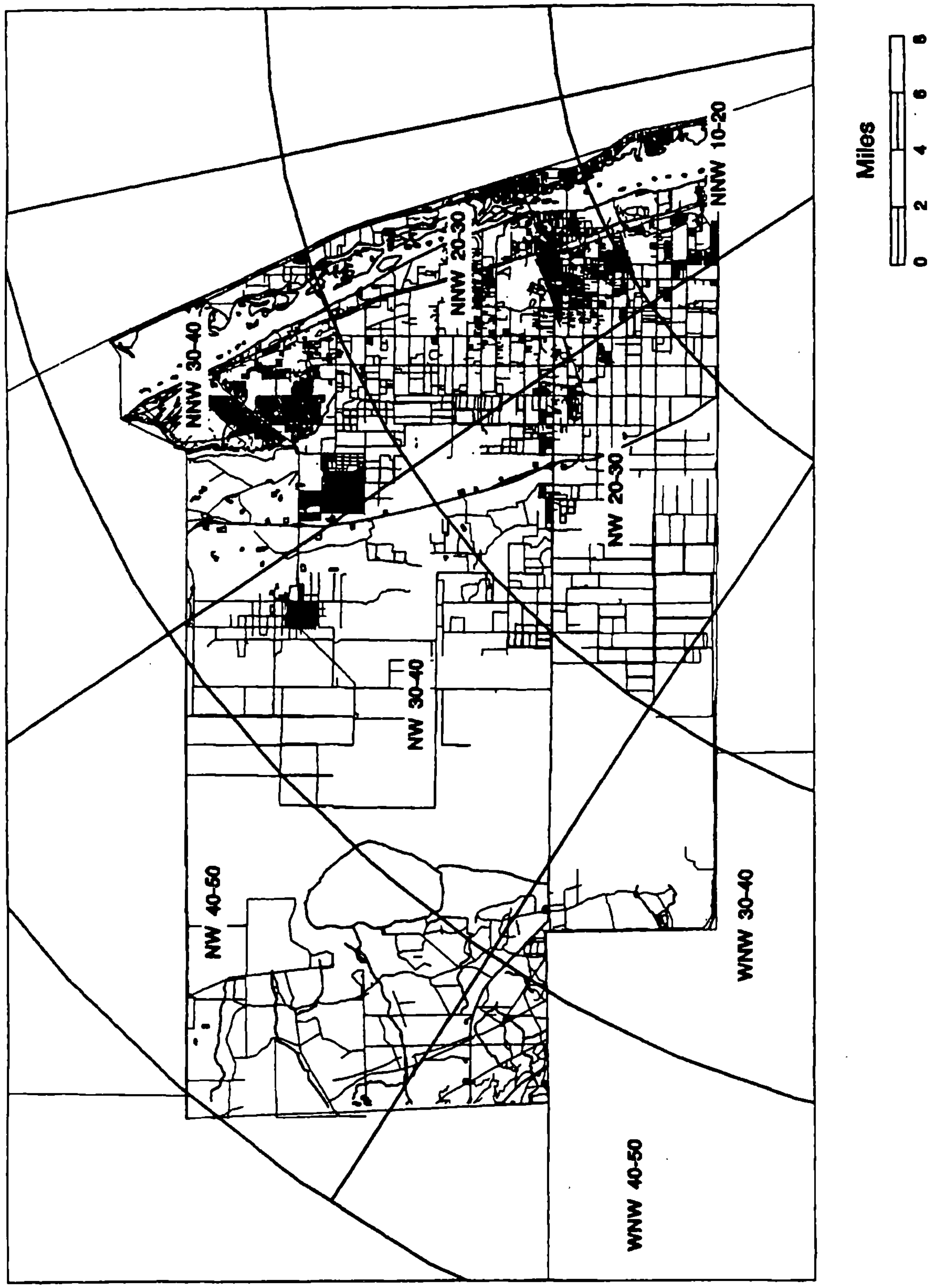


AMENDMENT NO. 8 (9/93)

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT - UNIT 2

ST. LUCIE COUNTY
WITH SECTOR SEGMENTS
SHEET 10

FIGURE 2.1-14

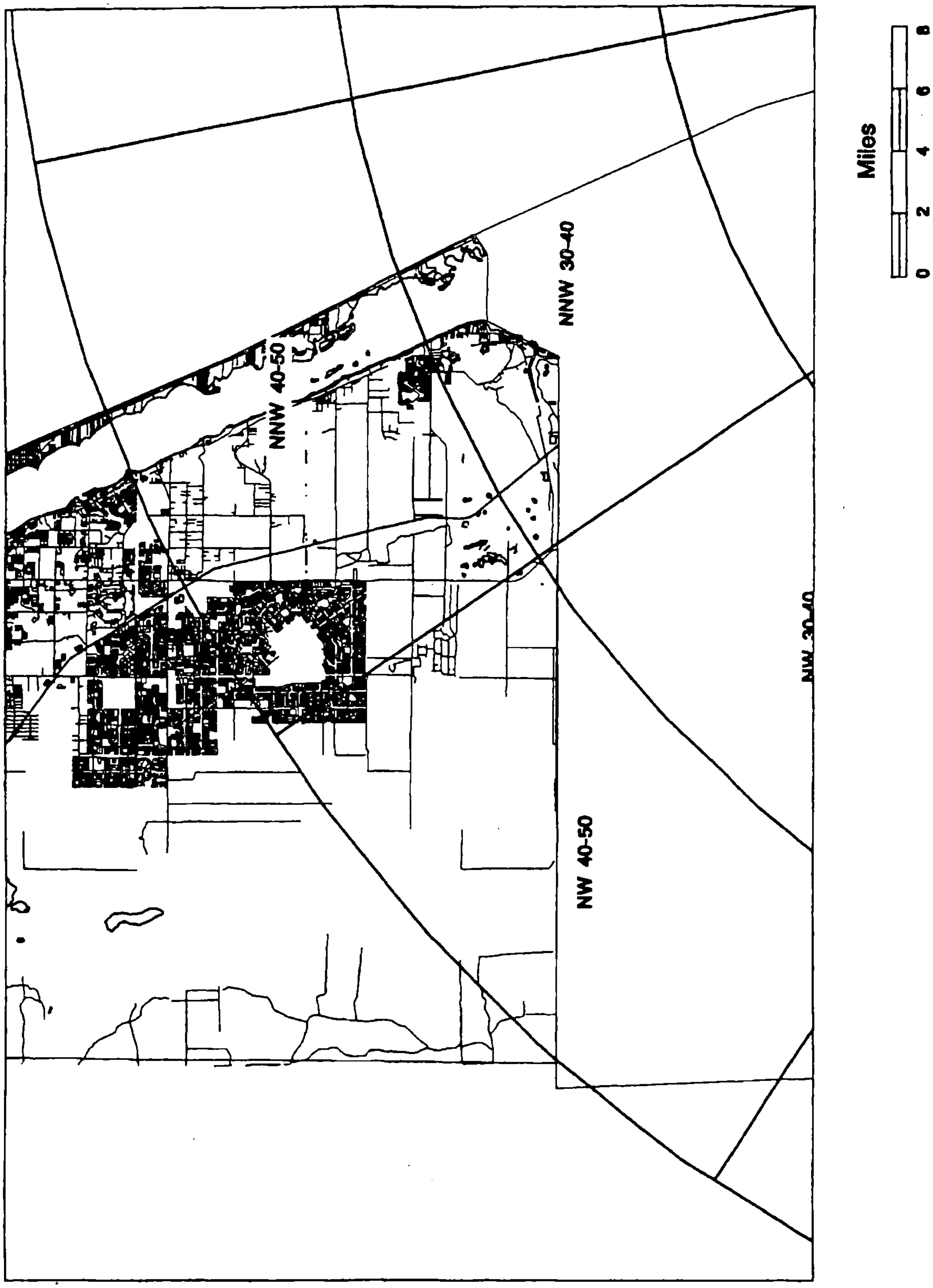


AMENDMENT NO. 8 (9/93)

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT – UNIT 2

INDIAN RIVER COUNTY
WITH SECTOR SEGMENTS
SHEET 11

FIGURE 2.1–15

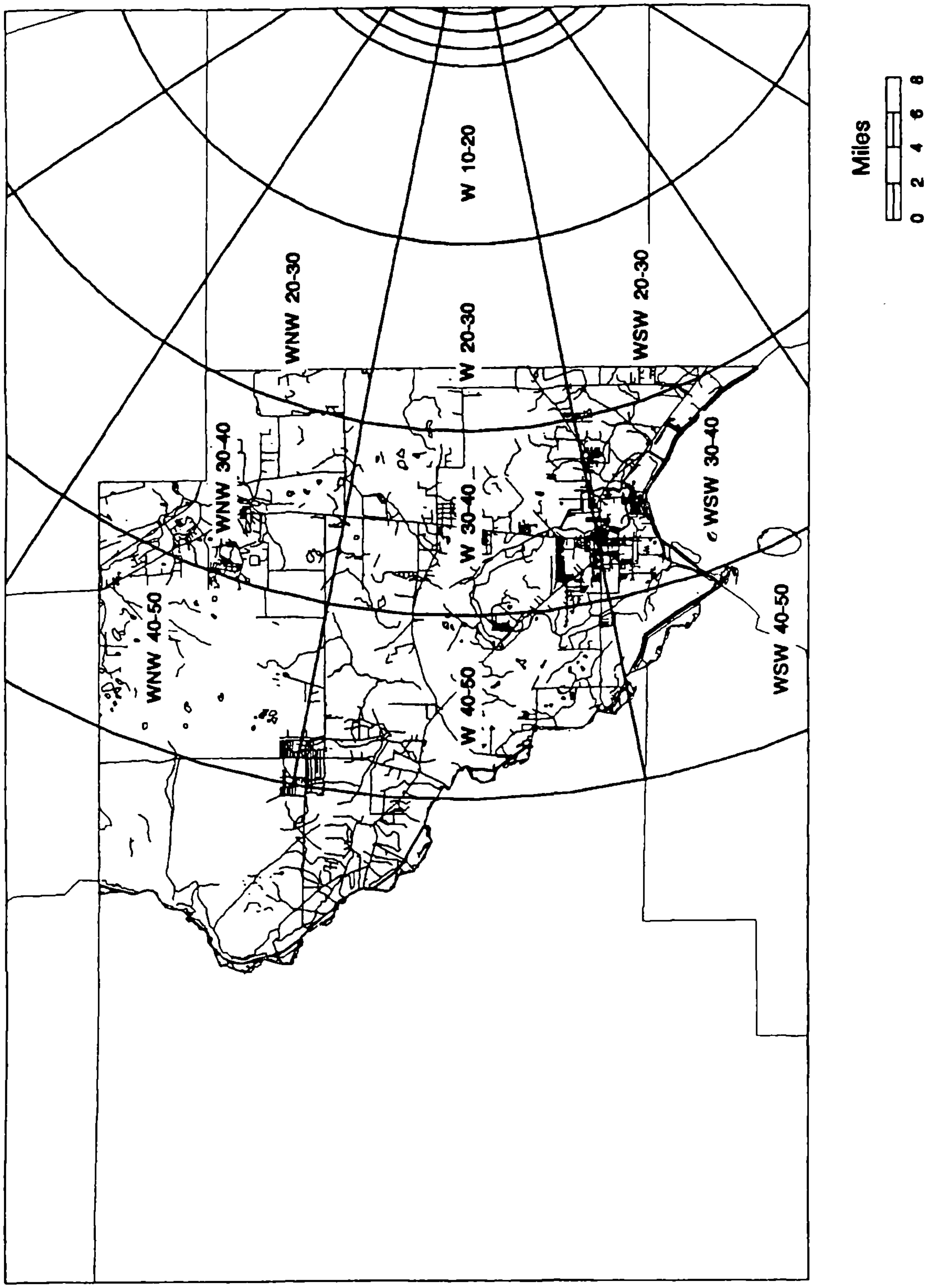


AMENDMENT NO. 8 (9/93)

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT – UNIT 2

BREVARD COUNTY
WITH SECTOR SEGMENTS
SHEET 12

FIGURE 2.1-16

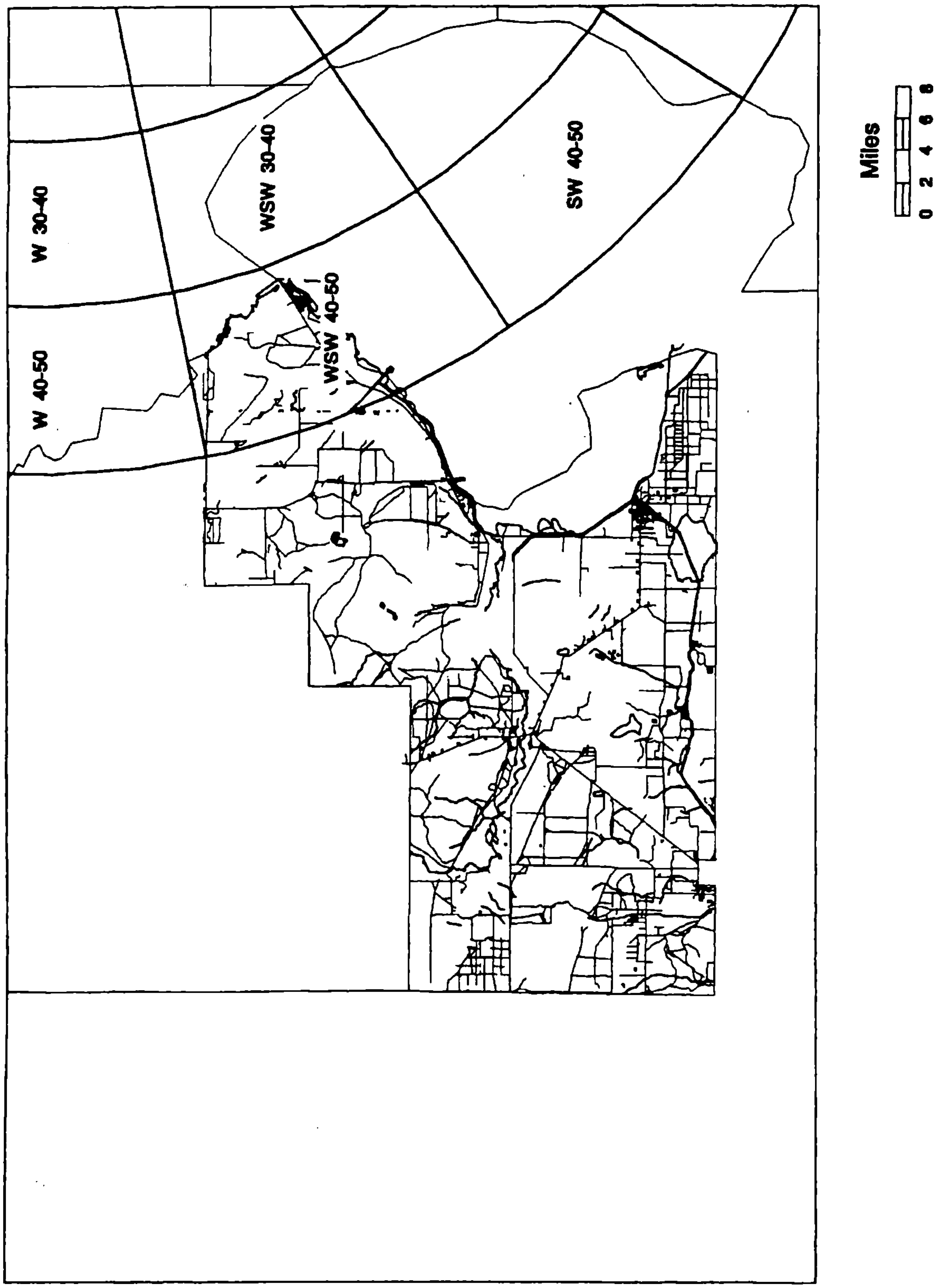


AMENDMENT NO. 8 (9/93)

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT – UNIT 2

OKEECHOBEE COUNTY
WITH SECTOR SEGMENTS
SHEET 13

FIGURE 2.1–17

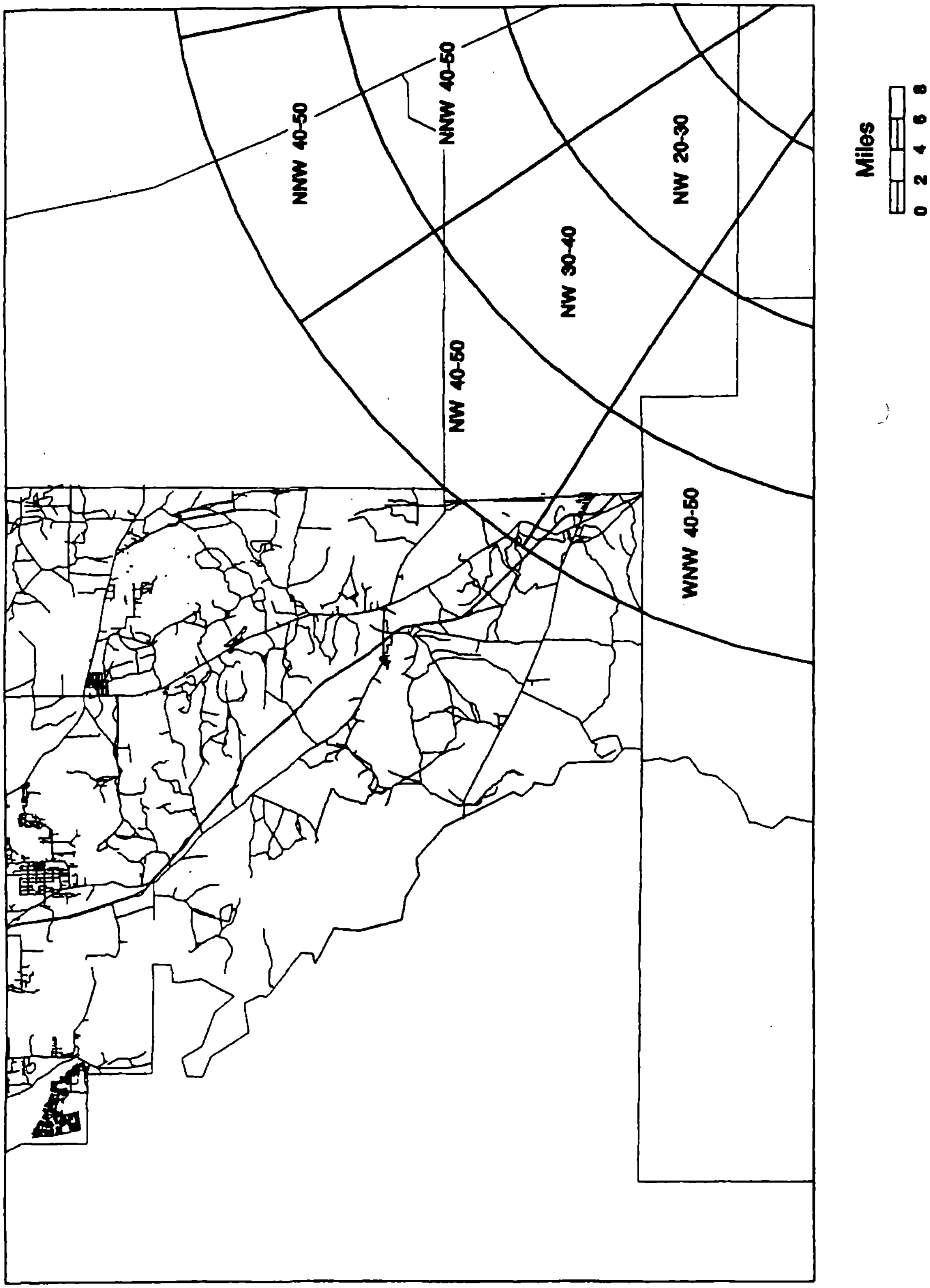


AMENDMENT NO. 8 (9/93)

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT – UNIT 2

GLADES COUNTY
WITH SECTOR SEGMENTS
SHEET 14

FIGURE 2.1–18

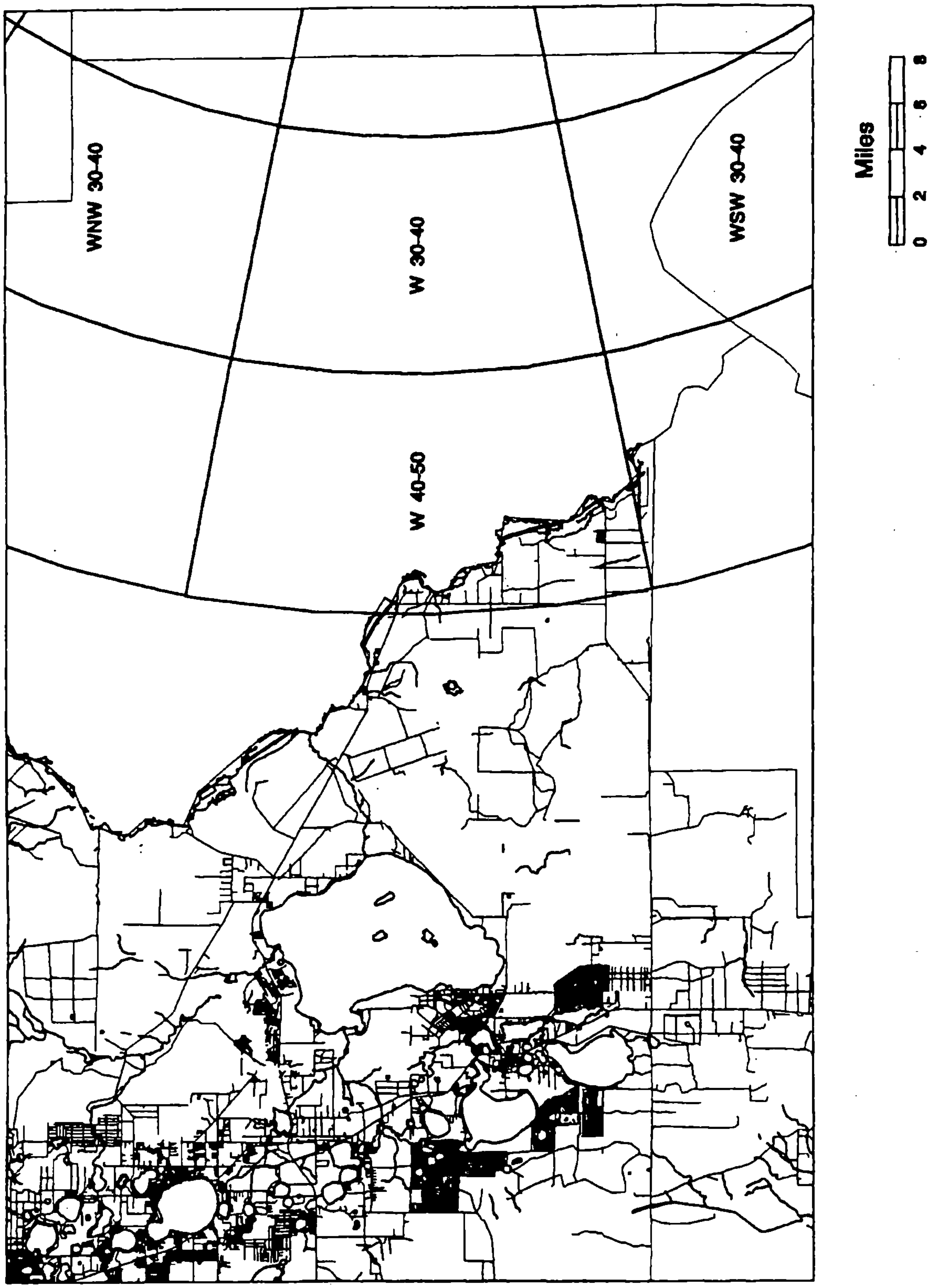


AMENDMENT NO. 8 (9/93)

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT – UNIT 2

OSCEOLA COUNTY
WITH SECTOR SEGMENTS
SHEET 15

FIGURE 2.1–19

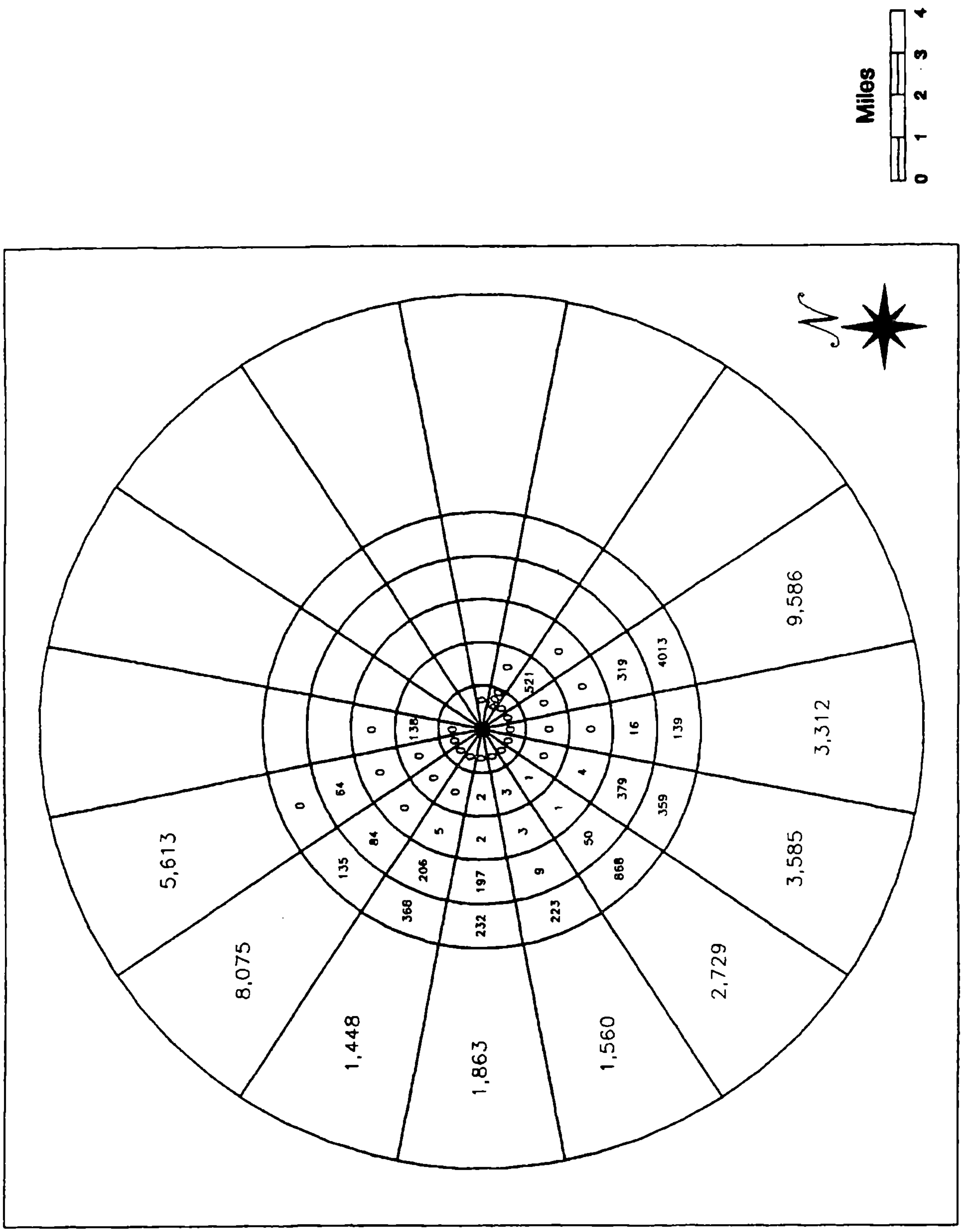


AMENDMENT NO. 8 (9/93)

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT - UNIT 2

HIGHLANDS COUNTY
WITH SECTOR SEGMENTS
SHEET 16

FIGURE 2.1-20

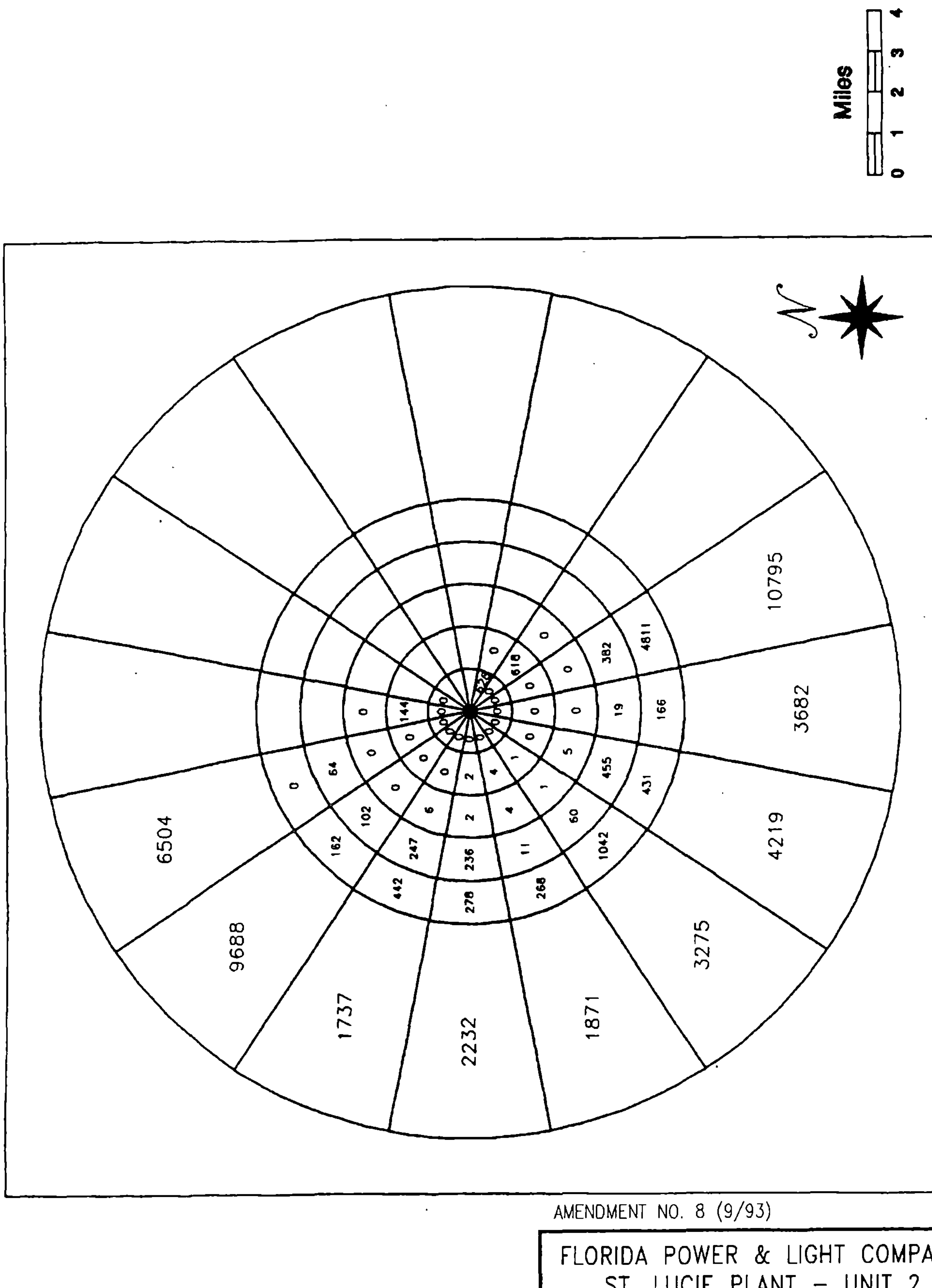


AMENDMENT NO. 8 (9/93)

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT – UNIT 2

ESTIMATED 1992 PEAK DAILY AND SEASONAL VISITORS WITHIN 10 MILES
SHEET 17

FIGURE 2.1–21

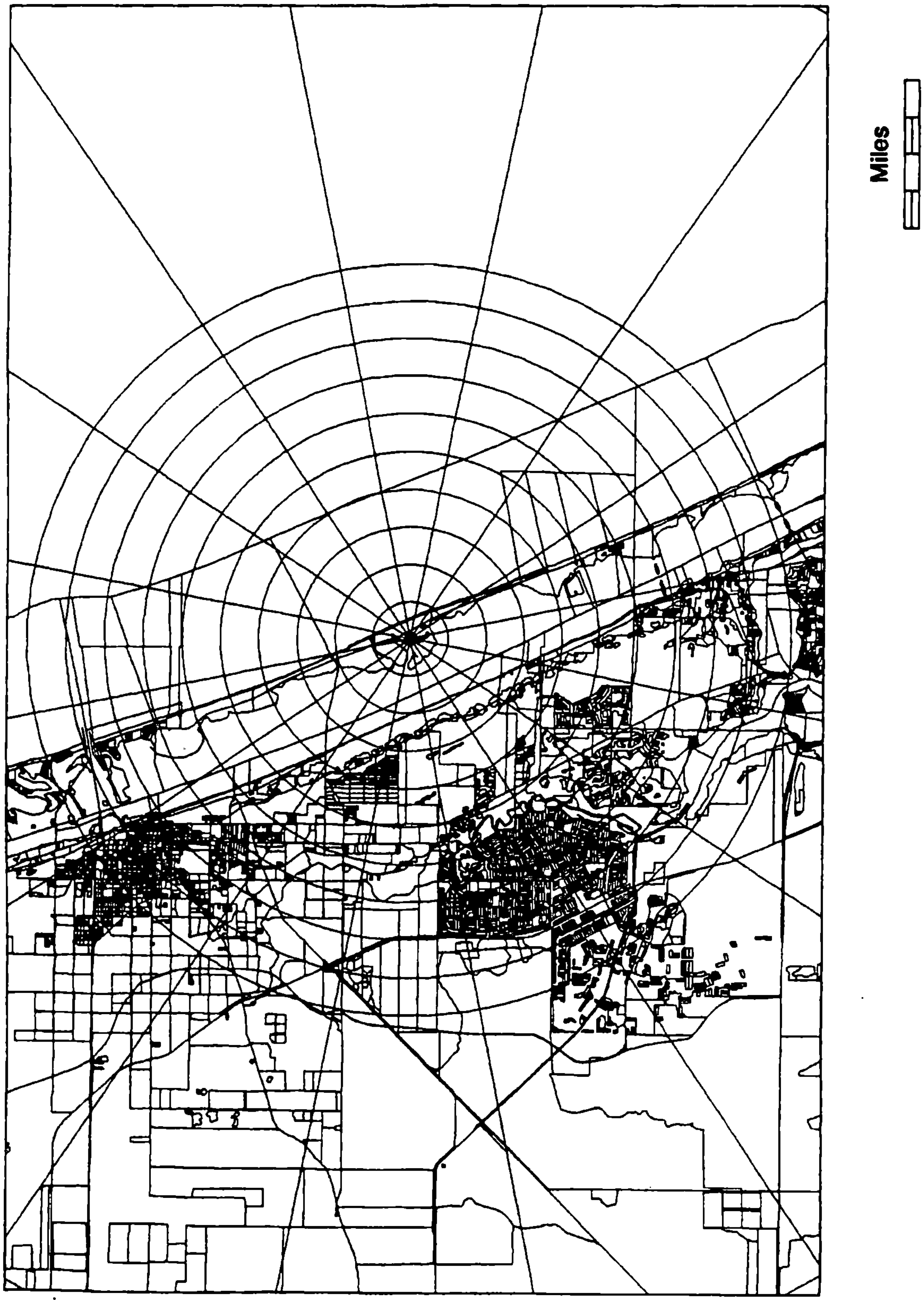


AMENDMENT NO. 8 (9/93)

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT – UNIT 2

ESTIMATED 1995 PEAK DAILY AND
SEASONAL VISITORS WITHIN 10 MILES
SHEET 18

FIGURE 2.1-22



AMENDMENT NO. 8 (9/93)

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT - UNIT 2

CENSUS BLOCKS WITH THE
10-MILE SECTOR SEGMENTS
SHEET 19

FIGURE 2.1-23

APPENDIX 2.1A

2003 POPULATION ESTIMATES

FOR THE AREAS SURROUNDING

ST. LUCIE PLANT

March 2003

This appendix represents an excerpt from a report submitted to the NRC via FPL letter L-2003-081 dated April 14, 2003. Those portions of the report pertaining to population estimates are included in this appendix. Other portions of the report, specifically Sections 4, 5, 6, and Appendices B and C, have not been included herein since they do not pertain to population estimates.

This appendix also includes residential population projections for the region out to 50 miles around the St. Lucie Plant. The residential population projections are taken from an October 2, 2003 letter from William Groot (Earth Tech) to Donna Calabrese (FPL).

Appendix 2.1A has been reissued in its entirety for UFSAR Amendment No. 15. Revision bars have not been used on subsequent pages.

The estimated residential population for the region out to 50 miles from St. Lucie Plant as provided to NRC in FPL Letter L-2013-111 dated March 28, 2013 (Reference 220) is 1,271,229.

Final Report

Evacuation Time Estimates for the Plume Exposure Pathway Emergency Planning Zone

St. Lucie Nuclear Power Plant

Prepared for:
Florida Power & Light Company

Prepared by:
Earth Tech
196 Baker Avenue
Concord, MA 01742

March 2003

EXECUTIVE SUMMARY

This report documents the results and methodology of Evacuation Time Estimates (ETE) prepared by Earth Tech for the St. Lucie Nuclear Power Plant on Hutchinson Island in Florida. This study supersedes the ETE study completed in 1993. It is based on the most recent available population data from the 2000 U. S. Census.

This study was performed using the NETVAC computer program, a dynamic model developed specifically for performing ETE studies. The NETVAC model accounts for road and intersection capacities, variable vehicle loading rates, and the geographic distribution of vehicles entering the network. The model also accounts for reduced travel speeds due to traffic congestion and queuing at intersections. The model realistically simulates driver behavior in congested traffic by dynamically assigning evacuation routes based on downstream queuing.

The road network used in the evacuation simulations consisted of designated evacuation routes plus any additional roadways needed to accurately simulate conditions during an evacuation. Roadway capacities were calculated by the NETVAC model based on actual road and intersection data collected in the field during August and September of 2002. Evacuees were generally assumed to proceed out of the Emergency Planning Zone (EPZ) by the most direct route and make their way to reception centers after leaving the EPZ.

The permanent resident population of the St. Lucie Nuclear Power Plant's EPZ is estimated at 171,061 persons, while the seasonal population is 29,989 persons.

The total population, which represents the permanent resident population, the seasonal population (winter only), special facilities (as schools, nursing homes, day care centers, hospitals, and correctional facilities), and the transient population, was estimated at 273,662 persons for a winter day, 216,690 persons for a winter night, 201,780 persons for a summer day, and 183,073 persons for a summer night. These population estimates include some intrinsic double counting, as some persons in the transient and special facility populations are undoubtedly also included in the permanent resident totals. Thus, evacuation times using this population data are considered conservative.

Evacuation times were estimated for the entire EPZ and for eight additional combinations of the St. Lucie Nuclear Power Plant's Emergency Areas for the winter day, winter night, summer day, and summer night cases under both fair and adverse weather conditions.

Evacuation times for the full EPZ for the winter day case were 9 hours 17 minutes under fair weather conditions and 10 hours 31 minute under adverse weather conditions. For the winter night case, the evacuation times were 8 hours 29 minutes and 9 hours 32 minutes under fair and adverse weather conditions. For the summer day case, the evacuation times were 8 hours 40 minutes and 9 hours 45 minutes; and for the summer night cases evacuation times were 8 hours 14 minutes and 9 hours 13 minutes under fair and adverse weather conditions, respectively.

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Appendix B - Vehicle Demand Data Summaries from POPDIS

Appendix C - Roadway Network Listing and Capacities from NETVAC

Appendix D - Resident Population Data to 50 Miles

1. INTRODUCTION

1.1 General

Evacuation time studies analyze the manner in which the population within the Plume Exposure Pathway Emergency Planning Zone (EPZ) surrounding a nuclear power plant site would evacuate during a radiological emergency. Evacuation time studies provide the licensee, State, Counties and local governments site-specific information needed for protective action decision-making. The studies estimate, for officials who would make protective action decisions, the time necessary to evacuate the EPZ, and identify instances in which unusual evacuation constraints exist.

Estimates of the time required to evacuate from areas around nuclear power plant sites are required for all operating plants in the United States. Federal guidance has been prepared to outline the format and content of these evacuation time estimates (NUREG-0654, Rev.1[1] and NUREG/CR-4831[2]).

Previous evacuation time estimate (ETE) studies were last updated for the St. Lucie Nuclear Power Plant's Plume Exposure Pathway EPZ in 1993. The guidance presented in NUREG-0654, Rev. 1 and NLTREG/CR-4831[2] indicate that evacuation time estimates should be updated as local conditions change. Although there are no specified time frames for updating the evacuation time estimates, they are updated here to account for growth within the EPZ, based on more current population information from the 2000 U. S. Census, along with roadway improvements in the EPZ.

The evacuation time estimates have been developed using current population information, local roadway network data, and the NETVAC computer simulation model. The NETVAC model was developed specifically by Earth Tech to provide evacuation time estimates and related information for use in emergency planning. The preparation of the ETE study has been accomplished with the direct input and review of St. Lucie County, Martin County, and St. Lucie Nuclear Power Plant representatives.

Evacuation times have been estimated for various areas, times, and weather conditions, as suggested in Appendix 4 of NUREG-0654, Rev. 1. These evacuation times represent the length of time required for completing the following actions:

1) Public notification;

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[1] Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, *NUREG-0654,* FEMA-REP-1, Rev. 1, U.S. Nuclear Regulatory Commission, Federal Emergency Management Agency, November, 1980.

[2] State of the Art in Evacuation Time Estimate Studies for Nuclear Power Plants, NUREG/CR-4831, T. E. Urbanik and J. D. Jamison, Pacific Northwest Laboratory, U.S. Nuclear Regulatory Commission, March, 1992.

2) Preparation and mobilization; and

3) Actual movement out of the EPZ (i.e., on-road travel time, including delays associated with vehicle queuing).

1.2 Site Location and Emergency Planning Zone (EPZ)

The St. Lucie Nuclear Power Plant is located on Hutchinson Island in St. Lucie County, Florida. The plant is situated approximately 36 miles to the north-northwest of West Palm Beach; 4.5 miles to the east-northeast of Port St. Lucie; and seven (7) miles southeast of Fort Pierce. A site vicinity map for the St. Lucie Nuclear Power Plant is included as Figure 1-1, while Figure 1-2 shows the location of the plant on Hutchinson Island.

The plume exposure pathway EPZ is the geographic area surrounding a nuclear power plant within which the Nuclear Regulatory Commission (NRC) requires advance planning for evacuation or other short-term protective actions in the event of a radiological emergency. NRC regulations define the plume exposure pathway EPZ as follows:

> "Generally, the Plume Exposure Pathway EPZ for nuclear power plants shall consist of an area about 10 miles (16 kilometers) in radius... The exact size and configuration of the EPZ surrounding a particular nuclear power reactor shall be determined in relation to local emergency response needs and capabilities as they are affected by such conditions as demography, topography, land characteristics, access routes and jurisdictional boundaries."[3]

The state and county governments of Florida have prepared plans for emergencies at the St. Lucie Nuclear Power Plant. These agencies have defined and designated the plume exposure pathway EPZ consisting of an irregularly shaped boundary located approximately 10 miles from the facility as shown in Figure 1-2.

Major roadways, which service the facility's EPZ include, State Route 1, the Florida Turnpike, and Interstate 95 which traverse the EPZ, on the mainland, in a general north-south direction. County Road A1A runs the length of Hutchinson Island and serves as the access point for the plant. Principal east-west running roadways in the EPZ include: County Roads 68, 70, 611, and 712 which run north of the facility; and County Routes 778, 716, 723/707, and 732 which run south of the facility.

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3 10 CFR, Section 50.47(c) (2). The NRC provides further guidance for defining the Plume Exposure Pathway EPZ in NUREG-0654, Rev. 1.

1.3 Evacuation Areas

The EPZ has been subdivided into eight (8) emergency areas based on conditions such as demography, topography, land characteristics, access/egress routes, and jurisdictional boundaries. Permanent resident and seasonal population data are summarized for these areas in Table 1-1. These areas are shown in Figure 1-2 and described in Table 1-2. For purposes of analyzing evacuation times for various scenarios, the emergency areas have been combined in various ways to form different evacuation cases, as shown in Table 1-3.

1.4 Reception Centers

Reception Centers are provided outside of the St. Lucie Nuclear Power Plant's EPZ for evacuees from each of the eight emergency areas. During an evacuation, all persons are expected to leave the EPZ by the most direct route and to make their way to the designated reception center after leaving the EPZ. Designated reception centers are listed in Table 1-4.

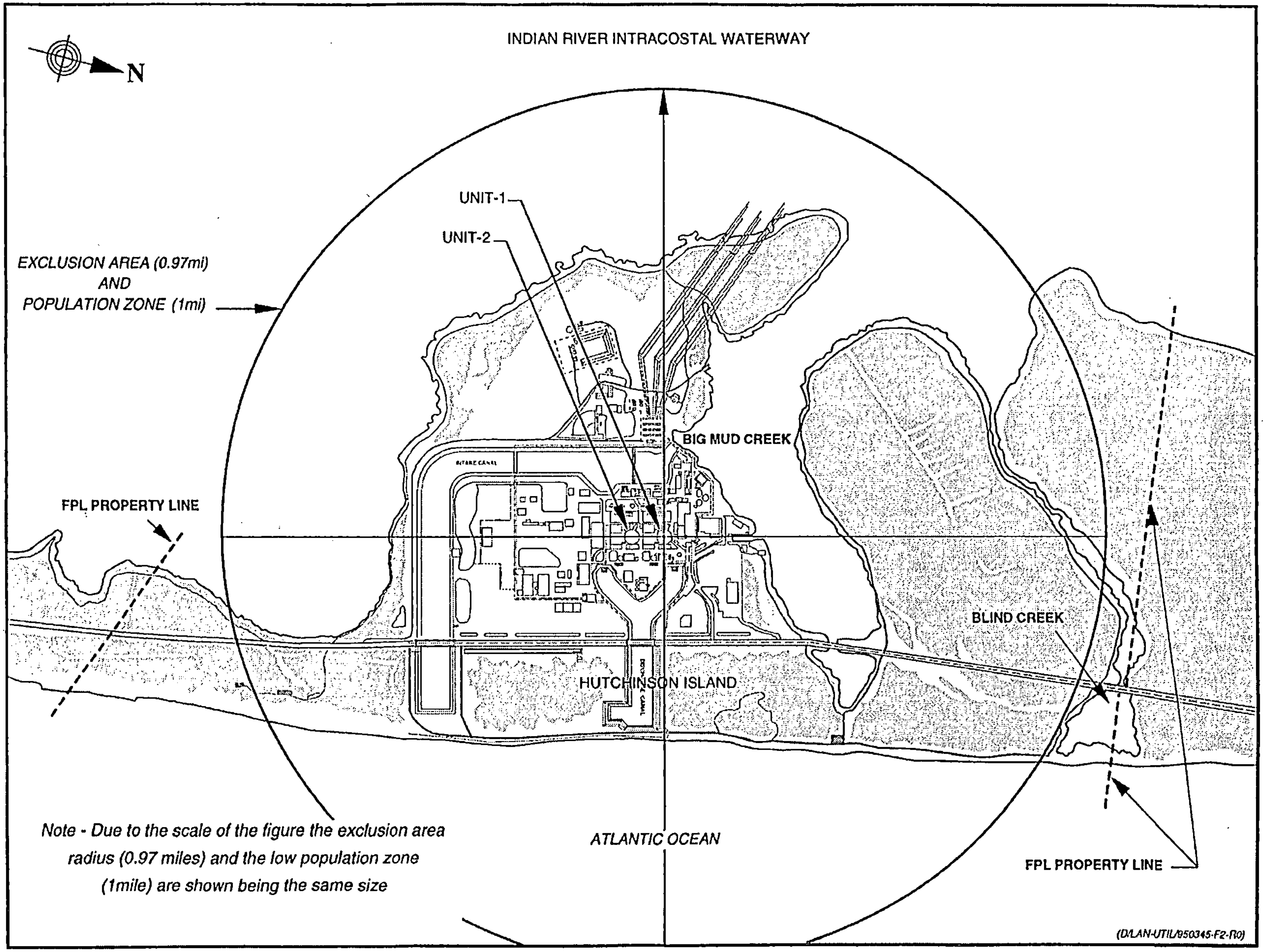

Figure 1 St. Lucie Plant Site
(Source: St. Lucie Plant UFSAR)

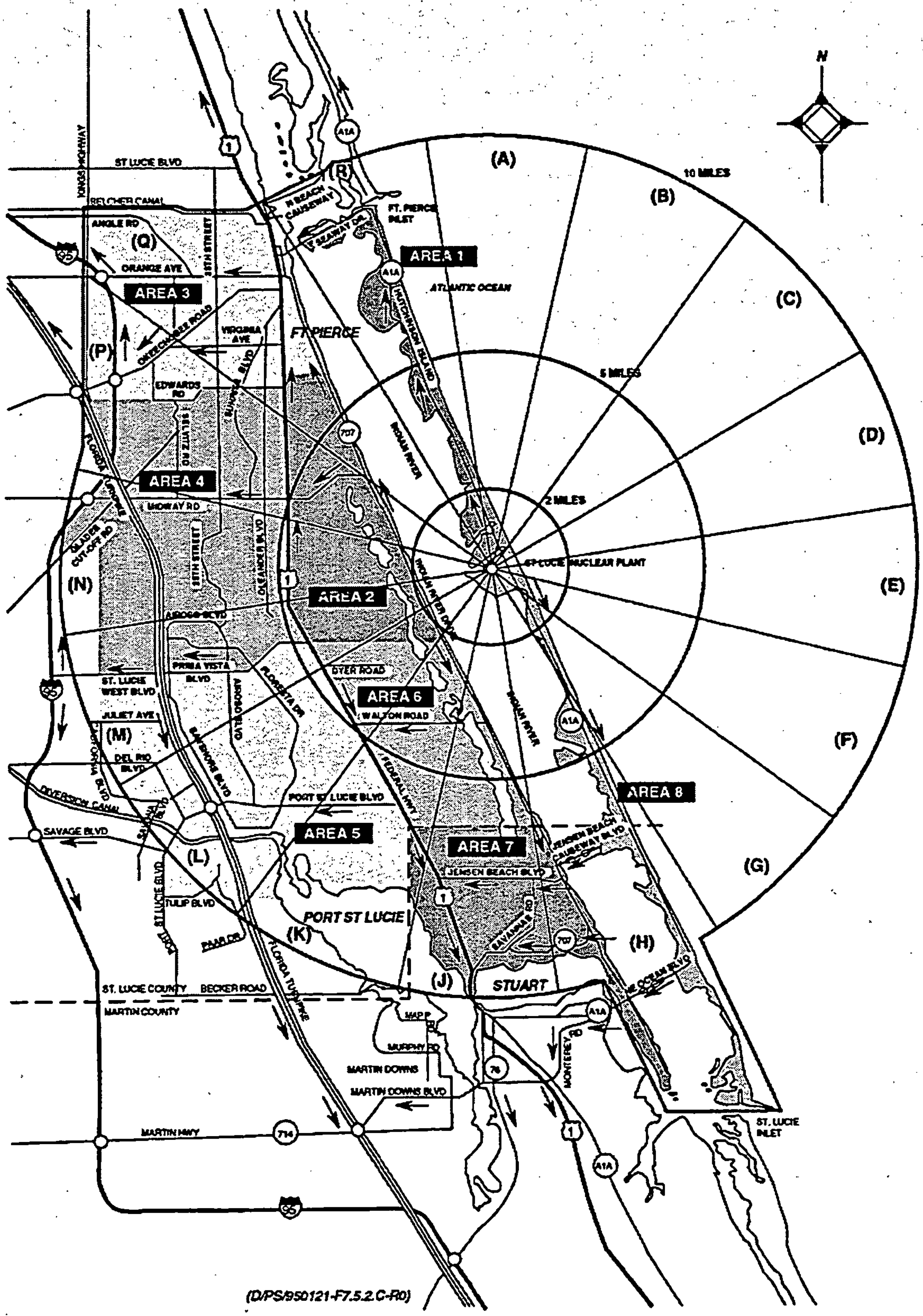

Figure 2 Ten-Mile Emergency Planning Zone
(Source: St. Lucie Plant Radiological Emergency Plan)

Table 1-4 St. Lucie Reception Centers

Reception Centers	General Location from St. Lucie Plant
Sebastian River Middle School	Northwest of Plant on County Road 512, west of Interstate 95 (Sebastian)
Life For Youth Ranch	Northwest of Plant on 82nd Ave, south of State Road 60 (Vero Beach)
Carlin Park	South-southeast of Plant on A1A from State Road 76, east of US Highway 1 (Jupiter)
Palm Beach County Truck & Trailer Park	South-southeast of Plant at Ronald Reagan Turnpike & Indiantown Road, near Turnpike Exit 116 Toll Plaza
Jupiter Lighthouse Park	South-southeast of Plant on A1A/707, east of US Highway 1 (Jupiter)

2. METHODOLOGY AND ASSUMPTIONS

2.1 Sources of Data

The following data sources were reviewed in order to develop the appropriate input required for the computer simulation model used for the evacuation analysis:

- Population estimates of permanent residents for St. Lucie and Martin Counties were developed from the 2000 U. S. Census Bureau data. Both block group and block data were used.
- Seasonal residents were estimated from 2000 U.S. Census Bureau block data for seasonal units.
- Lists of transient facilities (hotels/motels, major employers, recreational facilities, shopping centers) were developed based data provide by both St. Lucie and Martin Counties, along with information from the previous study, internet yellow pages, internet searches, the Harris Information Source, data from the local Chamber of Commerce offices, and the AAA Vacation TourBook. Population estimates were developed from these sources and telephone surveys conducted during October 2002.
- Lists of special facilities (schools & colleges, day care centers, hospitals, nursing homes, assisted living facilities, and correctional facilities) were developed based data provide by both St. Lucie and Martin Counties, as well as information from the previous study, internet yellow pages, internet searches, US Medicare web page, and data from the State's health and human services agencies. Population estimates were developed from these sources and telephone surveys conducted during October 2002.
- Roadway geometric and operational data were collected during August and September 2002 through field surveys.

2.2 Assumptions

The following assumptions were made in order to simulate an evacuation of the plume exposure EPZ:

General Assumptions

- The evacuation will be conducted in accordance with the current state and county Radiological Emergency Response Plans (RERPs).

- Preparation and mobilization times have been developed for each population component (i.e., permanent residents, seasonal residents, transients, and special facilities). The specific times are discussed in Sections 5.2 and 5.3.

- The evacuation time estimates represent the time required to evacuate the population from the designated Emergency Areas, for each of the evacuation schemes (outlined in Table 1-3), and include the time required for initial notification.

- Winter evacuation times include the seasonal population.

- Summer evacuation times do not include the seasonal population.

- Daytime evacuations are for the period from 7:00 AM until 7:00 PM.

- Nighttime evacuations are for the period between 7:00 PM and 7:00 AM.

- It is assumed that all persons within the EPZ area will evacuate. Evacuation of the EPZ will be considered complete after all evacuating vehicles are outside of the EPZ or analysis area.

- The public will travel out of the plume exposure EPZ along evacuation routes designated by state and county emergency preparedness officials. These routes are generally designed to move the population out of the EPZ via westbound routes.

- The evacuation analysis cases, which have been analyzed, are summarized in Section 2.4 and represent a range of conditions, per guidance presented in Appendix 4 of *NUREG-0654,* Rev. 1 (1980). These cases have been carefully chosen to present an appropriate range of conditions to be used in the protective action decision-making process. Although additional conditions can be identified, the cases analyzed reflect the bounds (i.e., low, typical, and high) of possible cases.

Population Related Assumptions

- It is assumed that the permanent population sector will evacuate from their places of residence. It is assumed that 1.13 cars per residential unit will evacuate. This value is based on 2000 U. S. Census data of vehicle ownership by household distributions for the St. Lucie and Martin County areas, and the assumption that 50% of households with two or more vehicles will use two vehicles to evacuate. (Research indicates that people will not evacuate, regardless of danger, until all family members are accounted for and arrangements have been made for their evacuation. Thus, there is a strong tendency for evacuees to evacuate as a family unit where possible.[4] Therefore many homes are expected to evacuate with only one vehicle and the assumptions given above are likely to be somewhat conservative.)

- The transport-dependent population will be evacuated by bus or ambulance through efforts coordinated by county emergency preparedness officials. The 2000 census data for St. Lucie and Martin Counties indicates that between 5% and 6% of housing units are without a vehicle.

- For the seasonal population, 2.7 persons are assumed per seasonal unit. This is based on data for the area, provided by Martin County, from Visit Florida, Inc.

- The marine activity in the EPZ portion of Indian River and the Atlantic Ocean will be evacuated early on in an event. Any persons that return to shore are assumed to either evacuate early or are considered part of the seasonal/residential population.

- Schools will be evacuated by buses; students will not return home. *Roadway Related Assumptions*

- Normal weather conditions assume normal roadway speeds and roadway capacities.

- Adverse weather conditions assume a 20% reduction in both travel speed and roadway capacities.

- Adverse conditions are defined by significant rain with localized flooding.

- It is assumed that existing lane utilization will prevail during the course of the evacuation. Also, most signalized intersections will be managed by traffic control officers. It is also assumed that appropriate State and municipal personnel will restrict unauthorized access into the EPZ.

- Traffic is assumed to flow in a uniform direction away from and generally to the west of the St. Lucie Plant.

- The evacuation routes are free of traffic at the start of the evacuation.

- All evacuation routes are open for use.

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[4] Evacuation Risks-An Evaluation, Hans and Sell, USEPA, July 1974; and Evacuation Planning in Emergency Management, Perry, Lindell and Green, Lexington Books, 1981.

- Tolls will not be collected on the Florida Turnpike; traffic control officers will be posted at toll booths to direct people through.

- Vehicle occupancy rates used for the various population categories are as follows:

  - Permanent residents - 1.13 vehicles per household. The average household size (2000 U. S. Census) is 2.51 persons. This translates into 2.22 persons per vehicle.

  - Seasonal transient population - 2.7 persons per vehicle (source: Visit Florida, Inc). This value assumes one vehicle per seasonal unit.

  - Schools - 48 persons per bus plus 1 vehicle per staff/employee

  - Day care centers . covered by staff vehicles (5 persons per vehicle assumed)

  - Hospitals, nursing homes, and assisted living facilities . 2 persons per ambulance for non-ambulatory, 10 persons per van for ambulatory, plus 1 vehicle per staff/employee. For Lawnwood Medical Center and Port St. Lucie Medical Center 2 persons per ambulance for non-ambulatory, 48 persons per bus for ambulatory, plus 1 vehicle per staff/employee. For all facilities, it is assumed that there is a 50%/50% split of ambulatory and non-ambulatory patients.

  - Major places of employment - 1 employee per vehicle

  - Hotel/Motel - 1 vehicle per room plus 1 vehicle per staff

  - Recreational/Campgrounds areas - 3 persons per vehicle

  - Correctional facilities - 48 persons per bus plus 1 vehicle per staff

- All persons at places of employment within the EPZ have access to vehicles.

2.3 Summary of Methodology

The evacuation time estimates developed for the St. Lucie Nuclear Power Plant's EPZ are based upon a time distribution of evacuation events as opposed to a summation of sequential events. This methodology assumes that the various time components in an evacuation (i.e., the time associated with preparation, mobilization, etc.) overlap and occur within certain time ranges.

The sequential methodology, which assumes that each phase of the evacuation must be completed before the next one begins, tends to over-estimate evacuation times. The time distribution approach, although more complex than the sequential approach, is based upon more realistic assumptions, hence it leads to more realistic evacuation times.

The NETVAC computer simulation model was used to develop the evacuation time estimates. This is a computer program developed by Earth Tech, in collaboration with Professor Yosef Sheffi of the Massachusetts Institute of Technology's (MIT) Center for Transportation Studies. The model was developed specifically to provide evacuation time estimates and related information for use in emergency planning. The NETVAC program has the following characteristics:

- The model accounts for the detailed distribution of vehicle demand.
- The model considers fundamental physical and operational characteristics of the evacuation road network.
- The model accounts for dynamic characteristics of evacuation time flows.
- Intersection capacities, and resulting level-of-service, are dynamic values. These are updated, based on modeled traffic conditions, at each intersection and for each time interval as the evacuation progresses.
- The model provides thorough documentation of results.
- The model provides a means for examining a complex problem in a structured manner.
- The model can readily address fair weather versus adverse weather conditions.
- The model can readily address evacuation scenarios occurring at different times of day.
- The model can readily address changes in population, which would be likely to occur within the EPZ at different times of the day and different times of the year.

The NETVAC program is a computer simulation model, which uses traffic flow relationships to calculate and record traffic densities, speeds, flows, queues, and other relevant information throughout the evacuation process. The model employs a sophisticated list processing method to represent the evacuation as a series of links (roadway segments) and nodes (intersections). Traffic is first entered at designated entry nodes on the roadway network. At every simulation interval, the model processes vehicles from the links entering an intersection to the links emanating from it. The NETVAC model includes a dynamic route selection feature whereby drivers' choice of outbound links at every intersection is based on two criteria:

1. The degree to which an outbound link leads away from the plant or the direction of specific evacuation routings where such plans exist, and

2. The traffic conditions on the outbound links (i.e., travel speeds and presence of vehicle queuing or congestion).

The roadway and intersection approach capacities calculated by the NET VAC program are based upon recorded geometric and operational field data and accepted traffic flow relationships presented in the Highway Capacity Manual[5] and related traffic engineering reference material. Due to the dynamic route assignment mechanism, approach capacities are updated at each simulation interval to account for potential changes in turning movement volumes. The intersection control options, which can be specified with the NETVAC model, include priority control intersections (i.e., stop or yield signs).

A more detailed description of the NETVAC program is described in Section 5.4.

2.4 Conditions Modeled

Pursuant to NUREG-0654, Rev. 1 guidance, evacuation time estimates have been prepared for a range of temporal, seasonal and weather conditions. Estimates have been prepared for fair and adverse weather conditions during a winter day, a winter night, a summer day, and a summer night.

Normal (or fair) weather refers to conditions where roadways are clear and dry, and visibility is not impaired. Adverse weather is defined by the occurrence of significant rain with localized flooding. In these cases, visibility is impaired and roadway capacities and speeds are reduced by 20 percent.

The various population components which have been incorporated in the evacuation conditions modeled are summarized below:

1. **Winter Daytime**: This situation represents a typical peak weekday with both the permanent resident and seasonal populations. School is in session and the workforce is at a full daytime level. Assumptions on the population levels for this condition include the following:

   - Permanent residents will evacuate from their places of residence;
   - Seasonal residents will evacuate from their places of residence;
   - Major work places are fully staffed at typical daytime levels;
   - The St. Lucie Plant's employment is at an estimated peak daytime level;

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[5] Highway Capacity Manual, Transportation Research Board Special Report 209, National Research Council, 1985 and Highway Capacity Manual, Highway Research Board Special Report 27, National Research council, 1965.

- Schools are in session;
- Day cares are open;
- Hospitals are full;
- Nursing homes are at typical occupied levels;
- Hotels and motels are occupied at winter levels; and
- Recreational and campground facilities are at winter daytime levels.

2. **Winter Night**: This situation represents a winter weeknight with both the permanent resident and seasonal populations. Assumptions on the population levels for this condition include the following:

   - Permanent residents will evacuate from their places of residence;
   - Seasonal residents will evacuate from their places of residence;
   - Major work places are staffed at weeknight levels;
   - The St. Lucie Plant's employment is at an estimated peak night-time level;
   - Day schools are closed;
   - Day cares are closed;
   - Hospitals are full;
   - Nursing homes are at typical occupied levels;
   - Hotels and motels are occupied at winter levels; and
   - Campgrounds are at winter nighttime levels.

3. **Summer Daytime**: This situation represents a typical weekday period during the summer when only summer school is in session and the work force is at a full daytime level. The seasonal population is not included. Assumptions on the population levels for this condition include the following:

   - Permanent residents will evacuate from their places of residence;
   - Major work places are fully staffed at typical daytime levels;
   - The St. Lucie Plant's employment is at an estimated peak daytime level;

- Schools are at summer levels;
- Daycares are open;
- Hospitals are full;
- Nursing homes are at typical occupied levels;
- Hotels and motels are occupied at summer levels; and
- Recreational and campground facilities are at summer-time levels;

4. **Summer Nighttime:** This situation represents a typical night during the summer, with major work places at typical nighttime levels and schools closed. The seasonal population is not included. Assumptions on the population levels for this condition include the following:

    - Permanent residents will evacuate from their places of residence;
    - Major work places are staffed at weeknight levels;
    - The St. Lucie Plant's employment is at an estimated peak nighttime level;
    - Schools are closed;
    - Day cares are closed;
    - Hospitals are full;
    - Nursing homes are at typical occupied levels;
    - Hotels and motels are occupied at summer levels; and
    - Campgrounds are at summer-time levels.

3. POPULATION AND VEHICLE DEMAND ESTIMATION

The development of vehicle demand estimates for the St. Lucie Plant's EPZ consisted of two primary steps. The first step was the determination of the number and distribution of the population to be evacuated. The second step was the determination of the appropriate number of vehicles for each of the population categories. Federal guidance (NUREG-0654, Rev. 1) indicates that three population categories should be considered: permanent residents, transients (seasonal, recreational, and work places), and persons in special facilities (such as schools, day care centers, medical facilities, nursing homes, assisted living facilities, and correctional facilities).

The methodology used to develop the total population and vehicle demand estimates within the plant's EPZ incorporates intrinsic double-counting. For example, it is reasonable to assume that a portion of the identified employees and visitors to recreational areas are also permanent residents within the EPZ. In addition, school children, treated as an independent special facility category, are also included in the permanent population estimates. Accordingly, the population and vehicle demand estimates which have been developed are considered to be conservative (i.e., they over-estimate actual population and vehicle levels which may be in the area at any given time). For the purpose of developing evacuation time estimates, however, these figures are considered appropriate since they more accurately reflect vehicle activity along the evacuation network. Population and vehicle demand estimates for each of the population categories are summarized below.

The following sections summarize the methodology and data sources used to develop the permanent, seasonal, transient, and special facilities population data.

3.1 Permanent Residents

Permanent residents are defined as those persons having a permanent residence within the EPZ. The 2000 U.S. Census Bureau population data were used to calculate the total permanent resident population within the EPZ. Census block data were used to distribute the population within each Emergency Area, based on land area allocation, excluding water.

An estimated 171,061 persons reside permanently within the St. Lucie Nuclear Power Plant's EPZ. Tables 3-1 through 3-4 present the permanent resident population by Emergency Area in tabular format.

3.1.1 Auto-Owning Permanent Population

Based on the census data, there are on average 2.51 persons per household in the EPZ. This value (of persons per household) was combined with 1.13 vehicles per household assumed to evacuate, resulting in 2.22 persons per vehicle. The 1.13 vehicles per household number is based on the recognition that many families have two vehicles, but the tendency of persons will be to evacuate, where possible, as a family unit.[6] It was assumed that 50% of homes with two or more vehicles would evacuate with two vehicles, and the remaining with one vehicle.

3.1.2 Transport-Dependent Permanent Population

Emergency response plans specify that the transport-dependent population will receive transportation assistance. In order to estimate the total vehicle demand associated with the transport dependent population for evacuation modeling purposes, an occupancy rate of one vehicle per household was used. This is a conservative estimate of the vehicle demand associated with the transport-dependent population, since plans include evacuating these households by van or bus.

3.2 Seasonal Residents

The seasonal population category includes those residents who reside in the area on a temporary basis, particularly during the winter months. Seasonal populations for areas within the EPZ were estimated based on the 2000 U.S. Census Bureau data for the number of seasonal housing units in the EPZ. Modeling was conducted with an average of 2.7 persons occupying each seasonal unit. This factor is based on data for the area as provided by Martin County (Source: Visit Florida, Inc.).

Based on this data, an estimated 29,989 persons reside within the St. Lucie Plant's EPZ on a seasonal basis. Tables 3-3 and 3-4 present this seasonal resident population by Emergency Area.

3.3 Transient Population

The transient population segment includes the work force, hotels/motels, recreational areas, and camping areas. Listings of major industrial and plant employers, hotels/motels, recreational area, and campgrounds within the EPZ are presented in Appendix A.

Lists of major employers were updated based on employer listings from the Chambers of Commerce in the area, the Harris Information Source, and internet searches of businesses within the EPZ. Employee population estimates were updated through a telephone survey, as necessary. Employment data for the site were provided by plant personnel and reflect the peak population during the daytime and nighttime. An auto occupancy factor of one (1) person per vehicle was assumed for employees.

Lists of hotels/motels were updated based on information obtained from the Chambers of Commerce, AAA TourBook Guide, internet yellow pages, and internet searches. The population estimates were updated, as necessary, through a telephone survey. Hotels and motels individually provided average persons per room; one vehicle per room was modeled.

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[6] Evacuation Risks-An Evaluation, Hans and Sell, USEPA, July 1974; and "Evacuation Planning in Emergency Management", Perry, Lindell, and Green, Lexington Books, 1981.

There are two camping/recreational areas in the EPZ, both in St. Lucie County. These include the Fort Pierce Inlet State Park and Savanna's Recreational Area. It was assumed that there would be 3 persons per vehicle for these areas. Tables 3-1 through 3-4 present the transient population for each of the eight emergency areas.

3.4 Special Facilities Population

The special facility population segment includes persons in schools/colleges, day cares, hospitals, nursing homes, assisted living facilities, and correctional facilities. Listings of special facilities are provided in Appendix A.

Listings of special facilities were updated based on information obtained from the Chamber of Commerce, internet searches, US Medicare web page, State health & human services agencies, and information provided by St. Lucie and Martin Counties. The population estimates were updated through a telephone survey, as needed.

There are 48 schools and 86 day care centers within the EPZ. For schools, it was assumed that there would be 48 persons per bus, and one vehicle for each staff member/employee. For day care centers, it was assumed that staff vehicles would be utilized for evacuation purposes (5 persons per vehicle was used).

There are four hospitals/medical facilities and 43 nursing homes/assisted living facilities within the EPZ. It was assumed that there would be 10 persons per van for ambulatory residents, two persons per ambulance for non-ambulatory residents, and one vehicle for each staff member. For Lawnwood Medical Center and the Port St. Lucie Medical Center, 48 persons per bus was used for ambulatory patients, two persons per ambulance was used for non-ambulatory patients, and one vehicle was used for each staff member. For each facility a 50%/50% split was used for ambulatory/non-ambulatory for both residents at nursing homes and patients at hospitals

There are two correctional facilities in the EPZ. For these facilities, it was assumed that there would be 48 persons per bus, and one vehicle for each staff member/employee.

Tables 3-1 through 3-4 present the special facility population for each of the eight emergency areas.

3.5 Waterborne Transient Population

The waterborne population includes persons using boats and other watercraft in Indian River and the Atlantic Ocean.

Since this population will be warned early of an event at the St. Lucie Nuclear Power Plant, it will have the opportunity to leave the EPZ in a timely fashion. For those returning to shore in the EPZ, it is likely they will already be part of the permanent or seasonal population, which will evacuate from their residence. Therefore, this population group was not considered separately.

TABLE 7: ST. LUCIE NUCLEAR POWER PLANT
2000 RESIDENT POPULATION BY COUNTY OUT TO 50 MILES

County	Population
BREVARD	34,542
GLADES	1,541
HENDRY	0
HIGHLANDS	919
INDIAN RIVER	112,947
MARTIN	126,731
OKEECHOBEE	35,713
OSCEOLA	268
PALM BEACH	507,600
ST. LUCIE	192,695
Total	1,012,956

Notes: Based on 2000 census block data.
Assumes uniform population distribution in block.

APPENDIX 2.1B

ESTIMATE OF THE ACTUAL POPULATION

WITHIN 10 MILES OF

ST. LUCIE PLANT

This appendix represents an excerpt from a letter submitted to the NRC via FPL letter L-2008-047 dated March 26, 2008.

The 10 mile population estimate as provided in Reference 221 for 2013 is 225,058.

There are an estimated 204,190 people who reside within ten miles of the St. Lucie Plant. This is based on updated data received from St. Lucie County Department of Public Safety and Martin County Emergency Management. The data is provided by geographic area.

Area	Estimated Resident Population (2007)
1	2,863
2	9,890
3	33,155
4	36,697
5	66,855
6	19,624
7	28,073
8	7,033
Total	**204,190**

Figure 1 provides a geographic description of the eight area boundaries.

Figure 2 shows the division of the Ten Mile Emergency Planning Zone (EPZ) into the geographic boundary areas described in Figure 1.

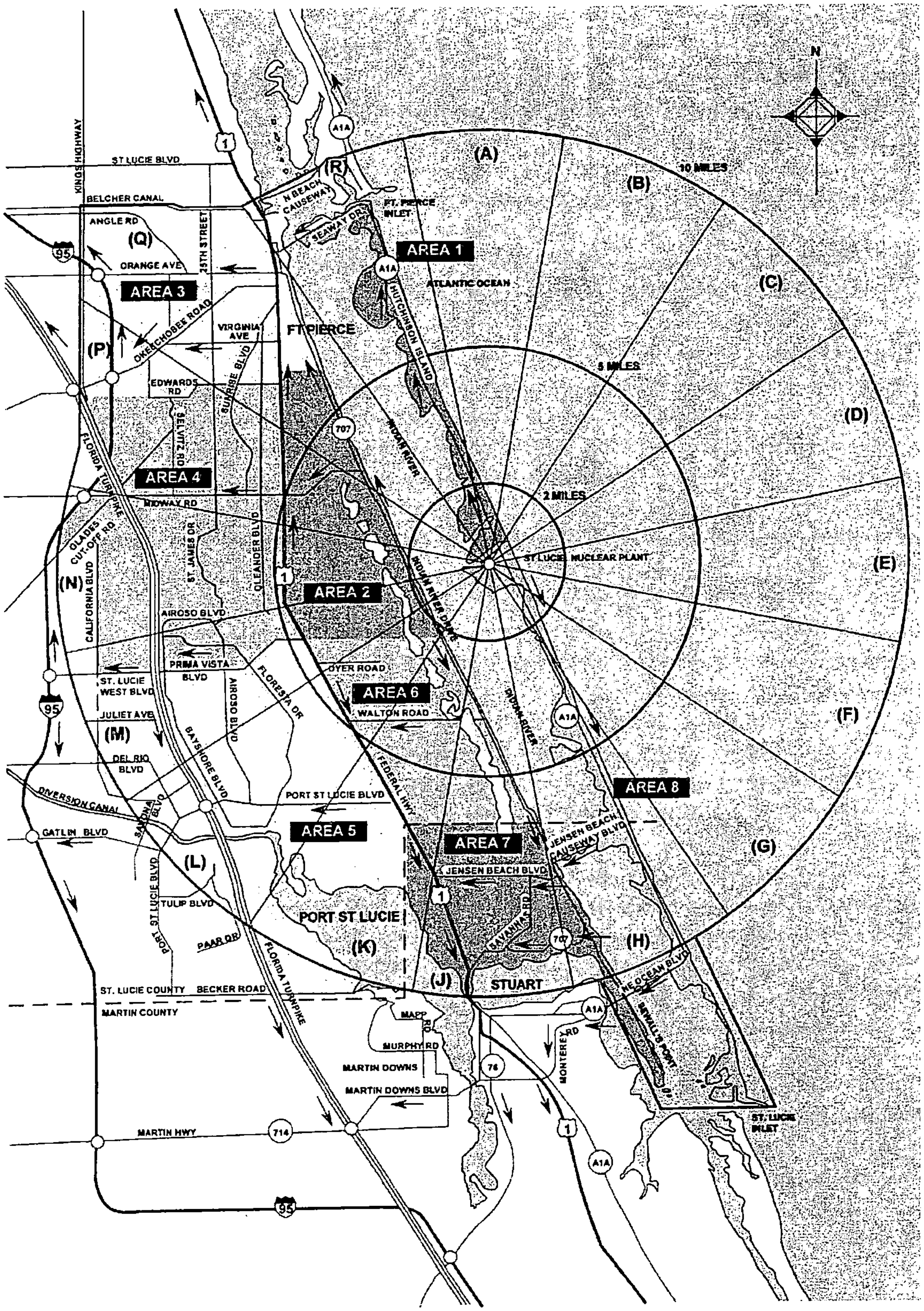
FIGURE 1
GEOGRAPHIC DESCRIPTION OF AREA BOUNDARIES

Area	Boundaries	
#1	North of:	The St. Lucie Nuclear Power Plant on Hutchinson Island
	South of:	Seaway Drive
	West of:	The Atlantic Ocean
	East of:	The Indian River
#2	North of:	Dyer Road
	South of:	Savannah Road
	West of:	The Indian River
	East of:	U.S. Highway 1
#3	North of:	Edwards Road Savannah Road Seaway Drive
	South of:	Belcher Canal North Beach Causeway
	West of:	The Atlantic Ocean U.S. Highway 1
	East of:	Kings Highway I-95
#4	North of:	St. Lucie West Boulevard Prima Vista Boulevard
	South of:	Edwards Road
	West of:	U.S. Highway 1
	East of:	California Boulevard I-95 The Florida Turnpike
#5	North of:	Becker Road St. Lucie / Martin County Line
	South of:	Prima Vista Boulevard St. Lucie West Boulevard
	West of:	U.S. Highway 1 St. Lucie / Martin County Line
	East of:	The Florida Turnpike I-95 California Boulevard Savona Boulevard Gatlin Boulevard Tulip Boulevard Paar Drive

FIGURE 1 (Continued)
GEOGRAPHIC DESCRIPTION OF AREA BOUNDARIES

Area	Boundaries	
#6	North of:	St. Lucie / Martin County Line
	South of:	Dyer Road
	West of:	The Indian River
	East of:	U.S. Highway 1
#7	North of:	The St. Lucie Inlet
		All of Sewalls Point
		The St. Lucie River
	South of:	The St. Lucie / Martin County Line
	West of:	The Indian River
	East of:	The St. Lucie / Martin County Line
#8	North of:	The St. Lucie Inlet
	South of:	The St. Lucie Nuclear Power Plant on Hutchinson Island
	West of:	The Atlantic Ocean
	East of:	The Indian River

FIGURE 2



AREA 1
AREA 2
AREA 3
AREA 4
AREA 5
AREA 6
AREA 7
AREA 8
(A)
(B)
(C)
(D)
(E)
(F)
(G)
(H)
(J)
(K)
(L)
(M)
(N)
(P)
(Q)
(R)
10 MILES
5 MILES
2 MILES
ST LUCIE NUCLEAR PLANT
ATLANTIC OCEAN
FT PIERCE
PORT ST LUCIE
STUART
ST. LUCIE COUNTY
MARTIN COUNTY
ST LUCIE BLVD
BELCHER CANAL
ANGLE RD
ORANGE AVE
OKEECHOBEE ROAD
VIRGINIA AVE
EDWARDS RD
MIDWAY RD
AIROSO BLVD
PRIMA VISTA BLVD
DYER ROAD
WALTON ROAD
PORT ST LUCIE BLVD
JENSEN BEACH BLVD
GATLIN BLVD
TULIP BLVD
BECKER ROAD
MARTIN DOWNS BLVD
MARTIN HWY
INDIAN RIVER
HUTCHINSON ISLAND
FLORIDA TURNPIKE
FEDERAL HWY
ST. LUCIE INLET

2.2 NEARBY INDUSTRIAL, TRANSPORTATION AND MILITARY FACILITIES

2.2.1 LOCATION AND ROUTES

Information contained in this section is considered historical. It may be acceptable to update this section if such changes are determined by the UFSAR Update Group to be appropriate.

The St. Lucie site is located on Hutchinson Island approximately six miles southeast of Ft. Pierce, Florida. Within five miles of the St. Lucie site are: (a) six primary, secondary and light duty highways, (b) one rail line, (c) two airways, (d) intracoastal shipping lanes, (e) sand mining operations, and (f) wastewater treatment facility (see Figure 2.2-1). Available data indicate that no other facilities exist within either a five mile radius or, in terms of significant facilities, a 10 mile radius of the plant (e.g., oil and gas pipelines, military bases, chemical plants, drilling operations, etc.)(1-11)

2.2.2 DESCRIPTIONS

2.2.2.1 Description of Facilities

Information contained in this section is considered historical. It may be acceptable to update this section if such changes are determined by the UFSAR Update Group to be appropriate.

There are no significant facilities within the plant vicinity that produce hazardous materials. For a description of nearby facilities, refer to Subsection 2.1.3.3.3.

2.2.2.1.1 Transportation Facilities

Roads

One primary highway (US 1), three secondary highways (SR A1A, SR 712, SR 707) and two light duty roads (Walton Road, Easy Street), are within five miles of the plant. As indicated by Table 2.2-1, average daily traffic volumes on these routes during peak seasonal times (fall and winter) during 1977-1978 ranged from 1,016 to 19,640. Increases in traffic volumes could be as high as six percent annually(12,13). The shortest linear distance from the center of the Reactor Building to each of these highway corridors is listed below:

a) US 1 - 4.8 miles WSW

b) SR A1A - 0.2 mile E

c) SR 712 - 3.8 miles NW

d) SR 707 - 1.8 miles WSW

f) Easy Street - 3.1 miles NW

Rail

Paralleling the western shore of the Indian River (2.0 miles west southwest of the Reactor Building) is the Florida East Coast Railway. Descriptive statistics concerning this facility are provided below[14]:

a) Average daily number of trains - 21

b) Average train size - 50 to 55 cars

c) Maximum train size - No limit

d) Number of passenger trains - None

e) Commodities transported - Rock, autos, building materials, perishables, piggyback shipments (FAK/Freight of all kinds) and any hazardous materials meeting the tariff regulations of the Interstate Commerce Commission (ICC)

f) Tonnage shipped annually past the site - 7,959,098 tons

Airways

Two airways are located approximately two miles to the east of the plant: V295 and V3E. The two airways are used extensively by both IFR traffic (instrument flight rules, primarily commercial) and VFR traffic (visual flight rules; primarily private)[15].

Waterways

Commercial shipping lanes are located east and west of the plant. The Intracoastal Waterway is located 1.2 miles to the west of the plant. The St. Lucie County portion of the Intracoastal Waterway (a north-south transportation route extending the length of the east coast) passes through the Indian River. Atlantic Ocean shipping lanes are about 10 to 15 nautical miles east of the plant, with north bound traffic lanes located farther east than southbound lanes[16].

2.2.2.1.2 Quarrying/Mining Operations

A small sand mining operation (employing two people) is located along the western shore of the Indian River approximately four miles northwest of the plant site. No explosives are employed by these operations[1,13].

2.2.2.1.3 Wastewater Treatment Facility

A wastewater treatment facility is located on Hutchinson Island west of State Road A1A, approximately two miles south of the plant site.

2.2.2.2 Description of Products and Materials

2.2.2.2.1 Railroads

Information contained in this section is considered historical. It may be acceptable to update this section if such changes are determined by the UFSAR Update Group to be appropriate.

The Florida East Coast Railway may transport any hazardous material complying with ICC tariff regulations past St Lucie Unit 2. The principle explosive substance transported is liquid petroleum gas (maximum tank size, 33,000 gallons): the principle toxic substance transported is chlorine (maximum tank size, 90 tons)[17]. Such materials may be included on all trains.

Within the past 10 years, two minor rail accidents (both derailments) have occurred within five miles of the plant: (a) May 15, 1969 at milepost (MP) 248.2- "wrung journal" (i.e., broken axle) on car FEC 12295, (b) August 26, 1974 at MP 257.1 - brake rod broke, derailing car NW 292587. Neither incident involved hazardous materials and total recorded damage (involving only equipment and track) approximated $762.00[14]

2.2.2.2.2 Truck Carriers

Information contained in this section is considered historical. It may be acceptable to update this section if such changes are determined by the UFSAR Update Group to be appropriate.

No data were available on truck traffic or truck shipments within five miles of St. Lucie Unit 2, although existing records indicate that no truck related accidents involving hazardous materials have occurred within the area[19]

Since there was very little information on truck traffic in the vicinity of the plant, the Applicant performed a survey[20] to get an indication of the amount and type of truck traffic on the roads within a five mile radius of the site. The survey was performed between January 30, and February 6, 1979 and consisted of collected information on US 1, SR A1A, SR 707, SR 712, and Walton Road. The survey consisted of the following:

a) A collection of existing information from the state and the county regarding traffic counts and accident characteristics.

b) Twenty-four hour truck classification counts taken at 13 locations. Each truck was classified by the number of axles and whether it was marked as carrying hazardous material. The type of hazardous material was also noted.

c) A roadside interview on US 1 of trucks marked as carrying material was conducted on US 1 for a total of 18.5 hours over a two day period. Information on the type and amount of hazardous material being carried by these vehicles was collected. The interview station was located on US 1 because it is the most heavily traveled roadway in the five mile area and has the majority of truck traffic of the roads in question.

d) Automatic traffic recorder counts were obtained at 10 locations for a seven day period.

e) Contacting propane gas supply companies in the area to determine if deliveries were made within the five mile radius; the type of material being transported; and size and capacity of these trucks.

The survey locations are shown on Figure 2.2-2. The results of the survey are given in Tables 2.2-2, 2.2-3 and 2.2-5 and shown on Figures 2.2-3 and 2.2-4.

The average daily traffic count and the average weekday traffic count determined from the survey are given in Table 2.2-2 and shown on Figure 2.2-3. The count data are consistently higher than the volume figures obtained from the State of Florida. The difference is apparently caused by the increase in seasonal activity on all routes in the area during this time of year (January-February), and in traffic volumes on SR A1A due mainly to construction activities at St. Lucie Unit 2.

The truck volume and the volume of trucks displaying hazardous material placards are also represented in Table 2.2-2 and Figure 2.2-3 and are based on the trucks observed during the classification counts.

In summary, the trucks observed during the study period comprised from 1.3 to 6.4 percent of the total traffic. These values are comparable to the normal truck percentages, which are usually five percent[21]. Trucks carrying hazardous material comprised from 0 to 16.7 percent of the total truck traffic as indicated on Table 2.2-2.

A summary of the trucks marked hazardous and interviewed on US 1 is given in Table 2.2-3. Though this is a limited sample, it does give an indication of the type and amount of hazardous material transported within the five mile radius.

On SR A1A, the majority of the truck traffic services the St. Lucie site. Table 2.2-4 is a description of the type, size and frequency of truck shipments of compressed gases and process chemicals to the St. Lucie site.

In addition to interviews and classification counts, four propane gas companies known to make deliveries in the area were contacted to determine the type and amount of material being transported and the size and capacity of their trucks; the results are as follows:

a) Tropigas, Stuart - transports liquid propane gas in 2,000 gallon tanks on two axle and three axle trucks into the area of the five mile radius. They deliver once a month on SR 707 as far north as the plant site and they deliver once a month to "Venture Sales" located on SR A1A in the area of Nettles Island.

b) Tropigas, Fort Pierce - is similar to a) above. However, they deliver once a month during summer months and twice a month during winter months to locations along SR 712 and SR 707 as far south as the plant site.

c) Tri-County Gas, Inc, Stuart - transports liquid propane gas in quantities up to 2,150 gallons on three axle trucks into the area of the five mile radius. They presently service St. Lucie Unit 2 once or twice a week for welding operations. They also service "American Resort" in the vicinity of Nettles Island once a month and deliver along SR 707 and SR 712 once a month.

d) Econ-O-Gas, Inc, Stuart - makes no deliveries into the site area.

In addition, hazardous materials are delivered by truck to the St. Lucie County wastewater treatment facility located south of St. Lucie Units 1 and 2. The storage of this material at the wastewater treatment facility, along with the potential for transport accidents, is addressed in Section 2.2.3.2.

Information on truck accidents is presented in Table 2.2-5 and Figure 2.2-4. Between January 1, 1973 and December 31, 1977, 19 accidents involving trucks occurred on US 1 and one accident occurred on SR A1A within the five mile radius. Between January 1, 1973 and December 31, 1976, one accident occurred on SR 707. Within the last five years there were no accidents within the St. Lucie County involving hazardous material[20]

2.2.2.2.3 Waterborne Commerce

Information contained in this section is considered historical. It may be acceptable to update this section if such changes are determined by the UFSAR Update Group to be appropriate.

As is indicated in Table 2.2-6, 23 different types of commodities are regularly shipped past the site via the Intracoastal Waterway [22]. During 1975-1977, residual fuel oil constituted 56 percent of all shipments (by weight/tons). Other major types of commodities shipped past the site during this same period included nonmetallic mineral products (10.3 percent) and sugar (9.0 percent). Although no data are available concerning shipping in the Atlantic Ocean, the U.S. Coast Guard estimates that 40 to 50 ships pass the site each day. Approximately half of this traffic (i.e., 25 to 30 ships) is estimated to carry petroleum products[16].

2.2.2.2.4 Onsite Products and Materials

Compressed gases and process chemicals located on the St. Lucie site for operation and maintenance purposes (and stored in standard industrial high pressure cylinders) include the following:

Compressed gases

a) Acetylene - approximately 25 bottles, (360 scf)

b) Oxygen - approximately 25 bottles, (360 scf)

c) CO_2- approximately 80 bottles, (360 scf)

d) N_2- 40,000 scf tube trailer
40 bottles, (360 scf)
Liquid Dwyer (several hundred gallons)

e) Hydrogen - 40,000 scf tube trailer
80 bottles, (260 scf)

f) Helium - Approximately 10 bottles (360 scf)

Process Chemicals

a) Ammonium hydroxide - fifteen 1 gallon bottles

b) Hydrazine - six 350 gallon tanks, two 550 gallon tanks

c) Sodium Hydrochlorite - 7500 gallons

d) Dimethylamine (liquid) - six 350 gallon tanks, two 550 gallon tanks

e) Carbohydrazide - 100 gal.

f) Ethanolamine (liquid) - six 350 gallon tanks, two 550 gallon tanks

Other gases limited to a small number of bottles

a) Argon

b) Methane

c) Propane

d) Laboratory specialty gases

2.2.2.3 Pipelines

Information contained in this section is considered historical. It may be acceptable to update this section if such changes are determined by the UFSAR Update Group to be appropriate.

No pipelines carrying toxic chemicals are located within five miles of the plant.[3,4]

2.2.2.4 Waterways

Information contained in this section is considered historical. It may be acceptable to update this section if such changes are determined by the UFSAR Update Group to be appropriate.

The Intracoastal Waterway (10 foot channel depth) passes 1.2 miles west of the plant. All intake structures are located to the east of the plant and open into the Atlantic Ocean. Four types of vessels utilize the Intracoastal Waterway: (a) self propelled passenger and dry cargo vessels, (b) non-self propelled dry cargo vessels, (c) non-self propelled tankers, and (d) towboats and tugboats[22].

2.2.2.5 Airports and Airways

Information contained in this section is considered historical. It may be acceptable to update this section if such changes are determined by the UFSAR Update Group to be appropriate.

No major airports exist within 10 miles of the plant. Approximately nine miles west northwest of the site there is a private airport called Sunrise. Within nine and 50 miles of the plant, there are 26 airports. Location data for all airports within 50 miles of the site are provided in Table 2.2-7. Based on available data, no airport within the 50 miles area records operations at or beyond levels of $500d^{2*}$ (within 10 miles) or $1000d^2$ (within 10 to 50 miles) [23,24,25,26]. The estimated number of IFR flights occurring in airways V295 and V3E (calculated within a 20 mile radius of the site) is 250,000 annually; VFR traffic in this same area is estimated to equal 500,000 flights annually.[27]

2.2.2.6 Projections of Industrial Growth

Information contained in this section is considered historical. It may be acceptable to update this section if such changes are determined by the UFSAR Update Group to be appropriate.

Between 1980 and the year 2000, light manufacturing activity in St. Lucie County is projected to increase by approximately 111 percent[28]. In 1980, approximately seven percent of total earnings** or $13.1 million is expected to be derived from manufacturing activities. By the year 2000, earnings derived from light manufacturing ($27.7 million) are projected to approximate two percent of total earnings. During each of these benchmark years, approximately 60 percent of manufacturing-based earnings is expected to be derived from two industrial sectors: foods and kindred products, (primarily citrus) and chemicals and allied products (primarily fertilizers). Throughout this time frame, relatively small amounts of manufacturing activity are expected to occur in four additional industrial sectors: printing and publishing; metal fabrication; machinery manufacturing; and electrical equipment manufacturing.

Such increases in manufacturing activity as may occur in St. Lucie County are expected to be contained in relatively high intensity nuclei located along major highways - especially I95 and US 1[29]. Given such a development strategy, increases in manufacturing activity within five miles of St Lucie Unit 2 may be anticipated primarily along US 1 in the vicinity of Port St. Lucie (i.e., approximately five miles west of the plant).

* Refers to distance (d) in miles from the site.

** Earnings include income derived from wages, salaries, proprietary and miscellaneous income.

2.2.3 EVALUATION OF POTENTIAL ACCIDENTS

There are no design basis events external to the plant that have a probability of occurrence of 10^{-7} per year or greater and have potential consequences serious enough to affect the safety of the plant to the extent that guidelines established for design basis accidents could be exceeded.

2.2.3.1 Explosions

2.2.3.1.1 Transportation of Explosives and/or Flammables on the Atlantic Ocean and Intracoastal Waterway

The Atlantic Ocean shipping lanes are about 10 to 15 nautical miles east of the plant (refer to Subsection 2.2.2.1.1). Hence, with a distance of 10 miles, no ship or barge explosion can affect the plant structures.

Due to the Intracoastal Waterway channel depth of 10 ft, the size of barges passing the plant site is limited. The waterway depth is nominally assumed to be capable of handling nine feet draft vessels which transport a maximum load of about 16,000 bbl(30). However in actual practice, transporters are limited to loads of about 7,000 bbls per trip on barges of no more than a six feet draft because the Intracoastal Waterway is not dredged often(30). As indicated in Table 2.2-6, the commodities of concern regarding explosions are gasoline and petroleum.

Gasoline is used as an example for calculating explosion overpressures. According to Robert F Benedict, the upper limit of flammability for gasoline is 7.9 percent(31) . The highest limit of flammability for the gasoline family stated by the Bureau of Mines is 10.5 percent for cyclo-propane(32). Mr. Benedict has stated that although the density of gasoline vapor at the highest limits of flammability is unavailable, the combination of a 10.5 percent limit of flammability and a gasoline vapor density of 0.245 lbm/ft^3 (which corresponds to the vapor density of heptane) at this limit is conservative.

The free volume of a 16,000 bbl barge is 16,000 bbl x 42 gal/bbl x 0.1337 ft^3 /gal = 89,846 ft^3. Using a conservative 10.5 percent gasoline-air mixture (i.e., 0.105 of volume) at a vapor density of 0.245 lbm/ft^3, there are 2311 lbm of gasoline in a 16,000 bbl barge. Assuming an extremely conservative upper bound of mass equivalency at 240 percent, 2311 lbm of gasoline vapor yields a detonation equivalent to 5547 lbm TNT.

From Equation 1 of Regulatory Guide 1.91, "Evaluations of Explosions Postulated to Occur on Transportation Routes Near Nuclear Power Plants," February 1978 (R1), the calculated safe overpressure distance is

$$R \geq k\,W^{1/3} \geq 45\,(5547)^{1/3} \geq 797 \text{ ft.}$$

where:

R = distance in feet from an exploding charge

W = pounds of TNT

K = constant = 45

Therefore a one psi peak positive overpressure will not occur at a distance greater than 797 ft. for a 16,000 bbl barge of gasoline vapors. Since the Intracoastal Waterway shipping channel is over 6000 ft away from any safety related structures, no damage occurs from a barge explosion.

Explosion generated missiles are also considered as follows:

In order to determine the distance through which generated missiles can travel, Consider the exploding volume of 89,846 ft^3 as a sphere (radius = 27.78 ft^3) with energy equipartitioned through the exploding volume. The explosive energy (E_e) assuming 5547 lbm TNT is

$$E_e = 5547 \text{ lbm} \times 500 \frac{\text{kcal}}{\text{lbm}} \times 3.968 \frac{\text{Btu}}{\text{kcal}} = 1.1 \times 10^7 \text{ Btu}$$

and the energy density (E) is

$$E = \frac{E_e}{\text{free volume}} = \frac{1.1 \times 10^7 \text{ Btu}}{89{,}846 \text{ ft}^3} = 122.5 \text{ Btu/ft}^3$$

In a deflagration type of explosion the maximum energy density imparted to potential missiles cannot exceed the energy of the explosion. Hence, the kinetic energy (KE) of a potential missile cannot exceed

$$KE(\text{Btu}) = E(\text{Btu/ft}^3) \times M_m(\text{lbm}) \div \rho_m (\text{lbm/ft}^3)$$

where M_m and ρ_m are the mass and density of the potential missile. With a kinetic energy (KE) = 1/2 $M_m V^2$, where V is the missile speed, the maximum range (R_{max}) of a missile is

$$R_{max} = \frac{V^2}{g} = \frac{2\,KE}{M_m} \times \frac{1}{g} = \frac{2E\,M_m}{\rho_m M_m} \; \frac{1}{g} = \frac{2\,E}{\rho_m g}$$

Using steel as an example with a density of 489 lbm/ft^3, the maximum range calculated of a potential missile is

$$R_{max} = \frac{2 \times 122.5 \frac{\text{Btu}}{\text{ft}^3} \times 778 \frac{\text{ft-lbf}}{\text{Btu}} \times 32.2 \frac{\text{lbm-ft}}{\text{lbf-sec}^2}}{32.2 \text{ ft/sec}^2 \times 489 \text{ lbm/ft}^3} = 389.8 \text{ ft}$$

The above equation does not include consideration of air resistance or energy lost in rotation, which would decrease the range of any generated missile. Thus there is no hazard from a barge explosion due to missiles.

2.2.3.1.2 Transportation of Explosives and/or Flammables by Truck or State Road A1A

A review of the truck traffic reveals that the governing explosive and/or flammable event would arise on SR A1A which passes about 750 ft east of the diesel oil storage tanks due to a liquified propane truck accident. Based on the limited amount of hazardous truck movements past the site, the probability of having a potential accident whose consequence can result in radionuclide releases in excess of guidelines established for design basis accidents is less than 10^{-7} per year as described below.

Based on accident data for a five year period (January 1, 1973 through December 31, 1977) provided by the Florida Department of Transportation, there has been only one truck accident within five miles of the site on SR A1A in a total of 2,600,000 truck vehicle miles traveled[20]. Therefore, the probability of any type of truck accident is calculated to be 3.8×10^{-7} truck accidents per vehicle mile. This site specific probability is much smaller than the 1.3×10^{-6} truck accidents per vehicle mile probability for a tank truck accident in the "minor" severity category predicted in WASH-1238[35]. Therefore the WASH-1238 probability is used and gives a conservative estimate of the frequency of truck accidents in the site vicinity.

To calculate the probability that hazardous flammable liquids explode due to a spill, it is necessary to determine the conditional probability of a spill and the conditional probability of an explosion occurring due to a spill. Although there have been no accidents within St. Lucie County involving hazardous material within a period of 1973-1978[20], the probability of a spill as a result of an accident is estimated at 0.02[36], since two percent of accidents involve a tank truck with sufficient impact to cause rupture of tank. The probability of an explosion due to a spill as determined by the Department of Transportation's Office of Hazardous Materials is 0.0113[37]

Thus, the probability(Pe) associated with an in-transit explosion of a truck is $1.3 \times 10^{-6} \times 0.02 \times 0.0113 = 3.6 \times 10^{-10}$ explosions per vehicle mile.

The number of vehicle miles per year for the transport of hazardous material in the one mile stretch of SR A1A incident to the site can be estimated. The annual number of liquified propane gas truck deliveries on SR A1A in the vicinity of the site is 27 shipment/yr (as described in Subsection 2.2.2.2.2). Assuming all these trucks travel through the one mile stretch of road incident to the site, 27 vehicle mile/yr can be estimated. Using the probability of 3.6×10^{-10} explosions/vehicle mile, the probability of an explosion is 9.72×10^{-9} per year, in the one mile stretch of SR A1A closest to the site.

Since the probability is less than 10^{-7} per year, an explosion of a truck carrying hazardous material is not a design basis event.

2.2.3.1.3 Transportation of Explosives and/or Flammables on the Florida East Coast Railway

The Florida East Coast Railway runs about two miles west southwest of the plant site (refer to Subsection 2.2.2.1.1). Since the rail line can approach the safety related structures no closer than the distances computed in Figure 1 of Regulatory Guide 1.91(R1), no further consideration need be given to the effects of blast in plant design. This two mile distance is greater than the ranges of fragments of the train accident in Laurel, Mississippi(38). The range of the "rocketing" car in the Laurel, Mississippi accident was 1100 ft while small fragments had a maximum range of 1600 ft.

Thus there are no hazards from "rocketing" rail cars or their fragments for St. Lucie Unit 2 safety related structures.

2.2.3.2 Design Basis Toxic Chemical Events

2.2.3.2.1 Introduction

The accidental release of toxic chemicals may affect control room habitability. Based on information presented in Subsection 2.2.2, the potential sources are analyzed in detail to determine the threat to the control room operators.

Table 2.2-8 contains a list of each of the toxic chemical stored or transported in the vicinity of the plant. Those specific events which are found to have a probability of less than 10^{-7} per year are considered not to be design basis events.

2.2.3.2.2 Assumptions and Methodology

Based on information presented in Subsection 2.2.2, Table 2.2-8 includes a list of hazardous chemical sources which are considered in evaluation of potential accidents. Consideration is limited to those chemicals which are present within a distance of five miles from the control room air intakes. Chemicals stored or situated at distances greater than five miles from the facility are not considered because, if a release occurs at such a distance, wind speed and atmospheric dispersion will dilute and disperse the incoming plume to such a degree that there will be sufficient time for the control room operators to take appropriate action, if any is required. In addition, the probability of a plume remaining within a given sector for a long period of time is quite small.

The St. Lucie County wastewater treatment facility (located approximately two miles south of the plant) uses and stores certain hazardous materials (Chlorine, sodium hydroxide, sodium bisulfite, and polymers). The use and storage of hazardous materials at the wastewater treatment facility is addressed later in this section. There are no other facilities located within five miles of the plant which store, use, or produce large quantities of hazardous substances. However, some quantities are stored on site as indicated in Table 2.2-8. Other than the chemicals transported to the wastewater treatment facility, there are not toxic chemicals transported by waterborne commerce and road in significant quantities that may affect the safety of the plant following accidental releases; consequently such sources are not evaluated. The transport of hazardous materials to the wastewater treatment facility is addressed later in this section. There are no pipelines carrying toxic chemicals located within five miles of the plant and so this source is also not considered. The amounts of toxic chemicals transported by the Florida East Coast Railway (FECR) are greater than those specified in Regulatory Guide 1.78, "Assumptions for Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release," June 1974 (R0). Therefore releases of toxic chemicals due to railroad accidents are considered in the analysis.

In order for the control room operators to become exposed to one of the toxic chemicals listed in Table 2.2-8, the following chain of events must occur. First, the container in which a given chemical is enclosed must somehow fail and release its contents. Second, the chemical must be sufficiently volatile to become airborne. Third, at the time of release, the direction of the wind must be such as to transport the airborne material from the point of release to the control room outside air intakes. The airborne material has to be sufficiently stable in air not to condense on the ground, or burn or explode, or otherwise lose its toxicity prior to reaching the outside air intake. The quantity of the chemical which becomes airborne has to be sufficiently large and dispersion in air sufficiently low, for the concentration of the toxic agent to build up to toxic levels in the control room atmosphere before the operators can take protective action.

Chemicals that are nonvolatile solids or liquids, or that spontaneously combust in air do not pose a threat to control room habitability. Consideration of these factors leads to the elimination of the following chemical sources from toxic hazard evaluation. Solutions of sodium hydroxide and potassium dichromate are eliminated because, while the solvent may evaporate, the solute is nonvolatile. Sulfuric acid is eliminated due to its low volatility. It is an oily liquid with a vapor pressure of only 0.0008 mm Hg at 25°C and its evaporation rate is negligible under ambient atmospheric conditions. Similarly hydrazine, dimethylamine and ethanolamine stored on site are eliminated because the partial vapor pressure of the solutions are low under ambinet conditions (hydrazine at 3.7 mm Hg, DMA at 2 mm Hg, ETA at .02 mm Hg).

Table 2.2-8 also indicates that many chemicals are eliminated because their potential for ignition constitutes a greater hazard than their toxicity. When a flammable or explosive substance is released, it is highly likely that its vapor will explode or burn before reaching the control room. Therefore, the only chemicals considered to present a potential danger to control room operators, are those whose toxicity limits are lower than their lower limits of flammability. This leads to the elimination of chemicals such as hydrogen, acetylene, natural gas, propane, butane, and other flammable hydrocarbons.

These toxic chemicals in Table 2.2-8, which are not eliminated on the basis of criteria discussed above are shown to pose no threat to control room habitability by a detailed assessment of their atmospheric transport and potential for infiltrating into the control room atmosphere. The atmospheric dispersion condition is conservatively assumed to be stability Class G and 0.5 m/sec wind speed.

Ammonium hydroxide used to be stored onsite in two 55 gallon drums at 30 percent concentration by weight. The concentration at the outside air intakes of the control room was calculated assuming all the ammonia in the solution becomes airborne instantaneously following a postulated rupture of the container. This very conservative assumption resulted in concentration at the outside air intakes well in excess of that which can be actually expected. Although, ammonium hydroxide was assumed in the original analysis, this chemical in 55-gallon drums is no longer stored onsite. Therefore, ammonium hydroxide poses no threat to the Unit 2 control room operators.

In case of carbon dioxide, complete vaporization is assumed immediately following accidental release. The airborne transport of the puff is modeled using the instantaneous release diffusion model presented in Regulatory Guide 1.78 (R0). Since the control room is located at a short distance from the release point and the amount of chemical is small, the model is adjusted to allow for additional dispersion in the vertical direction by assuming uniform mixing between the ground and the elevation of the fresh air inlet (a 23 meter elevation from ground level is used).

The models described above are used to calculate concentrations of toxic chemicals at the control room outside air intakes. As indicated in Table 2.2-8, the concentration of ammonia at the outside air intake of the control room is the only chemical expected to exceed the toxicity limit following the rupture of a 55 gallon drum containing 30 percent ammonia by weight. 55 gallon drums of ammonium hydroxide are no longer stored at the site, so the rest of the discussion below is kept for historical purposes. Since carbon dioxide concentrations at the outside air intakes are below the toxicity limits, the concentrations inside the control room are not required to be calculated.

The ammonium hydroxide concentrations inside the control room was calculated based on the following equation:

$$C(t) = e^{-vt} \int_0^t v e^{v't} X(t')dt$$

where:

C (t) = chemical concentration inside the control room at time t

X (t') = chemical concentration outside the air intake at time t'

v = control room air exchange rate of 0.46 per hour which is based on normal air intake rate of 750 cfm

Based on the above equation, the concentration of ammonia inside the control room remains well below the toxicity limit under the assumptions that the control room is not isolated and no action is taken by the operators to do so following the accident. Therefore, ammonium hydroxide stored onsite poses no threat to the control room operators. The two 55 gallon drums of ammonium hydroxide, however, are no longer stored at the plant site. So this chemical no longer poses a threat to the control room operators.

Chlorine is the principal toxic substance transported by the FECR (2.0 miles west south west of the plant). Since the quantity, per shipment, of chlorine (90 tons) shipped past the site is greater than the adjusted quantity given in Table C-2 of Regulatory Guide 1.78 (R0), the shipments are considered in the hazardous chemical analysis.

There have been a few minor railroad accidents within five miles from the plant in the past 10 years which resulted in small damages. Based on information presented in Regulatory Guide 1.78 (R0), releases in the amount of 30 tons or more of chlorine at the railroad require consideration in an evaluation of the control room habitability. A release of such magnitude is assumed to be equivalent to the total loss of a railroad car with a capacity of 90 tons or less, i.e., the accidental release of the entire contents of chlorine from a tank car is assumed to be an initiating event for a design basis accident.

The probability of such an event is given by the following equation:

$$P_{il} = P \times N_i \times M_l \times \sum_{j=1}^{n} D_j \times F_{jl}$$

where:

- P_{il}= annual probability of design basis event under atmospheric stability Class 1 involving the i-th chemical
- P = probability of a design basis accident for a mobile source per unit length of travel
- N_i = annual numbers of trips involving the i-th chemical.
- M_1 = annual probability of an atmospheric stability class.
- D_j = the length of road, rail or river in sector j.
- F_{jl}= wind frequency from sector j to outside air intake of the control room for stability Class 1.
- n = number of wind direction sectors.

Based on the number of train, movements, cars per train (see Subsection 2.2.2.1.1) and the length of the track near the site (approximately 9.2 miles), there are approximately 3.52×10^6 railroad car-miles traveled per year within five miles of the site. Within the past 10 years, two rail accidents have occurred within five miles of the plant. Therefore the probability of an accident near the site is 5.68×10^{-8} per car mile. National statistics indicate that 33×10^{-9} events[40] per car mile result in total loss of chlorine contents from a car. The national statistics also indicate that the probability of rail road accident[35] is 8.1×10^{-7} per car mile. Therefore the probability that an accident results in the total loss of the contents from a car is 4.1×10^{-2} ($=33\times10^{-9} / 8.1\times10^{-7}$) per accident. Assuming the same relationship is applicable in the vicinity of the plant, the probability of a design basis accident P, is 2.33×10^{-9} ($= 5.68 \times 10^{-8} \times 4.1 \times 10^{-2}$) per car mile of travel distance. An average number of 14 cars carrying chlorine are shipped per month by the FECR[41]. Therefore the annual number of trips, Ni, involving chlorine is 168.

Table 2.3-81 indicates that the atmospheric stability frequency, M_1, is 4.16 and 1.13 percent for stability Classes F and G, respectively. Although atmospheric stability classes A through E are considered, the control room habitability is not affected under such meteorological conditions. The length of each segment of railroad, D_i, within each sector is shown on Figure 2.2-5. The required wind direction from each segment of railroad towards the outside air intakes of the control room is also shown on Figure 2.2-5. The wind frequency F_{il}, for stability Class F and G is obtained from Table 2.3-34 and Table 2.3-35. The probability P_{il}, of a design basis event under stability Class F in each segment is then:

Segment 1-2: P_i= 2.33x10^{-9}x168x0.0416x0.0617x2.66=2.67x10^{-9} /yr

Segment 2-3: P_i= 2.33x10^{-9}x168x0.0416x0.1122x1.14=2.08x10^{-9} /yr

Segment 3-4: P_i= 2.33x10^{-9}x168x0.0416x0.0813x0.823=1.09x10^{-9} /yr

Segment 4-5: P_i= 2.33x10^{-9}x168x0.0416x0.0631x0.835=8.58x10^{-10} /yr

Segment 5-6: P_i= 2.33x10^{-9}x168x0.0416x0.0449x1.2=8.77x10^{-10} /yr

Segment 6-7: P_i= 2.33x10^{-9}x168x0.0416x0.0757x2.51=3.09x10^{-9} /yr

Total 1.07x10^{-8}/yr

The probability of an event under stability Class F for the entire hazardous travel distance of 9.2 miles is the sum of the values calculated above and is 1.07x10^{-9} per year. Similarly, the probability of an event under stability Class G is calculated to be 3.27 x 10^{-9} per year. Therefore an overall probability of an event that may affect control room habitability is 1.4 x 10^{-8} per year. Since the probability is less than 10^{-7} per year, the release of chlorine due to a railroad accident is not a design basis event.

St. Lucie County Wastewater Treatment Facility

The evaluation of the use and storage of hazardous materials at the wastewater treatment facility, and the transport of materials to the facility, is documented in Reference 42.

The following are the potentially hazardous chemicals which will be used at the facility to treat wastewater:

- Chlorine
- Polymer
- Sodium Bisulfite
- Sodium hydroxide

Potential toxicity levels resulting from the chlorine cylinders previously stored on site have been determined and documented in Section 6.4.4.2 and in Reference 43. From consideration of the relative amounts of chlorine at varying distances from the Control Room required to produce a given toxicity level (using information from Regulatory Guide 1.78), it has been determined that the chlorine stored at the wastewater treatment facility will have no adverse effect on the operation of St. Lucie Units 1 and 2.

The effects of polymer and sodium bisulfite will be bounded by the effects of chlorine.

As stated in Section 2.2.3.2.2, sodium hydroxide is not required to be considered in the toxic hazard evaluation (the solvent may evaporate, but the solute is nonvolatile).

An evaluation was performed (Reference 42) to determine the probability of an accident involving chlorine transport to the wastewater treatment facility which could result in toxicity levels in either control room exceeding allowable limits. This evaluation took into account the following factors:

- probability of truck accidents per mile
- probability of chlorine spill resulting from an accident
- number of miles traveled by the delivery truck in the area of concern
- wind direction

The probability of an accident involving chlorine transport to the wastewater treatment facility which could result in the toxicity level in either control room exceeding allowable limits was determined to be 6.1×10^{-8} per year. Since this probability is less than 10^{-7} per year, this is not considered a design basis event.

From this evaluation, the use and storage of potentially hazardous chemicals at the wastewater treatment facility, and the transport of these chemicals to the facility, will have no adverse effect on the operation of St. Lucie Units 1 and 2.

2.2.3.2.3 Results

The accidental releases of chemicals stored on site and transported in the vicinity of the plant are found not to present undue risk to control room operators.

2.2.3.3 Fires in the Vicinity of the Site

There are no industrial and chemical plants or pipelines containing oil or gas adjacent to St. Lucie Unit 2. The potential hazard from fires offsite are negligible because no flammable mass of appreciable size exists in the area.

At the St. Lucie Plant Site there are two fuel storage tanks (one ten thousand gallon, one eight thousand gallon) and one 8000 gallon waste oil storage tank. The tanks are enclosed by a reinforced concrete retention area and are located a significant distance away from essential structures, systems and components such that a fire or explosion at this location would not impact the ability to achieve and maintain safe shutdown plant conditions.

In the unlikely event that a barge spills oil or gasoline accidentally on the Intracoastal Waterway, the spill would not only have to travel to the Hutchinson Island shoreline (approximately 3000 ft) but would have to travel across 3000 ft of Big Mud Creek, basically a stagnant body of water. The ultimate heat sink barrier will stop the flow of water from Big Mud Creek to the intake structure. Therefore, it is highly improbable that such a fire could affect the St. Lucie site.

2.2.3.4 Collisions with Intake Structure and Liquid Spills

Because the plant cooling water intake structure is located in a commercially nonnavigable area offshore in the Atlantic Ocean, no reasonable hazard exists from barges or ships that pass the site and no corrosive liquids or oils accidentally released could enter the intake structure.

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TABLE 2.2-1

AVERAGE DAILY AUTO AND TRUCK TRAFFIC COUNTS
DURING PEAK (FALL AND WINTER) SEASON
1977-1978

(Information provided in this table is historical)

HIGHWAY NO.	HIGHWAY SEGMENT	TRAFFIC VOLUME
U S 1	712 to Walton Road	19,640
SR 712	U S 1 to SR 707	6,406
SR A1A	Ft. Pierce to Martin Co.	2,731
SR 707	Walton Road to Martin Co.	2,072
	SR 712 to Walton Road	1,016
Walton Road	-	NA
Easy Street	-	NA

SOURCE: St. Lucie County. Traffic Corridors Input Data, 1978.

NOTE: Separate truck counts do not exist for the area within five miles of the plant.

TABLE 2.2-2
RESULTS OF TRUCK TRAFFIC SURVEY

(Information provided in this table is historical)

Station[(1)] Number	Average Daily Traffic[(2)]	Average Weekday Traffic[(2)]	Number of Trucks Counted	Number of Trucks Classified as Carrying Hazardous Materials	Percentage of Trucks of Weekday Traffic (%)	Percentage of Trucks Carrying Hazardous Material (%)
1	6,895	7,262	129	4	1.8	3.9
			210	6	6.1(3)	1.9
2	_(5)	_(5)				
3	_(5)	_(5)	187	6	5.5(3)	3.2
4	2,511	2,574	50	1	1.9	2.0
5A	1,543	1,537	24	4	1.6	16.7
5B	1,871	1,953	26	4	1.3	15.4
5C	1,687	1,711	27	0	1.6	0
6A	5,163	5,289	340	8	6.4	2.4
6B	_(5)	_(5)	859	43	4.5(4)	5.0
7	17,641	19,170	1,187	32	6.2	2.7
8A &B	1,305	1,380	19	0	1.4	0
9	3,035	3,418	_(6)	_(6)	_(6)	_(6)

Notes:

(1) See Figure 2.2-2 for locations of stations.
(2) All counts are non-directional.
(3) Based on Average Weekday Traffic recorded at **Station** No. 9.
(4) Based on Average Weekday Traffic recorded at Station No. 7A.
(5) As indicated on Figure 2.2-2 – automatic traffic recordings were not made at this location.
(6) As indicated on Figure 2.2-2 – classification counts and roadside interviews were not made at this location.

Source: Champagne Associates, Vehicle Classification and Product Containment Study, February, 1979.

TABLE 2.2-3

HAZARDOUS MATERIALS FROM TRUCKS

INTERVIEW ON US 1

JANUARY 30 AND 31 1979

(Information provided in this table is historical)

Propane	Total	5 Vehicles
	Maximum size (gallons	2604
	Average size (gallons)	1400
Gasoline	Total	19 Vehicles
	Maximum size (gallons)	8300
	Average size (gallons)	3340
Non-Flammable Gas:		
(A)	Total	1 Vehicle
	Size (ft^3)	12000
(B)	Total	1 Vehicle
	Size (lbm)	230
(C)	Total size (gallons)	1 Vehicle
	Size (gallons)	100
Oxygen	Total	1 Vehicle
	Size (ft^3)	10,000
Batteries	Total	2 Vehicles
	Maximum transported	400
	Average transported	300
Diesel Oil	Total	8 Vehicles
	Maximum size (gallons)	1000
	Average size (gallons)	402
Bottled Gas	Total	1 Vehicle
	Size (gallons)	50
Chlorine	Total	2 ½ Vehicles
	Maximum gallons	2400
	Average (gallons	970

TABLE 2.2-3 (Cont'd)

Muriatic Acid	Total Size (gallons)	1/2 Vehicle 500
Combustible	Total Size (total)	1 Vehicle 6000
Corrosives	Total Size (gallons)	1 Vehicle 3600
	Total Number of Vehicles:	44

Source: Champagne Associates, Vehicle Classification and Product Containment Study, March, 1979

TABLE 2.2-4

TRUCK DELIVERIES (COMPRESSED GASES, PROCESS CHEMICALS) TO ST LUCIE UNITS 1 AND 2

Historical Information - This table identifies deliveries estimated at the time of plant license and will not be updated.

MATERIAL	S,HIPMENT FREQUENCY	SHIPMENT METHOD	QUANTITY SHIPPED
Acetylene	weekly	5 ton open truck	5-10 cylinders
Oxygen	weekly	5 ton open truck	5-10 cylinders
CO_2	semi-annually	5 ton open truck	80 cylinders
N_2 - trailers	bi-monthly	Tube trailer	40,000 scf ea. load
N_2 - bottles	3 times/year	5 ton open truck	20-30 bottles
N_2 - liquid	monthly	Liquid N_2 tanker	1100 gal.
Argon	3 times/year	5 ton open truck	1-2 cylinders
Methane	3 times/year	5 ton open truck	1-2 cylinders
Propane	3 times/year	5 ton open truck	1-2 cylinders
Specialty gases	3 times/year	5 ton open truck	1-2 cylinders
Cyclohexylamine	semi-annually	Closed semi-trailer	2 drums
Ammonium Hydroxide	semi-annually	Closed semi-trailer	2 drums
Hydrazine	bi-monthly	Closed semi-trailer	6 drums
Potassium Dichromate	semi-annually	UPS	200 lbs
Sodium Hydroxide	monthly	Tank truck	3, 800 gallons
Sulfuric Acid	monthly	Tank truck	3,000 gallons
Chlorine	monthly	Open tractor trailor	150 lb cylinder
Hydrogen-trailer	bi-monthly	Tube trailer	75,000 scf
Hydrogen-bottles	bi-monthly	5 ton open truck	20-30 bottles

TABLE 2.2-5

TRUCK ACCIDENTS WITHIN FIVE MILES OF ST LUCIE UNIT 2
1973-1977

(Information provided in this table is historical)

Location*	Date of Accident	Number Of Vehicles Involved	Type Of Truck** Involved	Type Of Damage	Amount of Property Damage
A	1973	2	SU	I	$ 10,000
B	1973	1	T-T	I	$ 2,000
C	1973	2	SU	PDO	$ 150
D	1973	2	T-T	I	$ 2,700
E	1973	2	SU	PDO	$ 150
F	1973	1	SU	I	$ 2,100
G	1974	3	T-T	PDO	$ 300
H	1974	2	T-T	F	$ 1,900
I	1974	2	SU	PDO	$ 175
J	1974	2	SU	I	$ 2,300
K	1977	2	T-T	PDO	$ 900
L	1977	3	SU	PDO	$ 2,500
M	1977	2	T-T	PDO	$ 800
N	1977	2	SU	PDO	$ 350
O	1976	2	SU	PDO	$ 300
P	1973	2	T-T	PDO	$ 800
Q	1973	2	SU	PDO	$ 1,600
R	1974	1	SU	PDO	$ 100
S	1976	2	T-T	I	$ 9,000
T	1973	1	SU	PDO	$ 5,000
U	1977	2	SU	PDO	$ 900

*See Figure 2.2-4.
**No accident involved more than one truck.

Legend:

SU - Single Unit Truck
T-T - Tractor Trailer
I - Injury
F - Fatality
PDO - Property Damage Only

Source: Champagne Associates, Vehicle Classification and Product Containment Study March, 1979

TABLE 2.2-6

FLORIDA POWER & LIGHT COMPANY
COMMODITY MOVEMENTS - 1975, 1976 & 1977
DOMESTIC (ONLY) WATERBORNE COMMERCE
PASSING THE APPROXIMATE LOCATION OF THE
ST LUCIE UNIT 2

(Information provided in this table is historical)

Type of Commodity	Type of Vessel	Short Tons per Calendar Year 1975	1976	1977	Totals
Ships and Boats	Passenger & Dry Cargo –Self-propelled	748.0	4,030.0	12,832.0	17,610.0
Fresh Fish, except Shellfish	"		15.0	22.0	37.0
Ice	"		11.0	5.0	16.0
Misc Products of Manufacturing	"			50.0	50.0
Furniture and Fixtures	Dry Cargo - Non-Self-propelled	28.0			28.0
Misc. Non-metallic Mineral Prod.	"	19,615.0	9,372.0	7,203.0	36,190.0
Iron and Steel bars, Rods, Angles, Shapes and Sections, Including Sheet Piling	"	480.0	75.0	650.0	1,205.0
Iron and Steel Pipe and Tube	"	1,395.0		300.0	1,695.0
Fabricated Metal Products except. Ordinance, Machinery, and Transportation Equipment	"	3,801.0	2,940.0	5,225.0	11,966.0
Machinery except Electrical	"	6,753.0	2,955.0	7,056.0	16,764.0
Electrical Machinery, Equipment and Supplies-	"	1,190.0	3,050.0	1,610.0	5,850.0
Aircraft and Parts	"	33.0		280.0	313.0
Ships and boats	"	28.0		275.0	303.0
Misc Shipments not Identifiable by Commodity	"	300.0	615.0	2,255.0	3,170.0
Sugar	"		2,700.0	29,050.0	31,750.0
Aluminum and Aluminum Alloys, Unworked	"		4,000.0	5,000.0	9,000.0

TABLE 2.2-6 (Cont'd)

Type of Commodity	Type of Vessel	Short Tons per Calendar Year 1975	1976	1977	Totals
Basic Textile Products, except Textile Fibers	Dry Cargo - Non-Self-propelled			50.0	50.0
Timber, Posts, Poles, Piling, and other Wood in the Rough	"			100.0	100.0
Iron and Steel Scrap	"			2,170.0	2,170.0
Sodium Hydroxide - (Caustic Soda)	Tanker - Non-Self-propelled	3,987.0	4,046.0	4,098.0	12,131.0
Gasoline, including Natural Gas	"	100.0			100.0
Residual Fuel Oil	"	48,273.0	91,269.0	57,251.0	196,793.0
Asphalt, Tar, and Pitches	"		2,812.0		2,812.0
	TOTALS	86,731.0	127,890.0	135,482.0	350,103.0

Source: Department of the Army, Lower Mississippi Valley Division Corps of Engineers, Waterborne Commerce Statistics Center, January 10, 1979.

TABLE 2.2-7
AIRPORTS WITHIN 9-50 MILES OF ST LUCIE UNIT 2
(Information provided in this table is historical)

AIRFIELD	DISTANCE AND DIRECTION FROM SITE (STATUTE MILES)
Civil-Public Use	
Valkaria	45 NNW
Sebastian	34 NNW
Vero Beach	22 NNW
St Lucie Co.	12 NW
Witham	13 S
Palm Beach Gardens	38 S
Palm Beach International	48 SSE
Okeechobee Co.	37 W
Circle T Ranch	25 SSW
Palm Beach Co., Glades	48 SW
Private	
Fellsmere	36 NW
Broocke	27 NNW
New Hibiscus	25 WNW
Indian River	22 WNW
Nelson	11 NW
Hawgwild	11 NW
Peacock Ranch	13 WSW
Naked Lady Ranch	16 SSW
Tropical Plantation	18 S
Chem	42 SSW

TABLE 2.2-7 (Cont'd)

Mulgrew Ranch	40 WSW
Sunset	41 W
Indian Hammock	38 WNW
Sunrise	9 WNW
Palm Beach Ranch Groves	37 S
<u>Heliports</u>	
Sikorsky (Private)	32 SSW

SOURCE: United States Department of Commerce, National Oceanic and Atmospheric Administration. Sectional Aeronautical Chart, Miami, September 1978.

* To nearest mile, measured from Sectional Aeronautical Chart, Miami.

TABLE 2.2-8

TOXIC CHEMICAL EVALUATION

SOURCE & TYPE OF TOXIC CHEM	TOXICITY LIMIT/(REF) (ppm)	DISTANCE FROM MAIN CONTROL ROOM (FEET)	(DIRECTION)	QUANTITY RELEASED	PEAK CONCENTRATION (ppm) OAI OF CONTROL RM	INSIDE CONTROL RM	REMARKS
Onsite Storage:							
Acetylene		600	NW	360 SCF	-	-	Note 4
Ammonium Hydroxide	500 / (4)	260	NW	55 gal; 30% conc by wgt	4.8×10^4	105	Note 2
Carbon Dioxide	1.0×10^4 / (3)	600	NW	360 SCF	2.1×10^3	*	Note 1
Dimethylamine	500 / (8)	180	NW	550 gal; 2% conc by wgt	-	-	Note 9
Ethanolamine	30 / (8)	180	NW	550 gal; 40% conc by wgt	-	-	Note 9
Hydrazine, Chem Feed System	5 / (5)	180	NW	550 gal; 35% conc by wgt	-	-	Note 9
Hydrazine-Iodine Removal	5 / (5)	60	NW	550 gal; 5% conc by wgt	-	-	Note 9
Hydrogen		640	NW	260 SCF	-	-	Notes 4, 5
N_2-gas		590	NW	360 SCF	-	-	Note 5
N_2-liquid		620	NW	1100 gal	-	-	Note 5
Molybdate/Nitrite Corrosion Inhibitor-TCCWS		60	W	100 gal		-	Notes 3, 6
Molybdate/Nitrite Corrosion Inhibitor-CCWS		220	ENE	50 gal	-	-	Notes 3, 6
Sodium Hydroxide	2.0 mg/m³ / (2)	690	NW	10,000 gal; 50% conc by wgt	-	-	Notes 3, 6
Sulfuric Acid	3.0 mg/m³ / (5)	700	NW	10,000 gal; 60° Baume	-	-	Note 3
Combustibles		800	SSE	26,000 gal	-	-	Notes 4, 5
Road:							
Chlorine	15 / (7)	4.8 miles	WSW	2,430 gal (2.8×10^4 lbs)	-	-	Note 7
Combustibles		4.8 miles	WSW	6,000 gal	-	-	Note 4

*Concentration inside control room not determined since concentration at outside air intake is below toxicity limit.

TABLE 2.2-8 (Cont'd)

Source and Type of Toxic Chem	Toxicity Limit/(Ref) (ppm)	Distance From Main Control Room (Feet)	Distance From Main Control Room (Direction)	Quantity Released	Peak Concentration (ppm) OAI of Control Rm	Peak Concentration (ppm) Inside Control Rm	Remarks
Rail:							
Chlorine	15 / (7)	2.0 miles	W	90 Tons	-	-	Note 8
Liquid Petroleum Gas		2.0 miles	W	33,000 gal	-	-	Notes 4,5
River:							
Gasoline		1.2 miles	W	16,000 bbl	-	-	Notes 4,5
Sodium Hydroxide	2.0 mg / m^3 / (2)	1.2 miles	W	16,000 bbl	-	-	Notes 3,6

Notes

1) Not a design basis event because the calculated concentration at the outside air intake of the control room is less than the toxicity limit.

2) The concentration at the outside air intake of the control room calculated assuming all the toxic chemicals in the solution becomes airborne instantaneously following the rupture of the container. 55 gallon drums of ammonium hydroxide are no longer stored onsite.

3) Not volatile.

4) Primarily a fire hazard.

5) Simple asphyxiant. Toxic effect occurs at 33 percent volume in air.

6) Toxic agent is a solid under ambient conditions.

7) Quantity of toxic chemical, at the given distance; is less than the maximum specified in Regulatory Guide 1.78 (80), Table C-2.

8) Not a design basis event. The probability of occurrence, as indicated in Subsection 2.2.3 is less than 10^{-7} per year.

9) The partial vapor pressure of the toxic chemical in the solution is less than 10 mm Hg. The event eliminated based on guidelines provided in Regulatory Guide 1.78 (R0)

TABLE 2.2-8 (Cont'd)

References for Toxicity Limits

1) Criteria for a Recommended Standard - Occupational Exposure to Acetylene, DHEW/PBU/NIOSH-76/195.

2) Sax, N Irving. Dangerous Properties of Industrial Materials, Third Edition Reinhold Book Corp., New York, 1968.

3) Regulatory Guide 1.78, "Assumptions for Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release."

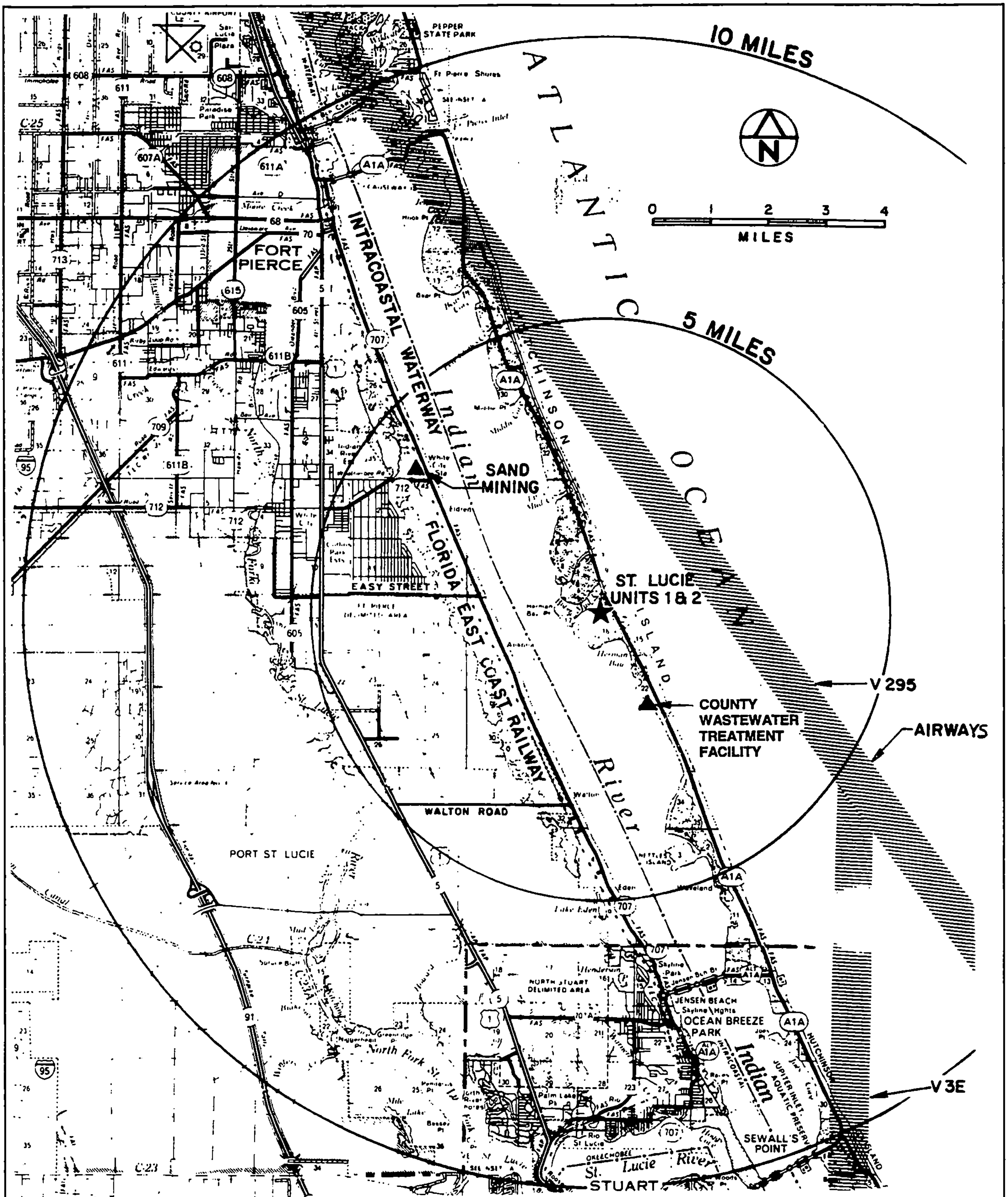
4) Criteria for a Recommended Standard - Occupational Exposure to Ammonia. DHEW/PUB/NIOSH 74-136. NTIS-PB-246 699.

5) Patty, Frank, A. Industrial Hygiene and Toxicity, Vol II - Toxicity (2nd Edition Revised), Interscience Publishing Co. New York, 1963.

6) Karel Verschueren. Handbook of Environmental Data on Organic Chemicals, Van Norstrand Rheinhold Company, New York.

7) Criteria for a Recommended Standard - Occupational Exposure to Chlorine. DHEW/PUB/NIOSH 76-170.

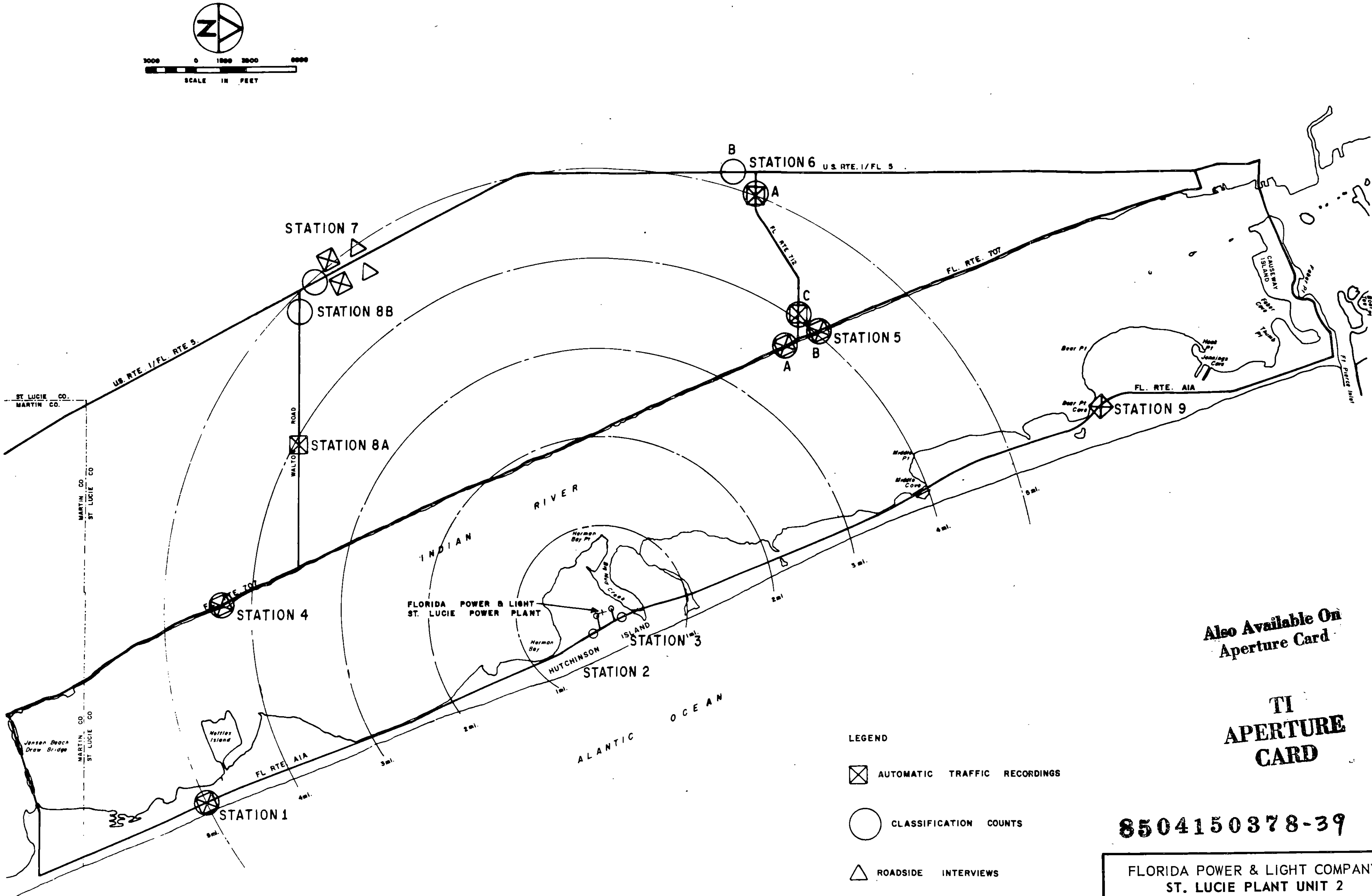
8) NTIS Publication No. PB-94-195047, "Documentation for Immediately Dangerous to Life or Health Concentrations (IDLH): NIOSH Chemical Listing and Documentation of Revised IDLH Values (as of 3/1/95)"



FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

NEARBY INDUSTRIAL AND TRANSPORTATION FACILITIES
FIGURE 2.2-1

Amendment No. 12 (12/98)



LEGEND

☒ AUTOMATIC TRAFFIC RECORDINGS

○ CLASSIFICATION COUNTS

△ ROADSIDE INTERVIEWS

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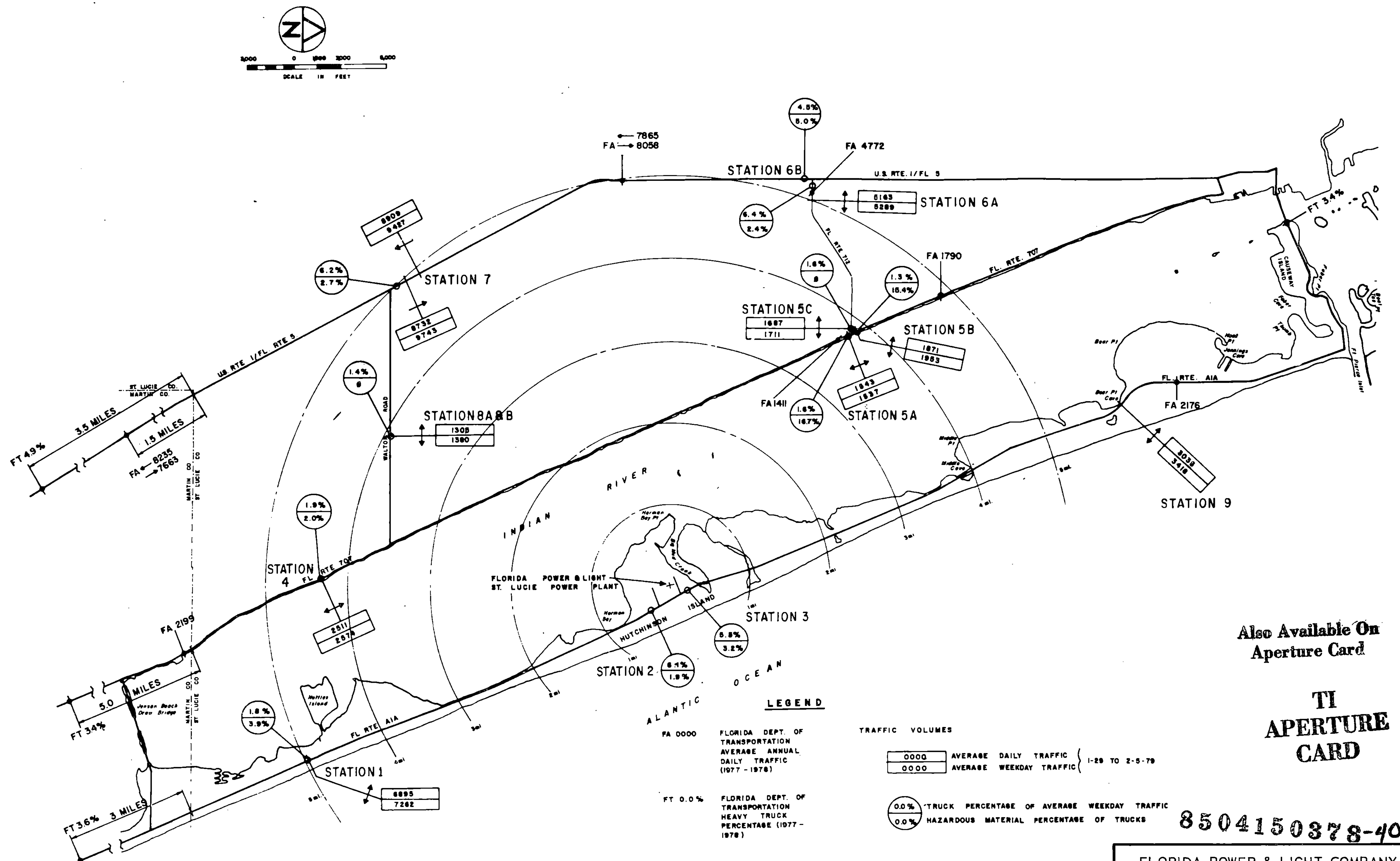
MARCH 1979

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

SURVEY LOCATIONS
FIGURE 2.2–2



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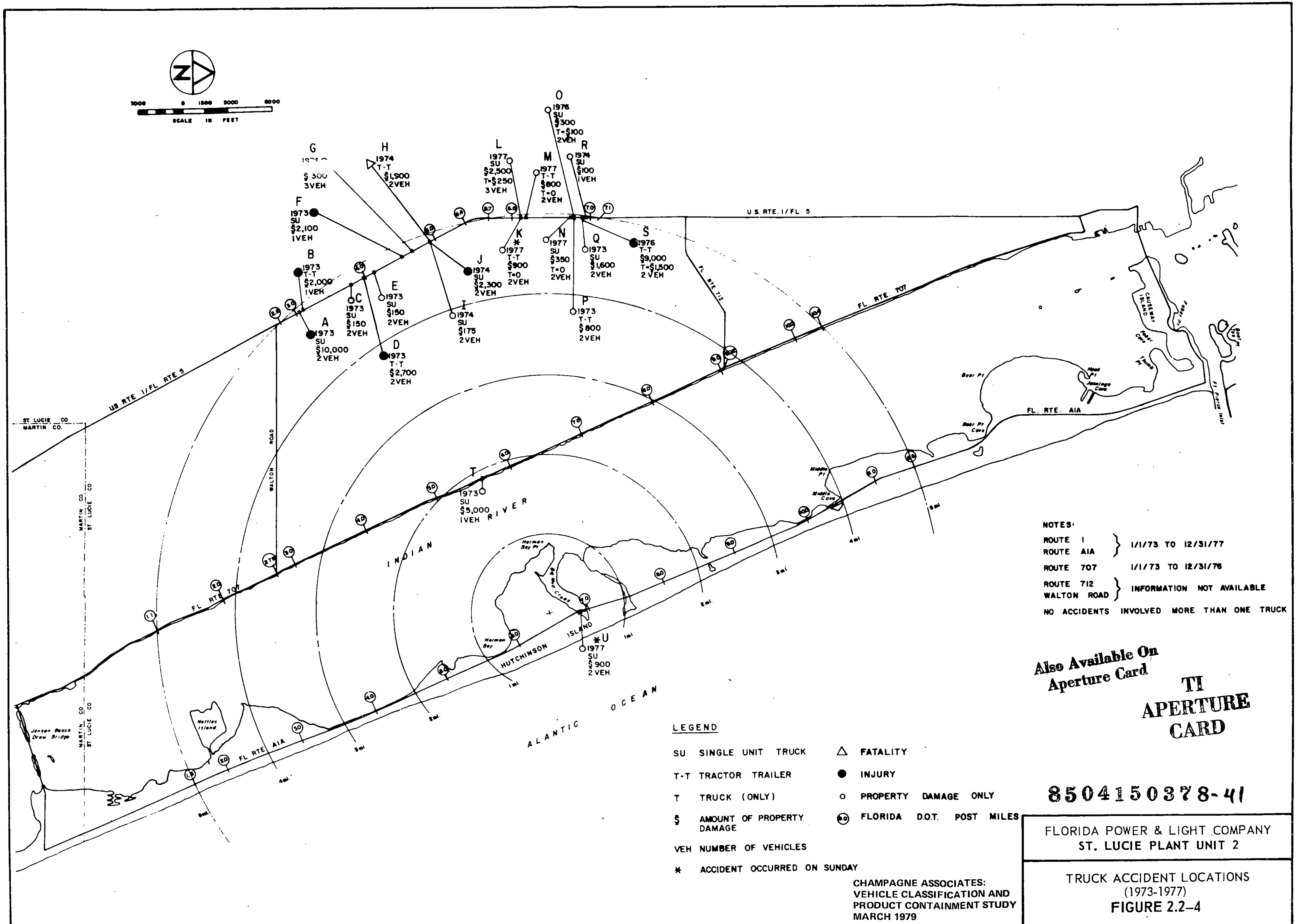
TRAFFIC VOLUMES
TRUCK PERCENTAGES
FIGURE 2.2-3



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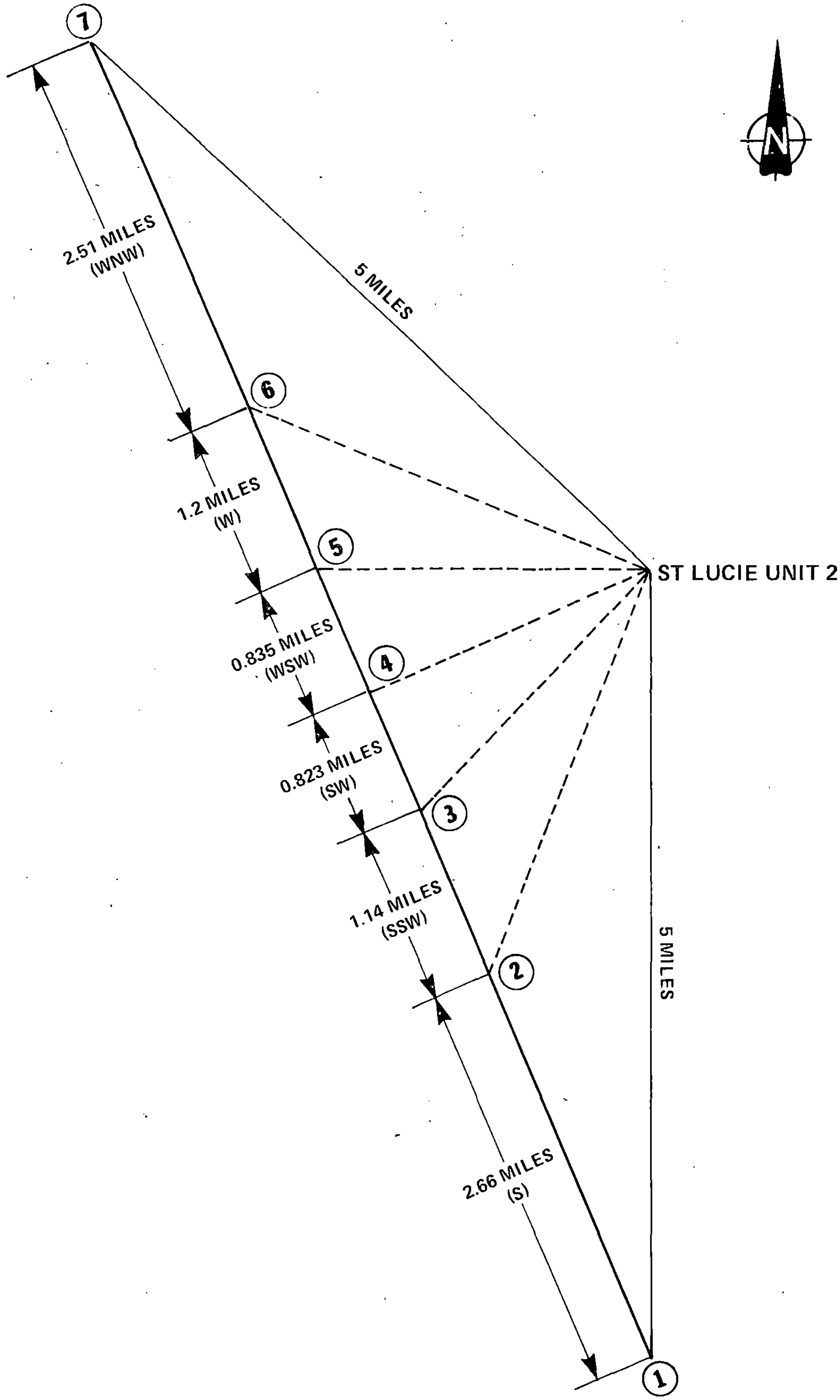
FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

TRUCK ACCIDENT LOCATIONS
(1973-1977)
FIGURE 2.2-4



NOTE: THE WIND DIRECTION FROM THE SEGMENT OF THE RAILROAD TO THE OUTSIDE AIR INTAKES OF THE CONTROL ROOM INCLUDED IN PARANTHESIS.

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT UNIT 2

SEGMENTS OF THE FLORIDA EAST COAST RAILWAY USED IN TOXIC CHEMICAL ANALYSIS
FIGURE 2.2-5